SCOTTISH HOSPITALS INQUIRY

Bundle of documents for Oral hearings commencing from 19 August 2024 in relation to the Queen Elizabeth University Hospital and the Royal Hospital for Children, Glasgow

Witness Statements – Week Commencing 19 August 2024 – Volume 1

SCOTTISH HOSPITALS INQUIRY

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Scottish Hospitals Inquiry
Witness Statement of Questions and Responses
David Watson

This statement was produced by the process of sending the witness a questionnaire with an introduction followed by a series of questions and spaces for answers. The introduction, questions and answers are produced within the statement.

Personal Details

1. Name, qualifications, chronological professional history, specialism etc – please provide an up-to-date CV to assist with answering this question.

A David Watson – see attached CV for chronological professional history, specialism etc.

Specialism

2. Provide details of any qualifications and experience that you hold in respect of:

a) legionella; L8, Legionella identification, testing, management, compliance with guidance and regulations.

A See attached CV for details of qualifications and experience etc

b) waterborne pathogens; identification, testing management, compliance with guidance and regulations

A See attached CV for details of qualifications and experience etc.

c) Health and Safety at Work Act 1974 compliance

A See attached CV for details of qualifications and experience etc

d) Any other relevant qualifications and experience you hold in relation to your role within DMA Canyon

A See attached CV for details of qualifications and experience etc.

3. Provide details of any specific qualifications/ experience that you have in respect of working in/ with healthcare settings?

A See attached CV for details of qualifications and experience etc.

4. What is your understanding for the need of a water supply to be wholesome? What is the relevant guidance that applies? Who in general terms is responsible for the supply of wholesome water?

A The water utility company (Scottish Water) would be responsible for the supply of wholesome water to the site, with GG&C being responsible for managing the water quality within their systems. The requirement for the water supply to be wholesome is to ensure that the water being delivered to site, and on to end users of the water system(s), is safe to drink, wash, prepare food etc. The Water Supply (Water Fittings) (Scotland) Byelaws 2014 would the primary guidance for the supply of water to buildings, with L8, HSG 274 and SHTM 04-01 being the primary guidance documentation for Hospital Estates.

Scottish Water's website states "*The Water Supply (Water Fittings) (Scotland) Byelaws 2014 apply to all plumbing systems, water fittings and appliances connected to the public water supply.*

Created under Section 70 of the Water (Scotland) Act 1980, these byelaws help ensure the safety of the water supply and the prevention of contamination of the public water supply."

SHTM 04-01 Part B states *"Current statutory legislation requires both management and staff to be aware of their individual and collective responsibility for the provision of wholesome, safe hot and cold-water supplies, and storage and distribution systems in healthcare premises."*

5. What is your understanding of the need to appoint post holders in respect of water compliance, such as Authorised Persons etc in accordance with SHTM04-01?

A The requirement to appoint post holders in respect of water compliance is laid out in L8 and in SHTM 04-01 Part B which provides an example management structure organogram with definitions and description of the duties allocated to each of the roles required and as described in the response to Q4 above *"requires both management and staff to be aware of their individual and collective responsibility for the provision of*

wholesome, safe hot and cold water supplies, and storage and distribution systems in healthcare premises."

DMA Canyon

6. Describe the services that DMA Canyon provide?

A DMA Canyon Ltd are independent specialists in the provision of Legionella control & consultancy and specialist plumbing solutions services. Formed in 1999 the directors of the company have in excess of 50 years' combined experience within the industry. DMA has grown and expanded since its inception and provides consultancy and service to companies across the UK. In 2016 DMA acquired Canyon Water Services Ltd. Canyon Water Services Ltd are a SNIPEF and Water Safe registered company with extensive knowledge and experience of the risks associated with Legionnaires Disease and working with Legionella Risk Assessments ensuring that remedial actions, ongoing service works or new installations are completed in accordance with the requirements of ACOP L8, Water Supply (Water Fittings) Regulations and Water Byelaws. As a result of the acquisition DMA Water Treatment Ltd was renamed as DMA Canyon Ltd. This acquisition allowed us to provide a both a standalone legionella consultancy and monitoring service as well as offering a full plumbing and mechanical service to assist with compliance where required. With a team of highly qualified and experienced independently trained field staff DMA Canyon consider its service to be second to none and aim to ensure our clients benefit from our extensive knowledge and experience to assist in fulfilling their obligations under the L8 ACOP/HSG and SHTM 04-01 guidance's as well as, COSHH, Water Byelaws and The Health and Safety at Work Act. We aim to provide our clients with a cost effective, bespoke package for their requirements. DMA Canyon provide legionella prevention and compliance services for all sizes of organisations from government bodies to facilities managers, from small independent companies to multinational organisations. DMA can provide L8 Legionella risk assessments, L8 water hygiene monitoring programs, chemical dosing, consultancy and upgrades of plumbing services and systems, provide advice and consultancy. DMA are registered with the Legionella Control Association (LCA) for carrying out a wide variety of legionella control and consultancy services under the Conditions of Compliance as laid out in the LCA's Code of Conduct for Service Providers. DMA

Canyon are also ISO 9001, ISO 14001 and ISO 45001 registered as well as having SNIPEF, Water safe and APHC accreditation.

7. Describe the areas which DMA Canyon offer experience and knowledge in.

A DMA offer services covering L8/Legionella & SHTM 04-01 Water Hygiene Consultancy and Monitoring, Microbiological Sampling, Cleaning and Disinfection, Plumbing and Water Byelaws Consultancy and Legionella plumbing and remedial services. See response to Q6 above also.

8. Describe the company structure of DMA Canyon and the role you hold, and provide details of the training have you undertaken/ which is relevant in order to meet the needs of this role?

A Please see attached Organogram for DMA Canyon. See attached CV for details of training etc. for the role I have as a Director of DMA.

9. Describe your day-to-day duties within DMA Canyon

A Day to day duties involve providing technical consultancy to clients, overseeing managerial staff and assisting with technical and operational aspects of running the company (this is split across all 3 directors). See attached CV for details.

Initial involvement with QEUH/RHC

10. Provide details of when you and DMA Canyon were first involved with QEUH/RHC; what was the remit of your instruction, who instructed you, who did you dealt with, and the nature and purpose of the work carried out by DMA Canyon at QEUH/RHC.

A DMA were first contacted in late 2014 (December) BY GG&C Estates and requested to carry out a “pre-occupation” Legionella Risk Assessment of the New QEUH Adult & Children’s Hospital (at the time referred to as the “South Glasgow University Hospital”). Our contact within GG&C Estates for these works was Ian Powrie and this is who instructed us in the works to be carried out and who we reported to. The attached quotation DMA Ref: Q33533/DW provides details of the nature and purpose of the works DMA were tasked to carry out.

11. At the point of your initial instruction did you have any concerns regarding the design of the water system at QEUH/RHC? If so, describe theses concerns, and any recommendations or work carried out by DMA Canyon relative to any concerns.

A At the point of our initial instruction, we had very little idea of the design or layout of the water system, having had only a brief tour of the site, and at this point didn't have sufficient knowledge of the site and/or water system(s) to raise any concerns or make recommendations prior to conducting the assessments discussed in detail later in this document.

12. What views, if any, do you have in respect of the size of the water system used in QEUH/RHC? Would you have recommended using a water system of that size had DMA Canyon been involved in the design of the water system, for example would you have recommended using multiple smaller water systems, if so, provide details of what you would have recommended and why.

A The water system within the QEUH/RHC is a very large water system, supplying a very large building. Using multiple smaller system may have been an option for delivering water throughout the building and may have allowed for isolation and/or works on individual water systems to proceed which would impact on only the area(s) supplied from this system, with no, or little, impact on other parts of the hospital. However, we are not a water system designer and do not have the experience of designing and constructing a water system of the size required to supply the hospital, or how a different design could impact on the design of the other aspects of the hospital.

13. We are aware that handover of the QEUH/RHC site from Multiplex to NHSGGC took place on 26th January 2015. Were you present during the handover period, and if so, did you have any observations regarding the site at handover, please provide details.

A DMA were working on site around the handover period carrying out the site survey works for on the water system for the risk assessment, though I cannot state specifically if DMA were on site on the 26th of January 2015. DMA had no involvement in the actual handover of the building.

14. At the point of handover, who was the Dutyholder at QUEH/RHC? What information did you see regarding this when carrying out the 2015 report?

A Not aware of who the Dutyholder was at this time. We were not provided with a management structure for GG&C with named individuals appointed into specific roles. DMA were provided with a generic GG&C Written Scheme Hierarchy Diagram and Hierarchy Appointment Table (as detailed in Section 10 of the 2015 Risk Assessment), but no individuals were named within these.

15. To what extent was it clear that the obligations to appoint an authorised person/ designated person for water/ competent person for water/ authorised engineer for water required to discharge water supply safety had been complied with at handover? What awareness did you have as to when these roles had been filled as at 2015? If there were any delays in filling these roles was this a factor in any deficiencies that you identified?

A As stated above only generic information without named individuals who had been appointed to the specific roles was provided to DMA. We are unable to comment on whether any appointments had been made within GG&C which wasn't supplied to DMA, or when these roles were filled as DMA had no input into the water system management and control other than to conduct the risk assessment.

16. Describe any concerns you had regarding the appointments in respect of SHTM04-01 at QEUH/RHC around the time of handover?

A DMA noted that no appointments appear to have been made at the time of handover and that no legionella management structure had been put in place at this time for the QEUH/RHC.

17. Who was tasked with ensuring that these appointments were filled?

A Appointment to these roles would have been by GG&C with no input from DMA.

18. What is the risk, if any, in not having the appointments filled?

A It is important to have a management structure in place, to provide a formal process for the implementation and oversight of a PPM regime, and for the reporting and escalation of issues arising and to allow for specific roles with responsibilities and accountability for ensuring the necessary works are being carried out assigned and documented.

19. To what extent was it clear that the roles required in respect of Legionella required to discharge water supply safety had been complied with at the point of handover?

A As stated above only generic information without named individuals who had been appointed to the specific roles was provided to DMA.

20. Were the lines of responsibility clear?

A Unable to comment as this information was not supplied to DMA.

21. If not, what in your view was lacking from them?

A Unable to comment as this information was not supplied to DMA.

22. How clear was it to you that arrangements were deficient?

A As stated above only generic information without named individuals who had been appointed to the specific roles was provided to DMA, so unable to comment on any deficiencies within the actual roles.

23. What is the risk, if any, in not having the appointments filled at handover in respect of Legionella?

A Please see response to Q18 above.

L8 Risk Assessment (Pre-Occupancy) NHS Greater Glasgow and Clyde South Glasgow University Hospital 29th April 2015 (hereinafter referred to as 'the 2015 report') – Refer the Bundle 6, Miscellaneous Documents, Document 29

24. The Inquiry is aware the DMA Canyon prepared the 2015 report. Please describe your role in preparing the report, and the role of Allan McRobbie, how did the two roles differ in terms of preparing the 2015 report?

A Due to the size of the building and water system(s) it was agreed within DMA that it would require to have more than a single assessor on site. I worked alongside Allan McRobbie on carrying out the site surveys, reviewing documentation provided to DMA for the assessment and compiling the reports. The roles did not majorly differ between Allan McRobbie and I – it was a joint effort, though Allan took on the majority of the write up with assistance and technical support by myself. We carried out much of the site

surveys together and would work together during the write up and document review phases.

25. When and by whom were DMA Canyon instructed to carry out the 2015 report? What was the remit of instruction? If you have a written copy of this instruction, please make it available to the Inquiry by uploading it to the workspace.

A DMA were requested to carry out the Risk Assessment by Ian Powrie from GG&C Estates. Please refer to DMA quotation "Q33553 GG&C New SGH Building L8 RA" for the proposal for the assessment to be carried out and the purchase order "PO SGH L8 RA 2015" instructing DMA to carry out these works for remit.

26. What is the purpose of carrying out a pre-occupation L8 risk assessment? Please describe any regulatory requirements to have a L8 risk assessment prior to the patient occupation of a healthcare premise.

A As stated within L8 Paragraph 28 *"A suitable and sufficient assessment must be carried out to identify and assess the risk of exposure to legionella bacteria from work activities and water systems on the premises and any precautionary measures needed."*

Paragraph 33-34 states *"Before any formal health and safety management system for water systems is implemented, the dutyholder should carry out a risk assessment to identify the possible risks. The purpose of the assessment is to enable a decision on:*
(a) the risk to health, ie whether the potential for harm to health from exposure is reasonably foreseeable, unless adequate precautionary measures are taken;
(b) the necessary measures to prevent, or adequately control, the risk from exposure to legionella bacteria.
The risk assessment also enables the dutyholder to show they have considered all the relevant factors, and the steps needed to prevent or control the risk."

Delivery of the 2015 report

27. At the bottom of page 2 of the 2015 report it states:
'The findings included within the report have been communicated throughout the assessment process by Allan McRobbie and David Watson of DMA Water Treatment Ltd to NHS Estates staff (Ian Powrie and Jim Guthrie) verbally in both formal and informal meetings and via email.'

a) Confirm how frequently you discussed the findings of the report during the assessment process with Estates staff.

A Most days when DMA were on site carrying out the site survey we would be in communication with Estates staff (though we can't state for certain exactly how many time we would have met). Most meetings were on an ad-hoc basis depending on availability of Estates staff. If there were any matters which we felt had to be communicated to Estates we would make a point of informing Estates as soon as practical (i.e. that day or the next).

b) Did you have discussions or communications with any other members of Estates staff, save for Ian Powrie or Allan McRobbie? If so, whom?

A Allan McRobbie worked for DMA and I was in contact with Allan continually throughout the process. Most information was relayed to Ian Powrie from NHS GG&C Estates as he was our main point of contact. We had contact with Jim Guthrie and Mel MacMillan, though this was more logistical and assisting with identifying areas within the hospital rather than reporting of findings of the RA.

c) If you have any copies of email correspondence between DMA Canyon and Estates staff during the assessment process, please make these available to the Inquiry via the workspace.

A Please see emails attached.

d) At any point during the assessment process did Estates staff appear concerned regarding the findings of the report?

A As stated above, our findings were relayed to Ian Powrie at GG&C. Mr Powrie advised that he would report the findings to the appropriate persons, however, DMA were unaware of the identity of those persons. DMA's remit and instruction was to carry out the risk assessment and to report the findings to GG&C. GG&C did not express any concern or provide comment during the assessment process or on receipt of the report.

e) Did the reaction of those you spoke to appear appropriate to you? Or as you would have anticipated?

A Yes

f) Are you aware of any action being taken by Estates staff during the assessment process in relation to the findings? If so, please provide details of actions taken and by whom.

A We were aware of actions being taken (e.g. Calorifiers being put back online) though unable to comment on who carried out these works or the dates they were completed. DMA were not directly involved in any such actions, and so any awareness on our part would have been anecdotal only.

g) At any point during the assessment process did you speak to clinical staff or microbiologists at QEUH/RHC regarding the findings of the report, if so, whom? If not, would you have expected to?

A No

28. To whom in QEUH/RHC Estates staff was the final 2015 report sent, and by what means (email/ hard copy letter)? Who sent the report from DMA Canyon? Do you have a copy of the letter or email sending the report? If so please make same available to the Inquiry via the workspace.

A 2 Hard copies of the report and 2 copies of the assessment were burned onto a CD and sent to Ian Powrie. Unable to locate delivery note, but have DMA's internal delivery note register which refers to it being delivered in early May 2024 by Darren Waldron of DMA (DMA Delivery Note 01214 – 06/05/15).

29. What would you have expected to have happened following receipt of the 2015 report by NHSGGC?

A DMA would have expected GG&C Estates to review the Risk Assessment report and work through any recommendations and implement as they deemed appropriate.

30. The Inquiry understands that following receipt of the 2015 report a meeting took place between DMA Canyon, Ian Powrie, James Guthrie and David Brattey. With the purpose of the meeting being to develop and implement an action plan to address the points raised in the 2015 report.

a) Do you recall attending this meeting? If so, what was the outcome of the meeting?

A This meeting appears to have been attended by Allan McRobbie, with DMA providing a quotation (QAM15031b) on 9th June to provide costs for DMA to carry out L8/SHTM monitoring works to aid Estates with their compliance with the guidelines as well as to provide a Gap analysis on the L8 Management and PPM regimes. See Email "150610 – NHS SGUH"

b) Who was tasked with preparing and implanting the action plan?

A DMA were not involved in preparing and implementing the action plan and are not aware of who was tasked with this. DMA provided quotation QAM15031b for DMA to provide L8/SHTM monitoring works but DMA were not instructed to proceed with these works.

c) Did the action plan discussed address all the points identified in the 2015 report?

A DMA were not involved in preparing and implementing the action plan and are not aware of who was tasked with this.

d) What role, if any, did you play in implementing/advising/ assessing the actions to address the points raised in the 2015 report?

A DMA were not involved in preparing and implementing the action plan and are not aware of who was tasked with this.

e) If you did not attend this meeting, who attended from DMA Canyon?

A As stated above it would appear that Allan McRobbie attended this meeting.

f) Were you made aware of the outcome of the meeting, or of any action plan developed at the meeting?

A The outcome of the meeting was DMA produced quotation QAM15031b which was sent to Estates on 9th June to provide costs for DMA to carry out L8/SHTM monitoring works to aid Estates with their compliance with the guidelines as well as to provide a Gap analysis on the L8 Management and PPM regimes. DMA were not provided with any action plan by Estates after this meeting.

31. Following delivery of the 2015 report to QEUH/RHC estates staff, what action, if any, were you aware of having been taken by estates staff to address the points raised in the 2015 report, prior to DMA Canyon carrying out the L8 Risk Assessment NHS

Greater Glasgow and Clyde Queen Elizabeth University Hospital and Royal Hospital for Children Site survey completed 8th September 2017 (Plant) Outlets surveyed 10th, 12th, 13th, 16th, 20th & 24th October 2017 Management Review Meeting for Gap Analysis, 30th January 2018 (hereinafter referred to as 'the 2018 report') Refer to Bundle 6, Miscellaneous Documents, document 30 ?

A DMA were not involved in any ongoing works within the QEUH/RHC at this time and not aware of what actions were taken.

32. What was the purpose of the 2018 report? Who instructed you and when? What was the remit of the report?

A DMA understands the purpose of the Risk Assessment carried out in late 2017 & early 2018 was to update the Risk Assessment from 2015. We were requested to provide a quotation for this in November 2016 and provided an instruction to proceed in September 2017. The quotation was provided to Colin Purdon (C.C. to Ian Powrie), with the report being issued to Tommy Romeo. Please see quotation "Q171049DW GG&C QEUH L8 RA Update" and Purchase Order "170904 QEUH L8 RA Update PO" for remit of these works.

33. Were DMA Canyon present at the QEUH/RHC site between 2015 and September 2017? If so, at any point did any members of staff discuss the 2015 report, with you or your colleagues that you are aware of? If so, who from estates had discussions regarding the 2015 report? What was the nature of the discussions?

A DMA carried out work in the "Retained Estate" within the QEUH campus, but had very limited input into any works within the QEUH/RHC between 2015 and 2017, with only some ad-hoc works carried out as and when requested during this period, with the works being carried out being local disinfections of the hot and cold water systems within Ward 4A of the adults hospital in June/July 2016 and some microbiological sampling in Sep, Oct & Nov 2016 and more microbiological sampling during the second half of 2017. DMA were not requested to assist with any remedial actions based on the results of this sampling. We cannot recall having any conversations around the 2015 Risk Assessment with Estates during this period.

34. At any point between the 2015 report and the commencement of the assessment for the purposes of completing the 2018 report were you or colleagues at DMA Canyon

approached by any members of QEUH/RHC estates staff, or other members of staff, for advice or assistance with addressing the points raised in the 2015 report? If so, who were you approached by and what support or advice was given?

A No.

35. When you delivered the 2018 report what was the reaction from NHSGGC Estates staff? Do you recall any surprise from members of staff to the findings of the 2018 report? If so, from whom?

A We cannot recall the reaction of any Estates staff from this time. DMA were not present when the risk assessment was reviewed by GG&C Estates. As before, DMA's remit and instruction was to carry out the risk assessment and to report the findings to GG&C.

36. What are your thoughts on the lack of action taken between the 2015 and 2018 report by NHSGGC Estates staff?

A DMA were surprised during the 2018 risk assessment that there was little progress made on implementing the recommendations made in the 2015 report.

37. At any time did any member of staff offer an explanation as to why little action was taken between 2015 and 2018? If so, what explanation was offered and what did you think of the explanation?

A No explanation was offered to DMA.

38. What concerns, if any, did you have regarding the lack of action between the 2015 and 2018 report?

A Our concerns were that deadlegs which had been highlighted previously were still present and did not appear to be on a recorded flushing regime, the CWSTs did not appear to have been cleaned and disinfected during the period between the two reports and Estates were not able to provide a detailed management structure and there were gaps highlighted in the ppm regime for the water systems.

39. Any further comments you have regarding the lack of action taken between 2015 and 2018?

A No additional comments.

Guidance Compliance - General

40. At page 15 of the 2015 report it states: '*As the building is used by persons with acute underlying medical conditions which increases susceptibly to contracting legionellosis then the requirements for L8, HSG 274 and HTM/SHTM 04-01 compliance is of paramount importance.'*

a) Explain how the how compliance with the requirements for L8, HSG 274 and HTM/SHTM 04-01 is of paramount importance, insofar as what protection from additional risk of avoidable infections does compliance with the aforementioned requirements provide patients?

A L8 states *"This book is aimed at dutyholders, including employers, those in control of premises and those with health and safety responsibilities for others, to help them comply with their legal duties in relation to legionella. These include identifying and assessing sources of risk, preparing a scheme to prevent or control risk, implementing, managing and monitoring precautions, keeping records of precautions and appointing a manager to be responsible for others."*

The guidance provided by L8 helps users to comply with the legal obligations in managing and operating water systems and complying with their obligations under the Health and Safety at Work etc. Act 1974, Control of Substances Hazardous to Health (COSHH) Regulations, The Management of Health and Safety at Work Regulations and other relevant legislation, with HSG 274 and SHTM 04-01 providing technical guidance on how to manage and operate water systems in order to comply with this legislation and provide safe water systems for end users.

b) Further what is your understanding of the overarching principles of the guidance?

A See response to Q40 a) above.

Water Sampling 2015

41. At page 15 of the 2015 report in respect of the water sampling programme it states: '*DMA were advised sampling being carried out in accordance with the method statement used by the main contractor prior to handover in order to ensure continuity of methodology. DMA were advised this method statement had been reviewed and deemed as acceptable by NHS Microbiologists and was not submitted to DMA for review or comment.'*

a) Who as far as you were aware was 'the main contractor'?

A DMA were advised the main contractor was Brookfield/Multiplex with the main plumbing/mechanical Contractor being Mercury.

b) What were DMA advised regarding the 'method statement'? Who made DMA aware of the terms of the method statement? What did DMA understand the method statement provided for regarding testing? Were DMA satisfied that the method statement provided for appropriate testing? If so, how so? If not, why not?

A Unable to comment any further than the statement above we made within the risk assessment.

c) Who advised DMA that the method statement had been reviewed and deemed appropriate by NHS Microbiologists?

A NHS Estates would have advised DMA of this, though we cannot recall the person within Estate who advised this.

d) Did DMA have opportunity to discuss with matter with NHS Microbiologists at QEUH/RHC, if so, whom?

A No

e) Would you have expected to have discussed matters with NHS Microbiologists? Did you raise any concerns regarding not speaking to them?

A No

f) Were you concerned that DMA were not provided with either actual microbiological results after sampling nor the method statement for disinfections? If so, did you/DMA discuss this with anyone at QEUH/RHC? Did you/DMA ever ask for this information, but were refused it? If so by whom?

A DMA raised the issue of not being provided with method statements for the microbiological sampling in an email to 09/04/15. DMA had been provided with some H&V sampling and disinfection information, and queries regarding this were raised in the same email, advising we were unable to see what, if any, remedial actions were taken when "out-of-specification" results were returned during the commissioning (H&V) sampling. We are unable to find a response to this email. DMA also recorded the fact

that we had no access to the NHS sampling results, or to the method statements within the 2015 report.

42. What concerns, if any, at the time of the 2015 report did you have regarding 'out of specification legionella and potable results'?

A At the time of the 2015 Risk Assessment DMA emailed Ian Powrie (09/04/15) stating there were *"no remedial actions or re-sampling procedures recorded after "failed" and multiple "failed" samples (i.e. samples which have "failed on the resample"."*

a) How satisfied were you that the results were addressed by NHSGGC at the point of completing the 2019 report? What sampling results did you see to reach this conclusion.

A The main concern at the time of the 2019 report with regards to sampling results were in relation to Cupriavidus (and other organisms) for which there were no guidance documents for the water hygiene industry to follow. This was covered within section 10 of the 2019 report. DMA did not receive copies of all the sampling results carried out during 2018 as much of this was held internally by GG&C Microbiology and Estates, with the actual analysis carried out by GG&C internal laboratories at the Glasgow Royal Infirmary.

DMA did have access to some of the sampling results from 2018, with the majority of potable and Legionella samples being within specification, with out-of-specification results being for "other" organisms for which there was no guidance documentation.

All out-of-specification results were, however, considered by DMA and included within the report whether subject to guidance or not.

b) Did continuous chlorine dioxide dosing the system address these issues?

A To DMA's knowledge the dosing of the full system with ClO_2 was not started until very late in 2018, so would not have had an impact on the results.

c) At the time of the Water System Risk Assessment, NHS Greater Glasgow & Clyde, Queen Elizabeth University Hospital and Royal Hospital for Children, report issued January 2019 (herein after referred to as 'the 2019 report'), did you have any concerns regarding sampling results? Explain your answer.

A The main concern at the time of the 2019 report with regards to sampling results were in relation to Cupriavidus (and other organisms) for which there were no guidance

documents for the water hygiene industry to follow. This was covered within section 10 of the 2019 report.

Management Structure & Communications

43. At page 15 of the 2015 report reference is made to the lack of formal management structure, written scheme or communication protocols.

a) Did a lack of formal management structure comply with HTM/SHTM guidance? If so, how so, and if not, how not?

A SHTM 04-01 Part B and Part G (issued in draft format at the time of the report) provides the positions which should be filled in relation to the management structure. DMA were not provided with any details of the management structure at the time of the assessment. L8 also requires that a Legionella Management structure should be put in place. To the extent that no such formal management structures were in place, this would not have complied with the above guidance.

b) What concerns did you have surrounding the lack of formal management structure?

A A formal management structure provides a formal process for the implementation and oversight of a PPM regime and the reporting and escalation of any issues which may have arisen and to allow for specific roles with responsibilities and accountability for ensuring the necessary works are being carried out assigned and documented.

c) What impact did the lack of formal management structure have on the operation of the water system, and the prevention of avoidable risk of infections?

A DMA were asked to report on the system at the time of the survey and had no input into the running of the system afterwards and so are unable to comment on how any lack of formal management structure impacted on the running of the water system.

d) To the same extent explain your concerns surround the lack of written scheme, the potential patient impact, and compliance with guidance.

A The lack of a written scheme could have impacts on the allocation and management of the tasks, ensuring all required monitoring and other tasks are being carried out on the water system and potentially the ability to react to any issues that arose from this monitoring. Both L8 and SHTM 04-01 (Part G in Draft format at time of 2015 report) advice the a written scheme should be created and implemented to “for controlling the

risk of exposure". L8 also requires that a Legionella Management structure should be put in place.

e) To the same extent explain your concerns regarding the communication protocols, potential patient impact and compliance with guidance.

A The lack of communication protocols could have an impact in a large building/water system where multiple staff members or sub-contractors have responsibilities for different aspects of managing the water system, ensuring that information about the water system is reported to the relevant personnel, allowing for any appropriate action to be taken as and when required.

f) Describe the '*significant communication issues'* and confirm the meaning of '*between the parties involved*' who were the parties?

A As stated in the 2015 risk assessment:

"DMA have been informed by Estates personnel there have been breakdowns in communication between Estates, Projects and Building Contractor(s) where defects highlighted by NHS Estates to other parties are being acted upon without Estates without Estates being informed to allow proper consideration of bacterial control to be made, or to review/sign off that actions have been carried out in a compliant manner minimising any potential bacterial control impacts.

Examples include:

- *A direct and open connection installed by the Building Contractor(s) between the Hardgate Road mains supply and the PR 41/22/21 distribution pipe bypassing the filtration plant running for an unknown length of time which NHS Estates were previously unaware of.*
- *A calorifier which appeared to have been offline for over three months being reinstated by the Building Contractor(s) with no evidence of flushing/pasteurisation/disinfection."*

g) What impact did this have the on the operation of the water system at QEUH/ RHC and in turn what impact or potential impact, if any, did this have on patient safety?

A As stated above this appears to have resulted in some works being carried out without NHS Estates being aware of the works. The comments by DMA were made during the

pre-occupation phase and DMA were not involved in the post handover phase and so cannot comment on the potential impact this had after handover.

44. At the time of the 2018 report, who was the Dutyholder at QUEH/RHC?

A Not aware of who the Dutyholder was at this time. We were not provided with a management structure for GG&C with named individuals appointed into specific roles. (as detailed in Section 10 of the 2018 Risk Assessment).

45. To what extent was it clear that the obligations to appoint an authorised person/ designated person for water/ competent person for water/ authorised engineer for water required to discharge water supply safety had been complied with at handover? What awareness did you have as to when these roles had been filled as at the time of the 2018 report? If there were any delays in filling these roles was this a factor in any deficiencies that you identified?

A As stated within the 2015 risk assessment DMA were not aware of any management structure being put in place at the time of the assessment being carried out, and as stated in the 2018 assessment this had been completed/updated. Unable to comment on whether this contributed to the “deficiencies” identified within the 2018 assessment as DMA had very limited involvement within the QEUH/RHC during the period between the 2015 and 2018 reports.

46. Describe any concerns you had regarding the appointments in respect of SHTM04-01 at QEUH/RHC around the time of the 2018 report?

A As stated within the 2018 assessment DMA raised concern about Tommy Romeo being nominated into the Authorised Person role, without having had the appropriate training.

47. To what extent was it clear that the roles required in respect of Legionella required to discharge water supply safety had been complied with at the point of the 2018 report?

A It was not clear to DMA this had been complied with as no management structure was supplied to us.

48. Were the lines of responsibility clear?

A As stated within the 2018 assessment the lines of communication did not appear to have been documented.

49. If not, what in your view was lacking from them?

A Completed management structure, with lines of communication etc. were not provided to DMA to review. As stated in the 2018 assessment a "general 'Written Scheme' to be implemented on each of their sites", though this would have to be made site specific.

50. How clear was it to you that arrangements were deficient?

A As GG&C were not able to provide this information this appeared clear to DMA.

51. To what extent had these matters been addressed at the time of writing the 2019 report? Were the lines of responsibility clear, if not, what in your view was lacking? To the same extent do any such issues still remain?

A As stated within the 2019 report:

"An Estates organogram is included within the Written Scheme. This covers only the Estates department and does not cover positions outwith the Estates Department, though it does incorporate other Estates Personnel who do not appear to have any direct involvement with the water services (Paul McAllister, Darrel Conner and Paul Allan. N.B. This will require to be updated due to some named personnel leaving the organisation and others taking up new roles.

Some members of staff named within the NHS GG&C South Sector (QEUH) Hierarchy Appointment Table do not appear within the Estates organogram (e.g. Scott Macer and Darren Hopkins), with the Estates Competent Persons (Water Systems) referred to only by Job Title."

Currently DMA do not carry out the reviews of the Water Management and Written Schemes, this is carried out by Authorising Engineer during annual audits/reviews, though in DMA's experience there appears to be clear definition of who carries out which roles and close co-operation with different departments (e.g. between Estates and Infection Control, Microbiology etc.).

Water supply to the Renal systems

52. The 2015 report states that there was no separate supply to the Renal systems, and made recommendations regarding disinfection procedures and chemicals.

a) Would you have expected there to have been a separate supply to Renal systems?

A Not necessarily, it was a comment with regards to ensuring appropriate cognisance of this was taken at any point when disinfections or other works on the water system were taking place.

b) What issues does having a single point supply present? Insofar as avoidable risk potential infection to patients?

A A single supply system which has connections to the renal supplies would have to be taken into account if/when remedial works were being undertaken to ensure supply to renal system(s) was not interrupted and no disinfectant was drawn into the renal systems with out the knowledge or renal technicians etc.

c) Why would the Renal system have benefitted from a separate supply?

A A separate supply to this system which was not connected into the renal system would perhaps make the management of the system simpler and alleviate some of the issues described in a) & b) above re: disinfection and remedial actions.

d) What disinfection procedures were put in place by Estates staff between the 2015 and the 2017 report? If no procedures were put in place, did this surprise you, if yes why? What would you have expected to have been done by Estates staff?

A Not aware of any disinfection processes implemented by Estates staff in this period, though DMA had very limited involvement in the QEUH during this period and may not have been aware of disinfections being carried out. DMA would have expected the CWSTs to have been disinfected during this time period.

Note: DMA did carry out disinfections within Ward 4A in June/July of 2016.

e) DMA carried out a further report in 2019 and found that *'suitable filtration and testing regimes have been implemented on the renal system in light of the ClO_2 dosing systems being installed, and that supply pipework to the renal plants have been altered to bypass the local ClO_2 "top-up" units.'* Page 8 the 2019 report.

(i) When was the suitable filtration and testing regime implemented?

A This filtration and sampling regime was implemented as part of the ClO_2 installation in late 2018/early 2019, though DMA had no involvement in this.

(ii) When would you have expected it to have been implemented?

A At the time of installation of the ClO_2 plant.

(iii) What was the impact, if any, in not introducing a suitable filtration and testing regime sooner? What was the impact, if any, of the delay in action in implementing a suitable filtration and testing regime?

A This was not required prior to the ClO_2 installation.

53. Describe your involvement, if any, with disinfection of the water system supply to Ward 4A? What was the purpose? Who did you work with/ who instructed DMA Canyon from Estates staff? Was this connected to the testing and filtration systems referred to in Question 37? What was the outcome?

A DMA were requested to carry out a disinfection of Ward 4A by Jim Guthrie from GG&C Estates. We understood that this was due to "out-of-specification" microbiological results, though DMA do not have copies of these results. A disinfection was carried out in June 2016 and then repeated in July 2016. DMA were not provided with the follow up sample results.

This question makes reference to Question 37 above, but the reference appears to be incorrect.

Water System Features & Water Provisional Position Paper 11 (PPP 11)

The Inquiry has produced a Provisional Position Paper; Potentially Deficient Features of the Water System of the QEUH/RHC – please refer to within the workspace for assistance with answering these questions.

Bypass Pipes

Please refer to page 91 of the 2015 report and page 23 paragraph 5.4 of PPP11.

54. What evidence was there that the water system was filled with water that bypassed the installed filtration system prior to commissioning? If so, why what mechanism would the system have been filled bypassing the filtration system?

A As stated in the 2015 assessment DMA witnessed pipework connecting from the Hardgate road mains water supply into the booster pump sets which was after all water tanks and the filtration system, with the valves open.

55. Who fitted the bypass pipework/ mechanism at the Hardgate Road mains?

A DMA not advised who fitted this bypass.

56. What was the purpose of fitting bypass pipework/ mechanisms?

A DMA unaware of why this bypass was in place.

57. Describe the issues, if any, associated with the bypass pipework/ mechanisms at the Hardgate Road mains?

A The bypass was a temporary installation which bypassed the filtration plant, which DMA understands was a control measure for the water system, introducing unfiltered water into the system.

58. The Inquiry understands that in order to comply with SHTM04-01 that '*all incoming cold water supplies destined for domestic use within NHS Scotland premises should be filtered*'.

a) Is this your understanding of the guidance?

A Yes – for new buildings.

b) If so, was the bypass pipework at the Hardgate Road mains compliant with SHTM04-01 in 2015?

A Not whilst the bypass was in place and in use.

c) If the presence of the pipework was not compliant with SHTM04-01, for how long was the system non-compliant? What impact did this have on the integrity of the water supply? Did Estates staff explain why the pipework remained in place for a number of weeks?

A Unsure how long the pipework had been in place, with no explanation of why the pipework remained in place for a number of weeks. Unsure of the impact this would have had.

59. Who filled the water system with water that bypassed the filter system?

A DMA were not informed of who filled the system with the bypass.

60. What would have been the purpose of doing this?

A DMA were not informed of the purpose of this.

61. How long did the water remain in system, after the system was filled bypassing the filter system? Did the water simply sit in the system? How, if at all, could have encouraged dead legs/ temperatures out with acceptable limits?

A DMA were not present on site at this time and unsure of how long water was in system, or what happened to the system after the water had been introduced. Realistically this would have had no real impact on deadlegs and/or water temperatures on distribution system, though may have had an impact on water within CWSTs and plantroom pipework which would not be in use.

62. How did that affect the extent to which parts of the system operated as dead legs? How, if at all, would that have affected the extent to which the system strayed outside temperature limits?

A Unlikely to have had any effect on distribution system, though may have had an impact on water within CWSTs and plantroom pipework which would not be in use.

63. How did this, if at all, potentially impact the integrity of the water supply?

A Unfiltered water, potentially with small deposits of grit, sand, debris etc. could have entered the water system, and it is possible water from within CWSTs and pipework in plantrooms which were not used whilst bypass was in place could then have been drawn into the system when system returned to normal operating conditions, unless this water was discharged to drain and system refilled.

64. How long did the bypass remain in place? When was it removed, by whom, and what prompted its removal?

A DMA highlighted the presence of the bypass being in place, but are unsure of how long the bypass was in place, when it was removed, who removed it or what prompted its removal. As noted, DMA were not involved in progressing the actions recommended to GG&C in the reports provided.

65. Was any additional cleaning or flushing of the water system carried out following removal of the bypass?

A DMA not informed of what if any actions were undertaken.

66. What impact, if any, would not flushing the system after removal of the bypass have had? Did this lead to a potentially impact the integrity of the water supply?

A As stated above small deposits of grit, sand, debris etc. could have entered the water system if unfiltered mains water entered the water system, which if not properly flushed could have remained in the system.

67. At paragraph 5.8 of PPP11 the Inquiry understands from the 2015 report that the bypass was in place for a number of weeks prior to being removed. What impact did the bypass being in place for a number of weeks have on the system? What reason was given by Estates staff for the bypass being in place for a number of weeks? Did this give you cause for concern?

A Unsure if/when bypass was in use during the period it was in place. Impact would have been as described in points 63 & 66 above. The concern for DMA at the time was as stated in the risk assessment *"may have led to sediment and other debris which would otherwise have been removed by the filtration set being introduced into the system and could be a contributory factor to any out-of-specification microbiological results."*

68. Do you agree with PPP11 that the bypass being in place was a potential deficient feature of the water system at QEUH/RHC?

A Yes

Drain points and low turnover

69. PPP11 paragraph 5.17

a) What risk arose, if any, due the lack of flushing regime, particularly in respect of the Govan Road and Hardgate Road and low turnover areas?

A There are some deadlegs on the Govan Road and Hardgate Road mains water supplies and a dedicated mains water supply to the fire tanks in the basement which ties into the Hardgate road mains line. Water within these deadlegs and low use line to fire tanks could allow stagnant water to leach into the mains supply to the Raw Water CWSTs.

b) In the 2018 report it was noted that there was no record of flushing. Were you aware of any flushing having been carried out by Estates in respect of the low turnover areas identified?

A Estates verbally advised DMA flushing of low use outlets within Estates areas was being carried out, though no records of this were provided to DMA. DMA had very limited input into the QEUH during this period and have no first hand knowledge of what was carried out. Estates were unable to confirm if unused outlets in clinical areas were being flushed.

c) What, if any, risks are created by not carrying out flushing of low turnover areas?

A Water within low use areas can stagnate and will rise/fall to building / ambient temperature which may be in the temperature zone where microbial growth is more likely to occur, and could potentially leach into other areas, or be released when low use outlets used.

d) Were Estates staff able to confirm whether any flushing had been carried out between the 2015 and 2018 reports in respect of low turnover areas?

A As stated above Estates stated verbally that areas they were responsible for were being flushed, though no records of this were provided to DMA, and were unable to confirm if clinical areas were being flushed.

e) What requirements are there in terms of guidance and legislation to carry out regular flushing of low turnover areas?

A Both SHTM 04-01 and HSG 274 Part 2 recommend flushing low use outlets twice weekly.

f) The Inquiry understands that regular flushing had begun by the time of the review carried out by DMA Canyon in 2019. When should regular flushing have begun? What was the reason for it not having been done prior to in or around 2019?

A Regular flushing should have been implemented as soon as the water system was filled, until such times as the building was handed over and then any low use outlets should have remained on a flushing regime until such times as they were put into full usage. DMA are unable to comment on why this was not done prior to 2019 as we were not consulted on or directly involved in the actions taken by GG&C on receipt of the reports.

Deadlegs

PPP11 paragraphs 6.7-6.14

70. What concerns, if any, did DMA Canyon have regarding the short deadlegs created by installing various flushing points on the water mains? How can this impact the integrity of the water supply? Did the presence of deadlegs create an additional avoidable risk of infection to patients? If so, how so?

A Water within deadlegs can stagnate and will rise/fall to ambient building temperature which may be in the temperature zone where microbial growth is more likely to occur, and could potentially leach into other areas, or be released when deadleg is opened drawing stagnant water into the water systems(s).

71. Likewise, what concerns, if any, did DMA Canyon have regarding the valved off water tanks, one Raw Water Tank and one Trades Water Tank? How did the creation of deadlegs impact the integrity of the water supply? Did the presence of deadlegs create an additional avoidable risk of infection to patients? If so, how so?

A The presence of valved off water tanks can leak to stagnation within the tank itself, and also create deadlegs on the water supply (mains water) and on the outlet pipework to the offline tank. If the tanks are not cleaned and disinfected and simply opened to the system then this stagnant water would be drawn into the water system(s), similarly the stagnant water within inlet/outlet pipework could be drawn into the water system when lines opened. As stated above this water would be sitting at ambient temperatures within the tanks and pipework where microbial growth is more likely to occur.

72. At the time of writing the 2015 report describe the concerns DMA Canyon had with the Raw Water inlet and the similar set up on the trades system which created stagnation. What is the potential impact of stagnation in water tanks? How can this impact on avoidable risk of infection to patients? How could this have been avoided when building the water system?

A See response to Q 71.

73. The Inquiry understands that at the time of the 2015 report the supply into Raw Water Tank 1A had been isolated pending repair by Mercury Engineering, but that the issue

remained, and DMA made recommendations regarding completely isolating the tank until the mains inlet was repaired, the CWST cleaned and disinfected prior to re-use.

a) Are you aware of this recommendation having been followed by Estates/ Mercury?

A DMA were not informed of what action was taken for the reasons provided previously.

b) If so, what work was carried out, by whom and when?

A DMA were not informed of what action was taken for the reasons provided previously.

74. Was the issue resolved by the time the 2018 report was carried out? The Inquiry understands that the 2018 report appears to identity the same deadleg in the trades water tank as in the 2015 report. If not, what remained to be addressed, and what was the impact of this not having been addressed in 2015 when first reported by DMA Canyon?

A The issue with regards to the supply to the Raw Water CWSTs had been resolved, though one side of the Trades Water tank was still offline. This was creating a deadleg on the Govan Road mains water supply, which as described above could have impacted on the supply to the online Trades water tank and potentially to the Raw Water tanks supplied by the Govan Road mains supply. This was also creating a deadleg on the outlet from the online trades water tank which could impact on the system supplied form this tank.

75. When did you become aware that the issue had been addressed by Estates staff? Are you aware what cause the delay, if any, in actioning the recommendations of the 2015 report in respect of deadlegs?

A The first DMA were aware of any works being carried out to the Trades water tanks was recorded during the 2019 risk assessment, where we noted that the mains supply to the offline trades tank had been removed and the tank drained.

76. Please describe your concerns with the irrigation system at QEUH. Action was taken in 2017 to disconnect the system; the Inquiry understands that the residual system may remain in place [PPP 11 at para 23.7]. Please state your views on the adequacy of this response.

A Our concerns in relation to the irrigation system were noted within the 2015 risk assessment which stated the irrigation system was supplied by *"very long runs through*

the building and plantrooms to the outlets. All points on the trades system should be included in the site flushing regime – though additional flushing (outlets run for extended periods) may be required to bring temperatures on distribution system down particularly during periods of low use (e.g. in winter when irrigation system is not required to operate frequently)." The response of disconnecting the system, though leaving the system in place, would be adequate.

Temperature risk/ lack of flow in the tank system

Refer to paragraphs 6.15-6.24 of PPP11.

77. Why should the temperature of water stored in water tanks not be more than 2ºC higher than incoming mains? What, if any, additional avoidable risks does a rise of greater than 2ºC create?

A If there is a temperature difference between the incoming supply and stored water temperatures then this could indicate the tank is not turning over within the required time period. The tanks should be insulated to prevent heat gain and all water within tank replaced every 12 hours maintaining temperatures similar to this of the tank supply water.

a) What caused the greater than 2ºC rise in the stored water in QEUH/RHC?

A Potentially the water within the tanks was gaining heat from the ambient plantroom temperatures and not turning over within the 12 hour period as this was during the pre-occupancy phase and water system was not in full use.

b) What action was taken by Estates to address the issue between the 2015 and 2018 report? If no action was taken during this time, was the matter resolved at the time of carrying out the 2019 review?

A DMA have not been advised what action was taken by Estates during this period, though the building was in full use by 2018 which may have corrected the issue as this was not noted during the 2018 assessment.

c) What awareness do you have in respect of the 2019 HFS Water Management Technical Review? Action recommended and taken in response?

A None. DMA requested to carry out the water sampling and continue to sample the tanks on a monthly basis, but not aware of this being in relation to a HFS report.

d) Have any actions taken by Estates staff resolved the issues in respect of water temperature and lack of flow in the tank system? If so, how so?

A Action has been taken to correct the balancing of the water tanks to try and equalise flow through each of the tanks, and a monthly sampling regime has been implemented to monitor water condition within the tanks.

Debris within tanks

78. Both the 2015 and 2018 report identified debris within the tanks.

a) What issues, if any, does debris within tanks cause?

A Depending on what the debris within the tank is it could provide a nutrient source for any bacteria within the water system, and potentially block strainers (or damage components) withing the system if the debris moves through the system.

b) What action are you aware of Estates staff having taken regarding debris in the tanks following the 2015 report?

A DMA were not informed of what action was taken for the reasons provided previously.

c) If no, action was taken, why?

A DMA were not informed of what action was taken for the reasons provided previously.

d) The presence of large biofilm was noted on the debris in 2018. What, if any, risk did this pose to the water system and integrity of the water supply? Did this create and increased risk to patients? If so, how so?

A The biofilm noted on the debris could potentially break off from the debris it was noted on and/or leach into other areas and into the water system where it could potentially seed microbial growth in other parts of the system.

e) Was the biofilm in debris still present at the time of 2019 review? If not, what action had been taken to address this issue? If no action was taken, has action now been taken to address this issue?

A No debris, other than “light silt” in the Raw Water tanks which is common in water tanks supplied from mains water, was noted within the water tanks at the time of the 2019 assessment (CWSTs had been cleaned in 2018).

f) In 2018 biofilm was identified on baffles. What was the potential cause of this? What additional risks to the water supply did this create?

A It would appear that the cause of this was splashing/spray from the 4" inlet to the Raw Water CWSTs which sprayed onto the baffle between the 4" inlet and the 15mm Kera-flo float valve which due to wetting and drying appeared to have caused a build-up of material (as is often seen around the water line in CWSTs). This material could potentially drip down into the water tank, or water flush it off into the water tank where it could then enter the water supply to the filtration units.

Screens around tanks

79. At the time of the 2015 report did all raw and bulk cold water storage tanks have suitable screens fitted to the warning pipes? What regulations, if any, are applicable, and why?

A There did not appear to be any screens fitted to the warning pipes at the time of the 2015 risk assessment.

80. At the time of the 2018 report had screens been fitted? If not, why not? Was any further action required following the 2019 review?

A Screens did not appear to have been fitted at time of 2018 or 2019 risk assessments. These have now been fitted. DMA do not know why this was not carried out prior to the 2018 or 2019 reports.

Filtration Units

81. Explain what concerns, if any, you had regarding the connection of filtration units (for example refer to PPP11 paragraph 7.7)? What risk, if any, did this present?

A Concern raised by DMA was that during normal operation Filtration Unit 1 supplied Post Filter CWSTs 1A & 1B, with Filtration Unit 2 supplying Post Filter CWSTs 2A & 2B. Should there be an issue with either of the filtration units then there was no simple way for the other Filtration Unit to supply the other tanks (with back filling from e.g. 1A/1B to 2A/2B being the only realistic option) which would have required manual intervention from Estates to maintain water supply to the hospital.

a) What remedial action was taken by Estates staff between 2015 and 2018?

A DMA are not aware of any remedial action on this issue taken during this period.

b) Did the issue remain by the time of the 2019 review? If not, what remedial action had been taken? Did this resolve the issue? Do you have any concerns remaining regarding the connection of filtration units?

A No action had been taken by the time of the 2019 report, though there is now a third filtration unit in place, with the distribution pipework from all the filters reconfigured into a common header which supplies all 4 Post Filter CWSTs. This work was carried out in 2019 and resolved the issue.

82. In the 2015 report issues were reported with the filtration units failing leading the Bulk Water tanks draining down.

a) What was the impact on the water system of the tanks draining down?

A If the water tanks drained down then there would be a loss of supply to the building, until tanks refilled.

b) Why did Estates staff not have access to the BEMS system? Would they have been aware of the issue if they had of had access?

A DMA do not know the reason why this was not provided at this time.

c) Why did DMA Canyon recommend that the bypass be left open? How could doing this resolve the issue?

A If the bypass was left open then all of the post filter tanks would be linked together via the outlet distribution pipework, which would allow the tanks to back-fill each other in the event one of the filtration units failing, and would also allow all 4 of the Post Filter CWSTs to supply both sets of booster pumps, reducing likelihood of an interruption to the water supply to the hospital.

d) What action was taken by Estates staff?

A DMA not aware of what action was taken by Estates staff for the reasons provided previously.

e) Did Estates staff have access to the BEMS system by 2018? If not, why not?

A We believe Estates staff did have access to BEMS when the 2018 report was carried out.

f) In RFI response No 8 from NHSGGC it states that the 2015 report records verbal reports of issues with the filtration units. GGC have no records of faults or if there were faults, how and when they were resolved. Do you agree with this statement? If so, why, if not, why not?

A Unable to locate RFI Response No 8.

As stated within the 2015 Assessment DMA were advised verbally by Estates staff that there had been faults with the Filtration units, and witnessed the effects of this when as reported the levels within Post Filter CWSTs 2A & 2B were extremely low. Unable to comment on GG&C records for faults and repairs on these units.

Pipework

83. At paragraph 8.11 of PPP11 GGC have advised the Inquiry that the deadlegs identified by DMA were removed between 2015 and 2017, while the 2018 report identifies much of the same deadleg pipework as in the 2015 report.

a) Do you now agree with GGC's position? If so, why, if not, why not?

A Where deadlegs were recorded within the 2018 report these would have been included within the report only if physically seen by DMA risk assessors.

b) Do you now agree with the comments in paragraph 8.10? Explain your answer.

A Unable to identify where DMA made recommendations about a deadleg in Medical Day Unit MDU-005 within either of the risk assessments dated 2018 or 2019, though there was a deadleg recorded in this room in the 2015 report, so would agree this deadleg had been removed (or line put into use) by time of 2018 assessment.

With regards to the Emergency Shower in FMB-030 was flushed intermittently only and DMA recommended this should be included in a more formal flushing regime.

Other deadlegs described as "connections required for flushing purposes" would be classed as deadlegs if not in regular use, and should therefore we would advise are either removed if not required for regular flushing or added into the site flushing regime.

c) Describe any understanding you have to the Scottish Water Bylaws Inspect Reports of 28 February 2020?

A DMA understands this was a reports generated by Scottish Water after a site survey to review the water system in relation to the Scottish Water Byelaws. This report

highlighted some areas where there was insufficient backflow protection on various parts of the domestic water system(s) where it connected into other water systems. GG&C Estates have since worked through this report (with some support from DMA) to close off the actions raised within the report.

84. What issues, if any, were created by the use of copper tails? Are you aware of any remedial action having been taken in Estates staff in respect of concerns regarding copper tails?

A DMA are not aware of any issues created by the use of copper tails. This was noted in the risk assessment as a comment only highlighting that some outlets had different connections to the majority of outlets and that there were multiple metals used in the fitting of the water system.

a) Is the use of copper tails compliant with SHTM guidance?

A SHTM 04-01 does not expressly state copper tails should not be used. As stated below there are some tap types for which stainless steel tails (or tails made from other compliant materials) are not available (or were not available at the time of construction). It does state *"very careful consideration will be required if copper pipework and fittings are to be specified for healthcare premises in Scotland"* – this would have been a decision for the design team to consider.

b) What is you view regarding the use of copper tails within QEUH/ RHC?

A Some tap types do not have compatible stainless steel connectors which can be used to connect the taps, and the only option for fitting these types of outlets is to use the tails supplied by the manufacturer. We do not see this as a significant issue.

85. Describe the concerns, if any, regarding the placement of pipework, running above ceilings etc. Do you have any views on the lack of action taken by NHS GGC regarding pipework placement?

A With pipework running above the ceilings in many areas of the building access to the pipework may not be straightforward as this would involve lifting ceiling tiles in live areas to access the pipework. However, the pipework has to be run either above ceilings, below floors or in risers, each of which can present access issues.

DMA advised GG&C should consider fitting monitoring sensors onto the pipework and connecting into the BEMS system, should the original sensors fitted not be sufficient to fully monitor the system(s).

Cold Water Temperature

Refer to paragraph 10.13 of PPP11

86. In response to the findings in the 2015 report regarding the cold water temperature variation, with a majority being more than 5ºC higher than those recorded at the water tanks, with peaks at 30ºC, and heat gain again being recorded in the 2018 and 2019 reports GGC's response is '*that temperature issues were due to lack of occupation and have subsequently been resolved following full occupancy.'*

a) Do you now agree that the temperature issues were cause by lack of occupation? Please explain your answer.

A As stated previously lack of occupancy and the corresponding lower turnover of water through the system would in all likelihood have been the major factor in the increased cold water temperatures at outlets.

b) To the best of your knowledge were the issues resolved in 2019 at the point of occupancy?

A DMA did not carry out any temperature monitoring after occupancy, with very little involvement for DMA to record temperatures at outlets being during the 2018 and 2019 risk assessments, both of which showed a significant improvement in the cold water distribution temperatures, though both still had some locations recorded as having temperatures higher than 20°C.

c) What likely caused the heat gain? Did the design of the water system contribute to the heat gain in the cold water temperature?

A As stated previously lack of occupancy and the corresponding lower turnover of water through the system would in all likelihood have been the major factor in the increased cold water temperatures at outlets.

d) What impact did the heat gain have on SHTM compliance at 2015, 2018 and 2019?

A SHTM 04-01 recommends that cold water temperatures should be below 20°C at outlets within 2 minutes and having areas where this was not happening would not be compliant with SHTN 04-01.

e) What impact, if any, would set point increase on calorifiers have had on heat gain?

A By increasing the set point of the calorifiers, this would have delivered hotter water to all thermostatic mixing valves, which in turn would have required more cold water to blend the water at the TMVs back to the set point temperature (~41°C) which would have resulted in drawing more cold water through the system, which could have helped reduce cold water temperatures throughout the cold distribution system.

f) What impact, if any, would continuous chlorine dioxide dosing have had on the heat gain issues?

A Dosing the system with ClO_2 would not have any impact on distribution temperatures, though could help mitigate any microbial effects caused by the heat gain.

g) What impact did the cold water dump valves not operating as intended have on cold water temperature? What action, if any, was taken to remedy this issue? Did this issue remain in 2018 and 2019?

A The dump valves not operating could mean that areas where they were fitted which were experiencing heat gain did not have cold water drawn into the lines to reduce the temperatures in the distribution system until outlets in the area were run. DMA are not aware of what action was taken to remedy this.

h) What increased risks, if any, were associated with the heat gain on cold water temperature at 2015, 2018 and 2019? Do these risks still remain?

A In areas where there was heat gain in the cold water system the water would be reaching temperatures in the zone where microbial growth is more likely to occur. Whilst there are occasionally instances where high cold water temperatures are noted, these are not a frequent occurrence, and there are mitigation procedures put in place for out of use areas (flushing regimes) to minimise the occurrences of this.

Flushing

87. In the 2015 report DMA recommended that all sites of the Trades system should be included in the site flushing regime to avoid risk of stagnancy. The same recommendations were made within the 2018 and 2019 reports.

a) Was a flushing regime introduced in response to this recommendation?

A DMA not aware of what actions were taken by Estates with regards to a flushing regime.

b) Do you agree with GGC's position that as the trade system only supplied the fire-fighting equipment flushing was not considered to be required? Did this approach sit consistent with the recommendations of the 2015 report?

A At the time of the 2015 assessment the irrigation system was supplied from the Trades Water system and some bib taps within plantrooms in addition to the 12th Floor Heli-pad fire suppression system.

c) In your opinion, does this create a potential risk to the integrity of the water supply? And in turn create any potential risk to patients?

A Areas fed from the Trades System were not in patient areas (on roof gardens for the irrigation system and in plantrooms where there was no patient access).

The risk to the domestic water system was from the mains water link to the Trades system as described previously in the "Deadlegs" section of this document.

Hot Water System

88. At the time of preparing the 2015 report was the temperature in the hot water system compliant with SHTM 04-01

A There were a number of areas where it was reported that the hot distribution temperatures were not reaching 55°C (as recommended in SHTM 04-01), though were achieving 50°C, with a small number of outlets not achieving 50°C within 60 seconds. There were also some calorifiers where storage temperatures were recorded as being lower than SHTM 04-01 guidelines.

a) What caused the issues with the hot water temperatures at the time of the 2015 report?

A The low hot water distribution temperatures may have caused by the calorifier set points being set very close to 60°C which didn't leave enough of a margin to account for the natural heat loss that was occurring as the water was distributed around the system, or

there may have been localised balancing/commissioning issues (or a combination of both).

89. The following features have been identified by PPP11 as being potentially deficient features in the QEUH/RHC water system.

    a) Deadlegs

    b) Calorifiers, set points

    c) Calorifiers, flushing and disinfectant

    d) Non-operational calorifiers as deadlegs

    In respect of each feature, the Inquiry is aware that DMA Canyon identified these features in the 2015, 2018 and 2019 reports. Please consider each feature explain briefly the impact the feature had on the hot water temperature; whether the hot water temperature complied with SHTM04-01 at the time of the 2015, 2018 and 2019 reports, and if not, why not; describe the impact, if any, Estates staff lack of access to BEMS had; describe briefly any work carried out to address the issue by GGC; describe any advice sought from GGC regarding the features; whether any concerns remained regarding the feature at the time of writing the 2018 and 2019 reports.

a) Deadlegs

A Water within low use lines (deadlegs) can stagnate and will rise/fall to building / ambient temperature which may be in the temperature zone where microbial growth is more likely to occur, and could potentially leach into other areas, or be released when low use outlets used.

DMA were not involved in preparing and implementing any action plan to address deadlegs identified during the 2015, 2018 or 2019 reports, and are not aware of who was tasked with this.

b) Calorifiers, set points

A The Calorifier set points appeared to be set very close to 60°C which didn't appear to be leaving enough of a margin to account for the natural heat loss that was occurring as the water was distributed around the system as some areas had lower than expected hot water temperatures at outlets and on the hot return (i.e. <55°C).

By increasing the set point of the calorifiers, this would have delivered hotter water to the hot water distribution system, which would bring the temperatures into range

required at outlets and on the hot return (i.e. >55°C). This in turn would have required more cold water to blend the water at the TMVs back to the set point temperature (~41°C) which would have resulted in drawing more cold water through the system, which could have helped reduce cold water temperatures throughout the cold distribution system.

Low calorifier flow and return temperatures were recorded in the 2015 report with most calorifier temperatures recorded on 21/04/15 below 60°C, though some temperatures issues were still recorded as low on 27/04/15 when DMA revisited to review calorifiers. SHTM 04-01 Part G (issued as draft at time of 2015 report) states *"The domestic hot water circulating loop shall be designed to give a return temperature to the storage water heater of 55°C, but certainly no less than 50°C."* whilst at other points within Part G and in Parts A & B the return temperature is advised as being *"no less than 50°C return (lowest limit) to the water heating device".*

Where hot return temperatures were recorded in the 2015 and 2018 reports as <50°C DMA noted these as being lower than the *"Brookfield specified return temperature though reaches the SHTM 04-01 guidance temperature of 50°C." DMA were advised that the system had been designed and installed to ensure all return temperatures to calorifiers achieved 55°C by Estates/Mercury Engineering.*

The 2019 reports record all calorifiers flow and return temperatures as <60°C and >55°C respectively.

DMA are not aware of what works were undertaken to increase the calorifier set points, or by whom, at any time between the reports in 2015, 2018 & 2019.
DMA do not know the impact created by Estates not having access to the BEMS system at this time.

c) Calorifiers, flushing and disinfectant

A DMA were aware of actions being taken to place Calorifiers back online during the 2015 assessment though unable to comment on who carried out these works or the dates they were completed, and what, if any, flushing and disinfection procedures were carried out prior to the calorifier(s) being put back online.

Offline calorifiers were only recorded during the 2015 report, with all calorifiers online during the 2018 & 2019 reports.

d) Non-operational calorifiers as deadlegs

A The presence of valved off calorifiers can lead to stagnation within the calorifier itself, and also create deadlegs on the water supply (cold feed) and on the hot flow and hot return line pipework to the offline calorifier. If the calorifiers are not flushed/cleaned and disinfected/pasteurised and simply opened to the system then this stagnant water would be drawn into the water system(s), similarly the stagnant water within inlet/outlet/return pipework could be drawn into the water system when lines opened. This water could be sitting at ambient temperatures within the calorifiers and pipework where microbial growth is more likely to occur.

Offline calorifiers were only recorded during the 2015 report, with all calorifiers online during the 2018 & 2019 reports.

Energy Centre and hot water temperature

90. At the time of carrying out the 2018 and 2019 reports DMA Canyon described the hot water temperatures as *'generally satisfactory'* explain what was meant by this statement. Did the hot water temperature in 2018 and 2019 comply with the requirements if SHMT 04-01? Explain your answer.

A What was meant by this statement was that in the majority of instances where hot water temperatures were recorded the temperatures were compliant with the SHTM 04-01 guidelines, and there were only a few instances of the hot temperature not being in the correct range (with these being noted within the reports).

91. What issues, if any, were known to DMA Canyon regarding the Energy Centre and hot water temperature, at the time of the 2015, 2018 and 2019 reports? How were the issue(s) managed by GGC? What action was taken and did this resolve the issue(s)?

A Any issues with the Energy Centre were as noted within each of the risk assessments, though DMA were not aware of any specific issues, and these were relayed to DMA verbally as issues at the Energy Centre, with no specifics of the cause of the issues being provided. We are not aware of what action was taken to address the issues,

through as noted within the 2019 report when issues were reported to Estates action was taken by Estates to rectify the issue.

a) The Inquiry understands that the HFS Water Management review of March 2019 found that *"The hot water is designed for 60°C flow and 55°C return. It has been advised by GGC that these temperatures are not what is being found in practice due to issues with the Energy Centre."* Page 56 PPP11.
Do you agree? Explain your answer

A DMA can only comment on temperatures recorded by us during the assessments and these were as described in each of the assessments, with our knowledge of any issues around the Energy Centre being as per our response to Q91 above.

92. Explain your concerns, if any, in respect of heating system failures, how these were connected, if at all, to the Energy Centre, record keeping regarding these issues including compliance measures and commissioning undertaken.

A Heating system failures impacted on calorifier storage temperatures and in turn on the hot water distribution temperatures. How these were connected to the Energy Centre and any record keeping, commissioning etc. we are not sure of as this was not within DMA's remit and instruction.

Expansion Vessels

93. Who designed the expansion vessels in place at the time of the 2015 report? What understanding do you have of the reasons for not using flow through expansion vessels as recommended in SHTM04-01 not used in the initial design?

A Unsure of the manufacturer of the expansion vessels originally installed, and DMA had no part in the design of the system or the decision on what type of expansion vessels were installed.

94. What impact, if any, did the use of these expansion vessels have on creating an increased risk of avoidable infection risk to patients?

A If there is no water flow through the vessels then this can allow water to potentially stagnate within the vessel at a temperature which may be in the temperature zone where microbial growth is more likely to occur, and could potentially leach into cold feed, or be released into the water system if/when pressure and/or flow rates change.

Commissioning and record keeping

95. The 2015 report identified that steam humidifiers did not appear to have been commissioned at the time of the report.

a) How satisfied were you at the time of carrying out the 2015 report that commissioning of the water system had been carried out? What evidence of this was provided to you? Was there are comprehensive storage system? Who was responsible for commissioning prior to handover?

A The steam humidifiers may not have formed part of the commissioning of the water system as these would supply humidification into the air conditioning/ventilation system, though there were supplies to the humidifiers from the domestic water system. It was this connection which DMA made recommendations around.

With regards to the commissioning of the water system(s) DMA understands this was carried out by H&V Commissioning, with DMA being provided with some records via the Zutec portal (an online portal which DMA were provided access to certain records on). DMA made comments on the hot and cold water temperatures within the QEUH/RHC stating these were in line with records we had been provided access to, along with our recommendations in line with what we witnessed.

b) How satisfied were you that ongoing commissioning of the water system was being carried out following the 2015 report?

A DMA had no input into the water system commissioning and were not working on site after we had completed the 2015 report – we are unable to comment on what works were undertaken after the assessment was completed.

c) Did you have any further concerns regarding ongoing commissioning of the water system at the time of the 2017 report?

A DMA made comment on there being no records available for commissioning around TMVs and that some local hot flow and return loops should be commissioned (meaning the pipework be (re)balanced to ensure hot water in flow and return lines in these areas was running at correct temperatures). DMA were not aware of any ongoing commissioning at this stage, and other than noted above did not highlight any concerns around the system commissioning.

d) Likewise, did any concerns remain regarding ongoing commissioning at the time of the 2019 report?

A The 2018 report DMA made comment that a small number of local hot flow and return loops should be commissioned (meaning the pipework be (re)balanced to ensure hot water in flow and return lines in these areas was running at correct temperatures). DMA were not aware of any ongoing commissioning at this stage, and other than noted above did not highlight any concerns around the system commissioning.

e) What impact, if any, did lack of commissioning have on the integrity of the water system and the water supply? Were there issues which could have been avoided if adequate commissioning was carried out prior to handover in 2015?

A DMA did not highlight any lack of commissioning on the water system within the 2015 assessment, though DMA made comments on the hot and cold water temperatures within the QEUH/RHC stating these were in line with records we had been provided access to, along with our recommendations in line with what we witnessed.

f) Likewise, were there any issues at the time of 2018 and the 2019 which could have been avoided had adequate commissioning been carried out?

A See responses above.

Planned Preventative Maintenance (PPM)

96. Refer to page 13 of the 2018 report in reference to the GAP analysis DMA Canyon advised *'as part of this assessment and recorded several gaps in the PPM program (verbally advised by NHS Estates).'*

a) Who in Estates advised that there were gaps in the PPM program?

A As stated within the 2018 Gap Analysis (page 1 of Gap Analysis, Page 182 of the full report) information was provided by NHS Estates Representatives: David Brattey, Paul McAllister and Tommy Romeo with additional information from Ian Powrie.

b) What were the gaps identified?

A The gaps identified were as recorded in pages 1-12 of the Gap Analysis.

c) What is the benefit of a PPM program?

A A PPM regime allows for all the tasks required in order to manage and run the water systems(s) safely, and within the design parameters, are allocated and scheduled in order to check and identify any issues in the operation of the system in a proactive manner.

d) What impact, if any, did not having a full PPM program have on the operation and maintenance of the water system at QEUH/RHC?

A Having gaps in the PPM regime could result in issues in the water system not being identified to allow corrective/remedial actions to be taken in a timely manner and potentially maintenance and monitoring tasks not being carried out on frequencies recommended within guidance and/or manufacturers instructions.

e) When should a PPM program have been implanted? i.e prior to handover, following handover?

A A PPM regime should be implemented from the time water is first introduced into the water system(s). The requirements of a PPM regime would change as the building moves from the construction phase into the handover phase and then into full operation.

f) The Inquiry understands from the 2015 report (page 236) that Mercury Engineer provided a PPM schedule. Are you aware of Estates staff having completed/ followed the schedule?

A DMA had very limited involvement within the QEUH/RHC during the period between the 2015 and 2018 reports and are unable to comment on what PPM regime was implemented.

g) What reasons were given by Estates staff for their not being a complete PPM program in 2018?

A No explanation was provided.

h) Were you surprised to find that there were gaps in the PPM program in 2018?

A It was surprising to see that some tasks had not been implemented by 2018, or had only been implemented in some “high risk” areas and not rolled out into all areas, and that parts of the management regime required around the water system had not been implemented. However, the purpose of the gap analysis was to assist Estates in

identifying any gaps within their PPM regime, and it is very rare to carry out a review of the regime and not identify some gaps in the regime on any site.

i) Was adequate action taken to remedy this by Estates staff following the 2018 report?

A There were still some gaps identified in the PPM regime during the 2019 report. Currently there now appears to be a comprehensive PPM regime in place, with DMA understanding that Annual AE audits highlight very few gaps in the PPM regime.

97. Did Estates staff not having access to BEMS impact on PPM? If so, how so?

A As noted within the 2015 assessment some alarms/faults may have been missed because Estates staff did not have access to the BEMS system at this point. Other than this we do not know how this impacted on the PPM regime as DMA had very limited involvement after the 2015 report.

Mercury Engineering

98. Describe the role of Mercury Engineering in respect of carrying out the 2015 report? Why did they assist on site when the 2015 report investigations were being carried out?

A Mercury Engineering provided DMA within initial site tours of the building and the water system layout. Other than this DMA had very little involvement with Mercury Engineering, with DMA being contracted to carry out the works and report to GG&C Estates.

99. Describe your understanding of the role of Mercury Engineering prior to handover of QEUH/RHC from Multiplex? Who were they instructed by, and what was their role and responsibilities? Were they instructed in respect of the design of the water system?

A DMA were advised that Mercury were the water system installers. We have no knowledge of their exact remit.

100. What role did Mercury Engineering retain following handover? Who instructed them and why?

A DMA are not aware of what Mercury's role (if any) was post handover.

101. In respect of the domestic hot and cold water outlets page 17 of the 2015 report:

'There are connection points onto other "non-domestic" outlets (see Section 8 for details) which are connected to the Bulk Water system. It is advised that Estates (or Brookfield/Mercury) confirm these systems have suitable backflow protection installed or if necessary suitable backflow protection fitted.'

At the time did you agree with this advice? Do you still agree with this advice? If you did not agree with this advice, did you raise the matter with Mercury Engineering? If not, why not? Explain your answer.

A This statement was made by DMA – so yes we agree with the statement and would still agree with this advice being provided. This matter was not raised with Mercury Engineering by DMA as that was not within our remit and instruction – DMA were contracted and reported to GG&C Estates.

102. What explanation were you given by either Estates staff or Mercury Engineering for the delay in respect of Raw Water Tank 1A, which was isolated pending repair creating a deadleg? What impact, if any, did this delay have on the water supply? Page 22 of 2015 report.

A No explanation was provided, other than a repair was required on the mains inlet. See response to Q71 for potential impact this may have had.

103. Refer to page 26 of the 2015 report. Were Mercury Engineer advised to turn on Calorifier 32-03 during the walk-round in January 2015? Were you surprised that it remained offline in April 2015? Describe the impact, if any, this had.

A This was pointed out during the walk round with Mercury Engineering. We cannot recall the reason provided for this being offline at the time of the walk round (if one was provided). Yes we were surprised that the calorifier was still offline. The impact this would have had would have been very similar to the impact of the offline CWSTs as described in response to Q71.

104. Refer to page 111 of the 2015 report. Mercury Engineering advised '*that the domestic hot water systems do not operate on a conventional flow and return system, with principle, sub-ordinate and tertiary loops, instead utilising a reverse return circuit.'* The report goes on the advise '*This means that there are longer "deadlegs" to the outlets than SHTM 04-01 advises.'* Is this as you would expected to see in a healthcare setting?

Was this compliant with SHTM? How, if at all, did this impact the hot water system? What was Mercury Engineering's role in respect of the hot water system?

A SHTM 04-01 Part G (which was issued in draft format at the time of the 2015 assessment) states "the length of any dead-legs is checked and minimise where possible by taking the return leg pipework up to wash hand stations and sinks. (this should be included in the Legionella Risk Assessment for the water system);" with SHTM 04-01 Part A Note 20 stating "the circulation taken close to the draw-off point" and drawings 2(i) to 2(iv) all showing the hot flow and return being taken down to the outlets. SHTM 04-01 Part A guidance was issued in 2014 and it may have been the case that the design for the water system was complete and agreed by parties involved completed and installation underway and changes to the design and installation were not practical at this point. DMA carried out the risk assessment based on the guidance provided within SHTM 04-01 as this was the up to date standard at the time of the assessment.

As stated above DMA were advised that Mercury were the water system installers. We have no knowledge of their exact remit.

105. At page 111 of the 2015 report: *'DMA were advised by Mercury Engineering and Estates that all materials fitted during the construction are WRAs approved and therefore do not support bacterial growth. In particular Horne TMV taps were designed specifically with Legionella and Pseudomonas control in mind. The use of EPDM flexible hoses in some areas may contradict this statement and their use should be reviewed to ensure compliance.'*

a) What WRA approved mean? Why should materials be WRA approved?

A WRAS – Water Regulations Approval Scheme. The WRAS website states:

"Gaining approval from WRAS, the Water Regulations Approval Scheme, is an easy way to demonstrate compliance with water fittings regulations1. We certify plumbing products and materials in the UK following rigorous tests in accredited laboratories – and consumers trust us."

https://www.wrasapprovals.co.uk/about/

b) Who from Estates advised DMA Canyon of this?

A Unable to recall specifically who advised DMA of this.

c) What was Mercury Engineering's role?

A As stated above DMA were advised that Mercury were the water system installers. We have no knowledge of their exact remit.

d) What does it mean that the *'the use of EPDM flexible hose in some areas may contradict this statement"*? Is EPDM flexible hose WRA approved?

A In 2009 NHS Scotland issued a Safety Action Notice in regard to the use of flexible hoses (SAN(SC)09/03) and SHTM 04-01 advises against the use of EPDM flexible hoses

SAN(SC)09/03 stated *" HFS has received reports that high levels of Pseudomonas and Legionella bacteria have been found in water samples taken from water outlets fed by flexible hoses, confirmed by testing of the hoses which revealed colonisation of the lining. The lining material in these reports was EPDM. However, it is possible that other lining materials (and washers within the couplings) could be similarly affected."*

e) Why was EPDM flexible hose used? How would have installed this?

A DMA were not involved in the decision making process for this and can't comment. It is presumed the flexible hoses were connected by Mercury Engineering.

f) The 2018 report at page 11 refers to the use of EPDM flexible hose, had any of the recommendations to remove the flexible hose from the 2015 report been actioned in 2018? If not, what explanation was provided by Estates staff or Mercury Engineering?

A DMA were not aware of any flexible hoses being removed by the time of the 2018 report. No explanation was provided.

g) What impact, if any, did this use of EPDM flexible hose have on the water system and guidance compliance?

A It is very difficult to state what impact, if any, the use of the EPDM flexible hoses actually had on the water system.

With regards to guidance compliance please refer to the response to Q 105 d) above.

h) The 2019 report further advises the removal of flexible hose. Had any action in respect of the 2018 report recommendations relating to flexible hose been actioned at the time of the 2019 report? What did you think of the action/ lack of action taken?

A DMA were not aware of any flexible hoses being removed by the time of the 2019 report. No explanation was provided, though DMA were aware that being able to source suitable connections to replace the EDPM flexible hoses was not always straightforward, and some tap types did not have stainless steel, copper or other approved material alternatives available.

Conclusion

106. Provide brief details of any instruction to carry out further work or investigation by GGC Estates staff following the 2019 report.

A DMA commenced carrying out work within the QEUH/RHC building in 2018, with tasks allocated to DMA based on Estates requirements at the time. DMA were not directly instructed to work on any issues or recommendations made within the risk assessment. Since initially starting work in the building in 2018 additional tasks have been allocated to DMA to carry out to aid compliance with guidelines.

107. Describe what concerns, if any, you had regarding communications within GGC Estates staff?

A As stated within the 2015 report *"DMA have been informed by Estates personnel there have been breakdowns in communication between Estates, Projects and Building Contractor(s) where defects highlighted by NHS Estates to other parties are being acted upon without Estates being informed to allow proper consideration of bacterial control to be made, or to review/sign off that actions have been carried out in a compliant manner minimising any potential bacterial control impacts."*

108. Do you consider the state of the water system at the time of either the 2015 or 2018 reports could be said to present or presented an additional risk of avoidable infection to patients? Explain your answer.

A DMA recorded parts of the water systems and the Management of the water systems as being "High Risk" in both the 2015 and 2018 risk assessments, and therefore could present an elevated risk to users of the water system.

109. Confirm the basis of opinions reached in your answers, having regard to any experience or expertise that you may hold in respect of the subject matter of the question.

A See attached CV for details of qualifications and experience etc. The opinions provided in response to the answers are based on my experience of working within the Legionella Control/Water Hygiene industry for over 25 years and from personally being involved in carrying out risk assessments and other works within the QEUH, and the records and , where appropriate, my recollection of the events being referred to within the questions.

Declaration

I believe that the facts stated in this witness statement are true. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief in its truth.

The witness was provided the following Scottish Hospital Inquiry documents for reference when they completed their questionnaire statement.

Appendix A

A33870454- DMA Canyon Report 2019- Water Systems Risk Assessment

A43293438- Scottish Hospitals Inquiry- Hearing Commencing 12 June 2023- Bundle 6 Miscellaneous documents (external version)

A47540489- Provisional Position Paper 11- Potentially Deficient Features of the water system

The witness provided the following documents to the Scottish Hospital Inquiry for reference when they completed their questionnaire statement.

Appendix B

A49139880- 141208 – FW_NSGH Water system details_Transmission No 1

A49139900- 141210 – RE_ GG+ C Policy document_written scheme

A49139907- 141216- Legionella Risk Assessment and Written Scheme

A49139946- 141230- NSGH Legionella Risk Assessment and Written Scheme

A49139888- 150106- DMA – Zutec Online O and M Access_

A49139913- 150106- NSGH Water System Drawings

A49139870- 150106- RE_NSGH Water System Drawings

A49139876- 150109- RE_NSGH Water System Drawings

A49140126- 150109- RE_NSGH Water System Drawings

A49140723- 150112- Questions to Ian Powrie

A49141059- 150116- RE_sample draw off record

A49141207- 150116- Written Scheme Guidance

A49141171- 150307- SGUH L8 RA

A49141222- 150409- Risk Assessment Queries

A49141249- 150422- Calorifiers Temps

A49140747- 150422- MRI Chillers Query

A49141304- 150506- RE_Risk Assessment

A49141233- 150610- NHS SGUH

A49139820- Q1- David Watson CV 2023

A49139804- Q10 & Q25- Q33553 GG&C New SGH Building L8 RA

A49139781- Q25- PO SGH L8 RA 2015

A49139773- Q28- DMA Delivery Note Register

A49139806- Q30a- 150610- NHS SGUH

A49139828- Q32- 170904 QEUH L8 RA Update PO

A49139846- Q32- Q171049DW GG&C QEUH L8 RA Update

A49139852- Q8- DMA Organogram 2024

– Water Regulations Approval Scheme Ltd - About Us (wrasapprovals.co.uk)

David Watson

[redacted]

Email: david[redacted]

Experience

2017 – Present Director – DMA Canyon Ltd

The responsibility for the day to day management of supervisory staff within DMA. Overseeing compliance Manager to ensure compliance with relevant guidelines (L8, HSG 274, SHTM 04-01, COSHH, HASAW 1974 etc.) and Legionella Code of Conduct requirements.

Liaising with Mechanical Director in relation to plumbing remedial works to ensure compliance with appropriate water treatment standards.

Water treatment and legionella control and consultancy encompassing industrial, commercial and domestic water systems as well as cooling towers and closed water systems.

Experience with DMA and other leading water treatment companies resulting in wide and varied experience of client requirements and providing management systems and solutions to meet and exceed these requirements.

Ensuring DMA Canyon retain a high quality standard of services and consultancy by liaising with colleagues and industry bodies and experts to ensure the most up to date and effective programmes are made available to our clients.

Workplace Inspections on staff/operators as part of the company's auditing process as well as carrying out technical proofing of risk assessments and other consultancy documents, ensuring the document is correct for the clients and maintaining a high standard of work. Identifying training issues for staff to improve the service provided.

- Legionella consultancy & Risk Assessments
- NHS specific consultancy (e.g. pseudomonas, (S)HTM 04-01 Risk Assessments)
- Pseudomonas Risk Assessments
- Specialist investigative works and consultancy services provided to clients as well as bespoke remedial action packages and programs.
- Legionella Risk assessments of domestic water systems
- Risk assessments of Cooling Towers
- Cleaning & disinfection of Cold Water Storage Tanks, water heaters, pipework and systems
- Cleaning and Disinfection of Cooling Towers and Evaporative Condensers
- Temperature monitoring of sentinel points, representative outlets, calorifiers, water heaters and Cold Water
- Storage Tanks
- Microbiological (Legionella, Potable, Pseudomonas) sampling
- Cleaning & disinfection of showerheads
- Technical editing of risk assessments
- Creating schedules for staff/technicians
- Client meetings
- Chemical Cleaning of closed water systems (LTHW/Chilled)
- Implementation of ISO 9001 Quality Management System
- Implementation of OHSAS 18001 Safety Management System

1999 – 2017 Director – DMA Water Treatment Ltd

The responsibility for the day to day management of supervisory staff within DMA. Overseeing compliance Manager to ensure compliance with relevant guidelines (L8, HSG 274, SHTM 04-01, COSHH, HASAW 1974 etc.) and Legionella Code of Conduct requirements.

Water treatment and legionella control and consultancy encompassing industrial, commercial and domestic water systems as well as cooling towers and closed water systems.

Experience with DMA and other leading water treatment companies resulting in wide and varied experience of client requirements and providing management systems and solutions to meet and exceed these requirements.

Ensuring DMA Water Treatment retained high quality standard of services and consultancy by liaising with colleagues and industry bodies and experts to ensure the most up to date and effective programmes are made available to our clients.

Workplace Inspections on staff/operators as part of the company's auditing process as well as carrying out technical proofing of risk assessments and other consultancy documents, ensuring the document is correct for the clients and maintaining a high standard of work. Identifying training issues for staff to improve the service provided.

- Legionella consultancy
- NSH specific consultancy (e.g. pseudomonas)
- Specialist investigative works and consultancy services provided to clients as well as bespoke remedial action packages and programs.
- Legionella Risk assessments of domestic water systems
- Risk assessments of Cooling Towers
- Cleaning & disinfection of Cold Water Storage Tanks, water heaters, pipework and systems
- Cleaning and Disinfection of Cooling Towers and Evaporative Condensers
- Temperature monitoring of sentinel points, representative outlets, calorifiers, water heaters and Cold Water
- Storage Tanks
- Microbiological (Legionella, Potable, Pseudomonas) sampling
- Cleaning & disinfection of showerheads
- Technical editing of risk assessments
- Creating schedules for staff/technicians
- Client meetings
- Chemical Cleaning of closed water systems (LTHW/Chilled)
- Implementation of ISO 9001 Quality Management System
- Implementation of OHSAS 18001 Safety Management System

1996 to 1999 Operations Supervisor - Lothian Water Treatment

Operations Supervisor responsible for day to day works carried out by site operators. Duties included scheduling of site visits and ensuring the requirement of clients on site were carried out in accordance with contractual and legal obligations.

- Legionella Risk assessments of domestic water systems
- Risk assessments of Cooling Towers
- Cleaning & disinfection of Cold Water Storage Tanks, water heaters, pipework and systems
- Cleaning and Disinfection of Cooling Towers and Evaporative Condensers
- Temperature monitoring of sentinel points, representative outlets, calorifiers, water heaters and Cold Water
- Storage Tanks
- Microbiological (Legionella, Potable, Pseudomonas) sampling
- Cleaning & disinfection of showerheads
- Technical editing of risk assessments
- Creating schedules for staff/technicians
- Client meetings
- Chemical Cleaning of closed water systems (LTHW/Chilled)

1995 – 1996 ES Technician - Deveron Environmental Services

Environmental Services Technician responsible for carrying out routine legionella and water hygiene monitoring works, legionella risk assessments, cleaning and disinfection works and microbiological sampling.

- Legionella Risk assessments of domestic water systems
- Cleaning & disinfection of Cold Water Storage Tanks, water heaters, pipework and systems
- Cleaning and Disinfection of Cooling Towers and Evaporative Condensers
- Temperature monitoring of sentinel points, representative outlets, calorifiers, water heaters and Cold Water
- Storage Tanks
- Microbiological (Legionella, Potable) sampling
- Cleaning & disinfection of showerheads
- Chemical Cleaning of closed water systems (LTHW/Chilled)

Accreditations

M.W.M.Soc - Full Member of the Water Management Society (since 2018)
MIHEEM - Member of The Institute of Healthcare Engineering and Estate Management (Since 2020)

Training

Training Organisation	Course Title
Pro Lp	Microbiological Awareness and Risk Assessment in Healthcare Building Water Systems Advanced Course
Pro Lp	Legionella Advanced Understanding Training
Pro Lp	Pseudomonas Awareness in NHS Water Systems
Pro Lp	Hospital Water Systems Microbiology
Legionella Control International	Legionella Awareness Hot and Cold Water Services & Other Risk Systems Systems (LCA 9000) (9950-05)
Legionella Control International	Legionella Awareness Hot and Cold Water Services & Evaporative Cooling Systems (LCA 9001) (9950-05)
BPEC	The Water Supply (Water Fittings) (Scotland) Byelaws 2014 (WB2014)
Develop	Legionella Water Systems Refresher Update (City & Guilds) (BS8)
Develop	Legionella HSG 274 Part 1 Update and Interpretation (City & Guilds) (BS8/SP)
BRIO Group	Spa Pool Legionella Awareness
Horne Engineering	Maintenance Seminar Thermostatic Mixing Valves and Optitherm Tap
Eastwood Park	Managing Legionella in Building Water Systems (City & Guilds)
David Harper Associates	The Appreciation of the Maintenance and Management of a Building's Water System's, with regards to Legionnaires Disease, to include Cooling Towers and Logbooks
St Andrews First Aid	First Aid at Work
IOSH	Managing Safely
IOSH	Working Safely
UKATA	Asbestos Awareness
CN Safety	Confined Space Safety
CN Safety	Working at Height
CN Safety	Hazard Identification
CN Safety	Asbestos Awareness
CN Safety	Manual Handling
CN Safety	COSHH Awareness

Scottish Hospitals Inquiry
Witness Statement of
Matthew Lambert

This statement was produced by the process of sending the witness a questionnaire with an introduction followed by a series of questions and spaces for answers. The introduction, questions and answers are produced within the statement.

Personal Details

1. Name, qualifications, chronological professional history, specialism etc – please provide an up-to-date CV to assist with answering this question.

A Matthew Lambert, BSc Building Services Engineering, BEng (Hons) Building Services Engineering, MCIBSE, specialise in the design and specification of mechanical building services. CV attached for reference, which includes career history.

Professional Experience and Qualifications

2. Provide details of any experience you have working in healthcare facilities and settings. Experience gained and qualifications obtained etc.

A I have been directly involved with detailed design and specification of most mechanical building services (natural gas, domestic water services, heating, ventilation, air conditioning, etc.) for numerous healthcare projects during my career. This also includes surveying and reports pertaining to existing installations/systems.

3. Confirm your understanding of the importance and purpose of SHTM/HTM guidance in respect of ventilation in a healthcare setting? Do you hold any qualifications relevant to this?

A (Scottish) Health Technical Memorandum are a suite of guidance documents covering a range of engineering topics specifically relating to Healthcare, which include ventilation (SHTM/HTM 03-01, Parts A & B).

SHTM 03-01 offers detailed guidance with regards to the design, selection, operation, verification, maintenance, etc. of ventilation systems with a view to supporting design engineers, estates teams, installers, and maintenance personnel, to ensure that systems are fit for purpose (i.e. achieve required function/performance, are safe, are reliable, appropriately maintained, etc.).

No, I do not hold specific qualifications relative to SHTM/HTM's.

4. What is your understanding of the need to appoint post holders in respect of ventilation compliance, such as Authorised Persons etc in accordance with SHTM03-01?

A To ensure that ventilation systems are designed, installed, tested, commissioned, operated and maintained appropriately and safely.

5. Please provide details of any qualification and experience that you hold in respect of Health and Safety at Work Act 1974 compliance within a healthcare setting.

A No specific qualifications. When involved with the design of mechanical building services within a Healthcare setting I would refer to SHTM's, Scottish Building Regulations, and CIBSE Guidance, which would effectively achieve/better requirements set out within the Health and Safety at Work Act.

Innovated Design Solutions

7. Describe the services that Innovated Design Solutions provide, including areas Innovated Design Solutions offer experience and knowledge in?

A Predominately specialise in the design and specification of mechanical and electrical building services, including site monitoring. Also offer various other services such as feasibility studies, advice with regards to renewable/sustainable technologies, capacity analysis, surveying and reporting (condition reports, pre-acquisition, dilapidation, etc.).

8. Describe any areas of specialism or particular focus that Innovated Design Solutions offer experience and knowledge in

A As point 7 above.

9. The Inquiry is aware that Innovated Designs were instructed in respect of the refurbishment works to Ward 2A and 2B, is this usual, or are you normally instructed in respect of new build projects?

A We were not initially instructed with regards to the refurbishment works within the Wards, albeit we did retrospectively produce a brief/scope to facilitate the appointment of a Lead Consultant to undertake refurbishment works (attached for reference).

A large extent of our previous experience relates to existing buildings. We are also experienced/knowledgeable with regards to mechanical ventilation systems (in most buildings), therefore this request was not deemed to be unusual.

10. Describe the company structure of Innovated Design Solutions and the role you hold, and provide details of the training have you undertaken/ which is relevant in order to meet the needs of this role?

A Please refer to attached CV.

11. Describe your day-to-day duties within Innovated Design Solutions

A Typical daily duties involve the design and specification of mechanical building services, attending site meetings, reviewing progress of installations on site, and general administration (emails, fee quotations, answering queries, etc).

Initial involvement with QEUH/RHC

12. Provide details of when Innovated Design Solutions were first involved with QEUH/RHC;

a) What, in broad terms, were the terms of your involvement?

A Initial scope/duties were to determine the viability of providing 6 air changes per hour (6 ac/hr) within the existing single Bedroom spaces located in Ward 2A, and within the DCU and BMT Day Wards of Ward 2B.

This typically entailed collating and reviewing record information from Zutec, ascertaining existing room air change rates, determining the increase in air change rates to achieve the desired 6 ac/hr, establishing if the existing ductwork distribution systems were capable of handling the additional air flow rate requirements, and providing a brief outline report appertaining to findings.

b) Who instructed you?

A Following initial discussion with Mary Anne Kane and Alan Gallacher, we were asked to liaise with Ian Powrie thereafter. From memory, our instruction/appointment was raised by Ian Powrie.

c) Who did you deal with?

A Predominately Ian Powrie.

d) What was the nature and purpose of the work carried out by Innovated Design Solutions at QEUH/RHC?

A As described in point a. above.

13. Please explain, in broad terms, what at the time you understood to have been the event or events which prompted your instruction?

A From memory, we were not aware of any particular events at this time. We understood, from the request, that there was concern air change rates within these rooms were below 6 ac/hr.

Being instructed to carry out reports

14. The Inquiry is aware that Innovated Design Solutions produced 2 reports in respect of feasibility studies for Wards 2A and 2B. The Ward 2B report: '*Report prepared by Innovated Design Solutions dated 15 October 2018 titled "Feasibility Study Regarding Increasing Ventilation Air Change Rates within Ward 2B'*– Refer the document 33 Bundle 6, Miscellaneous documents.

a) What, in broad terms, was the remit of your instructions? Were there specific instructions given in relation to Ward 2B?

A Our initial remit was as described above in Point 12 a.

During the analysis process we were asked to incorporate/include additional aspects such as the impact increased air change rates would have on the systems (generally), a high-level outline of what alterations could be required to the existing systems in order to facilitate the increased air changes (together with outline cost/time estimates), and a note of any additional observations made with regards to the existing system installations.

b) At the point of initial instruction what issues, if any, with the ventilation system in respect of Ward 2B were you made aware of?

A As Point 13.

c) Why was the feasibility study instructed?

A As Point 13.

d) Who instructed you?

A As Point 12.

e) What background information, if any, were you provided with and by whom?

A We were given access to Zutec, and online/digital record documentation system. From memory this was provided via Colin Purdon from the site Estates Team.

15. The Ward 2A report: *Report prepared by Innovated Design Solutions dated 24 October (revision 01, 30 October 2018) titled "Feasibility Study Regarding Increasing Ventilation Air Change Rates within Ward 2A"* Refer to document 34, Bundle 6, Miscellaneous documents.

a) What, in broad terms, was the remit of your instructions? Were there specific instructions given in relation to Ward 2B (assumed this should refer to Ward 2A)?

A As Point 14 a) - In terms of specific instruction with regards to Ward 2A, we were asked to incorporate additional options in relation to upgrading the facilities, taking cognisance of guidance within SHTM03-01 and SPHN 04 (Isolation Facilities in Acute Settings).

b) At the point of instruction what issues, if any, with the ventilation system in respect of Ward 2A were you made aware of?

A As Point 14 b).

c) Why was the feasibility study instructed?

A As Point 14 c).

d) Who instructed you?

A As Point 14 d).

e) What background information, if any, were you provided with and by whom?

A As Point 14 e).

Addressing the Ventilation System

16. Who designed the ventilation system for QEUH/RHC?

A I believe Multiplex were the Main Contractor, and TUV SUD were appointed as the design consultant in relation to the mechanical ventilation systems, along with the other mechanical services within the building.

17. What information were you provided with in respect of the design of the ventilation system prior to carrying out the feasibility studies?

A None from memory, I was afforded access to Zutec.

18. To what extent were you able to ascertain the design philosophy underlying the ventilation system, or different elements of the ventilation system?

A Unable to provide comment with regard to the underlying design philosophy (unknown), however, we believe our analysis enabled a relatively accurate interpretation of the probable design intent and operational functionality of the ventilation systems.

19. What hinderances presented themselves you in attempting to ascertain the thinking underlying the ventilation system?

A Zutec was difficult to navigate, especially at the start of the process.

Lack of definitive design brief/scope.

As-Fitted drawings were deemed to be incomplete and inaccurate in some instances. Drawings also lacked detail, particularly with regards to terminal devices and associated air flow rates. It was necessary to relate third party commissioning data (from H&V) to As-Fitted record drawings in order to carry out the analysis.

Discrepancies were noted between air flow rates stated by the AHU manufacturer, H&V commissioning data, the designer, and from our own calculations.

There was a lack of technical literature/data within record documentation with respect to some elements of equipment and terminal devices.

It was necessary to liaise directly with the AHU manufacturer in order to establish AHU capacities/limitations and selection principles.

20. Please comment on the extent of available documentation to enable you to do so. Did the availability of information match your expectations?

A As Point 19.

21. You mention in your reports occasions on which you had to work on the basis of assumptions. In what areas was this required? To what extent did you have to revisit assumptions while carrying out your work? Did that in itself lead you to draw inferences about the ventilation system?

A Whilst undertaking our analysis concerns regarding the ventilation systems became more apparent and the urgency to complete our findings and issue the associated reports was duly emphasised on numerous occasions. We were also asked to include additional elements within the reports. In view of this, the practical viability of revisiting calculations, record documents, etc. to check various aspects was unfortunately very limited, which essentially resulted in the use of phrasing such as ‘anticipate’, ‘assumed’, etc.

In some instances there was absence and/or inaccuracy with regard to aspects of record documentation (such as discrepancies pertaining to ductwork dimensions, system air flow rates, terminal devices, etc.), which would have also led to the use of this form of terminology.

Ward 2B report

Please refer to document 33, Bundle 6 for assistance.

22. What did you understand to be the patient cohort intended for Ward 2B?

A Record drawings intimate BMT Day Ward and Day Stay Ward, thereby implying they are utilised by patients being cared for in terms of bone marrow transplant.

23. What specialist ventilation requirements, if any, did the patient cohort require?

A Design guidance within SHTM 03-01 relating to Neutropenic Patient Ward would be more appropriate (10 ac/hr, positively pressurised).

24. What ventilation specification would you have expected to see?

A As Point 23.

The Lead Consultant Appointment Brief (produced after feasibility reports) essentially outlined what we considered appropriate to this type of facility, whilst also taking cognisance of supplementary facilities/ancillaries agreed following discussions with estates and infection control (i.e. monitoring and automatic control of Bedroom/Corridor pressure differentials, etc.). Note this brief related to works within Ward 2A, and not Ward 2B.

We were subsequently asked to produce an Appointment Addendum with regards to Ward 2A BMT and Ward 2B areas (both appointment documents are attached for reference). The purpose of these works was intended to 'improve' air cleanliness, air movement (differential pressures), and air change rates, without significant modification/replacement of existing ductwork distribution installations.

25. To what extent were you furnished with material to enable you to verify what specification had been used, and what had been the thinking behind that choice?

A The verification of specification did not form part of our scope as we were instructed to determine the viability of increasing air change rates to 6 ac/hr. Reference was made to SHTM 03-01 within the report as it was related to observations.

26. What initial observations, if any, did you have regarding the design of the ventilation system?

A Existing ventilation air change rates seemed abnormally low and supply/extract air volume flow rates tended to suggest the potential for air movement from circulation spaces towards patient areas.

27. Describe your understanding of why the ventilation system was designed as you found it?

A When considering air change rates, AHU/fan selections, resilience, ductwork selection, etc., it is very difficult to understand any rational in terms of the design intent, even when considering a ‘General Ward’ or ‘Single Room’ application.

From a completely speculative viewpoint there could be multiple reasons, such as:-

- Design carried out by an inexperienced engineer that was unfamiliar with associated design guidance, and/or the design was not appropriately checked by a senior/experienced engineer.

- Pressure to achieve additional project cost savings. Decreasing air change rates would reduce AHU requirements, reduce ductwork sizes, etc., thereby reduce the overall capital cost of the installations. Although this wouldn’t seem to justify reasoning in terms of dirty extract systems being integrated within the Ward 2A system.

- Inaccuracies with regards to the design brief, and/or an agreed deviation from the design brief/SHTM's. However, there would normally be formal/written record in relation to any deviation from design brief, especially in terms of such a significant/abnormal deviation from SHTM guidance.

- Misinterpretation of the proposed function of the facilities, although if this was the case we would still expect the systems to have been designed based on 6 ac/hr (General Ward / Single Room).

- A post-design change in terms of the use/function of these rooms/areas, that was not appropriately communicated to the design team. However, record drawings intimate the use of these facilities (room names), and this would still not justify the extent of deviation from SHTM guidance relating to General Ward/Single Room requirements.

28. Please describe the significance of SHTM 03-01 with respect to the task for which you had been instructed.

A As Point 25.

29. In respect of Ward 2B, what concerns, if any, did you have regarding compliance with SHTM 03-01?

A Ventilation air change rates seemed abnormally low, and supply/extract air volume flow rates tended to suggest the potential for undesirable air movement from circulation spaces towards patient areas.

Air handling unit (AHU) supply and extract fans were not capable of providing the necessary air volumes.

AHU selection did not appear to be afforded with appropriate resilience with regards to spare capacities, to facilitate ongoing maintenance regimes without undermining patient comfort and safety, and/or to protect against critical plant fault/failure. Selection was also made on the basis of clean filters, which

suggested there to be a risk of abnormally low air change rates decreasing further.

Air terminals did not appear to be suitable in terms of potentially increasing air flow rates. Moreover, there was dubiety with regards to the appropriateness of supply air terminals relative to the design/installed air flow rates.

The use of a thermal wheel heat recovery device, and associated risks in terms of potential cross-contamination (leakage and carryover).

H&V commissioning records stated that AHU 24 fan chamber was full of water, thereby implying the equipment was potentially not fit for use.

30. What other guidance, if any, did you have in mind when carrying out your assessment of Ward 2B? Please describe your assessment of any such compliance, and the significance of this.

A CIBSE ventilation design guidance relating to maximum ductwork velocities within critical care facilities. Numerous sections of the installed ductwork distribution system was deemed to be inappropriately sized relative to the associated recommended maximum air velocities. This not only restricted the feasibility of increasing air change rates, it also suggested that there could be excessive noise generation from the distribution that could cause annoyance to the patients, particularly where routed within ceiling voids directly above Bedrooms.

DW/144 (Ductwork Specification) provides minimum requirements with regards to the manufacture of ductwork in terms of velocity/pressure classifications. We anticipate the ductwork was designed and installed relative to a low pressure Class A system, and not in accordance with the pressures stated within final commissioning records. Moreover, pressure losses at commissioning stage would be based on a completely new and clean system, thereby system resistances would appear only likely to increase once in use.

CIBSE guidance with regards to heat recovery devices. Guidance identifies there could be a 1% to 10% risk of cross-leakage with the use of a thermal wheel device.

Air handling units

31. In section 1.01 of you report you write that 'a significant discrepancy was identified with the selection of the air handling units'.

a) Can you explain the nature of this discrepancy?

A AHU selections were based on abnormally low room air change rates, did not appear to be afforded with appropriate resilience with regards to spare capacities, did not facilitate ongoing maintenance regimes without undermining patient comfort and safety, and/or afford protection with regards to critical plant fault/failure. Selection was also made on the basis of clean filters, which suggested there to be a risk of abnormally low air change rates decreasing further.

b) You mention having proceeded on the assumption of a 125% capacity level for these units. Why did you make that assumption?

A From memory, this level of spare capacity was stated within record documentation contained on Zutec.

c) How did you come to the view that it was unfounded?

A From our analysis (calculations, assessing record drawings, commissioning data, etc.) and the subsequent direct communication with the AHU manufacturer to verify selection parameters.

d) Please explain the significance of the units instead having been selected based on 100% air volume, with clean filters?

A Limited spare capacity in terms of air volumes and pressures, which could undermine the (intended) performance of the system once in use.

It also limits the viability of increasing air volumes at a later date (i.e. to facilitate building/facilities modifications, etc.), and could adversely impact the life expectancy of the equipment by continuously operating near full capacity.

e) How important is the 25% additional capacity?

A In my opinion it is very important to afford some level of resilience/spare capacity with respect to the design and selection of equipment, for most systems. If a 25% spare capacity formed part of the Clients requirements, and/or was offered/stated as part of record documentation, it would be deemed a critical aspect (effectively a non-compliance with contractual obligations that adversely impacts the entire system).

f) How did this, if at all, impact on the air changes?

A As Point 31 c.

g) How significant is the assumption of 'clean filters'? How does that affect the performance of the units? How did this, if at all, impact on the air changes?

A Very important/significant. Filters would only be completely clean until initial operation, and/or following replacement. Once operational, filters, ductwork, terminal devices, dampers, etc. would accumulate dust/debris/dirt, which would increase external system resistance and adversely impact air flow rates. The resultant impact of this could be a reduction in air change rate(s), which would be exacerbated relative to operating hours, cleanliness of the environment(s), and frequency of cleaning (ductwork, terminals, filters, etc.).

h) What issues, of any, were created by the selection of these air handling units?

A As described in Points above.

i) What impact, if any, did this have on the ability to carry out air change compliance with SHTM03-01?

A It was not deemed feasible to increase air change rates to 6 ac/hr, thereby compliance with SHTM 03-01 would not be viable.

j) To what extent was any such difficulty a result of the air handling units, and to what extent was it the result of other factors?

A As described in Points above. The inability to achieve 6 ac/hr was not only linked to AHU selection.

k) Are you able to draw any inference as to why those particular air handling units were selected?

A Only speculatively, incompetence in terms of the design.

Competence of the manufacturer could possibly also be questioned, if the 'peak design air flow rates' were advised and the AHU's were selected by them without any meaningful extent of spare capacity. Notwithstanding this, it is ultimately the designers responsibility to select and specify the AHU, not the manufacturer (i.e. designer should check information provided by the manufacturer, if they do not select equipment/duties).

l) What air handling units in your opinion should have been selected?

A Reference should be made to the attached 'Lead Consultant Appoint Brief', which duly outlines performance criteria (relative to Ward 2A).

AHU's (and associated ductwork, ancillaries, etc.) with higher capacities to afford air change rates more akin to the proposed purpose of the facilities being served, along with some degree of spare capacity to facilitate future flexibility.

Occupants are completely reliant on fresh air supplies derived from the mechanical ventilation systems in these rooms (for regulatory compliance, disregarding any other guidance documents such as SHTM's and CIBSE). Resilience (i.e. twin fan motors, duplicate AHU's, twin heating/cooling coils, etc.) should also be duly considered given the importance of maintaining the continued operation of the facilities.

Thermal wheels

32. You made reference in the Executive Summary to: *"Other significant potential issues identified include the installation of thermal wheel type heat recovery devices serving areas where the risk of cross-contamination may require further consideration"*. Please explain your comment regarding the use of thermal wheels? Why was this described as a potential issue?

A Due to potential risks in terms of cross-contamination (leakage and carryover). AHU manufacturer confirmed the installed thermal wheel heat recovery devices do not afford complete segregation of airpaths.

33. What experience do you have of dealing with thermal wheel devices?

A Minimal experience in terms of specifying the use of thermal wheels, however, we have encountered these devices on projects previously. We tend to specify the use of cross-flow heat exchangers. These do not exchange humidity, avoid risks associated with cross-contamination of airstreams (leakage and carryover), and are normally of lower (capital) cost.

34. In your experience are thermal wheels used in areas which house immune compromised patients?

A Unless there was absolutely no risk of cross-contamination (throughout the life expectancy of the device), I would not recommend the use of a thermal wheel heat recovery device in a critical care facility, especially where immune compromised patients are cared for.

35. Does the use of thermal wheels create an additional avoidable risk of infection? If so, how so?

A We were advised the thermal wheel heat recovery devices do not afford absolute segregation of airpaths, and therefore, yes it does create additional avoidable risk when other forms of heat recovery devices could have been utilised.

36. Is the use of thermal wheels compliant with SHTM03-01 in areas which house immune compromised patients?

A SHTM 03-01 states the use of a plate heat exchanger (i.e. cross-flow type) or run-around coil system would be suitable. Guidance further notes that thermal wheels may be used providing they are fitted with a purge sector, as the small amounts of air leakage are not considered significant.

Therefore, whilst it could be argued the use of thermal wheels would be acceptable in terms of compliance with SHTM 03-01, I would argue that any potential risk associated with cross-contamination and ultimately patient safety should be completely mitigated wherever possible to do so.

Cooling Devices

37. At para 4.03 of your report you identify the presence of “ceiling mounted Swegon Parasol heating/cooling comfort modules”, and draw a distinction between those and Chilled Beams. Please explain the distinction.

A They function in a similar manner, however, the installed comfort modules are effectively a compact version of a chilled beam, which distributes supply air in four directions in lieu of two, within a smaller footprint (square module instead of a linear beam).

This aspect could adversely impact the energy performance rating of the system/building (BREAMM), should induction modules not hold the same standard of accreditation as chilled beams.

38. You note that it was Swegon Parasols which were a feature of Ward 2B. Is there any particular significance to it being those which were chosen?

A No particular significance. This was simply something noted from record documentation. We anticipate this form of terminal will be available from other manufacturers.

39. In which areas were they present?

A Swegon Parasol modules were installed within the BMT Day Ward and Day Stay Ward of Ward 2B. They were also installed in other rooms of Ward 2B, such as Consultation and Examination rooms.

40. In your experience is it usual to see these devices in areas which house immune compromised patients? Would it be usual to see chilled beams in such areas?

A We would in all probability not select/recommend the use of chilled beams, or the installed modules, for rooms housing this patient group. Perforated sections would seem to be inherently difficult to clean properly, and given that the rooms could be in use for prolonged periods, undertaking cleaning whilst occupied would not be deemed practical/appropriate in terms of patient safety.

SHTM 03-01 emphasises these aspects, with regards to the use of chilled beams, along with the need to ensure external surfaces remain below dewpoint (i.e. to avoid condensation forming).

41. Does the use of Swegon Parasols create an additional avoidable risk of infection? If so, how so?

A Arguably no more so than the use of chilled beams, however, the use of this type of terminal should have been better considered relative to the function of the facilities (in my opinion).

42. Is the use of Swegon Parasols compliant with SHTM 03-01 in areas which house immune compromised patients?

A Arguable not, when taking cognisance of points relating to access for cleaning and impact of maintenance in terms of room availability (SHTM 03-01, Clause 2.40).

43. Please explain the mechanism by which the noise output of Swegon Parasols is affected by increased air flow. Does this represent a practical limitation on their capacity?

A Forcing additional air through the supply openings would increase face velocity (speed of air going through the openings), create more resistance/pressure drop through each opening, and subsequently increase the noise generation from the terminal. The same would apply in terms of the extract air path through the perforated front face.

Yes, it represents a practical limitation on their capacity. Excessive noise generation would adversely impact occupant comfort. Also, increasing air flow rate would increase air velocity and associated throw from the terminal (i.e. how far the air is distributed into the room from the terminal), which could adversely influence occupant comfort in terms of air speed / draught.

Increasing air flow through the terminals would also increase pressure drop in the system (albeit only on index terminal), however, it would further reduce any spare capacity on the AHU/fans.

44. To what extent, if at all, did the cooling or heating devices constitute a limitation on the capacity of the ventilation system? How did this compare to other limitations?

A Approximate calculations carried out suggested that existing heating/cooling (distribution) installations could be retained, and/or locally modified/adjusted, relative to the desired increase to 6 ac/hr. In that regard, the extent of modifications deemed necessary relative to other limitations would be regarded as minimal.

Filters

45. You identify at 4.05 that *"AHU supply and extract fans were apparently sized and selected based on 100% air duty with clean filters … As AHU capabilities are based on clean filters, we anticipate there will be a reduction in current/existing air volumes (i.e. ac/hr) as filter free areas diminish.".* Please explain the mechanism by which filters affect the volume capacity of a ventilation system.

A As filters become dirty (clogged by debris, dirt, etc.) the free area for air flow through the filter is reduced. This reduction in free area increases resistance through the filter, essentially making the fans work harder. As the fans were selected near peak capacity there would be a point at which they reach maximum duty, and may not be capable of overcoming resistances (through filters, and the rest of the system). Once peak fan capacity is exceeded, the resultant air volume/flow rates from the AHU would decrease, thereby decreasing the air change rates within the facilities.

46. Does it follow that the presence of filters represent an inherent limitation on capacity. By what means might/can/should this be addressed?

A Yes. Fan duties should be selected with a view to overcoming resistances when the 'system' is in a 'dirty' condition (i.e. filters, terminals, heat recovery devices, heating/cooling coils, ductwork, etc.). Noting that a 'dirty' condition should take cognisance of appropriate maintenance/cleaning/replacement regimes, to avoid putting undue strain/pressure on the fans and minimise energy consumption.

47. To what extent does it appear to you that this was taken into account in designing the ventilation system?

A Sizing/selecting fan duties based on clean filters tends to suggest that cognisance was in all probability not taken with regards to system degradation.

48. Please comment on the adequacy of this aspect of the ventilation system.

A Inadequate.

Air change rates

49. At para 3.01 you record the Day Stay ward as having a ward air supply of 2.33 ACH.

a) Is this compliant with SHTM03-01?

A No.

b) Was this air change as agreed at the design stage?

A Unknown.

c) What documentation did you see regarding this?

A None.

d) Should the ward have been operating at slightly negative pressure?

A No.

50. You also record the BMT Day Ward as having a ward air supply of 2.79 ACH.

a) Is this compliant with SHTM03-01?

A As Point 49 a.

b) Was this air change as agreed at the design stage?

A As Point 49 b.

c) What documentation did you see regarding this?

A As Point 49 c.

d) Should the ward have been operating at slightly negative pressure?

A As Point 49 d.

51. At the time of the report, did the ventilation system as installed in ward 2B create an additional risk of avoidable infection? Please explain your view: if so, how so? If not, why not?

A In my view yes, for reasoning outlined in previous points.

52. At para 3.02 you set out the 'Proposed Air Volumes' required to achieve an air supply of 6 ACH in those wards. In broad terms, would those have been achievable with the wards designed as they were?

A No, the systems were not deemed suitable to achieve the desired increased air change rate of 6 within the Wards.

53. What conclusions, if anything, would you draw from this as to the aim of the design of the hospital in respect of air change rates?

A Inadequate.

54. At section 4 of your report you describe the 'Impact on Existing Installations'. At para 4.01 you describe learning that your assumption of 125% capacity had been incorrect.

a) Please describe why you made that assumption.

A As described in points above.

b) Were you surprised that that assumption turned out to be erroneous?

A Yes.

c) What conclusion, if any, did that lead you to draw as regards the design of the ventilation system?

A Inadequate.

Supply & Extract Air Ductwork

55. At para 4.02 you set out the parameters of the ductwork and considered whether it would be able to handle an increase to 6 ACH. Broadly it appears that the Extract ductwork would have been able to cope with 6 ACH, whereas the Supply Air ductwork largely would not. Is that correct? Do you have anything to add at present.

A Incorrect. Various sections of the extract system were also deemed to be at/above recommended velocity.

56. The Supply Air exception is the Main 1000x600mm rectangular ductwork first described at para 4.02, which would be able to cope. Why, in your view, might this have been different from the rest of the Supply Air ductwork?

A Probably as larger sections of ductwork can accommodate higher air volumes, thereby a marginal increase in the quantity of air would have a lesser impact in comparison to smaller sections of ductwork.

57. Would you draw any inference from this? What might it say about the coherence of the Supply Air ductwork system?

A No, this would seem to be incidental.

58. Why might the supply and extract ductwork have differed in this way?

A The design of both the supply and extract ductwork distribution seemed to be similar.

59. Please explain the significance of the noise levels described at these passages.

A Excessive ductwork air velocities can create noise generation, which could be detrimental to patient comfort.

Supply & Extract Air Terminals

60. Please explain the significance of your conclusions on Supply Air Terminals at para 4.03.

A Increasing the quantity of supply air via existing terminals could cause discomfort to the patients, plus there would be additional external resistance within the system.

61. You describe the Extract Air Terminals as capable of handling the volumes required for 6 ACH. Again, why might the supply and extract systems have differed in this way?

A Technical literature for the installed extract grilles was unavailable so we utilised literature for a similar grille from a different manufacturer. We established that the grilles would likely be suitable for an extract rate of 500l/s (i.e. oversized).

Extract grilles do not appear to have been appropriately sized, they seem to have been selected to suit the ceiling grid size in lieu of the extraction rate from the ventilation system (in my opinion). Note that we have discovered this same issue on numerous other sites/projects.

LTHW Heating & Chilled Water Installations

62. At para 4.03 your conclusion appears to be that these installations would be capable of handling an increase to 6 ACH. Is this correct? Do you have anything to add?

A Indicative calculations/estimations carried out suggested the existing heating and cooling systems would be capable of achieving the necessary increase in duty (i.e. in terms of pipe sizes). However, this would have involved re-balancing/replacing commissioning valves (to suit increased flow rates), and the associated pump sets would also require re-commissioning.

63. Why might these installations have differed in capacity from the air ductwork and terminals described above? Would there be any operational reasons for this?

A It wouldn't be unusual for different engineers to be tasked with the design of different systems, especially for a building of this size. Another reason could be that the design of the heating/cooling systems was checked more appropriately than with the ventilation systems.

From memory, the piped distribution systems were reasonably well selected and could accommodate the increased loads. The heating/cooling system pumps were also utilised to serve various/numerous areas throughout the building, thereby the associated increase in flow/pressure was marginal/negligible (in the same manner the larger section of supply air ductwork could accommodate a marginal increase in duty).

64. What inference might you draw regarding the coherence of the ventilation system?

A As described in points above.

System Alterations Required

65. You describe options at section 5 of your report. Do you have anything to add?

A Options were relative to increasing air change rates to 6 ac/hr, as noted in the report. We were not asked to provide 'upgrade' options for Ward 2B with regards to compliance with SHTM 03-01 (as we were with Ward 2A).

66. Are you aware of the remedial works undertaken? Do you have any comments to make in that regard?

A Following the appointment of the Lead Consultant undertaking remedial works we attended meetings and provided comments pertaining to the proposed design, up to tender stage. From memory at/around tender stage various other/additional concerns were discovered on site, which led to re-design, and we were not asked/appointed thereafter.

In view of this, no, we are not aware of the remedial works that were eventually undertaken on site.

Additional Notes

67. At section 6 you set out a number of additional points identified in your analysis. Please comment as you think fit on the following aspects:

a) The quality and availability of Zutec or other documentation.

A As described in points above.

b) The robustness of the AHU 24 system. You mention that your observations here may be applicable to other systems within the building. Do you mean other systems feeding off AHU 24, or other independent systems? If the latter, did you see any evidence of this?

A Other independent systems. Again from memory, we discovered an Excel Sheet within Zutec that implied various other/most AHU's were equipped with thermal wheel heat recovery devices. It also seemed reasonable to presume that other systems installed elsewhere within the building may have been inappropriately selected in a similar manner as the systems we had reviewed appeared to be.

c) That the commissioning data relative to AHU extract system indicates that the fan chamber was full of water. What might this indicate? How might it have come about? Did you see evidence of this?

A It would indicate inadvertent water ingress into the system. This may have occurred during installation, or perhaps due to water ingress as a result of external discharge terminal positioning, but essentially unknown.

No, this installation was not reviewed on site and we are unaware if remedial works were undertaken prior to handover.

Ward 2A report –

Report prepared by Innovated Design Solutions dated 24 October (revision 01, 30 October 2018) titled "Feasibility Study Regarding Increasing Ventilation Air Change Rates within Ward 2A" Refer to document 34, Bundle 6, Miscellaneous documents.

68. What did you understand to be the patient cohort intended for Ward 2A?

A Teenage cancer patients, and patients being cared for in terms of bone marrow transplant.

69. What specialist ventilation requirements, if any, would that patient cohort require?

A Design guidance within SHTM 03-01 relating to Neutropenic Patient Ward would be more appropriate (10 ac/hr, positively pressurised).

70. What ventilation specification would you have expected to see?

A As Point 69.

The Lead Consultant Appointment Brief (produced after feasibility reports) essentially outlined what we considered appropriate to this type of facility, whilst also taking cognisance of supplementary facilities/ancillaries agreed following discussions with estates and infection control (i.e. monitoring and automatic control of Bedroom/Corridor pressure differentials, etc.).

71. To what extent were you furnished with material to enable you to verify what specification had been used, and what had been the thinking behind that choice?

A The verification of specification did not form part of our scope as we were instructed to determine the viability of increasing air change rates to 6 ac/hr.

72. What initial observations, if any, did you have regarding the design of the ventilation system?

A Existing ventilation air change rates seemed abnormally low and supply/extract air volume flow rates tended to suggest the potential for air movement from circulation spaces towards patient areas.

73. Describe your understanding of why the ventilation system was designed as you found it?

A As Point 27.

74. Please describe the significance of SHTM 03-01 with respect to the task for which you had been instructed.

A Under initial instruction, as per Point 25. We were subsequently asked to include within the report upgrade options within Ward 2A relative to the patient group. To facilitate this aspect guidance contained within SHTM 03-01 and SHPN 04 : Supplement 1 (Isolation Facilities in Acute Settings) was significant/fundamental.

75. In respect of Ward 2A, what concerns, if any, did you have regarding compliance with SHTM 03-01?

A Similar concerns to those identified as part of the Ward 2B analysis (As Point 29).

76. What other guidance, if any, did you have in mind when carrying out your assessment of Ward 2A? Please describe your assessment of any such compliance, and the significance of this.

A As Point 30.

Cognisance was also taken with regards to guidance within SHTM 03-01 and SHPN 04.

77. You considered both Ward 2A and 2B when compiling your report. In general terms, was there any significant difference between the ventilation system in the two wards?

A In terms of Ward 2A, we identified that exhaust air from 'dirty' environments (i.e. such as Toilets, Shower Rooms, Dirty Utility Rooms, Disposal Rooms, Cleaners Stores, etc.) was being routed back to the AHU, whereas exhaust air from cleaner environments was being discharged directly to atmosphere (i.e. dedicated extract system).

Ward 2A and Ward 2B also differed in terms of individual Bedrooms/Ensuites and communal Ward environments, albeit ventilation strategies were similar.

78. You did not consider the ventilation installations pertaining to the BMT area within Ward 2A and 2B when compiling your report. Why not?

A These areas were excluded from our remit.

Immunocompromised patients

79. You state in the first paragraph of your para 1.01, and again at para 6.01, that you did not consider the original design philosophy of ward 2A to be intended for use for immune response impairment/deficiency patients.

a) Were you able to determine the 'design philosophy'? What assisted/hindered you in doing so?

A No, we were not able to establish the design philosophy, however, we believe our analysis enabled a relatively accurate interpretation of the probable design intent and operational functionality of the ventilation systems.

b) Why did you form the view that it was not designed with immune-deficiency patients in mind?

A For various reasons, including abnormally low air change rates, the probable direction of air movement, the AHU being equipped with a thermal wheel that did not afford complete segregation of airpaths, the interconnection of exhaust air from 'dirty' environments into the system/AHU, and lack of system resilience.

c) Had it been so designed, what would you have expected to see?

A As Point 70.

d) Please explain what conclusions you drew from the absence of any such features or items. In particular, did the ward appear to have been designed with such features or items in mind, or was there no indication that they had been in contemplation?

A The ventilation installations were not deemed appropriate relative to the care of the particular patient group.

The ventilation systems within Ward 2A did not appear to have been designed with appropriate, or compliant, features/items in mind, nor did there appear to be any indication that they had been considered.

80. You also indicated at those paras that the design was likely to promote risks.

e) Please explain what risks you had in mind?

A Potential for air from the adjacent circulation areas entering patient Bedrooms, risk of cross-contamination occurring within the AHU (via thermal wheel), and various single points of failure that could undermine occupancy supply air provisions.

It should be noted that the mechanical supply air provisions were the only means of affording fresh outside air for occupancy purposes (from a regulatory perspective, disregarding the use of the facilities). Failure of the system, and resultant loss of fresh air provisions, would essentially necessitate the complete relocation of occupants from the Ward.

f) What items or features caused those risks?

A As generally described in foregoing Points, and fundamentally the design of the system.

g) Are there examples of the absence of particular items or features causing such risks?

A Probably, however, it should be recognised that guidance within SHTM's is not simply based on assumed best practice, but experience and knowledge acquired by a multitude of Healthcare professionals (such as infection control specialists).

h) Did the layout of the ward (in terms of its being composed of single bedrooms with en-suite facilities) contribute to your conclusions regarding promotion of risk?

A No, I do not remember this aspect being of particular concern in terms of our conclusion.

i) Were there measures which ought to have been taken prior to your involvement either to eliminate or mitigate the risks (if any) posed by that layout?

A As above.

Air change rates

81. At para 2.01 of your report you describe its purpose as being: "…to determine the viability of increasing mechanical supply and extract air volumes to achieve 6 air changes per hour within the upper Single Bedroom spaces located within Ward 2A, including those situated within the Teenage Cancer Trust zone".

a) Who asked you to use the parameter of 6 air changes per hour?

A From memory this was advised during initial discussions, as Point 12 b. I do not remember who in particular mentioned this parameter.

b) Do you know why that rate was chosen?

A No.

c) In light of the intended patient cohort, are you able to give a view on the appropriateness of a 6 air changes per hour rate?

A Inappropriate.

d) Are you aware of guidance suggesting 10 AC/h?

A Yes, within SHTM 03-01 guidance pertaining to Neutropenic Patients.

82. You mention the presence of the Teenage Cancer Trust zone.

a) How did that affect your view of the ventilation system in ward 2A?

A In terms of viability of increasing air change rates to 6 ac/hr, this did not impact our assessment any more so than other areas within the Ward.

With regards to upgrading the facilities, it was deemed that this zone should be afforded with enhanced provisions in the same manner as the other areas of the Ward.

b) Were there any specific or enhanced requirements posed by the presence of that zone, in respect of ventilation?

A As Point 82.

83. In the remainder of your report you largely discuss the feasibility of achieving an air change rate of 6 changes per hour.

a) Does it follow from your conclusions regarding 6 air changes per hour, that 10 air changes per hour would have been no more achievable?

A Achieving 10 ac/hr would have been significantly less viable.

b) What do you conclude from that as regards the design choices around the ventilation system for ward 2A?

A Inadequate.

c) Are there any parts of the ventilation hardware which would have been able to cope with a rate of 10 air changes per hour?

A In all probability no, albeit this would need to be assessed in further detail.

d) Please add any comments you consider may assist the Inquiry in understanding the difference between 6 and 10 air changes per hour, in terms of the demands placed upon a ventilation system, and consequences for its design?

A This is roughly a 66% increase in terms of air volume, which would impact the entire installation (i.e. AHU, ductwork, dampers, room supply/extract terminals, intake/discharge terminals, etc.). The size/scale of the ventilation

installations would in all likelihood be considerable larger, and more expensive.

The increased size of the system would also need to be accommodated within the building (i.e. structural weight of equipment, larger voids/zones to accommodate ductwork, etc.).

84. You state (at para 1.01) that the rate of 3 air changes per hour was 'significantly lower than would normally be expected'. Please explain your expectations, by reference to guidance and by reference to any requirements which you understand may apply to the patient cohort.

A Bedrooms should have been afforded with 10 ac/hr, and positively pressurised, relative to SHTM 03-01 guidance in terms of Neutropenic Patients. BMT and cancer patients receiving intensive treatment would be deemed more susceptible to infection due to weekend immune systems.

Even if the original design intent had considered the Bedrooms to be 'Single Rooms', we would still have expected a minimum rate of 6 ac/hr (relative to SHTM 03-01 guidance).

85. In broad terms, what was your view of the air change regime which you found in place at ward 2A?

A Inadequate.

86. At para 4.05 (first bullet) you imply that you had seen no agreement to vary from the expected standard.

a) What would be your view were such a variation to have been agreed?

A It would be irresponsible and alarming to do so.

b) Would you have expected to be appraised of it from the documentation available to you when compiling your report?

A Yes, I would have expected this to be clearly identified within record documentation, and within the Health & Safety File.

c) What would be acceptable circumstances, in your view, for agreeing to such a variation?

A None.

87. At paras 4.01 to 4.03 you set out by reference to certain metrics the shortfall in performance of the ventilation system (by reference to the parameter of 6 air changes per hour), and identify what might be required in order to achieve that level.

a) Is there any significant difference between your analysis at these paras and your analysis at the equivalent paras in respect of the Ward 2B report?

A No significant difference.

b) In broad terms, is it the case that (in terms of achieving 6 air changes per hour) the ventilation system would be inadequate in terms of supply, but adequate in terms of extraction? Please explain your answer if required.

A No, various sections of the extract ductwork distribution were also deemed to be at/above recommended velocity.

88. In terms of heating and cooling air, was your conclusion at para 4.04 that the ventilation system in ward 2A was broadly adequate to handle 6 air changes per hour? Please explain your answer if required.

A As Point 62.

89. Overall, if your answers to the questions above indicate that parts of the system would be adequate to handle an air change rate of 6 air changes per hour, but that other parts would fall significantly short of that, what conclusions (if any) would you draw? How coherent would that suggest the design philosophy of the ventilation system was in ward 2A?

A As Point 63.

Other air change issues

90. At para 4.05 (second bullet) you explain your conclusion that air was likely to flow from other areas into the bedrooms.

a) Please explain how you reach that conclusion.

A The volume of air being extracted from the Ensuite was higher than that being supplied into the associated Bedroom, thereby this differential in 'make-up air' must be derived from somewhere. The adjacent corridor was also equipped with mechanical supply air.

b) Are you able to offer a view on whether that conclusion is positive or negative for the operation of ward 2A? Please explain.

A A negative impact.

The purpose of maintaining a positive pressure within the Bedroom is to reduce risks associated with inadvertent air ingress from adjacencies (i.e. such as a circulation corridor utilised by staff, patients, visitors, etc.).

c) At para 6.03 you make a proposal for modification by way of making the bedrooms pressure-positive? Please explain why you proposed this.

A As Point 90 b.

d) What conclusion, if any, would you draw from the fact that such an arrangement was not already in place?

A There would be a risk of inadvertent/undesirable air ingress into the Patient Bedroom.

e) At para 6.04 you make a similar proposal should the Teenage Cancer Zone be repurposed? Please explain why you proposed this.

A We were asked to consider the viability of creating individual positively pressurised suites throughout Ward 2A, which was deemed impractical due to the probable reduction in accommodation (from forming lobbies). However, the TCT zone appeared to be more suitable in this regard due to the existing

circulation space positioned between the Bedrooms and main Ward 2A corridor.

91. At para 4.05 (third bullet) you describe the supply and extract fans being selected at 100% capacity.

a) Please explain the significance of that.

A Same reasoning as described for Ward 2B AHU.

b) Did that match your expectation when commencing your report? On what basis had you formed an expectation?

A Same reasoning as described for Ward 2B AHU.

c) Please explain the third para of this bullet. How can the fans be both 'based on 100% design air volume' and having '15.5% and 9.5% air volume' spare capacity?

A The AHU manufacturer selected the nearest fan sizes to achieve design parameters. Following discussions with the manufacturer, the actual/resultant fan selections afforded 15.5% and 9.5% spare capacity, based on clean filters.

For example, calculating a room heat loss of 2.7kW, and then installing a 3kW radiator (the nearest suitable radiator size/output to achieve/exceed the design duty).

d) Please explain the consequences for life expectancy. How likely is their means of operation to be harmful to them?

A From memory this aspect was discussed/confirmed with the AHU manufacturer, but would need to be verified.

Notwithstanding this, operating most appliances/equipment at/near full capacity (continuously) would in all probability be detrimental to life expectancy.

e) Please explain the significance of clean or otherwise filters.

A Same reasoning as described for Ward 2B AHU.

92. Please explain the significance of air velocity. How confident are you of your estimates in that regard?

A Significance as described for Ward 2B installations.

From memory, we either referenced terminal schedules and/or H&V commissioning data/sketches to the record drawings in order to establish air flow rates for the various sections of ductwork. We then referenced these to CIBSE guidance as intimated below.

Table 2.18 Guide to maximum duct velocities in risers and ceilings

Duct location	Duct type	Maximum air velocity / $m \cdot s^{-1}$ for stated room type		
		Critical	Normal	Non-critical
Riser or above plasterboard ceiling	Rectangular	5	7.5	10
	Circular	7	10	15
Above suspended ceiling	Rectangular	3	5	6
	Circular	5	7	10

I have checked two separate sections of Ward 2A supply air ductwork and velocity calculations were accurate. Could you please advise if there are any other/specific concerns with regards to same?

93. Please explain your observations in the last bullet of para 4.05. How much work would be required in each bedroom to bring the air change rate up to the desired rate, as opposed to in other areas?

A Initial assessment of the heating/cooling pipework sizes must have intimated that these services would be capable of accommodating the additional loads.

Therefore, if additional supply air (i.e. circa 3 ac/hr) was introduced via new terminals into the Bedrooms, we anticipated that heating/cooling pipework could be locally interconnected to existing piped distribution within the Ward 2A ceiling void (together with new valves and re-commissioning, etc.).

94. At para 6.02 of you report you disregard the viability of creating isolation suites within ward 2A. To what extent, if any, is this as a result of your observations on the ventilation system?

A From memory we queried if any form of reduction in accommodation (Bedroom numbers) would be considered to facilitate the introduction of isolation suites/lobbies. As a reduction in accommodation was not deemed practical/viable, this option was disregarded.

System Alterations Required

95. You describe options at section 5 of your report. Do you have anything to add?

A Options were described with regard to introducing additional supply air to achieve 6 ac/hr. Could you please be more specific?

96. Are you aware of the remedial works undertaken? Do you have any comments to make in that regard?

A As Point 66.

Additional Notes

97. At para 7.01.1 you describe the extract system configuration as abnormal.

a) Please explain the significance of having separate arrangements for ‘dirty’ and ‘clean’ areas.

A To minimise risks associated with cross-contamination.

b) Are there negative implications from the configuration observed by you?

A Yes.

c) If so, please explain any conclusion you would draw about the design of the ventilation system within ward 2A.

A Connecting the ‘dirty’ exhaust system into the AHU, whilst discharging exhaust from ‘cleaner’ environments directly to atmosphere, would appear to

have been a mistake with regards to the design of the system(s). It would also only appear likely to increase any potential risks associated with cross-contamination within the AHU (i.e. via thermal wheel).

Should the AHU/extract system fail there would also appear to be potential risk in terms of contaminated air inadvertently entering Ward 2A Bedroom Ensuites (backflow of air via extract terminals), due to differential pressures within rooms/floor levels, although that aspect would need to be considered/assessed in greater detail.

Furthermore, the dirty extract system served various facilities within the hospital, on multiple floor levels, thereby suggesting inherent vulnerabilities in terms of resilience (i.e. fan failure would result in complete loss of numerous facilities).

98. At para 7.01.6 you mention humidity. Please explain the significance of this metric.

A SHTM 03-01 guidance states parameters pertaining to humidity levels, primarily due to condensate risk, which could undermine the safety of patients if not controlled/maintained properly.

99. Do you have anything to add regarding the matters covered at your 'Section 7 – Additional Notes'?

A The positioning of isolation suites at the bottom section of Ward 2A (through a set of double doors) was not deemed to be ideally located in terms of the patient group within the upper section of Ward 2A. Another consultant/contractor was involved with re-design works within these areas at the time of our analysis, and these areas were not to form part of our remit.

As part of the Lead Consultant Appointment Brief it was recommended that consideration be given to the introduction of positively pressurised lobbies within the Ward 2A corridor.

Views on ventilation system Ward 2A and 2B:

100. What if any, impact did the ventilation system in 2A & 2B have on the increased risk of avoidable infection?

A I would consider that the ventilation systems would have a negative impact with regards to avoidable risk of infection.

101. Are you aware of whether following works carried out to Ward 2A and 2B the ventilation systems in place in those wards complied with SHTM guidance?

A No, our input/appointment ceased prior to this stage.

102. Are you aware of any other areas of the hospital which did not comply with SHTM guidance in respect of ventilation? Please explain your answer.

A During our analysis we discovered an Excel sheet intimating the installation of thermal wheels in other/most AHU's within the hospital. We would also be concerned that inadequacies identified as part of the Ward 2A & 2B analysis were applicable to other systems within the hospital.

Declaration

103. I believe that the facts stated in this witness statement are true. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief in its truth.

Appendix A

The witness was provided the following Scottish Hospital Inquiry documents for reference when they completed their questionnaire statement.

A33795394 – QUEH Forensic Analysis – Energy Centre/MTHW (Innovated Design Solutions) 10 May 2018

A43293438 – Bundle 6 – Miscellaneous Documents

Appendix B

The witness provided the following documents to the Scottish Hospital Inquiry for reference when they completed their questionnaire statement.

A49471926 – Matthew Lambert CV
A49377285 – Ward 2A Ventilation Consultancy Scope of Works
A49377009 – Appointment Addendum

Matthew Lambert

Job Title : **Director**
Qualifications : **BSc Building Services Engineering**
BEng (Hons) Building Services Engineering
MCIBSE (Member of Chartered Institute of Building Service Engineers)

Matthew has worked in professional Building Services design consultancy engineering since 1998, being part of a private engineering practice throughout this period. He has extensive experience and technical knowledge gained from working on a wide variety of complex projects ranging across most industry sectors, including domestic/housing, residential care facilities, hostels, office accommodation, community buildings, education (nursery, primary, secondary, and special needs facilities), leisure, fire and rescue, police, healthcare, and industrial.

Matthew also has significant experience with regards to undertaking the lead role, and associated responsibilities, on numerous new and refurbishment/upgrade projects, often requiring meticulous planning and delivery in difficult environments. This experience includes where properties/facilities must remain fully operational throughout the works (such as healthcare facilities, large residential care properties, and educational buildings), listed buildings involvements, and undertaking the role of Principal Designer on numerous occasions. He is also accustomed to undertaking the role of lead technical advisor/manager, having carried out these responsibilities on numerous occasions for complex projects, including a large PFI development for Avon Somerset Police.

Matthew is a firm advocate of fundamental engineering principles and philosophies, encouraging and mentoring developing engineers to ensure these essentials are fully recognised and appreciated from the outset. Matthew's knowledge and technical expertise has also led to a significant extent of repeat business for the practice.

Matthew is the Managing Director of the company, thereby responsible for managing all aspects of the business. Whilst this includes administration of contracts, Health and Safety, quality of output, business development, and ultimately delivery of service, he remains fully involved in the design aspect of the company from inception to completion/handover.

Career History

Date	Position	Company
2018 – date	Director	Innovated Design Solutions
2015 – 2018	Associate Director	Clancy Consulting
2013 – 2015	Principal Engineer	Clancy Consulting
2012 – 2013	Senior Mechanical Engineer	Clancy Consulting
2006 – 2012	Senior Mechanical Engineer	Mexel Design Consultants
2002 – 2006	Mechanical Engineer	Mexel Design Consultants
2000 – 2002	Intermediate Mechanical Engineer	Mexel Design Consultants
1998 – 2000	Trainee Mechanical Engineer	Mexel Design Consultants

Scottish Hospitals Inquiry
Witness Statement of
Kerr Clarkson

Introduction

1. My name is Kerr Clarkson. I am currently employed by NHS Greater Glasgow and Clyde ('NHS GG&C') as one of three Site Managers for Operational Estates primarily looking after building and water management.

2. The Scottish Hospitals Inquiry (the 'Inquiry') has asked me to provide a written statement in preparation for the Glasgow III hearings commencing later this year in relation to my experiences during my time at NHS GGC.

3. This statement seeks to provide that information to the best of my recollection.

Background

4. Below is a summary of my work experience:

- March 2020 – to present **NHS GG&C, Queen Elizabeth University Hospital (QEUH') Glasgow Site Manager**

  My current role is Site Manager for Operational Estates responsible for the delivery of patient care by the provision of effective, efficient and safe operation and maintenance of estates services, systems and budgetary resource, in compliance with statutory requirements and mandatory NHS Healthcare standards and guidelines. This covers the day to day operational activities, technical and management control of directly employed and specialist contract staff.

Primarily this covers buildings and water management, however will at time require to deal with other aspects of Estates Management due to the nature of the role/resources available.

Appointed as one a number of Water Authorised Persons in August 2018 including Darren Hopkins (Estates Supervisor). James Guthrie also attended the training and was assessed by the AE, however, does not appear to have been appointed. Scott Macer (Estates Supervisor at the time) was also appointed in February 2019.

Other Site Operational Managers are:

- Hugh Brown – Mechanical Services (including ventilation).
- Colin McKechnie – Electrical Services.

I have been asked who did/ do I work with on a day-to-day basis, and to provide details of the management/ line management structure that I work(ed) within, who was/ is my superior, who did/ do I report to, did/ does anyone report to me, if so, whom.

I work collectively as a team with the entire estates department which covers all disciplines. I report to Euan Smith (Assistant Head of Estates and who also is Responsible person for water for QEUH Campus).

Currently I have three Managers reporting to myself:-

- Mel MacMillan – Estates Manager (Water Management). Although Mel covers Medical gas AP duties for Hugh Brown.
  - An Estates Supervisor also reports to Mel.
  - A team of NHS Plumbers reports to the Estates supervisor.

- Mark McGowan – Estates Manager (Building Maintenance).
  - An Estates Supervisor also reports to Mark.
  - A team of NHS joiners and painters report to the Estates Supervisor.
  - An Estates shift Supervisor for managing multi-trade team.

- Harry Christie – Estates Manager (Building Maintenance).
  - An Estates Supervisor also reports to Harry.

  All managers and supervisors manage various outsourced service providers.

- **Site Operating Manager for Mechanical services** - Hugh Brown (reporting to Euan Smith),

  - Connor Stepney (Estates Manager) for Mechanical and Ventilation and William Fenn (Trainee Manager) reports to Hugh.

  - An Estates supervisor reports to Connor.

  - The supervisor manages a team of NHS mechanical Engineers and NHS maintenance assistants.

  - An Estates shift supervisor also reports to Connor.

  - A multi-trade team (4-5) covering electrical, mechanical and plumbing reports to the shift supervisor.

  All managers and supervisors manage various outsourced service providers.

- **Site Operating Manager for Electrical Services,** Colin McKechnie

  - Paul Allan (Estates Manager) for Electrical and Daniel Martin (Trainee Manager) reports to Colin.

  - An Estates supervisor reporting to Paul.

  - The supervisor manages a team of NHS electricians.

  - Two Estates Shift Supervisors also reports to Paul.

- 2 multi-trade teams (4-5) covering electrical, mechanical and plumbing reports to each Estates shift supervisor.

  All managers and supervisors manage various outsourced service providers. I have been asked what water specific qualifications/ experience I hold in order in order to carry out this role. I have completed a City and Guilds legionella control and hot and cold water systems training course. I also completed an Authorising Engineer Assessment for Water. Over and above this I completed legionella management training in previous roles prior to working for the NHS and managed water management (including cooling towers).

- June 2018 – March 2020 **NHS GG&C, QEUH Glasgow**

  Estates Manager

  The role involves managing multidisciplinary activities and primarily as main contact in Estates for specific non clinical building and liaison on site with University of Glasgow. Additionally assisting Lead AP for water in certain activities in primarily the retained estate in relation to water management and latterly assisting in improving processes overall for water management including the Retained Estate and Adults and Childrens Carrying out other Estates tasks as requested including co-ordinating works as instructed such as floor/wall repairs, drain cleans and working with Infection control colleagues to achieve required repairs.

  I have been asked who I worked with on a day to day basis, to provide details of the management/ line management structure that I worked within, who was my superior, who did I report to, did anyone report to me, if so, whom. I worked part of management team including Mel MacMillan (Plumbing/Water), William Madden (Buildings), Paul Allan (Electrical), James Guthrie (Mechanical Systems including ventilation), who took over from Darryl Connor (Mechanical/ventilation). Scott Macer subsequently replaced James Guthrie when he moved to another role. Darryl who was promoted to interim site Manager when Colin Purdon was promoted to Interim Sector Estates Manager. I reported to Colin Purdon.

The above had a number of supervisors and specific or multitrade or specific trade staff reporting.

All managers and supervisors manage various outsourced service providers.

I had two shift supervisors and they had 4-5 multitrade staff reporting.

I managed a number of service provider for buildings out with Adults and Childrens.

After taking voluntary redundancy I was unemployed between January 2018 and June 2018.

- April 2008–Jan 2018 **Student Loans Company, Glasgow**
  Property & Facilities Operations Manager
  The role involves managing the Property & Facilities services for eight buildings covering over 23,000 sqm of property. This includes managing 14 FTE and various outsourced Service Providers.

- Mar 2002–March 2008 **Student Loans Company, Glasgow**
  Assistant Facilities Manager
  Working for a non-departmental public body, looking after five buildings throughout the UK, employing 1200 employees, over 17,000 sqm of property and managing 17 Facilities Staff.

- Apr 2000–Mar 2002 **Rosti (Scotland) Ltd, Blantyre, Lanarkshire**
  Facilities Engineer
  Working for a manufacturer of technical plastics within a new facility, utilising modern production techniques including injection moulding machines, robots, automated assembly and painting.

- Oct 1992-Apr 2000 **Volvo Truck & Bus Assembly, Irvine, Ayrshire**
  Facilities Engineer
  Working within a team that looks after the day to day operation of the available facilities.

5. I hold a Masters in Science (MSC) in Manufacturing: Management and Technology from the Open University (1995) and a Higher National Certificate in Computer Studies from Ayr College (1989).

Water Management

6. In relation to Water Management, Mel MacMillan was appointed as Authorised Person from mid-2018 (primarily responsible for managing water) and was in place when I started. It is my understanding that a number of Competent Persons ('CPs') were in place e.g. plumbers who have completed an agreed training course and signed off to work on a hospital water system. DMA Canyon were also on site carrying out activities. Andy Wilson (Sector Estates Manager), Colin Purdon (Site Manager) and Ian Powrie –Deputy General Manager (Estates) appeared to be dealing with water management and ongoing concerns in the Adults and Childrens. Mel MacMillan was tasked by them to complete the actions in the 2018 risk assessment. Melville (Mel) Macmillan issued work requests to the Estates team to complete using our Computer Aided Facilities Management CAFM Software and also created a spreadsheet detailing completion. On completion of a work request the status would be changed by the L8 technician to completed. Mel updated the spreadsheet accordingly.

7. I have been asked to explain what, on appointment as AP, I was told about the state of the water system at QEUH/RHC and by whom. I have been asked if this is as I expected. And, if not, why not. As my role was primarily looking at other aspects of Estates Management within the retained estate (other building on site and not the Adults and Childrens) I was not aware of the condition of the water system within the Adults and Childrens. However, was told via

correspondence and meetings with Colin Purdon, Andy Wilson with Mel MacMillan about the amount of actions which were required on the QEUH/RHC water system from 2018 risk assessment. Colin and Andy tasked Mel to focus on these actions. Personally, it was concerning that a large number of issues still appeared.

8. I have been asked to describe the handover process, if any, between me and my predecessor (the former AP), and when I became to be appointed AP. Provide details of who the former AP was and describe the handover process. In general, a number of AP's for various disciplines are appointed although it does not mean they are actively carrying out or require to carry out those activities as this may only be part of a wider Estates role. In some cases Managers and Supervisors may be AP's for a number of duties. Although those duties may be required for specific activities as and when required and as and when instructed.

9. I am aware that prior to Mel MacMillan being appointed as AP for water that Tommy Romeo (Estates Manager) was responsible for water management and before that James Guthrie (Estates Manager). As Mel MacMillan was the AP for water, there was no requirement for a handover as he was still in post.

10. Other AP's including myself were there to assist when required/requested. Primarily I was tasked with aspects of the retained estate for general estates management and for water management recording any legionella out of specifications for retained estate and other tasks where instructed by my Manager (Colin Purdon).

11. I have been asked what steps I took on commencing my role as AP and at QEUH/RHC to satisfy yourself that the water system was being properly managed in respect of legionella risk. I was not tasked with managing water management within the Adults and Childrens building as this task was carried out by Mel MacMillan as AP for water, the associated team and service providers (including DMA Canyon) from June 2018. Additional AP's including myself were appointed to be able to provide support for specific activities when

required. My primarily role was managing day to day/contract management within other buildings on site within the QEUH campus.

12. On appointment as Site Manager in 2020 I started to implement processes to better manage water systems information. This included standardised reporting, actions etc together with Mel MacMillan (as he now reports to myself).

13. I have been asked to describe the CAFM system, what is the purpose of CAFM, to describe the use of the CAFM system and state if it was regularly updated; and did everyone use it. CAFM is a computer aided facilities management software used widely within Estates/Facilities industry and is a software system designed to assist in managing and maintaining facilities. A number of software packages are available globally. FM First is utilised by NHS GGC. This allows reactive works to be generated by internal customers e.g. Clinical Staff, Facilities staff, Non-clinical staff, who can raise requests via a portal on their PC.

14. This then allows Estates supervisors to allocate these to NHS staff or contractors who can access these on their PDA's (personal digital device, multi-purpose mobile phone). Reactive work requests then appear on a phone/pda to be completed. Once activities are carried out the status of these is updated to 'completed' and automatically updates in the software.

15. Planned preventative maintenance activities can be defined also with the software system and also allocated to NHS staff or contractors. These can be accessed via PDA's and follow the same completion process.

16. I have been asked whether, in my opinion, it was used appropriately. Since I started in June 2018, FM First has been the only source of raising a request for reactive works. In emergencies there may be occasions when internal customers do not raise a work request, although they would have been asked to raise one retrospectively or the supervisor would then create a work request via the software.

17. I have been asked how, if at all, could the use of CAFM have been improved. The ability to complete forms on PDA's removing the requirements for paper records.

18. I have been asked how long was information stored on CAFM for? How far back did records date? Were there any gaps that you were aware of? If so, what action, if any, was taken to address these gaps? On checking the CAFM software records go back to 2012 when the site was at the Southern General Hospital. I am not aware of any gaps since I started in June 2018.

19. I was involved in supporting Mel MacMillan including updating reports for any out of specification for legionella within the retained estate (buildings other than Adults and Childrens) and passing on reports to Microbiology colleagues. DMA Canyon were sampling water outlets from predetermined outlets (decision by others). On occasion Mel would be requested by Colin Purdon to follow up on out of speciation sample results within the Adults and Childrens. This included legionella positives on:-

- Sample date Building Floor Room Number
- 05/11/18 – Adults 5A GENWA-031
- 05/11/18 – Adults 9A GENW13-031
- 09/11/18 – Adults 7A GENW5-001
- 05/11/18 – Adults 5A GENW5-031
- 12/03/19 – Adults 5A GENWA-033
- 12/03/19 – Adults 8A GENW9-065
- 01/04/19 – Adults Ground AAW-017

20. I have been asked to confirm which clinical staff I worked with, describe the working relationship. I would liaise with ward clinical staff and non-clinical staff as required and this would be either by phone, email or in person. This could potentially be anyone over the entire QEUH site. Although primarily I was tasked with managing buildings out with the Adults and Childrens. However, when the RHC Ward 2A patients were moved to Ward 6A in the Adults I was

requested by Colin Purdon to assist William Madden (Estates Manager for Childrens) in various activities including repairs to walls/floors before patients would be allowed to return.

21. Additionally, I attended regular enhanced supervision meetings/physical reviews (for 6A) led by Infection Control (documented). These meetings/physical reviews included representations from Estates, Facilities and Clinical staff.

22. The purpose of the above was to review any Estates/Facilities or Clinical issues and put in place timescales to carry out improvements. In the case of Estates this could include but not limited to repairing floor damage, wall damage, door damage, silicon damage around sinks etc.

23. The working relationship with both Clinical and Infection Control was very good with the people I dealt with.

24. I have been asked to describe the sharing of information between estates and clinical staff. And how this operated. I have also been asked if I had any concerns regarding the sharing of information and, if so, to describe these concerns, and how, if at all, any concerns were addressed.

25. Information would be shared between estates and clinical staff via email, over phone or in person or in meetings formal or informal as required. Throughout my career in Estates and Facilities Management sharing information and managing customer expectations is key to service delivery and this is the ethos I work to.

26. Additionally, from September 2018 I created spreadsheet for the retained estate for out specification for sampled from DMA Canyon, actions taken to resolve this and when they were not detected. This also included the above detail as included in paragraph 19 for Adults and Childrens.

27. The Inquiry has become aware through investigations that in around April 2018 following receipt of the 2018 DMA Canyon Report, that there was an earlier 2015 report, and that there were concerns that findings and recommendations from the 2016 had not been actioned at the time of the 2018 report.

28. I have been asked to describe my understanding and involvement, if any, in respect of this situation.

29. Neither I or Mel MacMillan were made aware of the above. Mel was tasked with completing the 2018 water risk assessment actions. I am aware from reviewing Smartsheet retrospectively, that actions were also uploaded for the DMA Canyon 2017 risk assessment and those associated actions appear to have been completed in 2018 by both Colin Purdon and Andy Wilson.

30. I have been asked when I first became aware of the DMA Canyon 2015 report. I was not aware of the report potentially until it was noted in the media and only really looked at this when analysing water history in 2021, by which time it had been superseded by other risk assessments and in particular the 2018 risk assessment as noted above which was already actioned by Mel.

31. I have been asked if I was surprised that findings and recommendations from the 2015 report had not been actioned. I was surprised as this report was a pre-occupation risk assessment. My expectation would be that these should have been addressed by the project team/contractor prior to practical handover and I would question why the hospital was handed over when certain actions were easier to complete when not occupied.

32. I have been asked what, in my opinion, based on my experience, was the impact, if any, of the 2015 report having not been actioned. On the basis of what I know in relation to water management, this could potentially have increased the legionella risk.

33. Consequently, from April 2020 I adapted this spreadsheet to include out of specification for Adults and Childrens. I have continued to evolve this spreadsheet including chart data for sample results v's out of specifications, Planned Maintenance summaries for water and audit/risk assessment summaries.

34. I have been asked what planned preventative maintenance (PPM) was in place when my role at QEUH commenced and was it as expected. Mel MacMillan was the AP for water and manging activities from his role appointment in June 2018 and my role was primarily looking after other buildings on site within the QEUH Campus and acting as support for Mel and William Madden. Although someone may be appointed as an AP this will be only an aspect of their role. Unfortunately, I cannot comment on PPM's at the time. However, as part of a review carried out by myself and Water AE (Dennis Kelly) in 2021 we analysed amongst other aspects, the PPM completed were paper based and identified a number of gaps between 2015 and 2018.

35. I have been asked what PPM has been introduced, and by whom, during my time at QEUH and if I would have expected to see this PPM in place when I commenced my role at QEUH. It is my understanding that Andy Wilson and Colin Purdon implemented additional PPM's increasing in 2018 based around the written scheme document. As part of a review carried out by myself and Water AE (Dennis Kelly) in 2021 this details what was in place and how this developed up to 2020.

36. In June 2018 Colin Purdon requested that I create a spreadsheet to record daily (Monday to Friday) calorifier hot water temperatures and any issues to raise with Mel MacMillan to action with the onsite Estates team. This process continued until early 2020 when formal checking of the calorifiers became part of the shift supervisors responsibility via a new checklist. Mel MacMillan who was a previous shift supervisor indicated that these were always part of the role requirements amongst other checks.

37. I have been asked to confirm my understanding of what records were kept prior to making the spreadsheet. I have also been asked what concerns, if any, did I have regarding being asked to create a spreadsheet to maintain these records. As I was not primarily involved in day to day management of water, I was not aware of what records were available. The Building Management system continually monitors the calorifiers and the supervisors would be checking this informally. My understanding was that the supervisors would add this to the shift report if any issues arose. The only concern I had was why this was required if not an SHTM requirements as it took time to complete daily although this activity was implemented regardless.

38. I have been asked if I agree with Mel MacMillan's indication that 'these were always part of the role requirements…' and if not, why not? I do agree with Mel MacMillan as he was a previous shift supervisor and well placed to make this comment.

39. In December 2020, I introduced a more detailed shift report which explicitly indicated what checks to be carried out on cold and domestic hot water along with another building and services checks.

40. I was involved in other items when required by Colin Purdon to liaise with Dr Inkster (Consultant Microbiologist) for rooms and dishwashers for taking swabs for culturing. My role was solely to take Dr Inkster to the relevant locations.

Ventilation Management

41. Darryl Connor was an Authorised Person (AP) for ventilation when I started. A number of CP's were in place e.g. Mechanic Engineers who have completed a recognised training course of hospital ventilation systems and signed off to carry out works on these.

42. I have been asked what role, if any, did I play in respect of ventilation. I had no role in managing ventilation. This was carried out Darryl Connor then Jim

Guthrie (Estates Manager) and then Scott Macer (Estates Manager) and then Connor Stepney (Estates Manager) together with their associated teams and service providers.

CL02 Additional Water Filtration Project and Water Technical Groups

43. In 2018/2019 Ian Powrie and Mark Riddell (Role at the time was Head of Estates Operations) led on the implementation of chlorine dioxide (along with additional filtration plant and associated pipework changes). I, together with Mel MacMillan, were asked to help facilitate this implementation and met the appointed contractor (Morris and Spottiswood) and managed over a number of nights the installation and modification to the pipework to accommodate the CL02 installation. This included CL02 direct dosing into the main water tanks in the basement, monitoring units, back up secondary units and additional dosing for hot water. This installation was agreed via the Water Technical Group following the potential of infections due to bacteria in the water system and to minimise risks in the future. I was not a member of the water technical group during their existence (with regards to the above). Primarily this was Ian Powrie and Colin Purdon who attended the water technical groups.

44. I have been asked to describe the events leading up to the implementation of Chlorine Dioxide. I was made aware via Colin Purdon and Andy Wilson that Ian Powrie was working on implementation of CL02 via water technical group due to issues detailed in above paragraph 43.

45. I have been asked what is my understanding of the potential infections and what concerns I had regarding potential infections. Through informal discussions with Colin Purdon, I became aware of potential infections in relation to water and being asked to escort Dr Inkster to various locations to enable swab tests e.g. to dishwashers. My general concern would be what was the route of transmission, if it was from water in the hospital.

46. I have been asked what was the purpose of introducing Chlorine Dioxide, and how does the use of Chlorine Dioxide minimise potential future risks. Chlorine dioxide (Cl02) is a biocide which when introduced to drinking water rapidly can control naturally occurring water bacteria such as legionella and other bacteria and is used globally.

47. Constant dosing minimises the risk of natural occurring bacteria proliferation within a water system as part of an overall risk reduction strategy which includes but not limited to temperature control and ensuring outlets are used and flushed.

48. I have been asked who took the decision to introduce Chlorine Dioxide and why it was chosen. I have been asked if I had any concerns regarding the use of Chlorine Dioxide at the time. It is my understanding that the Water Technical Group made the decision and I was not part of the group who made the decision.

49. I have been asked why was modification required to the pipework? Modifications were required to the pipework to allow the implementation of CL02 and to accommodate a third mains filtration unit (to facilitate additional resilience).

NICU Sink and Tap Replacement 2019/2020

50. It is my understanding that Ian Powrie/Dr Inkster agreed to works within NICU with modification to trough sinks and taps. Ian asked Mel MacMillan to lead on the works. However, Mel confirmed in 2021 (as there were questions from our Infection Control/Microbiology colleagues at this time) that new taps were fitted, the trough sinks were removed from the wall to allow DMA Canyon to carry out work to seal behind and new IPS panels introduced (removable panel attached to a wall). Changes to drainage were made to allow Facilities team if require to shock dose drains by being able to close a valve and allow disinfection to sit in the drain. Taps were also fitted with point of use filters.

51. I have been asked to describe the events that lead to the taps being replaced and what concerns were there regarding the taps at the time. Note : This is in the Neo-Natal building which is a separate building from the Adults and Childrens which has a separate water supply and separate water filtration. I was not involved in the works here although I did ask Mel MacMillan in 2021 to create a report as detailed in paragraph 50. However, it is my understanding that this was in relation to potential bacteria found in this water system and possible infections.

52. To the same extent, I have been asked to describe the events leading up to the sinks being replaced and what concerns were there regarding the sinks at the time. I was not involved so cannot comment further other than what Mel MacMillan indicated on the summary written as detailed in paragraph 51.

Point of Use filters

53. It is my understanding that in response to the immediate water concerns, point of use filters (POU's), were installed as additional control measure. Following an IMT on the 16th March 2018 it was agreed to install POU filters at wash hand basins, sinks and showers, to ensure filtration at 0.2µm. Filter locations were determined through clinical risk assessment (Wards 2A, 2B, 2C and PICU within the RHC and 4A, 4B, 4C and 4D within QEUH). SHTM04-01 guidelines indicate that POU filters can be considered to be introduced as a secondary risk reduction process. Additional POU filters were subsequently fitted to other areas throughout the Adults and Childrens and Neo-Natal building in areas agreed by Infection Control/Microbiology.

54. The reason why POU Filters are still fitted (as many hospitals do globally) is due to Infection Control risk assessment based on the patient groups, to provide filtered water at point of use as final precaution and to reduce risk of route of transmission.

55. SHTM04-01 Part A Page 28-29 indicates:-

"Filters will also need to be changed routinely, depending on usage of the outlets. Their use, therefore, should be considered only as part of an overall regime of bacterial control to be used where the most vulnerable patients are to be treated……..Once a point-of-use filter has been installed it will require to be retained in use thereafter unless a risk assessment deems otherwise"

56. In 2020 Mark Riddell (Head of Estates Operations) arranged with Royal Hospital for Children Management for removal of POU's from low risk outlets. It is my understanding that Mark Riddell sent spreadsheet to Gael Rolls (Lead nurse) who along with colleagues identified POU's which can be removed. In May 2020 Mark Riddell emailed myself, Sandra Devine (Director Infection Control), Melville MacMillan (Estates Manager and Lead AP for Water), Euan Smith (Assistant Head of Estates), Alan Gallacher (Head of Compliance), Gerry Cox (Assistant Director) and Alistair Leonard (Chief of Medical Diagnostics) to agree the process for removal of which Alistair Leonard agreed.

57. Subsequently Jamie Redfern (General Manager – RHC) and Melanie Hutton (Clinical Services Manager) and I were advised of the process and schedule for removal. The process was initiated with DMA Canyon who then undertook the work. If sample results were not detected for Legionella, Pseudomonas or potable (not showers) and after 3 concurrent not detected then filters were removed. If any outlets were out of specification these would continue to be sampled until no out of specification were detected.

58. In total 185 POU filters were removed. However, due to COVID no others were removed. However we are revisiting this again in 2024 to initiate more removals (where appropriate, risk assessed and agreed with Infection Control and Microbiology colleagues).

59. In 2023 there were additional areas identified by Infection Control/Microbiology where the proposal was to remove POU filters based on patient groups, however there is no national guidance on how this can be achieved in large

numbers although there are further plans to remove POU Filters once a process/procedure is agreed. A NHS GGC wide short life working group was set up in to look to implement this and is still ongoing via Point of Use Filter Removal SLWG Meeting.

Water Management processes

60. One task I was given was to continue to develop together with the Estates Team the water management processes in my new role as Site Manager and to implement continuous improvement by Euan Smith (Assistant Head of Estates). This continues to be part of my current role.

General comment

61. In my opinion due to the design of the building it has a significant impact on ability to maintain whilst rooms are occupied by patients. Also taking into consideration HAI SCRIBE requirements and that rooms require to be vacated of patients to allow maintenance e.g. access to valves for heating, cooling which can be behind ceilings or TMT isolation valves which can be behind walls which impacts on the maintenance aspects of the hospitals or water return pipes in ceilings not accessible due to other services. This may though not be any different with other hospitals or buildings however there is a requirement for appropriate access for maintenance/repair as per CDM Regs 2015, Regulation 9.

62. I have been asked to describe how the design of the building significantly impacted on the ability to maintain while occupied by patients, and to provide details and reasoning for my opinions:

Example - Heating and cooling isolation valves are situated above ceilings in patient rooms. If there are any issues with heating or cooling then these require to be checked for correct operation or replaced. However, this cannot be achieved with a patient in the room and room requires to be vacated. This can

impact patient comfort. This could have been avoided if valves were easily accessed.

Example – Isolations for thermal mixing taps for sinks in en-suites are situated behind IPS (wall panels). To carry out 6 monthly or annual TMT maintenance/checks requires the panel removed. However, given the safety precautions which require to be implemented this can only be carried out when the room is vacated in high risk wards, (to implement the HAI SCRIBE/carry out the works) and in other areas access granted. This adds additional hours to this activity which could have been avoided if isolations were readily accessible.

Internal blinds behind wooden frames – If these break, the room requires to be vacated to allow the corridor window frames to be removed to allow access to the blind. If the external blind fails it may also require for the frame to be removed, although in most cases there is a small glass access window which may be sufficient to allow access depending on what is the issue. However, again, the patient requires to be removed from the room to allow work to be carried out under HAI SCRIBE.

63. Additionally in my opinion the design of the walls/floors, due to the adhesion of the skirting to the walls and seals in the showers, together with the different thermal properties of the materials (over the coving). this has the risk of allowing the potential for water ingress.

64. I have been asked if the design of the walls and falls as I mention above have been addressed and, if so, how, and who was involved and what was my involvement, if any. Most Estates Managers and Supervisors have been involved in replacing flooring and wall coverings and resealing as part of reactive maintenance when issues have been reported since I started in 2018.

65. Capital Planning carried out a full replacement of walls and floors in RHC Ward 2A to a new design removing the above issue, creating an overhang.

Keith Johnstone (Estates Manager) carried out replacement of floors/walls to a small number of rooms in Adults Ward 4B (Ensuite Rooms 78, 95, 93, 82, 97 & 111) in 2022/23 with a redesign to create an overhang similar to that on RHC Ward 2A.

66. It is my understanding that the Rectification Team within Capital Planning is planning to replace wall coverings and flooring subject to budget approval through the Adults and Childrens and this included Adults Ward 4B.

Chilled Beams:

67. I have been asked to describe my understanding at the time of the cleaning regimes in place for chilled beams and to what extent I was involved in the cleaning regimes for chilled beams. I was not responsible for managing or cleaning of chilled beams in general as this was the responsibility of those managing mechanical systems including ventilation.

68. Darryl Connor tasked myself and a number of Estates staff from Summer 2019 to arrange an access programme to coordinate with the wards for access for cleaning of chilled beam on Ward 6A. Frequency was set at every 6 weeks. Rooms required to be vacated and cleaning carried out under an approved HAI SCRIBE by Infection Control.

69. I have been asked what specific events do I remember in relation to chilled beams. As above this was not my area of responsibility.

70. Although I was asked by Colin Purdon to accompany Dr Inkster (Microbiologist) to certain rooms on Ward 6A to look at chilled beams. I was aware there was concerns by others that these were leaking.

71. Darryl Connor also asked me to extract from CAFM the air conditioning issues for June 2019 this was to allow a comparison to external temperature dew point and any reported leak on CAFM system and cross reference this to work requests reported and against in plant failures.

72. The primary reason for this was to identify if there was any correlation to plant failures or high external humidity.

73. On 3rd June 2019 with regards to Ward 6A chilled beam with the fittings which were not compression fittings from build. The original fittings would leak if the primary source of heat was lost. William Madden was asked to work with Stuart McCready (Estates Supervisor) to arrange for these to be replaced. I was tasked with arranging the HAI SCRIBE document with Infection Control. This covered Ward 6A Rooms 1,7,13,17,18, 22 & 26.
"*The dew point of a given body of air is the temperature to which it must be cooled to become saturated with water vapour*".

74. Darryl Connor arranged for the software changed on the 6th August 2019 and sent out an email indicating that *"The chilled beam Dew point control and software strategy has now been globally applied….Modifications to fixed set point control of Chilled Beam Circuit, so that the fixed set point of the Chilled Beam Circuit can be modulated to be above the dew point of the outside air humidity when the dew point exceeds the fixed set point of the Chilled Beam Circuit". The fixed set point of the Chilled Beam Circuit is always to be 1'C above the outside air dew point."*

75. This has been replicated for all the set points for all the Chilled Beam Circuits throughout the Adults and Children Hospital plant rooms.

Ward 6A

76. With reference to the Estates Communications Bundle 12 – page 998 I have been asked what was my involvement in respect of the leakage of Ward 6A, and to describe the situation, my involvement and any actions taken. Specifically to the above, I was contacted from Ward 6A that water was leaking into the Ward 6A kitchen. I attended with Darryl Connor. Dr Inkster and Dr Peters (Microbiologist) attended. We attended when it was reported and arranged for the HAI SCRIBE to be implemented after approval by Infection Control to allow investigations and repairs.

77. Water was reported running out of the bottom right hand corner of the kitchen unit. On initial investigation there was water on the floor and the supply pipes and insulation was found to be wet. When the kitchen unit was dismantled, water was found on what appears to be sawdust, which would appear to be from the original build. We also found dry sawdust. There was also paper towels and other debris which would appear to be from the original build behind the kitchen units.

78. However, what was initially perceived by others to be saturated walls, was in fact paint line finish i.e. where the builder did not paint the entire wall behind the kitchen unit to the floor. On initial viewing it showed two different colours.

79. On further investigation it was found that the Zip Boiler overflow was running intermittently and running along the sink surface and leaking down the pipes and onto the floor. Note: I was made aware that the tap was changed only a few weeks prior to the water being found on the floor and it was difficult to determine if this was leaking due to the pipe being wet. Initially it was assumed that the pipe was leaking (All tap connections were subsequently tightened). On discussions with Clinical staff (in general) based on Ward 6A, they indicated that the Zip Boiler was overflowing intermittently for only a number of weeks.

80. Under and approved HAI SCRIBE, the kitchen flooring was cleaned and an inspection hatch cut in the wall to facilitate investigation on whether there was any subsequent dampness behind the sink. Once the section had been cut out this was investigated with Estates including myself and Gillian Bowskill (Lead IPC Nurse, South Paediatrics) and no dampness was found behind the wall or floor. A new kitchen was subsequently installed.

81. Part of the works was to also remove a water dead end (a water source with no means to flush) which also had a point of use filter attached. The dead end and filter were removed as part of the works.

82. On completion of the above works and upon review by Infection Control (Gillian Bowskill) they were happy for kitchen to be handed back to Clinical colleagues. As per standard protocol the room was then cleaned by a specialist service provider. The HAI SCRIBE risk prevention measures were then then removed from the room. Domestic staff carried out a domestic clean and DMA Canyon refitted point of use filters to the outlets.

Cryptococcus

83. I have been asked to recall my understanding of the Cryptococcus infections in 2018.

84. Cryptococcus is fungi and is found in soil and bird droppings.

85. I have been asked what issues, if any, do I recall in respect of pigeons either nesting, leaving droppings or otherwise at QEUH/RHC. I have also been asked if I recall any such issues, what action did I take, or what action was taken? Did the action taken resolve the issue(s) I was not involved directly in managing these issue but became aware (via Darryl Connor) of bird dropping being found in a plantroom and pigeons outside the helideck.

86. I have been asked what were the issues with Cryptococcus at QEUH. I have been asked when I first become aware of these issues and what happened in response to these issues. I have also been asked who, if anyone, did I report these issues to. I was not involved but became aware of a number of infections via Darryl Connor in December 2018 when he asked me to help him look out maintenance records for AHU's.

87. I have been asked to describe any visits I made to the plant rooms, when did I go, why did I go at that time, and what did I see? I have also been asked what cleaning, if any, took place before the visit – if so why – and what was evidence prior to the cleaning. I did not visit any plant rooms, but I believe other Estates Managers did visit plant rooms and arranged repairs to a wall; which is my understanding was a gap from the initial build. Additionally, I was aware plant

and floors were arranged to be cleaned via Darryl Connor. Our Facilities colleagues (David MacDonald – Head of FM Operations) also arranged for bird netting to be added to courtyard areas.

88. I have been asked if I recall seeing photos relating to pigeons at QEUH/RHC, if so, what did they show? I believe, Darryl Connor showed me photos of some droppings on a floor in a plantroom.

Water Technical Group

89. The Inquiry stated that the water technical group (WTG) which sat between 2018 and 2019. I have been referred to Water Technical Group Bundle and Estates Communication Bundle, document 133.

90. I have been asked what is the purpose of WTG. A WTG is and can to this day be set up as short term working group to focus of specific issues or project in relation to water management.

91. I have been asked what issue/ event prompted the setting up of the WTG. It is my understanding from analysing water history that this was due to potential infections in relation to water.

92. I have been asked what was my involvement with the WTG and to detail the specific work carried out in respect of my involvement with the WTG, why I carried out this work, and what was the impact. I was not involved in the WTG between those dates (other than assisting in the CL02 installation as discussed in paragraph 43).

93. In December 2018, I was asked however to provide Colin Purdon, details of the location for where a water meter was removed and sent to Intertek (service provider) for analysis (arranged by others, however cannot confirm whom). The report indicated internal corrosion.

94. I have been asked if this was within my remit within estates. This was not within my remit to attend these meetings in the timespan noted in point 90.

95. The Inquiry have asked who was in the WTG, what were their names and their roles within WTG. I cannot comment on who attended. However, I am aware that from an Estates perspective, Colin Purdon and Ian Powrie attended (and this was through general conversations).

96. I have been asked why was the WTG set up. It is my understanding this was due to potential infections in relation to water.

97. The Inquiry have asked me what qualifications were required in order to be chair of WTG. It is my understanding that there are no formal qualifications required to be the chair of WTG. Depending on what the subject would be a WTG could be chaired by anyone, however at minimum my expectation would be this would range from Duty Holders, Designated Persons, Responsible persons, Authorised persons for water depending on the specific subject being addressed.

98. I have been asked to discuss focus of WTG – what was the purpose – why was WTG required – what issues came to light as a result and what action was taken; what were the concerns of the WTG and how did this impact on patients? I have been referred to the Water Technical Group Bundle to assist with my answers. Unfortunately, I cannot comment on something I was not directly involved in during the dates above. I attended a number of Water Technical Group meetings in 2020 and 2021 prior to these being subsumed into Water Safety Group Meetings as it was felt there was a level of duplication at this time.

Water Safety Group

99. I have been asked to refer to the Water Safety Group Bundle.

100. I have been asked to detail what is the purpose of WSG. As defined within SHTM04-01 a Water Safety Group should be set up to provide appropriate expertise, to support, co-ordinate and review operational management and controls in accordance with statutory and mandatory requirements.

101. This would be at each sector and this would then report via governance to a Board Water Safety Group.

102. I have been asked why was the WSG set up. This is a requirement of SHTM04-01.

103. I started to attend Board WSG meetings from 2021 (initially in the absence of Euan Smith).

104. I have been asked who was in the WSG, what were their names and their roles within WSG? If this is relation to Board Water Safety Group meetings this included a quorum at the meetings I attended on September 2021, March 2022.

105. This would include designated persons (Gerry Cox Assistant Director then Mark Riddell), representation from Infection Control including Designated Person (Pseudomonas), Microbiology, Health and Safety Clinical representation, Authorised Engineer – Water, Public health consultant and Responsible person for each sector, as noted in the minutes. Each would their expertise and knowledge to make decisions at the meeting.

106. Each sector would then have sector meeting led by the Responsible Person for Water for the site and report to the Board Water Safety Group Meeting. The sector meetings would include but not limited to Estates, Compliance, Infection Control, Facilities and Microbiology attendees.

107. I have been asked what qualifications were required in order to be in the WSG. It is my understanding that there are no formal qualifications required and WSG requires a quorum of experts in their field. This is a broad definition but at minimum my expectation would be this would include Designated Persons, Designated persons and Responsible persons, Compliance Managers, Infection Control Managers. The meeting would be chaired by the Designated Person or their deputy.

108. I have been asked to look through the Water Safety Group Bundle and to explain any issues discussed, my involvement and any action taken by me, and why, in response to issues raised at the WSG meeting. In particular discuss my involvement, if any, in respect of flow restrictor replacement; and the National Water Group.

109. **August 2020 -** Mark Riddell (Head of Estates at that time) appears to have been asked to contact myself to provide a copy of the Intertek report which analysed results for flow straighteners from June 2020 which were sent to Intertek for analysis to allow the Board Water meeting to agree whether the quarterly exchanges could stop. Although on reading the subsequent minutes it appears that any decision based on the report for this was passed back to the Water Technical Group Meeting.

110. I was aware before then and currently the process is still these are changed quarterly. Although in 2024 we carried out further analysis of results and Intertek indicates we could consider to lengthen the frequency for changes.

111. **September 2021** – Attended in absence of Euan Smith. Indicates that there has been some deterioration of metal supports in the tanks, due to wrong metal being used. (This has formed a basis on a SBAR for Capital planning to consider replacing these tanks).

March 2022 – Attended and discussed:

1. Looking at implementing process for further removal of filters in the absence of any extant guidance.
2. Working with colleagues in Microbiology for a board wide to a uniform sampling protocol across GGC.
3. Discussed external leak to Spinal and Office block supply which Scottish Water repaired.
4. Also looking at other potential suppliers of taps.

112. **National Water Group** – Purpose of the National Water Group is for representatives across Scotland NHS Boards to share information, experience, concerns, provide support, assistance and agree any national standardisation, where possible. At the Water Safety Group Board Meeting in October 2020 it was recommended that I start to represent GGC at the national meetings.

113. I have been asked if this within my remit within estates. The Responsible Person (Euan Smith) was the person who attended the Board Water Safety Group Meetings, representing QEUH. I attending initially for experience and to provide support or in the absence of Euan.

114. **September 2022** - Mark Riddell asked me to chair the meetings to gain experience. Meeting was chaired previously by Gerry Cox (Assistant Director), then Mark Riddell (Assistant Director) and occasionally by Alan Gallacher (Head of Compliance).

115. I have been asked how did clinical staff and estates get along at these meetings. In my experience at the meetings I attended, everyone got on very well, with a collective approach.

Decision to Close Wards 2A/B and Move to 6A and 4B

116. I have been asked to discuss the issues surrounding and leading up to the decant of patients from Ward 2A in 2018. I was not involved in the decision to move from Ward 2A/2B to Wards 6A and 4B and can only comment generally or was I fully aware of the issues on 2A at the time. It is my understanding that Ian Powrie and Colin Purdon were involved. I may have been made aware (as would other people within Estates) of some of the issues generally through informal conversations via Colin but not the detail.

117. I have been asked to discuss the issues surrounding and leading up to the decant of patients from Ward 2A in 2018, such as the use of bottled water. I have been asked what was my involvement. I had no involvement. It is my understanding that Ian Powrie and Colin Purdon were involved.

118. I have been asked what risk assessment and additional measures were put in place to ensure patient safety, both prior to and during the move. I can only comment generally as I was not involved. It is my understanding that new sinks were introduced initially to Ward 2A along with bringing the hot water return pipe to as close to the outlet as possible, new flushers for toilets introduced and the use of point of use filters.

119. With regards to the move to Ward 6A, it is my understanding that floor mounted Hepafilter units were agreed to be installed. Additionally, hepa-units in ceiling in en-suites (implemented by Darryl Connor via the service provider - Morris and Spottiswood). Point of use filters were fitted to all water outlets including taps and showers.

120. Additionally, I attended regular enhanced supervision meetings/physical reviews (for 6A) led by Infection Control (documented). These meetings/physical reviews included representations from Estates, Facilities and Clinical staff.

121. The purpose of the above was to review any Estates/Facilities or Clinical issues and put in place timescales to carry out improvements. In the case of Estates this could include but not limited to repairing floor damage, wall damage, door damage, silicon damage around sinks etc.

122. My only involvement was working with William Madden to redecorate and arrange various repairs to Ward 6A before occupation to satisfy requirements by Infection Control prior to occupation.

123. I have been asked what risk assessment and additional measures were put in place to ensure patient safety. See response at paragraph 118.

124. I have been asked what concerns, if any, did I have about where the patient cohort was being moved to and if so, why did I have these concerns, and did I escalate these concerns. I have also been asked with the benefit of hindsight,

what steps could have been taken to progress this matter further. I can only comment generally as I was not involved, however it is my understanding that this was risk assessed as Ward 6A was supplied via a general air handling unit and additional measures were implemented as noted in my response in paragraph 118.

125. The Inquiry would like me to discuss and detail the works done to Ward 2A/B what was required to be done and why, what has been done and when the work was completed and include details of my involvement. I cannot comment on details of the initial works as I was not involved in Ward 2A other than what my understanding as noted in paragraph 118.

126. I can comment though on the works when the patients moved to Adults Ward 6A. Capital Planning (led by James Huddleston – Head of Capital projects) carried out a significant construction project including but not limited to new ventilation, new walls, services, floors, pipework and a specialist radiation room; which opened in 2022. My role in this aspect of the project was working alongside other representative from Estates, Capital Planning, Microbiology, DMA Canyon and Infection Control to agree and implement sampling, tap changes and analyse results. Additionally, along with the above teams we provided information (including the pre-handover water risk assessment for the capital works) to NHS Scotland Assure. This included collectively answering a significant number of questions with evidence prior to handover to Clinical Staff.

Declaration

127. I believe that the facts stated in this witness statement are true to the best of my knowledge, information, and belief. I understand that this statement may form part of the evidence before the Inquiry and be published on the Inquiry's website.

Scottish Hospitals Inquiry

Witness Statement of Questions and Responses

Colin George Purdon

This statement was produced by the process of sending the witness a questionnaire with an introduction followed by a series of questions and spaces for answers. The introduction, questions and answers are produced within the statement.

Personal Details

1 Full name

A. Colin George Purdon

2 Occupation

A. Head of Estates, NHS Golden Jubilee Hospital

3 Qualification(s)

A. BSc (Hons) Building Surveying

Professional Background

4 Professional role(s) at NHS GGC

A. Senior Estates Manager (Retained Estate) Aug 2015 to Dec 2018 followed by Interim Sector Estates Manager (South Sector) Dec 2018 to Feb 2020

5 Area(s) of the hospital in which you worked/work

A. Queen Elizabeth University Hospital Campus (Retained Estate) followed by whole campus from Dec 2018.

6 Role and responsibilities within the above area(s)

A. I had senior management responsibility for all aspects of scheduled and unscheduled maintenance and repair activities to all building and engineering assets.

Specific Role(s) at NHS GGC

7 When were you appointed to your role(s)? How did you come to be appointed, who selected you, what was the selection process, did you have previous working relationships with those who selected you?

A. Selection for my initial role at QEUH was by interview in early 2015. Whilst working at the Royal Alexandra Hospital in Paisley I applied for the role of Senior Estates Manager and after my application had been shortlisted I was interviewed by James McFadden, Ian Powrie and a member of the Human Resources team whose name I cannot recall. Of the 3 panel members I had only previously met James McFadden incidentally on a few occasions when we attended the same meetings. I was told initially that I had been unsuccessful in securing the role, and David Brattey was being appointed to the post. A number of weeks later I was contacted by Ian Powrie and informed that an equivalent role was available within the Retained Estate and they would like to offer me this post. I accepted the post and commenced employment at QEUH (Retained Estate) in August 2015. My second role at QEUH was secondment into the vacant post of Sector Estates Manager. The post was vacated by Andy Wilson in late 2018. It was then advertised as a secondment opportunity by Alan Gallacher Head of Corporate Estates. Alan had previously been my line manager during a period of my time based at Royal Alexandra Hospital Paisley where I worked as an Estates Manager. I

registered my interest and was successfully appointed on 3rd Dec 2018 as Interim Sector Estates Manager.

8 Go through each of your roles in turn held in Estates at the QEUH: Describe the role.

A. Senior Estates Manager (Retained Estate) I was the Senior manager to the Estates Managers and Supervisors responsible for the overall management of day-to-day repair and maintenance activities for all building and engineering elements and grounds. The portfolio of buildings in the retained estate included Podiatry, West MARC, CMB, Office Building, TLC, INS, Neurology, PDRU, Maternity, Labs, and multi storey Car Parks. I had incidental involvement with issues arising in the Adult & Childrens Hospitals as and when I could be of assistance. As Interim Sector Estates Manager I had the same duties and responsibility but for the entire campus including Adult & Childrens Hospitals.

9 What were your duties in this role?

A. Both roles were similar in duties and differed only in terms of whole or partial responsibility for the site buildings. I led the maintenance team and had management responsibility for maintenance and repair of all assets.

10 Who did you report to in this role? Detail superiors/superiors for this role.

A. Senior Estates Manager: I reported to the Sector Estates Manager in post at the time. These were initially Ian Powrie followed by Andy Wilson. As Interim Sector Estates Manager I reported to a number of individuals depending on the type and timing of request. These were Alan Gallacher, Karen Connolly, Billy Hunter, Mary-Anne Kane, and Tom Steele.

11 What was your relationship like with your supervisor in this role.

A I had good relationships with both Ian and Andy. We had no conflicts and I would carry out instructions as necessary to the best of my ability with the resources I had at my disposal.

12 Provide details of staff who reported to you, and you were responsible for in this role, and your relationship with them.

A. As Senior Estates Manager for the retained estate I had 1 x Estates Manager, 2 x Co-ordinating Supervisors who reported to me directly. I cannot recall exact numbers of Technician, Building Craft, or Assistant staff who were in post for retained estate at the time.

13 Provide the name and role of any managers you worked with. Please provide their job (s) and role responsibilities.

A. David Brattey was the Senior Estates Manager for the QEUH Adult & Childrens Hospitals. His role, duties and responsibilities were the same as mine although we covered a different portfolio of buildings on the same campus.

14 How was work delegated in the Estates team?

A. Work would be delegated to the technicians and trade staff by the coordinating supervisors or Estates Managers.

15 How did you keep a record of work delegated?

A. The organisation uses a Computer Aided Facilities Management system called FM First. Any work would be delegated to individuals would be done so electronically. The job tickets would be allocated from the software on a desktop PC and transferred over Wi-Fi to the tradespersons mobile phone. A log would be kept of all activities from initial report to completion of every task.

16 How did you check that the work delegated had been carried out?

A. Checking work was completed was the responsibility of the Estates Managers and Coordinating supervisors.

17 Did you have any concerns about any member of staff? If so, please describe these concerns. What action, if any, did you take in relation to these concerns?

A. No I had no concerns that I felt would require intervention.

18 Did you ever have any concerns/ever raise any concerns regarding management/ managers? If so, please describe these concerns. What action, if any, did you take in relation to these concerns?

A. No concerns.

19 Describe the interpersonal relationships within the Estates team. How would you describe communication between you and your supervisor(s)/ superior(s)? How would you describe communication to you from those who were senior to you/ supervised you?

A. Generally I had good working relationships with staff throughout the Estates Team. Communications were often verbal or by email. If I required any clarity I would often ask for this by email so that there was no dubiety. Emails were the preferred method of communication so much so that the number of emails I could receive in a day was unmanageable within a standard working day.

20 On how many occasions, if any, did issues arise caused by misunderstandings or poor communication? Please provide details of any such instances.

A. I cannot recall any specifics about misunderstandings or incidences of poor communication within the Estate Management department.

21 How many people worked within QEUH hard facilities management when you started? How many people worked within QEUH soft facilities management when you started? Did the number of people working at QEUH change during your time there? If so, how many people changed in soft facilities management? If so, how many people changed in hard facilities management?

A. In Hard FM there were approximately 70 people in the organisation. I have no idea how many worked in Soft FM. Yes the number of people working in Hard FM changed during my time. There was an increase in the number of managers and supervisors. I cannot recall exact numbers.

22 How did Estates management operate on a daily basis? Was responsibility shared between different teams? If so, to what extent was responsibility shared?

A. The Estate was split across 2 areas of responsibility and had 2 dedicated teams of managers and trade staff. The split was retained Estate, and Adult & Childrens. Responsibility was shared across the 2 areas where there was high demand, or where a person's knowledge and skills could be of benefit in addressing any particular issue. The Adult & Childrens shift team assumed responsibility for attending to issues across the entire estate out of hours.

23 Refer to the **Estates Team Bundle, document 29** - Organograms showing the organisational structures within QUEH.

a) Do the organograms match the organisational structures of QEUH?

A. Yes I believe this matches the organisational structure at QEUH at the time.

b) If not, why not?

A. NA

c) How did the structure and hierarchy operate across the different sectors?

A. I am unable to comment on how they operated across the sectors.

<u>Training</u>

24 What training had you undertaken for your role(s) in estates?

A I have been working in NHS Estates since 1994. Over my career I had undertaken various statutory training courses and also completed an HNC in

Construction Practice in 2004. I completed some further training courses provided by the organisation such as City & Guilds qualifications in Water Systems Management and finally enrolled in a degree course in Building Surveying at GCU in 2012. I completed this course in 2016 during my time at QEUH.

25 What qualifications did you have for your role(s) in estates?

A As stated above.

26 What experience did you have working in estates prior to the QEUH/RHC? How similar was the industry, role, and responsibilities to your work in QEUH/RHC estates?

A I had worked in the NHS since 1994. My first role was as Maintenance Craftsperson in the Dental Hospital from 1994 to 2005. I then moved on to become Estates Officer at RAH Paisley from 2005 to 2014. I spent a further year at RAH as Minor Works Project Manager serving RAH, IRH, and Health Centres within the Clyde Sector. In 2015 I moved to QEUH.

27 Did you have any formal training or qualifications in respect of:

a) Water

A Yes City & Guilds in Managing Water Systems circa 2008

b) Ventilation

A No

c) Infection Control

A No

If so, please detail above any training and qualifications – when trained? When qualified? Who was the awarding body? Please describe how the training and qualifications applied to your work at QEUH.

A The training gave me an understanding of how to manage Legionella bacteria in water systems. I had an understanding of what tasks should be performed and what actions should be taken in the event of a positive reading from samples.

28 Did you ever have any specific roles or duties in relation to the water systems operation or maintenance within NHS facilities? When did you have these roles and duties?

A Yes, as part of my role at RAH as Estates Officer I had operational responsibility for managing the water system maintenance procedures. I also had senior responsibility for retained estate water systems whilst working at QEUH.

29 If you did:

a) What were these responsibilities?

A Ensuring that all water related maintenance tasks were carried out, all sampling was carried out and any positive samples were responded to appropriately.

b) What was the purpose of these responsibilities?

A To ensure that the system remained under control and that legionella bacteria would not be allowed to proliferate.

c) Were you aware of any specific legal responsibilities/ obligations relating to working with the water systems. If so, please detail.

A Yes, It is a legal responsibility to manage water systems in accordance with the HSE ACOP L8 document.

30 If you did not have any such roles or responsibilities in relation to the water systems operation or maintenance within NHS facilities:

a) Who did?

A N/A

b) What were these responsibilities?

A N/A

c) What did you understand the responsibilities to be?

A N/A

d) Were you aware of any legal obligations/ responsibilities? If so, please detail.

A N/A

31 Have you ever worked on a large-scale water or ventilation system before? If so, when was this? How did this compare to working on QEUH? What was your role and duties?

A Yes, during my time at RAH Paisley.

Documents, Paperwork and Processes in Place as of 26th January 2015

We know that handover of QEUH occurred on 26th January 2015:

32 What contractual documentation would you expect to see in place at such a handover?

A I was not employed at QEUH at this time, although I would expect that a full Operation and Maintenance package (O&M Manuals) would be present. These would contain as built drawings, schematics, commissioning and validation documentation for all systems, test results, manufacturers literature and maintenance recommendations.

a) What contractual documentation did you see upon commencing your role?

A I was not specifically handed or directed to view any documentation, but I asked to be given access to the ZUTEC online portal where all of the relative O&M information was held. The ZUTEC portal held information on the Lab Block building as well as the Adult & Childrens hospitals. As I was responsible for the lab building, I required access to this to view O&M information. I could

view this information when required and familiarise myself with the many assets and systems installed in the buildings. There were no admin restrictions therefore I was also able to freely browse files relating to the Adult & Childrens buildings. I did this on occasion purely out of interest and to aid my understanding of the Adult & Childrens construction.

33 We understand that you did not take up the role of Site Manager Operational Estates until August 2015:

a) At the commencement of your role, what was your initial instruction in respect of the state of the QEUH/RHC campus?

A I was placed in charge of the Retained Estate when I took up post. I would occasionally be asked to get involved in issues within the Adult & Childrens hospitals where my knowledge or experience could be useful

b) At the commencement of your role, what was your initial instruction in respect of the repairs which had been undertaken and/or required to be undertaken?

A I cannot specifically recall details of any repairs carried out to the adult or children's hospitals since opening in 2015. I was focussed on the maintenance works required in the retained estate

c) What was the position regarding outstanding repairs and maintenance when you left your role in May 2023?

A I departed the QEUH campus in Feb 2020 to take up a post in the Clyde Sector. I had no further involvement in the QEUH after that date.

d) At the commencement of your role, what relevant paperwork were you provided with relating to the QEUH/RHC Campus?

A I had access to all of the historical information that was held in relation to the Retained Estates buildings which consisted of drawings, maintenance records, risk assessments, O&M manuals etc. I was given access to the ZUTEC platform which held O&M information in relation to the Laboratory

medicine block as this was one of the building I had responsibility for. It also contained information on the Adult & Childrens hospital buildings

e) What were your observations in terms of the extent of the remedial work required to the hospital?

A My observations were that the building stock was of a significant age and as such was going to require a huge amount of investment in order to eliminate the list of backlog maintenance tasks and bring it up to a good condition. Although there was constant repair work going on day-to-day, this was only in an effort to keep the buildings functional. The maintenance budget only allowed for running repairs and not for upgrade or refurbishment

f) Here you state that “the building stock was of a significant age”. The QEUH handover occurred in January 2015 a short while before you started your role, therefore the buildings would have been new, can you please clarify your response.

A The building stock I am referring to is within the retained estates which consists of many older buildings from the original Sothern General Hospital site. These dated back to 1900 onwards. Those are the buildings that were within my remit. I was not fully informed or involved in any remedial works being carried out on the more recent Adult & Childrens hospitals.

g) What were your observations in terms of the extent of the remedial work required to the new hospital buildings when you commenced your role?

A I cannot recall making any observations as I was not directly involved in planning or managing any of the remedial or defect works in the new buildings. I was only aware of the vague detail of any issues that would be mentioned in passing discussions with my colleagues who were more directly involved in the Adult & Childrens hospitals. From memory it was some time in 2017 I became involved in investigating issues related to spontaneous glass failures on the façade as it was thought my knowledge could be useful.

h) What were your observations in terms of the team dynamics?

A I felt the team were working well together. They were always very busy and could rely on each other. The volume of work they got through on a daily basis was significant, but the demand was always greater. This led to some members of staff becoming tired and burnt out as the workload was often unmanageable.

34 We understand that you did not commence your role in estates until August 2015, consider the following questions in respect of the commencement of each of your roles held in estates:

a) At the commencement of your role, what was your initial instruction in respect of the water system at the QEUH/RHC? Who provided you with this information? Was there an official handover process? If so, who conducted this and was there paperwork involved?

A As Senior Estates Manager (Retained Estate) I had no direct remit over the water system within the QEUH/RHC Adult & Childrens hospital buildings, therefore I did not receive any information, handover, or paperwork. When I commenced my role as Interim Sector Estates Manager I assumed overall responsibility for managing all assets and systems with the QEUH Campus. There was no official handover process at the time and no paperwork was involved. I had worked closely with Andy Wilson during his tenure at QEUH and therefore was able to access documentation he had set aside for me on the department hard drive.

b) At the commencement of your role, what was your initial instruction in respect of the ventilation system at the QEUH/RHC? Who provided you with this information? Was there an official handover process? If so, who conducted this and was there paperwork involved?

A As Senior Estates Manager (Retained Estate) I had no remit over the ventilation system in QEUH/RHC. When I commenced my role as Interim Sector Estates Manger I assumed responsibility for managing all assets and

systems across the QEUH Campus. There was no official handover process and no paperwork was involved.

c) At the commencement of your role what was your initial instruction in respect of the infection control at the QEUH/RHC? Who provided you with this information? Was there an official handover process? If so, who conducted this and was there paperwork involved?

A At commencement both of my roles at QEUH/RHC I was not given any formal instruction in relation to infection control. It was widely accepted that any works carried out within the property would require to be done under HAISCRIBE control measures. This knowledge predated my time at QEUH. I was already aware of the requirements from my time within the Clyde Sector

d) What relevant paperwork were you provided with relating to the operation of facilities and estates at the QEUH/RHC?

A I was given access via username and password to the ZUTEC platform which stored all of the Operation and Maintenance information that had been submitted by Brookfield Multiplex at the time

Risk Assessments at Occupation

35 Are you aware that there is a legal requirement to carry out a water risk assessment at the point of occupation?

A Yes

36 Where is this legal requirement set out?

A The legal requirement is set out in HSE ACOP L8 and relates to carrying out a legionella risk assessment on water systems

37 Are you aware if such a risk assessment was carried out at the QEUH/RHC?

A Yes

38 If so, when did you become aware of this risk assessment?

A I am unsure of exactly when I was first aware of the existence of the QEUH/RHC Water Risk Assessment. I would estimate it was some time in 2016

39 What documentation have you seen in relation to this risk assessment?

A I have seen the pre-occupancy risk assessment (2015) and the updated version from 2018

40 DMA Canyon Reports: **Refer to Bundle 6 – Miscellaneous documents – documents 29 and 30.**

a) Have you seen these reports before?

A Yes

b) Was this the DMA Canyon 2015 report **(document 29)**?

A Yes

c) When did you first become aware of this report?

A I am unsure of exactly when I first saw this. I would estimate that it was some time in 2016

d) In 2016 what were the circumstances in which you first viewed the DMA Canyon report? Who showed this to you?

A I cannot recall the exact date or location or who provided me with a copy. At that time I was only given it for information purposes. I do not believe there were any responsibilities placed upon me to action the document. I cannot recall whether I received it as an email attachment or whether it was a hard copy.

e) Who made you aware of this report?

A I cannot recall

f) Did you discuss this report with anyone?

A Initially I did not discuss this report with anyone as it did not relate to any of the building within my remit at the time.

g) Who would have instructed these reports?

A Yes had I been in that position I would have instructed a similar risk assessment to be carried out.

h) What would the cost of such reports be?

A I would approximate circa £5,000

i) Who would have signed off on these reports? What would this process look like?

A Normally the person commissioning the report would sign off on it. The process would normally consist of a post risk assessment meeting with the consultant who carried out the assessment to discuss the content and highlight any concerns or clarify any points. An action plan would normally be created and issued to a member of the management team to implement

j) Are you aware of why the risk assessment was not undertaken prior to handover in 2015?

A No

k) Do you have a view on why this might have happened?

A No

l) The report makes several recommendations, do you know what was done to follow up on these recommendations between 2015 and 2017?

A I am not aware of what was done in relation to the recommendations between 2015 and 2017

m) Do you know if/when the works suggested in the 2015 report were actioned?

A The works identified were completed. I am unable to state exactly when each of the individual actions were completed

n) What is your own view of the findings of the 2015 report? Do you agree with it or not? Explain your rationale.

A My view would be that the findings are the opinion of a qualified Risk Assessor. The purpose of outsourcing this type of specialist service is to ensure that it results in the creation of a suitable and sufficient document

o) At the time of learning of the DMA Reports what was your impression of the extent to which the points raised in them had been addressed?

A I cannot specifically recall what conclusions, if any, I had drawn about the content of the report on my first viewing in 2016. The buildings within the report were not within my area of responsibility therefore I did not spend much time assessing the content. At that time it was unclear which points had already been addressed or if any were still outstanding, nor did I know who had been given the responsibility of ensuring that the actions were addressed. Once the 2018 report was sent to me and I was asked to become involved in resolving the water contamination issue, I reviewed the reports in greater detail. At that time I could not determine which action points were still to be addressed. Shortly afterwards a programme of work was commenced to check and confirm the status of each point and ensure all were closed out and evidenced as such.

p) The 2015 report highlights a number of actions required to be taken, are you aware how these actions were managed by estates? If so, please provide details of the management of the recommended actions.

A I subsequently became involved in this process some time in mid-2018. At this point the actions were transferred into an action tracker and followed through to completion. Evidence of the completion including photographs, temperature readings etc were also attached to the tracker

q) Can you please advise regarding the circumstances around you becoming involved in the process in 2018 and who asked you to become involved?

A After the document was shared with me it was also raised at either an IMT meeting or Water Technical Sub Group Meeting, I cannot recall exactly. The document was tabled and myself and others were tasked with investigating which of the actions had been completed, and also to ensure that completed actions could be evidenced. I cannot recall specifically who asked me to become involved in this task.

r) DMA Canyon prepared another report in 2017 **(document 30).** Do you know what works, if any, recommended in the 2015 were carried out prior to the 2017 report?

A I am unable to confirm how many of the works from the 2015 report were carried out prior to the 2017 report.

s) What was the impact, if any, of the failure to implement the 2015 recommendations on patient safety?

A I am unable to state what the impact on patient safety would have been

t) We understand that Infection Control were only advised about the 2015 DMA Canyon Report in 2018. Do you know why were they not told sooner? What happened?

A I have no knowledge of why they were not told about this report until 2018.

u) The Inquiry understands a copy of the 2017 report was emailed to you in April 2018. Do you remember receiving this report? Did you discuss the report with anyone? What actions did you or other take in relation to the report's recommendations?

A Yes I recall being sent the report. I am sure I discussed the report with Mary-Anne Kane, Ian Powrie and Alan Gallacher in order to determine how the actions would be addressed

v) Was the approach taken by Estates compliant with all relevant guidance and legislation at that time?

A Yes I believe that in addressing the actions within the report they were done in accordance with relevant guidance and legislation

w) Do you have any concerns about the way in which the water system was managed?

A At that time my thoughts were that the Estates department was not adequately resourced to carry out all of the related maintenance activities. There were not enough staff available to perform the tasks and there were no planned maintenance tasks programmed into the CaFM (FM First) system. There were no clear lines of responsibility within the management and supervisory chain. As I recall, at the time there were no Authorised Persons or Competent Person appointed

41 What risk assessments have been undertaken in respect of the water system since the DMA Canyon Reports? Please provide details.

A I cannot recall exactly when but I am sure DMA Canyon updated the 2017 risk assessment during 2019

42 Following the DMA Canyon Reports, what water maintenance strategies have since been put in place? Who is/was responsible for these? Please provide details of any applicable strategies which were put in place.

A I became involved in this incident circa April 2018. Although the Adult & Childrens hospitals were not within my remit, I was asked to step in and help out as much as I could. From there I assisted Ian Powrie and the rest of the management team in responding to the water system contamination issue. In 2018 I re-drafted the Written Scheme document which details the strategy for managing the water system

Design Requirements for Specialist Wards

43 What is your experience in design requirements for specialist wards within a hospital?

A I do not have experience in designing specialist wards

44 Is there specific guidance relating to these requirements? Please provide relevant details.

A Yes, there are specific Health Building Notes relating to the designs for a range of specialist clinical environments

45 What might design requirements for specialist wards within a hospital look like?

A The design requirements would take into consideration, the type of patient cohort and what their particular needs would be. The facility would be designed around those needs in order to provide the most suitable environment for specialist patient care. This would be in accordance with the relevant Health Building Notes and extant guidance. It is possible that deviation from the design can be accommodated via a derogation agreement but this must be risk assessed and agreed with the relevant stakeholders

46 Are you aware of what consideration was given to design requirements for specialist wards within the QEUH/RHC?

A No I was not involved with the design team.

47 Are you aware of what the specific design requirements were for the specialist wards in the QEUH/RHC?

A No I was not involved at the design stage.

48 Who would have been responsible for ensuring such design requirements were in place?

A I do not know who was responsible.

Asset Tagging

49 Describe and detail asset tagging:

a) What is this?

A This is the process by which each individual item/asset is given a unique ID number, QR code or barcode. A label with the tag number or code should be securely fixed to the asset

b) Why is this important?

A It is important in order to trace the lifecycle and history of each asset. This allows for all relative information on the item to be linked, such as manufacturers literature or maintenance history

c) Who was responsible?

A I do not know who was given this responsibility at QEUH.

d) What was the impact if this was not done?

A This can lead to delays in identifying the correct maintenance procedures for individual assets or lead to the incorrect asset being maintained.

e) What concerns, if any, did you have about this?

A I cannot recall any concerns I had.

f) Did you escalate these concerns? If not, why not?

A I cannot recall

g) Discuss any issues regarding asset tagging and how you managed this?

A I cannot recall.

HEPA Filters

50 Are you aware if HEPA filters were installed in the relevant rooms at handover (January 2015)?

A I am not aware

51 What issues, if any, were there with HEPA filters when you commenced your role in Estates in 2015 at the QEUH/RHC?

A I was not aware of issues relating to HEPA filters on commencement of my role in 2015.

52 What information were you given upon commencing your role about the use of HEPA filters, their installation, and any previous issues surrounding their use?

A I don't recall any relative information being shared with me at that time.

a) What would be the impact of HEPA filters not being installed?

A If HEPA filters are not installed the air entering the room is not filtered to the appropriate standard, therefore the air could contain contaminants which would infiltrate the room

b) What would the potential patient impact of the absence of HEPA filters be?

A There could be a significant health risk to patients in particular if they are in protective isolation due to suppressed or compromised immunity

53 Refer to IMT Bundle – **Document 58**
There are discussions here about sourcing HEPA filters: why was there a lack of HEPA filters?

A The type of HEPA filtered unit discussed here is a mobile unit. These are not an item that would normally be kept in stock. There were a very limited number on site at the time of this incident. I was asked to source more units so that they could be deployed in locations throughout the ward

54 Why were they required?

A These were requested by the IMT as a contingency/control measure in an effort to scrub the air in the room and capture any contaminants in the integral HEPA filter

55 Can you explain the circumstances leading up to this?

Refer to IMT Bundle re. HEPA filters: Documents 57 to 69

A It was felt by the IMT that due to the apparent sample results, the deployment of mobile HEPA units could help control and mitigate the risk of patient infection from airborne contaminants

56 **Refer to Document 59:**

This states that particle counts in Ward 6A came back higher than expected especially with the HEPA filter at maximum, as a result of mould in the showers and water leaking:

a) How effective are HEPA filters in managing infection control?

A I was not party to any research literature on the topic and i do not feel I have sufficient expertise to comment on how effective the HEPA filter in question is at managing infection control

b) What, if anything, was being done to address the issue of mould and leaks in the showers?

A Where mould and leaks were present in shower areas we would schedule repairs to be carried out which involved replacing the wall and flooring vinyl, and resealing the area to make it water resistant

c) Who was responsible for the maintenance and upkeep of the showers? when were these issues actioned? If they were not actioned, why not?

A The Estates Department are responsible for the upkeep of the showers. These issues were actioned at the first opportunity as soon as they were reported to Estates. This was sometimes challenging due to patient activity and inability to access the rooms to carry out the necessary repairs

Chilled Beams

57 What are chilled beams?

A A chilled beam is a ceiling mounted unit which provides heating or cooling to a room by means of blowing air over the heating and cooling coils within the unit

58 Do you have experience of working with chilled beams?

A Before working at QEUH I had very limited experience with chilled beams but subsequently built on my experience during that period

59 Are you aware of any circumstances/environments where chilled beams should not be used?

A No. At the time I worked at QEUH I do not recall any guidance that placed limitations on where chilled beams could be used

60 Can you recall any specific events in relation to chilled beams at the QEUH/RHC?

Refer to IMT Bundle to assist

A Yes. The cleaning process for the chilled beams was problematic both in terms of accessing the rooms to carry out the cleaning procedure and having the sufficient resource available to keep up with the demand. There were also incidents when the pipework connecting the chilled beam to the chilled water was subject to failure and would leak into the room. There was concern that the water leaking from the pipework could contain bacteria as it was on a closed loop system, therefore sampling was carried out to establish if bacteria was present. During periods of high humidity there were instances where condensation would form on the cooling coils of the chilled beam which would lead to droplets of water entering the patients rooms

For example: condensation/leaking/growth of bacteria/mould
Cleaning of Chilled Beams
Air Sampling/water sampling

Showers in 6A
Action Plan
Patient Placement
Biocide Dosing
SBAR prepared by Dr Christine Peters: **Bundle 4, document 37**
For each event please tell us:

a) What was the issue?

b) The impact on the hospital (include wards/areas) and its patients (if applicable)

c) Who was involved?

d) What was the escalation process?

e) Were any external organisations approached to support and advise?

f) If so, what was the advice?

g) Was there opposing advice and by whom, and what was the advice?

h) What remedial action was decided on and who made the decision?

i) Was the issue resolved – consider any ongoing aftercare/support/monitoring;

j) Any ongoing concerns the witness had himself or others advised him of?

k) Was there any documentation referenced during or created after the event. For example, an incident report?

l) Did anyone sign off to say the work had been completed and issue resolved/area safe.

Write your answers above in the relevant section.

61 **At Page 166 of Bundle 4,** Dr Peters lists reasons why chilled beams should not be used in neutropenic settings due to the infection risks associated with them, including the build-up of dust and their being a water source from condensation, leaks, and dripping water:
Do you agree with this? If so, can you explain why?
If not, can you explain why?

A I also became aware of the problems associated with chilled beams during my time working at QEUH and whilst I have no medical qualifications, from a common sense approach I would agree with Dr Peters assessment and comments on why they should not be used in neutropenic settings. I am aware that Neutropenic patients are susceptible to infection therefore every possible measure should be taken to ensure the treatment environment is kept free of contaminants

Combined Heating and Power Unit

62 Describe the Combined Heating and Power Unit (CHP)

A The CHP is a dual fuel engine capable of running on diesel or natural gas. The QEUH Energy Centre houses 3 such units on the ground floor which are situated within acoustic shipping containers

a) What is the purpose of the CHP?

A When running this generates heat which is used to heat domestic hot water of the building heating system water. It also powers a generator which feeds electricity in the national grid

b) What condition was the CHP in when you commenced your role at QEUH?

A As far as I am aware the CHP's were running and in service when I commenced in 2015

c) Were you advised of the condition of the CHP at handover?

A No

d) What information do you have to support your view on the CHP's condition?

A None

63 Are you aware if commissioning and validation of the CHP was carried out prior to handover?

A I am not aware

a) What, if any, commissioning and validation documentation did you see at the commencement of your role?

A None

Refer to **Estates team Bundle, document 90**

b) Who was/is responsible for ensuring that the commissioning and validation documentation was in place?

A I do not know who was responsible for this commissioning information.

c) Where were/are the records of the commissioning and validation for the CHP kept?

A I cannot recall

64 Who was/is responsible for ensuring that the CHP was operating correctly?

A The Estates department were able to monitor the operation of the CHP but it was managed by an external service provider. I cannot recall the name of the company. They were responsible for running and maintaining the CHP equipment

65 If the CHP was not operating correctly, could this impact patients? If so, how? Refer to

A In my view no. The CHP not operating correctly would not directly impact patients as there are 7 gas fired medium temperature hot water boilers in the building which are capable of providing sufficient heat to the building.

66 Are you aware of any historical issues with the CHP throughout your time within your roles in estates?

A Yes. There was a technical issue with the control of return temperature to the CHP engines. They were only able to run if the return temperature was below 74 deg C. If the temperature rose above 74 deg C a diverter valve would open routing hot water to heat rejection units on the roof of the energy centre in order to avoid shutdown on high temperature

67 Have any further issues arisen during your time in estates? If so, please provide details.

A I am not aware of any further issues

<u>Water Guidance and Obligations</u>

68 What guidance applies to water? How did you/others ensure that such guidance was complied with? What contractual documents, if any, would you consult to ensure that the guidance was complied with?

A HSE ACOP L8 The control of Legionella in water systems is the legal instrument referred to by all NHS estates teams. The Health Technical Memorandum SHTM 04-01 suite of documents are used as specific guidance for health care properties. I would consult these documents for compliance

69 What was your initial instruction relating to historical water guidance and obligations upon commencing your role(s) within estates?

A I was not given any instruction in relation to historical water guidance. I would refer to the current guidance in all instances.

70 Who was responsible for ensuring a safe water supply following handover?

A I do not know who was deemed responsible.

71 What was your knowledge and understanding of the Health and Safety regulations on control of Legionella at the time of handover?

A I was not present at the date of handover but had a good understanding of HSE ACOP L8 on commencement of my role.

72 Are you aware of what, if any, Legionella training was provided to all maintenance staff, estate officers and contractors? If not, what training would you expect them to have been provided with?

A On commencement of my role I would expect all estates staff and contractors involved in the maintenance of the water system to have Legionella awareness training as a minimum

73 Are you aware of what, if any, water borne pathogens (other than Legionella) training was provided to maintenance staff, estate officers and contractors? If not, what training would you expect them to have been provided with?

A I am not aware of any training being provided in relation to any other water borne pathogens.

74 Do you know who was the Dutyholder at the time of handover? Are you aware of the role/responsibilities of the Dutyholder?

A I do not know who the dutyholder was at time of handover. I am aware of the responsibilities of the duty holder.

75 Commissioning of water system prior to handover/ patient migration to QEUH:

a) What details, if any, were you provided with relating to the commissioning of the water system upon commencement of your role?

A I was not provided with any commissioning details on commencement of my role.

b) Who was or would you expect to be responsible for the water system requirements?

A I am unable to answer

c) Are you aware of what, if any, checks were carried out to ensure that the water system had been commissioned appropriately? What checks would you have expected to have been undertaken? What information were you provided with about the water commissioning process at the outset of your role(s)? Refer to **Estates Team Bundle, document 132.**

A I am not aware of what checks were carried out to ensure the systems were commissioned appropriately. I would expect that a number of individuals with the necessary knowledge and experience in commissioning water systems would have reviewed the contractors commissioning information and satisfied themselves that it had been carried out appropriately. I would also expect that they would review the circulation hot water temperatures for each circuit, return temperatures to the calorifiers, disinfection and cleaning certificates and any sampling results to confirm the system was clean and free of bacteria. I was not specifically provided with any such information at the outset of my role

d) Do you know which teams (such as infection control) were involved in the water system sign off, and who would have signed it off on behalf of those teams?

A I don’t know

e) Are you aware if the L8 testing requirements complied with?

A I don't know

f) Are you aware if there were any Legionella concerns at handover? If so, what were the nature of any such concerns, and what, if anything, was done to deal with these concerns?

A I don't know

g) Are you aware of any issues with the testing of the water system? Please provide details of any such issues.

A I don't know

h) What was your understanding at the time of the SHTM 03-01 guidance in respect of water?

A SHTM 03-01 does not relate to water systems. SHTM 04-01 relates to water guidance. My understanding of SHTM 04-01 is good

i) Was the QEUH/ RHC water system SHTM 03-01 compliant at the date of handover – if not, what was outstanding? Who was responsible to ensure that the water system complied with SHTM? What, if any, actions were taken to ensure compliance?

A I cannot comment as I was not present at date of handover.

76 Was a pre-occupation water test carried prior to occupation? Refer to **Estates Team Bundle, documents 14, 14.1, 14.2:**

A I cannot comment as I was not present at this time.

a) Who carried this out?

A I don't know

b) What was the result of the test?

A I don't know

c) If this was not done, should it have been done and why?

A Unable to answer. I am unsure of what is meant by a pre-occupation water test.

d) What are the consequences of not carrying out such a test.

A Unable to answer

e) Are you aware of the post occupation water testing regime at QEUH? What was it?

A No. I don't know

f) Was this carried out?

A I don't know

g) Are you aware of who carried out testing?

A No

h) If so, how frequent was testing carried out?

A I don't know

i) Did any such testing comply with L8 and SHTM 03-01 guidance? If not, why not?

A I don't know

j) What happened to the results?

A I don't know

k) Where were the results stored?

A I don't know

l) What, if any, action was taken in response to results?

A I don't know

m) Was there an escalation process? Please provide details.

A I don't know

Water - Commissioning and Validation (C&V)

77 What commissioning and validation documentation did you see in respect of the pre- handover in 2015 when commencing your role? Who would have had sight of any such documentation at the pre-handover in 2015?

A I didn't see anything as I wasn't there pre-handover. I don't know.

78 Where is the commissioning and validation documentation ("C&V") stored generally on the hospital system?

A C&V information would normally either be stored on the ZUTEC web platform in relation to the Adult & Childrens hospital, or on the GG&C Shared Drive

79 What is the purpose of C&V?

A The C&V process provides evidence that the mechanical aspects of the building are performing as per the design intent

80 What are the consequences of it not being carried out?

A If this were not carried out you would be unable to verify that the building is performing as designed

81 Were records kept of the cleaning and testing regime? Where were the records kept and what was the retention policy? What concerns, if any, did you have about record keeping and retention?

A It is normal practice to keep records of every maintenance activity, The retention policy is 5 years. I don't recall that I had any concerns about record keeping or retention

82 What concerns, if any, would you have if the water system were to have no C&V before handover in 2015?

A I would be very concerned if there were no C&V records. From a professional perspective, this would leave me with no evidence that the building water system had been designed, built and commissioned and disinfected correctly. This would make it very difficult to maintain going forward

a) Can you please clarify whether you had any knowledge as to whether commissioning and validation had taken place? Please explain your answer.

A At the time I did not have any knowledge of the existence of C&V records for the adult & children's hospitals as these buildings were not within my remit. As I was not present on site in early 2015 I was not involved in the commissioning and handover process of the building. By the time I took up post on site the building was fully occupied and operational. I had no reason to doubt that the building would not have been properly commissioned, therefore naturally assumed that others would have overseen the process.

83 Describe the same in respect of verification and the cold-water supply system.

A Regardless of whether this pertained to the hot or cold water system my concerns would be the same. The lack of evidence would make maintaining the systems very difficult if there is no data to prove that they were performing as per design from the outset

84 What C&V of the water system was carried out post-handover?

A I don't know

a) Who was responsible?

A I don't know

b) How was the C&V recorded?

A I don't know

c) Any concerns arising from post-handover C&V? If so, why did these concerns arise?

A I don't know

Water System – General

85 What testing and maintenance protocols and regimes were in place at handover in 2015? What should have been in place? What remedial actions were taken? When were any such remedial actions taken? By whom were any such remedial actions ordered?

A I was not on site. Don't know

86 What testing and maintenance protocols and regimes were in place at the point of commencing your role(s) within estates? What should have been in place? What remedial action was taken? When were any such remedial actions taken? By whom were any such remedial actions ordered?

A I cannot recall exactly what protocols were in place. The regime that should have been in place would be as defined in the written scheme for maintaining the water system such as regular temperature monitoring, water tank inspections, sampling where required, and shower head disinfection or exchange. Remedial action should be taken where any of the above are out of spec. Normally there is a standard response to address such actions and record the outcome

87 What concerns, if any, were there about the temperature and movement within the water system? Please provide details of any such concerns. How were these concerns recorded and measured? Who was responsible for this?

a) At point of handover in 2015

A I cannot answer

b) From the commencement of your role(s) within estates?

A No concerns were conveyed to me at that point

88 What concerns, if any, did you have about testing and stagnant water being in the system following testing? Please describe and provide information on how this was dealt with.

a) At point of handover in 2015

A I cannot answer

b) From the commencement of your role(s) within estates?

A I was not aware of any concerns

89 Did you have any concerns about dead ends in the system?

A No

Please describe and provide information on how this was dealt with.

a) At point of handover in 2015

A NA

b) From the commencement of your role(s) within estates?

A NA

90 To what extent could the water system in QEUH/RHC have been more comprehensive?

A I am unable to answer

91 If the water system as installed had been operated correctly, would it have achieved the system objectives? In your answer set out what the system objectives were and how these were/ could have been met.

A I was not involved in the design of this particular system so unable to state what the system objectives were

92 Describe any ward/area specific water systems used?

a) Detail the individual ward water specification
b) What were/ are your thoughts about this
c) Why, if applicable, did certain wards have different water systems
d) Was there a standard protocol for sanitising water systems?

93 To what extent were the standard protocols for sanitising water systems used on a system of the size and complexity of this one?

A Standard protocols for sanitising or disinfecting a water system are normally broken into sections. If any part of the system required disinfection it would be isolated and done in such a manner that it would not affect other parts of the system. The system is too large and complex to disinfect at once. The only way to do this would be to install background dosing such as the chlorine dioxide dosing system that has been installed retrospectively

94 Were consultants brought in to advise on sterilisation of the water systems?

a) Who were they?
b) When were the brought in?
c) Had you worked with them before?
d) Describe and comment on the methodology used.
e) Who decided to accept it or not.
f) Did it work?
g) What paperwork or records were kept in relation to their installation, maintenance, or flushing?
h) Were these kept on paper or electronically?
i) What equipment was used for recording work by employees doing day to day tasks?
j) How was the work carried out reported back and checked? By whom was it checked?

A As far as I can recollect, the consultants brought in to advise on sterilising the water system were Dennis Kelly, Dr Tom Makin, and Tim Wafer. I cannot

recall exactly when they became involved but it was circa May 2018. This was approximately the time the Water Technical Group was formed. I had only worked with Dennis Kelly before as he was the GG&C Authorising Engineer. The methodology used was devised by the Water Technical Group all aspects and intricacies of the system were examined and the most appropriate method of disinfection was devised. The decision to proceed with the method was granted by the WTG. Once the chlorine dioxide system was in place and established it appeared to be very effective. As far as I recall there were comprehensive maintenance records kept for the operation of the system. This would be a combination of paper and electronic records. The FM First CaFM system was used to record day to day work. The work would have been checked by the appointed Authorised Persons at the time

Water Maintenance

95 What was your involvement in relation to the discovery and build-up of biofilm in the water system? What actions were taken to address this? Who was responsible for carrying out these actions?

A I was involved in this incident from approx. April 2018. The actions to address the biofilm issue were jointly agreed between the members of the Water Technical Group. The actions were delegated to various members of the group and also to members of the maintenance management team

96 Were you involved in the swabbing/sampling of the biofilm/drains/water system? If so, who instructed you to do this, and what were the results?

A I was present when swabbing was carried out but was not directly involved. The swabbing was always carried out by a microbiologist as far as I recall. There were many results that were positive for bacteria

97 Explain the cleaning and maintenance of the water system, taps, drains, shower heads etc. When doing so consider:

a) What was the cleaning regime?

A There is no standard cleaning schedule for the water system, taps, or drains. Shower heads and hoses are normally disinfected every 3 months

b) What was the importance of this?

A To descale if required and ensure any build-up of bacteria or biofilm is eliminated

c) What responsibilities did you have as a result of this?

A To ensure it was scheduled and completed within the buildings of the retained estate

d) What did you do to ensure these responsibilities were executed?

A Engaged a specialist contractor to do the work.

e) What issues, if any, did you have in fulfilling these responsibilities?

A None

f) Are you aware if concerns were raised about cleaning practices? **IMT bundle, document 22.** Detail these concerns.

A I was not aware of any cleaning concerns as referred to in document 22

g) What, if any, matters regarding the maintenance of the water system were escalated? If so, were they escalated BICC or AICC? Who were they escalated to? What was the outcome of any such escalation?

A I am not aware of any concerns being raised with AICC or BICC

h) What is dosing?

i) When was any dosing carried out to the water system?

j) Why was any such dosing carried out?

k) What was the result of any such dosing?

l) Why was chlorine dioxide used in the cleaning regime? **IMT bundle, document 30.**

A For questions (h – l), I believe the term dosing being referred to in Document 30 relates to the proposal to implement background dosing of chlorine dioxide to the whole water system of the Adult & Childrens hospitals. This took some time to install and commission. I cannot recall exactly when it went live. This was installed to eliminate any bacteria or biofilm from the water system. The dosing was successful but took some time to establish

m) **Refer to Estates Bundle pg. 919 –** what was this email about?

n) Are you aware why routine drain cleaning was not carried out?

o) Was this normal practice for a building/property of this size?

p) Clearing of drains in June 2018 following water incident. What was the relevance and purpose of this? **IMT bundle document 27.**

q) Are you aware if the actions taken resolved the issue? **IMT bundle, document 38**

r) Do you know why expert advice was required?

A For questions (m – r), The email on page 919 is in reference to the hypothesis that the drains may be the source of the bacteria linked to infections. Drain cleaning is not routinely carried out as there is normally no requirement and is not covered by any guidance. The cleaning of drains commenced at this time as an instruction was issued by the IMT to carry it out in specific wards. The cleaning was completed but I cannot recall if it was deemed to have resolved the issue. The expert advice sought was in relation to the installation of drainage pipework. The specialist was a building contractor who have experience in installing drainage systems. They were asked to survey the system and identify any potential defects

s) What happened in response to concerns about on-going maintenance and cleaning? What further action did you take personally?

A I cannot recall

t) What, if any, further steps should have been undertaken? Why?

A I don't know

98 Were you involved in the decision to proceed with a drain survey? If so, can you explain your role in this decision? What was the purpose of the drain survey?

A As I recall I was asked for my opinion. The purpose of the survey was to identify any defects or poor workmanship

99 What were the results of the drain survey?

A I cannot recall exactly but I do not remember any major defects being identified

100 Debris, including sponges, were found in the water tanks. What is the significance of this, if any, in relation to the wider issue of water contamination?

A No foreign objects should be left in water tanks. They should be cleaned and disinfected before being put back into service. Debris can be considered a contaminant and can contribute to the growth of biofilm and bacteria.

101 Concerns have been raised regarding the hospital design and the increased risk of water contamination. What is your view on the increased risk of water contamination in relation to the following:

a) Having a single barrier approach water system, resulting in fluctuating water temperatures

A I do not know

b) Ensuite bathrooms attached to each room

A I have no opinion

c) Overprovision of water outlets leading to sink removals?

A I have no opinion

102 How involved were you in the decision to use point of use filters?

A I was involved via the IMT meetings but was only there to feedback or accept any actions for Estates to carry out. The decision to use filters was based on clinical risk

103 Who was responsible for the effective management of and installation of the point of use filters?

A Various members of the estates management team were responsible

104 Did the point of use filters meet the water regulation requirements? Did they have an effective gap between the water level and the filter to prevent contamination?

A Yes as far as I recall

105 Why were the point of use filters not introduced earlier?

A They were never requested to be used earlier

106 How often were you aware of the filters being changed? Were the manufacturer's recommendations followed?

A They were changed after either 31 or 62 days depending on the filter design limitations. Some were changed before they reached the time limit. The manufacturers recommendation were always followed although there were a few occasions where the filters went beyond the time limit

107 How involved were you in decisions relating to water testing?

A I was involved via the IMT meetings. I was normally in receipt of requests to carry out testing in specific locations

108 If not, who was responsible for these?

A NA

109 What do you understand about the management of water testing? What do you understand about decisions on when water testing should be undertaken?

A Decisions on testing were always issued by the IMT

110 In her statement Dr Teresa Inkster states *'there was a direction from Mary Anne Kane, who was at senior director level, not to give microbiologists access to water testing results'*:

a) What is your reaction to this statement?

A I am not aware of this

b) Why did estates direct that microbiologists should not have access to water testing results?

A I would disagree with this. As far as I recall all sample results were emailed to a group of recipients including Dr Inkster

c) Can you please explain why you disagree with this and provide justification for your response.

A I disagree due to the fact that microbiological sampling is always directed or requested by the microbiologists. It is my belief that the laboratory carrying out the analysis would always, by default, report the results directly back to the microbiologists. The microbiologist have the necessary knowledge and experience to analyse the results and form a conclusion as to any cause or source. It would not make sense to deny access to this information.

d) Have you ever been advised not to contact someone/ not to provide water testing information? If so, when? By whom? And why?

A No

e) Have you ever refused, or directed others to refuse to provide water testing information requested by microbiologists or infection control? If so, why? Provide as much information for your rationale and the consequences of withholding information.

A No

f) Provide information on how you dealt with requests for water testing results from microbiologists and infection control – was all the information requested provided? If so, what was provided? If not, why was paperwork not provided?

A If microbiologists request sampling be carried out we would arrange this as soon as possible in all cases. All sample results were shared with microbiologists as far as I recall

g) Can you please explain your answer and provide detail to justify your response.

A If a request to carry out sampling was received from any member of the Infection Control Team, a member of Estates would arrange to have the samples taken by a specialist contractor. The specialist contractor would obtain the samples in the appropriate manner and transport them either to a private lab, or to the GRI Water lab for analysis. If the analysis was carried out at a private lab, the results would be emailed directly to the specialist contractor, who would then forward them to a standard group of names on a distribution list which would always include those from the Infection Control Team who had requested the sampling. If analysis was carried out at GRI Water Lab the results would be emailed directly to a distribution list containing the addresses of the Infection Control members requesting the samples and the Infection Control Doctor or Consultant Microbiologist. As stated above, The microbiologists have the necessary knowledge and experience to analyse the results and form a conclusion as to any cause or source. It would not make sense to deny access to this information. As far as I can recall the lab carrying out the analysis of samples would share the results with the microbiologists as soon as they were available.

h) Who was responsible for dealing with these requests for information?

A These requests could be issued to any individual in the estates management team

i) What was your role in dealing with these requests for information?

A I had no specific role but would always carry out the instructions in the request and share the results

j) How were these requests for information managed by estates? What steps did you take?

A Normally they would be issued at an IMT or via an email

k) What concerns, if any, did you have with how matters were being handled? If so, what steps did you take in response to these concerns?

A I had no concerns

February 2016 – Sinks – Ward 2A

In early 2016 a PAG took place regarding the *'Contamination of aseptic pharmacy unit at RHC water supply with Cupriavidus pauculus'* **(Bundle 2, document 3),** a subsequent investigation linked the infection to sink within the Aseptic Pharmacy Unit:

111 Are you aware of this incident? If so, when did you become aware of it? How did you become aware of it?

A I am not aware of this

112 What information, if any, were you provided with in respect of this incident? When were you provided with any such information?

A None

113 What was your understanding of this incident?

A I had no involvement

114 What, if any, action was taken in relation to this incident? By whom was it taken? When?

A I don't know

115 Do you recall any further issues in relation to sinks? If so please discuss, describing your involvement and any action taken in response to any issues.

A No

Water Incident 2018

116 Please provide details of the concerns as they emerged in 2017 into 2018 in respect of the water issues. Initially focus on your recollection of events as they happened. In relation to the concerns:
The following IMTs have been highlighted to assist with this: **IMT Bundle Documents 16-18. 21,24, 26-29, 31-32.** If you are also able to respond to the questions raised in respect of the IMTs below when considering your recollection of events.

a) When did the concern arise?

A To the best of my recollection the concerns were first raised early in 2018 sometime around February or March.

b) Nature of concerns?

A The concern was that a patient had become infected and a possible source was the water system.

c) Possible cause of concerns?

A If the water system was contaminated with bacteria then there could have been wider implications across the hospital due to the complex nature of the water storage and distribution system.

d) What actions were taken in response to the concerns?

A The concerns were raised by Infection Control and sampling was requested to identify if the bacteria was in fact in the water system. Once it was confirmed an IMT was convened to discuss hypotheses and create a plan to address the issue. There were many actions that stemmed from the IMT all of which will be detailed in the IMT minutes.

e) In your view, how sufficient were these actions?

A In my view everything that could be done was being done. The actions were varied took a significant amount of time to be completed but ultimately the issue was resolved and improvement measures were put in place to closely monitor and control water quality.

In Summary: I cannot recall exactly when concerns emerged. I became involved at the request of Alan Gallacher Head of Corporate Estates, circa March 2018. I was asked to become involved and assist with resolving the issue. The concern I was made aware of was that there was Cupriavidus bacteria in the water system. Thereafter I was asked to attend IMT meetings. I had never heard of the bacteria before and had no idea what actions would be required to disinfect the system therefore relied upon the collective expertise attending the IMT to devise the best possible approach to dealing with the problem.

Taps

117 The use of Horne Taps was discussed in the IMTs relative to the water incident. Refer to **IMT Bundle document 18**
Please confirm:

a) Your understanding of use and function of Horne taps.

A The particular model of Horne taps used in the QEUH were designed for clinical settings. They are thermostatic mixer taps which blend water from both hot and cold systems to control the outlet temperature to 41 deg C

b) Who authorised the use of Horne taps? Where were Horne taps used?

A I do not know who selected the Horne taps. They were used throughout the Adult and Childrens hospitals

c) Why were Horne taps selected?

A I don't know

118 **Refer to Bundle 10 document 1:**

a) What was the purpose of this meeting?

A The WTG meetings were a sub group of the IMT. The WTG was specifically set up to focus on addressing issues associates with the water system

b) How did this meeting come about?

A It was instructed by the IMT

c) Did you have or express any concerns in terms of the discussions which took place and the use of Horne taps?

A I don't recall if I had any express concerns with the Horne tap

d) What actions were taken following this meeting? Were these completed?

A I believe all of the actions for the WTG were completed

e) Did the follow-up meeting with the Horne representatives occur? If so, what were the outcomes of that meeting?

A I cannot recall a meeting with the Horne representatives

119 Flow straighteners: when did you become aware that they were non-compliant with SHTM 03-01 guidance? Do you know if they were non-compliant at handover?

A SHTM 03-01 relates to ventilation systems. SHTM 04-01 is the guidance for water systems. Although there were numerous discussions about flow

straighteners I cannot recall specifically that they were non-compliant or the reason that they would not be recommended

120 Were new taps replaced in January 2019? If so, why were they replaced? Where were they replaced? What were they replaced with? Was the replacement related to the use of chlorine dioxide?

A Yes taps were being replaced with a model from another manufacturer. It was Armitage Shanks Markwick sequential mixer taps. I cannot recall exactly where the replacement programme started and ended but it was widespread across the hospitals

Water Technical Group

121 The water technical group (WTG) sat between 2018 and 2019. **Refer to Bundle 10**

a) What was the purpose of WTG?

A The WTG meetings were a sub group of the IMT. The WTG was specifically set up to focus on addressing issues associates with the water system

b) What issue/ event prompted the setting up of the WTG?

A It was requested via the Water Incident IMT

c) What was your involvement with the WTG?

A I represented Operational Estates and participated in carrying out instructions that would assist the group in researching and addressing water related issues

d) Detail specific work which you carried out in respect of your involvement with WTG, why did you carry out this work, what was the impact?

A I arranged the fitting and testing of Point of Use filters, sampling of water across the adult and children's hospitals, collection of water temperature records

e) Who was in the WTG, what were their names and their roles within WTG?

A The names and roles of all involved are detailed in the minutes within Bundle 10

f) What qualifications were required in order to be chair of WTG?

A I don't believe there was a criteria set. It tended to be the most senior manager present

g) Discuss the focus of the WTG. What was the purpose? Why was the WTG required? What issues came to light as a result and what action was taken? What were the concerns of the WTG and how did this impact on patients?

A Already answered in Question 119 above

h) How did clinical staff and estates get along at these meetings? What, if any, were the points of contention between these groups?

A Relationships were good as we were all focussed on the same goal. I do not recall any points of contention

Review of Issues Relating to Hospital Water Systems' Risk Assessment on 26th September 2018

Refer to Estates Team Bundle, document 134.

122 Have you seen this document before? Are you aware of who commissioned this document? What issues prompted the instruction of this report?

A I do not recall seeing this document

123 What concerns, if any, did you have about the water system?

A None

124 When did these concerns arise? Was anyone else concerned? Who? Why?

A NA

125 What was the impact of this on patients?

A NA

126 Did you flag/ raise your concerns with anyone? Who? When?

A I cannot recall raising any particular concerns

127 What happened in response to the report?

A I don't know

128 What works, if any, were carried out in response to any findings in this report? What was the result of any such works?

A I don't know

Tap Water- Ward 3C – 2019

129 What were the issues in relation to tap water in Ward 3C?

A I cannot recall the specific issue in Ward 3C

130 What was your understanding and involvement with these issues?

A I cannot recall

131 What action was taken?

A I cannot recall

132 How were matters resolved?

A I can't recall

Dr Susanne Lee

Refer to Estates Bundle, Document 131, Page 930

133 Have you seen this document before?

A I cannot recall seeing this document

134 Who provided you a copy of this document?

A I don't know

135 What was your involvement, if any, with Dr Lee?

A I was present when Dr Lees was on site. I was present at the meeting where she gave feedback on her findings

136 What are your views on the recommendations set out in this action plan?

A The recommendations seem reasonable given the issues that were being dealt with.

137 Do you know if these recommendations were followed and to what extent they were implemented?

A I cannot recall

138 Who was responsible for implementing these recommendations?

A Each of the recommendations have been assigned an owner. I don't recall being directly involved in implementation

Other Water Incidents

139 What other specific events do you recall in relation to water? Do you have any recollection of debris in the water tanks? **Refer to IMT Bundle, Document 45 as starting point.**

If so, please explain:

a) What the issue was;
b) The impact on the hospital (include wards/areas) and its patients (if applicable)
c) Who was involved;
d) What was escalation process;
e) What was the result of any escalation;
f) Were any external organisations approached to support and advise;
g) Detail the role and function of HPS and HFS, advise if they were involved and any reports prepared by them;
h) Detail advice given from external organisations; what was the advice, did you agree with it, how was any advice managed/ communicated with others in your team and your superiors?;
i) Was there opposing advice and by whom;
j) What remedial action was decided on and who made the decision;
k) Was the issue resolved – consider any ongoing aftercare/support/monitoring;
l) Detail any ongoing concerns you had, or which you were made aware of;
m) Was there any documentation referenced during or created after the event? i.e. an SBAR/ minutes from a meeting – use the bundle provided to assist.
n) Did anyone sign off to say the work had been completed and issue resolved/area safe? If so, who signed off on the work?

A Yes I recall debris being found in the water tanks. There was the remains of a cleaning sponge and what appeared to be stones/course aggregate in one of the raw water tanks. These tanks receive incoming mains water and store it before it goes through the filtration plant. I do not recall debris being found in the main water tanks downstream of the filtration. There was no direct impact on the wards as I recall due to the arrangement of the water tanks. They are

designed to be duty and stand-by therefore 1 of the pair can be taken offline for maintenance whilst the other tank remains in service. The debris was found during a clean and disinfection of the tanks. This process was carried out by DMA Canyon and the discovery of debris was brought to my attention immediately by one of the DMA operatives. As I recall I immediately raised this with Ian Powrie and with the WTG. As the cleaning and disinfection process was already in progress I don't recall if there were any other actions deemed necessary to resolve. I took photographs of the items found and shared these with the WTG for discussion. It was believed they may have been there since pre-handover. HFS and HPS were involved in the discussion as they were members of the WTG

140 What were the NHS procedures for raising concerns about water or water infections?

a) How were these dealt with by you?

A Normally any issues or concerns around the water system would be referred to infection control for advice. A joint approach would be devised in order to deal with the issue. This was the practice I would normally follow

b) How was it confirmed that they had been dealt with?

A Usually there would be a sampling protocol put in place to identify the extent of any problem and confirm it had been successfully resolved. Infection control would normally require that 3 successive samples were returned as "not detected" to confirm the issue was closed

c) Do you recall specific incidents, and in particular any that gave you concern.

A Other than the issue above I cannot recall anything specific. It is not uncommon to find bacteria in water systems. On every occasion I can recall these were successfully resolved using the advice of infection control

Ventilation - Commissioning and Validation

141 Describe the commissioning and validation process in respect of the ventilation system in the QEUH/RHC.

A I was not involved in this process

a) Who was this carried out by?

A I don't know

b) Who signed off?

A I don't know

c) What commission and validation documentation did you see when you commenced your role(s) in estates?

A None

(i) If not, who would have seen commission and validation documentation?

A I don't know

(ii) Was there anything from the commission and validation documentation that you have seen which has given rise to any concerns? If so, what were these concerns?

A No. I did not review any of the commissioning or validation information for the adult and children's hospitals. I do not recall seeing any information that would have given me any concerns.

Ventilation System – General

142 What are thermal wheels?

A Thermal wheels are heat recovery devices installed in air handling units

143 Are you familiar with thermal wheels?

A Yes I know what they are

144 What is the purpose of thermal wheels in the ventilation system?

A The purpose is to recover heat energy from the extracted air and re-insert it into the supply air to conserve energy.

145 What testing and maintenance protocols and regimes were in place for the ventilation system when you commenced your role(s) in estates?

A I cannot recall

146 Are you aware of the testing and maintenance protocols which were in place at handover in 2015?

A No

147 What concerns, if any, did you have relating to the ventilation? What concerns, if any, do you have relating to the water temperature? What concerns, if any, did you have relating to the movement within the water system?

A No concerns

148 Was it possible to incorporate a comprehensive ventilation system into the QEUH/RHC?

A I was not involved in the design.

149 Describe any ward/area specific ventilation systems used?

A I cannot recall which systems were installed in each location.

150 What are your thoughts about these ventilation systems that were used?

A I don’t know

Specific Events in Relation to the Ventilation System

151 Can you recall any specific events in relation to ventilation?
For example:

a) Issues with the air change rates in Ward 2A.

A I cannot recall the details of this

b) The Ventilation Report

A I am unsure what this refers to

c) The Ventilation Group and difficulties establishing this

A I am unsure of what this refers to.

d) Birds Roosting in Plant Rooms

A I recall the concerns about birds roosting in plant rooms. There was a suggestion that pigeon faeces might be the cause of Cryptococcus being present in the air which had been identified in patient infections. It was though that this may have got into the ventilation systems from the plant rooms on level 12. This could have an impact on patients with compromised immunity. An IMT was convened to look into the issue led by Dr Inkster. The minutes of those meetings will indicate who was involved. All issues were escalated through the IMT. The incumbent pest control contractor was engaged to assist in identifying and rectifying any pigeon ingress or fouling issues. Over the coming months a specialist group (Cryptococcus Expert Advisory Group) was formed consisting of myself, Dr John Hood, Tom Steel, Ian Powrie, Dr Peter Hoffman, Darryl Conner, Sandra Devine. The group were tasked with looking at every hypothesis and find solutions to any related issues

e) Smell of Sewage within Theatres and remedial works

A Yes this was common as the hospital is in close proximity to a water treatment plant.

f) Can you please provide your understanding of ward 2A ventilation requirements? What actions were taken in respect of ventilation in response to the cryptococcus case?

In providing your answer please tell us:

i. What was the issue?

A It was believed that infections in patients could have been caused by contamination in the ventilation system due to Cryptococcus from pigeon fouling in the plantrooms. An investigation would need to be undertaken to establish if this was the cause or if there was some other explanation.

ii. The impact on the hospital (include wards/areas) and its patients (if applicable)

A I am unable to list the full impact on the hospital but generally this resulted in patients from Ward 2A Childrens ward being moved to Ward 6A in the Adults hospital.

iii. Who was involved?

A There were many people from many different departments but overall they were the members of the IMT meetings including the all of the management structure within the Estates Department.

iv. What was the escalation process?

A As far as I recall, the issue was escalated by Infection Control and brought to the attention of Estates to carry out checks within plantrooms to establish the presence and extent of pigeon fouling and whether it was possible this could be drawn into the ventilation system. Further escalation was via the IMT meetings.

v. What was the result of any escalation?

A I cannot recall specifics but all escalations will be evident in the minutes of the IMT meetings.

vi. Were any external organisations approached to support and advise?

A Yes.

vii. What was the advice?

A There were many different recommendations made to aid in investigating and resolving the issue. I cannot recall specifics but all information on this will be documented in the IMT or Cryptococcus Expert Group meeting minutes.

viii. Was there opposing advice and by whom?

A I cannot recall.

ix. What remedial action was decided on and who made the decision?

A All decisions on remedial action were made collectively at the IMT meetings.

x. Was the issue resolved – consider any ongoing aftercare/support/monitoring?

A The full resolution to the issue was in a redesign of the ventilation system serving Ward 2A in the children's hospital. This work was still ongoing when I left the QEUH.

xi. Any ongoing concerns witness had himself or others advised him of?

A No. None that I can recall.

xii. Was there any documentation referenced during or created after the event? For example an incident report?

A The chair of the Cryptococcus Expert Group, Dr John Hood, produced a report detailing the investigation.

xiii. Did anyone sign off to say the work had been completed and issue resolved/area safe? If so, who signed off on the work?

A I don't know.

Write your answers in the relevant answer boxes above.

152 Throughout your time at the QEUH, what work was undertaken in respect of ventilation and why?

A I cannot accurately recall all work carried out or the reasons for this.

153 What work, if any, was outstanding when you left in May 2023?

A I cannot recall. I left the QEUH in Feb 2020 to work in the Clyde sector. I finally left GG&C in May 2023.

Isolation Rooms

154 Upon commencement of your role(s) in estates, what information were you given or documentation did you see relating to isolation rooms and the issues pertaining to them and remedial works carried out/required?

A None

Pentamidine Rooms

155 Discuss Pentamidine Rooms:

a) What are Pentamidine Rooms?

A I don’t know I was not involved in this work

b) Your understanding of the purpose of these rooms?

A I don’t know

c) The guidance applicable to these rooms for water and ventilation?

A I don’t know

d) Were you aware of any issues with the specification of these rooms in 2015? **Estates Teams Bundle, document 38.**
In particular, consider any issues with:
i) the air change rates
ii) air pressure **Estates team Bundle, document 78.**
iii) compliance with guidance
iv) any issue(s) arising from the testing

A I don't know

Ward 4B

157 Refer to **Estates Team Bundle document 62:**

a) what is this document?

A This appears to be a report on the ventilation system serving Ward 4B in the Adult Hospital.

b) Have you seen it before? If so, when?

A No

c) Do you know what the purpose was of carrying out a ventilation report in October 2015?

A No

d) Are you aware of any issues arising from this report? What, if any, actions were taken following this report? By whom were these actions ordered? By whom were they carried out? What was the result of any such actions being undertaken?

A No

e) Refer to **Estates Team Bundle, document 87** – Do you know why NSS was involved in the issues? Actions taken in response, your involvement.

A I don't know. I was not involved in this issue.

Decision to Close wards 2A/B and Move to 6A and 4B

158 Discuss the issues surrounding and leading up to the decant of patients from Ward 2A in 2018.

a) What was the lead up and background?

A As I recall there were patient infection suspected to be linked to bacteria in the water system. After a decision taken by the IMT the patients were to be transferred to Wards 4b and 6a whilst remedial work was carried out.

b) What was your involvement?

A I was asked to look into the issue and assist in any way I could. The Adult & Childrens hospitals were not within my remit at the time but I was happy to get involved and assist my colleagues. I attended many of the IMT meetings and took a number of actions in preparation of the moves to Ward 4b and 6a

c) What risk assessment and additional measures were put in place to ensure patient safety?

A I cannot recall

d) What concerns, if any, did you have about where the patient cohort was being moved to? If so, why did you have these concerns?

A I didn't have an opinion on the patient cohorts. I left those decisions to the clinical experts and focussed on estates participation in addressing actions

e) Discuss and detail the works done to Ward 2A/B. What was required to be done and why? What was done and when was the work completed? Please include details of your involvement. **Reference IMT Bundle to assist.**

A There was a lot of work going on at the time. I cannot specifically recall all of the works done to Ward 2A/B but it involved changing toilet seats, flush mechanisms, taps, shower enclosures. The list of work required grew almost daily and resulted in the team from Capital Projects becoming involved and taking over

f) Any other relevant information.

A None

159 Discuss the issues surrounding the ward 2A patients when in occupation of ward 6A. In particular, views you may have in respect of:

a) Chilled beams
b) Gram Negative Bacteraemia
c) Water filters
d) Ventilation
e) issues/ testing/ escalation/ response/ IMTs/SBARs impact on patients
f) Patient communication
g) Internal escalation - HAIIT scoring
h) External escalation

A The decision to move patients from Ward 2A to 6A was made by the clinical team attending the IMT. A list of works in preparation for the move was drawn up and carried out by the estates team

<u>Reports Prepared by Innovated Design Solutions October 2018</u>

190 **Refer to Bundle 6 – Miscellaneous Documents – Documents 33 and 34.** These documents are feasibility studies regarding increasing ventilation air change rates within Wards 2A and 2B by Innovated Design Solutions.

a) Who commissioned these reports?

A I remember when IDS were approached to conduct the report but cannot recall exactly when or who commissioned it

b) What was the background to these reports being commissioned?

A I cannot recall accurately

c) Why were these reports commissioned? What issues prompted the instruction of these reports?

A I cannot recall

d) Who were these reports shared with?

A I believe the reports were shared with the members of the IMT and Infection Control

e) What concerns, if any, did you have regarding the ventilation system in Ward 2A?

A I cannot recall

f) When did these concerns arise? Was anyone else in estates concerned? Why?

A I don’t know as I was not directly involved in ventilation at that time.

g) What was the impact on patients?

A I don’t know

h) What concerns were raised? By whom were they raised? With whom were they raised?

A I don’t know

i) What concerns, if any, did you have regarding the ventilation system in Ward 2B?

A I can't recall

j) When did these concerns arise? Was anyone else in estates concerned? Why?

A NA

k) What was the impact on patients?

A NA

l) What concerns were raised? By whom were they raised? With whom were they raised?

A I can't recall

m) What happened in response to these reports?

A I cannot recall exactly what happened once the reports were received.

n) What matters were escalated arising from these reports? If so, to whom, and if not, why not?

A I cannot recall

o) What works, if any, were carried out in response to any findings in these reports?

A I believe there were significant works carried out to reconfigure the ventilation system but was not involved directly so cannot provide specific details

p) What was HFS Involvement with this?

A I don't know

191 Iain Powrie prepared a SBAR following the Innovated Designs Solutions report – **Refer to Bundle 4, Document 31**

a) Do you recall seeing this document?

A Yes I recall seeing this document

b) If so, what are your views on this document?

A I tend to agree with the contents and concerns raised in the document.

c) Who was this SBAR shared with?

A I cannot recall who else in addition to Tom Steele

d) What actions were taken as a result of the SBAR?

A I believe this document triggered the major work that was carried out in Ward 2A.

e) What recommendations were carried forward?

A I cannot recall exactly

f)Who was responsible for these actions?

A I believe this was handed over the Capital Planning to carry out the major works to resolve.

<u>Cryptococcus</u>

Refer to the Cryptococcus Bundle to assist.

192 Recall your understanding of the Cryptococcus infections in 2018:

a) What is Cryptococcus?

A It is a fungus.

b) Had you seen/ heard of Cryptococcus in a healthcare setting prior to QEUH?

A No

c) What were the issues with Cryptococcus at QEUH? When did you first become aware of these issues? What happened in response to these issues?

A I first became aware of Cryptococcus in late December 2018 when it was raised by Dr Inkster. It was thought that the fungus was present in the hospital and we were asked to inspect the plant rooms on Level 12 and the ventilation system. I cannot recollect all of the action that were instructed but they are all documented in the minutes of IMT meetings

d) Discuss your involvement at the Cryptococcus **IMTs: Refer to IMT Bundle, Documents 55-64, 66-70**

A I was involved in each of the IMT meetings in response to this issue. I arranged for many of the actions requested at the IMT meetings to be carried out. This included cleaning of plant rooms and ledges, fitting bird deterrent netting or spikes, procuring portable HEPA filter units, and arranging repairs to any rooms within the ward areas

193 Refer to the **Action Plans Pg 260, 264, 314 of Bundle 1 IMT:**

a) What is this document?

A These are action plans generated from the discussions during the IMT meetings.

b) What was its purpose?

A It was used as a summary of the actions drawn down from the minutes.

c) What actions were you responsible for and why?

A I was responsible for taking forward any action on Estates behalf.

d) Did you complete your actions?

A Yes

e) Were all the actions in the plan completed?

A Yes as far as I recall I completed all actions.

f) How did this contribute overall to the management of the cryptococcus incident?

A I cannot state whether the actions I took forward made the environment safer. It was what I was instructed to do by the IMT so I completed them as quickly as possible and to the best of my ability

194 Refer to page 289, which states that you had been contacted by a member of facilities who believed they had been put at risk while carrying out vent cleaning:

a) How did this situation come about?

A I cannot recall this communication or the member of staff involved.

b) Was it resolved? If so, how?

A I cannot recall how this was resolved.

c) You state you cannot recall this communication. How might a member of staff be put at risk from cleaning vents? Was this a common concern amongst staff? Why would occupational health be contacted? Would there be a record of the details of this incident?

A I can only assume that the staff member felt that they had been put at risk either due to fall from working at height, a manual handling issue leading to injury or a perceived infection issue due to exposure to dust or contaminants whilst cleaning the vent grilles. Occupational health are normally contacted to address any concerns about staff health in the workplace. If this was an incident or accident it is likely it would have been recorded on the DATIX system.

195 Discuss your involvement at the Cryptococcus Sub-Group Meetings - actions taken, internal escalation: HPS involvement.

A I was asked to become a member of the Cryptococcus sub group in order to focus on any estates related actions and report on their progress and completion. We were also tasked with working through the hypotheses and produce a report detailing any findings

196 What, if any, external reporting occurred?

A I don't recall that the group reported externally. We did commission some external specialists to provide specific reports to feed into the sub group such as carrying out a study of airflow patterns around the helipad to determine if this would have an effect on the ventilation system

197 PAGs/ IMTs/ AICC and BICC involvement.

A The sub group was made up of members of HPS, NHS and HPS. The group regularly reported into the IMT

198 What steps were taken in response/ precautions put in place?

A I cannot recall all of the measures taken but they will be recorded in the minutes of meetings

a) What were the hypotheses put forward for the cases of cryptococcus? **Refer to the cryptococcus bundle**

A The hypotheses were: 1. Fungal spores were entering the ventilation systems from pigeon faeces in the plant rooms. 2. Fungal spores were being drawn into the ventilation system from outside air. 3. Helicopter downwash during landing releases spores into the air and are drawn into the ventilation system

b) Who put these hypotheses forward?

A These were collectively discussed at the sub group meetings. I cannot recall who suggested them

c) Did you agree with them?

A I thought all were feasible and kept an open mind whilst involved in the investigation of each

d) What was your own hypothesis regarding the cryptococcus cases?

A I had no expertise in the area therefore had not formed my own hypothesis. I committed to investigating the hypotheses suggested by the microbiologists

e) What is the rationale behind your hypothesis?

A None

199 Did you read John Hood's report?

A Yes I read through the report a number of times when it was in draft form and the completed version.

200 When did you read John Hood's report?

A I cannot recall exactly.

201 What observations, if any, did you make after reading John Hood's report? What actions were taken following the John Hood report?

A I was a member of the Cryptococcus Sub group so I was aware of the content within the report. Each of the issues looked at were investigated and dealt with as soon as possible. I cannot comment on what further actions were completed as I had moved on to the Clyde Sector by the time the report was finalised

202 What else could have been done? How could matters have been handled differently? What concerns, if any, did you have about how matters were dealt with?

A I don't think anything else could have been done or anything could have been handled differently

203 What was your view on the pigeon infestation on the QEUH/RHC site?

A I would not use the word infestation to describe what I observed. Numbers of birds in comparison to the size of area in question was very low. Infestation tends to give the impression that there were significant numbers of birds in the plant room and this was not the case

204 What is your view on the pigeon contamination in the plant rooms?

A The accumulations of contamination were sporadic. My observation were that there was not widespread and significant contamination. It did not appear that the problem was out of control

205 Who was responsible for pest control/ clean up regarding this?

A The Estates team were responsible for cleaning up this area. I led on most of the work instruction and liaison with pest control contractors

206 What actions were taken?

A A thorough inspection and cleaning of all areas of the plant rooms was instructed. This involved checking high and low to remove and sanitise any signs of bird activity, ingress points, and fouling

207 Was air sampling/testing of plant rooms undertaken?

A Yes this was carried out.

Refer to Document **A38240772 - NHS - Colin Purdon - Pest Control and Housekeeping Inspection - QEUH - 24.12 details - Objective ECM (scotland.gov.uk)**

208 When and why did you instruct GP Environmental? What did you instruct them to do? Who knew about this inspection?

A This work was actually instructed by Scott Macer, Duty Estates Manager who was on duty over the weekend of 21st to 23dr Dec 2018. My name appeared on the report as I was the Sector Estates Manager at the time and the report was to be issued to me on completion. As I recall Scott was asked by Tom

Steele to bring GP Environmental in over the weekend to carry out the survey in response to the suspected link to Cryptococcus infections from pigeon faeces

209 The report by GP Environmental states that the works took place over several days and daily reports were left with the estates department. Do you remember receiving these daily reports? If not, who would have received these reports?

A I do not recall receiving the daily reports. These would have been left at the end of each working day with the Duty Estates Manager

210 Was a record of these reports shared with anyone?

A It is my opinion that the content of these reports would have been transferred into the above report A38240772 as an overall summary

211 Was a record kept of these reports? If so, where was it kept?

A I don’t know

212 Who did you share this report and its recommendations with?

A I cannot recall who this was shared with. I undoubtedly would have shared it with the senior management and directors at the time

213 What actions were taken following this report?

A All of the recommendations were actioned and also the thorough cleaning and sanitation of the plant rooms across the adult and children’s hospitals was carried out as a direct result of this report

214 In her statement, Dr Inkster advises that she only became aware of this report in August 2019 and that this was an issue which had not been volunteered in IMTs or appeared on the estates spreadsheet. What is your view on this? Why was it not discussed at IMTs? Why was it not on the estate's spreadsheet?

A I was not aware that it had not been shared with Dr Inkster. In my recollection of the discussions at IMT meetings about the ongoing actions in the plant rooms in relation to the report led me to believe that everyone was aware of what needed to be done from the findings of the report

Gram Negative Bacteraemia

215 Describe your involvement relating to the Gram Negative Bacteraemia Outbreak –

Refer to IMT Bundle Documents 77-88, 90, 92-93, 103

A As the Interim Sector Estates Manager at the time my role in relation to the bacteraemia cases was to coordinate the estates response as directed by the IMT group. I would take actions identified at the IMT meetings and carry them out so that information and findings could be fed back into the IMT in order to try and identify the source of the infections. There were a number of hypotheses therefore I was asked to instruct tasks such as sampling, filter fitting, exchange of toilet seats, dosing of the chilled water system and heating system water, change fittings on chilled beams

216 **Refer to document A41519666 (IMT Action List 19.06.2019 details - Objective ECM (scotland.gov.uk))**

Discuss the mycobacterium chelonae incident and your involvement. Discuss the actions allocated to you from this list, following the **IMT of 19.06.2019 (Document 72)**. Were they completed? When were they completed? What follow-up, if any, occurred?

A My involvement was to coordinate the estates response to the actions allocated to the department from the IMTs. Apply POUFs to theatres outlets:

This was an instruction to fit Point of Use Filters to all taps throughout the theatre suite. Check water cooler removed from 6A staff room: This was an instruction to double check that a water cooler/dispenser had been removed from the staff room to prevent it being used to give water to patients in advertently. Carry out water testing in ward 6A pre and post POUFs (incl showers) and in theatres pre POUF application: This was an instruction to ensure sampling was carried out. To the best of my recollection this was to prove the efficacy of the filters and ensure they were performing as per their design i.e. filtering out all bacteria. Water testing to be undertaken on outlets identified from timeline which currently have no filters: This was to carry out further sampling of outlets without filters fitted. Obtain Information from PAL to ensure that POUF are effective against Mycobacteria: I liaises with the filter manufacturer (PALL Europe) to ensure that the filters were designed to filter out mycobacterium. As far as I recall this was confirmed that they were able to filter mycobacterium. Compile report of water sampling results across RHC site to establish extent of M. Chelonae within water supply: This was an instruction to check and collate the water sampling results previously received to identify where it had been detected previously. I cannot recall the details of the report

Whistleblowing Process

217 When did you first become aware of concerns being expressed by clinicians regarding the environment? In your view, were these concerns taken seriously?

A I cannot recall

218 What was your involvement, if any, in the whistleblowing process?

A None

219 What was your view on the concerns being raised?

A I do not recall what concerns were raised in whistleblowing

220 Were you aware of the 27-point action plan implemented following the whistle blow meeting of 4th October 2017? **See document A38759270 - Action Plan arising in response to SBAR dated 3 October 2017 details - Objective ECM (scotland.gov.uk)**

A No

221 Who was responsible for the implementation of this plan?

A I don't know

222 Did you take on any responsibility relating to this plan?

A I don't believe so.

223 What is your view of this plan and the proposed actions? Are you aware if they were completed?

A I was not involved and I am not aware of the details or if the actions were completed.

Staffing and Working Environment

224 What do you know about the staffing levels in estates at the point of handover? Where did the staff come from? Were they mainly transferred from the old site?

A I cannot comment on the levels of staff at handover as I was not onsite until August 2015. As far as I recall the estates staff were transferred to the new QEUH campus from the hospitals that had closed across the city as a result of the QEUH development. Some staff from the Southern General Hospital were also retained.

225 What have you seen/been told about concerns if any about staffing following handover? To what extent did the staffing levels manage the workload?

A My opinion on staffing levels was that it was hugely challenging to manage the workload imposed on estates with the limited resource we had. The volume of work being created was very high and the demand and expectations on how quickly tasks or repairs should be carried out was unrealistic. The managers were subjected to higher than normal stress levels due to the pressure to deliver.

226 Do you know if appropriate training was in place for new and existing staff on using the new systems and working within the QEUH? How was it ensured that new and current staff were appropriately trained?

A Training on new systems was carried out in handover sessions. This would involve a number of estates staff receiving demonstrations of how plant or systems operated. These were normally short familiarisation sessions given by contractors, sub-contractors and installers of the equipment or systems. These sessions were normally documented to record attendance.

227 Who was responsible for providing staffing? Who was responsible for ensuring staffing was maintained at sufficient levels?

A My only recollection on the provision of staffing was that prior to the opening of the QEUH campus, Ian Powrie had created a proposal to indicate the number of staff and skill mix that would be required in order to meet the maintenance demands. I recall speaking to Ian about this and he informed me that the funding provided was not enough to match his proposal

228 When commencing your role(s), what concerns did you have regarding staffing levels?

A It became almost immediately apparent to me that staffing levels were not sufficient. There were not enough tradespersons or manager to cope with the workload. The stress levels were high and almost every member of the team were working longer hours that they were contracted for. Personally I was

consistently working 10 hour days Monday to Friday in an attempt to keep up with my own workload. The other managers were similarly committed

229 What was the working environment like when QEUH opened – work life balance/ workplace culture? What issues, if any, were you aware of? What was your experience of this?

A The work/life balance was poor. As stated above, I was personally working 50 hours per week for the 4 and a half years I was based on the site. There were high levels of stress and a number of managers were emotionally drained by the constant demands of the job

230 What were you told at the commencement of your role in terms of who was on site to manage and assist with carrying out works relating to equipment? How did this assist workload in estates? To what extent, if any, was there a reliance on commercial third parties such as Multiplex when it came to staffing levels?

A I don't recall being told about who was onsite to assist Estates with work relating to equipment. It is common for Estates Management to have reliance on external contractor to carry out a lot of works and repairs. This was necessary as the estates labour resource was insufficient to cope with all of the demands.

231 Generally, discuss the workplace environment and culture. What concerns, if any, did you have?

A My main concerns were that it was a stressful environment and this was detrimental to the wellbeing of the staff and in particular managers and supervisors. Demands and expectations were high and priorities were always conflicting.

a) You speak about concerns which you had regarding staff levels/resourcing difficulties, did these result in difficulties for Estates staff in respect of carrying out their duties to the standards you would expect?

A I would say that the Estates staff always strived to do their best at all times. The workload was very high volume and staff were often unable to keep up with the demand. Managers including myself were working additional unpaid hours in order to try and meet the demand but it was very difficult to keep up. There was a limit to how much work we could delegate to the team members as they were always under pressure. It was clear that we required more staff but under tight budgetary constraints it was unlikely we would be able to expand the team.

b) How would these resourcing difficulties which you have mentioned manifest themselves?

A The workload had to be prioritised constantly in order to ensure any critical issues were addressed immediately. This meant that most of the day to day repair requests would have significant delays in being addressed. The backlog of work continued to grow throughout my time at the site.

232 In your view, were the concerns raised by infection control colleagues regarding the general build of QEUH/RHC taken seriously? What action was taken in response to these concerns, if not already mentioned in your answers? What is the position in respect of this since commencing your role and at present?

A Yes in my experience and during my time there, all concerns raised by Infection control were taken seriously. All matters highlighted at IMT meetings were thoroughly investigated and as far as I know all were acted upon

233 Is there anything further that you want to add that you feel could be of assistance to the Inquiry?

A I have nothing further to add.

Declaration

234 I believe that the facts stated in this witness statement are true. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief in its truth.

235. The witness was provided the following Scottish Hospital Inquiry Bundles / documents for reference when they completed their questionnaire statement.

Appendix A

A38759270 – Action Plan arising in response to SBAR dated 3 October 2017
A41519666 – IMT Action List 19.06.2019
A38240772 – NHS – Colin Purdon – Pest Control and Housekeeping Inspection QUEH – 24.12
A43255563 – Bundle 1 – Incident Management Team Meeting Minutes (IMT Minutes)
A43144419 – Bundle 2 – Problem Assessment Group Meeting Minutes (PAG Minutes)
A43299519 – Bundle 4 – NHS Greater Glasgow and Clyde: SBAR Documentation
A43293438 – Bundle 6 – Miscellaneous documents
A47175206 – Bundle 9 – QEUH Cryptococcus Sub-Group Minutes
A47395429 – Bundle 10 – Water Technical Group / Water Review Group Minutes
A47069198 – Bundle 12 – Estates Communications

Scottish Hospitals Inquiry
Witness Statement of Questions and Responses
Ian Powrie

This statement was produced by the process of sending the witness a questionnaire with an introduction followed by a series of questions and spaces for answers. The introduction, questions and answers are produced within the statement.

Personal Details

1. Name, qualifications, chronological professional history, specialism etc – please provide an up-to-date CV to assist with answering this question.

A Ian Powrie B.Sc. (IEng). Qualifications:
Glasgow Caledonian University 1992 – 1995: B.Sc. Building Services Engineering (Distinction).
Stow College, Glasgow 1990 – 1992: SCOTVEC (Level 5) Higher National Certificate in Management Studies.
1982 – 1985: SCOTEC (Level 5) Higher National Certificate in Electrical and Electronic Engineering Springburn College of Engineering, Glasgow
1989 – 1990: SCOTVEC Certificate (Level 3) in Mechanical Engineering (Plant)
1980 – 1982: SCOTEC Certificate (Level 3) in Electrical and Electronic Engineering
1976 – 1980: Scottish Health Service Apprenticeship certificate
EITB Certificate of Engineering Craftsmanship.
City & Guilds 232 Part III Certificate in Electrical and Electronic craft studies.
City & Guilds 232 Part II Certificate in Electrical and Electronic Craft Studies.
EITB 2nd Year Training Certificate
City & Guilds 200 Part I Certificate in Basic Engineering Craft Studies.

Roles held within NHS Greater Glasgow & Clyde from 1976 -2019 (43 Years Service):

Jan 2017 – July 2019: Deputy General Manager Estates Services.
Sept 2015 – Jan 2017: Sector Estates Manager (South Glasgow)
Aug 2012 – Sept 2015: New South Glasgow Hospitals Project, Project Technical Liaison\Input\ with responsibility for Board wide Energy Management
2003 – Aug 2012: Sector Estates Manager (North & East Glasgow), Inc Glasgow Royal Infirmary, Stobhill Hospital, Lightburn Hospital, Central Surgical instrument Decontamination Centre (Cowlairs).
1988 – 2003: Glasgow Royal Infirmary University NHS Trust, including roles:
2000 – 2003: Site Estates Manager.
1995 – 2000: Chief Engineer.
1992 – 1995: Senior Engineer.
1988 – 1992: Electrical Engineer.
1982 – 1988: Ruchill Hospital (Grade 5 Maintenance Technician) Responsible for maintaining all hospital building services and large-scale industrial laundry plant & Laboratory autoclaves.
1980 – 1982: Broomhill Hospital (Grade 4 Maintenance Electrician) Responsible for maintaining all building services and medium scale industrial laundry plant.
1976 – 1980: NHS Greater Glasgow Heath Board, Stobhill Hospital, Apprentice Electrical Engineer, responsible for learning craft skills required for maintaining building services and specialist plant for provision of health care facilities.

Core specialism

Electrical plant Engineering, supplemented by Education and experience in all aspects of building services required to support hospital\clinical environments.

Professional Background

2. Professional role(s) within the NHS.

A 2003 – Aug 2012: Sector Estates Manager (North & East Glasgow), Inc Glasgow Royal Infirmary, Stobhill Hospital, Lightburn Hospital, Central Surgical instrument Decontamination Centre (Cowlairs).
2000 – 2003: Glasgow Royal Infirmary Site Estates Manager.

3. Professional role (s) at QEUH/RHC, including dates when role(s) was occupied.

A Jan 2017 – July 2019: Deputy General Manager Estates Services.
Aug 2016 – Jan 2017: Sector Estates Manager South & Clyde.
Sept 2015 – Aug 2016: Sector Estates Manager (South Glasgow)
Aug 2012 – Sept 2015: New South Glasgow Hospitals Project, Project Technical Liaison\Input.

4. Area(s) of the hospital in which you worked/work.

A My role involved a knowledge and awareness of all services and infrastructure across the full campus. Including Retained Estate, QEUH, RHC, Laboratory Medicine, Energy Centre, I therefore worked across all areas of the campus to develop an operational and working knowledge of the building services plant and infrastructure.

5. Role and responsibilities within the above area(s)

A Sector Estates Manager role held specific responsibility as Professional Lead for the Estates Maintenance services and personnel. Develop and Implement the Estates Strategy and departmental business plans in line with the division's objectives. Responsible for the strategic Direction, professional and managerial leadership of the divisions Estates Department.

6. Who did you report to? Did the person(s) you reported to change over time? If so, how and when did it change?

A My line manager was Billy Hunter, Facilities General Manager South and Clyde, however during the project liaison period 2012 – 2015, I also reported

in parallel to Karen Connelly Project Facilities Lead. Billy Hunter was also my line manager when I took up the role of Sector Estates (south) & Sector Estates Manager (South & Clyde) Roles from Sept 2015 – Jan 2017. July 2016 Alan Gallacher was appointed as the General Manager (Estates) as Technical Lead for the Estates department Board wide, I now reported to Alan on technical matters and Billy Hunter on operational issues. I also reported directly to David Louden in ongoing contract\defect issues and site development issues. On Jan 2017, I was redeployed to work with Alan as Depute General Manager Estates.

7. Who selected you for your role(s)? When were you selected for your role(s)? Please describe the selection process for appointment to this/these roles?

A Alex McIntyre, Director of Facilities (DoF) called me to a meeting in his office in July 2011 and outlined his plans for a management reshuffle to align with the strategic plans for the New South Glasgow Hospitals, as part of his plan he asked if I would be interested in transferring to the South Glasgow facilities team with responsibility for technical liaison/input to the new South Glasgow Laboratories and Hospital and managing the operational commissioning of both buildings from a technical perspective. Following the opening of the Hospital, taking over as Sector Estates Manager south & Clyde. I was not subject to a selection process, I believe the selection options were discussed between the DoF and the then Corporate General Manager (Mary Anne Kane).

8. Had you worked with any of your QEUH/RHC estates and management colleagues before your current role? If so, who had you worked with before this current role? When did you work with this/these colleague(s)? What role were you in when you worked with this/these colleague(s)? How long were you colleagues in this/these previous role(s)?

A From the Facilities management team, I had worked with: Mary Anne Kane as my General Manger at the North & East Sector 2006 -2008, while I was the Sector Estates Manager 2003 – 2012. Likewise while I was in the same role Billy Hunter was my General Manager from 2008 - 2017, and Mary Anne Kane became the Corporate General manager 2008, where my working

relationship continued with her while she held that role. I had also worked with Alex McIntyre 2004 – 2006 supporting him in his role as ACH project Director, where I provided operational & technical support and advice with respect to PFI hard FM contractual elements, my working relationship continued with Alex from 2006 when he became Director of Facilities for NHS GG&C. With Respect to the Estates team at the QEUH, I had worked with Jim McFadyen (Sector Estates Manager South & Clyde) from 2006 – 2012 in our sector Estates Managers roles as part of the Boards Estates Management team and with regards to my extra responsibility for Board wide Energy Management (where bolt on responsibilities covering Board wide topics were added to the Sector Estates Managers role), my working relationship with Jim continued during the construction of the new QEUH campus until he retired Aug 2016. The only other member of the new operational Estates team I had work with before the QEUH , was Cyril Dowson (Planning Supervisor QEUH) I had worked with Cyril at the GRI since circa 1990 in his role as shift supervisor, I held various roles at the GRI during this period.

Specific Role(s) at QEUH/ RHC

9. Describe your role(s) at QEUH; job title and responsibilities including day to day responsibilities, and details of staff who reported to you, who you worked alongside and who you reported to. Please fully describe where the role was in the hierarchy of the organisational structure.

A My role as Technical Liaison from 2012 – 2015 I was responsible for Technical Liaison\input into the new South Glasgow Hospital & Laboratories Project, managing the operational commissioning of both buildings from a technical perspective as well as the integration and interfaces between the new and retained Estate (i.e. Infrastructure and services interface, i.e. High Voltage network, Appointed as lead Authorised Person-High Voltage (AP-HV) on behalf of the project for planning and management of all HV network connections as per safe code of practice, Medical gas supplies and infrastructure, telecoms\IT support), As well as developing a strategic Maintenance \manpower plan. During this time I reported to Billy Hunter\Karren Connelly as Project Facilities Lead and engaged with Mary

Anne Kane & Alan Seabourne (Project Director) over strategy (Latterly David Loudon after Allan retired 2014). I had no direct staff reports during this time, I worked with Members of the project team Karen Connolly (Facilities Lead), Peter Moir (Depute Director\Contract Manager) Frances Wrath (Project technical manager), Alistair Smith (Project M&E Technical Commissioning Manager), Hugh McDermid (Building Technical\Commissioning Manager), David Hall (Curry & Brown Independent Technical advisor),Graham Forsyth (Project Manager), Fiona McLuskey (Project Lead Nurse), Heather Griffen (Lead Contract Manager Adults), Mairi McLeod (Lead Contract Manager Childrens), Lorraine Pebbles (Laboratory Migration\integration Manager), Darren Pike (Brookfield Project M&E Manager), David Wilson (Multiplex Commissioning Manager), as well as Jim McFadden for coordination and support for issues of interface\integration with the retained Estate.
In my role as Sector Estates Manager (south) Jan 2016 – Sept 2016: I was responsible as Professional Lead for the Estates Maintenance services including and personnel, managing the implementation of the Estates Strategy for the full campus within the reduced operating budget made available as detailed within the initial QEUH Business plan, while contending with the high volume of ongoing contract works, defects and remedial actions. During this time, my line manager was Billy Hunter (Facilities General Manager), with technical lead from the newly appointed Estates General Manager Alan Gallacher. My direct reports were Senior Estates Managers David Brattey (with responsibility for the Adult & Childrens Building) & Colin Purdon (With Responsibility for the Retained Estates\Energy Centre & Laboratory Medicine).

My role as Sector Estates Manager (South & Clyde) Sept 2016 – Jan 2017, On the retirement of Jim McFadden from his temporary role as Sector Estates Manager (Clyde) the Clyde Remit was incorporated into my role, Billy Hunter remained my line manager for this extended remit of my responsibilities across the full South & Clyde Sector, My Site Estates manager direct reports remained the same for the QEUH but now included for RAH was Frank Zielinski, IRH was Ross Campbell and for VoL was John Menzies. Within all of these roles I worked alongside the site Facilities Managers, and all clinical

directors, service managers and nursing managers on a day-to-day basis as required to provide appropriate service and support.

10. When did you start your current role? How many people worked within QEUH hard facilities management when you started? How many people worked within QEUH soft facilities management when you started? Did the number of people working at QEUH change during your time there? If so, how many people changed in soft facilities management? If so, how many people changed in hard facilities management?

A I retired from NHS Greater Glasgow & Clyde on the 2nd July 2019, my role at that time and my last post from Jan 2017 to July 2019 was as Depute General Manager Estates reporting to Alan Gallacher (Estates General Manager) Initially with day to day responsibility to shadow and deputise for Alan as required as well as supporting Andy Wilson my replacement as Sector Estates Manager (South & Clyde) where required. This was until the water incident occurred and I was tasked with developing and implementing a solution to the contamination issue.

a) What concerns, if any, at this point did you have regarding staffing levels in Estates? Did you escalate any concerns and if so to whom?

A I had concerns over staffing from the time that I was advised that my management strategy paper had to be revised to meet the budget restrictions as detailed in the project outline business case, where staffing levels had to be reduced as part of meeting the budget allocation, this revised maintenance strategy was called the Affordability Model.

I also advised my Facilities General Manager Billy Hunter, when the operational estates department were required to contribute to the Board's Cash Releasing Efficiency Savings (CRES) programme, and the only way to achieve this at this time was to release vacant posts. While Mr Hunter accepted and agreed with my concerns, he advised that the department had to meet the CRES target set for the South & Clyde Sector Facilities department, he overruled my concerns and released the budget for these posts (from memory I think this was equated to 2 WTE's).

I shared my concerns over staffing levels at the time I was redeployed to the Depute General Managers post with Andy Wilson (my replacement Sector Estates Manager), who carried out his own staffing assessment and concluded that he required circa 108 WTE staff to deliver the required level of support.

11. How did Estates management operate on a daily basis? Was responsibility shared between different teams? If so, to what extent was responsibility shared?

A The Estates Structure within the QEUH was designed with geographic responsibility for Estates Services divided between two senior Estates Managers, David Brattey who was responsible for the operation, maintenance and compliance of the new Adult and Childrens Hospitals and Colin Purdon who was responsible for the operation, maintenance and compliance of the Retained estates, Energy Centre and Laboratory Medicine, each team was supported by an Estates Manager & planning supervisor along with a cohort technical staff to support each area, with joint working/resource sharing where required to meet the daily needs of the operation. In addition to this and due to the sites size and complexity a team of 5 duty Estates Managers managed and 20 technicians on a rotary shift basis to provide 1st line response to any emergency occurring anywhere on the campus on a 24/7 bases, this team also provided support to both day shift teams to address planned maintenance where possible.

12. Refer to the **Estates Team Bundle, document 29** - Organograms showing the organisational structures within QEUH.

a) Does the organogram match the organisational structures of QEUH?

A Yes, this was the structure for the South & Clyde sector.

b) If not, why not?

A N\A

c) How did the structure and hierarchy operate across the different sectors?

A The structure was replicated across each sector with a Sector General Manager Facilities Responsible for the sites within their sector, and supported by a Sector Estates Manager, each site has a site facilities manager reporting to the General Manager and each site has a site estates manager reporting to the Sector Estates Manager. Each General Manager reporting to the Director of Facilities (DoF) .

13. What role did you hold in Estates until 2019?

A I held the role of Estates Depute General Manager.

a) When were you appointed to this role? How did you come to be appointed, who selected you, what was the selection process, did you have previous working relationships with those who selected you?

A I was Appointed to this role In Dec 2016, and took-up post in Jan 2017 after providing a 4–6-week familiarisation\introduction for Andy Wilson. I was unaware of the proposed change of role, until Jim McFadden's retirement, following which I requested authorisation from Mary Anne Kane to fill the Site Estates Managers post (which was included within the Estates strategy for the QEUH), as Jim's retirement should have released the funding to support this role! At this point Mary Anne advised me that she and Alan Gallacher were interviewing the following week for a new Sector Estates Manager for South & Clyde. This was a surprise to me as I had not been consulted on this plan, I enquired how this was intended to work as this was my post. To which Mary Anne advised that I was being redeployed to support Alan Gallacher as Depute General Manager. There was no selection process that I am aware of for this new post. Yes, I have worked with very well and successfully with Mary Anne since 2006 and to a lesser extent with Alan since circa 2011 due to my involvement with the QEUH project we had little contact until 2015/16.

b) Describe the role of Deputy General Manager of Estates.

A There was no Job Description for this post, when I requested the job description from Alan, he provided a copy of his job description and advised that my role would follow his job description. My understanding was that I

would support Alan in his role and deputise for him as required as well as supporting Andy Wilson (Sector Estates Manager South & Clyde) on technical and procedural issues for the QEUH as required. Initially there was no workload direction for my post as Mary Anne was on sick leave, so I was left to address ongoing and legacy issues that were raised directly with me by QEUH departmental leads etc, allowing Andy more time to bed-in.

c) What were your duties in this role?

A My duties centred around project work rather than managerial roles for example following the Grenfell Tower fire, I was allocated the task of investigating, collating and populating the HFS External Cladding reporting tool for Scottish Government for all buildings across NHS GG&C, establishing if the cladding materials used were constructed of Aluminium Composite Material (ACM). Ward 2A Isolation room ventilation conversion from PPVL to positive pressure review/procurement/ implementation, Ward 2A General ward ventilation modification feasibility report. Ward 2A services modification works. Water incident control response, lead on investigation and design solution to address systemic contamination.

d) Who did you report to in this role? Detail superiors/superiors for this role.

A My line manager for this post was Alan Gallacher (Estates General Manager), with a close working relationship with Mary Anne Kane.

e) What was your relationship like with your supervisor in this role.

A It was a reasonable relationship, working well together to address the challenges surrounding the QEUH

f) Provide details of staff who reported to you, and you were responsible for in this role, and your relationship with them.

A I had no direct reports, in this role, Alan took point on man management.

g) Provide the name and role of any managers you worked with. Please provide their Job (s) and role responsibilities.

A Andy Wilson (Sector Estates Manager South & Clyde) this role held specific responsibility as Professional Lead for the Estates Maintenance services and personnel. Develop and implement the Estates Strategy and departmental business plans in line with the division's objectives. Responsible for the Strategic Direction, professional and managerial leadership of the divisions Estates Department. Colin Purdon, (QEUH, Site Estates Manager & then in his role as Sector Estates Manager), responsible for the implementation of the Estates strategy and day to day management of the sites staffing and physical assets. Sector Role as detailed above. Darryl Conner (Site Estates Manager QEUH), responsible for the implementation of the Estates Strategy and day to day management of the sites staffing and physical assets. Melville McMillan, Estates Manager, responsible for the management of staff and physical assets in line with technical, statutory as well as H&S compliance requirements. Dr Teresa Inkster (Microbiologist & Infection Control Doctor), Infection control lead for QEUH and ICT lead on water management issues. Dr John Hood (Microbiologist & Infection Control Doctor), lead on ventilation review relating to the cryptococcus incident.

14. Detail any other roles held by you within the Estates team and provide details as referred to in a-g above.

A I did not hold any other roles and responsibilities other than the project roles described.

15. How was work delegated in the Estates team?

A Generally, work was delegated ether by e-mail, formal team meetings or verbally on day-to-day interactions.

16. How did you keep a record of work delegated?

A e-mail correspondence or meeting minutes.

17. How did you check that the work delegated had been carried out?

A E-mail correspondence, one to one meetings or management team meetings. Although due to workload pressures for all of the estates team it was challenging to maintain planned meeting as invariable one or two of us were diverted to other priorities resulting in the meetings being cancelled.

18. Did you have any concerns about any member of staff? If so, please describe these concerns. What action, if any, did you take in relation to these concerns?

A As Sector Estates Manager (South) I had no concerns about the competence or capability of my site managers, I was however concerned about the work load placed on such a small team with respect to the high volume of contract defects and systemic system issues (such as the Pneumatic Transport System PTS\AGV's) etc and the pressure this was placing on the Estates team to prioritise based on immediate adverse impact to clinical service. These issues lead to Estates managers working longer hours, Particularly David Brattey, Colin Purdon and myself.

a) Did you ever ask for additional resource for the Estates department? If so, to whom? What was the response?

A I raised my concerns with David Loudon and latterly with Billy Hunter. David Loudon's position was that we had to work within the Budget constraints set in the Project Business Case and enforced by Robert Calderwood with David Loudon. Although David Loudon indicated his intention to address this at a later stage with Robert Calderwood once we established the actual operating cost pressures, to my knowledge David did not address this before his departure from NHS GG&C. Billy Hunter had a similar view that we needed to work within the set budget as demonstrated in my response to supplementary question 10 above.

19. Did you have any concerns/ ever raise any concerns regarding management/ managers? If so, please describe these concerns. What action, if any, did you take in relation to these concerns?

A I did not have any concerns with regards to the managers within my team, they were all experienced managers from the demitting sites transferred to QEUH, bear in mind that we did not know each other before coming together as a team. I did raise concerns on several occasions during one-to-one meetings with my line manager (Billy Hunter) regarding my inability to effectively perform my job function and that of my team due the high pressure of continual firefighting of critical issues on a daily basis. Billys response was to work through the pressures we faced until the site settled down and we can collectively return to normal.

a) What sort of critical issues were you firefighting on a daily basis?

A It is difficult for me to recall the details of all the issues that were dealt with on a daily basis at that time, however this is some of the more high-profile issue that I can recall:

- Repeated blocked drainage risers, causing sewage discharge into wards, the blockages were not evident until after migration when the system was challenged by routine activity. The cause of these blockages was found to be deliberate sabotage by Multiplex contractor staff who had their contracts terminated. We found bags full of rags pushed in to the stacks with lengths of screwed rods as well as plastic bottles, tools and other obstacles.
- Repeated surcharging of underground drainage, causing discharge of sewage into the Adult and Children's hospital ground floor departments, ED, Physio etc. (Caused by building debris in the main underground drains.
- Automatic Guided Vehicles (AGV's) daily issues including system failure, network communication issues, battery failures, charging issues.
- Pneumatic Transport System (PTS): on-going daily faults, system blockages, lost samples and operational issues as well as programming issues, having immediate and direct impact on clinical services and patient care, and placing pressure on reduced soft FM staffing levels to Implement and manage manual sample transfers and delivery of goods. In addition to system design intent not

being delivered i.e. ED\ICU direct priority line to the Laboratory not being designed correctly.

- Energy Centre boiler failure to operate automatically.
- Failure of Low Temperature Hot Water (LTHW) heating circuits and Chilled Water Circuits push fit connections to Heating and Cooling batteries, causing repeated widespread flooding damage and loss of service, ultimately all push fit connections were replaced with compression fittings.
- PPVL isolation room issues relating to noncompliance with SHPN 04 Supplement 1 which they were designed to. Working directly with ICD support from Dr John Hood, Prof Craig Williams and Dr Christine Peters
- On-going assessment and rectification of issues identified under the preparation of the written scheme of examination as per the Boards legal duty under the Pressure System Safety Regulations (PSSR) 2000, and the failure of Multiplex to meet their legal requirements under the Pressure Equipment Directive (PED).
- On-going works to secure and maintain the Pollution, Prevention & Control (PPC) permit as per the annually reviewed conditions of improvement applied by SEPA.
- With support from ICD (Dr Christine Peters), identify and address the omission of shared theatre prep room door interlock arrangements, required under SHTM 03-01 for control of infection between theatres.
- Asset register review and preparation for transfer to FMFirst (2 years working with IT)
- Lead on the development and redesign 4 PPVL isolation rooms in RHC ward 2A to convert to positive pressure isolation room facilities as per the requirements and approval of ICD and clinical leads.
- ETFE roof failure, as instructed by the David Loudon, Director of Facilities, carry out an investigation into the cause of the failure and prepare a report on my findings. I also contacted the Central Legal Office for advice on cost recovery under the contract but was advised by David Loudon that this was out with my remit! I also suggested that the Board should instruct an expert forensic analysist to carry out an investigation, this was not implemented until sometime later.

- Lead on the investigation and analysis of the external glazing failure of the toughened glass spandrel panels utilised on the building, establishing from lab assessments of the points of failure that that were recovered, that the failures were due to Nickel Sulphide Inclusion (NiS) impurities in the glass.
- Universal interstitial window blind failures, Multiplex would not accept these as design or product failures, but insisted that this was a result of misuse by the staff and patients? I was then tasked with developing, procuring and implementing a robust solution for the issue.
- Initial high volume BMS lighting controls failure, light could not be switched off.
- Initial high volume BMS heating control Failures.
- Fuel delivery system failures to both Generators and Boilers.
- En-suite shower flooring issues, water not running to drain, Multiplex insisted that this was due to the client's instruction to remove the shower curtains from the wet room design?
- High Voltage (HV) Substation, Underground water ingress to the HV cable ducts, H&S risk as well as a risk to the integrity of the HV equipment from the effects of high humidity.
- Boiler safety valve discharge was unsafely discharging to the boiler room floor, placing operators at risk in the event of an emergency safety valve operation. This addressed under the PSSR assessment and redesigned and modified by multiplex to address the PSSR\H&S non-compliance.
- Plant room electrical supply overload impacting several critical systems.
- Cold water System leak In the Acute Receiving Unit (ARU), this leak was caused by the corrosion of a section mild steel pipe installed in the stainless-steel Cold-Water System (CWS) between two modular service units. This compromised the integrity of the CWS.
- On going fire door issues.
- Fire Sprinkler zone control failure. (wiring fault).

This list is not exhaustive but is indicative to the type and scale of issues arising.

b) Did you expect to be ‘firefighting critical issues on a daily basis when you undertook the role? Explain your answer.

A No, I had expected to have a full team to support me, and that the new hospital would have been well designed and constructed with zero defects as per the NEC 3 contract.

20. Describe the interpersonal relationships within the Estates team. How would you describe communication between you and your supervisor(s)/ superior(s)? How would you describe communication to you from those you senior to you/ supervised you?

A Relationships between myself and my management team were good, communication was clear and instructions\responses were clear and any deviation from the intended direction were quickly clarified and addressed. Pressures on delivering on expectations were generally relating to unforeseen pressures relating to the size and scale of the campus as well as the ongoing level contract defects, impacted by the reduced staffing level due to the budget restrictions imposed from the outline business case. Likewise my working relationship and communications with my line manager and senior management team were good.

21. How many occasions, if any, did issues arise caused by misunderstandings or poor communication?

A This is a difficult question to answer due to the time lapse since my retirement, I am sure that there are examples of communication issues, but I cannot think of any at this time.

Training

22. What training had you undertaken for your role(s) in estates?

A Construction Site Managers Safety Certificate Awarded by CITB 1992. Management & Communication Skills for Estates Managers, Issued by: NHS Scotland Property & Environment Forum, 2000.

23. What qualifications did you have for your role(s) in estates?

A Glasgow Caledonian University 1992 – 1995: B.Sc. Building Services Engineering (Distinction).
Stow College, Glasgow. Awarded AHS Emstar award for Outstanding Dissertation
1990 – 1992: SCOTVEC (Level 5) Higher National Certificate in Management Studies.
1982 – 1985: SCOTEC (Level 5) Higher National Certificate in Electrical and Electronic Engineering
Springburn College of Engineering, Glasgow 1989 – 1990: SCOTVEC Certificate (Level 3) in Mechanical Engineering (Plant)
1980 – 1982: SCOTEC Certificate (Level 3) in Electrical and Electronic Engineering
1976 – 1980: Scottish Health Service Apprenticeship certificate
EITB Certificate of Engineering Craftsmanship.
City & Guilds 232 Part III Certificate in Electrical and Electronic craft studies.
City & Guilds 232 Part II Certificate in Electrical and Electronic Craft Studies.
EITB 2nd Year Training Certificate
City & Guilds 200 Part I Certificate in Basic Engineering Craft Studies.

24. What experience did you have working in estates prior to the QEUH/RHC? How similar was the industry, role, and responsibilities to your work in QEUH/RHC estates?

A Prior to working at the QEUH\RHC I had 38 years of experience within the health care environment (NHS Greater Glasgow).
9 years as Sector Estates Manager (North & East)
15 years in various Estates Management roles within the Glasgow Royal Infirmary Campus:
2000 – 2003: Site Estates Manager.
1995 – 2000: Chief Engineer.
1992 – 1995: Senior Engineer.
1988 – 1992: Electrical Engineer.

1980 – 1988: 8 years in various Electrical Engineering Technician\Tradesman roles.
1976 -1980: 4 year NHS GGHB Electrical Engineering Apprenticeship.

25. Did you have any formal training or qualifications in respect of:

a) Water

A 2009: BS1 Legionellosis: The Role of the Responsible Person. Issued by Develop Training Ltd. Providing awareness of the risks, issues and responsibilities relating to control and management water systems with respect to Leionellosis.
2019: BS1 Legionellosis: The Role of the Responsible Person. Arranged by the compliance team.

b) Ventilation

A Eastwood-Park,(NHS-Training-Centre-Falfield)
1988: V.175 Air Conditioning & Ventilation. Providing basic training and awareness of the operation and management of ventilation systems within a health care environment.

c) Infection Control

A In-House:
Annual-Infection-control-awareness.
Annual Hand hygiene. Provides basic infection control principles for working within a clinical environment.
If so, please detail above any training and qualifications – when trained? When qualified? Who was the awarding body? Please describe how the training and qualifications applied to your work at QEUH.

26. Have you ever had any specific roles or duties in relation to the water systems operation or maintenance within NHS facilities? When did you have these roles and duties?

A I was responsible person for water systems at the Glasgow Royal Infirmary 2003 – 2012.

a) What qualification(s)/ experience was necessary for this role? Did you have this experience/ qualification(s)?

A The Responsible Person will possess sound professional knowledge of Legionella and water safety issues and appropriate training. The Responsible Person should also be fully conversant with the design principles and requirements of water systems and should be fully briefed in respect of the cause and effect of water-borne organisms. I had received a 1 day Training course (BS1) Legionellosis: The Role of the Responsible Person, November 2009, my experience was gained on the job and from reference to SHTM\HSE guidance.

27. If you did:

a) What were these responsibilities?

A Ensure all water systems on site are fully compliant with all aspects of current H&S and Legionella specific legislation and guidance and manage any source of risk through the preparation of a legionella risk assessment. Carry out full risk assessment on all water systems and implement action plans to address any areas of risk. Implementation of an effective maintenance policy including preparation of fully detailed operating and maintenance documentation and the introduction of a Written Scheme and logbook system.

Chair the water safety group.

Advising on the potential areas of water-related risks and identifying where systems do not adhere to this guidance.

Liaising with the water authority and environmental health departments and advising on the continuing procedures necessary to ensure acceptable water quality.

Monitoring the implementation and efficacy of those procedures.

Approving and identifying any changes to those procedures.

Ensuring equipment that is to be permanently connected to the water supply is properly installed.

Ensuring adequate operating and maintenance instructions exist and adequate records are kept.

b) What was the purpose of these responsibilities?

A To ensure that the quality of water in healthcare premises is maintained and comply legislation & guidance.

c) Were you aware of any specific legal responsibilities/ obligations relating to working with the water systems. If so, please detail.

A Yes, these legal responsibilities are:
The Health and Safety at Work Act 1974.
Management of Health and Safety at Work Regulations 1999.
Control of Substances Hazardous to Health Regulations 2002 (COSHH).
Health & Safety Executive: Approved Code of Practice ACOP L8 "Legionnaires' disease. The control of legionella bacteria in water systems."
Health & Safety Executive: HSG274: Technical guidance Part 1: Evaporative cooling systems.
Health & Safety Executive: HSG274: Technical guidance Part 2: Hot and cold water systems.
Health & Safety Executive: HSG274: Technical guidance Part 3: Other risk systems.
Department of Health: Health Technical Memorandum HTM 04-01: Safe water in healthcare premises (where applicable).
The Notification of Cooling Towers and Evaporative Condensers Regulations 1992 (where applicable).

28. If you did not have any such roles or responsibilities in relation to the water systems operation or maintenance within NHS facilities:

a) Who did?

A N\A

b) What were these responsibilities?

A N\A

c) What did you understand the responsibilities to be?

A N\A

d) Were you aware of any legal obligations/ responsibilities? If so, please detail.

A N\A

29. Have you ever worked on a large scale water or ventilation system before? If so, when was this? How did this compare to working on QEUH? What was your role and duties?

A I have experience of large scale water distribution and ventilation system plant during my time working at the Glasgow Royal Infirmary 1988 – 2012, in various roles. The water systems in place at the QEUH where on a larger scale in both storage capacity & system complexity. The ventilation systems at the QEUH where more modern but with concerns over the design used for neutropenic patient isolation facilities being of PPVL design? From 2003 – 2012 I was Responsible person legionella with the duties detailed in Q27 above.

Pre 26th January 2015 involvement in QEUH/RHC

30. Describe the operational commissioning, what did this entail? How involved with the commissioning of the water and ventilation system were you in this role. Describe what, if any, commissioning in respect of the water and ventilation system was carried out and where these records were stored?

A Operational commissioning entails making the hospital ready for accepting patient following practical completion of the construction project, including:

- Tendering and managing the supply and installation of ward equipment.
- Carrying programme of ward/department modifications and changes of use from design, to meet the changed need of these services.
- Specify and procure and manage fit out new mop laundry facility.
- Installing all fixed and movable equipment.
- Managing the installation safety systems such as fire extinguishers.
- Specifying tendering and awarding specialist services support contracts.
- Instruct, manage and supporting the preparation of a Written Scheme under the Pressure Systems Safety Regulations (PSSR 2000) requirements.

- Instruct, manage and supporting the preparations of the written scheme of examination for all patient lifting equipment under the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER).
- Support the installation of 3rd party radiology equipment.
- Specify, tender and manage the retrospective installation of a Patient Entertainment System (PES) throughout the adult hospital, (this had previously been removed from the Multiplex contract).
- Support the installation of Scottish Ambulance Service (SAS) emergency services radio communications system with ED.
- Support the installation of IT wireless hubs across the site.
- Manage conditions applied under the PPC permit award under the control and direction of SEPA.
- Manage and coordinate the contractor access requirements including review and approve contractor Risk Assessments & Method Statements (RAMS) for all contractors including the 300 plus operators still working on site for Multiplex.
- Commission and support preparation and production of Water Risk assessment and written scheme.
- Continuation of water flushing control programme. (Records were held in the project office archive store)
- Water sampling programme and sanitisation of wall wards and departments prior to occupation. (Records for sampling results were held on the Al-control Laboratory Services Portal, I also understand that these results were e-mailed to Jim Guthrie/Melville McMillan and myself. Records of sanitisation programme would be held in the Operational Estates office managed and recorded by Jim Guthrie.).

  This is an indicative list of the works involved but is not exhaustive. I was not involved in the contractual commissioning and validation of the water and ventilation systems.

a) What technical input did you have during this time in respect of QEUH/RHC? What was your role? What areas were you responsible for? The Inquiry understands from later in your questionnaire response that you attended the

TMT product presentation/ selection meeting in respect of the selection and use of Horne Taps in QEUH/RHC. What had your role and involvement in respect of tap selection been prior to then?

A My technical input was to ensure that the hospital was ready for occupation providing technical support, guidance and management of the works required to make the hospital ready for patients, this included identifying technical problems with the hospital as provided at handover, these issues only became evident as the building was accessed and utilised by NHS staff. At the point of handover my remit was as technical manager for the new hospitals, and Energy Centre as well as the operation under the PPC permit conditions as applied by SEPA for the whole campus new and retained estate. With respect to the TMT selection presentations, I had no previous involvement in the specification or selection of any service\equipment required under the project up until this point. I had no previous experience of TMT selection prior to this other than knowledge gained from reading SHTM and DO8 guidance on the requirements for TMT's.

b) Have you advised on tap choice in other projects? What experience did you have in respect of taps?

A No, I had not advised on tap selection prior to this, my experience was from SHTM \DO8 Guidance.

c) Describe your day to day dealing with infection control staff during this period. Were there regular meetings between infection control staff and the project team? How regularly was input sought from infection control staff by the project team in design matters and the build of QEUH/RHC?

A I was not generally involved in design matters as most design issues had been addressed prior to my secondment to the project team. I believe that during the early stages of the design Jackie Barmanroy (ICN) was assigned to the project team to support design matters as well as Prof Craig Williams (Lead ICD). There was an Infection control nurse assigned to the project operational commissioning team, but his input was mainly to address ward \department setup with respect to infection control.

d) Describe any involvement you had in respect of room data sheets? Process, relevance etc.

A I had no involvement in the room data sheet preparation, this was developed before my secondment to the project. I did use them to verify elements were in place as required.

e) At this time clarify the roles and responsibilities of Currie & Brown, Capita, Mercury, IBI and Multiplex. Describe any involvement you had with these companies.

A Please note I was not provided with any formal induction into the project team, I was given a desk and left to review Aconex contract document management system, forge relationships with the various groups and become familiar with the site layout and functionality.

I assume that you are referring to the design stage. My understanding was:

- Currie & Brown: where technical advisors to the Board on design and contract matters. My involvement with Currie & Brown, was to gain insight & familiarisation into the project delivery.
- Capita: were project supervisors under the NEC3 contract, to my knowledge had no design input but were responsible for monitoring and verifying contractual compliance and delivery. I did not have much involvement with Capita until after hand over where they attended routine monthly defect meetings.
- I do not know who IBI are. I had no involvement with IBI.
- Multiplex: where the main contractor under contract for delivery of the project within the NEC3 contract requirements to the Board. I worked with multiplex on site and system familiarisation and technical understanding of the site.
- Mercury: were the M&E sub-contractors to Multiplex and partners in the contract delivery with Multiplex (however did not have a formal contract directly with the Board). I also undertook the role of Authorised Person (AP) High Voltage (HV) for the Board managing safe system of work and issue permits to work HV works under the responsibility and control of the Board.

f) Describe your involvement in any design aspects of the QUEH/ RHC build?

A I had no involvement with the design of the build other than spending one day circa 2007/8 along with Brian Gilespie (Clyde Sector estates Manager) working with Wallace Wittle shadow design team on electrical infrastructure operational issues and requirements for inclusion in the outline specification.

g) Questions for Witness: What is your understanding of the Employers Requirements? What involvement did you have with them/ how did they impact your role during this time?

A The Employers Requirements (ERs) were the Board's specification of accommodation and functionality requirements, including clinical details, departmental adjacencies, room data sheets etc, advising the successful contractor of their contractual responsibilities for the design and construction requirements to meet these requirements. Including the hierarchy of statutory, mandatory and guidance documentation that will be applied to the design and construction arrangements. I used these as a baseline for understanding what was being delivered, however it was difficult for me to keep track of variations\amendments to the ERs without reference to the project team.

h) Describe your understanding at this time of BREEAM. How important was BREEAM in the design and build stage?

A BREEAM, is a sustainable building and environmental assessment and certification tool used to quantify compliance with building standards requirements for sustainability. The Boards fundamental aim for the building design and construction was to achieve a BREEAM excellent rating, including a low carbon design with a stated energy target of 80Kg CO2/m2/annum. My understanding is that these requirements were paramount.

i) Refer to the ZBP Ventilation Strategy Document (separate document not in bundle). Were you aware of the ZBP Ventilation Strategy document dated 15 December 2009? If so, when did you first become aware of it? Were you consulted? If so, what were your views?

A I was not aware of ZBP ventilation strategy document until after patient migration circa late 2015, following concerns raised by ICDs over the

ventilation. I was not consulted on this strategy; I was not seconded to the project team until August 2011

j) When did you first learn of the Agreed Ventilation Derogation i.e., that 2.5 ACH was the agreed rate? When you became aware, to which wards did you understand this to apply to?

A I only became aware of this derogation after patient migration late 2015 when questions were being raised by the ICD team. When I carried out an assessment of the ACR for a typical ward single room accommodation in support of Dr Christine Peters to find that the ACR was 2.5 – 3 ACH and 0 differential pressure between the single rooms and the ward corridor. I advised the project team of these findings as a possible contract failure as the SHTM 03-01 guidance requirements are 6 ACH, I was directed to the Clarification log which indicated the acceptance by the project team of the standard room ventilation ACR derogation. With a caveat that the single rooms must be negative pressure to the general ward. Following further questions from ICD\Clinical colleagues over the validity of this derogation the "Ward Ventilation Design strategy" was shared. My understanding is that this derogation applied to all general ward, single room facilities, were chilled beam technology was adopted (most patient rooms)

k) Were your views asked for before the Building Contract was signed in December 2009?

A No

l) If you were aware of it and/or consulted about it, what did you think its scope was? e.g. did it apply to all wards in the QEUH/RHC including specialist wards and specialist ventilation and isolation rooms then intended to be included in the hospital, and any specialist facilities to be later added to the hospital before it opened?

A I was not aware or consulted on the ventilation strategy and had no input or involvement on the decision to accept this strategy at design stage.

m) Do you have any knowledge of the reasons why GGC would agree to derogate from their Employer's Requirements that said that compliance with SHTM 03-01 was mandatory?

A I have no knowledge of why GGC agreed to the proposal against the mandatory compliance with SHTM 03-01.

n) Do you think this agreement had an effect on the safe operation of the hospital?

A I believe that the design was implemented in areas that were not designated as general ward accommodation (e.g. RHC ward 2A, respiratory medicine etc) where it would have had an effect of the safe operation of wards not categorised as general wards. The designed installation also did not achieve the derogation requirement of negative pressure from the room to the corridor which introduces the risk of cross infection between rooms.

o) Do you think this agreement continues to have an effect on the safe operation of the hospital?

A Assuming that there have been no changes to the conditions reference above, the potential effect on the safe operation of hospital will remain.

Documents, Paperwork and Processes in Place as at 26th January 2015

We know that handover of QEUH occurred on 26th January 2015:

31. What contractual documentation would you expect to see in place at handover?

A From and operational Estates perspective I would have expected to have access to: A Full system \service\plant description of operation, as fitted schematic diagrams, commissioning certification and documentation, test certificates confirming that the systems had been designed and installed to meet the contractual, statutory and guidance requirements as per the contract higher archie of compliance. (e.g. for domestic hot & cold water: Flow rates, Temperature trend logs, Water quality tests for Bacteriological & Legionellae), Planned Preventive Maintenance (PPM) plan for all systems, associated plant and relevant components i.e. Water storage Tanks\ Calorifiers\ TMV's, etc.

Asset register of all plant and relevant equipment along with unique asset ID (The Asset Register and PPM programme along and itemised PPM task list should have been added to the Boards preferred Computer Aided Facilities Management system (ECIPSE, now FMFirst). Asset IDs should have also been tagged to all items on the asset register.

32. Describe the process for handover of QEUH:

A I was not involved in the handover process this was managed by Peter Moir supported by Capita Symonds, Contract Supervisors. I therefore do not have any working knowledge of this process.

a) What contractual documentation was in place?

A After hand over I tried to access contractual documents, drawings specifications and commissioning and maintenance data, however the information available within the official Post Completion Documentation (PCD) files were random and sparce, I enquired via David Willson (Brookfield Multiplex Commissioning Manager) when this data would be available and he advised that the contract allowed a 2 month period after contractual Practical Completion for the PCD to be handed over. I checked this with the project team and was advised that this was correct.

b) Was the paperwork you described in place after the 2 month period? If not, why not? Did you escalate any concerns regarding paperwork not being in place, if so, to whom?

A Zutec was populated by the sub-contractor to Multiplex at the 2-month mark, and vetted by Multiplex to ensure a consistent standard, however in my view the quality and content was variable. The menu structure was unclear resulting in it being difficult to interrogate and retrieve the data\documents required. Invariably, if multiplex were advised that a document was missing, they would claim to find it in an unrelated section of the archive. I did not believe that all the required PCD documentation was delivered (which has been demonstrated by multiple external agencies providing support to GGC and seeking access to PCD data). I raised this with David Hall\David Loudon

and Peter Moir. I understand that it was Capita's remit to verify and sign off on the PCD, however I believe that they experienced problems with the sheer scale of the task, however I am not aware of the details as I was not party to these actions.

c) How was the relevant paperwork handed over to QEUH?

A The PCD files were loaded onto the ZUTEC document management system adopted by Brookfield Multiplex for this purpose, to my knowledge all documents were provided electronically only, there are no paper copies. Point to note: Brookfield also utilised the Zutech system for the asset register and PPM schedule, this was a manual system requiring manual retrieval and feedback, it was not compliant with the contract requirements to adopt and populate this data on to the Boards preferred Computer Aided Facilities Management (CAFM) system.

d) Did you ever raise concerns about this non-compliance? If so, to whom, and what action was taken in response and by whom?

A I raised my concerns about the non-compliance with the contract requirements to adopt and populate the Boards CAFM system with David Hall, Peter Moir & David Loudon, to my knowledge this was not addressed contractually. I was instructed to work with IT & Zutec (with the approval of Multiplex) to:

- Rationalise the asset schedule for migration to the Boards CAFM system FMFirst. I spend 18 months working with Eugene Smyth (IT) on the rationalisation of the asset data.
- Conver the PPM paperwork to a PPM format for migration to FMFirst (this element was taken over by Alan Gallagher (Estates GM) in line with his work on the Board wide CAFM strategy)

33. Was the building of the QEUH complete at handover – if not, what was incomplete? Was QEUH ready at handover? If not, why was it not ready at handover? **Refer to Estates Team Bundle, document 3 – 'Stage 3 Adult and Children's Hospital Completion Certificate'** defects noted therein when considering this question.

A Having reviewed document 3 above, I do not believe that this completely represents the condition of the building at point of hand over, I don't see any reference to the RHC's status, there were also multiple elements of finishing works required around the Adults building not included within the Capita defect report, unfortunately I cannot recall the detail of these works other than the following major Items:

a. The Energy Centre Combined Heat & Power Plant (CHP) was not handed over until Dec 2015 and was not brought online until Jan 2016.
b. The ETFE Roof burn-off was not operational until Sept 2015.

I am not aware as to why the building was not completed in time for hand over as I was not party to contractual meetings or Board decisions, however I believe that the Board needed to complete handover when it did in order to meet its target dates for migration of patients into the new facility allowing sufficient time for the operational commission programme.

a) In your response you state '*I do not believe that this completely represents the condition of the building at point of hand over'* was this a view you held at the time? If so, what action did you take at the time?

A This statement represents my view having reviewed the **Estates Team Bundle, document 3 – 'Stage 3 Adult and Children's Hospital Completion Certificate'**. I did not have access to this at the time of hand over and therefore did not raise any concerns. The project team were aware of the outstanding works and to volume of contractual activity on site after handover.

34. Describe the site when QEUH/RHC at handover in January 2015.

A Contract works stopped on the 23rd January with all construction site boundaries and control arrangements removed ready for Hand over on the 26th January 2015. It was clear at that time that the RHC was not complete, with substantial fit out works incomplete in all areas of the building, the RHC

still looked like a construction site. There were also outstanding works required around the Adult hospital, however this building appeared to be complete ready for operational commissioning.

a) Did you expect that RHC would have been completed at handover?

A Yes, I would have expected the RHC would have been complete at point of handover.

35. Did Multiplex remain on site? How was this managed, and were records kept of Multiplex staff being on site, if so who was responsible for this and where were such records kept? Did you have any concerns?

A The following week after handover, 200+ Multiplex construction workers turned up to carry on with outstanding works including the fitout of the RHC. This level of activity was continued until June/July 2015 when the Children's Hospital was ready for patient migration (Note: Operational commissioning was carried out in parallel to the fitout works where possible). The operational estates team were required to manage the contractor access on site as the building now legally belonged to NHS GG&C. In addition to our Operational commissioning requirements for the build in preparation for Migration this required me and the five new duty managers to:

a. Review and approval all Brookfield Multiplex & sub-contractor Risk Assessments & Method statements (RAMS) for each element of ongoing constructions works.

b. Manage, control and monitor daily contractor access to the site and issue visiting contractor access passes for the specific area's they were designated to work. Records of access were kept in the form of the visitor passes logbook, recording the names of contractors, purpose, location and duration for each visit, these visitor logs were retained in the Estates Management offices. My concerns related to the volume of activity on site by Multiplex and my team's inability to directly supervise and monitor the activity of all their contractors, ensuring that these activities did not clash with the range of works\contractors involved in the operational commissioning activities.

36. At handover who was responsible for ensuring that paperwork was produced to confirm contractual compliance?

A My interpretation of this question would be: That David Wilson (Multiplex Commissioning Manager) was responsible for the production and provision of paperwork and certification to confirm contractual compliance, this documentation would then be witnessed, reviewed and verified by Capita Symonds project supervisors' team for presentation to Peter Moir, Project Manager. However, I was not involved in this process and therefore am not able to advise what was missing or how this was managed?

a) Paperwork

A John Redmond Lead Contract Supervisor (Capita Symonds)

b) O&M Manuals

A John Redmond Lead Contract Supervisor (Capita Symonds)

c) M&E Clarifications Log

A Peter Moir (Project Manager)\Alister Fernie (Multiplex Project Director)

d) Others paperwork as per the contract

A John Redmond, Lead Contract Supervisor (Capita Symonds).

Provide as much detail as possible – was anything missing? If so, how was this managed?

37. What commissioning and validation documentation for the water system did you see at handover? What commissioning and validation documentation for the ventilation system did you see at handover?

A Documentation was not complete at hand over due to the contract clause allowing 2 months for population by Multiplex and its sub-contractors. For water, I remember seen the disinfection method statement, which I shared with Prof Craig Williams for ICD approval as required, I then saw the Microbiological test results and the repeat iterations carried out where tests results were outwith expected limits. These were also shared with Prof

Williams until the results obtained received his approval. I don't remember seeing any other water documents at that time of hand over.
Ventilation Systems: I don't recall if the ventilation Commissioning reports were available to me at the point of hand over or 2 months later in line with the contract PCD clause? However I do recall seeing the H&V Commissioning reports for ventilation systems as well as the Medical Air Technology (MAT) commissioning reports for Ultra Clean Ventilation (UVC) terminals within Theatres etc.

a) What is the difference between commissioning and validation?

A From SHTM 03-01 Part A:
Commissioning - Commissioning is the process of advancing a system from physical completion to an operating condition.
Validation - A process of proving that the system is fit for purpose and achieves the operating performance originally specified. It will normally be a condition of contract that "The system will be acceptable to the client if at the time of validation, it is considered fit for purpose and will only require routine maintenance in order to remain so for its projected life."

b) What documentation would you expect to be available for both the water and ventilation systems?

A For Water: I would expect to see commission data in line with the requirements of SHTM 04-01 Pt A: "Water safety for healthcare premises Part A"
For Ventilation: I would expect to see commission data in line with the requirements of SHTM 03-01 Pt A:" Ventilation for healthcare premises Part A – Design and validation".

c) Did you see this commissioning data? What concerns, if any, did you raise in respect of lack of commissioning data for water and ventilation, and with whom? What action, if any, was taken and by whom?

A At the point of hand over this detail was not available, I advised the project team of the lack of data and was advised that the contract allowed for a 2-

month population period, I am not aware of any further action being taken over the commissioning data.

d) Did you see the validation data for both the water and ventilation system? What concerns, if any, did you raise in respect of lack of validation data for water and ventilation, and with whom? What action, if any, was taken and by whom?

A I did not see the validation data at the point of hand over as it was not populated on the PCD ZUTEC system at that time and don't recall seeing separate validation data later. I had expected that validation had been carried out and accepted as fit for purpose by Capita in-order for the board to accept hand over and therefore do not recall raising any concerns over separate validation.

e) Who was responsible for this documentation?

A Multiplex was responsible for the provision of the data, however this was largely delegated to their sub-contractors to populate Zutec, this was not done in a consistent manner and Multiplex were then responsible for sense checking the uploaded data. I Believe that Capita Symonds were responsible to verifying the PCD content to the Project Manager. I think there may have been issues regarding the size and scale of this task, however I am not sure how this was resolve with the Project manager.

f) What was your role?

A I had no involvement in the project sign off of documentation, my role was to access the data available as required to take the building into operation.

g) Were you ever aware of commissioning and validation having been carried out?

A Yes, commissioning dates where issued to the project team in advance to allow for suitable client representation and witnessing. However I was not in the co-hort of client representatives.

h) What about validation?

A I don't recall ever seeing any notices regarding validation.

i) If not, why were you not aware of commissioning and validation having been carried out?

A I was aware of the commissioning being carried out, but I was not included or involved in the commissioning\validation process and therefore did not have access to the results prior to handover.

38. Was any other paperwork missing at handover? If so, would you consider this missing paperwork to be of importance?

A Invariably any information that was required we needed assistance from Multiplex to source or find, documents were not always in the section of Zutec you would expect to find it, therefore it is difficult to quantity what was missing?

39. Operating systems at handover:

a) How many staff were allocated to maintaining operating systems and how was this determined?

A Approximately 2 months before handover, 5 supervisors previously recruited internally for fast-track estates management development programme were re-deployed from their substantive roles on other sites, to take up their new posts at the QEUH campus. Their initial role was to support me in managing the site after hand over and operational commissioning works on a Day shift basis until migration was complete, then they would take up their roles as shift duty managers providing 24/7 on site support. Their initial task was to become familiar with the site\infrastructure and services, supported by me and taking part in the Multiplex familiarisation training. In addition we were allocated 2 Maintenance staff from agency recruitment on a temporary basis to support operational commissioning works. All other staff were scheduled for redeployment to the QEUH for phased transfer as and when each of the demitting sites completed their patient migration. This meant that we had a skeleton staff at the QEUH until June/July 2015. After full Migration was complete most of the redeployed staff transferred, however a small number

were retained at their demitting sites for a period to assist in site closure decommissioning. There were circa 52 staff allocated to the QEUH Adults & Childrens complex made up of 5 off rotary shift duty managers, 1 off day shift manager, 1 off day shift planning supervisor, 20 of rotary shift M&E technicians and 24 M&E Technicians\Maintenance assistants. These numbers were part of the overall team of 80 supporting the whole campus including retained Estate. The staffing levels were determined within the Maintenance Strategy paper prepared by me for David Loudon (Project Director/Director of Facilities), The staffing levels identified within the initial paper was circa 111 WTE (Including Management), based on a previous GG&C statutory compliance formula included within a previous consultancy report. And modelled against the Whole life Cycle Cost (WLCC) Model prepared by Multiplex under QEUH contract requirements. David Loudon presented this paper to Robert Caulderwood (CEO). I was later advised by David Loudon that the CEO instructed that the Outline Business case had a built maintenance budget of £4.8m and that was what we had to work to. I therefore had to rework the Maintenance Strategy known as the affordability model, which reduced both the staffing compliment and the operating budget in line with the imposed budget. The final Budget £5.8m. was utilised following work with the Facilities Head of Finance.

b) What training was put in place for maintaining the operating systems?

A The Contract included a schedule of client training, however this did not allow for maintenance training it only provided familiarisation training for service infrastructure, and plant layout\configuration. I asked Multiplex about more detailed training for operation and maintenance but was advised that technical staff were expected to be competent in their respective trades and have a basic knowledge of building services.

c) Who carried out the training? **Refer to Estates Team Bundle document 5 – 'Brookfield Multiplex Client Training & Familiarisation Register for Ventilation'.**

A The training was managed by Multiplex and delivered by a combination of Multiplex\Mercury project staff along with specialist\supplier\installer contractors where Multiplex deemed appropriate.

d) Were Multiplex involved in the training?

A Yes, Multiplex developed and managed the programme and provided instructors for Multiplex delivered systems supported by instructors from Mercury as well as instructors from specialist equipment suppliers\installers where Multiplex deemed appropriate.

e) Was sufficient training provided to allow staff to operate the systems?

A Not in all cases, there were gaps in understanding of system interface\control panels, this was partly due to the restricted numbers of staff made available for training, requiring to be released from their demitting sites for regular training sessions over an extended period of time. Equally my small operational commissioning team and I, struggled to attend all sessions that we would have liked to have attended due to our commitment and volume of works during the Operational commissioning period, when the training was being carried out. Therefore attendance was generally in lower numbers than I would have liked.

f) Did you ever raise concerns about the lack of training or ability to attend training? What, if anything, was done in response?

A I did raise concerns with Multiplex over the depth of training as I had expected more than just an overview\familiarisation, I was advised that this was agreed by the Board, I raised this with the project team, and this was confirmed. I also raised the issue over the short timeline for the delivery of the training during Operational commissioning and the competing pressures, but other than some session date adjustments the programme delivery schedule was fixed.

g) Please describe the manuals/ documents that were handed over.

A In each session, the instructor issued a folder containing a written description of the topic covered along with supporting details such as schematics, key component data, manufacturers operating guides and references.

40. What was your involvement/ role in the handover process? How did you manage this?

A I was not involved in the handover process, this was a contract process and I was held at arm's length from project contract issues.

41. Who signed the completion certificates?

A I believe that the completion certificates were signed off by the Contract supervisor's team from Capita Symonds and or Peter Moir (Project Manager)

42. Who was the person with the responsibility to sign the completion certificates under the contract?

A I Believe this was the Project Manager Peter Moir.

43. **Estates Team Bundle, document 3 – 'Stage 3 Adult and Children's Hospital Completion Certificate'**:

(i) What is this?

A This is the "Stage three- Adult & Childrens Hospital Sectional Completion Certificate" I believe that this completion certificate indicates the client's acceptance that the contract has been brought to Practical Completion Stage.

(ii) Have you seen it before?

A No

(iii) Have you seen other such certificates?

A No

(iv) Who signed off these certificates?

A From document 3 above, it would appear to be: John Redmond Contract Supervisor (Capita Symonds) and Peter Moir (Client Project Manager)

(v) What checks were carried out prior to sign off?

A I don't have any knowledge of the checks carried out prior to sign off other than what might be included in the contract supervisors report?

(vi) What was your role/ responsibility?

A I had no role or responsibility in contract sign off.

(vii) Looking at the defects referred to in the completion certificate documents 3 above: Look also at Estates Team Bundle, document 4 – 'Capita NEC3 Supervisor's Report (No 46)':

(i) What are these defects?

A Generally most of the items reported as defects appear to be incomplete contract work, however I don't see any reference to the incomplete works for the RHC. Items 45 – 49 are defect works reported prior to hand over date. Items 14 & 34 are Project managers' instructions not defects (however it depends on when these were issued as to the expected status). I also notice that the energy model evidence of compliance with Energy targets is recorded as complete 20/2/2017, to my knowledge this was still outstanding when I retired July 2019, as it was affected by the ongoing failures of the CHP plant to deliver on expected outputs.

(ii) What was the impact of these defects?

A The Impact was ongoing contract continued works during Operational commissioning phase causing disruption to the mobilisation of the operational equipping and setting up of the hospital. I am not able to comment on the contractual impact.

(iii) Why two years to deal with the defects?

A The contract included a 2 year defect liability period, therefore Multiplex aim would be to have all agreed defects addressed and completed by January 26th, 2017.

(iv) Who decided that it was appropriate to accept handover with outstanding defects?

A I am not aware of the who made this decision, this would have been decided at Board level or between the CEO and DoF?

(v) Is this usual practice in the construction industry?

A It is not normal to accept practical completion with outstanding contractual works, as this would normally involve contractual penalties if the contract has over run on the agreed completion date.

44. **Refer to Estates Team Bundle, document 8 – 'Programme for handover to start of migration':**

(i) Do you know what this is?

A Yes, this was the programme for operational commissioning and preparation for Migration of patients from the demitting sites. Overall time scale was three months.

(ii) Have you seen it before?

A Yes.

(iii) What are the numerous defects?

A I don't recognise the high numbers of issues covered in Items 21 – 37 they seem to be managed by Heather Griffin (Project Manager) & Mairi McLeod (Project Manager). Items 39 – 93 are the issues detailed in the Completion certificate (Document 3) and or NEC3 Supervisors Report No46 (Document 4). Items 94 – 110 appear to be additional works for Multiplex to be defined by Heather Griffin (Project Manager) & Mairi McLeod (Project Manager).

(iv) What is your understanding of the purpose of this document?

A The purpose of this document is to programme and monitor progress of the works required to be complete during operational commissioning and equipping of the site ready for migration of patients from the demitting sites, all within the specified 3 month window.

(v) What comments if any do you have regarding the number of defects?

A I don't recall this number of defects at the time on the initial working version, I suspect that items 39 – 93 may be minor snagging issues identified during NHS Operational commissioning? Would need to see the detail of these items to response in more detail.

(vi) To what extent were you aware of this document at handover?

A This Document was shared at the weekly project management meeting ahead of hand over and tasks allocated to each member of the team before handover date to allow preparations for starting on hand over.

(vii) If not, should you have been aware of this document at handover?

A N\A

45. What did the contract say about retention of certain parts at handover? Was this enforced and why?

A I am not able to answer this question.

46. To what extent did Multiplex retain responsibility for the build following handover? Did Multiplex give any warranties? What were the terms of any warranty relating to Multiplex's work? How long was the warranty period following handover in January 2015?

A Multiplex did not retain any responsibility for the building after handover, although they did provide support under the contract known as soft landings, this was a hand holding exercise to allow time for NHS staff to settle-in and become familiar with the building this was for a period of 6 weeks, for example this included continuing with the hot and cold water flushing programme during this 6 week window. The warranties for the project were built into the contract for a period of 2 years ending 26 Jan 2017. NHS GG&C were now the owners of the building including the RHC where fitting out was ongoing.

47. How many companies have on-going responsibility following handover? If so, describe the responsibilities of the companies. How long post-handover were the other companies involved for?

A Multiplex and Mercury (M&E Contractor) had a joint contract liability although the Board Contract was with Multiplex, both companies remained present during the 2 year warranty, and would call in sub-contractor to the contract as and when required.

48. What concerns, if any, did you have about the opening of the hospital after handover? **Refer to Estates Team Bundle, documents 19 and 21 and 21.1** when answering.

A At the point of hand over the biggest issue that was immediate to me was the status of the RHC, this was still in a fitout condition. The secondary VIE plant located at the Maternity unit was not in place and therefore the MGPS Oxygen resilience was not in place. The issues raised in my e-mail (document 19) initiated June 7th, 2015, following handover, were all defects under the contract and only became apparent once the adult's hospital was occupied. Of the issues raised in Document 19 the most concerning was the PTS impact and ongoing PTS design and control issues. Ward 4B heating turned out not to be passing valves but a control wiring issue where the cables supplying the control valve throughout the ward where inducing a low voltage from surrounding services causing the actuator control valves to hold open, this was Identified using the Boards maintenance support contract with Schneider, the cable replacement was carried out by inhouse staff during the Christmas 2016 holiday, with the ward closed. The issues raised in Document 21 Early Warning (EW) process are mainly Project Manager instructions for variations and\or additional works to contract. There were also mass failures of MTHW flexible pipe push fit connections around that adult hospital resulting in high temperature water flooding of the areas affected, these push fit connections proved to be unable to cope with the MTHW pressure (Circ 4 bar), all flexible push fit connections were replaced across the site by flexible mechanical pipe connections prior to patient migration.

(a) Was there anything missing that you thought should have been constructed/installed? If so, please describe what was missing.

A Yes, the Energy Centre CHP plant was not in an operational condition due to design issues, it was almost a year before this plant was in a position to be brought online (Dec 2016) and did not go live until Jan 2017. I prepared a paper for David Loudon (DoF) detailing the lost revenue as a result of this delay. The CHP plant also did not perform as intended with output approximate 60% of design, the fluctuation (hunting) operation of the CHP plant also had a detrimental impact on the operation of the direct fired boiler

plant impacting on the stability of MTHW temperature affecting heat transfer levels for heating and DHW. This issue was still under dispute with Multiplex when I retired in 2019.

I believe that due to the size and complexity of the domestic hot and cold-water systems that water treatment plant should have been included in the system design and installation, this would have been a more practical, manageable and affordable way to maintain water quality.

The RHC ward 2A HEPA filters and associated range of issues surrounding the adoption of the PPVL design for Neutropenic patients.

(i) What action, if any, was taken, and by whom, following your paper for David Loudon?

A My understanding is that financial loss was raised by David Loudon at a contractual review meeting with Multiplex, and it was agreed that the loss would be offset against additional contractual costs to the Board.

(b) Did you have any other concerns about areas of the hospital at handover?

A Yes, as part of my operational commissioning requirements at hand over 1: I highlighted to David Loudon (Project Director/DoF) at the weekly project meeting that Multiplex were responsible for the provision of a pre-occupancy Water Risk Assessment, but this had not been provided. I believe that David raised this with Multiplex following which he instructed me to arrange for the Risk Assessment. 2 I had also engaged Zurich Engineering as Competent Persons (CP) Pressure Systems, to undertake the production and certification of our Witten Scheme of Examination (WSE) under the requirements of the Pressure Safety Systems Regulations (PSSR) 2000, pre-migration. During the system assessment and preparation of the WSE, I was advised by the CP (Brian Baldasara) that there were several items of plant as well as the onsite manufactured pipework that did not have certificates of conformity under the requirements of the EU Pressure Equipment Directive (PED) and as such he could not be included in the WSE. All plant issues where address and ready for inclusion of the WSE before the migration date, however Multiplex\Mercury could not provide the required certificates of conformity or supporting evidence of the onsite manufacturing process, I on behalf of the board had to

instruct Zurich to undertake a risk assessment of the MTHW pipework installation, from this a list of defects was produced for rectification by Mercury. Once these works were completed and assessed by the Board CP, the pipework risk assessment was underwritten by Zurich and added to the written scheme satisfying the boards legal requirements under PSSR, however PED status of the pipework remains unresolved as a non-compliance under Multiplex\Mercury duty.

49. Refer to **Estates Team Bundle, document 22** at the point of patient migration Mhairi Lloyd states that there were rooms/ areas 'not yet fit for purpose': Look also to **Estates Team Bundle, document 19:**

a) Detail your understanding of the concerns – namely what the concerns were any why?

A The decontamination room concerned was constructed for dealing with patients contaminated when exposed to Hazchem agents etc. I remember being involved in this room reviewing the issues with Christine Peters and separately with a member of the ED team (Can't remember her name). The aim of Christine and the ED team was to utilise the decontamination isolation facility for housing and initial assessment of VHF & MER patients, this requires the area to be isolated from the general population within the department to avoid potential cross infection. The concerns raised were around the status\condition of the Decontamination suite and its suitability for the proposed additional functionality. From the correspondence this seems to be premised on the ceiling being open and the ventilation being off.

b) Your involvement with the dealing with any concerns?

A I remember reviewing the requirements with Christine and the ED manager separately and establishing the operating conditions of the suite room, I can't recall the exact design requirements for the suite but from memory the suite was designed to be -ve pressure to the adjacent spaces with separate ventilation (I would think the extract would be HEPA filtered? but can't remember that detail.) the room was also connected to the general drainage system with a divertor valve taking discharge water to a separation tank when activated prior to a decontamination event from a dedicated control panel in

the decontamination room. Following discharge to this tank the tank requires to be emptied as licenced hazardous waste, (I provided this detail to the ED team as the hazardous materials need to be identified before transportation) the control panel warned when the tank required decant\disposal. This is the separation tank and decontamination room identified in the **Estates team Bundle, Document 3 - Stage 3 Adult and Childrens Hospital Sectional Completion Certificate, Schedule of Incomplete works item 5 – Separation Tank**, Noted as Complete 13/3/2015 and Item 16 – Decontamination room, noted complete 28\2\2015, however the NEC 3 supervisors report No 46, Feb 2015 states that Item 16 is dependent upon tank installation? The room also had external ambulance access to avoid transferring potentially contaminated patients through unprotected areas.

c) If so, how matters were resolved prior to patient migration?

A I believe that although the separation tank had been fitted there where control interface compatibility problems between the control panel and the tank diversion control valve, Colin Grindly Multiplex M&E manager) was dealing this issue as a defect. There were also concerns about the electronic door lock as the door defaulted to open on several occasions presenting a potential containment issue. Unfortunately, I can’t recall the date this was resolved but I would estimate this was June\July 2015.

d) Who signed off prior to patient migration?

A I am not sure who would have signed this element off but would expect it to be Capita Symonds\Peter Moir.

50. Detail the snagging process, refer to Estates Team Bundle, documents 90 and 91 when considering your answer detail:

a) What happened

b) How long were Multiplex on site following handover?

c) Main areas for snagging

d) Records of works carried out

e) Sign off – who as responsible and when signed off.

A I do not recognise the Wallace Whittle defect observations listed in documents 90 & 91, this was not shared with me. The snagging process from an operational Estates\Facilities point of view was that any member of our team could log a defect on to the online defect report tool similar to those shown in Documents 90 & 91, Before we logged a defect we had to check the issue was in our opinion a contract defect, were this was not confirmed Multiplex would return the task for confirmation. Once logged Capital Symonds would apply a defect log ref number and issue the defect to Multiplex. Multiplex would investigate and if they agreed it was a defect would address the matter or delegate to the appropriate sub-contractor. Access to site to addresses these defects was managed through the Estates Contractor log\ID system. If Multiplex did not agree the issue was a defect they would close the matter down on the log accordingly. Regular post completion works (defects) meetings were held, chaired by a Project\Capital team manager supported by Capita Symonds and attended by various members of the Multiplex team and the QEUH Estates team, these meetings were minuted. Multiplex were on site for 12 – 18 months eventually taking offices off site but close by. Snagging was widespread and diverse, I couldn’t say what the main areas were after all this time. Records of works carried out would start from the defect log unique reference number, from there Capita Symonds would have the detailed records. The defect would be referred back to the person who raised it to confirm their satisfaction that it was complete for formal sign off by Capita Symonds. I am not sure what the Vetting\oversight was from the Project Manager (however the project team were quickly disbanded 6 -9 months after hand over) and redeployed to other roles.

51. Refer to Estates Team Bundle, document 132 with the benefit of hindsight do you agree with Frances Wrath's comments that all area were commissioned in line with Employer's Requirements?

A No, I would not agree. I think this is indicative that the project team were under the belief that the system had been commissioned in line with Employers requirements however it is now clear that the commissioning and Validation processes did not follow guidance documentation requirements, these failings only coming to light over the various investigations carried out retrospectively.

Wards and Hospital Occupation from January 2015

52. At the point of taking occupation of QEUH/RHC on 26th January 2015 please confirm whether the following wards were fully handed over from Multiplex to NHS GGC:
Ward 2A/2B
Ward 4B
Ward 4C
Ward 6A
Ward 6C

A 2A/B RHC, were not handed over on this date, ward 4b (BMTU) was handed over but due to design compliance issues for the BMTU function the ward was used as a general winter pressures ward until a remodelling plan was put in place with Multiplex by Peter Moir. I think wards 4C, 6A or 6C (Adults) were handed over as I don't recall any issues with these wards at that time.?

53. Please also confirm your understanding of the ward specification and patient cohort to be located in each ward.

A Ward 2A (Schiehallion): Housed 3 patient cohorts, namely:
Haemato-oncology Isolation suite for Neutropenic\immuno compromised patients, Isolation facilities designed to PPVL standard.
Teenage Cancer Trust (TCT) Haemato-oncology unit designed as general ward with general ventilation design.

Children's Haemato-oncology ward designed as general ward with general ventilation design.
Ward 2B: Haemato-Oncology Day unit, designed as a general ward with general ventilation design.
Ward 4B (Adults): Initial design under the contract as a general ward, at some point well into contract fit out but before handover the Board requested this ward be converted to accommodate BMTU patients from Gartnavel. The ward was altered to provide single isolation room accommodation using the principles of SHPN 04 supplement 1 for the design alterations, with HEPA filtered air provided to all rooms from an existing central AHU plant, there were no protective lobbies and the ACR improved to circa 6ACH as opposed to the initial general ward 3ACH.
Ward 4C (Adults): designated as a Renal ward designed as a general ward with general ventilation design.
Ward 6A & 6B: I can't recall the patient cohort in these wards, but they were designed as general wards with general ventilation design.

54. If a ward or wards were not handed over on 26th January 2015, or were partially handed over, please confirm:

a) Why they were held back?

A Wards 2A & B were held back because the building and indeed these wards were not complete at handover.

b) Any financial consequence to both Multiplex and NHS GGC of the ward(s) being held back?

A I am not able to answer this question.

c) What works were carried out in order to allow this ward(s) to be handed over the NHS GGC?

A Building and ward fitting out.

55. Were any other wards, aside from those referred to above, retained? Answer as above?

A All Wards within the RHC were not included in the handover 26th Jan 2015.

56. We know that the energy centre was retained by Multiplex

a) Why was the energy centre retained?

A My recollection was that the energy centre was partially handed over to allow day to day operation of the campus, the area retained related to the CHP plant which had not yet been fully installed and commission at handover, this was not achieved until Dec 2015 and did not go live until Jan 2016.

b) What financial consequences, if any, arose for either Multiplex or NHS GGC if the energy centre was retained?

A I prepared a paper for David Loudon at the time indicating what the financial revenue impact was to the Board of not having the CHP plant online this was Circa £1m for the projected period of down time.

c) What works were carried out to allow hand over of the energy centre to NHS GGC?

A Full installation and commissioning of the CHP plant, this was not achieved until Dec 2015 and did not go live until Jan 2016. There was also another issue that arose from the PSSR inspections for the written scheme which Identified that the safety valve discharge from the MTHW boilers discharged to the boiler house floor, and this was a PSSR\H&S contravention. Multiplex had to redesign the discharge arrangements to run pipe work to a new bulk buffer tank for any safety valve discharge to be collected safely, the contents then needed to cool before they could be discharged to Drain. This also then required to be included in the PPC permeant management arrangements due to potential environmental impact.

57. Were any other parts of the hospital retained by Multiplex pending works being carried out? Why? What works required to be carried out prior to them being handed over?

A Other than the RHC and those detailed in **Estates Team Bundle, Document 3 – Stage 3 Adult & Children's Hospital Completion Certificate** I cannot think of any!

58. At the point of handover on 26th January 2015 how satisfied were you that all areas accepted by NHS GGC were designed to the intended specification and suitable for the intended patient cohort, meeting all the relevant guidance requirements?

A On the understanding that the Project Supervisor and the Project Manager where satisfied, I had no reason at that stage to be concerned.

59. If not, why were the wards handed over? Were any issues escalated to more senior management/ Board level? Please confirm.

A I do not recall having or escalating any issue regarding the specification\suitability of areas for the intended patient cohorts at the point of handover.

Asset Tagging

60. Describe and detail asset tagging:

a) What is this?

A An Asset register of all tangible assets and sub assets should be compiled for the development and programming of a full maintenance plan, each Item recorded on the asset register should be allocated a unique asset number and using this asset number an asset tag should be produced with a QR code and readable asset number and physical attached to the asset in and accessible location. The details of each asset should also be recorded in the Computer Aided Facilities Management (CAFM) asset register against the asset number.

b) Why is this important?

A This is important as the asset ID is used to assign all maintenance and repair tasks and record activities\actions for each asset on the estate.

c) Who was responsible?

A Under the contract Multiplex were responsible for the creation of the asset register, asset tagging development and population of a full PPM plan for all assets and its upload to the Boards preferred CAFM system, at the time of

handover the Board had fully adopted the FMFirst CAFM system. The contract also required Multiplex to provide the hardware required to run this system i.e. PC's, Handheld QR code readers and PDA's etc.

d) What was the impact if this was not done?

A If the asset register is not available and interfaced with the Asset management system within the Boards CAFM platform at the point of handover then the building maintenance requirements for its building fabric, infrastructure, services, plant and equipment cannot be effectively managed and recorded, this is particularly important on a project\property of this size, scale and complexity. It should be noted that the preparation and development of this level of data, maintenance planning and population of the CAFM system would take 18-24 months.

e) What concerns, if any, did you have about this?

A I was concerned the Asset Register was stand alone on Zutec, none of the assets in ether the Laboratory Medicine or the QEUH had been asset tagged, and that the PPM that had been produced on Zutec only included manufacturers maintenance requirements and did not include Statutory and NHS Mandatory PPM requirements. I was also concerned that the PPM data on Zutec did not appear to be in a readily manageable format. It was difficult to see how this could be utilised effectively. I was concerned that we would not be in a position to implement a fully functioning PPM programme for the new facility.

(i) Were you in a position to fully implement a fully functioning Planned Preventative Maintenance Programme in the circumstances? If not, what was the impact?

A No, we could not implement a fully functioning PPM, the impact of this was added pressure on the Estates managers to carry out key maintenance tasks manually. The impact being that it was difficult to manage and keep track of activity and that inevitably not all PPM requitements were addressed.

f) Did you escalate these concerns? If not, why not?

A Yes, I escalated these concerns via the project team, David Loudon, Peter Moir & David Hall Technical Advisor to the Board (Currie & Brown). I also advised Mary Anne Kane as Acting Director of Facilities.

g) Discuss any issues regarding asset tagging and how you managed this?

A Following hand over of the Laboratory Medicine I worked with our IT department, Pat McGrorry\Eugene Smyth, David Wilson (Multiplex), Zutec software team, & Asckey (FMFirst Platform team) to co-ordinate the preparation of existing data on Zutec for migration to FMFirst. The asset tagging element required me to work with Eugene Smyth (IT) to rationalise the asset schedule provided by multiplex into an asset register of tangible and maintainable items. Once the tangible asset register was completed, unique asset numbers needed be generated. Each asset number is made up of details of the asset location i.e. Site code\Block code\floor level\department code and room\space ID along with a final unique item code. This detail had to be extracted from Zutec for the coding structure to be developed by population of the FMFirst conversion template which was designed and developed specially for this task following joint working group meetings involving myself\Eugene Smyth\Asckey Data\ David Wilson & Zutec team. Extraction and conversion of this data along with an estimated number of assets allowed for the production of a set of unique asset tags by Asckey Data, these were issue to Multiplex for application to the relevant assets. This took a substantial period of time to complete from memory Multiplex did not complete the deployment of asset tags until near the end of 2016.

61. Was there a contractual requirement to provide CAMF?

A No: The CAFM system (FMFirst) was already being rolled out across by the Board across the existing Estate, The contract requirement under the Employers Requirements (ER's) was to provide a fully a comprehensive Asset register and PPM system integrated with a MiCAD as fitted drawing mapping tool and interface these with the Boards Labour Management System and CAFM platform. At the time the ER's were issued the Board were evaluating

which of the two legacy CAFM systems Apollo or Eclipse it would adopt Board wide, with the final decision being Eclipse (now known as FMFirst).

a) Again, what is the purpose of this and who was responsible for providing this?

A The CAFM system is the software platform that contains an integrated suite of Facilities Management tools (i.e. Asset register, Asset Tagging tools, PPM planning and flexible scheduling, Labour Management System (LMS), Electronic Task Assignment via PDA, Asset documentation data links, ward\department electronic fault logging with automatic status reporting, interface with the Domestic Monitoring Tool & the National Health Environmental Inspection (HEI) programme for real time reporting of clinical environmental issues). This allows the Facilities management teams to manage, plan and coordinate resources to workload and automatically reschedule PPM\Defect tasks to meet demand and prioritise against resource, it maintains records of activity and prioritises task in relation to urgency. It also allows for direct electronic reporting of issues for wards and departments with real time electronic feedback on the status of their request. In addition the CAFM can provide performance reports in various modes and formats. This is an essential tool for the effective management of the Facilities Estate. NHS GG&C had already selected and rolled out the Eclipse (FMFirst) CAFM system across all its existing Estate, therefore NHS GG&C were responsible for this platform, Multiplex were responsible for its population with data for the QEUH.

b) How does ZUTEC differ from CAMF?

A Zutec is a document management system used for storing large amounts of data relating to a project, i.e. final PCD containing as-fitted drawings, commissioning documents, manufacturers data, system\plant operating data, all of information that is required as part of the Post Commissioning Documentation (PCD). CAFM is much more than this it is an interactive Facilities Management tool (see Item 60a above for CAFM functionality).

c) Should both CAMF and ZUTEC have been provided at handover?

A Yes: however the ER's specified MiCAD for the Zutec function, I am not aware if there was any agreed change to this requirement between the Board and Multiplex?

(i) Who was responsible for ensuring provision of CAMF and ZUTEC?

A The Board were responsible for providing the CAFM platform, Multiplex were responsible for populating it with the required asset register\PPM content. Multiplex were also responsible for providing the Zutec platform for PCD hand over.

(ii) What were the consequences of these not being provided?

A Multiplex did not adopt and populate FMFirst as required in the ER's (Contract) this was detrimental to the Boards ability to implement and carry out the required PPM plan from the outset. The adoption of Zutec as an ineffective version of a CAFM system complicated and severely delayed actioning an effective PPM plan. The adoption of Zutec as the Drawing register\PCD platform while this element also did not meet with the ER's\Contract requirement the PCD\drawing data was accessible depending upon if and where it was populated within the menu driven system. However it did not integrate with the LMS\CAFM platform as was intended under the ER's by the use of MiCAD.

(iii) What action was taken to remedy matters? Were Multiplex contacted?

A I am not aware of what contractual steps were taken to address this with Multiplex, However as described above with the support and agreement of the Project\FM Director, I lead the review\Integration of asset data\Tagging requirements in conjunction with Specialist systems where manufacturers or agents were required provided support and records for the Planned maintenance they carried out, a manual PPM process was implemented for critical systems such as Critical ventilation systems etc. A plan of action was taken forward by Alan Gallacher (Estates General Manager) to complete the migration of the refined asset register to FMFirst while working to develop the industry standard PPM protocols in partnership with FM First and (SFG20).

62. Provide information on any issues in relation to CAMF and ZUTEC

a) Operation?

A The Zutec PPM plan contained on Zutec was unworkable, After the PPM plan was made available on Zutec, I asked Darryl Conner and Paul McAlister (Duty Managers) to run a test on the software to establish if we could operate the system as provided after 2 weeks, they both came back and advised that the system was not suitable or workable for our needs.

b) User suitability?

A The Zutech Model was not automated and therefore would require excessive Supervisory Input to extract PPMs with no mechanism for feeding back on the plant\equipment status or records of works completed, actions taken, or further actions required. It also required technical staff to work with paper job lines and task specifications rather than the intended automated job transmission via electronic LMS PDA's (which the contract required Multiplex to supply). All in all we did not have the staffing resources to manage the non-compliant ZUTEC offering from Multiplex.

c) Any other matters?

A The system offered did not allow for and was not capable of integration with other systems required by the Boards existing LMS\CAFM platform and there was no mechanism to measure or monitor performance. I was also concern that the PPM provided was only related to Manufacturers recommendations and it did not cover the Statutory and NHS mandatory PPM requirements within the health Care settings. These issues were reported to the director (David Loudon) and remedial actions taken by the Board to convert and migrate the data available into the FM First LMS\CAFM platform, with respect to the Statutory & Mandatory PPM requirements Multiplex advised they would carry this out if the Board specified and detailed the statutory and Mandatory Requirements (this was not what was intended in the ER's or contract requirements. It was decided that the Board would seek to adopt an industry standard approach for the generation of Statutory and Mandatory PPM to meet our requirements via the SFG20 platform and integrate this with FM first, Alan Gallacher took this forward as the Board lead on the roll out of FM First.

63. Did your team or NHS IT develop a system for asset registration?

a) If so, when and how long did it take following handover.

A I worked with IT & Asckey Data to develop the data conversion templates Eugene Smyth and the IT team then converted the Zutec data via these templates for upload to FMFirst. I also worked with Eugene Smyth to rationalise the asset register provided by Multiplex to a register representing maintainable assets. This process took about 18 months of repeated iterations before it was agreed the asset register was ready.

HEPA Filters

64. Were HEPA filters installed in the relevant rooms at handover (January 2015)?

A Yes, Hepa Filters were installed in some of the CCU PPVL isolation room extract systems, Known as safe change units. The reason for these is that Multiplex design could not ensure extract discharge at 3m above the hight of the building, therefore HEPA filters were used as a protective mitigation to this requirement. However were no Terminal HEPA filters installed in any of the supply terminals of PPVL isolation suites at point of hand over.

65. What issues, if any, were there with HEPA filters? **Refer to Estates Team Bundle, document 22.**

A HEPA filters had not been installed in the terminal supply grilles of any of the PPVL isolation rooms across the Adults or Childrens Hospitals.

66. If so, what issues were you aware of?

A The above Document 22 is referring to the status of the chemical decontamination room with adult ED, as previously advised this room was not complete at handover and is recorded as incomplete defects on the stage 3 Adult & Childrens Sectional Completion Certificate defects items 5 & 16 regarding the separation tank install, If I recall the room was not complete at the time of the correspondence in document 22, the tank had been installed but there were issues with the control panel for the waste water diverter valve in the decontamination room itself. From memory I think if the control panel interfaced with the extract to create the -ve pressure. I don't have access to

records or drawings to verify this. I recall liaising with Colin Grindley M&E manager Multiplex to resolve this (as a recorded defect at handover).

67. Dr Gibson in her statement refers to HEPA filters not being in place at the point of handover in wards 2A/B.

a) To what extent, if any, do you agree with Dr Gibson's statement above concerning HEPA filters?

A I agree with Dr Gibson that ward 2A PPVL isolation rooms did not have terminal HEPA filters fitted to the air supply terminals in the positive pressured ventilated lobbies. Ward 2A Heamato oncology and TCT units were designed with general ward ventilation with Chilled beam technology did not have HEPA filter capability. The supply air in these rooms was introduced via chilled beams, filtration for these wards was housed in the central Air Handling Unit (AHU) and was rated at F7. Ward 2b was also designed general ward ventilation including chilled beam and no HEPA filters.

b) What was the impact of HEPA filters not being installed?

A The impact on the isolation room, was that the supply air was not of suitable quality, the PPVL individual AHUs had not been commissioned against the additional resistance of the HEPA for the intended patient group and the PPVL isolation rooms were not ready to house the intended patient group.

c) What was the potential patient impact of the absence of HEPA filters?

A The potential impact was that the isolation rooms could not be open to house the Neutropenic patients it was designed for and therefore the affected patients could not migrate from the Yorkhill facility until the HEPA filters were supplied, fitted and integrity tested.

d) What was done to resolve any HEPA filter issues?

A When I raised this issue with David Wilson (Multiplex Commissioning Manager) his response was that the PPVL facilities were designed with the option for Source or protective Isolation and it was the responsibility of the client to install these if required, I advised David that these Isolation rooms were designed to house Neutropenic patients and therefore should be fitted to

accommodate the intended patient group from the point of hand over. David Did not change his position. I escalated this to David Loudon who raised it with Alistair Fernie (Multiplex Project Director). I also tried to source HEPA filters from various manufacturers, however none of them held these as stock items due to their short shelf life, therefore they are only available on order with a lead time of 3 months. I also advised David Loudon of this. I then had feedback from David Loudon That Multiplex would address this mater and that they had the appropriate HEPA filters for a project in Ireland and these were being diverted to our project.

e) What filters should have been installed at handover?

A Please answer the above, question box provided below.
H12 HEPA filters should have been installed in isolation rooms designated as protective isolation rooms for Neutropenic patients (ward 2A, 8 off PPVL rooms.

f) Dr Penelope Redding tells us in her statement that you said there was ‘no request for HEPA filters to be inserted in Ward 2A’: To what extent is Dr Redding’s statement accurate? Explain your understanding of the position relating to insertion of HEPA filters in Ward 2A:

A The requirement in line with SHTM 03-01 the HEPA filter should be of H12 standard (99.5% efficiency). I believe that this statement referred to above would have been in relation to the Haemato-oncology\TCT parts of ward 2A, as the ventilation for these parts of ward 2A were designed and installed as general ward ventilation with design intent of 3ACH due to the design selection of supply air temperature control via chilled beams.

(i) Did having 3ACH in the haemato-oncology/ TCT parts of Ward 2A comply with SHTM03-01? If so, how so?

A No.

g) Who was responsible for providing HEPA filters and ensuring that they were installed during the build?

A Multiplex were responsible for the supply, Install and commissioning of the HEPA filters within all rooms designed for the accommodation of Neutropenic patients.

h) Who signed off handover without HEPA filters being installed?

A I was not party to contract sign off, but from the Stage 3 – Adult & Childrens Sectional Completion Certificate (Document 3) John Redmond (Contract Supervisor) & Peter Moir (Project Manager) signed off on Handover.

i) Were infection control doctors and nurses consulted? If so, who?

A I was not party to contract sign off and am not aware if ICD|ICN were party to the contract sign off.

j) Why was handover signed off without HEPA filters?

A It should be remembered that the wards in the RHC were not ready on 26th Jan 2015 and therefore in my view could not have been assessed as complete at that time. However I note that Item number 35 of the completion certificate, Project Managers schedule of incomplete works states: Isolation room – HEPA Filters. Although there is no indication on the schedule of location or Defect completion date? I was not party to or aware of the content of this schedule of incomplete works at the time of addressing these issues.

68. Were HEPA filters missing from any other wards following handover?

A There are two PPVL isolation rooms in PICU, from Memory a HEPA was fitted retrospectively by Multiplex. This would allow for the housing of A Neutropenic Patient in PICU if they required ICU care, the other room was intended for source Isolation. There were also concerns raised by ICT regarding Placement of patients across the 10 PPVL rooms in adult ICU. Where there were no HEPA filters fitted.

(i) Describe any further action taken in respect of missing HEPA filters, that you have not already discussed in Question 67 above.
I recall HEPA filters being installed in some PPVL rooms in ICU Both Adult and children's hospitals to allow for protective Isolation of Immuno-compromised patients requiring intensive care. Also to assist in the appropriate patient placement.

Chilled Beams

69. Tell me about your understanding of the use of chilled beams in areas where immune compromised patients are treated with particular regard to SHTM03-01:

A From my experience at the QEUH, my current view on the use of chilled beams in areas where immune compromised patients are being treated is that they should not be adopted within these environments due to:

- The requirement to reduce to ACR to less than the recommended 10ACH for neutropenic patients (SHTM 03-01 Appendix 1).
- The risk of condensation should the chilled water hit dew point.
- The risk of regenerative dust\particles from the space building up on the surface of the heating\cooling coil fins.
- Increase cleaning \maintenance access requirements within the restricted ward environment.

SHTM 03-01 does not refer to the use of chilled beams in area's housing immune compromised patients.

70. Can the witness recall any specific events in relation to chilled beams?
For example:

a) Dripping chilled beams in critical care refer to Estates Team Bundle, document 63.

A The issue arose following repairs to failed chilled water pipe, following the repair the Chilled water circuit required to be recharged with inhibitor, hence

the reason I think the Plant room valve had been forced open electronically from the Building Management System (BMS) and then left open?

b) The impact on the ward areas affected would have been clean water dripping from the chilled beam cooling battery down on to the floor, due to the potential for infection risk and H&S risk in an open ICU bay the ward would have tried to move patients away from the location of the chilled beams where possible and cordon off and clean the wet floor.

c) These remedial works would have been carried out by Mercury Engineering (Project M&E contractor). The incident was responded to by ICT, ICD (Christine Peters), Estates (lead by David Brattey (Site Estates Manager), Domestic services team & ward staff.

d) Escalation process: Ward Manager to Estates 1st response & ICT\ICD, Estates to Multiplex. Estates (Ian Powrie) to Deputy Project Director (Peter Moir) and Contract Technical Advisor (David Hall).

e) External organisation input from Schneider Controls (Resident Engineer under support contract). Schneider advised that the plant room chilled circuit zone valve had been forced open and that there did not appear to be any dew point control in place. I then consulted SHTM 03-01 which advised that “The control settings should ensure that the external elements of the beam are always above dewpoint. I also consulted the chilled beam manufacturer data to establish that individual dew point control sensors and controls are available for inclusion in manufacture.

f) remedial action was undertaken by Multiplex (Julie Miller) to remove the fix from the chilled water zone valve and restore the zone to normal operating temperature. Estates cleaned the chilled beams of water and water marks and sanitised (David Brattey), Domestic Team cleaned the affected ward areas. This issue arose due to a defect repair therefore decision required over the remedial works. However the dew point issues were escalated to David Hall (Contract Technical, advisor Currie & Brown) & Peter Moir.

g) This incident was considered to be closed as it resulted from an error during defect repair.

h) I believe there would have been a job docket recorded on FM first as well as a Datix H&S

i) report. incident report logged and an ICT report. Both the H&S\ICT reports would have been closed off; I am not sure who would have signed these.

b) Issues with dew point controls refer to Estates Team Bundle, document 65.

A a) The issue relates to the removal of dew point control from the chilled beam design for the Adults and Childrens hospitals for all rooms provided with Chilled Beam Technology.

b) This was the first time I had been made aware that dew point control had been completely removed from the design, I was also not involved in the discussion\ design solution to address the overheating issues experience in the Laboratory Medicine and used to justify this change in control philosophy. I am equally not aware of who from the Boards project team was involved in this revised solution?

c) at this stage October 2015 I escalated the concern to David Hall as Technical Advisor to the Board & Peter Moir. Regarding this design omission.

d) there were no external organisations approached by me at this stage.

e) there was no opposing advise at this stage.

f) No remedial action at this stage.

g) The issue was not resolved at this stage.

h) No ongoing concerns from ward staff.

i) No

j) No.

c) Ward 2A cubicles 8-11 refer to Estates Team Bundle, document 106.

A

a) This issue occurred during a period of extremely high outside air temperatures, during this period the high outside air temperature holds higher moisture levels relative humidity (RH) under these conditions when this air hits a cold surface the moisture in the air condenses causing water droplets to form on the cold chilled beam finned coil, these droplets fall from the coil on the chilled beam cover plate and then to the floor. There was also a buildup of fibres on the finned coil of the chilled beam, the cause of this fibre buildup is due to the operation of the chilled beam air flow where a percentage of the room air is drawn (induced) into the chilled beam and recirculated into the

room along with the fresh air from the AHU to the room. The recirculated air contains fibres predominately from bedding, uniforms and sterile pack blue paper wraps. This fibre buildup caused the water droplets to turn black on contact. on this occasion and for the first time since handover the estates team received multiple calls from ward area's all over the Hospital experiencing the same issue simultaneously.

b) The impact for ward 2A was that due to the apparent risk of infection\H&S slip risk the patients were relocated to other rooms not affected and these four rooms closed.

c) Those involved included, Jean Kirkwood (ward manager), David Brattey (Site Estates Manager), Pamela Joannidis (ICN), Christine Peters (ICD), Teresa Inkster (ICD),

d) The issue was lack of Dew Point control on each chilled beam as this had been removed from the design of the Adults and Childrens hospitals by Multiplex. I had already escalated this to David Hall & Peter Moir during the CCU incident in Oct and therefore escalated the issue to David Loudon on this occasion due to the wider scale impact across the hospital and the omission of the required dew point control from the chilled beam design.

e) I consulted with Schneider Controls regarding the options to reintroduce dew point control into the control strategy:

f) Advice was software strategy could be developed to control all chilled beams by zone increasing the chilled water circuit temperature to above dew point on a real time bases thus designing out the risk of internal condensation discharge from the chilled beams.

g) We also considered internally the option to install the manufacturers dew point controls on each chilled beam, however this was discounted as these controls are normally installed during manufacturing process and retrofit would be complex and highly disruption to the ward environment.

h) Following a review of these options with David Loudon, I was instructed to proceed with the development of central control option. I delegated Paul McAlister (Estates Duty Manager) to work with Schneider controls on the full design solution and costing. On completion of the strategy I was authorised by David Loudon to proceed with implementation of the new universal chilled beam dew point strategy.

i) David Loudon made the decision to proceed with this strategy.

j) Yes this new control strategy addressed the dew point condensation issue, the control strategy was written up and distributed to all Estates manager\supervisors. With respect to the collection of regenerated fibres on the chilled beam finned coils, David Bratty was tasked to monitor the time scale for buildup to reoccur and develop a cleaning regime\frequency to address this issue, In addition samples were taken of the fibre buildup within ward 2A for Teresa Inkster to have analysed and the results confirmed that the fibre build up was inert.

k) I don't recall there being any ongoing concerns raised after this incident by Jean Kirkwood (ward manager).

l) There would have been ICT report and H&S Datex report submitted, these would have been signed off by the person raising the mater and the person allocated with management responsibility.

m) This would have been covered in the reporting systems detail in item "k" above.

d) Water samples being taken from chilled beams in Ward 6A refer to IMT Bundle, document 73.

A I am unable to respond to this question as I was not aware of or involved with this matter.

e) Leakage chilled beams Ward 6A refer to **Estates Team Bundle, document 138**.

A I am unable to respond to this question as I was not aware of or involved with this matter.

f) Leakage chilled beams Ward 6A refer to Estates Team Bundle, document 139.

A I am unable to respond to this question as I was not aware of or involved with this matter.

g) Leakage chilled beams Ward 6A refer to Estates Team Bundle, document 142.

A I am unable to respond to this question above here.as I was not aware of or involved with this matter.

h) Any other issues/ incidents not mentioned above.

A N\A

For each event please tell us:

a) What was the issue?

b)The impact on the hospital (include wards/areas) and its patients (if applicable)

c) Who was involved?

d) What was the escalation process?

e) Were any external organisations approached to support and advise?

f) If so, what was the advice?

g) Was there opposing advice and by whom, and what was the advice?

h) What remedial action was decided on and who made the decision?

i) Was the issue resolved – consider any ongoing aftercare/ support/ monitoring.

j) Any ongoing concerns witness had herself or others advised her of?

k) Was there any documentation referenced during or created after the event. For example, an incident report?

l) Did anyone sign off to say the work had been completed and issue resolved/area safe.

71. Tell me about your understanding of the use of thermal wheels in areas where immune compromised patients are treated:

A While SHTM 03-01 indicates that Thermal wheels may be used in healthcare settings provided they are fitted with Purge sections. It is my understanding from designers and manufacturers that they would not recommend thermal wheels for areas housing Immuno-compromised patients. I would note that on Supply systems with HEPA filters installed in the air stream there should be zero risk of cross contamination from the extract to the supply air stream reaching the patient environment.

a) What is your understanding of why designers and manufacturers do not recommend the use of thermal wheels in areas which house immune-compromised patients?

A My understanding is that there is a risk of cross contamination between the extract air deck and the supply air deck via the entrained air within the thermal wheel being released into the supply air stream, this is minimised using a purge sector, however there is still a small risk of cross contamination from this entrainment. In addition to this there is also a risk of cross contamination from air bypassing the seals between the wheel and the 2 decks. Therefore, the recommendation from the designers\manufacturer is to further protect immune compromised patient facilities by not employing thermal wheel technology.

Note: Where final HEPA filters are used in the AHU or terminal HEPA filters are employed in the air supply grilles in the ward space, this risk is controlled.

72. To what extent can you recall any specific events in relation to thermal wheels?

A I do not recall any specific events relating to Thermal wheels but would advise that the AHU's supplying ward 2A & B are general AHUs with thermal wheels fitted and without HEPA filter protection, rooms have circa 3 ACH, these wards housed immune-compromised Haemato-Oncology patients, therefore there is a theoretical risk of cross contamination from extract air to the patient.

a) Does the use of thermal wheels increase the risk of cross contamination when used without HEPA filers?

A Yes, HEPA filters would effectively contain any cross contamination from the thermal wheels, therefore areas supplied by AHU with thermal wheels and without HEPA filtration would have an increased risk for Immune compromised patients.

b) Did you expect to see thermal wheels used in a ward without HEPA filters, which was housing immune-compromised patients? Was this compliant with SHTM03-01 guidance?

A No, as I did not expect to see wards housing Immune-compromised patients to be designed without HEPA filters. however, that being the case I would not expect Thermal wheels to be used in this circumstance.

Yes, this is compliant with SHTM 03-01 guidance as it does not refer to areas housing immune compromised patients and the use of thermal wheels. Para 4.114 states that, “For systems in healthcare premises, a plate heat exchanger or ‘run-around coil’ system is suitable. Thermal wheels may be used providing they are fitted with a purge sector. The small amounts of air leakage across those devices are not considered significant”.

When answering consider the following:

a) What was the issue?

b) The impact on the hospital (include wards/areas) and its patients (if applicable)

c) Who was involved?

d) What was the escalation process?

e) Were any external organisations approached to support and advise?

f) If so, what was the advice?

g) Was there opposing advice and by whom, and what was the advice?

h) What remedial action was decided on and who made the decision?

i) Was the issue resolved – consider any ongoing aftercare/ support/ monitoring.

j) Any ongoing concerns witness had herself or others advised her of?

k) Was there any documentation referenced during or created after the event. For example, an incident report?

l) Did anyone sign off to say the work had been completed and issue resolved/area safe.

Combined Heating and Power Unit

73. Describe the Combined Heating and Power Unit (CHP)

a) What is the purpose of the CHP?

A CHP is a Combined Heat & Power plant, it is basically and Electrical Generator, with the coolant circuit output connected to the MTHW system enabling the unit to supply waste heat to the hospital this results in an improved energy performance of circa 80% (e.g. 40% electrical & 40% Heat). In comparison with standalone boilers and generators.

b) What condition was the CHP in at handover?

A The CHP plant was commissioned by the manufacturer but there were problems in meeting the designed intent of the plant with regards to sharing heat load with the boiler plant.

c) Describe your understanding at the time of the problems in meeting the design intent of the plant?

A The design intent was that the CHP plant would operate to provide heat to meet site base load supported in winter by the main boiler plant. The CHP plant would provide heat output into the MTHW system operating at 4 bar pressure with a flow temperature of 105ºC and a variable return temperature depending upon the heat demand of the site. Therefore, the CHP output was designed to meet these MTHW operating parameters. The control strategy was for the CHP to run continuously with the boiler plant automatically cutting in and out to meet increases in demand over and above the CHP capacity. However, when one or more boilers kicked in the return temperature would rise as the hospital demand was satisfied, when the return temperature exceeded 75ºC the CHP plant would ramp down to its lowest output setting and then cut out, leaving the boiler plant to supply the heat demand to the site with a resultant loss of the CHP heat and electrical output. Multiplex had problems reconciling the return temperature levels for the boiler plant with the limits of the CHP plant return temperatures.

d) What information do you have to support your view on the CHP's condition?

A I do not have any information as I have no access to records, however the Project team should have status reports on the progress of the CHP plant remedial works during the 2 year warranty period. I also submitted a paper to David Loudon late 2015 detailing the lost revenue as a result of the non-availability of the CHP plant for 1 year. I also believe that Innovated Design Solutions, carried out a technical report on the status of the CHP plant for Alan Gallacher (Estates General Manager). When I retired July 2019 the Board were still having meetings with Multiplex and the designers, Innovated Design Solutions etc to resolve these issues, in fact this was my last meeting on my last day.

74. Was commissioning and validation of the CHP carried out prior to handover?

A In part, the functional testing was complete but the actual commissioning was not complete until March\April 2015, this information was recorded within the SEPA "condition of permit" reports provided monthly by Multiplex.

a) What commissioning and validation documentation did you see, if any?

A I did see the commissioning paperwork and I shared these with SEPA under the conditions of the PPC permit application and with Zurich Engineering with regards to the PSSR\PED written scheme requirements. I cannot recall from memory the specific details of the commissioning paperwork but I believe that the commissioning paperwork ranged over a period of time from 2014 – well into 2015.

Refer to **Estates Team Bundle, document p90**

b) Who was responsible for ensuring that the commissioning and validation documentation was in place?

A Multiplex were responsible for providing the documentation and Capital Symonds were responsible for checking them.

c) Where were records of the commissioning and validation for the CHP kept?

A The records would have been kept on the Zutec document management system.

75. Who was responsible for ensuring that the CHP was operating correctly?

A Multiplex were responsible for ensuring that the CHP operated within the design parameters. In addition and in preparation for full hand over I had also adopted the Operation and Maintenance (Managed Service) contract with Edina, this was part of the scope of the Multiplex CHP tender package, for which I carried out a separate Managed service contract evaluation with the support of our procurement team. This ensured that the CHP was fully maintained after hand over Dec 2015, but did not cover system integration\design issues. However to my Knowledge the CHP design interface with the boilers and Absorption chiller were still not working as per design at July 2019.

a) How were the issues with integration and design being managed? What action was being taken, and who was dealing with matters?

A The integration issues of the CHP/Boilers with the MTHW system was managed by Multiplex with the support of the M&E consultants (Wallace Whittle), various actions were taken over the 3 years before I retired to try and integrate the systems, I cannot recall the detail of these actions. For the year that I was Sector Estates Manager for the QEUH and the CHP was brought online Jan 2016 – Jan 2017, I liaised Multiplex on the integration works and reported to David Loudon on the impacts, the overview and authorisation of these actions was handled by David Loudon at contract review meetings (which I was not party to) and latterly before I retired by Allan Gallagher.

76. If the CHP was not operating correctly, could this impact patients? If so, how? Refer to Estates Team Bundle, document p101

A The bundle document 101 refers to a local issue in the cardiac ward where 4 rooms were all over 26C with no local control, David Wilson confirmed that Schneider had left the local heater battery control valve on override. This was not related to the CHP. For the first year there was no impact on the hospital heating and DHW demands, however I believe that from circa 2017 Multiplex started to adjust the MTHW flow temperatures to ensure that the CHP plant did not cut out on high return temperatures, therefore increasing CHP uptime. This had a detrimental impact on the hospital heating & DHW services.

a) How, if at all, could the detrimental impact of the hospital heating and domestic hot water your referred to, affect/ impact patients?

A potential reduction of heat transfer at the DHW & LTHW plate heat exchangers due to temperature adjustments and or time lag for boiler initiation, potentially resulting in temperature variations to both systems and demand response issues impacting DHW and Heating systems recovery time.

77. **Estates Team Bundle, document 17:**

a) What is meant by labs flushing?

A When the Lab building was handed over 2012 it was fitted out with multiple LTHW boilers in each Pod, this was to allow the labs to operate independently until the energy centre was ready to provide the Labs building heat source. During the 2.5 years of the lab operation, the LTHW mild steel pipework exposed to LTHW water would have suffered an element of corrosion resulting in the conditions noted in Document 11, the flushing programme was needed to ensure that these contaminants did not affect the new Energy Centre pipework and equipment.

b) What issues, if any, arose from this?

A The works to flush the Labs LTHW pipework and associated equipment where scheduled to take place over several weekends ensure minimal impact on the lab function, in order to carry out these works and ensure that all parts of the system where flushed all control valves had to be electronically open and the boilers switched off. Apart from this minor disruption I do not recall any other issues.

c) What is the importance of this?

A The proposed flushing programme by Multiplex was to ensure that the corrosion contaminants found in the labs system would not be allowed to adversely impact on the new Energy Centre pipework and equipment. It should be noted that this would not have impacted the pipe work in the new hospital as the new LTHW circuit from the EC to the Labs was a dedicated secondary circuit from a new plate heat exchanger in the EC, and therefore isolated from the Hospital LTHW systems.

d) Discuss your knowledge of the reference to a '40-year-old system':

i) Explain what the 40-year system was:

A The INS building is the Institute of Nuro Sciences, the LTHW heating system in that building was run from 3 old boilers, however the contract had allowed for centralisation of energy production and as part of this the INS building LTHW was to be integrated into the EC heat distribution network.

ii) What was the issue(s)?

A Due to the age of this LTHW system, there was correctly some concern over the condition of the contents, hence the request for this to be sampled and the suggestion to install a dirt separator & deaerator, to separate and remove solid particulate and air from the system.

iii) What was the potential impact?

A The potential Impact would have been that a high level of mild steel corrosion and debris from the INS LTHW system could have contaminated and blocked the secondary circuit Plate Heat exchanger (PHe) and associated distribution pipework from the adults' plant room, potentially shortening the life of the new pipework and equipment within the Adults LTHW secondary loop.

(a) Did the '*high level of mild steel corrosion and debris from the INS LTHW system could have contaminated and blocked the secondary circuit Plate Heat exchanger (PHe) and associated distribution pipework from the Adults plant room'* have an actual impact on the pipework, as opposed to the potential impact?

A I cannot recall if the INS LTHW was if fact connected to the new adult plant room PHe or not due to the risk to the new system? The issue being that due to the age and condition of the pipework in the INS any flushing and chemical treatment to protect the new system could have adversely impacted the INS system resulting in system failures. However, if it was connected to the new system without treatment to address the system conditions it would have an actual impact, however this would be contained to the secondary circuit and secondary side of the PHe, it would not impact the primary circuit of new hospital the MTHW system.

iv) What actions, if any, were taken to address the issue(s)?

A I cannot recall if the connection to the INS went ahead Due to the risks involved. I would need to see the site records.

78. What was your understanding of how the CHP should be operated?

A The CHP was intended to operate 24/7 year-round by supplying heat energy to meet the hospital baseload demand of 3.6Mw (1.2Mw per CHP), in principle the winter heat demand would exceed the baseload and the CHP should have worked 24/7 with the boiler plant cutting in and out to meet winter fluctuations above the 3.6Mw base load. In the summer the hospital baseload would drop below the indicative 3.6Mw, the design allowed for this by including an absorption chiller to convert heat output from the CHP to chilled water output supplying the cooling load of the hospital, this would take the full heat output from one CHP unit, leaving the other two CHP units to meet the reduced summer baseload of the hospital.

79. What were the cost considerations for the operation of the CHP? What considerations impacted on its operation?

A The operating cost of the CHP related to the a). The gas consumption to run the plant and b). the lost revenue from the drop in electricity output as a result of the design operating failures, this resulted in the need to purchase more electricity at a higher cost from the grid. c). The Managed Service Contract cost which was a 15-year commitment and included for the full refurbishment\replacement of the CHP units twice during the life of the contract. I cannot recall the figures associated with these cost considerations, however I did submit a paper to David Loudon regarding the financial losses to the Board in the 1st year of lost operation from memory this was circa £1m. To my knowledge the Board did not restrict CHP operations on cost issue. Multiplex were allowed to manage the fine tuning of the CHP\boiler plant in an attempt to achieve design intent.

80. How was the CHP system being operated by GGC?

A While GGC were covering the cost of the Managed service contract with Edina, but Multiplex were having problems meeting the design intent, when a

boiler was brought online automatically to meet increased demand over the CHP output, the CHP plant would see this as a drop in demand and ramp its output down. With the boilers online the return temperature from the hospital would increase to exceed the CHP return operating limit causing the CHP to shut down. Multiplex were working to address this design issue for the duration of the defects period and beyond. To my knowledge this was sanctioned by David Loudon.

81. What operational issues, if any, were encountered by GGC with the CHP? Refer to **Estates Team Bundle document 12.**

A Document 12 is not related to issues regarding the CHP plant operation, Doc 12 relates to a heating zone valve being forced open via the BMS controls, this seemed to be related to works carried out by Multiplex and forgetting to reset the system to automatic control.

a) Without reference to document 12, what operational issues, if any, were encountered by GGC with the CHP?

A Issue with:

- Maintaining DHW at 60ºC
- Poor recovery times for DHW in time of peak demand,
- Maintaining heating via LTHW system capacity and demand response.
- Financial losses because of CHP down time\ reduced capacity etc.

82. Refer to Estates Team Bundle document 16:

a) Have you seen this before?

A Yes.

b) What is this document?

A This is a defect log generated from the FMFirst- LMS, these tasks would have then been passed on to the BAM or Multiplex defect logging systems, respectively.

c) Column 274 – ‘all CHPs cut out’ – what does this mean? How would this have impacted patients?

A This report refers to a G59 trip of all CHP plant, the electrical output of the CHP plant is synchronised to the national grid for frequency, phase sequence, phase angle and voltage if any one of these conditions vary from the grid the protection relay will drop the CHP units off grid and shut them down. This protection relay is known as the G59 relay. The CHP plant tripping out on its own should not affect patient area’s however this report advises that the boilers did not start up automatically after this CHP trip, this potential would result in the loss of MTHW supplying the LTHW heating and DHW, depending on how long the boilers remained offline. However this was reported by the Shift Duty manager Paul McAlister and he would have responded to this event quickly to reinstated the boilers manually until the situation was stabilised.

d) Refer to Estates Team Bundle, document 36 what was the incident referred to? Were you involved? How was this matter resolved?

A I don’t believe that this was an incident, It looks like this is an attempt to provide a sealed ceiling system using the existing suspended ceiling laying grid, within ward 4B Haemato-oncology or (BMT) ward single isolation rooms, instead of solid plasterboard ceilings with the aim to improve room differential pressure control to the corridor. I was not involved and was unaware of this meeting, Peter Moir was managing this project as part of the contract.

83. Refer to Estates Team Bundle, documents 19 & 20:

a) Provide any information about any concerns you had in relation to the building temperature and power.

A

(i) Building temperatures: Generally the room temperature issues recorded in documents 19 & 20 related to Schneider controls passing valves or wiring issues this is not unusual especially on a project of this size this level of reporting failures slowed down after the first few weeks of occupancy. The exception being ward 4b (Adults): overheating problems across all rooms turned out not to be passing valves but a control wiring issue, where the CY

control cables (unscreened) supplying the room heating control valves throughout the ward were inducing a low voltage from surrounding services causing the actuator control valves to be held slightly open. I took lead on this due to lack of progress with Multiplex and used the Boards maintenance support contract with Schneider to secure diagnostic support in identifying the problem. Once identified the cable replacement was carried by in-house staff during the Christmas 2016 holiday break, with the ward closed. No further problems with overheating were experience in this ward.

(ii) Power issues: Repeated loss of power within a section of plant room 31 caused issues with loss of plant items however resilient supply arrangement address most of these issues with the exception of the PTS impact. Loss of power to the PTS main adult transfer station & system server resulted in a total system crash, with sample carriers in transit being jammed ether in the transfer station or in the system pipework, the resulting effort to locate and remove these and reset the system took between 12 – 24hrs to recover. This impacting on patient sample results and portering services staffing pressures. I was involved with this issue and assisted in the monitoring of the power demand from the affected protective device, this proved to be overloaded at random times and required the plant served from this device to be split over two protective devices to reduce the load to meet the working capacity of the existing device. In addition, a second supply was installed along with an automatic transfer switch (ATS) to create a resilient supply arrangement for this essential PTS system, along with the provision of a Uninterruptible Power Supply (UPS) support the PTS server during short local or national grid power interruptions this protects the server allowing time for the ATS to operate or for the site standby generators to come on line. These works were carried out by Mercury Engineering under the contract defects process.

(i) Was lack of action by Multiplex something you frequently encountered, please explain?

A Generally, Multiplex would respond to emergency issues quickly and supportively, however in the defect process the Board had the burden of proof that an issue was a contractual defect before they would take ownership of it. This became more prevalent the further into the defect and liability period we

went and was more evident when Fergus Shaw took over the site support for Multiplex.

b) What was your involvement?

A I assisted with the monitoring of the protective device causing the problem, identified the random overloading and agreed the solution to be implemented. I also coordinated internal communications and updated staff as to the remedial works and service impact while putting in place contingency arrangements, where required to maintain service.

c) Was this recorded on Zutec?

A The defect would have been formally reported via the Capita Symond defect logging system, the alterations to services would have been recorded on the as fitted drawings and the system operating instructions, which should have been updated on Zutec by Multiplex.

d) What was the impact of these issues on patient migration?

A While these power failures where disruptive to the laboratory services, FM portering services and time taken to report patient test results from the labs, these issues were generally managed without any impact on the migration plan.

e) Were matters resolved? If so, how? If not, what was the consequence?

A Yes the issue was resolved by redesigning the electrical services to the PTS server and Main transfer station and introduction of a server Uninterruptible Power Supply (UPS) and resilient dual electricity supply with automatic change over. This resolved the issue and improved the protection of the PTS from impact from local and national grid power outage.

30. Refer to **Estates Team Bundle, document 91, page 754:**

a) Look at column 78 – what does debris within the AHUs mean?

A This means foreign materials that should not be in the AHU.

b) Is this something you would expect to see?

A No, this should be addressed within in the pre-commissioning checks & AHU\duct work cleaning requirements.

(i) Does the presence of debris indicate to you that the pre-commissioning checks and AHU ductwork cleaning requirements had either not been fulfilled or carried out to an adequate standard? Who as responsible for carrying out pre-commissioning checks and AHU/ductwork cleaning?

A Yes. Mercury were responsible for the pre-commissioning checks, this would have been carried out by the M&E contractors, witnessed by Multiplex/Capita possibly on a sample basis.

c) What was the impact on the AHUs?

A I would need to know what the debris was, it could be inert or could be a contamination risk?

d) How was this matter resolved?

A I can't answer this question as I was not aware of the Wallace Whittle Observations inspection or the report in Document 91 or of any actions taken to address these issues.

e) What happened in respect of Zurich?

A I commissioned Zurich at the point of hand over as the Boards Competent Persons (CP) Pressure Systems to review the pressure systems within the QEHU, RHC and Energy Centre to assess and prepare a Written Scheme of Examination for these properties as required under the Pressure Systems Safety Regulations 2000 (PSSR). Brian Baldasara (CP, PSSR) was duly appointed by Zurich and I provided him with site access for survey, as well as access to Zutec for records etc. As part of his assessment the CP needs to confirm that all pressure equipment is CE marked and review all of the associated certificates of conformity required under the Pressure Equipment Directive (PED) for equipment manufactured to operating under pressure, these are usually provided by the manufacturer and the equipment is usually labelled with the CE mark indicating a certificate of conformity was in place.

However Brian reported back to me that some items of plant were not labelled as compliant and that the MTHW pipe work being manufacturer on site was not CE marked and there was no recorded certificate of conformity for the pipe work installation across all three buildings. Brian advised that it was the responsibility of Multiplex to ensure that the pressure system pipe work manufactured on site had been assessed and CE marked with a certificate conformity as compliant with EU PED regulations, this would need to have been issued by a Notified Body, and to do this retrospectively would require full records of materials used, names and certificated evidence of coded welders who worked on the system, sample weld test results and system validated pressure test certificates and compliance with sound engineering practice guidance. Without this detail and CE marking the system could not be added to the written scheme and should not be put into service. This level of detail was not on Zutec, I therefore asked David Wilson for the information required, which he did not have available. I escalated this issue to David Loudon and a series of meetings were held with David Loudon, Multiplex, Mercury, Brian Baladasara (Zurich CP) for advise on how this could be addressed. Brian advised that Multiplex where responsible for placing the MTHW system on the market (Hand over to the Client) and that under EU PED regulations this was illegal without the required CE mark of conformity. He advised Multiplex that they could address this with retrospective certification by employing a Notifying body to assess and certify & CE mark the system however this will require access to all the evidence detailed above. Multiplex insisted that they could produce the relevant information and records for this process and would engage a Notified Body. David Loudon accepted this and gave them time to provide the data and have the system CE marked. In the meantime Zurich recommended that in order to allow the system to continue to operate that the boiler plant should be derated to less than 110C\10bar to take the system out of the scope of PSSR on a temporary basis until the pipework system had been CE marked. This was implemented through Multiplex\Mercury and the boiler manufacturer. After some time and several meetings multiplex provided the CE certification data and had new rating plates fitted where required for the pressure equipment and plant manufactured off site. However in June 2016 I provided David Loudon with an

option appraisal paper advising of the expert consensus that it was unlikely that Multiplex could meet the MTHW pipework conformity assessment for CE marking, I included options from Multiplex to address this matter , however I also advised that my preferred option for the Board to meet its legal obligation would be to take the advice from Zurich Steve Williams (Senior Engineer PED) & Brian Baldasara (CP, PSSR) and appointment of Zurich Engineering to undertake a Fit for Purpose Examination of the MTHW pipework and associated fittings with the view that once successfully complete Zurich Engineering could underwrite the pipework system and associated accessories deeming them Fit for Purpose as a notified body. Zurich would then be in a position to add the system to the Written scheme of examination thereby allowing the Board to meet it legal obligations under the PSSR regulations. David authorised me to proceed on this basis and the Fit for Purpose survey was carried out, several points of concern\defects were identified, tabulated, and issued to Multiplex for rectification. Following final inspection\assessment of these remedial works by Zurich and they were satisfied the system was Fit for Purpose, they added the Fit for Purpose assessment report to QEUH records on their system and to the Sites Written Scheme of Examination, as well as providing the Board with a final report confirming the system status. The Board had now met its legal responsibilities under Pressure System safety Regulations 2000 (PSSR) and the boilers were reset to the design operating temperatures & pressures by Multiplex\Mercury & the boiler manufacturer. It should be noted however that the system remains non-compliant with regards to compliance with the EU PED regulations and as such was placed on the Market illegally by Multiplex\Mercury. The Board carry no responsibility for this.

(i) Explain how the system remains non-compliant with EU PED regulations.

A Multiplex\Mercury should have complied with the requirements of the EU Pressure Equipment Directive (PED) and maintained records of the onsite manufacture of the MTHW pipework system and associated fittings carrying a relevant fluid (temperature above 111.4ºC) ensuring that all elements carried a certificate of Conformity and have a CE mark affixed to each item of equipment/pipework, then produce a global certificate of conformity for the full

system. Mercury had failed to keep appropriate records for the onsite manufactured pipework which should have included schedule of materials and their rating certificates, Name and appropriate qualifications of coded welders and the work they produced, certificates of conformity for the onsite manufactured pipework. The Certificates of conformity & CE marking of following issues remain outstanding:

- All on-site manufactured pipework.
- All Expansion Joints.
- Main basement manifolds.
- Global Certificate of Conformity for the full system.

Therefore, Multiplex did not comply with EU-PED requirements and placed a non-compliant system on the market, despite protracted attempts to unsuccessfully apply for retrospective certification.

(ii) Explain further what you mean by ‘placed on the market illegally’? Should the system have been selected by Multiplex? Please explain your answer.

A Placed on the market illegally, means that the system was put into service by the contractor without the legally required certificates of conformity and CE markings. The error was not in the design or selection of an MTHW system the error was in not following the statutory requirements of EU-PED, I believe that this was due to a misinterpretation of the definition of a relevant fluid by the designers and Mercury, who thought that as the system was operating at 105ºC it was not included in the scope of the PED regulations, however as the safety devices are set for 120ºC (safety margin above the operating temperature) the system is deemed to be a relevant fluid above 111.4ºC and falls within the remit of the Directive.

31. Refer to **Estates Team Bundle document 113:**

a) What is this?

A This appears to be the final defects certificate report from Capita Symonds. Prior to the end of warranty period 2017

b) Why was it issued in 2017 and not earlier?

A I can't answer that question as I was not involved in the contract sign off process.

c) What was the consequence of this?

A It would appear to me that there were many outstanding defects that required to be closed before contract retention sums could be released.

d) On what basis did Multiplex carry out the work?

A On the basis of warranty, I believe that Multiplex were eager to close outstanding issues to claim the contract retention monies.

32. Refer to **Estates Team Bundle, document 135:**

a) Please explain what this email was about.

A Multiplex were seeking partial payment against withheld retention monies from January 2017, "in connection with hospital works" I am not sure what hospital works includes.

b) was the money released or not?

A I don't know, as I was not party to the retention money payments.

<u>Water Guidance and Obligations</u>

33. What guidance applies to water? How did you/others ensure that guidance was complied with? What contractual documents, if any, would you consult to ensure guidance was complied with?

A SHTM 04-01 Water safety for healthcare premises Guides (Parts A – G).
L8 - ACoP - Legionnaires' disease: The control of legionella bacteria in water systems (L8).
HSG 274 – Control of Legionella Bacteria (Parts 1 – 3).
Water Regulations Guide & Water Byelaws 2000/2004 (Scotland). At the time of hand over, I commissioned DMA Water, to carry out a water risk assessment of the QEUH buildings and for the risk assessment to include a written scheme. In addition Multiplex continued with the routine flushing

programme for the 6-week soft landings period when GG&C took over this function up until the final occupation of all areas. As well as implementing a water quality monitoring and disinfection programme for each area 6 weeks prior to occupation of each area.

The contractual documents that should be consulted for are detailed in SHTM 04 01 (Part B) and are:

- All commissioning and testing activities is compiled and handed over to be incorporated within the operation and maintenance manuals.
- Results of temperature checks on the cold-water supply and hot water circulating systems.
- Commissioning and in-service test data for Type 3 TMVs.
- Identification of, and test results for, sentinel taps.
- Where continuous water treatment is installed, the commissioning records should include details of settings of the equipment, dosing rates and requirements for testing.
- Operation and maintenance manuals should be in accordance with BSRIA's (1990) Application Guide 1/87: 'Operation and maintenance manuals for building services installations.
- Full manufacturing details, including batch numbers of all pipes and fittings.
- Full records and certificates of pressure tests for all sections of pipework.
- Settings of all balancing valves, with readings of flow rates where applicable.
- Full details of each item of plant, including arrangement drawings and appropriate test certificates.
- As-fitted drawings clearly showing the location of balancing valves, flows and settings, isolation valves, drain valves.
- Schematic drawings for installation in plantrooms showing all valves and items of plant.
- Full details of water treatment parameters and operating modes and settings.
  Full details of maintenance requirements.
- Detailed confirmation of disinfection procedures to BS6700: 2006, BS EN 806-1-5: 2000-2012 and BS 8558: 2011, and results of post-disinfection microbiological analysis.

- Full records confirming that all materials and fittings hold WRAS or equivalent accreditation.
- As previously discussed, the commissioning documents were intended to be held on Zutec however the contract allowed Multiplex a 2-month window for population after hand over, I do not recall having reviewed these documents at that time due to the focus of works on the operational commissioning and migration plan.

a) Were you aware of all the of the contractual document having been consulted to ensure SHTM04-01 compliance?

A No, I was not involved in the monitoring, witnessing or verification of the commissioning and compliance of the system.

88. Who was responsible for ensuring a safe water supply following handover?

A The Board carried responsibility for water safety following hand over, My post job description included the role of Responsible Person water, although I was not formally appointed to this role for the QEUH.

(i) Who was the Responsible Person for water?

A My Job description included Responsible person for Water, but I was not formally appointed in writing.

89. What water safety training was provided to all maintenance staff, estates officers and contractors?

A At the point of hand over we had limited staff (6 off including myself) on site to support operational commissioning and Migration, of the 5 Estates Duty Managers, two were from a plumbing background where they held water management responsibilities at their previous sites this was Melville McMillan and Jim Guthrie, I cannot recall their water safety training credentials? I had been previously received a 1-day training course for Legionellosis the role of the responsible person (BS1), Carried out on site at the Glasgow Royal Infirmary. I cannot recall training status of all the staff who were scheduled for redeployment to the QEUH. With respect to contractors generally they would

be vetted as to their competence and awareness of water system safety by the appropriate estates manager and provided with the local knowledge and awareness of the systems to be worked on as required. The NHS do not train contractors as this is seen to be buying in the services, competence and the required expertise.

90. What was your knowledge and understanding of Health and Safety regulations on control of legionella at the time?

A I was generally aware of the regulations but not fully conversant with the detailed day to day requirements.

91. What legionella training was provided to all maintenance staff, estate officers and contractors?

A Up until the time of the water incident 2018, there had been no legionella training, I had allowed for training needs within the maintenance strategy for development and implementation after migration was completed. However this role was taken over by the newly formed central compliance management team under the newly appointed General Manager (Alan Gallacher), I therefore no longer held training budget responsibility for my staff at this stage. I did raise training requirements for water management with Alan and was advised that the Compliance team were working on the programme, and it would be rolled out when ready.

92. What water borne pathogens (other than legionella) training was provided to all maintenance staff, estate officers and contractors?

A There was no training provided on other water borne pathogens, the Board policy on other such pathogens was that Estates would be led by advice and guidance from the ICT\ICD on other pathogens.

93. Who was the Duty holder?

A The Duty Holder would have the CEO, Robert Caulderwood and David Loudon DoF.

94. Were you aware of obligations to appoint an authorised person or the like to discharge water supply safety? If so, who was appointed? When, for what period? If not, why not?

A It was my understanding that under both SHTM 04-01 Part B and the Boards Water Policy that it was the duty of the Designated Person to appoint the Authorised persons for each site. During preparation of the Water Risk Assessment DMA asked for confirmation of those with responsibility for legionella control. I prepared a schedule of those who should be formally appointed to these roles and e-mailed Mary Anne Kane (Corporate General Manager\Designated Person) to confirm that this schedule of roles and responsibilities was correct and when they would be formally appointed for inclusion in the Risk assessment. Mary Anne confirms the list was correct and if memory serves me correctly, she would take this to the next Board Water safety group for ratification. I passed on this schedule on to DMA, but they could not enter the details without confirmation of appointments.

a) Did you escalate DMA not being able to enter to the details? If so when and to whom?

A No, as I expected Mary Anne to get back to me on the appointment of these duty holders.

95. Commissioning of water system prior to handover/ patient migration to QEUH:

a) Requirements

A Requirements for commissioning of the water systems prior to hand over are detailed in SHTM 04 01 (Part A) namely:

(i) Designers Commissioning Brief.

(ii) Pre-commissioning checks & commissioning of the cold-water system

(iii) Pre-commissioning checks & commissioning of the hot-water system

(iv) Pressure testing must be carried out before disinfection.

(v) Temperature testing cold-water cisterns, hot water calorifiers, distribution pipe work, flow & return, hot and cold temperatures at outlets and inlets to mixing valve.

b) Who was responsible for this?

A

(i) Responsibility-of-ZBP/Wallace Whittle.

(ii) Responsibility-of-Multiplex.

(iii) Responsibility-of-Multiplex.

(iv) Responsibility-of-Multiplex.

(v) Responsibility-of-Multiplex

c) What checks were carried out to ensure that the water system had been commissioned. Refer to Estates Team Bundle, document 132.

A The witnessing of commissioning and sign off was the responsibility for Capita Symonds (Contract Supervisor) I am not aware if there was a Public Health engineer involved in this process or not? As required by SHTM 04 01 (Part A) section 16.1 “The design and commissioning procedures should be signed off on behalf of the client by a suitably experienced public health Engineer.” I was not included in the commissioning programme and was not invited to attend. I believe from a discussion with Mary Anne Kane (Acting DoF) after the water incident 2018 that David Loudon had told her that Multiplex had requested of David Loudon, that I be held at arm’s length from project matters as each time I was involved it cost Multiplex money? This would fit in with my lack of inclusion throughout the project. From document 132 above, it’s difficult to interpret what Frances Wrath was responding to from Jackie Barmanroy (detail not included) but the response is indicative of the project team belief that “All areas have been commissioned in line with contract ER’s and legislative requirements”.

d) Was SEPA/ the Water Board involved? Describe their role and involvement.

A SEPA were not involved with the potable water system, SEPA’s involvement with the site was related to the management control of the Environmental impact from site activities under the authority of the Pollution Prevention & Control (PPC) permit.

Scottish Water were involved on several issues, namely:

(i) Scottish Water were commissioned by the Board to install two new resilient water mains to the campus from separate distribution networks, Hardgate Rd & Govan Rd each capable of supplying the total campus demand. This work was commissioned by Peter Moir (Project Manager).

(ii) I wrote to Scottish Water to request a copy of their letter of consent to Multiplex to proceed with the Campus water distribution installation and any conditions applied under this consent, as required under Regulation 5 of the Water Bylaws 2004. Scottish water advised that they had not received formal notification of the intent to commence works and indeed not been contacted by Multiplex regarding the project up until the request for connection to the new water mains was received.

(iii) As a result of a Fire main hydrant blowing off, Scottish Water were contacted for support in Isolating the main line on Hardgate Rd, to allow repair of the damaged hydrant. From this several issues were identified.

- The Fire main had been connected to the main upstream of the hospital potable water supply with only a single check valve fitted, this created for potential contamination of both the Hospital supply and the Scottish water supply from the potentially stagnant water held in the fire hydrant line. The fire main connection should be down stream of the potable water connection and both the fire main and the potable water supplies should be fitted with a Double Check Valve to protect against back flow in the event of a loss of pressure.
- Scottish water should have adopted the water main on site up to and including the 1st isolation valve. However Scottish water refused to adopt this line as Multiplex had used non- standard Barrier pipe for the supply lines and non-standard Isolation valves (opened in the opposite direction to Scottish water specification valves) when Scottish water was contacted by Multiplex regarding the mains water connection to the distribution network, the site underground pipe had been back filled and they was not available for inspection, however they identified the Barrier pipe anomalies at the point of the main connection ground works.

(iv) Scottish water contacted me regarding pressure fluctuations being experienced on the Hardgate road water main local distribution network, affecting both commercial and domestic customers. I requested the Melville

McMillan (Estates Duty Manager) investigate this. After his initial investigation Mel found a faulty Keraflo valve on the inlet to one of the break tanks in the QEUH basement tank room. This was replaced and the issue resolved. However, Mel established that the valve had failed due to excessive pressure on the main supply. This was reported to Scottish Water, who investigated and found that the as part of the new water main installations for the campus (see item “a” above) they had installed new Pressure Reducing Valves (PRV) to supply the campus with the nominal supply pressure, however the PRV on Hardgate Rd had not been commissioned by Scottish water at the time they connected the campus to site. Scottish Water commissioned the valve at this point and the supply water pressure was returned to nominal pressure.

(v) As part of my work with Scottish Water to review the joint Emergency contingency plans for loss of the water supply network internal or external to the campus, it was established that we had no means of delivering emergency tanker water to the underground potable water storage tanks. I worked with Scottish Water and their nominated specialist sub-contractor to develop a solution to the issues raised in item “e” & “c” above. These works were funded by GGC under a capital allocation, providing resilience for tanker water deliveries via both Hardgate Road & Govan Rd supply main lines.

e) Which teams (such as infection control) were involved in the water system sign off, who would have signed it off on behalf of those teams?

A I was not party to the commissioning sign off as such I am unable to answer this question.

f) Were L8 testing requirements complied with?

A I commissioned the Water Risk Assessment this included preparation of a Written Scheme which detailed the testing required under L8. on receipt of the Risk Assessment and Written Scheme from DMA, I held a briefing meeting with DMA, David Bratty & Jim Guthrie to review the document and discuss the way forward. At that meeting I tasked David Brattey & Jim Guthrie to work with DMA to develop an action plan and address issues arising from the Risk assessment and to populate and implement the written scheme. I believe that

elements of the Written scheme were implemented records of which would be held by Jim Guthrie.

g) Were there any legionella concerns at handover? Is so, what was done to deal with these?

A From Memory points of concern at the time were:

- The system had been filled early in the commissioning period and had been controlled via a routine flushing programme, which was continued after handover by Multiplex for a 6-week soft-landing period after which GGC staff continued the programme until Migration of all area's was complete. This was supplemented by a testing sanitisation programme for all wards\departments 2 weeks prior to their migration.

(i) How, if at all, did this contribute to legionella concerns at handover?

A I raised concerns prior to hand over regarding early filling of the system and was advised that due to the size of the system Multiplex need this time scale to complete all the required testing and commissioning and that this was being managed via a full flushing programme as pre SHTM requirements. This was accepted by the project team and the technical advisors. There were no concerns raised at the point of hand over regarding this as the water test results were approved by Professor Williams.

- Jim Guthrie also found that the design included end of line flushing valves per zone for activation when the line temperature exceeded a set temperature (i.e. 18C) in order to ensure end of line temperatures did not exceed the Max of 20C, Jim found that several of these had not been connected or were not functioning. This was reported as contract defects by Jim however I believe the response to this was slow and Jim resolved the issues himself.

(ii) What impact did the end of line flushing valves not being connected have on the water system/ raise concerns about legionella?

A Where these valves were not functional there was a potential for the cold-water temperature on the affected lines to be sitting above the dump

temperature set point (circa 18ºC) due to ambient temperature heat gain. Cold water temperatures above 20ºC have the potential to support the proliferation of microbial activity in water.

- The renal dialysis Reverse Osmosis (RO) filtration (please define RO system) system did not have a duty\Standby line and therefore when the RO line was under routine thermal sanitisation there was no emergency renal RO connections available for renal dialysis. From memory 6 emergency renal connections were installed on the Potable water system, these were installed by Multiplex under PMI from Peter Moir\ David Hall. I advised that it was not appropriate to connect these to the potable water system but was informed that there was no other option at this stage. Later on circa 2016/17 I submitted an application for capital funds to address this issue by installing a backup line fed from the RO plant which would allow for alternate emergency RO source. Funding was not approved.

(iii) What was the impact/risk, if any, with connecting to the portable water supply?

A Potable water is defined as: Safe to Drink. The impact of connecting Renal dialysis connection stations to the potable water supply is that they are automatically classed as seldom used outlets introducing the potential risk of stagnation and regressive contamination of the supply line it is connected to. These points were therefore added to the routine flushing and water sampling programme by Jim Guthrie.

h) What concerns, if any, did you have about water sitting in the system before the hospital opened?

A I was concerned over the risk of water stagnation and build-up of biofilm especially in a system of this size and complexity. I believe the system was filled approximately 9 months before hand over, although I was not aware of this at the time of filling, however when I became aware I raised my concerns with the project team and David Wilson and was advised that the system needed to be filled early due to the scale of the system to allow time to carry out the commissioning checks and that the system was under a water flushing control regime as per SHTM guidance. I recall suggesting chemical treatment

but was advise guidance states that new well engineered system should not need chemical treatment.

(a) What impact, if any, did water stagnation/ build-up of biofilm have on the integrity of the water supply?

A In principle the routine water flushing programme should have turned over the water volume in the bulk storage tanks, however I am unsure of how long it would have taken to have turned over the full volume of these tanks? therefore the potential for stagnation. Stagnation would allow for the multiplication of microbial activity in the system; however, the water sampling regime did not indicate this at the time.

(b) You state that the water system was filled approximately 9 months prior to handover. Would this have been done bypassing the filters? If so, was a full flush to drain the water system have been carried out before the filters were put in place/ put back on, and then the system filled with eh filters in place? If this was not done, should it have been done? Please explain your answer.

A I believe that the system was filled before the filters were installed, although I did not know this at the time. I do not believe that the system was drained\flushed after the filters were installed. The reason for the filters is to remove suspended solids from the supply, therefore It would be expected for the system to have been drained and filled via the filtration plant and flushed.

i) Were you aware of any issues with the testing of the water system?

A I was aware of the sanitisation programme Method statement, indeed I asked if this had been shared with the ICD? Which it had not, I then advised that Craig Williams should have access to this and sign off his approval for the proposed methodology following which he should be witness to the implementation of the method statement and sign off on the micro-biological test results. Following this the Method statement was approved by Craig, and I believe the test results signed off by him although I was not party to this. However not all areas pasted the microbiological test first time, some area’s required re-sanitisation and retesting until the results were within acceptable limits.

(a) Which areas required re-sanitisation?

A I cannot recall that level of detail.

j) What was your understanding at the time of the SHTM guidance, particularly SHTM 2027 and SHTM 04-01, in respect of water?

A My understanding was that STHM 04 – 01 superseded SHTM 2027 as part of the overall update of the SHTM suite, Therefore SHTM 04-01 was the relevant document under the contract Hierarchy.

k) Was the QEUH/ RHC water system SHTM 2027 and SHTM 04-01 compliant at the date of handover – if not, what was outstanding? Who was responsible to ensure that the water system complied with SHTM guidance?

A I believe that the water systems installation should have been compliant with HTM 04-01 which was live and in place at the time the contract date moving to SHTM 04-01 Scottish version published 2011. I was not aware of any outstanding compliance issues with SHTM 04-01 at the date of hand over. Capita Symonds would have been responsible for SHTM guidance compliance.

(a) Did you therefore consider, at the time, the water system was compliant with SHTM04-01?

A Yes, I was under the impression that the system was fully compliant and approved by Capita as meeting the contract requirements.

96. Was a pre-occupation water test done prior to occupation? Refer to Estates Team Bundle, documents 14, 14.1, 14.2:

A Yes preoccupation water tests were carried out.

(i) Please direct us to these tests, within the bundles you have seen, or advise where this information would be stored?

A I have not seen these test results in the evidence bundles, but these would be accessible on the Al-control Laboratories services portal under the GGC\QEUH account. Jim Guthrie or Melville McMillan would have access to this.

a) Who carried this out?

A Jim Guthrie (Estates Manager).

b) If this was not done, should it have been done and why?

A N\A.

c) Consequences of not doing it.

A The patient groups would have been moved to accommodation with an unknown water system condition.

97. What was the post occupation water testing regime at QEUH?

a) Was carried this out?

A Yes.

b) Who carried out testing?

A Jim Guthrie and Melville Mcmillan (Estates Duty Managers)

c) Your involvement with the testing?

A I was not involved in the testing.

d) How frequent was testing?

A Where positive results were found following sanitisation, these tests would be repeated weekly until 3 consecutive sets of clear results were achieved, then the test would have been discontinued. NHS GGC policy.

e) Did this comply with L8 and SHTM 04-01 guidance? If not, why not?

A Yes, as this would comply with the requirement to carry out testing.

f) What happened to the results?

A The results were provided by e-mail to Jim Guthrie, Melville McMillan as well as on the Accredited Laboratory service providers portal (Alcontrol Ltd) and Jim\Mel should have kept electronic copies.

g) Your role in connection with the results of water testing?

A My role would have been to review out of spec results with the ICD as and when notified by the AP, to risk assess the situation and develop action plans.

(l) Do you recall carrying out risk assessments and actions plans? If so, when? Describe any events that caused you concern.

A Sorry, I cannot recall receiving notification of out of spec results from the AP for review.

h) Where were the results stored?

A In the online portal and electronically on-site Jim & Mel would have access to this.

i) Does GGC have a policy for addressing water testing results? If so, describe this policy and confirm whether it was followed.

A Yes, where a water sample exceeds permitted legionella levels, routine control measures to eliminate the legionella will be applied. If there is still Legionella detected in a follow-up sample, then a record of this incident will be recorded on the Boards Datix reporting system. With the key duty holders copied into the report, i.e. The Authorised person, Responsible person & ICD. I have no recollection of any reports being made via Datix.

i.) What action was taken in response to results?

A I believe that some of the areas were resanitised and retested.

j) Was there an escalation process?

A There was an escalation process in the NHS GGC policy, but I cannot recall the detail.

98. We understand that there were positive legionella results in Ward 2A in around June 2015. Dr Christine Peters tells us that you ‘did not want to put this in writing’:

a) What concerns did you have about the positive legionella results?

b) Why did you not want to put the finding of positive legionella results in writing?

c) What action did you take in response to this?

d) Was legionella found in any other areas of the hospital? If so, where, and what action was taken?

A Unfortunately, I do not recall these results nor Dr Peters statement that I "did not want to put this in writing" I would have no reason not to put these in writing.

99. In around June 2015 Dr Christine Peters requested the risk assessment for waterborne infection in the QEUH from Estates, the Project Team and Mary Anne Kane. Did you provide this information? If not, why not? why?

A I do not recall being asked for this by Dr Peters, she may have made this request via the project team or Mary Anne Kane, but I don't recall ether of them asking for this from me. Although I had the Risk Assessment from DMA at this point, I had not escalated it to David Loudon or Mary Anne Kane, If I had been asked for the report by anyone, Dr Peters, Mary Anne or David Loudon this would have prompted me to share it.

100. How many positive tests, if any, came from Ward 4B? Could you recall how many positive tests at the time?

A Sorry I cannot recall the result from any of the tests from that far back, remembering I do not have any access to records.

(a) Were you ever concerned about the number of positive tests from Ward 4B? If so, did you escalate these concerns and to whom?

A I don't recall being involved in the water testing results for ward 4B. I am not sure of the timeline for these tests it could be I was redeployed to my new post by then in Jan 2017.

Water - Commissioning and Validation (C&V)

101. What commissioning and validation documentation did you see before handover in 2015 – if not, who would have had sight of this?

A The only Documents that I had sight of at that time were the water sanitisation method statement and the water microbiological test results following

sanitisation. I would expect that Capita Symonds would have had witnessed the C&V elements and had access to the records.

102. Where is this commissioning and validation documentation ("C&V") stored generally on the hospital system?

A These would be stored in the Zutec document management system, 60 days after handover.

103. What is the purpose of C&V?

A The C&V is required to ensure that the installation has been completed as per design \specification and the materials and equipment installed comply with the Scottish Water Byelaws and other British Standards and are not otherwise unsuitable and all the requirements of current legislation are met in order to ensure that the system and the water quality is safe.

104. What are the consequences of it not being carried out?

A Failing to carry out the C&V process correctly risks the safe operation and management and control of the system.

105. Were records kept of the cleaning and testing regime? Where were the records kept and what was the retention policy? What concerns, if any, did you have about record keeping and retention?

A Assuming this is in relation to the C & V pre-hand over the records for cleaning and testing should have been held on Zutec document management system, it is unclear to me at this stage if these actions were fully recorded, the retention policy for the Board would follow L8 requirements with a minimum retention of 5 years.

106. What concerns, if any, would you have If the water system were to have no C&V before handover in 2015? Why were you concerned?

A If there was no C&V I would be concerned that the system was not fit for purpose and unsafe to take into service. At the point of hand over 2015, I was under the impression like the rest of the project team that the system had been Commissioned and Validated before acceptance of practical completion

and handover, therefor I was not concerned that there were any problems, however I was concerned at the lack of access to records due to the 60 day grace period for the population of Zutec with PCD\records under the contract T&C's.

a) Do you now, with the benefit of hindsight, believe that C&V was carried out prior to handover in respect of the water system?

A I have seen no evidence to support this, other than the water sampling results.

107. Describe the same in respect of verification and the cold-water supply system.

A I don't think my response would be any different from my response to question 105.

108. What C&V of the water system was carried out post-handover?

A 1). Risk assessment by DMA supported by Jim Guthrie.
2). Written Scheme framework for further population by David Brattey (Site Estates Manager) and Jum Guthrie (Estates Duty Manager).
3). Central Plant and Distribution systems Temperature monitoring and data logging (Melville McMillan\Jim Guthrie).
4). System pre-migration Microbiological Tests, e-coli, TVC's & Legionella, (by ward\department\zone).
5). System pre-migration Sanitisation (by ward\department\zone). System Post sanitisation microbiological retest (as detailed above)
6). Cold water end of line dump valve remedial works & tests (Jim Guthrie).
7). Cold water incoming supply remedial works for issues detailed in my report (Eastes Bundle, document 14.1).

a) Who was responsible?

A GGC were responsible most of this except where defect liability applied.

b) How was the C&V recorded?

A There should be records of all of these activities ether electronically or paper copies via the Estates office (Jim Guthrie\Melville McMillan) or in the Capita defect log.

c) Any concerns arising from post-handover C&V? If so, why did these concerns arise?

A The DMA, Risk assessment highlighted multiple areas of concern.

Water System – General

109. What testing and maintenance protocols and regimes were in place? What should have been in place. If it wasn't, why wasn't it? What did you do about that?

A I believed that David Brattey was managing this through Jim Guthrie\Melville McMillan (nominated AP's) and had implemented Testing and maintenance protocols but I do not recall the detail of these Jim & Mel would be better able to answer this question. These protocols were detailed in the Written Scheme included within the Risk Assessment from DMA, where I had asked DMA to prepare the Written Scheme in line with the new draft SHTM 04-01 Part G "Operational procedures and Exemplar Written Scheme" Following receipt of the Risk Assessment and Written Scheme from DMS, I arranged a meeting with David Brattey & Jim Guthrie, Melville McMillan(I don't believe Mel was available for this meeting), myself & DMA to review the RA and Written scheme, where I had tasked David & Jim at the meeting to work with DMA to develop and implement an action plan to address the points raised and populate and implement the written scheme of maintenance.

110. What concerns, if any, did you have about the temperature and movement within the water system? How was this recorded and measured? Who was responsible for this? If Schnieder did these were these reports forwarded to yourself or other GGC employees? How were these reports responded to, what did they tell you? How were issues flagged in these reports dealt with/ resolved?

A From **Estates Bundle, document 14.2** referenced above, there were concerns raised in the DMA RA (Circa: April 2015) regarding commissioning temperature anomalies lack of records and evidence of temperature measurement\monitoring during commissioning, I was also concerned over the volume of stored water being circa 650,000 ltrs and the ability to turn over this volume in a 24hrs period. These issues were recorded by e-mail to Multiplex and included David Loudon, Peter Moir and David Hall. The temperatures for the cold water tanks, DHW calorifiers, DHW flow and return cold water flow were trend logged on the BMS with the support of Schneider, these logs were monitored and actioned by Melville McMillan & Jim Guthrie (Duty Estates Managers), I have seen the print out records of the temperature trends shown to me by Melville but did not monitor them personally. I believe that temperature issues were raised as defects via Capita by Jim & Mel who could provide more detail on this and would be better placed to advise how they responded to temperature issues as they arose. I don't recall them raising any specific ongoing temperature issues with me. With Regards to water movement\stagnation the flushing programme would have maintained system turnover on the filtrate tanks and the raw water tanks, I was not aware of any stagnation evident on these filtrate tanks, although I believe there was an issue with a raw water tank (Jim & Mel would have more detail on this). From memory, I think that with Mel\Jims support we carried out a drop test on the filtrate tanks to establish the turnover during peak time once hospital was occupied.

111. What concerns, if any, did you have about testing and stagnant water being in the system following testing? Please describe and provide information on how this was dealt with.

A Jim Guthrie managed the testing protocol pre-migration and carrying out pre-migration sanitisation with the support of specialist sub-contractors followed by re-testing. Jim confirmed each ward department test results were within set limits prior to their occupation. Concerns over the potential for stagnation were highlighted by the DMA RA, my expectation was that David Brattey & Jim Guthrie would address these issues under the action plan being developed with DMA support.

112. Did you have any concerns about dead ends/ legs in the system? Please describe and provide information on how this was dealt with.

A Not at the time of hand over, the DMA's Risk assessment highlighted risks relating to dead legs, I recall Melville McMillan being tasked to implement a flushing programme to manage these as well as preparing and implementing a plan for their removal.

113. To what extent could the water system in QEUH/RHC have been more comprehensive?

A Due to the system being filled with water so early, the design should have included a suitable continual water treatment system to maintain water quality, This would have addressed the continuity of water quality control of the system pre & post-handover\migration. Although SHTM 04-01 (Part A) V1. Section 15.1 indicates that "The introduction of chemical treatment to the potable water supply is an admission that the physical installation and/or the management process is incapable of maintaining that water supply in a wholesome condition." In my view a system of this size, scale and complexity should have been designed with water treatment included from the day the system is filled with water and SHTM 04-01 should be updated to recognise this and provide advice and guidance for its inclusion in the design, as this statement would deter designers from including water treatment in their designs.

114. If the water system as installed had been operated correctly, would it have achieved the system objectives? In your answer set out what the system objectives were and how these were/ could have been met.

A With Hindsight, if the as installed water system had been operated correctly it could have achieved the system objectives as detailed in HSG 274 (Part 2), namely:

- Comply with legal duties.
- Identifying and assessing source of risks.
- Preparing a scheme to prevent or control Risk.
- Implementing Managing and Monitoring Precautions.

- Keeping Records of Precautions
- Appointing a manager responsible for others.

In order to have achieved system objectives with the system as installed, due to its size, scale and complexity the following measures would have been necessary,

a) Introduction of a suitable automatic water treatment system.

b) Bring the Authorising Engineer Water on board from point prior to handover to support and guide the RP\AP (Note NHS GG&C did not have an AE (Water) at the time of hand over) b)Formally appoint a Responsible person (water), with experience and knowledge of water management.

c) Formally Appoint 2 off Authorised person with experience and knowledge of water management and dedicated to the post contract water management\control & maintenance and to remain in post dedicated to managing the system going forward.

d) Formally appoint appropriate dedicated staffing resource prior to hand over for full training and familiarisation of the water systems and to support the routine monitoring, control, maintenance, and PPM tasks required of a system of this scale, to remain in post dedicated to maintaining and controlling the system going forward.

e) Formally appoint an Infection Control Microbiologist ICD (water), with experience and knowledge of water management to advise and supporting the management and Monitoring of water quality.

f) On the basis that the “water system as installed” The staff detailed above should be in-post at least 6 months (preferably longer) before hand over with access to the site design team, installers, and commissioning team, with full system training and familiarisation, as well as Commissioning and Validation approval status & witnessing of the C&V process and sign off rights.

g) detailed PPM with methodology training for all key items of plant\distribution system.

h) Formal certified training in all relevant aspects of water management and control for each staff group.

i) Preparation and interface of the PPM schedule\task data with the FMFirst LMS by Multiplex as required by the contract in advance of hand over.

j) All contract PCD, Commissioning and Validation records, as fitted drawings, manufacturers data, manufacturers maintenance requirements as well as statutory & mandatory Maintenance schedules available on FM first LMS, before handover.

k) Appointment of water risk assessors to carry out pre-occupancy risk assessment and Written scheme of management, working with the dedicated Authorised Person Water to development and implementation of the RA action plan and Written Scheme of Maintenance, and implemented prior to hand over to allow effective management control from the point of handover, (however this may not be practical under contract law?)

l) Allocation of an appropriate budget for the required resource covering, staffing, contract support, Laboratory services, consumables etc.

m) Staffing to be trained and in post from point of hand over.

115. Describe any ward/area specific water systems used?
a) Detail the individual ward water specification
b) What were/ are your thoughts about this
c) Why, if applicable, did certain wards have different water systems
d) Was there a standard protocol for sanitising water systems?

A Item a&b). Unfortunately, I am not close enough to the system to describe and comment on the ward water distribution (5 years retired). Item
c). the only wards I can recall with different distribution arrangements were the renal wards with dedicated RO loops for patient connected Dialysis machines. From memory all adult ward distribution was the same and all Childrens ward distribution were the same for the ward layout.
d). The sanitisation protocol adopted by GGC for the local sanitisation programme was adopted from Multiplex for the use of Sanosil as recommended by the manufacturer, I believe this was selected to address the risks to the main Membrane water filters feeding the raw water tank as well as the minimising the risk of chemical impact on the Horne TMT.

116. To what extent were the standard protocols for sanitising water systems used on a system of the size and complexity of this one?

A Under normal circumstances this would not be our preferred mode of sanitisation as the recommended strength of sanosil for normal sanitisation is 500ppm for 6 – 12 hours, however if we had adopted that strength of sanitant Multiplex\Horne may have voided the warranty on the Optitherm TMT. I believe that Jim Guthrie adopted the Multiplex protocol for this reason and the fact that the Manufacturer recommended this protocol to Multiplex for the QEUH system.

117. Were consultants brought in to advise on sterilisation of the water systems?
a) Who were they?
b) Had you worked with them before?
c) Describe and comment on the methodology used.
d) Who decided to accept it or not.
e)Did it work?
f) What paperwork or records were kept in relation to their installation, maintenance or flushing?
g) How were these kept on paper or electronically?
h) What equipment for recording work was used by employees doing day to day tasks?
i) How was that then reported back and checked?

A Jim Guthrie would be better placed to answer this question, however from memory

a) Jim utilised the company used by Multiplex, H&V commissioning, I believe Jim used them again for consistency of process.

b). We have worked with H&V many times, mainly on Ventilation commissioning and validation.

c). I do not have access to this methodology Jim could answer this.

d). Jim Guthrie approved this methodology.

e). at the time I was advised that the individual system zone was successfully sanitised and tested ready for migration.

f). Jim Guthrie should be able to provide this detail.

g). Jim Guthrie should be able to answer this detail.

h). for in-house staff they would have used PDA data loggers for the task recording and at that time paper record forms, but Jim could provide more detail on this.

i). The log sheet would have been returned to the planning supervisor who would have shared this with Jim Guthrie for checking\action.

Water Maintenance

Refer to Estates Team Bundle, document 10.

118. Explain the cleaning and maintenance of the water system, taps, drains, shower heads etc. When doing so consider:

a) What is the cleaning regime?

A The cleaning regime detailed in Estates Bundle Document 10, related to the Domestic Cleaning regime under Domestic Monitoring Tool guidance and should be carried out daily and include a 3-minute flush of all tap and water outlets in the room\en-suite. Cleaning and maintenance of shower heads requires 1). Showers heads and hoses should be descaled, cleaned and disinfected or the shower head & hose replaced with a new assembly on a quarterly basis. 2). Thermostatic Mixing Taps (TMT's) should have a quarterly functional test and replace the outlet flow control device. As well as a 6 monthly TMT service exchange maintenance programme including thermal sanitisation as per the Boards Optitherm Risk Assessment following the HPS SBAR recommendations.

i) Can you provide further details on the cleaning regime for taps; when it was implemented, who implemented and why? Was any particular process ever instructed in respect of the cleaning of taps and why?

A The cleaning regime for taps was not implemented prior to the water incident 2018, although I had worked with Horne to develop a service exchange model for functional testing, cleaning and thermal sanitisation of the TMT's and had purchased the equipment to facilitate this, I had delegated the creation of a workshop facility and heat sanitisation facility to David Bratty. I also issued David with a copy of the TMT risk assessment developed by John Green, Sandra McNamee and myself in response to the HPS SBAR. Due to workload

pressures and staffing resource issues David did not deliver on this before he retired, Paul McAllister took over David's post and I requested Paul complete this work which he did. However he also moved on before implementing the maintenance programme and by the time his post was filled the water issue had arisen. The TMT maintenance facility was then operated by DMA under instruction of Andy Wilson\Colin Purdon. The reason for this process being instructed was that it was the only sanitisation method approved by the TMT manufacturer Horne. I had raised my concerns several times that this was not a practical method for maintaining the TMTs to Alan Seabourne\Peter Moir at the TMT selection group. Also, to David Loudon following the HPS SBAR recommendations. I was not consulted or party to his decision to proceed with the existing TMT's with a maintenance regime, against the recommended option within the HPS SBAR.

b) What is the importance of this?

A These programmes are required to ensure that there is no buildup of nutrients\biofilm on the on shower heads & flexible hoses and that the TMT's preform their safety anti-scald function as well as ensuring the complex internal TMT tap configuration and the complex structure of the outlet flow control device do not support the build-up of nutrients or biofilm.

c) What responsibilities did you have a result of this?

A My responsibilities were to ensure that the management structure was in place to deliver monitor and control these requirements. In hindsight given the lack of staffing levels it would have been more practical and effective to introduce continual water treatment following hand over.

d) What did you do to ensure these responsibilities were executed?

A I sought clarification and confirmation from the Corporate General Manager (Designated Person) of the management structure and formal appointment of key post holders.

(i) Who was the Designated Person?

A Mary Anne Kane

e) What issues, if any, did you have fulfilling these responsibilities?

A The shower head\hose assembly sanitisation\replacement programme is a standard procedure, the senior estates manager David Bratty should have implemented this under the RA\Written scheme requirements delegated to him and Jim Guthrie. The TMT (Taps) was more complex to address, during the selection process for the TMT's Multiplex arranged for a product presentation from various manufacturers on TMT products for contract selection the project team were represented by Alan Seaborne, Peter Moir, David Hall and myself. During the presentations of the Horne Optitherm, Horne suggested that their TMT should not be exposed to chemical sanitisation as this would adversely affect the materials used in the TMT and the preferred sanitisation was thermal at system temperature 60C. I challenged this and advised that Thermal sanitisation at system temperature of a system of this size and complexity would be impractical and unsafe. This was further discussed during the final selection of the preferred option however at that time the Horne optitherm was the only TMT with full WRAS approval, the others were all pending approval hence the Honre TMT was selected. I later worked with Horne to develop a service exchange maintenance model for the full maintenance, inspection and manual cleaning, mechanical service, functional testing and finally thermal sanitisation. Jointly we developed a cleaning and thermal sanitisation station which I commission Hornes engineer to manufacture. This also required a workshop and connection to a hot water source with variable temperature control. I also asked Horne to confirm the exposure time for the thermal sanitisation at system temperature (60C), eventually Horne provided a thermal sanitisation curve for Temperature against time were at system temperature the exposure time was 20 minute (again impractical, unsafe and unmanageable in a live ward setting) the curve did however indicate that thermal sanitisation at 70C would be effective after 3 minutes. It should be noted that I worked with Horne to design and develop a sanitisation station for the introduction of a service exchange model this equipment was procured before hand over for development of a suitable workshop and installation of a heat sanitisation loop, after handover\Migration was complete circa June\July 2015. Without knowing the state of the water system before handover. Following Migration I

provided David Brattey with information regarding the proposed Service exchange model and instructed that he create the workshop within a central location of level 3 plant room close to the DHW heat station and develop install the required PHE\controls for this facility. Due to the unprecedented workload and pressured placed on David, although the procurement of the works package was complete the works had not started when he retired, Paul McAlister Who took over the role of senior Estates manger completed these works. This all lead to delays in implementing the service exchange model leading up to the water incident date. In addition this was always going to be a labour intensive procedure, In hindsight given the lack of staffing levels it would have been more practical and effective to introduce continual water treatment following hand over. With regards to Drainage cleaning and maintenance to my knowledge there were no current or historic Estates related cleaning protocols for this element. Following the water and related drainage issues in ward 2A, I recall Mary Anne discussing that domestic staff had previously cleaned drains as part of their remit, however with the introduction of the DMT and associated guidance this requirement had been removed due to the risk of aerosolization of the drain contents.

f) Were there ever concerns raised about cleaning practices? **IMT bundle, document 22**. Detail these concerns. Refer to **NHS GGC SBAR Bundle, page 112** when providing your answer.

A The Documents referred to do not raise issues of water system cleaning practices, the issues raised in Document 22 relate to the decontamination room not being complete, with no hot water, the drainage issue relates to the outstanding defect of the contaminated drainage separation tank etc, unfortunately I cannot recall what the solution to the lack of hot water issue was? Doc 112 Refers to capital works to create a new entrance for the INS building, my interpretation of this e-mail is that there are existing capped water services connections in the INS building at the link corridor that require to be removed. (May have been vending machine connections?).

(i) Were there ever concerns raised regarding cleaning practices?

A Yes; latterly at the ICD meeting chaired by Dr Jennefer Armstrong as recorded later in this statement. Prior to this the issue had not been raised with me by ICT.

g) What, if any, matters regarding the maintenance of the water system were escalated? If so, were they escalated BICC or AICC?

A I am unaware cleaning issues being escalated to the AICC or the BICC.

h) What is dosing?

A Dosing means treating the system or part of the system with chemical Sanitant. This can be a shock dosing (one off local or system shock treatment) to address out of spec water tests or continual dosing (Continual water treatment) to maintain water quality over time. i.e. Use of Chlorine Dioxide

i) Why was chlorine dioxide used in the cleaning regime. IMT bundle, document 30.

A I don't see any reference to cleaning regime or chlorine dioxide in IMT bundle document 30? However, Chlorine Dioxide was proposed as a sanitising agent by water specialist water consultant Tim Wafer (Water Services Group) who was brought in to support the Board to develop a water management solution to the water contamination issues. Chlorine Dioxide is well established in the water industry as effective in controlling organic materials and micro-organisms in both hot and cold-water systems and is supported in HSG 274 guidance and SHTM 04-01 Part A, as an effective means of control. It should also be noted that safe introduction of continuous chlorine dioxide water treatment design, procurement, installation, commissioning process system was planned and managed over an extended period of time, not just a single event.

j) Clearing of drains in June 2018 following water incident -relevance and purpose. **IMT bundle document 27**. Did this resolve the issue? IMT bundle, document 38 why was expert advice required?

A From memory, the water TMT, Taps and showers were all fitted with Pall point of use (POU) absolute filters, but the ICT were still recording patients positive blood cultures this then pointed attention to the drain outlets on the clinical wash hand basins (whb), there had also been black material noticed by staff on a whb drain orifice. The drains were tested for micro bacterial activity and then physically cleaned and sanitised. This had a short term impact but the issue reoccurred and therefore did not resolve the matter. The drainage expert from Germany, I had carried out some research on similar issues and found that a hospital in Germany had experience a similar issue, they found that by chemically treating the whb drain connections on a regular basis (weekly) controlled the situation. However is this regime was not maintained the issue returned . contact with this expert was to learn from their experience.

k) What happened in response to concerns about on-going maintenance and cleaning? What further action did you take personally? For example taps, refer to **Estates Team Bundle, document 121.**

A Document 121, My interpretation of this document is that Mary Anne seeking guidance on the definition of patient high risk areas, but my interpretation is based on this short e-mail exchange. At this stage Point of Use (POU) absolute filters had been deployed pending the introduction of the water treatment strategy. I sourced and implemented the rolling programme of POU filter replacement with DMA support. I also developed and managed the water treatment strategy with the support of Tim Wafer (WSG).

l) What further steps could have been undertaken?

A It is now my belief the application of POU absolute filters was effective in controlling exposure to the water risk, this combined with Chlorine Dioxide continual water treatment to bring the water quality and connected equipment back under control, in addition the chlorine dioxide discharge from TMT to drain would help to control bioburden in the CWHB drain outlet connection. The remaining steps that could improve the situation would be, a) replacement of the CWHB complete with new smooth drain connection design

and b) New TMT complete with bio-guard copper lined open orifice flow control device would minimise the need for intense maintenance cleaning.

119. Were you involved in the decision to proceed with a drain survey? If so, can you explain your role in this decision? What was the purpose of the drain survey?

A I was not involved in this decision but it would have been discussed WTG meeting, the survey was led by Andy Wilson\Colin Purdon, however my understanding was that the survey was to verify that the drainage configuration was in line with that of the as fitted drawings and that these were compliant with the design requirements for Public Health. In addition to establishing if there was any indication of cross contamination between areas connected to the common drainage system.

120. What were the results of the drain survey?

A I do not recall the outcome of the survey, Andy Wilson\Colin Purdon would be able to advise in this.

121. Debris, including sponges, were found in the water tanks; what is the significance of this, if any, in relation to the wider issue of water contamination?

A The debris found in the water particularly the sponge would have become a source of nutrient for micro-organisms and indeed would have supported the formation of a bioburden, this would potentially become a source of system contamination. I believe that this debris was left in the tank following the replacement of the water tank roof supports from hollow pipe supports to solid H section supports as advised under an HFS A Hazard Warning Notice (HAZ). At the time of the notice warning of the risks of hollow pipe support containing stagnant water, the tanks had been filled, I escalated the notice to Peter Moir who issued a PMI for the hollow pipe supports to be replaced. The tanks would have been drained, replacement works carried out, cleaned and sanitised under the supervision of Multiplex. However it should be noted that the debris referred to is quite small in size compared to the volume of the

tanks and would be hard to spot if the inspector did not enter the tank prior to cleaning\sanitisation.

122. Concerns have been raised regarding the hospital design and the increased risk of water contamination; what is your view on the increased risk of water contamination in relation to the following:

a) Having a single barrier approach water system, resulting in fluctuating water temperatures?

A The preferred barrier control regime within the NHS is temperature control, however this is vulnerable to temperature fluctuations on both Domestic Cold Water Services (DCWS) and Domestic Hot Water Services (DHWS). The ideal conditions for microbial activity in water are between 20 – 45C, The DCWS requires to be maintained at below 20C and not rise by more than 2C above the incoming mains temperature in summer this can exceed 24C, leading to a loss in single barrier temperature control. Likewise DHWS should be maintained at 60C flow and minimum 50C return, however issues with CHP plant\Boiler plant, Calorifier stations and controls problems all can all have a detrimental impact on the ability to maintain the single barrier temperature control, which is exasperated further by the lack of staffing resources required to effectively monitor and respond to these fluctuations and failure to maintain the required temperature control regimes. From the experience at the QEUH\RHC, I am firmly of the belief that a dual barrier system should have been included in the original design to maintain double barrier regime of temperature and continuous chemical (Chlorine Dioxide) control. Providing a more reliable approach to maintaining system control. This would have also addressed concerns over the use of TMT's with flow regulators fitted. Finally it would also be appropriate to add a 3rd Barrier approach by including POU filters in the original design for designated high risk wards. with potential for this 3rd barrier being withdrawn once the efficacy of the double barrier system has been proven.

b) Ensuite bathrooms attached to each room?

A Single room design is intended to provide a higher degree of infection control between patients, which for a standard single room, requires en-suite shower,

WC facilities and WHb as well as a CWHb in the patients bedroom for clinical use. Due to the single occupancy these outlets potentially all become seldom used outlets potentially introducing a level of stagnation, which should be addressed by the daily flushing protocol, which is included within the DMT cleaning regime, this flushing regime would also be required to be maintained in order to ensure efficacy of the above double barrier proposal. It is difficult to see how to reduce the need for ensuite facilities while controlling the risk of cross infection between patients from shared facilities.

c) Overprovision of water outlets leading to sink removals?

A As per my statement above, the water services are essential for single room design, I am not aware of any patient room outlet removals, there were some ancillary areas in the basement where sinks were removed as non-essential and long pipework runs reconfigured to reduce the risk of dead legs.

123. How involved were you in the decision to use point of use filters?

A Following the concerns over the water quality being linked to patient blood work results, I was therefore asked by Mary Anne Kane to join a telephone IMT held on a Saturday (I don't remember the date. Peter Hoffman (Public Health England) was also on the IMT call as an environmental\public health expert. As part of the meeting we discussed the placement of POU absolute filters on to the outlets this would contain the system contamination and to control patient exposure, although it does not address the source of the problem it is an effective control measure for the patient environment. I was tasked from this IMT to quickly source and install POU filters in the identified rooms ward 2A. I managed to source these direct from Pall filters (industry leaders with high quality and integrity tested standards) for delivery on the Monday. I also arranged for DMA to manage and record the installation process for a rolling replacement programme.

124. Who was responsible for the effective management of and installation of the point of use filters?

A After initial sourcing Andy Wilson\Colin Purdon took over the management of the process with the support of DMA.

125. Did the point of use filters meet the water regulation requirements? Did they have an effective gap between the water level and the filter to prevent contamination?

A Yes, the POU filters are certified and meet with the water fittings regulations and there was an effective gap between the water filter and the CWHB water level. I had obtained an reviewed all Pal Filter certifications at the time of procurement.

126. Why were the point of use filters not introduced earlier?

A From memory I believe that the Blood cultures had not been proven to be linked to the water up until this point.

127. How often were you aware of the filters being changed? Were the manufacturer's recommendations followed?

A From memory the POU filters were changed after 25-30 days based Manufacturer guarantee of 31day working life and allowing for access issues etc.

128. How involved were you in decisions relating to water testing?

A I was involved in setting the test requirements pre-Migration with Jim Guthrie & Melville McMillan, ongoing testing was carried by Jim following the Board water testing protocol. Water testing during the subsequent water incident were instructed by ICD regarding the organisms they were looking to trace\link to cases.

129. If not, who was responsible for these?

A I was responsible for water testing up until Jan 2017, then Andy Wilson took on this responsibility as Sector Estates Manager.

130. What do you understand about management of water testing? What do you understand about decisions on when water testing should be undertaken?

A The management of water testing is delegated to the Authorised Person (water) under the NHS GGC water policy, who should maintain records of

tests and formally report to the Responsible person (water) and the ICD of any repeated out of spec results, whereby an IMT may be formed to respond to and address the out of spec issues. Water testing Standard water testing should be undertaken:

- On newly commissioned systems.
- Before occupation by patients.
- Change of use of the ward\area
- Change of system configuration.

Other Pathogen tests as instructed by ICD.

Routine testing should be undertaken:

- High risk patient area's
- Engineering risk area's
- As Instructed by ICD\ICT

a) Please name relevant place and title holders for water i.e. Authorised Person etc

A Designated Person: Mary Anne Kane.
Responsible Person: Ian Powrie
Authorised Person: Jim Guthrie, Melville McMillan, Tommy Romeo
To my knowledge none of the above were formally appointed in writing or trained prior to hand over.
ICD: Dr Terresa Inkster.

131. In her statement Dr Teresa Inkster states *'there was a direction from Mary Anne Kane, who was at senior director level, not to give microbiologists access to water testing results'*:

a) What is your reaction to this statement?

A I don't recall any direction of this nature coming from Mary Anne to me.

(ii) Do you recall such a direction coming from another member of staff, if so, whom?

A No, I was never asked to withhold test results from the microbiologists.

b) Why did estates direct that microbiologists should not have access to water testing results?

A I don't recall Estates making such a direction.

c) Have you ever been advised not to contact someone/ not to provide water testing information? If so, when? By whom? and why?

A I don't recall ever being directed to withhold water test data.

d) Have you ever refused, or directed others to refuse to provide water testing information requested by microbiologists or infection control? If so, why? Provide as much information for your rationale and the consequences of withholding information.

A No I have never refused or directed others to refuse to provide water testing information requested by ICT or ICD's, I worked closely with the ICT and ICD's and supported them in whatever data they asked me for.

e) Provide information on how you dealt with requests for water testing results from microbiologists and infection control - was all the information requested provided? If so, what was provided? If not, why was paperwork not provided?

A When ICD requested water testing result, directly to me, I would pass this on to the Estates manager responsible for testing, to arrange for the sampling and provide the ICD with the results of the tests requested. Q130F). From HSG 274, the Legal requirements that must be complied with are COSHH, Management Regulations & HASW . Q130g). Microbiological monitoring of domestic hot and cold water supplied from the mains is not usually required, unless the risk assessment or monitoring indicates there is a problem. Q130h). I believe from feedback via David Brattey\Jim Guthrie that there were a small number of area's e.g. ward relative rooms and renal emergency connections that showed low level legionella results and that these were being treated and managed, this was not provided to me in writing. Q130i). I suspect that this relates to a leak that occurred around that time in ARU2, the leak was found to be a corroded and pin holed carbon steel pipe installed as a link pipe on the cold water stainless steel system between two modular service units. This pipe should not have been installed on the domestic cold

water service and was reported as a defect and escalated to David Loudon regarding the potential for similar issues across the DCWS system. The zone affected was isolated and patients relocated to allow remedial works to be carried out over the weekend by Multiplex\Mercury with sanitisation of the zone carried out by H&V. the system was then sampled after sanitisation. I am not sure if we had the results when Christine Peters asked for them however they would have been made available when they were received.

f) What legal and regulation requirements must be complied with to carry out regular water testing?

g) What situations would water testing not be carried out?

h) What are the consequences of regular water testing being carried out?

i) Dr Christine Peters tells us that in April 2016 water testing results or ARU2 were not available. To what extent is this accurate? If it is accurate, why were results not available, and should they have been?

132. Both Dr Penelope Redding and [redacted] tell us that they asked for information which was not forthcoming. To what extent do you agree with their recollection of events? If you agree, why was testing information not provided to clinical staff, microbiologists and infection control?

(i) Do you agree with the above statement? You can refer to your previous answer in 131 if you feel that this is of assistance.

A I am not clear as to what information Dr Redding and [redacted] are specifically referring to so cannot agree. However, this issue was raised at the Jennifer Armstrong meeting, and I think my response was that this could be due to changes in personnel in both the infection control and Estates teams. I was not aware of such issue being raised in the day-to-day operations and believe I had a good working relationship with the ICD\ICT and therefore would have expected someone to discuss these concerns with me before they were escalated.

a) Who was responsible for dealing with these requests for information?

A I not sure what this request is referring to and who the request was made to? But this would normally be the Authorised Person (Water).

b) What was your role in dealing with these requests for information?

A I would only be involved if the request was made directly to me or if I was asked to follow up on a request, generally the request would go directly to the Authorised Person (water) or via David Brattey as senior Estates Manager.

c) How were these requests for information managed by your department? What steps did you take?

A The request was usually by telephone or e-mail (depending upon the urgency) to David Brattey or Jim Guthrie or on some occasion myself (usually from Dr Inkster), If I received the request I would pass it the AP to arrange collection of the samples and processing via the accredited lab services. On receipt of the results the AP would copy them to the ICD\ICT that requested them.

d) What concerns, if any, did you have with how matters were being handled? If so, what steps did you take in response to these concerns?

A I am not sure of what time frame we are referring to here, but during 2015 – 2017 I was not aware of any issues with tests not being processed as requested.

e) In her statement Dr Teresa Inkster tells is that on 8th December 2015 she contacted you and William Hunter '*In this email, I requested back dated water results for the QEUH to the date when sampling commenced. I did not receive these water results until much later at the Water Technical Group ("WTG") in around April 2018.*'

i. To what extent is this statement accurate?

A I do not recall this request but have no reason to doubt Dr Inkster recollection.

ii. If it is accurate, why did you not provide the information?

A Unfortunately, again due to time lapse I do not recall this but cannot see any reason for not providing this detail.

DMA Canyon Reports

Refer to **Bundle 6 – Miscellaneous documents – documents 29 and 30.**

133. Was this the DMA Canyon 2015 report (Bundle 6 – Miscellaneous documents, document 29)?

A Yes.

134. Can you confirm that you ordered this report?

A Yes.

135. Who else knew that you had ordered the report?

A David Loudon, Mary Anne Kane, Billy Hunter, the project team, David Brattey, Jim Guthrie, Melville McMillan.

a) can you clarify whether this was at the time the report was ordered, or whether the awareness was retrospective?

A This was at the time the report was ordered.

136. Where was the report delivered to?

A It was delivered to me at my office.

137. Who received a copy of the report from DMA Canyon in 2015?

A David Brattey, Jim Guthrie.

138. Who signed off on payment?

A I did.

139. How was this report signed off or payment processed?

A Payment process via e-mail to Estates office clerk (Angela Jackson).

140. What did you do when you first received the report?

A I arranged a briefing meeting with DMA, David Bratty, Jim Guthrie, Melville McMillan (I don't think Mel was available to attend this meeting) & myself. The report was tabled by DMA at this meeting, following a brief overview from

DMA, I tasked David & Jim to work with DMA to develop and implement the action plan to address the issues raised in the Risk assessment as well as populating and implementing the Written Scheme of Management within the Risk Assessment.

141. Did you read it?

A No.

a) Why did you not read the report? Should you have read it?

A I had intended to read the report, but I didn't manage to fit it in. Yes, I should have read it.

142. Then what did you do with the report?

A David & Jim each took a copy and I held a copy.

143. Did you store the report in your office? If so, where? If not, where was it kept?

A Yes I kept a copy in my office file rack. (Q143). No I did not show it to anyone at the time but DMA later advised that following on from meetings with David\Jim that they needed the schedule of formally appointed staff to populate the Risk Assessment\written scheme and David\Jim could not provide this detail. I wrote a schedule based on who I expected to be appointed and e-mailed it to Mary Anne Kane, advising that DMA required this for inclusion within the Risk Assessment\Written Scheme as well as confirmation of the formal appointment. Mary Anne advised that the schedule was broadly correct and she would have this ratified at the next AICC.

144. Did you show it to anyone else or discuss it with anyone else at the time?

A No

145. Did you send a copy of the report/ show the report to your line manager/ superior? If yes, please confirm who you sent it to and what action they took. Showed the report to and what action they took. If not, please explain why not.

A No I did not share the report with my line managers, (was reporting to 3 different managers at this time), from memory my intention was to submit the

Risk assessment and Written scheme along with the action plan and populated written scheme of management.

a) Did you, or anyone else at the time of the 2015 report escalate any matters realised within eh report with Infection Control colleagues? If not, with the benefit of hindsight should you have? What, if anything, would sharing the report with Infection Control colleagues have achieved?
I did not share the report with infection control and to my knowledge neither did David Bratty or Jim Guthrie. Yes, in hindsight this should have been shared with infection control. Sharing this report would have opened a dialog where the action plan could have been fully developed.

146. What was the purpose of the report?

A The purpose of the report was to comply with the requirements of L8, HSG 274 & SHTM 04-01 (part B) by risk assessing the water system and developing a written scheme of maintenance for the management and control of the water system.

147. How long were DMA Canyon present at QEUH/RHC site between 2015 and 2018?

A I believe that DMA Canyon were on site throughout 2015 but not constantly, working with David\Jim on the RA action plan, and Written scheme. I also understand that they were on site during 2017 /18 although I was not party to the further iterations of the RA, I was involved commissioning their support for the placement and management of the POU filters.

148. How many times did DMA Canyon mention the report during their time on site between 2015 and 2018? If so, when and what was mentioned?

A I recall having one meeting with DMA regarding the schedule of formally staff, other than that I had very few meetings with DMA, David Bratty & Jim Guthrie were working with them on the RA\Written scheme action plans, I know these meetings were on going as they would use my office.

149. The report made several recommendations, what did you do to follow up on these recommendations between 2015 and 2017?

A I delegated the development and implementation of the RA action plan and Written scheme population to David Brattey and Jim Guthrie, I asked DMA to support them with this at our initial briefing meeting. I did not spend much time on this as I was heavily committed to other major problems and ongoing defects.

a) What follow up or check-ins did you put in place to follow up on the work being carried out? If you did not put follow-ups/ check-ins in place why not?

A I did not formally follow up on progress, I should have done so. The reason for not doing this was the sheer volume of issues requiring my input and pulling on my time. Again, I would refer to the extended hours I and my team were working. I did receive verbal feedback from David Brattey that works were on going to address the report, I know that the meetings with DMA were ongoing because David used my office to hold these meetings.

150. When were the works suggested in the 2015 report actioned?

A I believed at the time David\Jim were pushing on with this and received verbal confirmation from David that this was in hand.

151. Did you create an Action Plan?

A Q151). No, I had Delegated that task to David Brattey\Jim Guthrie who should have been appointed as Depute RP and AP water, respectively.

152. Who was tasked with carrying out the necessary work detailed in the Action Plan?

A Q153).David Brattey & Jim Guthrie were delegated the task to develop and manage the works required in the action plan.

153. If you created an Action Plan who else was aware of the plan?

A N\A

154. If you did not create an Action Plan, why not?

A I had delegated this to David Brattey & Jim Guthrie and expected that they were working on it, I did touch base with David on this verbally and he advised that they were making progress.

a) Did you see any evidence of progress having been made?

A I had verbal feedback from David Brattey that progress was being made with the action plan and that meetings with DMA were ongoing, but nothing tangible about actions being taken.

155. What is your own view of the findings of the 2015 report? Do you agree with it or not? Explain your rationale.

A Having read the report retrospectively 2018, I would have agreed with the report and would have been concerned with these findings. Having worked on the water system from 2018 to 2019 to address the systemic issues, I was involved in addressing many of the issues raised in the 2015 DMA report.

156. Refer to the **Estates Team Bundle, document 14:**

a) What is this email about?

A This is an e-mail to David Wilson Multiplex Commissioning Manager regarding issues identified by DMA as part of their risk assessment survey.

b) To what extent was this email connected to the DMA Canyon 2015 report?

A This is almost entirely related to issues identified by DMA in the preparation of the DMA report and written scheme.

c) At this point did you refer to the 2015 DMA Canyon report? If so, why? If not, why not?

A Looking at doc 14 date and the wording of the e-mail, I would say that this e-mail was to clarify commissioning issues in order to complete the written scheme. The DMA Canyon Risk Assessment\written scheme had not been issued at this time therefore they were only referred to as our risk assessors.

157. What concerns, if any, did the water testing raise? To what extent did these concerns feature in the DMA Canyon 2015 report?

A My understanding at the time from Jim Guthrie was that the results were generally within expected parameters and where results were out with expected parameters the sanitisation programme addressed these. From my retrospective review of the DMA RA provided within these documents under the Microbiological sampling, DMA confirmed that there was a microbiological sampling regime in place, testing prior to patient migration, with Legionella & potable samples included. DMA confirmed that the sampling regime adequately reflects the complexity and scope of the water system. They also note that there were a number of out of specification legionella and potable results with a responsive programme of daily flushing and local disinfections under way in affected area's

a) The Inquiry understands that DMA Canyon identified a lack of PPM. Did a lack of PPM impact on operational Estates? What caused the lack of PPM? How did this in turn impact the operation of the water system at QEUH/RHC?

A Yes, the lack of PPM would have a detrimental impact on the requirements of the operational estate's maintenance. The contract required that Multiplex provide the full asset register, PPM programme, detailed work schedules and populate these into the NHS GG&C CAFM system (FMFirst). This was not provided as required under the ER's. What was provided was an asset register and list of PPM schedules in a manual format within Zutec. This was difficult to extract and utilise affecting the delivery of Planned maintenance. Operational Estates did not have the resources to generation PPM and populate our CAFM system to address this issue in an appropriate time scale, especially as the data required to be reformatted for migration to FMFirst. I have addressed my input to this elsewhere in this statement. The rationalisation and formatting of this data was carried out by me with the support of IT under instruction from Mary Anne Kane, and ultimately added to Allan Gallagher's role for implementation under the adoption of a SFG20 maintenance strategy.

158. DMA Canyon prepared another report in 2017 **(Bundle 6 – Miscellaneous documents , document 30)**. What works, if any, recommended in the 2015 were carried out prior to the 2017 report?

A I had no role in the 2017 report or action plan, I have not seen this report until now. Although I see my name is recorded as having an input, I did not. It would appear that there was no significant works carried out from my reading of the gap analysis, the Estates Team advised that works had been carried out but did not provide evidence. DMA advised that "Corrective actions are as a matter of immediate urgency to ensure an accurate & compliant Written Scheme is compiled and appropriate PPM schedule implemented" Looking at the Estates team response to the GAP analysis questions, there is a lack of understanding regarding the policies and responsibilities for the water system.

159. What happened with DMA Canyon in 2017 – discuss and provide as much detail as possible. Who dealt with matters, what was your role and when did you become involved? Who sanctioned the works in 2017 report?

A I cannot answer this question as I was not aware of or involved at any stage with the 2017 Risk Assessment.

160. What was the impact, if any, of the failure to implement the 2015 recommendations on patient safety?

A The failure to implement the 2015 recommendations was a missed opportunity to attempt to manage and control the condition of the water system as delivered by Multiplex under the contract, potentially exposing patients to contamination risk

161. In her statement Dr Teresa Inkster states that you told her 'you felt like you were being made a scapegoat for them, and that it had been suggested that it might be time for you to retire'

a) To what extent is this statement accurate?

A I do not recall this discussion, but I may have said that I felt like a scape goat.

b) If it is accurate, why did you feel like you were being made a scapegoat and for whom?

A I was under investigation over my failure to escalate the 2015 Water risk assessment, and I felt that the organisation had not provided me with the resources or support to allow me to specifically focus on this issue against the size and scale of other managerial issues I was faced with during Operational Commissioning, Migration, and the operational requirements of the campus, incomplete contract works etc, as well as the scale of and complexity of defects, addressing contract permit omissions, etc it should also be noted that during that extended period I was working 12 - 14hrs days 7 days per week.

i) What was the outcome of the investigation? Was any further action taken? Was anyone else within the Estates team or otherwise investigated?

A I did not see the investigation report and I was not aware of the outcome other than being verbally advised by Tom Steele (Director of Facilities) that the investigation was complete and there would be no action taken against me. No one else was investigated but others were interviewed as part of the investigation.

c) Who suggested that it might be time for you to retire?

A I don't recall anyone suggesting I should retire, this was a decision I made personally with my wife who was concerned for my health.

a) How did you feel about suggestion?

A N\A

161. We understand that Infection Control were only advised about the 2015 DMA Canyon Report in 2018. Why were they not told sooner? What happened?

A I did not escalate the report, at the time I believed I had initiated works to address the issues raised in the report, with the intent that I intended to submit the report with the action plan prepared, however events and workload overtook me and distracted my attention from this matter.

162. Whose responsibility was it to be satisfied that the risk assessment had been carried out? Explain how you were satisfied that the appropriate risk assessment had been carried out prior to patient migration to QEUH.

A From SHTM 04-01 (Part B) The responsibility to be satisfied that the risk assessment had been carried sits with the Authorising Engineer (it should be noted that NHS GGC did not have an Authorising Engineer at this time) and the Water Safety Group. I was satisfied that the pre-occupancy risk assessment was carried out by a competent company "DMA Canyon" with relevant training & experience and accreditation for water risk assessment within the healthcare environment, with particular previous experience within NHS GGC.

163. Dr Christine Peters also states that she asked for *'asked for risk assessments for waterborne infection in the QEUH and they were not forthcoming from the Project Management Team, Estates, or Mary Anne Kane.'*

a) Do you recall being asked for this information? Did you provide the information requested? If so when and by what means? If not why not?

A I do not recall being asked for the Risk Assessment from Dr Christine Peters nor the project team, David Loudon or Mary Anne Kane. If I had this would have prompted me to share the report.

February 2016 – Sinks – Ward 2A

In early 2016 a PAG took place regarding the *'Contamination of aseptic pharmacy unit at RHC water supply with Cupriavidus pauculus'* a subsequent investigation linked the infection to sink within the Aseptic Pharmacy Unit:

164. What was your understanding of this incident?

A Form memory, patient blood works indicated positive for Cupriavidus pauculus, this was traced to a product produced in the aseptic unit. Following which I believe that Dr Inkster requested water sampling of the aseptic unit. Jim Guthrie carried out the sampling requirements\working with Dr Inkster. The results tested positive for Cupriavidus pauculus from the Thermostatic Mixing Tap (TMT) on the wash hand basin (whb) of the aseptic suite air lock\changing area. As far as I am aware none of the other tests were positive. Dr Inkster's conclusion was that this was a seldom used outlet and had been contaminated externally, not from the system. Dr Inkster indicated that this whb was not required within the changing room and requested it be

removed. Jim Guthrie arranged for the removal of this whb removing the pipe work back to the main branch.

165. What was your involvement with this matter?

A I was the 1st point of contact from Teresa and I instructed Jim to provide support to Teresa.

166. Do you recall anyone taking action, if so what, in relation to this incident?

A Dr Inkster's conclusion was that this was a seldom used outlet and had been contaminated externally, not from the system. Dr Inkster indicated that this whb was not required within the changing room and requested it be removed. Jim Guthrie arranged for the removal of this whb removing the pipe work back to the main branch, ensuring that there was no dead leg pipework remaining. The pipe work would have then been sanitised locally.

167. Do you recall any further issues in relation to sinks? If so please discuss, confirming your involvement and action taken in response to any issues.

A I don't recall any other issues at that time.

Water Incident 2018

168. Walk through the concerns as they emerged in 2017 into 2018 in respect of the water issues. Initially focus on your recollection of events as they happened. In relation to the concerns:
a) When did the concern arise?
b) Nature of concern?
c) Possible cause of concern?
d) Action taken in response to concern?
e) What actions were taken in response to concern?
f) How sufficient were these actions?

A Jan 2017, I was redeployed to the Depute General Manager Estates post and was not involved or aware of water related issues raised from then on until March 2018. March 6th, 2018, I was asked by Mary Anne Kane to attend a water related IMT for ward 2A. (please note I am using the IMT bundle to

establish the dates detailed here). I can't respond to any issues arising during this time.

169. The following IMTs have been highlighted to assist with this. If you are also able to respond to the questions raised in respect of the IMTs below when considering your recollection of events.
Refer to **IMT bundle, document 13: Cupriavidus bacteraemia in ward 2A at the end of January 2018**

a) What do you recall of this incident/ issue?

A I recall this incident, although I was not at the IMT referred to in Doc 13. The concerns were initially related to one patient tested positive for Pseudomonas and that this was linked to a positive test result from a water outlet (TMT) this developed over the next few weeks to patients testing positive for other Blood stream infections and further evidence of multiple positive tests for organisms on the TMT's\Shower heads. Initial thoughts were that the flow control devices were contaminated, and the contamination was being transferred by to patients by personal contact.

b) When did it begin?

A March 2018

c) How did it come to light? Who first reported the incident?

A I am not aware of who first reported this incident, my first knowledge of the incident was when I was asked by Mary Anne Kane to attend the IMT on the 6th March 2018 where I believe Dr Inkster was investigating the source of a patient's blood infection from Cupriavidus.

d) What was your involvement?

A I was involved in providing technical support and advice in assessing and addressing the control measures as they developed.

e) Did you ever ask about replacing all the taps within Ward 2A? What did you do? Did you discuss this with anyone else? What was the outcome?

A Yes, there are two issues here, first of all as part of the initial response to the TMT contamination the taps were replaced with the same make and model. Secondly further down the line through the Technical Water Group (TWG) review, I suggested as part of a ward refurbishment that the plumbing services be reconfigured to accept a different Markwik 21 TMT which did not have a complex structure flow control device but had an open orifice bioguard outlet reducing the risk of biofilm developing on the outlet. This proposal was accepted, and a ward refurbishment arranged to support this proposal.

170. Refer to **IMT bundle, document 16: Multiple positive results Cupriavidus and now Stenotrophomonas,** Dr Inkster states that the test results are from taps which have not been replaced in rooms 15 and 26. Shower head in room 12. At that IMT no cause for patient concern.
What was done as result of this meeting and why?

A I was not at this meeting, Estates were represented by Alan Gallacher, Colin Purdon & Paul McAlister, Mary Anne Kane was also in attendance. Manpower was increased to complete the service exchange programme of TMT's in the remaining rooms, 20 of TMT's completed by Wednesday 14th March and shower heads replaced by disposable shower heads over night Tuesday 13th March, this allowed for system sanitisation by end of play on Wednesday 14th, allowing 48 hours for resampled water cultures.

171. Refer to **IMT bundle, document 17:**

a) Your involvement and what measures were taken?

A I was involved in arranging a). sourcing procuring and managing the installation of POU water filters. b). Arranging for water samples from - QEUH bulk water storage tanks. – DSR water samples from the wards identified at the IMT. – Water samples from the Maternity and INS independent water supplies.

b) Did you discuss this with David Loudon?

A From memory, I discussed these issues with Mary Anne Kane who was acting DoF, as David Loudon had left NHS GGC.

c) Do you recall anything about how matters were managed?

A I recall receiving a telephone call from Mary Anne Kane on Saturday (I think the 17th March) asking if I could join a teleconference being held with Dr Jennifer Armstrong, Dr Teresa Inkster, Mary Anne Kane, Peter Hoffman, Public Health England. (I can't remember if anyone else was involved in this meeting) The focus was to accelerate the actions to bring ward 2A back under control and take specialist advice from Peter Hoffman on the issues we were experiencing and the deployment of POU filters. From here over the weekend I managed to make contact with the Pall filter sales Representative for Scotland, (I think Peter Hoffman recommended Pall filters) and secured sufficient Aqua safe filters to meet the targeted outlet on a first pass, with the filters on site ready for deployment from Monday 19th March.

d) How were costs managed?

A I produced a cost model spread sheet to monitor and forecast the materials and support costs going forward, I worked with the Facilities finance manager to keep track of costs and funding requirements, these reports were shared with MAK.

e) Who carried out the work?

A DMA Canyon, filter installation and replacement programme (in line with the stated filter expiry date), water sampling programme as well as the disposable shower replacement.

f) How was this reported and managed?

A This was reported via the IMT and ongoing management taken over by Andy Wilson\Paul McAlister.

g) How involved were you in the decision to use bottled water for handwashing and drinking? Discuss your knowledge and involvement surrounding this matter.

A This was an infection control\soft FM Management issue I did not contribute to this discussion.

172. Refer to **IMT bundle, document 18:**

a) As above, what was the outcome of this IMT, your involvement, actions and how you followed it up.

A The outcome indicated several areas for consideration as a way forward namely:

a). Baby Feed could have its supply transferred to the Maternity which already has a Chlorine dioxide water treatment system installed but would the production process would need protected from the chemical treatment by Carbon filter media, Proposed by me, Colin Purdon to verify.

b). I also suggested that we should consider the replacement on the TMT's with Markwick 21 complete with open copper line orifice rather than a complex flow control device.

c). Mobilise the supply and fitting of POU filters for ward 4B when confirmed by ICD (Colin Purdon. I Confirmed that POU filters are currently 31 day life expectancy but we could consider 61 day POU, I also carried out cost modelling on these options plus an alternative 91 day filter from another Manufacturer, if I remember correctly I later produced an option paper for this.

d). I communicated concerns over accuracy of pre and post sample labelling to DMA for inclusion within the sampling protocol.

b) What concerns, if any, did you have about Stenotrophomonas impacting patient safety at this point?

A I do not have a clinical background to interpret the impact of this organism over any other organism on patient safety, however given the patient group being immunocompromised I would be concerned that any microbiological exposure be identified and controlled as a matter of urgency.

173. Refer to **Estates Team Bundle, document 121;** how does this link to the IMT? Was this as a result of what was being discussed? What happened following this email?

A My interpretation of this e-mail is that Mary Anne Kane was seeking guidance of what patient areas should be deemed high risk. The ICT\ICD should define the high-risk patient groups for each hospital site. I am not aware of the outcome of this mail chain.

174. Refer to **IMT bundle, document 19:**

a) As above - the fitting of water filter – discuss – why were these filters not on the taps initially?

A I am not aware of POU filters being considered as part of the system design parameters. With regards to Operational arrangements, POU filters had not been fitted to high-risk areas previously as there had been no indication contamination from routine water sampling within these area's and therefore no perceived need from the ICD for POU filters until the water incident. POU filters were not recommended as part of the HPS Pseudomonas Guidance.

b) Do you have any knowledge of dosing the system with silver nitrate? How did this discussion come about?

A My interpretation is that silver nitrate was misquoted in the minute and should have read Silver Hydrogen Peroxide or Sanosil.

(i) Please explain the use of Silver Hydrogen Peroxide or Sanosil in dosing the system, your understanding of why this was done, and your involvement.

A Silver Hydrogen Peroxide (Sanosil), is a sanitising agent used as a shock treatment in water systems to kill microbiological activity. This was carried out in an attempt to bring the local ward system back to a baseline free of microbiological activity. I was not involved in the arrangements or the delivery of this procedure.

175. Refer to **IMT bundle, document 20:**

a) This was scored HAIIT red – why?

A As I understand it, the HIIAT was scored Red as per the HAIIT protocol, because the ICD\clinicians deemed the need for patient intervention to be high.

b) What were the concerns?

A From this and previous minutes it looks like 3 patients were on treatment for Stenotrophomonas. Concerns that although multiple organisms were identified from samples taken, the patient Stenotrophomonas organism was not linked.

c) You were asked to look at the historical water results during the commissioning of QEUH/RHC, what did you find out as a result? What concerns, if any, did the historical water results raise?

A I was not at this meeting, from the minute Mary Anne Kane was tasked with taking this forward, I do not recall being asked by Mary Anne to assist with this. I am not aware of the outcome of this review.

d) You emailed on 26th March 2018 – **(see Estates Team Bundle, document 124)** seeking information regarding the commissioning – what response was received? What did you do in response to this?

A This document is not from me and does not relate to commissioning?

(i) Do you recall providing the information requested by Mary Anne Kane?

A Yes, I provided the DMA Risk Assessment and Written Scheme as requested by Mary Anne.

e) Why was this not discussed at the next IMT?

A I am not sure as I don't have the correct e-mail to reference.

f) Refer to **Estates Team Bundle, documents 125 and 133** what was the relevance of these document to the water incident?

A Document 125: seems to relate to a question raised by Annette Rankin to Mary Anne Kane regarding the routine cleaning protocols for drains, Mary Anne confirmed the drains themselves are not part of the cleaning protocol, the surface of the drain is cleaned by domestics, with Estates dealing with blocked drain issues. This question I think has come out of the IMT meeting of the 27/3/2018 where one hypothesis tabled by Dr Inkster that the outlets could be contaminated from back flow from the drain, but with no evidence of this the hypothesis was discounted at this time by Dr Inkster. Document 133: The relevance of this document to the water issue revolved around the potential contamination of the outlet from erratic water flow from the POU filter hitting the CWHb and causing aerosolization from splash contact from the surface of the CWHb which may have been contaminated from water contact\backflow from the clinical drain connection.

176. Describe any other issues or matters arising from the water incident:

A This is difficult to recall without any point of reference

Taps

177. The use of Horne Taps was discussed in the IMTs relative to the water incident. IMT Bundle.
Please confirm:

a) Your understanding of use of Horne taps.

A The use of the Horne tap was required to provide a tap for clinical use that delivers water at a safe discharge temperature for vulnerable patients to protect them against the risk of scalding from a DHW service running at 60C, this is known as a Thermostatic Mixing Tap (TMT).

b) Who authorised the use of Horne taps?

A Peter Moir\David Hall would have formally approved the Horne TMT on behalf of the Board.

c) Why were Horne taps selected?

A The Horne tap was deemed to cover all of the functional requirements and it was the only TMT from the options proposed that held full Water Regulations Approval Scheme (WRAS) certification all of the other options were pending approval.

d) How involved were you in the decision to use Horne Taps - **SBAR Bundle, document 1** - please discuss your involvement and understanding.

A I attended the TMT product presentation\selection meeting where Multiplex had sourced 3 or 4 TMT's from different manufacturers for consideration for use on the project, once these options were proposed to the Board project team a joint selection panel was convened with representatives from the Project team and from Multiplex, each manufacturer was scheduled over the day to present their respective offerings, to allow for the panel to assess and determine which product suited the needs of the project best. At the Horne presentation the panel was advised that it was Hornes recommendation that

their TMT should be thermally sanitised and not exposed to chemical sanitants as chemicals adversely impacted on the materials used in the TMT manufacture. Thermal sanitisation could be achieved at system temperature (60C). I raised concerns that thermal sanitisation of the TMT insitu on the system in a working hospital environment would be impractical and unsafe give the size of each DHW distribution zone. (Note I cannot see the relation of SBAR document 1 with this question on the selection of Horne TMT?).

e) What is your recollection of the use of Horne taps.

A I believe that the Horne TMT was easy to use and popular with the clinical staff, unlike other TMT's it allowed for individual cold or blended operation. There were no indications at this time that this TMT had any issues.

f) At the time, were you aware of the incidents in Northern Ireland with Horne Taps?

A No I was not aware of the Northern Ireland incident at this time, HPS Guidance in response to this incident was not published at this time.

g) If so, why did you decided to proceed with the installation of these throughout QEUH/RCH? What was the deciding factor?

A N\A

h) In her statement Dr Teresa Inkster tells us that following the 2014 taps SBAR a meeting took place *'which was chaired by Ian Stewart from HFS and attended by Lisa Ritchie, Jimmy Walker, Ian Storer, Ian Powrie, and Alan Gallagher from the Board, is that the tap manufacturers (Angus Horne and John Horne of Horne Engineering) were allowed to be present at a meeting at which they were risk assessing patient safety in light of the issues with Horne Engineering's product'.*

To what extent did this meeting influence the decision to use Horne Taps? Please explain you recollection of the meeting, and any actions taken following the meeting and the extent of your involvement:

A Following the publication of the of the HPS Guidance for neonatal units (NNUs) (levels 1, 2 & 3), adult and paediatric intensive care units (ICUs) in

Scotland to minimise the risk of Pseudomonas aeruginosa infection from water, regarding the removal of flow straighteners, I contacted Horne to seek advise on how this could be achieved, Horne advised that this could not be achieved on their TMT's. I escalated this to David Loudon who asked me to seek advice from HFS. These discussions and communications lead to the above meeting, there were also a representative from HPS present at this meeting. This meeting was to allow Horne to present the reason why the flow Straightener could not simply be removed from their TMT and to allow the experts at the meeting to assess Horne's position against the above guidance recommendation. Following this meeting HPS issued an SBAR concluding that despite Hornes argued position, HPS remained of the opinion that the Flow straightener presented a risk and should be removed, the SBAR provided 3 options for NHS GGC as a way forward on this issue. David Loudon was of the opinion that the QEUH had already installed the Horne TMT's and should be treated as an existing site like other hospitals where the above guidance advised that there was no need to replace existing outlets under this guidance. David raised this with HFS who updated the SHTM 04-01 to allow for such contract situations. David Loudon then decided to proceed with the Horne TMT's as agreed under the contract due the risk to the project programme. David did not discuss the implications for maintenance of these TMT's as a result of this decision.

i) Discuss **Estates Team Bundle, document 121** explain the situation and your involvement.

A **I** was not aware of this e-mail, but my interpretation would be that Mary Anne was seeking definitions for High Risk patient groups. I was involved in the IMT support arrangements at the time of this e-mail, but don't recall discussing this question raised in this e-mail.

j) Refer to **Estates Team Bundle, documents 127 and 128** explain the situation and your involvement.

A My understanding is that Horne were consulted via HFS for support on how to address the situation currently found with the taps and flow straightener (flow control device) and alternative options for sanitisation. From memory Hornes

position regarding thermal sanitisation being the preferred option did not change, supported by Hornes development of a Thermal disinfection unit, which required to be installed in line with the hot and cold supply to the every TMT (plumbing alterations required), which when placed into disinfection mode allowed water at system temperature (60C) to enter the TMT Hot & cold circuits with TMT open for a defined period of time to effectively sanitise the internal components and flow control device of the TMT. From memory at system temperature this would take approximately 20 min. I worked closely with Horne to assess our options and I was party to this meeting with HFS and key stakeholders to assess Hornes current position. My view remained the same as before (2014), opening up outlets in a distribution zone to 60C flow for an extended period of time in a working hospital is unsafe, impractical and unmanageable. This would not provide an effective solution to the current system challenges. From memory the stakeholders at this meeting were in agreement.

k) Flow straighteners – when did you become aware that they were non-compliant with SHTM 2027 and SHTM 04-01 guidance? Were they non-compliant at handover?

A I became aware of flow Straighteners being non-compliant with SHTM 04 -01 when version 2 was issued late 2014 (SHTM 2027 had been superseded 2011) updated in line with “Guidance for neonatal units (NNUs) (levels 1, 2 & 3), adult and paediatric intensive care units (ICUs) in Scotland to minimise the risk of Pseudomonas aeruginosa infection from water”. Yes the flow straighteners were non-compliant at the time of hand over. But subject to the clause in HPS above guidance that there was no need to remove TMT’s as a result of this guidance and as amended in SHTM 04-01 to accommodate this contractual situation. (I cannot see the link to this question from IMT Document 27?)

l) In her statement Dr Teresa Inkster tells us that in 2016 she raised the issue of flow straighteners with you, HPS advice was sought and that you helped her roll out testing in high risk areas. Please explain the issue(s), what work or action was involved and your role:

A I cannot recall this conversation, however I did work closely with Dr Inkster. the issue of flow straighteners was covered in the HPS guidance on Pseudomonas which included the water testing protocol of pre and post flush sampling, I liaised with Colin Purdon\DMA to confirm that this protocol was formally documented and implemented for sampling in high risk areas.

m) Were new taps replaced in January 2019? If so, why were they replaced? Was the replacement related to the use of chlorine dioxide? IMT Bundle, documents 29 & 30.

A Yes the TMT's were replaced in ward 2A BMT, Haemato-oncology and TCT as well as ward 2B. The taps were replaced to allow for the removal of the Horne TMT flow control device (Flow Regulator). By installing a new TMT (Armitage Shanks, Markwik 21) complete with a copper lined bioguard open orifice outlet in order to meet SHTM 04-01 guidance. It should be noted that the Bio guard outlet was not installed at this time as the POU filter was installed in its place. No, the replacement was not specifically related to the use of Chlorine Dioxide, the replacement was to remove the risks associated with the Horne TMT flow control device and the volume of water held in the Horne TMT rough internal casting, this was established from my investigations and sectioning of a Horne TMT. I am sure I prepared a replacement proposal paper on this for the WTG, complete with illustrated photos of points of stagnation within the tap itself..

<u>Water Technical Group</u>

178. The water technical group (WTG) sat between 2018 and 2019. **Estates Team Bundle, page 938:**

a) What is the purpose of WTG?

A The water technical group was formed of key personnel to contribute the ongoing management control issues relating to the water incident and to develop, agree and implement long term solutions to the issues arising from the incident.

b) What issue/ event prompted the setting up of the WTG?

A The water incident of March 2018.

c) What was your involvement with the WTG?

A I was tasked with assessing issues arising from the water incident, develop & propose solutions for consideration and approval by the WTG.

d) Detail specific work which you carried out in respect of your involvement with WTG, why did you carry out this work, what was the impact? **Estates Team Bundle, page 939**

A From memory, Details of specific works I carried out (this may not be exhaustive) for the WTG are:

1. Identify a suitable chemical for continuous water treatment to bring the system under control for consideration and approval of the WTG.
2. Develop WTG a strategy for application of continuous water treatment.
3. Develop Technical proposals to the WTG for engineering works to support the installation of water treatment systems.
4. Develop proposals for modification of filtrate storage tank level controls to support water treatment and improve water level control and monitoring to the WTG, For implementation with the water treatment contract.
5. Develop WTG proposal for addition of a 3rd memcor filtration plant to provide capacity resilience based on a single unit failure (3 units at 50% capacity instead of 2). For implementation with the water treatment contract.
6. Procurement process for the supply and installation of the water treatment systems.
7. Manage the installation, commissioning and go live process.
8. Consider the impact of water treatment on special services (i.e. Renal Dialysis), consult with Renal Management and Medical Physics team on the safeguards required, develop specification\procurement for protective measure for the RO plant.
9. Integrate RO plant safety measure with the water treatment plant for fail safe shutdown.
10. Develop communication strategy for wards and departments affected by the installation works and introduction of water treatment.

11. Sourcing and specifying replacement flow-through calorifiers for the DHW services for inclusion in the above engineering works.
12. Laise with Scotomas (Chlorine Dioxide provider) on the H&S requirements for safe transport and storage and operational requirements for Chlorine dioxide and develop a suitable risk assessment.
13. Oversee Water treatment plant Commissioning and implementation.
14. Assess tap replacement options and produce a options proposal for WTG.
15. Develop proposal for refit of ward 2a\b plumbing service pipework for:
a. Horne TMT replacement (Markwik 21),
b. Whb replacement complete with new smooth flow drain spigots. C.
WC replace cisterns with direct flush valves.
16. Develop and implement a monitoring and testing plan following the introduction of Chlorine Dioxide.
17. Develop and implement the water treatment managed service contract arrangements with Scotmas for the supply of chlorine dioxide chemicals, monitoring and management of the treatment regime, maintenance and repair water treatment plant and monitoring equipment.
18. Review and assess plant, TMT, and drainage failure issues for WTG. I carried out these works to support the development of a solution to the on-going water incident as tasked by the WTG, to allow the group to consider and authorise the appropriate course of action. The impact of the continuous water treatment programme and associated engineering works was that by the time I retired July 2019, the water quality test results were coming back within set limits. I believe that the package of works introduced were successful in bringing the water system back to where it should have been.

e) Was this within your remit within estates?

A My remit as Depute General Manager Estates would require me to focus on technical issues \challenges\solutions as required. I was dedicated to the above task from Mid-2018.

f) Who was in the WTG, what were their names and their roles within WTG?

A Mary Anne Kane (Interim DoF & Chair)
Dr Teresa Inkster (Consultant Microbiologist, ICD)

Susie Dodd (Infection Control Nurse RHC)
Iain Kennedy (Consultant Public Health)
Alan Gallacher (General Manager Estates, Technical lead)
Ian Powrie (Depute General Manager Estates, Technical lead)
Andy Wilson (Sector Estates Manager, operational management)
Colin Purdon (Site Estates Manager, operational management)
Eddie McLaughlin (Ass Director HFS, national guidance, and support)
Annette Rankin (Consultant Infection Control Nurse, HPS, national guidance\support & Government report)
Ian Storrer (Principal Engineer, HFS, National guidance & support)
Dennis Kelly (Authorising Engineer, Water, compliance guidance & support)
Tim Wafer (Water Solutions Group, Water specialist consultant, water treatment) Monthly Meeting.
Dr Tom Makin (Makin & Makin, Water specialist consultant) Monthly Meeting.

g) Why was the WTG set up?

A The WTG was set up to provide a steering group for development and implementation of appropriate solutions to the water incident.

h) What qualifications were required in order to be chair of WTG?

A The Chair required overall management experience of incident control at a senior level supported by suitably qualified and experienced ICT\Technical members & external advisors to the group.

i) Discuss focus of WTG – what was the purpose – why was WTG required – what issues came to light as a result and what action was taken. What were the concerns of the WTG and how did this impact on patients? Refer to **Estates Team Bundle, document 127, 128, 129 and 130** to assist and confirm how these relate to issues before WTG.

A

a) The focus of the water group was to provide a management structured approach to deal with the ongoing water incident.

b) To ensure effective governance arrangements were in place to focus on developing solutions to the systemic issues identified, as well as supporting

external agency requests for data in relation to independent reports to Government (HFS & HPS).

c) I cannot recall the detail of the HPS\HFS reports so will focus on the issue faced at the time of the on-going incident, namely: The inability to effectively sanitise the Horne TMT's insitu despite Horne's insistence that this was the way forward. In addition the solution offered by Hornes new patented thermal disinfection valve proved to be overly labour intensive, would require a constant work force to implement, as well as introducing Scald risks to the patient environment requiring supervision at all outlets as well as requiring to be repeated with undefined frequencies. This also did not address how to thermally sanitised the main risers which was already exposed to 60C. These issues all lead consensus and conclusion that chemical sanitisation was the only viable systemic approach to resolving the issues identified from the water incident data. In addition continuous water treatment will draw treated water from the outlets into the CWHB with the treated water having a beneficial impact of the drain spigot of Chlorine Dioxide exposure.

d) Actions taken : Are described in my response to question 176d. The final solution identified had a minimal impact on patient services, the only direct impact of implementing this solution was the overnight down time for each area affecting hot and cold water supplies in each zone, one zone per night over a 9 day programme. impact was the mitigated by the deployment of portable whb's and bottled water.

j) How did clinical staff and estates get along at these meetings?

A From my perspective Clinical ICD's, ICT, Public Health and Estates staff had a good working relationship with a collaborative and supportive approach to developing appropriate solutions to the current water incident.

k) Refer to **IMT Bundle documents 39 onward**, and any other IMTs as a result of WTG. Go through and discuss issues – impact of patients – what was cause of these issues.

A I was not on site during these IMT meeting as I was on A\L from 12 sept – 1 Oct 2018 Inclusive. The issue of concern at this point was that the water system in ward 2A RHC was under control by the full deployment of POU

filters on all water outlets and showers but patient positive blood infections were still occurring The drains were the point of focus with on-going cleaning sanitisation procedures. Concern from the clinical staff over the disruption to patients from the frequency of access for drain cleaning\sanitisation and more regular access to isolation rooms than would be desired. The drain issues were a result of a). A build-up of foreign debris in the drain spigot. b). unexpected disposal of liquids other than water via the CWHB, providing a source of nutrients, c). Break down\decay of the rubber spigot seal. d) build-up of bioburden in the spigot orifice and spigot connection.

l) Refer to **Estates Team Bundle, document 129,** why were NSS involved, guidance issued, actions taken.

A NSS, HFS were tasked by Scottish Government\NHS GGC to investigate and review the circumstances around and leading up to the water incident at the QEUH\RHC. I am aware of the report being issued and that the recommendations were to be reviewed and addressed at the WTG but do not recall this happening.

(i) Why were the recommendations not followed up? Who was in charge of following up on the recommendations? What was the consequence, if any, of not following up on the recommendations?

A I cannot say that these recommendations were not followed up or actioned, these may have been addressed by Mary Anne\Allan Gallacher and\or Andy Wilson\Colin Purdon? Mary Anne Kane was leading on the HPS data collection and the outcome of the report. I cannot comment the consequences of not actioning the recommendations as I was not involved with the review of the report or the associated actions.

m) Refer to **Estates Team Bundle, document 131,** explain the background, your involvement, the purpose, guidance issued, actions taken.

A Dr Teresa Inkster reached out to Dr Susanne Lee for expert advice on the conditions surrounding ward 2A water incident, when Dr Lee arrived on site she was escorted by Dr Inkster to review the issues that she needed advice on. If I correctly recall Dr Inkster then brought Dr Lee to a pre-arranged meeting with the WTG (I recall that I was in attendance as well as Mary Anne

Kane, I cannot recall the other attendees) to provide any further detail required by Dr Lee and take advice from Dr Lee. The report in the above Document 131, details the issues raised by Dr Sussane Lee. Dr Inkster and I reviewed Dr Lee's report and developed the action plan detailed in document 131. My recollection of the actions against my name\Alan Gallacher are. Recommendation 2: Alan Gallacher and the compliance team developed and delivered a training programme, and I attended the Responsible Persons (Water) session. Recommendation 3: Although my name is against this with Alan Gallacher I was not involved in preparing this protocol (I believe Alan managed this issue). Recommendation 6, I had already reviewed the Asset Register provided by Multiplex and worked with I.T. colleagues to standardise the asset register for migration to FMFirst, Allan Gallacher was already leading on developing links with SFG20 PPM protocols with FMFirst . Recommendation 9: Board design should exclude the use of outlets with inserts & opt for more hygienic single bore demountable TMT's. and consideration should be given to replacement of these outlets in high risk areas, I reference Dr Susanne Lee's recommendation in my option paper for TMT replacement. All other actions identified were to be reviewed and address by the SLWG (WTG) HFS\HPS or the Board Water safety Group over.

Review of Issues Relating to Hospital Water Systems' Risk Assessment 26th September 2018

Refer to **Estates Team Bundle, document 134.**

179. Why did you commission/order the report? What issues prompted the instruction of this report?

A I did not commission this report, the report was commissioned by Jane Grant CEO.

180. What concerns, if any, did you have about the water system?

A I can't answer with respect to the concerns leading to this report.

181. When did these concerns arise? Was anyone else in estates concerned? Why?

A N\A

182. What was the impact on patients?

A N\A

183. Did you flag/ raise your concerns with anyone?

A N\A

184. What happened in response to the report?

A Up until this point I had not seen this report, I am not aware of any actions as a result of this report.

185. Did you escalate any matters arising from this report? If so, to who, and if not, why not?

A As per response to Question 182.

186. What works, if any, were carried out in response to any findings in this report?

A As per response to Question 182.

Tap Water- Ward 3C – 2019

187. What were the issues in relation to tap water?

A I was not involved in day-to-day operational issues at this time and would not have been party to this issue, I have no recollection of this issue, as I have no point of reference or access to records to jog my memory.

188. What was your understanding and involvement with these issues?

A As per response to Question 185.

189. What action was taken?

A As per response to Question 185.

190. How were matters resolved?

A As per response to Question 185.

Other Water Incidents

191. What other specific events do you recall in relation to water? Do you have any recollection of debris in the water tanks, If so, please explain:

a) What the issue was.

b) The impact on the hospital (include wards/areas) and its patients (if applicable)

c) Who was involved.

d) What was escalation process.

e) Were any external organisations approached to support and advise.

f) Detail role and function of HPS and HFS, advise if they were involved and any reports prepared by them.

g) Detail advice given from external organisations; what was the advice, did you agree with it, how was any advice managed/ communicated with others in your team and your superiors?.

h) Was there opposing advice and by whom.

i) What remedial action was decided on and who made the decision.

j) Was the issue resolved – consider any ongoing aftercare/support/monitoring.

k) Detail any ongoing concerns you had, or which you were made aware of.

l) Was there any documentation referenced during or created after the event? i.e. an SBAR/ minutes from a meeting – use the bundle provided to assist.

m) Did anyone sign off to say the work had been completed and issue resolved/area safe?

A There was an issue early in the migration programme (circa April 2015), where:

a). We lost the water supply to the QEUH\RHC (RHC was not occupied at this point) at approximately 18:00 hrs

b). resulting in there being no water for drinking\bathing\hand hygiene across both buildings. This was due to the failure of both water filtration plants.

c). All estates staff had left site with the exception of Tommy Romeo (Duty Estates Manager) and myself, we therefore responded to the situation but

could not establish the cause of the filtration common failure (Note: training had not yet been provided for the filtration plant by Multiplex). We could not secure support from the manufacturer until next morning as there engineer was not in the area. We therefore had to no option but to bypass the filtration plant and feed one of the tanks with mains water in order to return to normal services in the morning.

(i) Was the system flushed and drained after the bypass the filtration plant? If not, why not? Should this have been done and what are the consequences, if any, if not doing this?

A No, the system was not flushed and drained after the emergency refill of the tanks bypassing the failed filters. The logistics of fully draining, filling and flushing the whole campus was out with the existing staffing resources available at this time, bearing in mind we only have 6 estates managers including myself. I did prepare and provide David Loudon with a written report on the matter. With no further response from him on the issue. The consequences of not carrying out a drain\fill\flushing process is the potential for suspended particulate and micro-organisms to enter the system from the water main, however water mains have been tested numerous times and proven to be within acceptable parameters.

d). Once the arrangements were in place, Tommy supervised the manual fill process and I escalated the issue to the on-site out of hours nursing manager and appraised her of the situation and likely duration before we would return to normal water services, she communicated this to the limited number of wards that were occupied and I notified the site Facilities duty manager and arranged for the delivery of bottled water to all occupied wards.

e). I arranged for the service engineer from the manufacturer to attend site 1st thing next morning.

f). HFS/HPS were not notified or involved in this incident at the time.

g). Next day the service engineer identified that the prefilters on both units were blocked and recommended that these be changed on a weekly basis.

h). There was no opposing advice.

i). Immediate remedial action was to replace the prefilters, put in place a routine replacement SOP and notify Multiplex of the issue and the need for urgent training. After a 26 hour shift I also prepared a report on the incident and submitted this to David Loudon before leaving site for a rest period. (Tommy Romeo had been on site for 24 hours before he went home for a rest break).

j). Yes, this resolved the cause of the plant failure filters.

k). As a result of this incident I also identified that, as we did not have the staffing resource to man the BMS control room and that we needed an alternative critical alarm escalation process. I commissioned Schneider to programme a group of predefined critical alarms into the BMS for automatic escalation to the duty Estates managers Page. I worked with Schneider to create the critical alarm schedule and this was developed and implemented by the time the full migration process was complete and the Estates duty managers moved to their shift rota providing 24/7 site presence. Yes, I was aware of the debris in one of the water tanks, this was discovered during the routine water tank cleaning & sanitisation works, the debris was a sponge and some metal washers, this would have created a bio-burden source in the tank and likely the distribution system. It is my view this was left in the tank by the contractors working for Multiplex carrying out the tank lid support replacement works required under PMI issued by Peter Moir following receipt of a HAZ warning notice from HPS to the risks of using hollow pipes for tank supports.

(i) Why were HPS/HFS not notified at the time? Would you have expected them to have been notified?

A To my knowledge there is no requirement or procedure for notifying HFS\HPS of this type of event. I would not have expected them to be notified.

(ii) Was the system flushed and drained completely after it was filled with water which bypassed the filtration plant? If not, why not? What was the potential impact?

A I have answered this question in the supplementary question 191m.

(iii) Who fitted the bypass pipework initially? What was the purpose of doing so?

A Multiplex fitted the bypass pipework as contingency for such events.

(iv) Why do you think the sponge and metal washers were left in the tank?

A I think this was poor housekeeping and supervision of the works carried out by Multiplex prior to handover to replace the hollow tank roof supports with solid core supports.

192. What were the NHS procedures for raising concerns about water or water infections.

a) How were these dealt with by you?

A From memory If legionella is identified within in water system, routine precautions and control measures should be applied. If there is still legionella bacteria detected on the follow up tests then a record on the incident should be recorded on datix, the AP and RP (water) and ICD must be copied in. When it has been confirmed that legionella bacteria from water is the source of an outbreak then the AP must carry out an investigation and formally report his findings to the RP and ICD for inclusion in the IMT. I had not been made aware that there was any cause for concern or escalation, my understanding that the routine sampling results were generally returning good results and did not trigger the requirement for formal reporting escalation. (note that routine tests did not include the range of microbiological organism that were identified during the water incident.)

b) How was it confirmed they had been dealt with.

A As these had not been escalated to me I was under the impression that the results were within acceptable parameters.

(i) In general terms, once a concern had been raised about water or water infections, how would it be confirmed generally that the matter had been dealt with?

A If a water test shows out of spec legionella results the affected area would be subject to routine control measures to eliminate the legionella. If this was successful, no further actions would be taken other than monitoring to ensure that the sanitisation was successful. If there were repeat positive samples then this should be reported via Datix and once resolved signed off via the

Datix procedure. If there was a water related patient infection, an IMT would be set up to address the issue including notification to HPS, once the issue was addressed it would be formally closed out by the IMT.

c) Do you recall specific ones and in particular any that gave you concern.

A No, I do not recall being consulted on out of spec results that may have been cause for concern other than issues raised directly with me by Dr Teresa Inkster and these tended to be unusual organisms.

(i) Can you recall any specific concerns save for the ones you have discussed in this questionnaire, raised to you by Dr Inkster?

A Sorry I don't recall any other concerns being raised with me by Dr Inkster.

(ii) What is your understanding of an unusual organism?

A The estate's routine water monitoring only looks for legionella or Pseudomonas (defined high risk areas). Anything out with these organisms would be unusual and would only be brought to our attention if ICD raised concerns over the source of a patient infection requiring specific water analysis, looking at water as a potential source for this other organism. e.g. Cupriavidus, Serratia etc,

Ventilation - Commissioning and Validation

193. Describe the commissioning and validation process in respect of the ventilation system in the QEUH/RHC.

A I was not involved in the commissioning and validation process for the ventilation system and cannot describe the commissioning and validation works carried out at the QEUH/RHC. However the requirements for this commissioning and validation are set out in STHM 03-01 Part A.

a) Who was this carried out by?

A There are various stages to the commissioning and validation process, these would have been carried out by different designers\manufacturers\installers

and commissioning engineers, I believe that the final validation was carried out by H&V commissioning.

b) Who signed off?

A I believe that Capita Symonds signed off on behalf of the client.

(i) Can you confirm who the client would have been? Would the client have been involved or aware of the sign off?

A The Client is NHS Greater Glasgow and Clyde, represented by the Project Director (Allan Seabourne or David Loudon) I am not aware of the reporting arrangements between the Project Director and the Board, but would assume that they would have been briefed that the project was approved ready for sign off.

c) To what extent, if any, did infection control have input prior to sign off? Refer to **Estates Team Bundle, document 22.** For reference in this email Christine Peter's states that Craig (Williams) has not seen anything in writing about the ventilation.

A I was not involved in the commissioning process, My understanding was that Craig Williams, was the lead ICD interfacing with the project, with Jackie Barmanroy as the project ICN however I am not aware of ether of them signing off on the ventilation commissioning requirements.

d) If so, who?

A Not sure.

e) When should this have been done?

A This should have been reviewed and witnessed prior to hand over see SHTM requirements below in Q191f.

f) Were you involved?

A No, I was not involved in the ventilation commissioning or validation process.

g) Were you aware of any concerns raised at any point about the ventilation system and its commissioning?

A Not until after hand over, working with Infection control on several fronts regarding points of concern, Namely. 1).Theatre shared layup prep rooms no inter-locking doors to control the risk of cross infection, (Dr Christine Peters). 2). Adult CCU, 10 of PPVL isolation rooms with various issues (Dr Christine Peters). 3).Ward 2A PPVL isolation rooms air permeability integrity, Hepa filtration (Dr Craig Williams\Dr John Hood). 4). Ward 2A Heamato-oncology\TCT ventilation designed as a standard ward complete with chilled beam technology and 3 ACH. (Dr Teresa Inkster) 5). Ward 4b BMT ward non-compliance with isolation room design requirements (Dr Teresa Inkster).

h) What commissioning and validation documentation did you see before handover in 2015?

A None: I was not included in the client witnessing process.

i) If not, who would have seen commissioning and validation documentation?

A Capita Symonds, Contract supervisor.

j) What is your understanding of the SHTM guidance in respect of ventilation?

A Ventilation system commissioning/validation report Para 8.64: Following commissioning and/or validation a full report detailing the findings should be produced. The system will only be acceptable to the client if at the time of validation, it is considered fit for purpose and will only require routine maintenance in order to remain so for its projected life. Para 8.65 The report shall conclude with a clear statement as to whether the ventilation system achieved or did not achieve the required standard. A copy of the report should be lodged with the following groups: • the user department.• infection control (where required);• estates and facilities.

k) How important is SHTM guidance in respect of ventilation?

A SHTM guidance is especially important as it sets out the importance of 1). design and designer responsibilities, 2). The option for independent validation

of system performance on behalf of the client, 3). Installation, pre commissioning requirement, 4). Witnessing of the standard installation tests, 5). Cleanliness requirements for the installation, 6). System equipment certification requirements, 7). Equipment test witnessing requirements, 8). Dynamic commissioning requirements, 9). Specific Performance Standards, 10). Bacteriological sampling requirements, 11). Ventilation system Commissioning\Validation report. all of which should be in the Post Commissiong Documentation (PCD).

l) What is your understanding of the importance of SHTM compliance in infection control and prevention?

A SHTM compliance is very important for infection control with respect to providing the correct and relevant environmental controls for the requirements of the specific occupants, ensuring that the correct air dilution, filtration, temperature and condition is provided along with the appropriate safeguards for safe operation and placement of patients providing source or protective isolation where required.

m) Was the QEUH/ RHC ventilation system SHTM compliant at the date of handover – if not, what was outstanding? Who was responsible to ensure that the ventilation system complied with SHTM?

A From the issues that I have been involved with I would say that the ventilation systems were not SHTM compliant, it is difficult to say what was outstanding due to the lack of accessible information on Zutec, generally I can only remember seeing the H&V system Validation reports.

(i) What was the potential patient impact of the ventilation system not being compliant with SHTM?

A The potentially patient impact from not complying with SHTM is the risk of infection whether it’s due to lack of appropriate filtration\patient placement or air volumes resulting in a lack of single room air dilution and room negative pressure differential to the corridor leading to the increased risk of cross infection. As well as the lack of plant resilience.

n) Refer **Estates Team Bundle, documents 34, 34.1, 34.2:**

(i) Please explain the content of this email

A My understanding of the background to this Ward 4b issue is, the ward was originally designed as a general ward and services were being installed to meet this standard, however NHS GG&C requested that this ward be converted to accommodate Haemato-oncology patients from Gartnavel as part of a revised clinical strategy. Multiplex provided a proposal to the Project Manager to deliver on this, which was accepted and implemented as a variation to contract. After hand over several concerns were raised about the standard of protective accommodation provided in this ward not meeting SHTM 04-01 or SHPN 04 supplement 1 standards. This e-mail confirms that although HEPA filters were fitted, they had not been Dispersed Oil Particulate (DoP) challenge tested at commissioning.

(i) Is the reference to SHTM04-01 – for ventilation, the Inquiry understands for ventilation that the SHTM applicable is SHTM 03-01.

A Sorry my error, reference should be SHTM 03-01.

(ii) Please see the documents attached to the email – what are these documents, and have you seen them before?

A Yes, I have seen these documents before, Document 34.1, is the schedule of PPVL Isolation rooms that was produced at my request to David Wilson (Multiplex, Commissioning Manager) to facilitate familiarisation and understand what Multiplex thought the status of the PPVL rooms were across the site, this document became a live working document and was updated each time the status of a room changed. Document 34.2 is the H&V proportional balancing commission of the air volumes through the supply system and commissioned volumes in to each room.

(iii) What does this relate to?

A It relates to what was handed over as a supposedly suitable facility for accommodation of the Haemato-oncology patient group ward 4B.

(iv) Why was Professor Williams asking for this information?

A From memory I believe that there was concerns raised by Clinical\ICT staff about the apparent lack of compliance with SHTM\SHPN guidance for these facilities and their unsuitability to accommodate the intended patient group.

(v) When did Professor Williams ask for this information?

A I cannot recall when this information was requested.

(vi) When was this information provided to Professor Williams?

A From the e-mail in document 34, it would appear that I sent this to Professor Williamson on the 7th July 2015, I am not aware if he had seen this document before as it was created at my request.

l) Discuss the concerns about Ward 4B. Refer **Estate Team Bundle, document 30 -** What was the purpose of the SBAR?
Refer to **Estates Team Bundle, documents 30, 31, 32** to assist with your answer.

A It is clear from the communication that the clinical team and the ICT were advised they were moving in to a fully compliant, commissioned and validated accommodation for the BMT patient group, and they were concerned that ward 4b did not meet this requirement and was not fit for purpose. From memory the issues identified in consultation by Dr Inkster are : 1). Low\zero pressure differential between the isolation room and the corridor (should be +10 pascals). 2). Low air change rate 6 ACH, (should be 10ACH), 3). Rooms was not sealed, fitted out with suspended ceiling tiles. 4). Room had not been air permeability tested (to confirm air tightness\Sealed). 5). The HEPA filters had not been DoP Challenge tested. 6). The room pressure to corridor did not have local Differential pressure monitoring nor central monitored\Alarm facilities at the nurses station. 7). The Supply Air Handling Unit (AHU) was a single standalone unit (single point of failure potentially affecting all rooms simultaneously. As was the extract. 8). There was no facility to allow for annual maintenance\verification of the ward ventilation system which requires

the plant to be shut down and tank out of service during these works. s The SBAR contained within Document 30

(i) Were the concerns raised in the SBAR addressed? If so, how and what was your involvement if any. If not, why not?

A Yes, the concerns were addressed by Peter Moir (Depute Project Director). Peter developed a specification of works carried out by Multiplex to address these issues, I was not involved in the specification or delivery of these works. This was defined as a project issue and as such I was not included in the process until the end when I was invited for a familiarisation session on the operation and management of the room pressure monitoring and alarm system. However, this was only betterment toward the required standards and still did not meet the full requirements of SHPN 04 supplement 1.

m) How does commissioning differ to validation?

A I was not party to these communications, but my interpretation would be that the SBAR was prepared to justify the request to return the patients to a safe environment pending a review of the status of ward 4B.

(i) How does commission differ to validation?

A From SHTM 03-01 Part A:

Commissioning - Commissioning is the process of advancing a system from physical completion to an operating condition.

Validation - A process of proving that the system is fit for purpose and achieves the operating performance originally specified. It will normally be a condition of contract that “The system will be acceptable to the client if at the time of validation, it is considered fit for purpose and will only require routine maintenance in order to remain so for its projected life.”

n) Was there a validation document to accompany this for handover?

A I do not believe so, the only commission documents I had seen were the H&V documents.

o) What is the purpose of Commissioning and Validation (C&V)?

A Commissioning allows for all of the system components to be inspected, tested and commissioned in their own right before the air distribution balancing is carried as the final stage of commissioning. Validation provides confirmation that the overall performance of the whole system meets design intent.

p) What are the consequences of it not being carried out? What concerns did you have, if any, that the QEUH/RHC had not been signed off without C&V?

A If validation is not carried out then there is no way to confirm that the design requirements have been achieved. At the point of hand over I believed that the ventilation systems had been fully Commissioned and Validated and witnessed and accepted for hand over on that basis. Bearing in mind that at handover information of Zutec was not complete as the contract allowed for a 60 day period after practical completion for the Post Commissioning Documentation to be handed over. It was only once we started to occupy the building that issues started to arise.

q) What concerns, if any, would you have if there were no C&V of the ventilation system?

A I would be concerned that there would be no way to know if the system was operating as per the design intent, or if the building was safe for the intended purpose.

(i) Did you become concerned following handover that commissioning, and validation of the ventilation system had not been carried out?

A Following handover I was under the belief that the systems had been commissioned, validated and accepted under the contract sign off process,

therefore I was not concerned at this stage. My concerns with regards to commissioning and validation only arose after migration when we started to observe problems in various areas over time with what had been provided and with the Post Commissioning Documentation records available.

r) Why would no C&V of the ventilation system give rise to these specific concerns?

A Because there is insufficient data to carry out annual verification of the system performance.

194. In her statement Dr Teresa Inkster discusses concerns regarding Ward 4B states *'The concerns with regards to air quality, specification and lack of commissioning and validation data were disclosed to Tom Walsh, Ian Powrie, Peter Moir, Gary Jenkins and attendees of the initial meetings which were held in June and July 2015. There are no minutes available for these meetings because of the issues I have outlined above with record keeping.'*

a) What commissioning and validation data did you have in June and July 2015?

A From Memory, I had access to the H&V commissioning reports for the proportional balancing of the air distribution requirements against the design air distribution requirements.

b) Did you provide the commissioning and validation data to Dr Teresa Inkster?

A I share the data I had access to with Dr Teresa Inkster, I worked with her to demonstrate the ACR and Pressure differentials in various wards and marked up drawing to help demonstrate the intended system operations etc.

c) Is it correct that there are no minutes from these meetings?

A The meetings were chaired by Peter Moir, I do not recall seeing minutes for these.

d) Why were no minutes taken of these meetings?

A I am unable to answer this question.

e) What actions were taken following these meetings?

A I believe that Peter Moir issued a PMI to Multiplex to implement the changes discussed at the meetings detailed above.

195. What testing and maintenance protocols and regimes were in place?

A At this stage there were no testing and maintenance protocols in place as the system was not deemed fit for purpose, from memory the system was derated to provide general winter ward accommodation while arrangements were made to carry out the remedial works identified.

196. Refer to **Estates Team Bundle, document 47 page 5/18** of document: This states that air permeability tests were not carried out to 36 isolation rooms:

a) Were you aware of this? If you were not aware, who would have been aware?

A I was not made aware at the point of hand over nor was I made aware of the content of the contract supervisors report. However became aware of this issue as I uncovered this as part of my ongoing review and investigations with the ICT team (particularly for Ward 2A isolation rooms). Indeed I believe that I brought this matter to light with the project team.

b) What was the consequence of this?

A The air permeability test confirms that the Isolation room\rooms are sealed and that extraneous air cannot enter or leave the room from an unexpected source, minimising the risk to air transfer contamination of the protected space. The air permeability test should be carried out at 2 stages of the isolation suite construction: 1) when the room shell is constructed and all service penetrations have been sealed, this confirms the integrity of the shell space. 2). Once the room fitout has been completed, commissioned the air permeability test should be repeated to verify the overall air tightness of the final protective accommodation. The consequences of placing patients into protective Isolation in a facility that has not been Air Permeability tested has a risk of Patient infection from an unidentifiable source.

c) Why did handover take place in these circumstances?

A I am not able to answer this question, as I believed that the Commissioning and Validation had been witnessed and verified by the Contract Supervisors prior to handover.

d) What happened following this report?

A I believe that Multiplex arranged for air permeability tests in all of the affected areas and provided air permeability certification confirming the rooms tested had passed. I witnessed some of the tests in ward 2A and ward 4B. particularly ward 2A the test failed due to the room 2nd fix services and IPS panels leaking. Multiplex proposed that they would employ silicone sealant specialists to seal all service penetrations, trunking, IPS panels\Patient entertainment system etc to ensure these rooms passed the Air permeability tests. These was accepted by the project team as an acceptable solution.

e) What concerns, if any, did the contents of the report give you? Why did the report give rise to these specific concerns?

A My concerns were around the fact that we could not establish that any the PPVL isolation rooms ventilation systems were operating as per design intend or that the rooms were safe for patient placement with regards effective air tightness requirements for these rooms. With respect to the CCU any commissioning\air permeability tests supposedly carried, out could not have passed where pressure stabiliser had been installed with the blades the wrong way round! Part of this air permeability test under SHPN 04 supplement 1 is “Close all internal doors and, using the test fan, check that the pressure stabiliser opens at 10 Pascal and that it will carry the design airflow without flutter.” Doors open against the lobby pressure without handle to assist in this . with regards to reduced pressure I reported on 8 of 10 CCU PPVL rooms, this was witnessed by both Doctor Christine Peters and I, but was not evident at the site review with Peter Moir\Multiplex? The failure of 5 PPVL rooms ventilation plant to shut down was the result of a BMS controls network fault, this was replaced by a new network controller, we never received a report on why? However my concern at this point was that we could not take manual control of the ventilation plant to secure room operating parameters in the short term without the support of Schneider. Hand controls

should be independent of the BMS controls to allow for such failures. All in all these issued demonstrated the lack of the systems being proven to meet design intent.

Have regard to the following emails when considering your answers to the above:

Estates Team Bundle, documents 64, 67 and 68.

197. What concerns, if any, did you have about the ventilation system at the point of patient migration to QEUH?

A In the adults I was not aware at the time of migration that we had any concerns, as I believed that the Commissioning and validation had been witnessed and signed off by the Contract supervisors (Capita Symonds), For the Childrens a few simple smoke tests to check ward 2A PPVL air tightness with Dr John Hood was sufficient for me to be concerned and review the SHPN 04 Supplement 1 requirements against what was fitted and the lack of commissioning data. resulting in identifying the following: 1). There having been no air permeability test carried out at room shell stage or final fitout stage, 2). In fact the room air tightness integrity was breached at multiple points around each PPVL suite. 3). HEPA filters had not been installed in the Lobby supply terminal. 4). The full extract was not installed in the en-suite as required under SHPN 04 supplement 1, it was installed above the patients bed therefore the patient environment did not have the correct air flow pattern as intended under the guidance. 5). The en-suite did not have an air transfer grille in the door. In addition to this Dr Brenda Gibson raised concerns that ward 2A Haemato-oncology\TCT were did not meet her expectations for her the patient group. I checked this for her and established that the ward ventilation was design as a general ward with chilled beam technology and 3 Air Changes per Hour (ACH). I escalated this concern to David Loudon.

198. Where was the documentation for C&V stored at that time?

A At the time of patient Migration the all documentation was meant to be available within Zutec.

199. Have you seen the ventilation system validation documentation as at handover (Jan 2015)?

A No, I had not seen the Validation documents at handover or since.

a) If yes – who carried this out, who signed off, who authorised?

A N\A

b) If no – should you not have sought this? Who is responsible for ensuring it is in place? Who should have chased this up? Would this not be part of ID remit?

A I did seek these and highlighted the issues around Zutec population, navigation and lack of data. I believe that the Contract Supervisor was responsible for witnessing and verifying the Commissioning and Validation was carried out and was responsible for reviewing and confirming that all Post Commissiong Documentation was provided and accessible. Under SHTM 03-01 Part A, requiring that : Para 8.64: Following commissioning and/or validation a full report detailing the findings should be produced. The system will only be acceptable to the client if at the time of validation, it is considered fit for purpose and will only require routine maintenance in order to remain so for its projected life. Para 8.65: The report shall conclude with a clear statement as to whether the ventilation system achieved or did not achieve the required standard. A copy of the report should be lodged with the following groups: • the user department. • infection control (where required); • estates and facilities. This should have been followed up by Capita Symonds and or Peter Moir, Contract Manager. I assume the ID is the Infection Control Doctor (ICD) if so they should have been supplied with this data from which they could have raised any concerns with the Contract Manager in detail.

200. Where would the paperwork have been stored/ Who would have been responsible for it?

A There was no physical paperwork, all Post commissioning Documentation should have been stored on Zutec,

201. If validation was not in place at handover, how did the hospital open? Who would have had the authority to allow the hospital to open without validation in place?

A I am not aware of the reason the hospital opened without ventilation validation, my impression was that the Project team believed that the commissioning and validation requirements had been fulfilled and as such they must have received this confirmation from Capita Symonds. I am not able to provide an answer to how the hospital opened or who allowed this to open without validation in place.

202. Were you asked by microbiologists or Infection Control to provide information regarding the ventilation system and validation? Refer to **Estates Team Bundle, document 27.** Who was supposed to provide this information? If it was not provided, why not? What action was taken to ensure that information was provided – if it was not, what was done to escalate this? Who was responsible for providing this information?

A Yes I was asked for this by Dr Christine Peters and I am sure Dr Teresa Inkster. This information should have been provided by the Peter Moir (Contract Manager) under the requirements set out in SHTM 03-01 Part A, Para 8.64: Following commissioning and/or validation a full report detailing the findings should be produced. The system will only be acceptable to the client if at the time of validation, it is considered fit for purpose and will only require routine maintenance in order to remain so for its projected life. Para 8.65: The report shall conclude with a clear statement as to whether the ventilation system achieved or did not achieve the required standard. A copy of the report should be lodged with the following groups:

The user department.

Infection control (where required).

Estates and facilities.

I believe that the ICT should also have had access rights to Zutec to allow them to access and review the Commissioning & Validation data as required. I am not sure why this data was not provided other than it was not available on Zutec. I meet with Christine and Teresa at various point to try and support their requests, and demonstrated the issues I was experiencing trying to

obtain this data and the lack of clarity on what was on record. I believe Dr Christine Peters escalated this to the Project team, I also raised concerns with David Loudon\David Hall\Peter Moir over the lack of data available on Zutec and the issues around system navigation. Multiplex should have provided all of the Commissioning and Validation documentation the terms of the contract.

Ventilation System – General

203. What testing and maintenance protocols and regimes were in place? Refer to **Estates Bundle, document 62.**

A Document 62 above refers to the re-commissioning of the ventilation for the refurbishment of ward 4B to make it suitable for BMT patients, this was not a testing and maintenance regime. Following these upgrade works on ward 4b, I was part of a working group made up of Clinical staff, ward management staff, ICT\ICD Estates and Facilities to address the requirements to support transfer of the patient group from GGH to ward 4b, as part of this group I developed a ventilation maintenance\annual verification plan and well as a contingency plan for AHU single point of failure affecting all rooms.

a) What testing and maintenance protocols and regimes were in place that you were aware of?

A I had developed a schedule of all ventilation systems classified has high risk patient area's as per SHTM 03-01 and shared this with Dr Teresa Inkster for review and approval, I then issued this to David Brattey to implement. I also believe that the routine inspection and testing requirements for general systems were being carried out as per SHTM 03-01 under David's management.

204. What concerns, if any, do you have relating to the ventilation? What concerns, if any, do you have relating to the water temperature? What concerns, if any, do you have relating to the movement within the water system? Refer to **Estates Bundle, document 123.**

A For general ward ventilation, single room accommodation design proposal was to adopted chilled beam technology, in order for the chilled beam design approach to work the Multiplex proposed the contract specified Air Change Rate be dropped from 6ACH to 3 ACH, Multiplex submitted a paper justifying this approach and I believe ICT were consulted on this, the Board accepted the proposal which was logged in the Clarification log with a proviso that the rooms be negative pressure to the corridor. In practice the rooms are neutral\0pa differential pressure although Multiplex claim the rooms are slightly negative (unmeasurable), Lack of individual chilled beam dew point control. With regards to water temperatures raised in the Estates Bundle 123, my concerns over the water temperature raised in this bundle relate to the CHP operational failure and Multiplex attempts to adjust the CHP control parameters to maximise efficiency. These on-going attempts resulted in boilers shutting down when they should have been on line with a resultant drop in MTHW temperature which impacted the DHW temperature control regime. It should be noted that this was not an issue until early/mid 2016 when Multiplex put the CHP into service (Jan 2016) and then tried to address the incompatibility of the design parameters with the operational issues. I am not sure if there were any issues about the movement of water in the water system?

205. Was it possible to incorporate a comprehensive ventilation system into the QEUH/RHC?

A Yes.

(a) Was the ventilation system incorporated into QEUH/RHC comprehensive? Was it adequate to meet the needs of the various patient cohorts?

A The systems were comprehensive, however there are anomalies in the design, capacity, ACR's, pressure control regimes, dew point control etc that

suggests that they were not adequate to meet the needs of the various patient cohorts.

206. Describe any ward/area specific ventilation systems used?

A General ward ventilation consists of separate supply and extract Air Handling units located in the associated roof plant room of the arm of the tower they serve, the supply and extract AHU's are linked together via a thermal wheel for heat recovery. The supply AHU houses primary and secondary filters, frost coil, heating coil and cooling coils for primary air treatment. The AHU's are then ducted down through the building to service the wards over four floors on the associated tower. Within the wards single rooms are supplied with supply air through a chilled beam (providing heating and cooling capability) at a volume allowing for 3ACH and there is no dewpoint control on these chilled beams. There is no extract in the patient room, the extract is pulled from an extract grille in the en-suite and via the extract in the main corridor, the rooms are neutral\0 pascals differential pressure to the corridor. Each room has its own dedicated room temperature controlled.

207. What are your thoughts about these ventilation systems that were used?

A The ventilation in single rooms with zero pascal of differential pressure creates a risk of cross infection between rooms, the rooms should have had a measurable negative pressure barrier to the corridor. The Chilled beams have a regenerative element to their operation, meaning that room air is induced into the chilled beam for mixing with the supply air as an energy efficiency feature to reduce waste heat, this results in regenerated room fibres\dust being drawing through the chilled beam settling on the surface to build up over time, this creates an unexpected maintenance\cleaning burden and is disruptive the functionality of the ward. The lack of dew point control presents issues during periods of high external temperature and high humidity, where the chilled beam controls are not configured to protect against dew point condensation, leading to condensate water discharge from the chilled beam into the patient environment.

208. Refer to **Estates Team Bundle, document 48.** Explain your concerns and actions taken.

A My concerns were that the PPVL design used for isolation ward 2A isolation rooms did not comply with the guidance design intent within SHPN 04 supplement 1, on the basis that this design was accepted as part of the contract proposal, specifically in relation to volume of extract being drawn from the patient room above the bed (0.185m3/s), with only a small extract from the en-suite. Guidance design intent states: Para 4.3: The ventilation system is designed on the basis that all its constituent parts, as described in Table 1, work together to form an integrated system. For example, air to the suite is supplied at high level in the lobby, with extract in the en-suite bathroom. This ensures good airflow through the entire isolation suite. Similarly, the volumetric airflow rate in the lobby is determined by the number of air changes required in the patient's bedroom. Modifying or failing to provide one element of the system will jeopardise the performance of the system as a whole. Basic design parameters: Para 4.4: The patient's bedroom is to have 10 air changes per hour. The entry lobby is to be at +10 Pascals with respect to the corridor. The en-suite room is to have at least 10 air changes per hour and be at a negative pressure with respect to the patient's bedroom. (this cannot be achieved with the main extract volume in the patient room) Table 1 gives nominal design values calculated for rooms of the size stated. The air change rates and pressure differentials below should be maintained when filters are dirty. Variable-speed control of fan motors would be an acceptable method of flow control, within the normal operating range of the fan's speed. Following discussion with Craig Williams, he requested that I contact Estates teams on other paediatric Transplant centres and he would also speak to his counterparts at these centre. The mail chain in the document 48 refers to these exchanges. The input from Darren Pike details a typical snapshot of the PPVL design layout from ZBP, however this layout does not represent what was installed. it shows an en-suite transfer grille which was not part of our install, and it does not show the en-suite extract rate required to achieve 10ACH set out in SHPN 04 supplement 1. it also shows a magnehelic gauge relay to the nurses station alarm panel, this was not included in out installation. I supported the works of the ICT\ICD and

I produced a position report for David Loudon detailing these concerns and deficiencies.

209. Refer to **Estates Team Bundle, document 86.** Were there any issues? Did you respond to Dr Peters? If so, what did you say? If not, why not?

A I believe that there were concerns from the ID consultant about containment of infectious diseases within general ward design single rooms. Yes I responded to Dr Peters and advised that form the information I had single rooms have an air change rate of 3ACH, the differential pressure from the rooms to the corridor was stated as being negative however this was not shown on the commissioning data, I don't recall obtaining or providing detail of the overall flow of air through the ward. I also arranged for onsite measurement of these values to demonstrate this to Dr Peters, this confirmed the ACR and that single rooms where generally zero differential pressure to the corridor. I also took Dr Peters through the as fitted ventilation plans to demonstrate how to calculate the ACR from the space dimensions and the volumetric supply and extract data from the drawings to determine if the space is positive\negative or neutral to the corridor.

210. Refer to **Estates Team Bundle, document 136.** Explain the concerns regarding latent defects and actions taken.

A With respect to ventilation, Tom Steel had requested that I look at the possibility of increasing the ventilation ACR and pressure control regimes using the existing plant aiming for a time scale for completion in line with the associated plumbing improvement refurbishment works for ward 2A. It quickly became clear that this was not possible, and I engaged Mark Lambert of Innovated Design Solutions to support a review and propose options to address the stated aims for ward 2A. Mark quickly identified that the system was not designed for the specified patient group indicating several failures which are detailed in my latent defect enquiry document 136. The latent defect generally relates to the failure to design and install a system suitable for the specified patient group. The water issues identified in my e-mail in document 136 arose from my works associated with the supply, installation and commissioning of the chlorine dioxide water treatment system, whereby

the distribution pipework had been ordered on the basis of 316L Stainless Steel from the as fitted records which we found was actually 304l Stainless Steel pipework installed . This caused delay to the roll out of the water treatment programme due to change of materials to suite as installed. I was aware for my previous request to Scottish Water regarding confirmation of their letter of regulatory approval and associated conditions for the QEUH project, that Brookfield had not notified Scottish Water as regulator of the intent to proceed with the project and there for no assessment or approvals had been given. This is both illegal and a potential latent defect for knock on complications\issues. As you will see from document 136, Tom Steele (DoF) advised me “Given Douglas’s thoughts hold back at present and make sure that our position is contractually and totally correct.” I do not recall Tom coming back to me to authorise me to issue these latent defect letters. I would expect that he would have used the Capital project team for this.

211. Explain your involvement with a review of specialised ventilation areas.

A I was involved in the review of Ward 2A Haemato-oncology\TCT ward supported by Innovated Design solutions, Matthew Lambert who produced a status report on the unsuitability of this ward for the patient group housed there, he also provided proposed option for improvement to meet the requirements of the patient group, this was reviewed by the senior management team\clinical team and ICT\ICD and approval given to proceed to tender, Matthew Lambert prepared a specification to deliver the required facilities and I worked with procurement colleagues on the tender process, the tenders had been returned evaluated and contract awarded by the time I retire July 2019, I believe that this project was taken over by the capital projects team for delivery. I was also involved in the user group review for the reopening of ward 4b to BMT patients from GGH. I reiterated my concern the risk of the AHU single point of failure affecting all isolation rooms simultaneously as well as the impact of annual maintenance and verification requirements without any robust contingency arrangements. To this end I developed the maintenance and access plan for agreement with the SLWG, procured and deployed mobile heap filtration units for use in the event of plant failure or maintenance requirements . I also developed an SOP for these

arrangements all approved by the SLWG. I was not involved in any other specialist ventilation reviews before my retirement July 2019.

212. Dr Teresa Inkster tells us that there was little progress with this matter. To what extent, if any, is this statement accurate?

A I am unaware of this review and cannot answer this question.

Specific Events in Relation to Ventilation System

213. Can you recall any specific events in relation to ventilation?
For example:

a) In 2015 prior to patient migration there were checks to the ventilation in Ward 2A in particular, with there being issues in relation to breaches around the trunking, ceiling lights etc with the extract grills not being compliant with SHPN

A The issue was related to the lack of room air tightness potentially allowing air ingress from undefined extraneous areas. Impact was that the ward 2A PPVL isolation rooms were not fit for purpose to allow patient migration. Dr John Hood (Consultant Microbiologist), Prof Craig Williams (Lead ICD, GGC) and myself. The issue was escalated by me to the Project Director David Loudon, and by Dr Williams via the Infection control committee & clinical management team. Work was on-going with Multiplex as a contract defect. Multiplex proposed appointing an expert silicone sealant company to seal up all of the service penetrations, trunking\IPS panels etc. Dr John Hood and I raised concerns over future access requirements for maintenance and the risk of for example IPS access not being properly sealed again after maintenance work. Multiplex's proposal was accepted by the project team (Not sure if Peter Moir or David Loudon) and all ward 2A rooms were silicone sealed. Following this work I had advised that the rooms should be Air Permeability tested to prove that the rooms were now ait tight to the tolerance required, the rooms passed these tests and were certified by the test engineer (RSK) This was seen as contractual commissioning and was managed by Multiplex under the contract (Capita Symonds should have signed off).

b) Lack of HEPA filters and general concerns ward 2A/B refer to Estates Bundle, documents 35 and 37. Detail how the issues managed, what was your responsibility, outcome. Highlight any concerns you had with regards to work/ testing being carried out.

A The issue over the lack of HEPA filters, on first accessing ward 2A PPVL isolation rooms with Dr John Hood and Prof Craig Williams(there are no HEPA filters in ward 2B), to review the rooms suitability for migration, I noticed that there were no HEPA filters fitted in the terminal grills in each of the 8 PPVL rooms, This meant that the rooms could not be used to accommodate Transplant patients, I raised this with Multiplex (David Wilson) in the first instance to be advised that the HEPA filters were optional and it was a client responsibility to fit these where required. I did not agree with this and therefore escalated to Peter Moir\David Loudon, David raised this as a contract requirement with Alisdair Fernie. During this time I approached several HEPA filter manufacturers to seek stock to find that they all worked on a 3 month lead time. Alisdair Fernie responded to David Loudon to advise that Multiplex had HEPA filters in Ireland for another project and that these were being diverted to the QEUH for use in ward 2B, these HEPA filters were delivered within a few days and installed followed by DoP challenge testing which they all passed. Multiplex loaded the HEPA challenge test into Zutec. These tests should have been witnessed and signed off by Capita Symonds under contract defect. Prof Williams the issue with poor environmental test results arose after the HEPA filters and Air Permeability tests had been completed and passed, from memory this was related to unsealed light fitting breaching the patient room to ceiling space. These were replaced by Multiplex with sealed light fittings and from memory I believe that the environmental monitoring result stabilised. This was an omission by Multiplex during the room retro fit silicone sealing process, where the Air Permeability test would have past due to the 20pa pressure test causing the light fitting shade to seal on to the fitting during the test, with a gap reintroduced after the test.

(i) Are you aware of the challenge testing being witnessed by Capita? If not, why were these tests not witnessed?

A I believe that Capita witnessed a sample of the challenge testing, but not all of them.

c) Dr Brenda Gibson raises concerns refer to Estates Team Bundle, documents 17 & 18.
Describe your involvement and any actions taken in respect of this matter?.

A The issue over the lack of HEPA filters, on first accessing ward 2A PPVL isolation rooms with Dr John Hood and Prof Craig Williams(there are no HEPA filters in ward 2B), to review the rooms suitability for migration, I noticed that there were no HPA filters fitted in the terminal grills in each of the 8 PPVL rooms, This meant that the rooms could not be used to accommodate Transplant patients, I raised this with Multiplex (David Wilson in the first instance to be advised that the HEPA filters were optional and it was a client responsibility to fit these where required. I did not agree with this and therefore escalated to Peter Moir\David Loudon, David raised this as a contract requirement with Alisdair Fernie. During this time I approached several HEPA filter manufacturers to seek stock to find that they all worked on a 3 month lead time. Alisdair Fernie responded to David Loudon to advise that Multiplex had HEPA filters in Ireland for another project and that these were being diverted to for use in ward 2B, these HEPA filters were delivered within a few days and installed followed by DoP

d) Air permeability tests not carried out refer to **Estates Team Bundle, document 47 Capita NEC3 Supervisor's Report (No 53)** - dated September 2015.

A The issue was related to the lack of room air tightness potentially allowing air ingress from undefined extraneous area’s. Impact was that the ward 2A PPVL isolation rooms were not fit for purpose to allow patient migration. Dr John Hood (Consultant Microbiologist), Prof Craig Williams (Lead ICD, GGC) and myself. The issue was escalated by me to the Project Director David Loudon, and by Dr Williams via the Infection control committee & clinical management team. Work was on-going with Multiplex as a contract defect. Multiplex proposed appointing an expert silicone sealant company to seal up all of the

service penetrations, trunking\IPS panels etc. Dr John Hood and I raised concerns over future access requirements for maintenance and the risk of for example IPS access not being properly sealed again after maintenance work. Multiplex's proposal was accepted by the project team (Not sure if Peter Moir or David Loudon) and all ward 2A rooms were silicone sealed. Following this work I had advised that the rooms should be Air Permeability tested to prove that the rooms were now ait tight to the tolerance required, the rooms passed these tests and were certified by the test engineer (RSK) This was seen as contractual commissioning and was managed by Multiplex under the contract (Capita Symonds should have signed off).

e) Issues with rooms 18 & 19 Ward 2A **Estates Team Bundle, documents 46, 67 and 68.**

A There are two issues here 1). Document 46 refers to me handing back of ward 2A PPVL isolation rooms 18 & 19 to Craig Williams 31/8/2015, following final deep clean ready for microbiological testing before placement of patients. Following a report by the ward Manager Jean Kirkwood that room 19 had gone negative pressure that morning. Peter Moir Escalated this to David Wilson Multiplex who had this check out to find that and advised that this room was in manual off mode and suggested that Estates\ICT team s had been adjusting these? I am unaware of any such adjustment by the Estates\ICT Teams, however the AHU was return to Auto by Mercury on behalf of multiplex and Craig Williams was able to commence his Micro-biological testing.

The second issue is related to the loss of supply AHU's for two off PPVL isolation rooms 18 & 19 in ward 2A. On investigation AHU 18 filters were changed the AHU reset and returned to operation (an AHU trip on filter alarm is not normal). These units could not be reset in Auto or Manual mode, Julie Miller (Multiplex) attempted to assist but also could not restore the AHU. I mobilised Schneider controls who arrived on site run diagnostics on the controls but during his investigation a further 4 units tripped out including AHU 18. The Schneider engineer eventually managed to return all units to manual mode and set the system to operate at 10 – 15 Pa pending further investigation next day. Ultimately the Schneider engineer identified the

network controller was at fault and this was placed on order and replaced after a few days. During this time Estates monitored the plant and PPVL room status every 2 hours. Following replacement of the network controller the system was returned to normal auto mode, issue resolved.

f) Dr Christine Peters raised issues with the air change rates in Ward 2A. Were you aware that Dr Peters had raised issues with the air change rates in Ward 2A? If so, what were the issues, what was your involvement with any work carried out to remedy any issues?

A I believe that Dr Peters along with Professor Brenda Gibson raised concerns about the ACR within ward 2A oncology\TCT wards. I supported Dr Peters to establish the ACR in the patient bedrooms and establish that the rooms did not have positive pressure protection to the ward corridor, there was also no positive pressure protection between the general ward and the hospital corridors. This ward seemed to have been designed as a general ward (including the use of Chilled beam technology, which limited the ACR to 3ACH.) with no recognition of the patient group to be housed in the ward. I advised David Loudon of this as well as consulting David Wilson of Multiplex. The response was that this was the spec requested by the clinical teams, who requested that the facility replicated that of Yorkhill oncology ward. I believe that there was correspondence between Dr Peters, Prof Gibson and David Loudon, but I am not aware of the content or that there was any outcome.
At that time, I was asked by Dr Peters\Prof Gibson what could be done to improve the ventilation ACR and I advised that in my opinion the Ventilation would need to be completely redesigned and replaced as the ductwork was not of an adequate size to supply the required ACR and pressure control regime. It was not until Tom Steele took over as Director of Facilities that I was asked to formally establish if the ventilation system could be uprated to improve the ACRs.'s?
I commissioned Matt Lambert of Innovated Design Solutions to review the design and develop options for improvement. His report resulted in Tom Steele asking me to develop a specification and tender package for the redesign of ward 2A ventilation system, which I did with the support of Matt Lambert.

g) In December 2015 you emailed David Wilson, Brookfield Multiplex stating that the *'pressure in the isolation rooms presenting an unacceptable risk to the vulnerable patients present within these protective environments.'*

(ii) Explain your concerns

A I cannot recall this specific issue without access to the reference e-mail? As there were so many issues like this.

(iii) Detail the issues

A The issue was that unexpectedly the ventilation AHU's for several of ward 2A PPVL rooms shutdown, these could not be restarted via the BMS system nor manually at the AHU's.

(iv) Potential patient impact

A Potential risk of infection for the patients occupying the affected rooms, as the rooms no longer had Positive pressure control from the lobby to the corridor nor positive air cascade flow from the lobby through the patient room with the zero air changes in the patient bedroom.

(v) what was done to resolve matters and your involvement.

A As this occurred out of hours, I raised an emergency callout to Schneider via our service support contract (as Multiplex were unable to help at this time). The service engineer worked on the system over night but could not identify or resolve the cause of the problem, but he did manage to adjust the controls to allow for the ventilation plant to be reinstated manually. This brought the room back to normal operating conditions for pressure control and air changes. These rooms remained on manual setting with regular monitoring of the conditions by Estates staff for at least 8 -10 weeks. When ultimately the affected controller was replaced. I don't recall ever receiving a definitive cause for this controller failure.

h) In February 2016 you prepared a report regarding the action plan for proposed increase of extract in the ensuite rooms in the Schiehallion ward refer to Estates Team Bundle, document 93:

(i) Explain your concerns?

A My concern and that of Dr Christine Peters (ICD) was that the design of the PPVL did not follow the design principles of SHPN 04 Supplement 1. despite the disclaimer in SHPN 04 Supplement 1 Para 1.10: “This Supplement does not describe the specialist facilities required in infectious disease units or on wards where severely immuno-compromised patients are nursed. Guidance for these facilities will follow in a further Supplement to SHPN 04.” The project designers proceeded to use the principles of this guidance in the absence of more specific Guidance and without recourse to SHTM 03-01 air flow cascade principles (clean to dirty). The PPVL facilities provided do not follow the design intent to ensure the principle of air movement clean to dirty. This paper was escalated to David Loudon, to Alisdair Fernie (Multiplex) to the designers. Who advised they believe their design is compliant, with no evidence or justification. A further point to note which was not included in my paper is detailed under SHPN 04 Supplement 1, Para 4.12 Extract ventilation: An extract terminal should be fitted at high level in the en-suite room. An additional terminal may be fitted in certain circumstances at low level adjacent to the bedhead in the bedroom. The clinical requirement for this should be verified and such requirements would probably relate to highly infectious patients.

(ii) Detail the issues?

A The PPVL facilities provided do not follow the design intent to ensure the principle of air movement clean to dirty. Where 71.5% of the required extract is drawn from the Isolation room and 28.5% from the En-suite. Empirical data collected on site by ICD\Estates indicates that when the En-suite door is left open to the isolation room the extract in the isolation room becomes negative compared to the en-suite, increasing the risk of contamination from the En-suite.

(iii) Potential patient impact?

A Potential for the patient not to be fully protected from the environment particularly relating to the en-suite, where the WC plume could contaminate the environment.

(iv) What was done to resolve matters and the extent of your involvement?.

A This paper was escalated to David Loudon, who wrote to Alisdair Fernie (Multiplex) from there to the designers to the address our concerns raised. However the designer's response was a simple we believe the design is compliant, with no evidence or justification.

(v) Issues in respect of the safety of the PPVL rooms and adequacy for isolating infectious or immunosuppressed patients?:

A SHPN 04 supplement Para 1.10 states: "This Supplement does not describe the specialist facilities required in infectious disease units or on wards where severely immuno-compromised patients are nursed. Guidance for these facilities will follow in a further Supplement to SHPN 04." As well as advising under table 1 Isolation suite parameters that : "Where immuno-compromised patients are to be accommodated, such as in transplant units or specialist cancer units, there could be a need for positive pressure isolation rooms." Most ICD's and clinicians I have dealt with in the past would prefer a positive pressure Isolation facility for this patient group.

9i) Why would most ICD's and clinicians prefer a positive pressure isolation facility?

A Positive pressure control direct into the patient's room ensures that any potential breaches of the room envelope would have to exceed the pressure of the positive pressure (+10pa) within the room for there to be any risk to the patient. As opposed to the PPVL room, where the positive pressure control is between the protective lobby to the corridor (nominal +10pa), with a nominal pressure differential between the patient room and the corridor of 0pa.

(ii) Is it right to presume that the isolation facilities were not positive pressure? If so, how did this come about? Who would have been responsible for ensuring that there was positive pressure?

A Yes, the isolation rooms themselves were nominal 0pa differential pressure to the corridor and therefore all area's surrounding the patient room envelope.

SHTM 03-01, Pt A, Appendix 1, Table 1, states: that the requirements for a ward accommodating Neutropenic patients are:

- Supply air to the room at 10 ACH.
- Room differential pressure at +10pa
- Filtered type: H12 (HEPA)

However, the contract design was based upon SHPN 04 Supplement 1, which is for acute general ward isolation requirements. I do not know why SHPN 04 supplement 1 was used for this design as para 1:10 of SHPN 04 Supplement 1 states:

"This Supplement does not describe the specialist facilities required in infectious disease units or on wards where severely immuno-compromised patients are nursed. Guidance for these facilities will follow in a further Supplement to SHPN 04."

To my knowledge the further supplement to SHPN 04 in this regard was not published.

The designer would be responsible for the design; however, I am not aware of how this was addressed under the contract Review of Design Data (RDD) process and who was party to signing off on this.

(vi) Issues detailed in **Estates Team Bundle documents 94, 95 and 96.**

A This is the first time I have seen the response from Alisdair Fernie 3\3\2015 to the PPVL concerns raised in my report and David Loudon's letter dated 1\3\2015. The impact for the Hospital& patient groups were concerns by clinicians (Dr Brenda Gibson & her Team), \ICD's (Dr John Hood\Dr Teresa Inkster & her Team) and clinical management (Dr Alan Mathers, Clinical Director & Jamie Redfern, General Manager), over the suitability of PPVL isolation rooms for Immuno-compromised Transplant patients. Alistair Fernie's stated position was that 1). SHPN 04 supplement 1 does not exclude the use of extract vents in both rooms. SHPN excludes special facilities such as

infectious disease units or severely Immuno-compromised patients, Para 1:10 “Which now appears to be the criteria that isolation rooms particularly Schiehallion wards are being scrutinised” he also highlights the original proposal was to Design the PPVL as per the SHPN model (extract in en-suite only), however this was changed to the current model as part of the RDD (Review of Design Data) process and signed off by the Board and their advisors (capita). I believe that the technical advisors were Curry & Brown (David Hall) not Capita. Finally he suggests that at no point during construction, commissioning\witnessing process was it highlighted that the signed off solution was not what was required. I was not part of the RDD or sign off process however this would suggest to me that the appropriate clinical and ICD representation were not party to this process? Following on from the ongoing communications with Multiplex over this matter. I attended meetings with the Jamie Redfern, Dr Alan Mathers, Dr Brenda Gibson, Dr Teresa Inkster, ICN’s Ward Managers etc to review on-going concerns and assess options with the preferred option being to convert 4 PPVL isolation rooms to Positive pressure isolation rooms for the most vulnerable transplant patients. These proposals were reported back to David Loudon and I was authorised to have designs prepared and signed off by all parties before putting a specification out to Tender.

i) Issues detailed in **Estates Team Bundle, document 104?.**

A The issue relates to the design of general ward single rooms with 3 ACH as opposed to 6 ACH required under SHTM 03-01. This is the first time I have seen this correspondence and was not involved in the review or the sign off process. Alan Seabourne states that Annette Rankin was responsible for ensuring the liaison and communication with Infection control department and Microbiology was carried out effectively and that they were party to the sign off of all design matters impacting the patient including environment. I was not aware of the detail or methodology of this process nor did I see any sign off detail. Alan also advises that Facilities were also involved in these processes and signed off on these matters, I don’t believe that this included any member of the operational Estates team?

(i) Does the term Facilities relate to your earlier distinguishing of operational estates and facilities?

A Yes, the Facilities department encompasses Soft Facilities Management (FM) and Hard FM (Operational Estates), operational Estates are managed under the Facilities management structure and reference that Facilities were involved in sign of would suggest operational Estates involvement. However, I am not aware of any Operational Estates involvement in this process, as all the senior Facilities managers were from soft FM backgrounds.

j) Fungal growths in a number of rooms in ward 2A?.

A I have already covered the issues surrounding fungal spores in multiple rooms within 2A Isolation rooms and the resolution by installing sealed light fittings. However There was another incident if I recall correctly for PPVL room 19, where I was advised by Dr Inkster that routine monitoring had shown fungal counts in this room. The room was made available for investigation and it was found that there was a tear in the flexible duct connection to the HEPA filter housing, this caused the ceiling void above the isolation room to pressurise at about 10pa and the lobby pressure to drop, resulting in air from the ceiling void entering the isolation room The flexible duct was replaced and on closer inspection it looked like the duct material had a score along its length which split due the force of the air pressure applied to it over time. The flexible duct was replaced the room reseals, deep cleaned and returned to ICT for further monitoring before being placed back into service.

k) Any other issues/ incidents not mentioned above.
In providing your answer please tell us:

a) What was the issue?

b) The impact on the hospital (include wards/areas) and its patients (if applicable)

c) Who was involved?

d) What was the escalation process?

e) Were any external organisations approached to support and advise?

f) What was the advice?

g) Was there opposing advice and by whom?

h) What remedial action was decided on and who made the decision?

i) Was the issue resolved – consider any ongoing aftercare/support/monitoring?

j) Any ongoing concerns witness had herself or others advised her of?

k) Was there any documentation referenced during or created after the event. For example, an incident report?

l) Did anyone sign off to say the work had been completed and issue resolved/area safe?
Write your answers in the relevant answer boxes above.

A I cannot recall any other isolation room issues.

Isolation Rooms

214. In the Stage 3 Sectional Completion Certificate **Estates Team Bundle, document 3** on 29th January 2015, HEPA filters in isolation rooms were listed as incomplete **Estates Team Bundle, document 3, page 25:**

a) What was missing?

A Isolation rooms intended to house Immuno-compromised patients had not been fitted with the required HEPA filters at the PPVL lobby terminal filter boxes.

b) Why was the completion certificate signed when there were incomplete works to the isolation rooms?

A I don't know the answer to this question.

c) Was this discussed with other members of staff? If so, who?

A I don't know the answer to this question.

d) Was this issue escalated to Board level? If so, to whom and who escalated matters?

A I escalated this to the project Director, David Loudon. I don't know if it was escalated to Board level.

e) Explain what works were carried out to resolve this matter, your involvement and when matters were resolved?

A Multiplex sourced HEPA filter from one of their projects in Ireland and shipped them to site, the filters installed by Mercury Engineering and Dispersed Oil Particulate (DoP) (please define) challenge tests carried out on their behalf by H&V commissioning. From Memory this was carried out Circa June 2015.

215. What was the issued referred to in the email at **Estates Team Bundle, document 34?** How did this happen?

A From Memory, Professor Craig Williams had asked for the commissioning records for ward 4B BMT ward to assess the status of the HEPA filters and room differential pressures to the corridor, as this ward was supposedly upgraded to isolation room standard to accommodate BMT patients. I advised Professor Williams that Multiplex had not carried out HEPA filters DoP challenge tests nor single rooms differential pressure tests to the corridor. “as these rooms were not defined as isolation rooms” I am not sure where I got this quotation from but suspect it would have been from David Wilson (Multiplex Commissioning Manager). This means that the rooms had not been effectively commissioned for their intended purpose. I do not know how this happened as I was not involved in the change of specification for the change of use of ward 4b from a general ward to a BMT isolation ward. However it soon became clear that the ward was not generally fit for purpose however the rooms in general did not meet the requirements for the BMT patient group with the finish and engineering arrangements at hand over.

216. Discuss the air permeability testing carried out in respect of the isolation rooms **Estates Team Bundle, documents 37 & 41:**

a) Why was this work carried out?

A Air Permeability (Air tightness) tests of PPVL designed rooms are required to be undertaken as part of validation requirements set out in SHPN 04 supplement 1 for the Isolation suite. To ensure effective isolation, it is important that air leakage to or from adjacent areas is kept to a minimum. Construction gaps should be minimised and service penetrations sealed

before the suite is tested. These validation tests were not carried out by Multiplex as part of the commissioning and Validation process prior to hand over and therefore all PPVL isolations suites across the QEUH & RHC required Air Permeability validation.

b) What was the result of this work?

A I cannot speak to each test from memory, but in general the tests were carried out and were required additional minor re-sealing works were carried out. All rooms passed the Air Permiability Validation test by the end of this programme.

c) What was your involvement in the work?

A I supported the development of the programme working with David Wilsom, arranging access and issuing communications with the affected wards and consulting with ICD's. I also witness some of the tests carried out in wards 2A & 4B.

d) What if any issues arose?

A I had concerns over the requirement in SHPN 04 supplement to "Turn off the suite supply and extract ventilation systems and those serving adjoining spaces. (Rationale: All adjoining spaces need to be at atmospheric pressure in order to establish the true leakage rate.)" however David Wilson saw this as less of an issue and wanted to proceed to work with the systems as they were (occupied).

e) Refer to **Estates Team Bundle, document 47 Capita NEC3 Supervisor's Report (No 53) - dated September 2015. Estates Team Bundle, documents 51 & 55.1.** to assist with your answer.

A The patients were not in isolation rooms being tested, in line with the requirement to switch off ventilation in adjacent rooms, Professor Craig Williams also advised patients in adjacent rooms be relocated. Type your answer here

i) Were patients in these isolation rooms at this time?

A The patients were not in isolation rooms being tested, in line with the requirement to switch off ventilation in adjacent rooms, Professor Craig Williams also advised patients in adjacent rooms be relocated during the tests.

ii) Potential impact on patients?

A Ventilation pressure control is lost in the affected rooms during these tests therefore patients need to be relocated. Risk of exposure to contaminants in adjacent spaces if the test fails air tightness limits. It should be noted these tests should have been completed before handover where there would be no potential for patient impact.

iii) Are you aware why these tests were not completed before handover?

A No, I am not aware of the reason these tests were not completed before handover.

iv) Your involvement with the HAI Scribe

A I arranged the meeting, but I can't remember if it was David Brattey (senior Estates Manager) or myself who met with the ICN to complete the HAI Scribe.

v) Do you recall the outcome of the HAI Scribe?

A I don't recall the outcome of the HAI Scribe, but it would have put in place control measures to protect the patient from the activity being assessed.

217. Refer to **Estates Team Bundle, document 26** Christine Peters states that you were dealing with sealing light fittings:

a) What was the issue?

A I don't see any reference to my dealing with sealing of light fittings in document 26? However I believe this question refers to the fungal counts measure in one of the PPVL isolation rooms ward 2A, sometime after the air permeability test (not sure of timeline), where I identified the possibility that the light fittings had not been sealed prior to the Air Permeability test. I looked into this and arranged for multiplex to change the light fittings to a sealed unit to address the issue in the affected room, which was then rolled out to all isolation rooms. The affected room in ward 2A was deep cleaned and handed

back to ICD for further microbiological testing before being returned to service on receipt of clear results.

b) What was the potential impact on patients?

A Potential exposure environmental organisms.

c) What did you do to resolve this matter?

A I looked into this and arranged for multiplex to change the light fittings to a sealed unit to address the issue in the affected room, which was then rolled out to all isolation rooms. The affected room in ward 2A was deep cleaned and handed back to ICD for further microbiological testing before being returned to service on receipt of clear results.

218. There were issues in August 2015 with isolation rooms refer to **Estates Team Bundle, documents 44 & 45:**

a) Detail your understanding of the issues?

A I believe that these issues are related to the initial inspections of the ward 2A PPVL isolation rooms carried out by Dr John Hood, Professor Craig Williams and myself to assess the suitability of these rooms for patient migration, where John & I carried out smoke tests around all room IPS panels, trunking, ceilings etc to determine direction of air flow, results showed air flow in from the IPS\ceiling and wall breaches. In addition we carried out pressure differential tests between each space and the ceiling void\IPS panels to find that the ceiling was at a positive pressure relative to the en-suite. The worst rooms were rooms 18 & 19.

b) Were the affected wards/ areas complaint with the relevant guidance at the time

A No the PPVL isolation suites in all areas were not compliant with the guidance that they had been designed against SHPN 04-01.

c) Your understanding of whether the affected areas/ wards had been built to contractual specification at the time

A My opinion is that they were not as these PPVL suites were not designed with the correct Clean to dirty air flow pattern recommended with SHPN 04 supplement 1, with the main extract in the patient room rather than the en-suite, where Para 4.12 states “An extract terminal should be fitted at high level in the en-suite room. An additional terminal may be fitted in certain circumstances at low level adjacent to the bedhead in the bedroom. The clinical requirement for this should be verified and such requirements would probably relate to highly infectious patients.” In addition, these PPVL suites had not been properly commissioned and validated, lack of designer commissioning pack, equipment commissioning certificates and no overall system validation report. From the information provided in the supporting bundles to this questionnaire I cannot attest to the rooms meeting the final RRD agreed design.

(i) Was this your opinion at the time, or since being asked to consider by the Inquiry?

A This was my opinion at the time, and I advised the project team David Loudon\Peter Moir of this as well as (David Wilson) Multiplex.

d) Your involvement in carrying out/ instructing work to remedy any issues?

A Having identified an issue, I would consult with Multiplex (David Wilson) for background details, carry out an investigation\assessment and ether raise a defect via Capita or provide David Loudon with the details and options to resolve for him to address with Multiplex.

e) Whether there were patients in the affected wards/ areas at the time?

A With respect to this work I don’t recall patients in the ward at this time, I can’t remember the patient migration date for ward 2A, but I believe it was one of the later migrations.

f) Your understanding of the potential impact on patients?

A Potential patient exposure to environmental organisms as the rooms did not meet the Air Permeability (air tightness) test criteria.

219. There remained issues regarding testing in September 2015 refer to **Estates Team Bundle, document 61:**

a) Explain the issues?

A This was the on-going requirement to validate all PPVL rooms with respect professionally sealing of the PPVL suites to support Air Permiability (Air Tightness) tests and belated validation. Due to room occupancy\access issues this process was taking longer than expected. The issue regarding adjustment to the extract volumes relates to a trial the ICD's professor Criag Williams which to test, based on information from Leeds children's Hospital.

b) Your involvement?

A My involvement was to liaise with the ward staff, ICD and multiplex to manage the logistic and verify the results with Professor Williams as well as ensuring the suites were deep cleaned and handed back to ICT for microbiological sampling, before being returned to service.

c) Work carried out to resolve any issues?

A The works involved Pro-seal professional sealant company, sealing off all envelop penetrations gaps and potential breaches to the suite. Followed by independent Commissioning Engineers carrying out the air permeability test protocol to validate the suite air tightness against the set criteria laid down in SHPN 04 Supplement 1.

d) Potential patient impact?

A Patients placed in the affected PPVL suites before the sealing works and Air Permeability tests were carried out could potentially be exposed to environmental micro-organisms. However I believe this was tightly monitored and managed by ICT.

220. Refer to **Estates Team Bundle, document 70**, David Loudon stated that the Board would not be taking handover until they were confident that the rooms were fully compliant:

a) At the time how were the room not fully compliant?

A My interpretation of David's e-mail is related to the 2nd stage upgrade works for ward 4B BMT, as this ward had been taken back by Multiplex for further development and therefor had yet to be handed over under this stage 2 amendment to contract. The other issue referred to in the mail chain relate to works in occupied wards where hand over had already been accepted.

b) Explain your involvement?

A I was involved with the ICT\ICD review of the concerns for the ward's suitability for housing BMT patients. I was involved in a few progress meetings with Peter Moir, David Wilson (Multiplex), Prof Craig Williams (ICD) as well as the final site visit and review of commissioning documents with Teresa Inkster.

c) What work was carried out and how was this recorded?

A The following works were delivered under the stage 2nd stage contract for ward 4b:

1. Isolation room suspended ceiling replace with solid ceilings, complete with sealed access hatches for maintenance.
2. New sealed light fittings were installed.
3. Supply and extract AHU fans, motors and inverters were replaced to increase capacity.
4. Ventilation system rebalance to deliver 6 ACH at a differential pressure of 5-10 pa.
5. Supply ductwork cleaned and microbiological testing carried out.
6. Differential pressure room display, and central alarm installed and commissioned.
7. AHU filters replaced.
8. New HEPA filters fitted to all isolation rooms.
9. Room Air Permeability tests complete.
10. HEPA Filter DoP Challenge tests complete.

d) When did the rooms become fully compliant?

A I am not sure that these rooms could be classed as fully compliant, as they did not have ventilated lobbies and the did not achieve 10ACH or 10 pa differential pressure to the corridor, the ward was also reliant on a single supply AHU which was a single point of failure risk. But the works represented betterment to a level that I understand was acceptable to the clinical team & ICT.

e) When did the Board accept handover of the rooms?

A End Oct 2015.

f) Who advised the Board to accept handover of the rooms?

A I believe that David Loudon would have advised the Board with the support of ICT.

g) What document did you see to confirm that the rooms were fully complaint?

A 1. H&V commissioning reports: a. AHU Supply and Extract AHU commissioning volumes. b. AHU filter integrity test c. Ventilation Commissioning. d. HEPA Filter challenge test report. e. Room – corridor differential pressure.

2. Ventilation Duct Work cleaning report

3. Room Pressure Monitoring System Commissioning Report

4. RSK room air Permeability report

221. Discuss the issue with the manual controller in isolation rooms in ward 2A **Estates Team Bundle, document 83:**

a) Your understanding and involvement?

A The issue related to a loss of ventilation plant involving 5 PPVL rooms in ward 2A RHC, Initially 2 units tripped supplying rooms 18 & 19, we managed to reset one but not the other, the units could not be switched to manual mode. I mobilised support out off hours from Multiplex (Julie Miller) and also Schneider via the Boards service support contract. During Schneiders attempts to run diagnostics on the system another 4 units tripped out (totalling 5). The Schneider engineer could not resolve the issue but managed to

restore the 5 AHU to manual mode, this restored the positive pressure to all 5 PPVL suites affected. With further support next day it was established that BMS network controller had failed, and this needed to be replaced. This was placed on order and the AHU's monitored routinely by Estates every 2 hours while on hand mode.

b) Work carried out?

A From memory the network controller was replaced after the software issue was identified but I cannot recall the final cause of the failure.

c) Potential patient impact?

A The potential impact on patients was loss of pressure control in 5 rooms over a 4-6 hour window until the units were restored in hand mode. I don't recall there being any reported adverse impact on the patient who remained in the rooms. The rooms were stable for the period they were on hand mode.

Pentamidine Rooms

222. Discuss Pentamidine Rooms:

a) What are Pentamidine Rooms?

A As I understand it a Pentamidine room is a dedicated room for the safe administration of the drug Pentamidine.

b) Your understanding of the purpose of these rooms?

A The provide a safe environment to protect staff from exposure to the toxic drug pentamidine.

c) The guidance applicable to these rooms for water and ventilation?

A I am not aware of the applicable guidance for this facility, this would appear to be clinically driven, H&S\COSHH driven requirement to protect the operator, with negative pressure HEPA filtered isolator complete with pressure differential monitor\alarm.

d) Discuss any issues with the specification of these rooms during 2015 **Estates Teams Bundle, document 38.**
In particular consider any issues with:-
a) The air change rates
b) Air pressure Estates team Bundle, document 78.
c) Compliance with guidance
d) Any issue(s) arising from the testing

A I was not directly involved in addressing this issue, other than the info in the above documents (which is less than clear) I don't have answers to these questions.

Ward 4B

223. What was the intended purpose of Ward 4B?

A The original intended purpose of ward 4B was as a general ward with the same ventilation specification as all other wards.

224. Did this change prior to January 2015? If so, what changes were made?

A Yes, the board requested proposals from Multiplex to convert this ward to accommodate BMT patients from GGH under it modified clinical strategy.

225. What, if any, changes were required to the ventilation system? Why were they made?

A In principle, the ventilation should have been designed as a minimum full PPVL standard, preferably positive pressure isolation suite. However I believe that the proposals were limited to what could be delivered by the plant and ward environment already constructed. The main change made was to ramp up the existing ventilation plant to maximise are volumes delivered, with a view to creating an improved ACR and differential pressure, removal of the chilled beam technology and addition of terminal HEPA filters in each of the 24 rooms.

226. How involved were you with the changes?

A I was not involved in any changes to design prior to hand over (Jan 2015).

227. There were issues with Ward 4B though almost straight away with an SBAR being prepared on around 7th June 2015:

a) Discuss the concerns about Ward 4B. Refer Estate Team Bundle, document 30 - What was the purpose of the SBAR?

A The SBAR was intended to highlight the shortcomings of the new BMT ward 4B to the senior management team and propose remedial action to address the safety concerns for the affected patient group.

b) How long after migration to ward 4B were patients decanted back to the Beatson?

A Approximately 6 – 8 weeks

c) To what extent were issues raised in the SBAR from June 2015 present at the point of NHS GGC taking occupation in January 2015, and when Ward 4B was handed over to NHSGCC?

A I would consider that the issues raised existed at the point of handover Jan 2015.

228. How could these issues arise immediately between handover and patient migration when the Ward was signed off and handover accepted?

A My interpretation would be the ward was not fit for purpose at point of hand over, I was not party to the design specification or the sign off arrangements for this ward or premigration confirmation of the wards suitability.

229. Refer to **Estates Team Bundle, document 36:**

a) What were the early testing being carried out?

A I was not involved in these works, but I believe this was an attempt to provide a sealed ceiling using the existing suspended ceiling grid with tiles fitted with rubber edge seals.

b) Why were tests being carried out?

A In an attempt to raise the room pressure with the existing ventilation arrangements.

c) Explain your involvement?.

A I was not involved in this work nor the communication loop.

d) To what extent, did the test result provide assurance regarding Ward 4B's suitability for the intended patient cohort? If so, how?

A I don't think this attempt was successful, I believe that ICT insisted on full solid ceiling.

230. Refer to **Estates Team Bundle document 23:**

a) Was there issue(s) with the particle counts?

A Yes, the particle counts were high for all rooms.

b) If so, when was the issue(s) identified?

A If I recall correctly I reviewed the area with Christine or Teresa (I can quite remember who) and looked at the potential source of contamination, doors not closed to the rooms, ingress are from the stair well at the rear of the ward. We agreed to put in some control\housekeeping measure as well as carrying out a further deep clean.

c) What was your role?

A Supporting ICD, co-ordinating response for cleaning.

d) What action was taken and by whom?

A I briefed Facilities as to the need for further cleaning and more routine cleaning to the ward and then advised when we were ready for resampling.

e) Did the action taken resolve the issue(s)?

A I think so at that stage.

231. Refer to **Estates Team Bundle document 39:**

a) What were the issue(s) with the pressure gauges?

A Ward 4b BMT, did not have pressure gauges fitted therefore there was no monitoring of the room status or alert if the door to the room was left open resulting in the loss of positive pressure control

b) When was the issue(s) identified?

A I believe this was part of the issues identified for action following the decision to relocation ward 4B patient back to the Beatson (GGH).

c) What was your role?

A I was not directly involved in these works until close to hand over when Peter wanted support for sign off.

d) What action was taken and by who?

A Peter Moir managed the upgrade specification and project as Contract manager, still seen as a contract issue at that time. Multiplex carried out the works.

e) Did the action taken resolve the issue(s)?

A Not entirely, there were still teething problems with poor micro-biological results, I worked with Dr Teresa Inkster to review why 3 or 4 rooms at the top RHS of the ward were returning poor results. I traced the issued down to an unfiltered air supply in the medical supplies store at the back of the ward, the door for this room was left open and the air pathway was from this room down the corridor to the affected rooms was clear. The room was sealed to verify this theory. Once confirmed a new filter housing and HEPA filter were ordered and installed in this room. Control measures remained in place with the ward staff until the works were completed. In addition I was asked By Dr Teresa Inkster if we could improve on the isolation room differential pressure, as a trial David Brattey and I source and installed an adjustable door draft excluder and fitted this to an empty room and by adjusting the undercut gap on the door via this device we were able to increase the pressure by

approximately 2 pa. This was approved by Dr Inkster and this non-intrusive solution and was applied to all rooms.

f) Why was the issue(s) not identified sooner than July 2015?

A I can't answer that, as I was not involved before handover, or in the ward assessment after handover.

232. Refer to **Estates Team Bundle document 40:**

Provide information on the upgrade works referred to, what the works were, why they were required, when the matter was identified and by who, what was your involvement. Were matters escalated, if so, by who and who was the situation escalated to?

A The upgraded supply and extract AHU fans\drive motors and invertors was required to increase the system capacity to overcome the high resistance presented by 24 HEPA filter units and to increase the ACR and pressure cascade in each of the isolation rooms to something close to acceptable by the ICD\Clinical team as the SHPN requirement for 10 ACH at 10 Pa was not achievable with the existing AHU's installed capacity. The target for this upgrade was 6 ACH at 5 – 10pa, per room. This was identified as part of the upgrade review following the return of BMT to the Beatson. I was only involved if Peter Moir need my input, I was not involved in the scoping meetings with the clinical oncology team. nor the project management. I supported Dr Inkster on any technical questions she had throughout this process. I don't believe there was a need for escalation at this stage, this was looking for reassurances regarding the capacity of the upgraded AHU to meet SHPN requirements to provide full design air flow and pressure at the HEPA filter end of life.

233. Refer to **Estates Team Bundle document 62:**

a) What is this document?

A This is the ventilation commissioning and validation report for the overall system.

b) Have you seen it before? If so, when?

A Yes, I was provided with a copy of this along with the other handover documents at the site completion meeting on or around 28/10/15.

c) What was the purpose of carrying out a ventilation report in October 2015?

A This was to verify the Re-Commissioning and Validation of the ventilation system upgrade following the decant of ward 4b patients July 2015.

d) Did any issues arise from this report?

A Not that I can recall at the time.

e) How involved were you?

A I was not involved with the scoping meeting with the oncology clinical team, I was only involved as and when Peter Moir needed my input toward the handover and received copied of the completion documentation.

f) What matters, if any, did you escalate arising from this report? If so, to whom and why?

A I don’t recall escalating anything at the time.

g) If yes to (f) what action was taken?

A N\A

234. Refer to **Estates Team Bundle document 66:**

a) Discuss the issues referred to in this email chain.

A Peter Moir was seeking advice on any other commissioning data I might expect to see over and above what he already had.

b) What was your involvement?

A I was not involved in the commissioning process.

c) What works were required?

A 1. Isolation room suspended ceiling replace with solid ceilings, complete with sealed access hatches for maintenance.

2. New sealed light fittings were installed.

3. Supply and extract AHU fans, motors and inverters were replaced to increase capacity.

4. Ventilation system rebalance to deliver 6 ACH at a differential pressure of 5-10 pa.

5. Supply ductwork cleaned and microbiological testing carried out.

6. Differential pressure room display, and central alarm installed and commissioned.

7. AHU filters replaced.

8. New HEPA filters fitted to all isolation rooms.

9. Room Air Permeability tests complete.

10. HEPA Filter DoP Challenge tests complete.

d) Why were works required?

A To address to concerns raised by the BMT clinical team in their SBAR and those of the ICD.

e) Were all necessary works carried out?

A I understand that the works carried out addressed the stated aims of the clinical oncology team, however I was not party to this process.

235. Refer to **Estates Team Bundle document 69:**

a) What is his document?

A This is the Air permeability test certificate for the single isolation rooms within ward 4B BMT dated 27\10\15.

b) Have you seen it before?

A Yes.

c) How did this document inform your decisions and actions taken?

A This was part of the validation process for the upgrade of ward 4B, it confirms that all 24 rooms have been tested and passed the Air Permiability requirements of SHPN 04 supplement, no action required as this was a successful validation.

236. Refer to **Estates Team Bundle document 71:**

In this email Peter Moir states that Ward 4B was ready for handover:

a) How confident were you that the ward was ready for handover?

A As I understood it, I was confident that the commissioning and validation data meet the requirements of the clinical\ICD teams on the bases that this was not a fully compliant installation and could not be with the restrictions of the ward layout and plant available.

b) To what extent did the ward meet the relevant SHFN and SHTM 03-01guidelines for the intended patient cohort?

A It does not meet the requirements of SHPN 04 supplement 1 guidance, I was led to believe that the proposed upgrade works were agreed with the clinical oncology team to meet their requirements within the limitations of the existing build.

c) What reservations, if any, did you have at that time?

A The main concern I had was that the supply AHU was a single point of failure which could result in the loss of positive pressure control to all 24 rooms simultaneously. In addition I was concerned as to how annual maintenance and verification of the ventilation system could be delivered without impacting on the patient protective environment.

d) If so, when did you escalate these concerns and to whom? If not, why not?

A I raised concerns over this with David Loudon but can’t recall the timeline for this, David appointed Steve Russel from the capital planning team to assess if a standby plant could be installed to mitigate this issue. He concluded that this

was not possible with the plant room space restrictions (I believe Steve produced a paper for this).

e) Was any further work carried out to Ward 4B at this time?

A Not that I am aware of. Note that question 190 below has no space to respond therefore this is the response Q190: The issues detailed in the NEC3 supervisors report did not prevent handover of ward 4b on 29\10\2015.

237. Refer to **Estates Team Bundle document 73** detail the remaining defects at this stage, did this prevent handover of Ward 4B?

A The issues detailed in the NEC3 supervisors report did not prevent handover of ward 4b on 29\10\2015.

238. Refer to **Estates Team Bundle documents 77 & 77.1:**

a) Discuss this email?

A Document 77 refers to requests for ward 4b, BMT data from HPS in order to offer ICT support regarding requirements to ensure ward 4b & 2b are suitable to house BMT\oncology patients.

b) Explain your involvement?

A Other thanks being copied into the mail chain by Dr Inkster for information I was not involved in this process, this was being addressed by the Capital project team David\Loudon\Peter Moir.

c) Explain any assurances given?

A I am unaware of any assurances that were given from this email exchange.

239. In her statement Dr Teresa Inkster tells us that at a meeting on 7th December 2015 in respect of the proposed patient move back to Ward 4B that *'Ian Powrie highlighted that it was still unclear what specifications the original design team worked to.'*

To what extent is this statement accurate? What concerns did you have at the time regarding Ward 4B? What concerns did you have at the time about the ward specification? If so, explain what your concerns were and why? Had any of your concerns been resolved by December 2015?

A This was and is an accurate statement, I have not seen the original design spec and still don't know what the brief was, Zutec does not contain design brief data and ACONEX the contract management portal and the contract monitoring protocols are equally difficult to interrogate. I was unclear what the original specification\intent was as the ward that was delivered made no sense to me. I did not see the ward specification, my concerns were that other than there being no chilled beams in the rooms (HEPA filtered air supply) the ward looked like a standard ward with standard air volumes 3ACH and no pressure control regime, nowhere near SHPN 04 compliance. I cannot comment on the specification as I have not seen it. As of Dec 2015 these concerns had been improved with increased ACH (6ACH) at 5-10pa (average 7pa), HEPA filtered supply, pressure indication and central alarm system but still not SHPN 04 compliant. I believe this was betterment within the limitations of the ward layout and plant /ductwork configuration.

240. Refer to **Estates Team Bundle, document 87** – Why was NSS involved in the issues? Actions taken in response, your involvement.

A I don't know why NSS (HFS) were involved, I was not party to these communications or involved with HFS regarding ward 4B.

241. Refer to **Estates Team Bundle, documents 88 and 89**

a) Describe the situation?

A It would appear that Peter has been asked (possibly by HFS), about ancillary rooms within the ward were the supply vents are not fitted with HEPA filter terminals.

b) Any action taken?

A I am not aware that Peter took any action regarding this suggestion.

c) Your involvement?

A I was not involved at this stage and was not party to these discussions and was unaware that this issue had been identified. I was involved at a later stage with Dr Terresa Inkster, when microbiological counts increased in a block of rooms at the rear of the ward, this is incident is detailed in my response to Question 184e above.

d) Any concerns and whether matters were escalated and if so to who?.

A I am unable to comment as I was unaware of this?

242. Refer to **Estates Team Bundle, document 101**

a) Describe the situation

A I was unaware of this feasibility request, looks like David Loudon is seeking to introduce a pressure control regime to the corridor of ward 4b, (possibly to protect against unfiltered air supplies in ancillary rooms?

b) Any action taken?

A I am not aware that this was progressed.

c) Your involvement?

A I was not involved or aware of this proposal.

243. In respect of Ward 4B describe the works carried out, why, your involvement and when. Use the below to assist and detail issues you were aware of in respect of Ward 4B, your involvement and any remedial works – works done and why?.

Refer to the following when answering:

Estates Team Bundle, document 71

Estates Team Bundle, document 72

Estates Team Bundle, document 97

Estates Team Bundle, document 115 - why was there 'pre-start' meeting – what was the issue with this?

A From the documents below, Document 71: This is an update from Peter Moir on the completion of stage 2 work handed over 29/10/2015.
Document 72: is the hand over bundle provided by multiplex including Commissioning and Validation of the ventilation alterations to ward 4B. these works were intended to address the concerns raised by the clinical oncology team\ICT regarding the original ward design and occupation.
Document 97 seems to relate to confusion from Multiplex as to what is being requested (specification) by the Board for stage 3 upgrade work 2 ward 4B.
and Document 115 seems to be Communications from Dr Christine Peters Consultant Microbiologist and Dr Jennifer Armstrong Medical director over concerns over design parameters, management issues and infection control maters regarding the safety of patients, followed by confirmation from Billy Huntter (Facilities General Manager) that the HAI SCRIBE had been signed off. Unfortunately, I cannot answer the points raised in this question, as I was not involved in the planning or implementation or delivery of this stage 3 upgrade of ward 4B. In January 2017 I was redeployed to the depute General Manager Estates role based in the corporate offices (CMB).

244. Involvement and knowledge to HAISCRIBE – what was this and what was the issue?– refer to **Estates Team Bundle, documents 117 and 118.**

A I was not involved and have no knowledge of the preparation for this HAI SCRIBE document.

245. Ward 4B:

a) When were Ward 4B patients decanted from Ward 4B back to the Beatson

b) Why did this happen?

c) When patients initially transferred from the Beatson to Ward 4B was the specification of Ward 4B the same spec as the Beatson?

d) If not, then why were patients transferred from the Beatson initially if the specification?

e) Explain to the best of your understand what works were carried out to Ward 4B during this time, stating why, whether this was an issue when the ward

initially started taking patients, who signed off on the works, how did it become known that the works were required.

A Responses provided in earlier questions.

Decision to Close Wards 2A/B and Move to 6A and 4B

246. Discuss the issues surrounding and leading up to the decant of patients from Ward 2A in 2018.

a) What was the lead up and background to this refer to **Estates Team Bundle, document 133?.**

A I was on Annual leave 12\9\2018 – 1\10\2018 and therefore was not involved in the discussions\meetings held regarding the decant, however I understand that the ongoing concerns regarding the risks from water and drainage combined with the level of disruptive works associated with these issues affecting patients and staff as well as the historic concerns over ward 2A Haemato-oncology\TCT units not being in an effectively contained environment with non-compliant ventilation for the patient group was the catalyst for the decant.

b) What was your involvement?

A The Decant was complete by the time I returned from A\L, I was not involved. my involvement was to lead on the management and roll out of the water treatment installation and continuous delivery, modifications to the wards plumbing to accommodate:

a). New contour 21 clinical wash hand basins (CWHb) complete with new smooth drain outlet connection complete with a smooth transition silicone boot drain connection to minimise biofilm growth opportunities.

b). Replacement IPS panels to accommodate the CWHb and new the Markwik 21 TMT.

c). Installation of new Markwik 21 TMT's complete with Bio-guard copper lined outlets.

d). Removal of WC cisterns (due to possibility of contaminated water storage within them) and replace with direct flush valves. Refit modifications to bathroom conversion to treatment room, modify existing treatment room to

isolate whb from prep area and install additional storage. Lead on the ventilation review for ward 2A Haemato-oncology\TCT units supported by Innovated design solutions.

c) What risk assessment and additional measures were put in place to ensure patient safety?

A I was not involved in the patient decant and therefore not full conversant with the Risk Assessment\additional measure employed.

d) What concerns, if any, did you have about where the patient cohort was being moved to?, If so, why did you have these concerns? IMT Bundle, document 39 you flagged concerns, were these ever followed up? Did you escalate these concerns? With the benefit of hindsight, what steps could have been taken to progress this matter further?

A The **IMT bundle, document 39, dated 17\9\2018,** I was on A\L and did not attend this meeting, therefore I could not have flagged any concerns as suggested above. Mary Anne Kane , emphasised “that the facilities that children would be moved to on the adult QEUH site were no better from a ventilation perspective” following discussion the IMT still recommended decant as there are ongoing issues that need addressed that cannot be addressed while the ward is occupied.

e) Discuss and detail the works done to Ward 2A/B what was required to be done and why, what has been done and when the work was completed. Please include details of your involvement. Reference IMT Bundle to assist.

A My involvement in ward 2A\B was to lead on the management, procurement and roll out of the water treatment installation and introduction of continuous chlorine dioxide treatment as a standalone installation for ward 2A\B, Required to bring the water system within this ward back to accepted quality, went live Nov 2018, to allow ward to be reoccupied Jan 2019. This was an interim measure until the full site wide treatment strategy could be implemented and proven across the site while providing a stable water system to ward 2A\B. I also managed the procurement and implementation of works within wards 2A\B, all of which I submitted option papers to the WTG, for

discussion and approval in order to improve the environmental conditions for this patient group. These works included following elements:

a). New contour 21 clinical wash hand basins (CWHb) with newly designed smooth drain outlet connection complete with a smooth transition silicone boot drain connection to minimise biofilm growth opportunities.

b). Replacement IPS panel template to accommodate the CWHB and new the Markwik 21 TMT profiles.

c). Installation of new Markwik 21 TMT's complete with Bio-guard copper lined outlets, in order to meet SHTM 04-01 and HPS Pseudomonas guidance by removal of flow straighteners.

d). Removal of WC cisterns, due to possibility of contaminated water storage within them and the risk from the resulting flush plume and replace with direct flush valves.

e) Remove Argo bath and convert bathroom to a treatment room, removed internal flexible pipe risk and creates new treatment space. Review ward 2A Haemato-oncology\TCT and ward 2b ventilation system design to establish if the system can be amended to improve room ACR, supported by Innovated design solutions. All of these elements were completed and ready for hand over with clear water test results by the target date Dec 2018. However the ventilation reports indicated that although the ventilation could be amended it was not suitable for this patient group. Further works were carried out to develop a new ventilation strategy for these areas.

f) Any other relevant information, for example mould behind the IPS panels in Ward 2A.

A There may have been slight mould issues behand IPS panels, this would usually be the result of a small unidentified water leak (remember IPS panels were sealed) however I do not recall there being any substantial mould issues. There were on going technical\logistical challenges in completing these works by the Dec 2018 deadline scale, but I do not recall any other relevant details.

247. Discuss the issues surrounding the ward 2A patients when in occupation of ward 6A. In particular, views you may have in respect of:

a) Chilled beams

b) Gram Negative Bacteraemia

c) Water filters

d) Ventilation, including HEPA filters

e) issues/ testing/ escalation/ response/ IMTs/SBARs impact on patients

f) Patient communication

g) Internal escalation - HAIIT scoring

h) External escalation

A From Memory I was not involved in the operational management issues at this time with respect ward 6A, these would have been the remit of Andy Wilson (Sector Estates Manager Supported by Darryl Conner (Senior Estates Manager).

Reports Prepared by Innovated Design Solutions October 2018

248. Refer to **Bundle 6 – Miscellaneous Documents – Documents 33 and 34.** These documents are feasibility studies regarding increasing ventilation air change rates within Wards 2A and 2B by Innovated Design Solutions.

a) Who commissioned these reports?

A I commissioned these reports.

b) What was the background to these reports being commissioned?

A As part of ward 2A\B decant and status review, Tom Steele asked me to ascertain if the ACR in patient rooms could be increase utilising the existing ventilation system, I advised that it was my opinion that it was not but would need a ventilation design review to confirm this, Tom Authorised me to proceed with obtaining these reports.

c) Why were these reports commissioned? What issues prompted the instruction of these reports?

A To establish if the existing systems could be uprated to provided improved ACR (6 ACH).

d) What concerns, if any, did you have regarding the ventilation system in Ward 2A?

A My concerns were relating to the placement of Haemato-oncology\TCT patients into an environment that was clearly not designed to meet their needs for a protective environment.

e) When did these concerns arise? Was anyone else in estates concerned? Why?

A These concerns arose early in June 2015 after handover of the RHC, with regards to the works Dr John Hood & Professor Willams and I were carrying out in ward 2A BMT. Although Haemato-oncology\TCT do not need full Isolation facilities protection, their environment should still be controlled with positive pressure ward access air locks and suitable ventilation within their ward itself, this was clearly not the case for ward 2a with concerns later raised by Dr Brenda Gibson.

f) What was the impact on patients?

A Potential exposure to environmental organisms via the ward air supply, which was not HEPA filtered.

g) What concerns were raised with anyone?

A Yes I raised this with the project team and was advised that the ward was designed to meet the requirements asked for by the Yorkhill Haemato-Oncology team, although I can’t remember who advised me of this.

h) What concerns, if any, did you have regarding the ventilation system in Ward 2B?

A To a lesser extent as the patients using 2b were outpatient who were already coping with the general environment and therefore less dependent on a protective environment.

i) When did these concerns arise? Was anyone else in estates concerned? Why?

A These concerns were voiced by clinical staff\ICT team soon after migration, I don't recall anyone else from the estates\Project team indicating such concerns.

j) What was the impact on patients?

A As far as I was aware there were no adverse impacts to patients in ward 2B regarding ventilation.

k) What concerns were raised with anyone?

A No

l) What happened in response to these reports? For example, the SBAR you prepared?.

A I was authorised by Tom Steele (DoF) to commission Innovated Design Solutions to prepare a scoping document for procurement of a suitably experience design consultant to design, specify & tender a package of works for the installation and commissioning & Validation of a compliant ventilation system for these wards, with the support of Matthew Lambert of Innovated Design solutions as technical advisor.

m) What matters were escalated arising from these reports? If so, to whom, and if not, why not?

A These reports were escalated to the Tom Steele (DoF) highlighting the risks with the current design not being compliant with SHTM 03-01 (part A) for this patient group.

n) What works, if any, were carried out in response to any findings in these reports?

A I retired on 2\7\2019, the ventilation works package for ward 2A\B was passed on the Boards Capital project team to take forward, I don't know the outcome of these works after that date.

<u>Cryptococcus</u>

249. Refer to the **Cryptococcus Bundle and SBAR bundle to assist.**
Recall your understanding of the Cryptococcus infections in 2018:

a) What is Cryptococcus?

A Cryptococcus is a fungal infection caused by inhalation of Cryptococcus spores generally found in soil & pigeon droppings.

b) Had you seen/ heard of Cryptococcus in a healthcare setting prior to QEUH.

A I was aware that there was an infection risk from pigeon droppings or build-up of pigeon dropping (Guano).

c) What were the issues with Cryptococcus at QEUH? When did you first become aware of these issues? What happened in response to these issues? Who, if anyone, did you report these issues to?

A I was not involved in the operational management of the QEUH at the time the issue arose, Darryl Conner (Senior Estates Manager) had been tasked by Colin Purdon investigate pigeon ingress to plant room in support of the ICT.

d) Describe your visit to the plant rooms with Dr Christine Peters and Darryl Conner, when did you go, why did you go at that time, what did you see? Did cleaning take place before the visit – if so why – what was evidence prior to the cleaning?

A I visited the plant room with Dr Christine Peters and Darryl Conner at Christine's request to see the extent of the pigeon ingress and guano debris, However I was only shown a few locations where droppings were on the floor and under an AHU, this was not substantial. I believe that there were area's at high level with more substantial Guano evident on top of ducting etc but this was not accessible at the time. I cannot recall the date of this visit but it was before the IMT meetings commenced. The area was not cleaned before the visit.

e) Do you recall photos – what did they show?

A I was not shown any photographs of the findings.

f) Dr Christine Peters tells us that there was water cascading down the walls and that you said that this was 'not uncommon' – tell us what this means and what the consequences were? Why was water cascading down the walls?

A I don't recall seeing water cascading down the walls, this would not be common on the inside of the plant room.

g) Discuss your involvement at the Cryptococcus Sub-Group Meetings - actions taken, internal escalation: HPS involvement.

A My involvement was in a supportive role, Teresa Inkster asked me to support John Hood carry out his investigation from a technical perspective, in addition at the IMT I had highlighted my theory that the Helipad was a focal point for pigeons roosting (regardless of the effort made to displace them), therefore a buildup of guano is usually present, could the down draft from an emergency helicopter case dispersal in to the air intakes of the ventilation systems? I was requested to seek an expert investigation of this option.

h) What, if any, external reporting occurred?

A I appointed Quesada Solutions Ltd (recommended by Glasgow Caledonian University) to carry out a computational fluid dynamics simulation of the external air flow around the QEUH under various condition and the potential impact on the ventilations system.

i) PAGs/ IMTs/ AICC and BICC involvement.

A From Memory I was a only a member of the IMT.

j) What steps were taken in response/ precautions put in place?

A I was not involved in the response \precaution works, I was only involved in supporting the investigation.

k) Did you read John Hood's report?

A I retired on 2\7\2019 before John Hood's report was concluded, so I have not read John's report.

l) When did you read John Hood's report?

A N\A

m) What observations, if any, did you make after reading John Hood's report? What actions were taken following the John Hood report?

A N\A

n) What else could have been done? How could matters have been handled differently? What concerns, if any, did you have about how matters were dealt with?

A I was not involved in the response\actions taken so cannot address this question.

Staffing and Working Environment

250. What were the staffing levels like in estates at the point of handover? Where did the staff come from – were they mainly transferred from old site?

A At the point of hand over I had 5 duty managers assigned to QEUH for the operational commissioning programme prior to migration, as well as site familiarisation and attending the multiplex training programme sessions. These 5 Duty managers had been recruited to these posts from applicants from demitting sites (mainly supervisory staff).

251. Concerns if any about staffing following handover – to what extent did the staffing levels manage the workload? Refer to **Bundle 8, document 40.**

A Staffing level was inadequate for size and complexity of the campus, when I raised this concern, I was advised that the CEO\SMT expected that Multiplex would be providing maintenance during warranty period (this was not the case) and that the maintenance requirements would be less for a new build in comparison with the demitting hospital stock. I advised that this was not the case and indeed the new hospitals were highly serviced complex buildings requiring a higher level of maintenance and support. This did not make any difference to the Boards position regarding the Estates Budget and therefore staffing levels. The estates management team all provided day to day support and management of the items identified in the workload schedule contained in the above document as delegated. However, this combined with the volume and duration of defect issues meant that the team were constantly firefighting

with little time (if any) to focus on routine maintenance and PPM. I believe that Andy Wilson (Sector Estates Manager) carried out his own staffing review and came to a similar conclusion that he required circa 108 WTE staff in order to provide effective estates services for the campus.

252. Was appropriate training in place for new and existing staff on using new systems and working within the QEUH? How did you ensure that new and current staff were appropriately trained? Refer to **Estates Team Bundle, document 5** - what was this and what was the training like? How did this assist you and staff with working at QEUH – was it equipment focus, asset focused please describe.

A There were no existing staff for the QEUH, this was treated as a new independent campus where all staff were new transferring from demitting sites. Multiplex provided a schedule of training as per contract requirements post hand over, this covered a) Site Familiarisation. b) Manufacturers Training on specialist plant\systems. c) Systems familiarisation training (i.e. building services configuration, locations, key components etc). I had limited control over the delivery of training via the post-handover training programme, during this period the intended staff for the QEUH were still employed at their demitting sites, I communicated with my counterpart Sector estates managers regarding their release for training however due to the intensity and duration of the programme very few members of Estates staff could be released for this training programme, therefore it was run on a training the trainer basis. I attempted to schedule training following migration via multiplex and the project team however there was little flexibility in this. I also sought support via the Facilities senior management (GM's) to assist in release of staff for training but they were of the same opinion that the demitting sites staff were required to support on-going operational support. Document 5 referenced above is A record of attendees for the for the "Detailed Training" package delivered on the 3rd February 2015 by Mercury on behalf of Multiplex for the Chilled water system. As well as the training agenda. Although this is recorded as a "Detailed Training" it was a high level system over view and familiarisation, as well as manufacturer induction on the operation and control of the chiller plant (again high level). It was helpful in understanding the

scope, scale and lay out of the system however the plant operation and fault diagnosis side of the training was limited in its benefit.

253. Who was responsible for providing staffing? Who was responsible for ensuring staffing was maintained at sufficient levels?

A Under the Maintenance strategy report I prepared for David Loudon I identified the need for circa 108 WTE staff to support the whole campus Including the retained estate. However due to the Maintenance budget being limited to the QEUH outline business plan, less than approximately 50% of the identified requirement. I had to rework the maintenance strategy to what was called the affordability model, with a subsequent reduction on staff to about 68 WTE. It was my responsibility to maintain staffing to this level. However this was wholly inadequate. Estates Staffing levels were protected from the Boards Cash Releasing Efficiency Scheme (CRES) for the first year but in the 2016/17 financial year Estates had to contribute to CRES by releasing vacant posts, I cannot recall the figures for this CRES contribution.

254. What concerns did you have regarding staffing levels?

The operational Estates staffing levels were totally inadequate for a campus of this size, The staff levels we had barely covered the volume of defect\fault reporting across the site, it was therefore a struggle for the Estates management team to meet the planned maintenance requirements.

255. What was the working environment like when QEUH opened – work life balance/ workplace culture? What issues, if any, did you have? If so, what concerns did you raise? Who did you raise these concerns with?

A The working environment was high pressure constant issues requiring support and management of the critical situations arising on a daily basis, both myself and my team were being pulled in all directions to keep services going. Work\life balance was practically non-existent, I myself works 12-14hrs days 7 days a week during operational commissioning and migration, the duty managers were working 10 hour days. After migration I was still working 10 – 12 hour days but managed to drop off the weekends, David Brattey was also putting in 10 hour days after migration, with the support of the rotary shift duty

managers. I was concerned that due to the level contractual defects, system failings like the PTS\AGV, Energy centre problems, PSSR\PED failures and PPC permit management, integration of retained estate HV electrical network with the energy centre, and preparing contract proposals for the adoption of the T&L centre\office block for the provision of facilities services against external service bids, etc, that I was unable to perform the duties of Sector Estates Manager to oversee, manage and ensure that all management processes and procedures were implemented and monitored, I raised these concerns several times (informally) with my line Manager Billy Hunter (Facilities General Manager), his response was let's get the site settled down then we can get thing back to normal and take control.

256. Who was on site to manage and assist with carrying out works relating to equipment? How did this assist your workload in estates? To what extent, if any, was there a reliance on commercial third parties such as Multiplex when it came to staffing levels?

A The estates management team covering the new Adult and RHC hospital, consisted of David Brattey (Senior Estates Manager responsible for these buildings), William Madden (Estates Manager, reporting to David Brattey) Plus off planning supervisor (Mark McKaig) & 5 Rotary shift duty managers providing 24\7 emergency cover and maintenance support (1 per shift), this was supported by 16 off day shift Maintenance technicians and 8 off Maintenance assistants as well as 20 rotary shift technicians providing 24/7 emergency cover and maintenance support (4 per shift), In parallel to this there is an estates team responsible for looking after the retained Estates 1 off Senior Estates manager, 2 off Estates manager, 2 off Planning supervisors, supported by 20 day shift technicians and 5 Maintenance assistants, staff from the retained estates team can also be drafted in to support works in the A&C buildings as required. There is a copy of the organogram representing this structure in the maintenance strategy document. As part of the Estates Maintenance Strategy paper, I had developed a matrix of service support contract requirements for 3rd party specialist, most on a Support service contract complete with emergency call out response. In addition due to the size and scale of some of the services

and the complexity the following contracts included a normal working hours on site presence: Schneider Controls (BMS) – 1-2 WTE's, Swisslog AGV total support 1 WTE & PTS service + 2nd line emergency response. – 2 WTE. Scotsheild Fire Alarm – 1 WTE + emergency response. These support service and emergency response contracts absorbed half the estates maintenance budget. Multiplex only offered support to address system issues that were deemed to be contract defects, the Estates team had to provide 1st line response to check all issues to establish if they were defects or not, Multiplex would generally reject issues that they did not consider as defects.

257. Generally – discuss the workplace environment and culture – What concerns, if any, did you have?

A The work place culture at this time was tense, the operational Estates and facilities team worked well together to address the issues as they arose however these were overwhelming at all levels. The relationships between Estates and Facilities and the project team were less supportive, with the project team aim to bring the contract over the wire at all costs, seemingly siding with the contractor over concerns raised by Estates\Facilities and ICT. Multiplex response to most questions over contract was the Board agreed to this and it was difficult to question or challenge design decisions.

258. Describe the handover process – did it run smoothly or not? What concerns, if any, did you have in the run up to handover? What matters did you feel went to plan and what, if any, matters, had not gone to plan?

A The hand over did not run smoothly from my point of view, the site handover was accepted on Monday 26th January 2016, from memory Multiplex gave their staff a week of to recognise the effort in getting to handover, the following Monday 200+ Multiplex contractors arrived on site to continue fitting out in the RHC and various other works listed in the NEC 3 defects schedule, this level of activity was maintained at a steady level for the best part of the Operational Commissioning of the site up until Migration. During this time of the 5 Duty Estates managers I had available to me 2 of them were tied up dealing with the review of Risk Assessments and Method Statements (RAMS) from Multiplex and its contractors as well as managing the contractor access

control arrangements. There were also ongoing system failures to be dealt with and responded to, such as the repeated failure of push fit connections on the LTHW fitting for above ceiling heater batteries, causing wide spread water damage across the site, these push fit units could not cope with the system pressure and Multiplex had to arrange for the replacement of all off these connections with mechanical connections (1000's of connectors across all areas of the site. On the run up to hand over my focus was on the operational commissioning, I was under the impression that the building was ready and that there were only a few outstanding snags but nothing of consequence. The operational commissioning programme went well and was completed on time for migration, the migration plan was well executed, obviously a lot of logistical and inter agency planning had gone into this.

259. GGC took handover from Multiplex earlier than initially contracted for – what did you think about this? Why did it happen? What was the rationale for the early handover?

A I thought that instead of early hand over the time could have been used to complete the contract works rather than accept Practical Completion and handover of an incomplete contract the time could have. My understanding of why this happen was that it was the Boards intention to start the Operational commissioning works early in order to meet the target migration plan dates. The rationale being that failure to meet these dates would have a knock-on effect in the logistic for migration that had already developed. However my understanding is 3rd hand remove from these decisions.

260. Were the concerns raised by infection control colleagues regarding the general build of QEUH/RHC taken seriously? What action did you take in response to these concerns, not already mentioned in your answers? Refer to Estates Team bundle document 100 and 116 in considering your answer.

A I believe that the decisions\actions arising from this meeting were under the purview of the senior management team, with appropriate action being directed from the SMT, as evidenced in the e-mail between David Loudon and David Wilson in Document 100 above, I was not party to these decisions or

instructions at this time. My role at the above meeting was to provide technical support to David Loudon where required.

261. On 4th October 2017 you attended a meeting in respect of the SBAR prepared by Dr Peters:

a) Discuss what the nature of this meeting was?

A This meeting was convened by Dr Jennifer Armstrong (Medical Director) to address infection control concerns raised in correspondence from both Dr Penelope Redding (Consultant Microbiologist) and Dr Christine Peters (Consultant Microbiologist), and the subsequent SBAR prepared to inform this meeting.

b) What concerns were raised at this meeting and by whom?

A Concerns were raised about:

a) Patient placement - source Isolation (Mers\MDRTB) and Protective Isolation (PICU HEPA filter requirement), raised by Dr Redding.

b) Single room accommodation, 3 ACH not meeting guidance requirements & chilled beam dust entrainment raised by Dr Redding.

c) Cleaning: No cleaning agent used on ward floors and Dishwasher cleaning responsibility, Raised by Dr Redding.

d) Water quality & testing, Cleaning and maintenance policy not reported, delay in response to [redacted] request for Serratia sampling, Raised by Dr Peters

e) Plumbing within the INS building Blocked drains\sewage leaks into theatre, raised by Dr Redding.

f) Decontamination provision for Respiratory clinics, identified as inadequate, Raised by Dr Peters.

g) Infection Control Team Structure, roles within ICT are unclear. Raised by Dr Redding.

c) Describe your understanding of the issues raised by Dr Peters and colleagues in respect of estates? For example, the lack of cleaning and maintenance policy in respect of thermal taps/ production of the water testing result.

A The issue regarding the TMT cleaning and maintenance policy reporting, until now the expectation that the cleaning and maintenance policy should be notified had not been brought to my attention by ICT. This should have been available to ICT on request from the Water Written Scheme via the Authorised Person (water), In addition the TMT sensitisation works shop and thermal sanitisation system were still being installed and not yet operational. With regards to water sampling this had never been a problem before, Estates always respond quickly to a request from ICD for water samples, as I indicated at the meeting [redacted] request could have been a communication issue relating to changes in personnel in both departments. With regards to the water testing quality in ward 4b, it was my understanding that ward 4b had been downgraded and being used as a winter pressure ward at this time, therefore no need for routine water sampling.

d) Why were the issues raised by Dr Peters not addressed at the time?

A I believe that I sought confirmation of the status of the thermal sanitisation workshop and test rigs with Paul McAlister (Senior Estates Manager) who picked this task up from David Bratty (on his retirement), this was required in order to initiate a thermal sanitisation service exchange model detailed in the pseudomonas risk assessment that was produced by Sandra McNamee (Associate Nurse Director), John Green (Facilities H&S Advisor) and I following the decision by David Loudon not to replace the Horne TMT's as recommended in the HPS Pseudomonas SBAR. At the time it seemed that we were restricted to this method of thermal sanitisation protocol as the TMT's could not be safely thermally sanitised on the systems and local chemical sanitisation local was impractical and contrary to manufacturers advice.

e) What was your understanding of the action plan made following this meeting?

A I cannot recall a full action plan being issued, however from that actions listed on the minute I was required to provide documentation supporting the works carried on PPVL room.

f) What work and action was taken by you in response to the action plan? When was this work carried out?

A I provided the PPVL room data, and I escalated the water sampling requests to the Sector Estates Manager.

g) Was this communicated to clinical colleagues?

A I believe I issued this to the ICD.

h) Do you feel that these concerns raised by infection control colleagues were taken seriously?

A In hindsight I do not think that there was a collaborative approach to addressing these concerns.

262. Is there anything further that you want to add that you feel could be of assistance to the Inquiry?

A I can't think of anything else that has not already been covered in this questionnaire at this time.

Declaration

263. I believe that the facts stated in this witness statement are true. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief in its truth.

264. The witness was provided the following Scottish Hospital Inquiry documents for reference when they completed their questionnaire statement.

Appendix A

A43955371 – Bundle 8 – Supplementary Documents
A48185184 – Bundle 6 - Miscellaneous Documents
A48184865 – Bundle 9 - QEUH Cryptococcus Sub-Group Minutes
A48184800 – Bundle 4 – NHS Greater Glasgow and Clyde – SBAR
A48184790 – Bundle 1 – Incident Management Team Meeting Minutes
A47944648 – Bundle 12 – Estates Communications
A32993814 – Email C&B to K Connolly – Ward Ventilation

Scottish Hospitals Inquiry
Witness Statement of Questions and Responses
Alan Gallacher

This statement was produced by the process of sending the witness a questionnaire with an introduction followed by a series of questions and spaces for answers. The introduction, questions and answers are produced within the statement.

Given the seniority of the role that you hold and held at the time within Estates, relevant to the terms of Reference for the Inquiry, it would be of great assistance to the Inquiry if you were able to give as full answers as possible to the questions being asked of you.

Personal Details

1. Name, qualifications, chronological professional history, specialism etc – please provide an up-to-date CV to assist with answering this question.

A See attached CV – **Attachment 1**

Professional Background

2. Professional role(s) within the NHS.

A Jan 2006 – September 2011 – NHS Tayside – Engineering maintenance Manager; September 2011 – NHSGG&C – Sector Estates Manager (Clyde)

3. Professional role (s) at QEUH/RHC, including dates when role(s) was occupied.

A See question 9 below

4. Area(s) of the hospital in which you worked/work.

A See question 9 below

5. Role and responsibilities within the above area(s)

A See question 9 below

6. Who did you report to? Did the person(s) you reported to change over time? If so, how and when did it change?

A I reported to Mary-Anne Kane who was the Assistant Director of Estates & Facilities

7. Who selected you for your role(s)? When were you selected for your role(s)? Please describe the selection process for appointment to this/these roles?

A This is all detailed below between questions 10 to 26

8. Had you worked with any of your QEUH/RHC estates and management colleagues before your current role? If so, who had you worked with before this current role? When did you work with this/these colleague(s)? What role were you in when you worked with this/these colleague(s)? How long were you colleagues in this/these previous role(s)?

A This is all detailed below between questions 10 to 26

Specific Role(s) at QEUH/ RHC

9. Describe your role(s) at QEUH; job title and responsibilities including day to day responsibilities, and details of staff who reported to you, who you worked alongside and who you reported to. Please fully describe where the role was in the hierarchy of the organisational structure.

A Prior to August 2015, I was the Sector Estates Manager (Clyde) based at RAH Paisley. In Aug 2015 I was promoted to the position of General Manager (Estates) for NHSGG&C and did not have a QEUH specific role. My role covered NHSGG&C as a whole. My job responsibilities covered Net Zero,

Compliance, Asbestos Management, Minor Works & Asset Management. I was also a supportive/advisory role for the Sector Estates Managers although I had no direct responsibilities to manage them. When I initially took up this role it was a ‘new position’. The only staff who were in place in 2015 were 3 energy managers who carried out the Net Zero Carbon roles. I recruited the remainder of the team over a period of time.

10. Describe when you first became involved with QEUH/RHC, what was your role and involvement?

A I got involved with the QEUH/RHC in my role as General Manager (Estates) from August 2015 onwards as my role was a board wide responsibility although initially there was very little if any work associated with the QEUH as it had only recently been handed over to NHSGG&C]. I covered Energy Management/Net Zero, Minor Projects, Asbestos Management, Planned Maintenance of Assets and was tasked to form a new compliance team]

11. When did you start your current role?

A I started my current role in 2020

12. How many people worked within QEUH hard facilities management when you started?

A Not aware of staffing levels at that time

13. How many people worked within QEUH soft facilities management when you started?

A Not aware of staffing levels at that time

14. Did the number of people working at QEUH change during your time there? If so, how many people changed in soft facilities management? If so, how many people changed in hard facilities management?

A I was not made aware of any of this information

15. How did Estates management operate on a daily basis? Was responsibility shared between different teams? If so, to what extent was responsibility shared?

A I was not made aware of this as this was an operational issue

16. What responsibilities, if any, did you have in overseeing the day to day management of estates? If you were not responsible, who was, and why did this responsibility fall out-with your remit as General Manager of Estates?

A I had no responsibilities over the day to day management of operational estates across NHSGG&C including QEUH. This would have been at the time as follows:
Site Manager Operational Estates - David Brattey;
Sector Estates Manager (South) - Ian Powrie
Sector Estates Manager (South) – James McFadden (for a limited time until this role was taken on by Ian Powrie]
Sector Estates Manager (South) Andy Wilson (after Ian Powrie)
Facilities Manager (QEUH) – Karen Connelly
General Manager (Facilities) – William Hunter

17. Refer to the **Estates Team Bundle, document 29** - Organograms showing the organisational structures within QUEH.

a) Does the organogram match the organisational structures of QEUH?

A This is a Board wide Organogram not specific to QEUH. From a facilities perspective the QEUH sits within the South Sector

b) If not, why not?

A It is not factually accurate as I was until 1/8/2015 the Sector Estates Manager for Clyde. I had been offered the post of GM (Estates) with a starting date of 1/8/2015. The role of Sector Estates Manager (South) was either still with Jim McFadden or the role was now with Ian Powrie. Sector Estates Manager (South & Clyde) was, in my opinion still to be ‘agreed’ as the role on 1/8/2015 was now vacant.

c) How did the structure and hierarchy operate across the different sectors?

A Each sector had a General Manager (FM). Each ‘acute’ site within the sector had a FM Site Manager and a Sector Estates Manager who reported into the Sector GM (Facilities)

18. What role did you hold in Estates?

A At that time I was the Sector Estates Manager (Clyde) until 1/8/2015

a) When were you appointed to this role?

A I was appointed into the role on 12/09/2011

b) How did you come to be appointed,?

A I was selected from an external job application and interview.

c) Who selected you?

A I was selected by the General Manager FM (Clyde) at that time.

d) what was the selection process, did you have previous working relationships with those who selected you?

A I was selected from an external job application and interview. I had not worked previously with the GM FM(Clyde)

e) Describe the role of General Manager of Estates.

A See attached Job description – **Attachment 2**

f) What were your duties in this role?

A See attached Job description

g) Who did you report to in this role? Detail superiors/superiors for this role.

A See attached Job description

h) What was your relationship like with your supervisor in this role.

A I had a good working relationship with my manager. See attached Job description

i) Provide details of staff who reported to you, and you were responsible for in this role, and your relationship with them.

A 3 Energy managers – only one of who is in the position presently. See j) below

j) Provide the name and role of any managers you worked with. Please provide their Job (s) and role responsibilities.

A This is a difficult question to answer as when I was appointed to the position of General Manager (Estates) there was only 3 managers who were my responsibility and they were Energy Managers who had boardwide responsibilities. The minor works team, compliance team, asbestos team & asset team were still to be established.

19. What were the names of the 3 managers?

A Gillian Brown, John Keenan & Samuel Selwyn

20. Detail any other roles held by you within the Estates team and provide details as referred to in a-g above.

A Sector Estates manager (Clyde) based at RAH – all staff at that time based in paisley.

21. How was work delegated in the Estates team?

A I delegated to each manager and had regular meetings on progress.

22. How did you keep a record of work delegated?

A Through regular progress meetings

23. How were these meetings recorded?

A Where applicable team meeting minutes/notes were taken

24. How did you check that the work delegated had been carried out?

A Through regular progress meetings

25. What concerns, if any, did you have about any member of staff? If so, please describe these concerns. What action, if any, did you take in relation to these concerns?

A No concerns with any direct staff member

26. What concerns, if any, did you have about management/ managers? If so, please describe these concerns. What action, if any, did you take in relation to these concerns?

A No concerns about management or managers

27. Describe the interpersonal relationships within the Estates team. How would you describe communication between you and your supervisor(s)/ superior(s)? How would you describe communication to you from those you senior to you/ supervised you?

A I have good communications between myself and my managers and also my superiors.

28. How many occasions, if any, did issues arise caused by misunderstandings or poor communication?

A None that I can recollect

Training

29. What training had you undertaken for your role(s) in estates?

A I have worked in estates management since the age of 28 for the Ministry of defence, Local Government and NHS. This is 37 years of experience where I have attended numerous technical training courses. In recent years working in healthcare I have attended training courses covering Water/Ventilation and management courses.

30. What qualifications did you have for your role(s) in estates?

A BEng (Honours) in Engineering; Chartered Engineer with Institute of Mechanical Engineers (CEng)

31. What experience did you have working in estates prior to the QEUH/RHC? How similar was the industry, role, and responsibilities to your work in QEUH/RHC estates?

A I was Sector Estates Manager at the Royal Alexandra Hospital in Paisley. Prior to that position I worked at NHS Tayside as an Engineering Manager. The roles differ from my current position of Head of Corporate Estates which is a boardwide role

32. Did you have any formal training or qualifications in respect of:

a) Water

A I have attended a Responsible Persons (Water) Training Course which is a senior management course.

b) Ventilation

A I have attended a Ventilation Training Course which is a management course.

c) Infection Control

A No

If so, please detail above any training and qualifications – when trained? When qualified? Who was the awarding body? Please describe how the training and qualifications applied to your work at QEUH.

33. Have you ever had any specific roles or duties in relation to the water systems operation or maintenance within NHS facilities? When did you have these roles and duties?

A Responsible Persons (Water) Training Course

34. If you did:

a) What were these responsibilities?

A The training covered the following - Understand individual roles, responsibilities and legal obligations; Understand Growth requirements of Legionella and interactions with other microbiological species; Factors affecting the accumulation of biofilm; Effectiveness of chemical and non-chemical treatments against Legionella and biofilm; Temperature as a Legionella control method; Materials of construction, pipework installations; Water treatment, monitoring and commissioning; Design, operation, monitoring and maintenance of water systems; Other water systems such as spa baths and decorative fountains; Air conditioning system hygiene; Investigation of outbreaks and routine HSE visits; Consequences of non-compliance

b) What was the purpose of these responsibilities?

A To make senior managers who have managerial responsibility for Health and Safety, who have sufficient authority, competence and knowledge of water systems and water hygiene management, aware of water management risks and to interpret regulations such as the Approved Code of Practice L8:2013, HSG 274 parts 1-3 & SHTM04-01.

c) Were you aware of any specific legal responsibilities/ obligations relating to working with the water systems. If so, please detail.

A Approved Code of Practice L8:2013 and HSG 274 parts 1-3.

35. If you did not have any such roles or responsibilities in relation to the water systems operation or maintenance within NHS facilities:

a) Who did?

A All NHSGG&C sites have Authorised Persons (Water) & Competent Persons (Water) on the sites

b) What were these responsibilities?

A The AP's & CP's were responsible for the practical implementation and operation of Scottish Health Technical Memorandum 03-01 (Ventilation) & 04-01 (Water) for which they have been appointed

c) What did you understand the responsibilities to be?

A As above.

d) Were you aware of any legal obligations/ responsibilities? If so, please detail.

A Approved Code of Practice L8:2013 and HSG 274 parts 1-3.

36. Have you ever worked on a large scale water or ventilation system before? If so, when was this? How did this compare to working on QEUH? What was your role and duties?

A All acute hospital within the NHS have large scale water & ventilation systems where the management of them is important. As Sector Estates Manager for Clyde the Royal Alexandra Hospital (RAH) in Paisley, Inverclyde Royal Hospital (IRH) in Greenock & Vale of Leven (VoL) Hospital in Alexandria were all classed as Acute Hospitals with large scale Water & ventilation Systems.

37. How did the above roles compare to working on QEUH? What was your role and duties, and how, if at all, did this prepare you for your role at QEUH?

A Again I state that I was not operationally responsible for estates management at the QEUH. As General Manager (Estates) I had a strategic role. The move from an operational role to a strategic role meant I had to work alongside my operational colleagues and allow them to manage their site accordingly without interference as it was an operational responsibility to manage the QEUH after handover.

Documents, Paperwork and Processes in Place as at 26th January 2015

We know that handover of QEUH occurred on 26th January 2015:

37. What contractual documentation would you expect to see in place at handover?

A I was not part of the handover team so I do not know what was put in place

38. Who was part of the handover team and would have had responsibility for ensuring that the contractual documentation was in place at handover?

A I do not know who this was

39. Describe the process for handover of QEUH:

A I was not part of the handover team so I do not know what was put in place.

a) What contractual documentation was in place?

A I was not part of the handover team so I do not know what was put in place.

b) How was the relevant paperwork handed over to QEUH?

A I was not part of the handover team so I do not know what was put in place.

40. Was the building of the QEUH complete at handover – if not, what was incomplete? Was QEUH ready at handover? If not, why was it not ready at handover? Refer to **Estates Team Bundle, document 3 – 'Stage 3 Adult and Children's Hospital Completion Certificate'** defects noted therein when considering this question.

A I was not based at the site when it was handed over so I cannot respond.

41. Describe the site when QEUH/RHC at handover in January 2015.

A I was not based at the site when it was handed over so I cannot respond.

42. Please describe the site when you were appointed in August 2015.

A I was appointed in August 2015 but did not move to the QEUH from the RAH in Paisley until November 2015 as there was no appropriate space. Eventually I moved across from the RAH with my 3 energy Managers and moved into the QEUH Office Block. The QEUH site at that time, as I recall, was clear of contractors and most of the new hospital (that I am aware of) was occupied.

43. Did Multiplex remain on site? How was this managed, and were records kept of Multiplex staff being on site, if so who was responsible for this and where were such records kept? Did you have any concerns?

A I was not based at the site when it was handed over so I cannot respond.

44. Were Multiplex still on site when you were appointed in August 2015?

A As I recall they were no longer on site and were working from offices out with the QEUH Campus.

45. At handover who was responsible for ensuring that paperwork was produced to confirm contractual compliance?

A I was not part of the handover team so I do not know what was put in place.

a) Paperwork

A As above

b) O&M Manuals

A As above

c) M&E Clarifications Log

A As above

d) Others paperwork as per the contract

A As above

Provide as much detail as possible – was anything missing? If so, how was this managed?

46. What commissioning and validation documentation for the water system did you see at handover? What commissioning and validation documentation for the ventilation system did you see at handover?

A I was not part of the handover team so I cannot respond.

a) What documentation would you expect to be available for both the water and ventilation systems?

A As above

b) As Estates Manager, what would you have expected to have been in place? What responsibility, if any, did you have to review the documentation upon commencing your role in August 2015?

A A suite of Operation & Maintenance (O&M) Manuals should have been handed over and within that there should have been the following as a minimum;

<u>Water</u>

- Full set of ‘as fitted’ drawings of the water installation;
- Commissioning information;
- Asset information;
- Maintenance Schedules;

- Manufacturers Parts Literature

Ventilation

- Full set of ‘as fitted’ drawings of the ventilation installation;
- Commissioning & Validation (C&V) information;
- Asset information;
- Maintenance Schedules;
- Manufacturers Parts Literature

There should also be a snagging list which would be agreed at handover and would be actioned by the contractor over a small period of time (which would be agreed between the contractor and NHSGG&C]

This would be the responsibility of the project handover board to manage.

c) Who was responsible for this documentation?

A As above

d) While you were not part of the handover team who was responsible for the documentation?

A I do not know who personally would be responsible as I was not part of the project or handover teams, however the project handover board would be responsible.

Note for a contract/project of this size and complexity I am positive that this would have been outsourced to a specialist company to ensure all documentation was in place.

e) What was your role?

A As above

f) Were you ever aware of commissioning and validation having been carried out?

A As above

g) Upon commencement of your role in August 2015, what commissioning and validation document, if any, did you have sight of pertaining to handover? How did you assure yourself when you started in August 2015 that the appropriate commissioning and validation had been carried out at handover?

A None. This was not part of my role. This was the responsibility of the project & handover team.

h) If not, why were you not aware of commissioning and validation having been carried out?

A As above

47. Was any other paperwork missing at handover? If so, would you consider this missing paperwork to be of importance?

A As above

48. Operating systems at handover:

a) How many staff were allocated to maintaining operating systems and how was this determined?

A I was not made aware of this information

b) What training was put in place for maintaining the operating systems?

A I was not made aware of this information

c) Who carried out the training? Refer to **Estates Team Bundle document 5 – 'Brookfield Multiplex Client Training & Familiarisation Register for Ventilation'.**

A I was not made aware of this information

d) Were Multiplex involved in the training?

A I was not made aware of this information

e) Was sufficient training provided to allow staff to operate the systems?

A I was not made aware of this information

f) Please describe the manuals/ documents that were handed over.

A I was not made aware of this information

49. What was your involvement/ role in the handover process? How did you manage this?

A I was not part of the handover process so I cannot answer this

50. Who signed the completion certificates?

A I was not part of the handover process so I cannot answer this

51. Who was the person with the responsibility to sign the completion certificates under the contract?

A I was not part of the handover process so I cannot answer this

52. **Estates Team Bundle, document 3 – 'Stage 3 Adult and Children's Hospital Completion Certificate':**

a) What is this?

A I was not part of the handover process so I cannot answer this

b) Have you seen it before?

A I was not part of the handover process so I cannot answer this

c) Have you seen other such certificates?

A I was not part of the handover process so I cannot answer this

d) Who signed off these certificates?

A I was not part of the handover process so I cannot answer this

e) What checks were carried out prior to sign off?

A I was not part of the handover process so I cannot answer this

f) What was your role/ responsibility?

A I was not part of the handover process so I cannot answer this

g) Looking at the defects referred to in the completion certificate **documents 3 above:** Look also at **Estates Team Bundle, document 4 – 'Capita NEC3 Supervisor's Report (No 46)':**

(i) What are these defects?

A I was not part of the handover process so I cannot answer this

(ii) **Please refer to Estates Communications Bundle, document 47** – 'Capita NEC3 Supervisor's Report (No 53) dated September 2015'

A Looking at the defects certification within the report, please explain what are these defects? The is a monthly defects report and is self-explanatory. It highlights progress through an already agreed defects list. Looking at this report it shown many of the actions are progressing and does not highlight any major issues. A defect list of this size would be the norm on a project of this scale. None of the issues on this list would, it appears, impact on the safe operation of the hospital if as it states they have either been actioned or are progressing.

(iii) What was the impact of these defects?

A I was not part of the handover process so I cannot answer this.

(iv) Again looking at Please refer to Estates Communications Bundle, document 47 **– 'Capita NEC3 Supervisor's Report (No 53) dated September 2015'** What was the impact of these defects?

A See above response

(v) Why two years to deal with the defects?

A I was not part of the handover process so I cannot answer this

(vi) The two year period to address defects was in place when you commenced your role in August 2015, what information, if any, were you provided about this?

A I was not supplied with any information around defects.

(vii) Who decided that it was appropriate to accept handover with outstanding defects?

A I was not part of the handover process so I cannot answer this

(viii) Is this usual practice in the construction industry?

A I was not part of the handover process so I cannot answer this

(ix) In your experience was it usual practice to accept handover with level of defects set out in Estates Communications Bundle, documents 4 and 47 **–**

A Yes, for a project of this size and complexity

53. Refer to **Estates Team Bundle, document 8 – 'Programme for handover to start of migration':**

a) Do you know what this is?

A This is a Gant Chart showing programme of works to handover which is the norm in the construction industry

b) Have you seen it before?

A No

c) What are the numerous defects?

A I was not involved in the handover process

d) Please describe the defects in the above document.

A These would be defects identified during NEC3 inspectors/supervisor visits to the areas identified by the contractor as complete and ready for handover.

d) What is your understanding of the purpose of this document?

A As c above It is a plan produced by the contractor to allow ‘close out’ of the project in a phased approach

e) What comments if any do you have regarding the number of defects?

A As c above

(i) While you were not involved in handover, what view if any, having regard to your experience within estates, and estates management do you have regarding the number of defects?

A This would not have been unexpected given the size, scale and complexity of the project.

f) To what extent were you aware of this document at handover?

A As c above

g) If not, should you have been aware of this document at handover?

A As c) above

54. What did the contract say about retention of certain parts at handover? Was this enforced and why?

A I was not part of the handover process so I cannot answer this

55. To what extent did Multiplex retain responsibility for the build following handover? Did Multiplex give any warranties? What were the terms of any warranty relating to Multiplex’s work? How long was the warranty period following handover in January 2015?

A I was not part of the handover process so I cannot answer this

56. How many companies have on-going responsibility following handover? If so, describe the responsibilities of the companies. How long post-handover were the other companies involved for?

A I was not part of the handover process so I cannot answer this

57. From the point of commencing your role in August 2015, how many companies have on-going responsibility following handover? If so, describe the responsibilities of the companies. How long post-handover were the other companies involved for?

A I cannot answer this as I do not have the information. This would be the responsibility of the project/handover Board.

58. What concerns, if any, did you have about the opening of the hospital after handover? Refer to **Estates Team Bundle, documents 19 and 21 and 21.1** when answering.

A I was not part of the handover process so I cannot answer this. I was not part of any of the communication held in documents 19, 21 & 21.1

(a) Was there anything missing that you thought should have been constructed/installed? If so, please describe what was missing.

A I was not part of the handover process so I cannot answer this

(b) What other concerns did you have about areas of the hospital at handover?

A I was not part of the handover process so I cannot answer this

59. Refer to **Estates Team Bundle, document 22** at the point of patient migration Mhairi Lloyd states that there were rooms/ areas ‘not yet fit for purpose’: Look also to **Estates Team Bundle, document 19:**

a) Tell me about your understanding of the concerns – namely what the concerns were any why?

A I was not part of the patient migration process so I cannot answer this

b) Your involvement with the dealing with any concerns?

A I was not part of the patient migration process so I cannot answer this

c) If so, how matters were resolved prior to patient migration?

A I was not part of the patient migration process so I cannot answer this

d) Who signed off prior to patient migration?

A I was not part of the patient migration process so I cannot answer this

60. Tell me about the snagging process, refer to **Estates Team Bundle, documents 90 and 91** when considering your answer detail:

a) What happened

b) How long were Multiplex on site following handover

c) Main areas for snagging

d) Records of works carried out

e) Sign off – who as responsible and when signed off.

A I was not part of the handover or snagging process so I cannot answer the above questions

61. Refer to **Estates Team Bundle, document 132** with the benefit of hindsight do you agree with Frances Wrath's comments that all area were commissioned in line with Employer's Requirements?

A I was not part of the handover or commissioning process so I cannot answer this

62. With the benefit of hindsight, do you agree with the above, notwithstanding not commencing your role until August 2015?

A I still cannot answer the question as 'hindsight' is, in my opinion, something we should not be responding to. Facts are the most important.]

Wards and Hospital Occupation from January 2015

63. At the point of taking occupation of QEUH/RHC on 26th January 2015 please confirm whether the following wards were fully handed over from Multiplex to NHS GGC:

Ward 2A/2B
Ward 4B
Ward 4C
Ward 6A
Ward 6C

A I was not part of the handover process so I cannot answer the above questions

64. Please also confirm your understanding of the ward specification and patient cohort to be located in each ward?

A I was not part of the design team

65. If a ward or wards were not handed over on 26th January 2015, or were partially handed over, please confirm:

a) Why they were held back?

A I was not part of the handover process

b) Any financial consequence to both Multiplex and NHS GGC of the ward(s) being held back?

A I was not part of the handover process

c) What works were carried out in order to allow this ward(s) to be handed over the NHS GGC?

A I was not part of the handover process

66. Were any other wards, aside from those referred to above, retained? Answer as above?

A I was not part of the handover process

67. What was the position when you were appointed in August 2015?

A I cannot answer this as I was not aware of the position

68. We know that the energy centre was retained by Multiplex

a) Why was the energy centre retained?

A I was not part of the handover process

69**.** As at August 2015 the Inquiry is aware that the energy centre was still retained by Multiplex. What understanding, if any, as Estates Manager did you have during your time at QEUH, as to why the energy centre had been retained by Multiplex?

A I was not aware that the Energy Centre had been retained by Multiplex

b) What financial consequences, if any, arose for either Multiplex or NHS GGC if the energy centre was retained?

A I was not part of the handover process

c) As at August 2015 the Inquiry was aware that the energy centre was still retained by Multiplex. What understanding, if any, as Estates Manager of financial consequences, if any, arose for either Multiplex or NHS GGC if the energy centre was retained?

A See Q64 I was also not made privy of any financial consequences if the energy centre was retained

d) What works were carried out to allow hand over of the energy centre to NHS GGC?

A I was not part of the handover process

e) The Inquiry is aware that energy centre was handover in around 2017, what works were carried out in order to allow this to happen?

A I am not aware of the works required.

70. Were any other parts of the hospital retained by Multiplex pending works being carried out? Why? What works required to be carried out prior to them being handed over?

A I was not part of the handover process

71. As at August 2015, were you aware of any other parts of the hospital being retained by Multiplex pending works being carried out? Why? What works required to be carried out prior to them being handed over?

A No, I was not aware of any parts of the hospital being retained by Multiplex

72. At the point of handover on 26th January 2015 how satisfied were you that all areas accepted by NHS GGC were designed to the intended specification and suitable for the intended patient cohort, meeting all the relevant guidance requirements?

A I was not part of the design team

73. If not, why were the wards handed over? Were any issues escalated to more senior management/ Board level? Please confirm.

A As above

Asset Tagging

74. Describe and detail asset tagging:

a) What is this?

A Process to give each asset a unique number to identify each so as to track maintenance data/history

b) Why is this important?

A It allows a history of maintenance/repairs of that asset to be recorded and tracked

c) Who was responsible?

A Main Contractor of any project is responsible to ensure this is carried out.

d) What was the impact if this was not done?

A Maintenance & repairs cannot be accurately carried out or recorded

e) What concerns, if any, did you have about this?

A If the assets were not identified then this would be a concern although I was not involved at handover

f) From August 2015, what concerns, if any, did you have?

A I was concerned that if asset tagging had not taken place then there could be an issue with;

(a) The accuracy of any asset list which had been passed onto NHSGG&C as this could mean assets were not being maintained;

(b) Location of all assets is not known;

(c) What PPM (if any) was actually being carried out by either NHSGG&C, Multiplex or specialist contractors to support the hospital(s);

(d) What remedial works was being recorded against assets?

(e) Were there PPM schedules associated to assets put in place?

g) What concerns, if any, were escalated? If not, why not?

A These were escalated by Ian Powrie I believe, at that time

h) Tell me about any issues regarding asset tagging and how you managed this?

A There was no asset tagging in the QEUH/RHC hospitals. There were numerous meetings with representatives of Brookfield many months later to

try and resolve this. There was probably a gap of approx. 2 years before meetings were held with the contractor in an effort to address this issue.

75. Was there a contractual requirement to provide CAMF?

A I am not aware of the contractual details around this

a) What is the purpose of CAMF?

A CaFM System is a software platform to allow the management of planned and reactive maintenance of assets.

b) How does ZUTEC differ from CAMF?

A ZUTEC is a document library whilst a CaFM System is a software platform to allow the management of planned and reactive maintenance of assets.

c) Should both CAMF and ZUTEC have been provided at handover?

A In my opinion yes, however I was not privy to the contractual requirements

(i) Who was responsible for ensuring provision of CAMF and ZUTEC?

A I was not aware of the contractual requirements

(ii) What were the consequences of these not being provided?

A I was not aware of the contractual requirements

(iii) What action was taken to remedy matters? Were Multiplex contacted?

A I was not aware of the contractual requirements

76. Provide information on any issues in relation to CAMF and ZUTEC

a) Operation

A I was not aware of the contractual requirements

b) User suitability

A I was not aware of the contractual requirements

c) Any other matters

A I was not aware of the contractual requirements

Who was this reported to, what action was taken to remedy matters?

A I was not aware of the contractual requirements

77. Did your team or NHS IT develop a system for asset registration?

A Yes, FMFirst was used as it was currently being used across a number of other sites within NHSGG&C

a) If so, when and how long did it take following handover.

A This probably took in the region of 3.5/4 years after handover to implement

HEPA Filters

78. Were HEPA filters installed in the relevant rooms at handover (January 2015)?

A I was not aware of the design requirements

79. What issues, if any, were there with HEPA filters? **Refer to Estates Team Bundle, document 22.**

A I was not aware of the design requirements

80. If so, what issues were you aware of?

A See 68 above

81. Dr Gibson in her statement refers to HEPA filters not being in place at the point of handover in wards 2A/B.

a) To what extent, if any, do you agree with Dr Gibson's statement above concerning HEPA filters?

A I was not aware of the design requirements

b) What was the impact of HEPA filters not being installed?

A I was not aware of the design requirements

c) What was the potential patient impact of the absence of HEPA filters?

A I was not aware of the design requirements

d) What was done to resolve any HEPA filter issues?

A I was not aware what was done as I was not part of the handover process

e) What filters should have been installed at handover?

A I was not aware of the design requirements

f) Dr Penelope Redding tells us in her statement that you said there was ‘no request for HEPA filters to be inserted in Ward 2A’:Is To what extent is Dr Redding’s statement accurate? Explain your understanding of the position relating to insertion of HEPA filters in Ward 2A:

A This was not me as I was not aware of the design requirements

g) Who was responsible for providing HEPA filters and ensuring that they were installed during the build?

A I was not aware of the design requirements

h) Who signed off handover without HEPA filters being installed?

A I was not part of the handover board

i) Were infection control doctors and nurses consulted? If so, who?

A I was not part of the handover board

j) Why was handover signed off without HEPA filters?

A I was not part of the handover board

82. How many HEPA filters were missing, if any, from any other wards following handover?

A I was not part of the handover board

a) Discuss how this was managed follow Q55 above.

A I was not part of the handover board

Chilled Beams & Thermal Wheels

83. Tell me about your understanding of the use of chilled beams in areas where immune compromised patients are treated:

A A chilled beam is a convection heating & cooling system. These were installed throughout the new QEUH Adult & Children's Hospital. They were used to control the environment within a ward/single room area.

84. Tell me about your understanding at the time of the cleaning regimes in place for chilled beams? If you were not involved, with the benefit of hindsight should you have been?

A I was not involved as this was an operational estates task. I was not part of the operational management team so rightly I was not involved.

85. Can the witness recall any specific events in relation to chilled beams?

A I was aware that there were potential leaks from chilled beams due to operational issues which affected due points etc. I have attached the action plan from a Ward 6A IMT (dated 29/7/2019) – **Attachment 3** which refers to leaks from chilled beam which may help.

For example:

a) Dripping chilled beams in critical care refer to **Estates Team Bundle, document 63.**

A I was not involved with this at that time so unaware.

b) Issues with dew point controls refer to **Estates Team Bundle, document 65.**

A I was not involved with this at that time so unaware. However at a later stage I became made aware of situations which caused high condensation on pipework supplying the chilled beams which eventually leaked down into patient spaces. This was overcome by Darryl Conner (Estates Manager) working with Schneider controls around modification of dew point settings.

c) Ward 2A cubicles 8-11 refer to **Estates Team Bundle, document 106.**

A I was not involved with this at that time so unaware.

d) Water samples being taken from chilled beams in Ward 6A refer to **IMT Bundle, document 73.**

A I understand that these were taken to allow analysis of the ‘make up’ of the water within the Chilled Beam installation given there were leaks into a patient area. This was to ensure the chilled water was not contaminated

e) Leakage chilled beams Ward 6A refer to **Estates Team Bundle, document 138.**

A Darryl Connor was addressing these issues within operational estates and schneider controls (see 74b) above

f) Leakage chilled beams Ward 6A refer to **Estates Team Bundle, document 139.**

A A log of where and when there was leaks at the chilled beams was to be created by Darryl Connor.

g) Leakage chilled beams Ward 6A refer to **Estates Team Bundle, document 142.**

A I was aware that Darryl Connor was addressing these issues within operational estates and schneider controls (see 74b) above.

h) Any other issues/ incidents not mentioned above.

A Not that I am aware of or recollect

For each event please tell us:

a) What was the issue?

b) The impact on the hospital (include wards/areas) and its patients (if applicable)

c) Who was involved?

d) What was the escalation process?

e) Were any external organisations approached to support and advise?

f) If so, what was the advice?

g) Was there opposing advice and by whom, and what was the advice?

h) What remedial action was decided on and who made the decision?

i) Was the issue resolved – consider any ongoing aftercare/support/monitoring;

j) Any ongoing concerns witness had herself or others advised her of?

k) Was there any documentation referenced during or created after the event. For example an incident report?

l) Did anyone sign off to say the work had been completed and issue resolved/area safe.

Write your answers above in the relevant section.

86. Tell me about your understanding of the use of thermal wheels in areas where immune compromised patients are treated:

A A Thermal Wheel is used within a ventilation system to pre-heat (or pre-cool) fresh air thereby also reducing energy consumption. This was a means of environmental control or comfort heating for patients]

87. To what extent can you recall any specific events in relation to thermal wheels?

A I cannot think of any specific event regarding a Thermal Wheel. There has been the conversation around whether a Thermal Wheel should be used in healthcare system due to the possibility of cross contamination through ‘leakage’ and this was shared with the AE(V). However, the AE(Ventilation), at

that time, shared information and evidence with the QEUH estates team that this was a very low risk and that it was probably unlikely and a very low risk that any ‘cross contamination’ would occur.

a) What was the issue?

A I understand the discussion was around potential ‘cross contamination’

b) The impact on the hospital (include wards/areas) and its patients (if applicable)

A Given that there are thousands of Thermal Wheels with the QEUH/RHC Hospitals this could have been a significant issue

c) Who was involved?

A Discussions tool place, I believe, with Operational Estates Managers & Authorising Engineer (Ventilation)

d) What was the escalation process?

A There was no escalation as I understand the guidance given by the AE(V) de-escalated the issue

e) Were any external organisations approached to support and advise

A The Authorising Engineer (Ventilation) was approached for advice on thermal Wheels in ventilation systems

f) If so, what was the advice?

A See Q76 above

g) Was there opposing advice and by whom, and what was the advice?

A I understand there was no opposing advice

h) What remedial action was decided on and who made the decision?

A There was no remedial action required to the existing Thermal wheel installation as the Authorising Engineer (Ventilation) gave guidance which de-escalated the issue.

i) Was the issue resolved – consider any ongoing aftercare/support/monitoring;

A See Q76 above

j) Any ongoing concerns witness had herself or others advised her of?

A Not that I am aware of

k) Was there any documentation referenced during or created after the event. For example an incident report?

A Not that I am aware of

l) Did anyone sign off to say the work had been completed and issue resolved/area safe.

A Not that I am aware of

Combined Heating and Power Unit

88. Describe the Combined Heating and Power Unit (CHP)

A 3 x gas fired CHP Generators which generate electricity and waste heat to support the QEUH Campus

a) What is the purpose of the CHP?

A To generate electricity from gas through a turbine which will allow NHSGG&C to reduce the electricity consumption for the QEUH Campus from the grid. It also utilises the waste heat bi-product as part of the boilers heating regime.

b) What condition was the CHP in at handover?

A I was not part of the handover process so I cannot comment

c) What information do you have to support your view on the CHP's condition?

A I was not part of the handover process so I cannot comment

89. Was commissioning and validation of the CHP carried out prior to handover?

A I was not part of the handover process so I cannot comment

a) What commissioning and validation documentation did you see, if any?

A I was not part of the handover process so I cannot comment

Refer to **Estates Team Bundle, document p90**

b) Who was responsible for ensuring that the commissioning and validation documentation was in place?

A I was not part of the handover process so I cannot answer this question

c) Where were records of the commissioning and validation for the CHP kept?

A I was not part of the handover process so I cannot answer this question

90. Who was responsible for ensuring that the CHP was operating correctly?

A I was not part of the handover process so I cannot answer this question

91. To what extent could patients be impacted if the CHP was not operating correctly? If so, how? Refer to Estates Team Bundle, document p101

A There should be minimal impact as resilience is in place. Electricity would be drawn from the grid seamlessly and the boilers would provide sufficient heating & hot water.

92. What concerns, if any, did you raise about the CHP? If so, to whom, and what action was taken?

A I was not part of the handover process so I cannot answer this question

93. **Estates Team Bundle, document 17:**

d) What is meant by labs flushing?

A My interpretation of this was that the Lab Block water system had a flushing regime in place to ensure a continual movement of after through the system. This was a safeguard before the Lab Block Heating & DHWS Systems were connected to the QEUH/RHC Systems.

e) What issues, if any, arose from this?

A I am not aware of the end results

f) What is the importance of this?

A To prevent a contaminated system contaminating another

g) Discuss your knowledge of the reference to a ‘40 year old system’:

i) Explain what the 40 year system was:

A This, I understand, is a reference to connecting the INS Building (40 year old) to the Energy Centre (New)

ii) What was the issue(s)?

A The issue, as I understand, would be that there could be backward contamination of water from both the heating & dhws from the INS system back into the Energy Centre

iii) What was the potential impact?

A The potential impact is that the full heating & dhws system supplying the QEUH/RHC and Lab Block could become contaminated

iv) What actions, if any, were taken to address the issue(s)?

A I am not aware of what actions were put in place regarding connecting the INS to the Energy Centre. The only thing I am aware of is that it has, to this day, not happened.

94. What was your understanding of how the CHP should be operated?

A I don't have access to the design specification but most modern CHP's would be 'Thermal' led rather than 'Power' led.

95. Describe the difference between being thermal led and power led? What effect, if any, did that have on the operation of the CHP?

A a)Thermal Led CHP – In simplistic terms the operation is driven by the required heat of the building. This ensures that no heat is wasted and potentially exported to atmosphere.
b)Power Led CHP – In simplistic terms the CHP is driven by the energy/power requirements. Should the power requirements be less than the output of the CHP then the CHP will be controlled in a part load operation. As the CHP's at the QEUH are less than the power/energy requirements of the QEUH this will mean that they will operate at their maximum allowed load.

96. What were the cost considerations for the operation of the CHP? What considerations impacted on its operation?

A I do not have access to this information however over a period of time the control settings for the CHP were 'modified' and the CHP eventually became 'Power led' and remains so to this day

97. Please explain why the control settings were modified, what prompted this modification and who would have signed off on the modification?

A The control settings were modified to allow the CHP to become power led. This was, I believe prompted to maximise the output of the CHP and therefore minimise the amount of power NHSGG&C had to draw from the electricity grid. This would have been signed off by David Loudon.

98. How was the CHP system being operated by GGC?

A As 85 above

99. Please elaborate.

A I have answered this above as part of a clarification (90)

100. What operational issues, if any, were encountered by GGC with the CHP? Refer to Estates Team Bundle document 12.

A From recollection the return temperatures for the CHP from the hospital was too high which was impacting on the efficiency of the CHP. If the water return temperatures was high then the CHO could cut out.

101. **Refer to Estates Team Bundle document 16:**

a) Have you seen this before?

A I have seen similar documents but not this particular one

b) What is this document?

A This is a 'defect report' from NHSGG&C's CaFM system (i.e. FMFirst) around defects found at the QEUH campus

c) Column 274 – 'all CHPs cut out' – what does this mean? How would this have impacted patients?

A This statement tells me that the CHP's were not operational as all 3 CHP's had 'cut out'. This would have had no impact on patient care as electricity would have been taken from the grid (rather than generated by the CHP) automatically and seamlessly and heating would have been automatically and seamlessly taken from the boilers (rather than waste heat from the CHP

d) Refer to **Estates Team Bundle, document 36** what was the incident referred to? Were you involved? How was this matter resolved?

A I was not involved in this matter

102. **Refer to Estates Team Bundle, documents 19 & 20:**

d) Provide any information about any concerns you had in relation to the building temperature and power.

A I was not involved with the QEUH/RHC hospitals at this time

e) What was your involvement?

A As above

f) Was this recorded on Zutec?

A I am not aware what was held on Zutec

g) What was the impact of these issues on patient migration?

A I was not involved with the QEUH/RHC hospitals at this time

h) Were matters resolved? If so, how? If not, what was the consequence?

A I was not involved with the QEUH/RHC hospitals at this time

103. Refer to **Estates Team Bundle, document 91, page 754:**

a) Look at column 78 – what does debris within the AHUs mean?

A I have no idea what this means as I was not involved with the QEUH Campus at this time.

104. As estates manager you must know what debris within the AHU`s means. This part of the document pertains to July 2015, when you began your role at QEUH in August 2015 what awareness, if any, did you have of debris being found in the AHUs? What action was taken, if any, and by who to resolve this matter that you were aware of? If you had no awareness, had this issue been resolved by the time you commenced your role?

A Debris can mean many things from small particles to builders rubble which has been known to be found in ductwork. The risk here is that dirt/dust could get blown into the rooms at the end of the ductwork. In high risk areas this would be unlikely as additional filtration before entering the clinical space would provide the additional safeguard required.. I note the date is July 2015. I was not involved in this project at that time or involved in assisting to resolve any of these defects. I have not seen this list before.

a) What would you expect to see within AHUs?

A The internals to AHU's should all be spotlessly clean, especially new or unused AHU

b) What was the impact of debris on the AHUs?

A Debris can be picked up by the ventilation system and moved through ductwork. If there are no filters at the end of a ventilation system then debris will come out of external grills into the space below.

c) How was this matter resolved?

A I have no idea how this was resolved as I was not involved with the QEUH Campus at this time

105. What happened in respect of Zurich?

A Zurich were NHSGG&C's Insurance provider at that time but I have no idea what this question relates to.

106. Refer to **Estates Team Bundle document 113:**

a) What is this?

A This is a Supervisors Final Defect Certificate for the project

b) Why was it issued in 2017 and not earlier?

A I was not part of the project Team so I do not know.

c) What was the consequence of this?

A I was not part of the project Team so I do not know

d) On what basis did Multiplex carry out the work?

A I was not part of the project Team so I do not know

107. Refer to **Estates Team Bundle, document 135:**

a) Please explain what this email was about.

A This looks like an e-mail requesting payment of retention monies.

b) Was the money released or not?

A I was not part of the project or handover Team so I do not know

Water Guidance and Obligations

108. What guidance applies to water? How did you/others ensure that guidance was complied with? What contractual documents, if any, would you consult to ensure guidance was complied with?

A Approved Code of Practice L8:2013, HSG 274 parts 1-3 & SHTM04-01. I was not part of Project Team.

109. Who was responsible for ensuring a safe water supply following handover?

A This would be the responsibility of Operational Estates Team

110. What water safety training was provided to all maintenance staff, estates officers and contractors?

A At handover I was not aware of what water training had been carried out.

a) When you commenced your role in August 2015, what water safety training was provided to all maintenance staff, estates officers and contractors?

A Since 2016 onwards, with the creation of the compliance team, there has been a water compliance manager in place. One of the duties of the water compliance manager was to work with the operational estates teams across NHSGG&C to identify what training was required to support estates managers and staff who would be required to carry out their responsibilities on water management. This was predominately to support Authorised Persons (Water), Competent Person (Water) & Responsible Persons (Water). Any contractors who worked on water systems across NHSHH&C were informed about the courses they needed to attend before they could carry out work on water

systems. If contractors were awarded any work on water systems across NHSGG&C (including QEUH) then they would need to have the relevant training in place and would then be required to be assessed and appointed as a CP(Water) by the respective NHSGG&C AP(Water) for the site in question

111. What was your knowledge and understanding of Health and Safety regulations on control of legionella at the time?

A Although I was not part of the project or handover teams I fully understood the requirements for water safety to comply with Approved Code of Practice L8:2013, HSG 274 parts 1-3 & SHTM04-01.

112. What legionella training was provided to all maintenance staff, estate officers and contractors?

A At handover I was not aware of what water training had been carried out.

a) From the point of commencing your role in August 2015 what legionella training was provided to all maintenance state, estates officers and contractors?

A See Q100A above and below.
Legionella and Water Hygiene Control within Hot & Cold Water Systems SHTM04-01 (City & Guilds Assured (WHS03))
Legionella Management for Water Systems SHTM04-01 (City & Guilds Assured (WHS01))
Legionella Control Refresher and Update (City & Guilds Assured (WH007)
Level 3 Legionella Control for Responsible Persons (RQF)

113. What water borne pathogens (other than legionella) training was provided to all maintenance staff, estate officers and contractors?

A At handover I was not aware of what water training had been carried out.

a) From the point of commencing your role in August 2015 what water borne pathogens (other than legionella) training was provided to all maintenance staff, estate officers and contractors?

A None

114. Who was the Dutyholder?

A I was not part of the project or handover teams. Once handed over the dutyholder would have been NHSGG&C CEO at that time

115. Were you aware of obligations to appoint an authorised person or the like to discharge water supply safety? If so, who was appointed? When, for what period? If not, why not?

A I am aware of these requirements however I was not part of the project or handover teams so I cannot answer who was appointed to these roles.

a) Following commencement of your role in August 2015, what appointments were occupied in respect of water, who was responsible for ensuring these appointments?

A The following AP(W) appointments have been made;

	AP Appointment by	Appointment covering period
Melville MacMillan		31/05/18 to 30/05/21
		31/05/21 to 30/05/22
	Alan Gallacher	31/05/24 to 30/05/27
Darren Hopkins		24/08/18 to 24/08/21
	Alan Gallacher	23/03/23 to 22/03/26
Kerr Clarkson		24/08/18 to 24/08/21
	Alan Gallacher	15/07/22 to 14/07/25
Frank Green	Alan Gallacher	01/02/19 to 01/02/22
Scott Macer	Alan Gallacher	15/02/19 to 14/02/22
Daniel Martin	Alan Gallacher	22/07/22 to 21/07/25
William Fenn	Alan Gallacher	22/07/22 to 21/07/25
John Hetherton	Alan Gallacher	24/08/23 to 23/08/26

Grant Bennett	Alan Gallacher	15/07/22 to 14/07/25
Ryan Ogilvie	Alan Gallacher	24/04/24 to 23/04/27

It is the responsibility of the QEUH Site Manager Operational Estates (SMOE) to nominate to the Compliance Manager (Water), any staff who are to become Authorised Persons (Water). Training is then put in place for these staff by the Compliance Manager and, after successful completion of training, are then assessed by the AE(Water) on their competence to become an AP(Water) for the site. Once successfully assessed by the AE(Water) the Compliance Manager (Water) is then informed by the AE(Water) who then informs the Head of Corporate Estates. The Head of Corporate Estates then appoints the individual in writing as an AP(Water).

b) What steps did you take to ensure that these appointments were filled?

A As above

c) What training and qualifications were required in respect of these appointments?

A See Q102A above

116. Commissioning of water system prior to handover/ patient migration to QEUH:

a) Requirements

A I was not part of the project or handover teams

b) Who was responsible for this?

A See a) above

c) What checks were carried out to ensure that the water system had been commissioned. Refer to **Estates Team Bundle, document 132.**

A I was not part of the project or handover teams

d) Was SEPA/ the Water Board involved? Describe their role and involvement.

A I was not part of the project or handover teams

e) Which teams (such as infection control) were involved in the water system sign off, Who would have signed it off on behalf of those teams?

A I was not part of the project or handover teams

f) Were L8 testing requirements complied with?

A I was not part of the project or handover teams

g) Were there any legionella concerns at handover? Is so, what was done to deal with these?

A I was not part of the project or handover teams

h) What concerns, if any, did you have about water sitting in the system before the hospital opened?

A I was not part of the project or handover teams

i) Were you aware of any issues with the testing of the water system?

A I was not part of the project or handover teams

j) What was your understanding at the time of the SHTM guidance, particularly SHTM 2027 and SHTM 04-01, in respect of water?

A I was not part of the project or handover teams

k) How compliant was the QEUH/ RHC water system with SHTM 2027 and SHTM 04-01 at the date of handover – if not, what was outstanding? Who was responsible to ensure that the water system complied with SHTM guidance? What team was in place to regulate compliance? If so, please explain your knowledge, understanding and role within that team:

A I was not part of the project or handover teams

117. Was a pre-occupation water test done prior to occupation? **Refer to Estates Team Bundle, documents 14, 14.1, 14.2:**

A I was not part of the project or handover team, however if this question relates to a 'Pre-Occupation Water Risk Assessment then the answer is yes as this was found in 2017

a) Who carried this out?

A If a) above is yes then this was carried out by DMA

b) If this was not done, should it have been done and why?

A Yes, a pre-occupation Water Risk Assessment should have been carried out to ensure the water system was safe for patients

c) Consequences of not doing it.

A The water system could be non-compliant which would bring a risk to immunocompromised patients.

d) What risks assessments were carried out pre-occupation in respect of the water system?

A See 102 above

e) If these were not done, should they have been? What were the consequences? What further action did you take?

A Yes, a pre-occupation Water Risk Assessment should have been carried out

118. What was the post occupation water testing regime at QEUH?

a) Who carried this out?

A I was not part of the project or handover team so I cannot answer this.

b) From commencing your role in August 2015, who carried out the regular water testing? What responsibilities, if any, did you have in your role as Estates Manager, and in your role as Authorised Person to ensure that this was

carried out? How did you ensure that this was carried out to an appropriate standard? What concerns, if any, did you have regarding the water testing regime, during your time at QEUH?

A I don't know who, if anybody, carried out water testing at QEUH from 2015, however latterly DMA canyon have been involved with Operational Estates about regular water testing in areas of high risk.
The responsibilities to ensure this happened sat with the Estates Operational Team and the management in place at that time.

c) Who carried out testing?

A I was not part of the project or handover team so I cannot answer this

d) Please consider the question from the period of your appointment at QEHU.

A See 103 B b) above

e) Your involvement with the testing?

A I was not part of the project or handover team so I cannot answer this

f) Please consider the question from the period of your appointment at QEHU.

A I have no involvement in testing as this is an estates operational responsibility should it be required

g) How frequent was testing?

A I was not part of the project or handover team so I cannot answer this.

h) During your time at QEUH, how frequent was testing? What concerns, if any did you have regarding the frequency of testing?

A I have no involvement in testing as this is an estates operational responsibility should it be required

i) Did this comply with L8 and SHTM 04-01 guidance? If not, why not?

A I was not part of the project or handover team so I cannot answer this

j) Please consider the question from the period of your appointment at QEHU.

A I have no involvement in testing as this is an estates operational responsibility should it be required

k) What happened to the results?

A I was not part of the project team

l) Please consider the question from the period of your appointment at QEHU. Your role in connection with the results of water testing?

A I was not part of the project or handover team so I cannot answer this

l) Please consider the question from the period of your appointment at QEHU.

A My answer remains the same. I have no involvement in testing as this is an estates operational responsibility should it be required

m) Where were the results stored?

A I was not part of the project or handover team so I cannot answer this

n) Please consider the question from the period of your appointment at QEHU.

A My answer remains the same. I have no involvement in testing as this is an estates operational responsibility should it be required

o) What action was taken in response to results?

A I was not part of the project or handover team so I cannot answer this

p**)** Please consider the question from the period of your appointment at QEHU.

A My answer remains the same. I have no involvement in testing as this is an estates operational responsibility should it be required

q) Was there an escalation process? How was non-compliance managed?

A I was not part of the project or handover team so I cannot answer this

r) Please consider the question from the period of your appointment at QEHU.

A My answer remains the same. I have no involvement in testing as this is an estates operational responsibility should it be required

119. We understand that there were positive legionella results in Ward 2A in around June 2015.

a) What concerns did you have about the positive legionella results?

A I was not aware of this as I was still based at RAH Paisley

b) What action was taken in response to this?

A I was not aware of this as I was still based at RAH Paisley

c) Were you aware of legionella being found in any other areas of the hospital? If so, where, and what action was taken?

A I was not aware of this as I was still based at RAH Paisley

120. In around June 2015 Dr Christine Peters requested the risk assessment for waterborne infection in the QEUH from Estates, the Project Team and Mary Anne Kane. Were you aware of this request? If so, did you provide this information? If not, why not? why?

A I was not aware of this request a I was still based at RAH Paisley

121. How many positive tests, if any, came from Ward 4B? Could you recall how many positive tests at the time?

A I was not part of this project

Water - Commissioning and Validation (C&V)

122. What commissioning and validation documentation did you see before handover in 2015 – if not, who would have had sight of this?

A I was not part of the design team or handover process

123. In your role as Authorised Person did you ever have sight of C&V documentation pertaining to the water system at handover? If not, why not? How were you assured in August 2015 that all of the appropriate C&V had been carried out?

A I was never an Authorised Person. This question should be directed to the Project/Handover Team. Thereafter it would be the responsibility of the Estates Operational Team to ensure this was in place.

124. Where is this commissioning and validation documentation ("C&V") stored generally on the hospital system?

A ZUTEC

125. What is the purpose of C&V?

A Commissioning is required to ensure equipment is installed, tested and operated to the original design specification; Validation is to ensure the system is consistent to operate to the required healthcare documentation. In this case SHTM's

126. What are the consequences of it not being carried out?

A The equipment/system will not perform to the required design specification or healthcare documentation

127. How many records were kept of the cleaning and testing regime? Where were the records kept and what was the retention policy? What concerns, if any, did you have about record keeping and retention?

A I was not made aware of this information

128. What would your reaction have been if you had found out the water system had no C&V before handover in 2015? Why were you concerned?

A I would have been concerned about the performance of the system especially as this was an acute hospital

129. Please respond to the above question in respect of verification and the cold-water supply system respectively.

A I would have been concerned about the performance of the cold water supply system especially as this was an acute hospital

130. What C&V of the water system was carried out post-handover?

A I was not made aware of this information

a) Who was responsible?

A I was not made aware of this information]

b) Was it within your remit as Estates Manager to ensure that regular C&V was being carried out?

A Commissioning of a water system to the design happens only once and that is at pre-handover. Water systems are not validated or verified. Only after a major change to an existing water system is it re-commissioned to the revised design.

c) How was the C&V recorded?

A I was not made aware of this information]

d) What concerns if any did you have arising from post-handover C&V? If so, why did these concerns arise?

A I was not made aware of this information

Water System – General

131. What testing and maintenance protocols and regimes were in place? What should have been in place. If it wasn't, why wasn't it? What did you do about that?

A I was not made aware of this information. A full commissioning & PPM schedule for water asset management should have been in place. I have no idea why it was not in place

132. What concerns, if any, did you have about the temperature and movement within the water system? How was this recorded and measured? Who was responsible for this? If Schnieder did these were these reports forwarded to yourself or other GGC employees? How were these reports responded to, what did they tell you? How were issues flagged in these reports dealt with/ resolved?

A I was not part of the project or handover team so I cannot answer this question.

133. From the point of commencing your role at QEUH What concerns, if any, did you have about the temperature and movement within the water system? How was this recorded and measured? Who was responsible for this? If Schnieder did these were these reports forwarded to yourself or other GGC employees? How were these reports responded to, what did they tell you? How were issues flagged in these reports dealt with/ resolved?

A There were some concerns around water temperatures across the QEUH and that was flagged up in the DMA 2015 Water Risk Assessment which only came to light late 2017, however the monitoring and recording of this information was an operational responsibility of estates and schneider, I don't have the required information as to how this was monitored and reported up the management chain.

134. What concerns, if any, did you have about testing and stagnant water being in the system following testing? Please describe and provide information on how this was dealt with.

A I was not part of the project or handover team so I cannot answer this question.

135. From when you became involved, did you have any concerns?

A I was not involved in this

136. What concerns, if any, did you have about dead ends/ legs in the system? Please describe and provide information on how this was dealt with.

A I was not part of the project or handover team so I cannot answer this question.

137. From when you became involved, did you have any concerns?

A I cannot answer this question as I was not involved enough to know the issues.

138. To what extent could the water system in QEUH/RHC have been more comprehensive?

A I am not a water system designer so I cannot answer this question

139. To what extent would the installed water system have achieved the system objectives if operated correctly? In your answer set out what the system objectives were and how these were/ could have been met.

A I was not part of the project or handover team so I cannot answer this question

140. Whilst you were not part of the project team you became involved in QEUH in around August 2015, at the time you became involved in QEUH please confirm whether the installed water system have achieved the system objectives if operated correctly? In your answer set out what the system

objectives were and how these were/ could have been met. What issues, if any, were you aware of in respect to the water system achieving its objectives?

A I did not become involved in the QEUH in August 2015. I took the boardwide position of General Manager (Estates) which had strategic boardwide responsibilities. The issues with the new QEUH still sat with the Operational Team.

141. Describe any ward/area specific water systems used?

a) Detail the individual ward water specification

b) What were/ are your thoughts about this

c) Why, if applicable, did certain wards have different water systems

d) Was there a standard protocol for sanitising water systems?

A I was not part of the project or handover team so I cannot answer this question

142. This question is not specific to handover, so please answer having regard to the time when you became involved at QEUH.

A I still cannot answer the question as I do not have the information. This is an Estates Operational Responsibility.

143. To what extent were the standard protocols for sanitising water systems used on a system of the size and complexity of this one?

A I was not part of the project or handover team so I cannot answer this question.

144**.** This is not specific to handover so please consider from the point of your involvement.

A I have not been involved in the sanitisation of the QEUH Water System, however all new water systems across NHSGG&C are sanitised before taking into use by NHSGG&C. I would have expected the QEUH to be no different

145. Were consultants brought in to advise on sterilisation of the water systems?

a) Who were they?

b) Had you worked with them before?

c) Describe and comment on the methodology used.

d) Who decided to accept it or not.

e) Did it work?

f) What paperwork or records were kept in relation to their installation; maintenance or flushing?

g) How were these kept on paper or electronically?

h) What equipment for recording work was used by employees doing day to day tasks?

i) How was that then reported back and checked?

A [a) Water Solutions Group b) No; c) A whole new sterilisation/disinfection system was installed at the QEUH/RHC at a significant investment of over £1.5m d) I understand this was recommended to the BWSG for approval e) Yes, I believe the water system within the QEUH/RHC is of the highest quality across NHS in UK f) All paperwork is, I believe, held by operational estates management who also have access to the maintenance contractors on-line portal so electronic copies are available. This paperwork is audited regularly G) Both paper and electronic copies are available h) This work was sub contracted to a specialist contractor. I) I understand Electronic reports are generated on a weekly/monthly requirement

<u>Water Maintenance</u>

Refer to Estates Team Bundle, document 10.

146. Explain the cleaning and maintenance of the water system, taps, drains, shower heads etc. When doing so consider:

a) What is the cleaning regime?

A The maintenance regime should follow SHTM04-01 Part B requirements. The cleaning regime should follow the respective healthcare cleaning regime.

b) What is the importance of this?

A This will ensure the water system is compliant to this healthcare guidance document

c) What responsibilities did you have a result of this?

A This was the responsibility of the Operational Estates Team after handover and the major contractor prior to handover

d) What did you do to ensure these responsibilities were executed?

A I was not part of the project team or handover Team at that time.

e) Please confirm your role, if any, from your time at QEUH to execute responsibilities in respect of cleaning and maintenance of the water system, taps, drains, shower heads etc.

A I had no responsibilities in respect of cleaning and maintenance of the water system, taps, drains, shower heads etc. this sat with Operational Estates.

f) What issues, if any, did you have fulfilling these responsibilities?

A See d) above

g) Please consider the above question from the point your involvement began at QEUH.

A The answer supplied at e) above is still pertinent. I had no responsibilities.

h) Were there ever concerns raised about cleaning practices? IMT bundle, document 22. Detail these concerns. Refer to **NHS GGC SBAR Bundle, page 112** when providing your answer.

A I cannot recollect if any concerns were raised.

i) What, if any, matters regarding the maintenance of the water system were escalated? If so, were they escalated BICC or AICC?

A I am not aware that these issues were escalated to anybody other than the WTG

j) What is dosing?

A Dosing is a means of introducing chemicals to the water system to improve quality

k) Why was chlorine dioxide used in the cleaning regime. **IMT bundle, document 30.**

A Chlorine Dioxide is a tried and tested disinfectant for this type of cleaning. It is well used within healthcare.

l) Clearing of drains in June 2018 following water incident -relevance and purpose. **IMT bundle document 27.** Did this resolve the issue**? IMT bundle, document 38** why was expert advice required?

A The drains were cleaned but the whole nature of drains would mean that there could be further build-up of contamination even after they were cleaned.

m) What happened in response to concerns about on-going maintenance and cleaning? What further action did you take personally? For example taps, refer to **Estates Team Bundle, document 121**.

A Document 121 give little information about what the issue is so I cannot answer this question.

n**)** In general, what happened in response to concerns about on-going maintenance and cleaning? What further action did you take personally? For example taps?

A This is an Estates Operational responsibility for which I cannot answer.

o) What further steps could have been undertaken?

A See k) above

147. Were you involved in the decision to proceed with a drain survey? If so, can you explain your role in this decision? What was the purpose of the drain survey?

A I understand that the drain survey was agreed at either the Water Technical Group or the Board Water Safety Group, I cannot remember accurately which one.

148. What were the results of the drain survey?

A The Intertek report identified evidence of solid contamination in the drain trap from Ward 3C along with other debris (clumps of hair, piece of plastic film etc). Microbiological assessment of the debris was not deemed possible due to the expected high levels. Ward 3A on the other hand showed little or no contamination. This highlighted the non-standard potential contamination of drains across the QEUH A&C as the use of the sinks were potentially the major factor here.

149. What was found in the water tanks? What if anything significant was found in the water tanks?, To what extent would anything found result in a wider issue of water contamination?

A Debris and 2 sponges were found in water tanks and this was reported back in the Intertek Report dated July 2018. The debris had a large biofilm presence as did the 2 sponges. Given the size of the water system it is debatable about what impact this would have had on the water quality given that any potential contamination would have been dissipated by the volume of water in the system

150. Concerns have been raised regarding the hospital design and the increased risk of water contamination; what is your view on the increased risk of water contamination in relation to the following:

a) Having a single barrier approach water system, resulting in fluctuating water temperatures

A I really don't have an opinion on this. So long as the water system is compliant then this should not be an issue.

b) Ensuite bathrooms attached to each room

A I really don't have an opinion on this. So long as the water system is compliant then this should not be an issue.

c) Overprovision of water outlets leading to sink removals

A There is guidance around number of water outlets against number of patients. Overprovision can result in the underutilisation of water and water outlets.

151. How involved were you in the decision to use point of use filters?

A This was, if I remember correctly, a decision endorsed by the Board Water Safety Group.

152. Who was responsible for the effective management of and installation of the point of use filters?

A Operational Estates along with approved contractors installed PoU Filters. This would have been overseen by Operational Estates Manager delegated to do so.

153. Did the point of use filters meet the water regulation requirements? Did they have an effective gap between the water level and the filter to prevent contamination?

A The PoU Filters (i.e. PALL Filters) were the approved filter and complied with regulations

154. Why were the point of use filters not introduced earlier?

A As I understand it all engineering solutions were being investigated and discounted before PoUs were then introduced

155. How often were you aware of the filters being changed? Were the manufacturer's recommendations followed?

A The PoU Filters were being replaced as per manufacturers recommendations (every 30 days). This was a strictly imposed regime that I can recollect

156. How involved were you in decisions relating to water testing?

A Decisions around water testing were taken by the Board Water safety Group with significant input and agreement/advice from Infection Control & the Microbiologist Consultant.

157. If not, who was responsible for these?

A See 131 above

158. What do you understand about management of water testing? What do you understand about decisions on when water testing should be undertaken?

A SHTM04-01 does not recommend that water testing should be carried out. However certain circumstances within healthcare determine when testing should be carried out; i.e. failure of water temperature control; areas of a water system where historically there are low temperatures; certain parts of hospitals where there is a high risk patient group.

159. In her statement Dr Teresa Inkster states *'there was a direction from Mary Anne Kane, who was at senior director level, not to give microbiologists access to water testing results'*:

a) What is your reaction to this statement?

A I was not aware of this statement, and I am surprised that this was said given the high visibility around water at that time

b) Why did estates direct that microbiologists should not have access to water testing results?

A I have no idea why and have no recollection of this

c) Have you ever been advised not to contact someone/ not to provide water testing information? If so, when? By whom? and why?

A No

d) Have you ever refused, or directed others to refuse to provide water testing information requested by microbiologists or infection control? If so, why? Provide as much information for your rationale and the consequences of withholding information.

A No

e) Provide information on how you dealt with requests for water testing results from microbiologists and infection control - was all the information requested provided? If so, what was provided? If not, why was paperwork not provided?

A I was not involved operationally so I would not provide this information. That would come from others (i.e. operational estates)

f) What legal and regulation requirements must be complied with to carry out regular water testing?

A There is no legal requirement to carry out water testing that I am aware of, apart from if you were a water supplier (i.e. Scottish water)

g) What situations would water testing not be carried out?

A There is no legal requirement however testing can be carried out when requested and if required

h) What are the consequences of regular water testing being carried out?

A Water quality can be proven (good or bad) which can impact on patient safety

i) Dr Christine Peters tells us that in April 2016 water testing results or ARU2 were not available. To what extent is this accurate? If it is accurate, why were results not available, and should they have been?

A I am not aware of this

160. Both Dr Penelope Redding and [redacted] tell us that they asked for information which was not forthcoming. To what extent do you agree with their recollection of events? If you agree, why was testing information not provided to clinical staff, microbiologists and infection control?

a) Who was responsible for dealing with these requests for information?

A I was not aware of this

b) What was your role in dealing with these requests for information?

A I was not involved

c) How were these requests for information managed by your department? What steps did you take?

A See a) above

d) What concerns, if any, did you have with how matters were being handled? If so, what steps did you take in response to these concerns?

A See a) above

DMA Canyon Reports

Refer to Bundle 6 – Miscellaneous documents – documents 29 and 30.

161. Was this the DMA Canyon 2015 report (document 29)?

A Yes

162. Who ordered this?

A Ian Powrie

163. Who signed off on payment?

A I understand it would have been Ian Powrie

164. How was this signed off or payment processed?

A I do not know or have this information

165. Who was the report sent to?

A I do not know or have this information

166. When did you first become aware of the DMA Cayon 2015 report?

A I was informed by Mary-Anne Kane mid 2017

167. What was the purpose of the report?

A As part of SHTM04-01 there is a requirement to produce a Pre-Occupancy Water Risk Assessment to identify any issues/non-conformances and to ensure the water system is safe for use

168. Who had the report?

A I understand this was held by Ian Powrie

169. When Were DMA Canyon present at QEUH/RHC site between 2015 and 2018?

A I am only aware of DMA canyon being on site to carry out the 2015 & 2017 Water RA’s

170. What, if anything, did DMA Canyon say about the report during their time on site between 2015 and 2018? If so, when and what was mentioned?

A I cannot recollect.

171. When were the works suggested in the 2015 report actioned?

A I understand they were not actioned until a 2017 Water RA had been received which highlighted that a number of actions within the 2015 Report were still outstanding.

172. Did this come as a surprise to you? What concerns at the time, if any, did you have regarding the lack of action of the 2015 report?

A Given the individual who commissioned and received the pre- occupation Water Risk Assessment this did come as a surprise. The lack of action could potentially have an impact on water quality.

173. Were you aware of Ian Powrie creating an Action Plan?

A I was not aware of an action plan being produced

(a) If yes, when were you made aware of the Action Plan?

A See above

(b) Who was tasked with carrying out the work in the Action Plan?

A See above

(c) When was the work from the Action Plan carried out?

A See above

174. What is your own view of the findings of the 2015 report? Do you agree with it or not? Explain your rationale.

A Given that there was a 2 year window between when the 2015 Water RA was produced and when I got visibility of it, I do not have an opinion on the accuracy of the 2015 Water RA.

175. When you first became aware of the 2015 DMA Canyon Report, what action did you take (1) in terms of sharing the findings of the report, and (2) in terms of instructing that work be carried out following the report?

A (1) I did not share the report (2) I did not instruct any work as this action sat with Operational Estates Team

176. DMA Canyon prepared another report in 2017 **(Bundle 6 – Miscellaneous documents , document 30)**. What works, if any, recommended in the 2015 were carried out prior to the 2017 report?

A I do not know what works were carried out as this was an 'operational team' delivery

177. What happened with DMA Canyon in 2017 – discuss and provide as much detail as possible. Who dealt with matters, what was your role and when did you become involved? Who sanctioned the works in 2017 report?

A The actions from the 2017 Water RA would have been taken forward by the Operational Estates Team. I became involved at a much later date (2020) when I was asked to review the content of the report as there was concerns around some inaccuracies around 'risk categorisation' and some technical inaccuracies also. I was tasked to pull together a review group and review accordingly. I attach a copy of my report

178. What was the impact, if any, of the failure to implement the 2015 recommendations on patient safety?

A There were a number of recommendations within the 2015 Water RA which would need to have been assessed and if high risk should have been actioned urgently to minimise the risk to patients

179. We understand that Infection Control were only advised about the 2015 DMA Canyon Report in 2018. Why were they not told sooner? What happened?

A I cannot answer this question as I do not know.

180. Whose responsibility was it to be satisfied that the risk assessment had been carried out? Explain how you were satisfied that the appropriate risk assessment had been carried out prior to patient migration to QEUH.

A I was not part of the design or handover team so I cannot answer this question.

181. What responsibility, if any, did you have to ensure that upon commencing your role at QEUH that the appropriate risk assessment had been carried out?

A These duties sat firmly with the Operational Estates Team. There was no compliance team in place at the time of the QEUH period of handover.

182. Dr Christine Peters also states that she asked for *'asked for risk assessments for waterborne infection in the QEUH and they were not forthcoming from the Project Management Team, Estates, or Mary Anne Kane.'*
Do you recall being asked for this information? Did you provide the information requested? If so when and by what means? If not why not?

A I do not recall this being asked

February 2016 – Sinks – Ward 2A

In early 2016 a PAG took place regarding the *'Contamination of aseptic pharmacy unit at RHC water supply with Cupriavidus pauculus'* a subsequent investigation linked the infection to sink within the Aseptic Pharmacy Unit:

183. What was your understanding of this incident?

A I was not aware of this incident

184. What was your involvement with this matter?

A I was not involved in this incident

185. What action did anyone take in relation to this incident?

A I was not involved in this incident

186. Do you recall any further issues in relation to sinks? If so please discuss, confirming your involvement and action taken in response to any issues.

A I do not recall any further issues with sinks.

Water Incident 2018

187. Walk through the concerns as they emerged in 2017 into 2018 in respect of the water issues. Initially focus on your recollection of events as they happened. In relation to the concerns:

a) When did the concern arise?

b) Nature of concern?

c) Possible cause of concern?

d) Action taken in response to concern?

e) What actions were taken in response to concern?

f) How sufficient were these actions?

A The water quality incident plan pulled together for the WTG was very detailed and looks at all areas where there was a risk associated with water quality. This only part of this plan that I am aware of which was not actioned was the 'shock dosing' as this was found not to be needed once the introduction of Chlorine Dioxide improved the water quality substantially. This is added as **Attachment 8**

188. The following IMTs have been highlighted to assist with this. If you are also able to respond to the questions raised in respect of the IMTs below when considering your recollection of events.

a) **Refer to IMT bundle, document 13:**
Cupriavidus bacteraemia in ward 2A at the end of January 2018

(i) what do you recall of this incident/ issue?

A An IMT was called due to patient contracting Cupriavidus. Routine water testing identified the presence of the organism.

(ii) When did it begin?

A I understand it was end January 2018

(iii) How did it come to light? Who first reported the incident?

A An IMT was called due to patient contracting Cupriavidus. Routine water testing thereafter identified the presence of the organism

(iv) What was your involvement?

A I was part of the IMT 3 or 4 weeks later.

(v) Please describe what you took, what role and responsibilities you had in respect of dealing this this matter? Did you have any concerns with how matters were managed at the time?

A I was involved to support the delivery of a plan around position of taps and showers in ward 2A. the IMT was pro-active in the actions being discussed.

(vi) What enquiries did you make about replacing all the taps within Ward 2A? What did you do? Did you discuss this with anyone else? What was the outcome?

A The issue of Taps was discussed in detail at several of the IMT's for Ward 2A. As I understand it the final outcome being that all Taps within Ward 2A were changed along with other sanitary ware. This was led by Ian Powrie

b) **Refer to IMT bundle, document 16:**
Multiple positive results Cupriavidus and now Stenotrophomonas, Dr Inkster states that the test results are from taps which have not been replaced in rooms 15 and 26. Shower head in room 12. At that IMT no cause for patient concern.

(i) What was done as result of this meeting and why?

A The meeting minutes confirmed actions as follows: 1 – all shower heads to be taken to microbiology for testing; 2 – Portable Clinical Wash Hand Basins would be put in each room by the following morning (13/3/2018); 3 – A detailed plan outlining the situation of each tap and shower head would be pulled together; 4 – Once all taps had been replaced then a full chemical clean would be carried out and retesting of taps would commence.

c) **Refer to IMT bundle, document 17:**

(i) Your involvement and what measures were taken?

A As I recollect all actions were delivered by the operational estates team

(ii) Did you discuss this with David Loudon?

A I have no recollection if this was discussed with David Loudon

(iii) Do you recall anything about how matters were managed?

A I do not recall how matters were managed

(iv) How were costs managed?

A I have no recollection on how costs were managed

(v) Who carried out the work?

A I have no recollection on who carried out what works but it was managed by Operational estates Team in most cases

(vi) How was this reported and managed?

A As I recollect, everything was reported back to the IMT

(vii) How involved were you in the decision to use bottled water for handwashing and drinking? Discuss your knowledge and involvement surrounding this matter.

A This would have been a joint decision made at the IMT but primarily led by Infection Control Team

d) **Refer to IMT bundle, document 18:**

(i) As above, what was the outcome of this IMT, your involvement, actions and how you followed it up.

A The meeting minutes confirmed actions as follows: 1- The infection control team will look into the list of patients from Liz Chalmers currently on Ward 2A and ward 3C; 2 – Infection control measures are to stay in place until results from water outlets fitted with the filters have come back negative and Dr

Inkster is pleased that the filters are working; 3 – Dr Inkster will speak to concerned parents of patient in PICU; 4- A list of immunocompromised patients who are currently an inpatient at the RHC will be compiled so that the same control measures can be implemented for these patients throughout the hospital; 5 – Susie Dodds and Mary-Anne Kane will identify all items domestics commonly use throughout RHC and QEUH. I had no involvement in any of these actions.

(ii) What concerns, if any, did you have about Stenotrophomonas impacting patient safety at this point?

A Being non clinical I cannot comment on this

(iii) Did you, in your role, have any concerns about Stenotrophomonas impacting patient safety?

A I did not know what Stenotrophomonas was or what impact it could have on individuals/patients.

(iv) Refer to **Estates Team Bundle, document 121;** how does this link to the IMT? Was this as a result of what was being discussed? What happened following this email?

A I cannot recollect if this was linked to the IMT

(v) What was the issue that required urgent attention in respect of flow straightener? Were you aware of this at the time? If not, why not? With the benefit of hindsight, is this something that, in your role as General Manager, that you should have been aware of?

A My recollection of this was the Horne Taps fitted within Ward 2A and the flow straighteners fitted to these taps. This area was classed as ‘High Risk’ and the potential issue with having these on taps in high risk areas. I was not privy to the outcome between Mary Anne Kane and Annette Rankin that I can recollect.

e) **Refer to IMT bundle, document 19:**

(i) As above - the fitting of water filter – discuss – why were these filters not on the taps initially?

A Water Filters are not supplied on taps. It is expected that the water quality being supplied fully complies with legislation.

(ii**)** This being the case, why then were water filters fitted to the taps? Why did this responsibility fall to QEUH staff, if the water being supplied is to fully comply with legislation? What was the reason for the filters being fitted?

A Water filters were fitted to the taps because after water testing of specific water outlets it was found that the water quality had high counts of various bacteria in it. This fell to QEUH staff as the water system had been handed over to NHSGG&C.

(iii) What do you know about the dosing of the system with silver nitrate? How did this discussion come about?

A I cannot recollect as to why the system was dosed with silver nitrate and not another chemical.

f) **Refer to IMT bundle, document 20:**

(i) This was scored HAIIT red – why?

A This is a clinical decision and follows the Infection Incident Assessment Tool (HIIAT) which is used by the IPCT & HPT to assess every healthcare infection incident.

(ii) What were the concerns?

A I understand the concerns were major around public anxiety & significant media interest

(iii) You were asked to look at the historical water results during the commissioning of QEUH/RHC, what did you find out as a result? What concerns, if any, did the historical water results raise?

A This was not an action placed on myself

(iv) You were emailed on 26th March 2018 – **(see Estates Team Bundle, document 124)** by Mary Anne Kane seeking information regarding the commissioning – what response did you send? What did you do in response to this?

A I cannot recollect exactly what was sent however I do recollect that commissioning information was sent to Shiona Frew as requested

(v) What was discussed at the next IMT in relation to commissioning? If not, why not?

A I cannot recollect if this was discussed at the next IMT

189. **Refer to Estates Team Bundle, documents 125 and 133** what was the relevance of these document to the water incident?

A Document 125 was around block sinks/showers within Ward 2A and to get an understanding of how many we had within ward at any one time and whether this could contribute to water contamination. This showed that it was working out at 5 blockages a month. Document 133 was a summary e-mail about the measures we were carrying out at QEUH to manage the water incident.

190. Describe any other issues or matters arising from the water incident:

A This issues are well documented and I have nothing else to raise.

191. In her evidence Phyllis Urquart states that she was informed by you that there was a Water Safety Plan in place which reflected the entire picture of all water documentation within GG&C , but there was no sole document that she was aware of titled ‘Water Safety Plan’. Please confirm if there was such a document, who was responsible of the provision of a Water Safety Plan. If

there was no such document, why not? What was the potential impact, if any, of there not being such a document in place?

A I don't know the period you are referring to or if it is just for the QUEH, however each site across NHSGG&C has a Water Safety Plan (WSP). This is the responsibility of the Site Manager Operational Estates (SMOE) and consists of the following:

- NHSGG&C Water Safety Policy;
- Site Water Written Scheme;
- Site Water Risk Assessment;
- Site Water Schematics;
- Site Authorising Engineer Audit;
- Site Control measures (this includes testing & sampling);
- Site Water Emergency Plans;
- Board & Site Specific SoPs to support Water Safety;
- Planned Maintenance Schedules for Water;
- Site Logbooks

Prior to 2018 it is unlikely all these documents were in place

T<u>aps</u>

192. The use of Horne Taps was discussed in the IMTs relative to the water incident**. IMT Bundle.**
Please confirm:

a) Your understanding of use of Horne taps.

A Horne Taps were specified within the initial new hospital build. They are a thermostatic mixing tap which mixes hot & cold water.

b) Who authorised the use of Horne taps?

A This was included as part of the hospital design. I am aware that HFS at the time were also contacted about potential concerns (by Ian Powrie) and that they were happy with the proposed Tap

c) Why were Horne taps selected?

A See b) above

d) How involved were you in the decision to use Horne Taps - **SBAR Bundle, document 1** - please discuss your involvement and understanding.

A I was not involved with the final decision to install Horne Taps at the QEUH/RHC

e) What is your recollection of the use of Horne taps.

A I am aware that there was some early concerns raised by Ian Powrie (specifically around flow straighteners) but I'm led to believe that with the support of HFS at the time they were to be installed.

f) At the time, were you aware of the incidents in Northern Ireland with Horne Taps?

A No

g) If so, why did you decided to proceed with the installation of these throughout QEUH/RCH? What was the deciding factor?

A I was not aware of the NI incidents. I did not make the decision to install Horne Taps

h) In her statement Dr Teresa Inkster tells us that following the 2014 taps SBAR a meeting took place *'which was chaired by Ian Stewart from HFS and attended by Lisa Ritchie, Jimmy Walker, Ian Storer, Ian Powrie, and Alan Gallagher from the Board, is that the tap manufacturers (Angus Horne and John Horne of Horne Engineering) were allowed to be present at a meeting at*

which they were risk assessing patient safety in light of the issues with Horne Engineering's product'.

To what extent did this meeting influence the decision to use Horne Taps? Please explain you recollection of the meeting, and any actions taken following the meeting and the extent of your involvement:

A The meeting took place to get a better understanding of the Horne tap and its functionality. Discussion also took place around the requirement to chemically sanitise the water and its impact on the Horne Taps as within their literature it mentioned that the taps should not be chemically sanitised. It also allowed NHSGG&C to bring the contents of Mary Anne Kane's e-mail dated 9 April 2018 around asking questions about copper/metal outlet, heat sterilisation as against chemical sterilisation, biofilm & PoU filters. This meeting did not influence the use of Horne Taps as this had already been decided.

i) At that meeting, what risk assessment took place, what mitigation was put in place following the meeting? Describe your understanding of the issues raised with Horne taps at this meeting. What action, if any, did you take following this meeting?

A No risk assessment was carried out. Discussion also took place around the requirement to chemically sanitise the water and its impact on the Horne Taps as within their literature it mentioned that the taps should not be chemically sanitised. It also allowed NHSGG&C to bring the contents of Mary Anne Kane's e-mail dated 9 April to them. Details and answer are given in Q m) below.

j) Discuss **Estates Team Bundle, document 121** explain the situation and your involvement. Here re CP and Horne taps - check

A As General Manager (Estates) I was now required to get involved with the QEUH/RHC as it had now been handed over and there were issues appearing. Colin Purdon was the Estates Site Manager tasked to be involved. He was supplying HFS with relevant information and pictures around the Horne Taps.

k) Specifically what action did you take and why?

A Document 121 is unclear as to its content.

l) **Refer to Estates Team Bundle, documents 127 and 128** explain the situation and your involvement.

A In Mary Anne Kanes absence I stood in for her at this meeting in an effort to get more information from Horne about their taps and their specification.

m**)** Please describe the information you gained from the meeting and actions taken as a result.

A Questions asked at the meeting were as follows:

Q - Do Horne have a copper/metal tap outlet – plastic seems unsatisfactory when we know many gram negative organisms “love Plastic” ?

A - The answer to this was yes there was a ‘straight through’ flow straightener available. This was considered as a potential option across the QEUH/RHC especially in ‘high risk areas’, however, subsequently all ‘high risk areas’ now have PoU filters in place and the remainder of the QEUH/RHC have the existing flow straighteners have remained on the taps and are replaced quarterly.

Q -The potential implementation of the patent seen on Friday – would this really address the ongoing challenges on site? – don’t think hot water disinfection would address biofilm build up –

A - This was specifically around a Horne attachment for Thermal disinfection of the taps. There was concern at NHSGG&C that this could introduce a risk to the patients as it would require taps to be removed and replaced within the clinical space which could introduce an infection control risk. There was also a fear that the thermal disinfection would not completely remove any biofilm. This was subsequently not implemented.

Q - How do we address heat sterilisation in the risers separate from the taps?

A - This would need to be actioned locally by NHSGG&C as this was not part of a Tap question. The tap, in their opinion would need to be removed, thermally sterilised, and then replaced.

Q - Do we know if we have biofilm build up in the system ? How do we find out ? Obviously we know it's in the taps – that visibly obvious but what about further back in the system?
A - They could not answer this question.

Q - How long would we need to keep POU Filters in place for after we have thoroughly chemically and thermally disinfected the system ? Obviously we would be stirring this up so there will be elevated counts until that's "flushed away"
A - his was a general question and the answer, to my recollection, was that only after regular replacement of PoU filters could we get to a position where the counts were acceptable.

n) Flow straighteners – when did you become aware that they were non-compliant with SHTM 2027 and SHTM 04-01 guidance? Were they non-compliant at handover? IMT Bundle, document 27.

A Ian Powrie had raised concerns around the flow straighteners during construction but then a detailed Risk Assessment had been carried out with included HFS/HPS/DOH/ICT & Estates which allowed the Horne Taps with the flow straighteners continue to be installed.

o) What testing did you carry out or assist with in high risk areas?

A This statement in the IMT was more around the definition of what a High Risk Area was and not specific to testing in a high risk area

p) What new taps, if any, were replaced in January 2019? If so, why were they replaced? Was the replacement related to the use of chlorine dioxide? IMT Bundle, documents 29 & 30.

A Marwick 21+ taps were installed. These were replaced as after significant investigations they were found to be compliant to the SHTM.

Water Technical Group

Refer to the Water Technical Group Bundle:

193. The water technical group (WTG) sat between 2018 and 2019. **Estates Team Bundle, page 938:**

a) What is the purpose of WTG?

A The main purpose of the WTG was to look at technical issues around water & water management at the QEUH/RHC and to propose solutions which would overcome these technical issues

b) What issue/ event prompted the setting up of the WTG?

A If I recall correctly this was mainly due to a combination of water quality issues ranging from legionella results to potentially installation of PALL filters was a major driver around a WTG being set up.

c) What was your involvement with the WTG?

A I was a member of the group.

d) Detail specific work which you carried out in respect of your involvement with WTG, why did you carry out this work, what was the impact? **Estates Team Bundle, page 939**

A I was tasked to review the initial enhanced 3 state ClO2 action plan (developed by Ian Powrie) to fully dose the water system across the QUUH/RHC Hospitals should it be needed and pull together a plan to

implement across the respective wards. These documents are attached as **Attachments 4 & 5**

e) Was this within your remit within estates?

A As a senior manager I understood it to be within my remit at that time.

f) Who was in the WTG, what were their names and their roles within WTG?

A I have attached a minute from the WTG dates 21/6/2019 which lists attendees **– Attachment 6**

g) Why was the WTG set up?

A To address water issues at the QEUH/RHC Hospitals

h) What qualifications were required in order to be chair of WTG?

A No qualifications were required.

i) Discuss focus of WTG – what was the purpose – why was WTG required – what issues came to light as a result and what action was taken. What were the concerns of the WTG and how did this impact on patients? **Refer to Estates Team Bundle, document 127, 128, 129 and 130** to assist and confirm how these relate to issues before WTG.

A The WTG allowed water issues specific to the QEUH to have more focus and actions to be taken to resolve these issues. It discussed in more detail many issues around water and associated areas such as; 1- flow straighteners, 2 - Tap types; 3 – drainage issues; 4 – Sampling Outcome; 5 – Sterilisation. All of which is detailed to some extent in the WTG minutes which are attached at **Attachment 6**. It also allowed for water specialists from out with the NHS to bring to the table their expertise and support.

j) How did clinical staff and estates get along at these meetings?

A Both groups got along okay at these meetings as there was a common objective.

k) Refer to **IMT Bundle documents 39** onward, and any other IMTs as a result of WTG. Go through and discuss issues – impact of patients – what was cause of these issues.

A This is best answered by my clinical colleagues

(i) For example, you were involved in the IMT of 28th September 2018 **IMT Bundle Document 44,** please describe your involvement, what role you played. Describe the issues being considered here, and describe your understanding of what impact, if any, the issues were having on patients. What role the water Technical Group played. Why was shock dosing required? What is the potential impact on the water system? What was actually carried out in response to this IMT? Was the report provided as requested by Dr Inkster? What was the outcome of the report?

A I was involved as the General Manager (Estates). My involvement was to ensure the estates team carried out the actions placed on them from this IMT group. The group discussed issues relating to the water & ventilation issues within Wards 2A. Also looking at any issues arising from movement of patients to Wards 6A & Ward 4 of QEUH Adult Hospital. Shock dosing to the water system was being considered if all other interventions were not successful, however this would bring a significant logistical issue and risk to the QEUH/RHC should it be required and this was what was going to be discussed at the Water Technical Group. The report requested by Dr Inkster regarding impact on wards is attachments 4 & 5 already uploaded to workspace. This action plan was not taken forward.

(ii) The IMT of 5th October 2018: **IMT Bundle, document 45:** Describe the issues, why was the matter referred to the WTG? Describe the issues, if any, were there with drains? Was individual continual dosing until for Ward 2A/B veer introduced? Why was this suggested? What were the issues leading to this suggestion being made? What was your understanding of the issues on patients in respect of this matter? Describe your involvement, role and actions taken by you.

A The WTG was the technical group where any issues relating to water from the IMT had to be discussed and actioned where required. The drain surveys had shown that there was nothing to identify that the drain designs had deviated from original design however it did identify some issues around finding components such as small toys/syringes, pump components etc being found which were causing blockages.

An Individual dosing unit to supply ward 2A/B was being considered mainly due to the timescale to install a larger system for the whole of the hospital. This would then be connected to the larger system at a later date. It was important to try and get Wards2A/2B water quality back into a complaint position and to prevent delays in patient care to allow the patient group to move back quicker

(iii) The IMT of 5th October 2018: **IMT Bundle, document 45:** describe your recollection of the microbiological criteria that was presented at the WTG.

A I cannot recollect the microbiological criteria that was presented.

(iv) Explain what the drains survey informed you? Why was it necessary?

A To eliminate the possibility of drains contributing to the contamination of the water it was considered a drain survey around the actual ‘installation’ would be beneficial. The drain surveys had shown that there was nothing to identify that the drain designs had deviated from original design however it did identify some issues around finding components such as small toys/syringes, pump components etc being found which were causing blockages.

(v) What was the relevance and requirement for the ventilation survey? How dis this relate the to role of the WTG?

A A ventilation survey would have identified the compliance of the installation against the initial design and also identified its compliance against SHTM03-01. The survey would also have highlighted any issues with the actual installation etc. This would have gone back to the WTG for review and consideration of any actions.

l) Refer to **Estates Team Bundle, document 129**, why were NSS involved, guidance issued, actions taken.

A NSS were involved as they were the NHS Scotland's lead organisation providing NHS Boards with technical support and guidance around SHTM's.

m) Refer to **Estates Team Bundle, document 131**, explain the background, your involvement, the purpose, guidance issued, actions taken.

A This report looked at the whole operation and management of water systems at the QEUH Campus and listed recommendations to improve their overall compliance. From this report the actions placed on myself and my team, along with the operational team, have all been actioned fully

<u>Board Water Group</u>

194. Refer to the **Water Safety Group Bundle:**

a) What is the purpose of WSG?

A The WSG is in place to ensure Water Safety follows the guidelines within SHTM04-01and CEL 03 (2012) around water policy, safety plans, reporting and controls. It is the main forum for water safety within NHSGG&C.

b) Why was the WSG set up?

A This is a requirement of SHTM04-01

c) What was your involvement with the WSG?

A I was a member of the WSG

a) Who was in the WSG, what were their names and their roles within WSG?

A The membership of the WSG would vary depending on the period however the main positions were as follows:- Lead GM Facilities (Mary-Anne Kane (2012); Billy Hunter (2013); Infection Control Manager (Tom Walsh (2012; Prof Craig Williams (2013)); H&S Manager (John Green); Lead Nurse (ICT)

(Pamela Joannidis); Consultant Microbiologist (Theresa Inkster); Assist Director of Nursing (Sandra McNamee)]; Lead Sector Estates Manager (Alan Gallacher; Jim McFadden); Head of Nursing (John Stuart); Various Ward Manager Leads as required.

b) What qualifications were required in order to be in the WSG?

A There were no qualifications required.

c) Look through the **Water Safety Group Bundle** – explain any issues discussed, your involvement and any action taken by you, and why, in response to issues raised at the WSG meeting.

A This is documented within Action plans attached **(Attachments 3, 7 & 8)**

d) Was this within your remit within estates?

A As a senior manager I was expected to action any issues

e) How did clinical staff and estates get along at these meetings?

A Clinical staff and estates got on well as there was the same objective.

Review of Issues Relating to Hospital Water Systems' Risk Assessment 26th September 2018

Refer to Estates Team Bundle, document 134.

195. Why did you commission/order the report? What issues prompted the instruction of this report?

A I did not commission the report

196. At the time were you aware of the report? Who commissioned it and why?

A Yes, I was aware of the investigations supporting this report. This was commissioned by Mary Anne Kane and was commissioned, I believe, around

concerns around the DMA2015 QEUH Pre-Occupation Water Risk Assessment and the lack of actioning the content of same.

197. What concerns, if any, did you have about the water system?

A I did not commission the report

198. What concerns, if any, at the time did you have regarding the water system? What action, if any, did you take regarding any concerns?

A When I was made aware of the existence of the DMA2015 Water RA and the lack of actions then this raised concerns with me about what non-compliances/risk could be in this system.

199. When did these concerns arise? Was anyone else in estates concerned? Why?

A I did not commission the report.

a**)** At the time was anyone else in estates concerned about the water system? If so whom, and why were they concerned? What action, if any, did you take regarding any concerns?

A I was not aware of anybody else being concerned about the QEUH Water systems at that time.

200. What was the impact on patients?

A I did not commission the report.

a) The Inquiry notes your answer that you did not commission the report, but what was your understanding, if any, of the impact on patients?

A Again, this answer would needed to be answered by my clinical colleagues.

201. Did you flag/ raise your concerns with anyone?

A I did not commission the report

202. What happened in response to the report?

A I did not commission the report

203. Did you escalate any matters arising from this report? If so, to who, and if not, why not?

A I did not commission the report

204. What works, if any, were carried out in response to any findings in this report?

A I am not aware of any actions and I did not commission the report

Tap Water- Ward 3C – 2019

205. What were the issues in relation to tap water?

A I do not recollect any issues with Tap water in Ward 3c during 2019

206. What was your understanding and involvement with these issues?

A I do not recollect any issues with Tap water in Ward 3c during 2019

207. What action was taken?

A I do not recollect any issues with Tap water in Ward 3c during 2019

208. How were matters resolved?

A I do not recollect any issues with Tap water in Ward 3c during 2019

a) The Inquiry understands that there was concerns regarding the tap water in Ward 3C not being fit for consumption. Please advise whether you are answer the above having this information.

A I cannot recollect these concerns.

Other Water Incidents

209. What other specific events do you recall in relation to water? For example do you have any recollection of debris in the water tanks, If so, please explain:

a) What the issue was;

b) The impact on the hospital (include wards/areas) and its patients (if applicable)

c) Who was involved;

d) What was escalation process;

e) Were any external organisations approached to support and advise;

f) Detail role and function of HPS and HFS, advise if they were involved and any reports prepared by them;

g) Detail advice given from external organisations; what was the advice, did you agree with it, how was any advice managed/ communicated with others in your team and your superiors?;

h) Was there opposing advice and by whom;

i) What remedial action was decided on and who made the decision;

j) Was the issue resolved – consider any ongoing aftercare/support/monitoring;

k) Detail any ongoing concerns you had, or which you were made aware of;

l) Was there any documentation referenced during or created after the event? i.e. an SBAR/ minutes from a meeting – use the bundle provided to assist.

m) Did anyone sign off to say the work had been completed and issue resolved/area safe?

A I feel sections M & N above address all these questions

The Inquiry is not aware that you have answered the question at 179, please can you explain what other specific events do you recall in relation to water? For example do you have any recollection of debris in the water tanks. When answering have regard to appoints a-m above in your answer.

210. What were the NHS procedures for raising concerns about water or water infections.

a) How were these dealt with by you?

A For operational water systems there are NHSGG&C standard SoPs around water quality and for reporting water samples out with spec

b) How was it confirmed they had been dealt with.

A I cannot answer this

c) Do you recall specific ones and in particular any that gave you concern.

A I do not recall specifically

211. What was your understanding at handover in January 2015 of water guidance and regulations specifically SHTM guidance (at the time being SHTM 27 and 40 and now being SHTM04-01) and L8 guidance?

a) What is the purpose of the guidance?

A These guidance documents (i.e. SHTM's) are in place to ensure patients are treated in a safe healthcare environment

b) What are the consequences of non-compliance with the guidance?

A You will end up with non-compliant systems in a healthcare environment which will put patients at risk

c) How was the water system operating when you signed the completion certificate for stage 3? To what extent was the water system in compliance with the guidance at handover?

A I was not part of this project team

d) How satisfied were you of the compliance?

A I did not get visibility of any documentation to support compliance so I cannot comment

e) What documentation did you see that satisfied you? Where was that documentation stored? How often were you able to access the stored documentation?

A I was not part of this project team

f) Why did you sign the completion certificate? How was this matter escalated? If so, to whom? Was the water systems non-compliance discussed with any colleagues? What further action, if any, was taken to ensure that the water system complied with the guidance? How did you satisfy yourself that it was appropriate to sign off on the completion certificate?

A I was not part of this project team

g) If no, with the benefit of hindsight, should you have signed off the completion certificate?

A I was not part of this project team

Ventilation – Guidance and Obligations

212. What was your understanding at handover in January 2015 of water guidance and regulations specifically SHTM guidance?

a) What is the purpose of the guidance?

A These guidance documents (i.e. SHTM's) are in place to ensure patients are treated in a safe healthcare environment

b) What are the consequences of non-compliance with the guidance?

A You will end up with non-compliant systems in a healthcare environment which will put patients at risk

c) How was the ventilation system operating when you signed the completion certificate for stage 3? To what extent was the ventilation system in compliance with the guidance at handover?

A I was not part of the Handover Team

d) How satisfied were you of the compliance?

A I was not part of the Handover Team

e) What documentation did you see that satisfied you? Where was that documentation stored? How often were you able to access the stored documentation?

A I was not part of the Handover Team

l) Was this matter escalated? If so, to whom? Was the ventilation systems non-compliance discussed with any colleagues? What further action, if any, was taken to ensure that the ventilation system complied with the guidance? Was there a team in place to regulate compliance, if so, please explain your knowledge, understanding and role within that team:

A I was not part of the Handover Team

213. Tell me about your role and involvement in the Specialist Ventilation Group. Explain the purpose of the Specialist Ventilation Group.

A As I recollect this group only met on a couple of occasions to discuss the issues of the QEUH Ventilation, It was agreed that this should not be a group specific to the QEUH and as such the BVSG was established and this group was disbanded

Ventilation - Commissioning and Validation

214. Describe the commissioning and validation process in respect of the ventilation system in the QEUH/RHC.

A I was not involved in this process

a) Who was this carried out by?

A I was not involved in this process

b) Who signed off?

A I was not involved in this process

c) To what extent, if any, did infection control have input prior to sign off? Refer to **Estates Team Bundle, document 22**. For reference in this email Christine Peter's states that Craig (Williams) has not seen anything in writing about the ventilation.

A I was not involved in this process

(i) If so, who did have input?

A I was not involved in this process

(ii) When should this have been done?

A I was not involved in this process

(iii) Were you involved?

A I was not involved in this process

d) Were you aware of any concerns raised at any point about the ventilation system and its commissioning?

A I was not aware as I was not involved

e) What commissioning and validation documentation did you see before handover in 2015?

A I was not involved in this process

(i) If not, who would have seen commissioning and validation documentation?

A I was not involved in this process

f) Discuss the concerns about Ward 4B. **Refer Estate Team Bundle, document 30** - What was the purpose of the SBAR?
Refer to Estates Team Bundle, documents 30, 31, 32 to assist with your answer.

A I was not involved in this process

g) How does commissioning differ to validation?

A Commissioning is required to ensure equipment is installed, tested and operated to the original design specification; Validation is to ensure the system is consistent to operate to the required healthcare documentation. In this case SHTM's

h) Was there a validation document to accompany this for handover?

A I was not involved in this process

i) What is the purpose of Commissioning and Validation (C&V)?

A Commissioning is required to ensure equipment is installed, tested and operated to the original design specification; Validation is to ensure the system is consistent to operate to the required healthcare documentation. In this case SHTM's

j) What are the consequences of it not being carried out? What concerns did you have, if any, that the QEUH/RHC had not been signed off without C&V?

A If commissioning is not carried out then there is nothing to show that the system is compliant to the design specification. If the C&V was not carried out then this would affect certain patient groups, especially high risk patients.

k) What concerns, if any, would you have if there were no C&V of the ventilation system?

A I would be concerned about its compliance to the original design specification and SHTM03-01

l) Why would no C&V of the ventilation system give rise to these specific concerns?

A You would not be able to know how the ventilation system was performing and as such would be a potential risk to patients

215. In her statement Dr Teresa Inkster discusses concerns regarding Ward 4B:

a) What commissioning and validation data did you have in June and July 2015?

A I was not involved with the project

b) Did you provide the commissioning and validation data to Dr Teresa Inkster?

A I was not involved with the project

c) Is it correct that there are no minutes from these meetings?

A I was not involved with the project

d) Why were no minutes taken of these meetings?

A I was not involved with the project

e) What actions were taken following these meetings?

A I was not involved with the project

216. What testing and maintenance protocols and regimes were in place?

A I was not involved with the project

217. **Refer to Estates Team Bundle, document 47 page 5/18 of document:** This states that air permeability tests were not carried out to 36 isolation rooms:

a) Were you aware of this? If you were not aware, who would have been aware?

A I was not involved with the project

b) What was the consequence of this?

A I was not involved with the project

c) Why did handover take place in these circumstances?

A I was not involved with the project]

d) What happened following this report?

A I was not involved with the project

e) What concerns, if any, did the contents of the report give you? Why did the report give rise to these specific concerns?

A I was not involved with the project

Have regard to the following emails when considering your answers to the above:

Estates Team Bundle, documents 64, 67 and 68.

218. What concerns, if any, did you have about the ventilation system at the point of patient migration to QEUH?

A I was not involved in this process

219. Where was the documentation for C&V stored at that time?

A I was not involved in this process

220. Have you seen the ventilation system validation documentation as at handover (Jan 2015)?

A No

a) If yes – who carried this out, who signed off, who authorised?

A I was not involved in this process

b) If no – should you not have sought this? Who is responsible for ensuring it is in place? Who should have chased this up? Would this not be part of ID remit?

A I was not involved in this process

221. Where would the paperwork have been stored/ Who would have been responsible for it?

A I was not involved in this process

222. If validation was not in place at handover, how did the hospital open? Who would have had the authority to allow the hospital to open without validation in place?

A I was not involved in this process

a) To the best of your knowledge, was the hospital ventilation system validated at the point of handover?

A I was not involved so I cannot answer this question.

223. Were you asked by microbiologists or Infection Control to provide information regarding the ventilation system and validation? **Refer to Estates Team Bundle, document 27.** Who was supposed to provide this information? If it was not provided, why not? What action was taken to ensure that information was provided – if it was not, what was done to escalate this? Who was responsible for providing this information?

A I was not involved in this process

Ventilation System – General

224. What testing and maintenance protocols and regimes were in place? **Refer to Estates Bundle, document 62.**

A These are ventilation commissioning reports, however I was not involved.

225. What concerns, if any, do you have relating to the ventilation? What concerns, if any, do you have relating to the water temperature? What concerns, if any, do you have relating to the movement within the water system? **Refer to Estates Bundle, document 123.**

A I am not a HVAC or water systems designer and cannot answer this question
As an Estates Manger, standing not being a HVAC or water system designer, what concerns, if any, do you have relating to the ventilation? What concerns, if any, do you have relating to the water temperature? What concerns, if any, do you have relating to the movement within the water system?

226. Was it possible to incorporate a comprehensive ventilation system into the QEUH/RHC?

A I am not a HVAC designer and cannot answer this question
As per Q195 please can your answer relative to your role as Estates Manger?

227. Describe any ward/area specific ventilation systems used?

A I am not a HVAC designer and cannot answer this question
As per Q195 please can your answer relative to your role as Estates Manger?

228. What are your thoughts about these ventilation systems that were used?

A I am not a HVAC designer and cannot answer this question
As per Q195 please can your answer relative to your role as Estates Manger?

229. **Refer to Estates Team Bundle, document 48**. Explain your concerns and actions taken.

A I am not a HVAC designer and cannot answer this question

As per Q195 please can your answer relative to your role as Estates Manger?

230. **Refer to Estates Team Bundle, document 86**. Where there any issues? Did you respond to Dr Peters? If so, what did you say? If not, why not?

A I was not involved

231. **Refer to Estates Team Bundle, document 136**. Explain the concerns regarding latent defects and actions taken.

A I was not involved

232. Explain your involvement with a review of specialised ventilation areas.

A I was not involved

233. Dr Teresa Inkster tells us that there was little progress with this matter. To what extent, if any, is this statement accurate?

A I was not involved

234. Describe your understanding to have appointments, such as authorised person for ventilation.

A The respective SHTM Guidance documents details the requirements for Authorised Persons (APs) and Competent Persons (CP's) which will bring governance and compliance to the management of these systems.

a) Following commencement of your role in August 2015, what appointments were occupied in respect of ventilation, who was responsible for ensuring these appointments?

A

	AP Appointment by	Appointment covering period
Cyril Dawson		05/01/15 to 04/01/18
	Mary-Anne Kane	12/12/16 to 11/12/19 #
Melville McMillan	Alan Gallacher	01/12/20 to 30/11/23

Paul Allan		05/01/15 to 04/01/18 ##
	Alan Gallacher	03/07/19 to 02/07/22
James Guthrie	Alan Gallacher	09/05/19 to 08/05/22
Mark McKaig	Alan Gallacher	08/05/19 to 08/05/22
Darryl Connor	Alan Gallacher	22/01/19 to 21/01/22
Hugh Brown	Alan Gallacher	02/12/20 to 01/12/23
William Fenn	Alan Gallacher	16/12/22 to 15/12/25
Thomas Ramsay	Alan Gallacher	31/05/23 to 30/05/26
Scott Macer	Alan Gallacher	04/03/21 to 04/03/24
		05/03/21 to 04/03/24
Connor Stepney	Alan Gallacher	07/06/24 to 06/06/27
Grant Bennett	Alan Gallacher	16/12/21 to 11/08/24
Ben Twaddle	Alan Gallacher	11/04/23 to 10/04/26
Gary Donnachie	Alan Gallacher	13/06/24 to 12/06/27
John Hetherton	Alan Gallacher	31/03/23 to 30/03/26

Certificate of Appointment GG&C-V-16 dated 12 Dec 2016 (from AE (Ventilation) issued to Cyril Dawson. No 'appointment letter' from NHSGG&C found. Cyril was noted within the 2017 AE (Ventilation) annual audit (See below) as appointed as AP(V) and issued 12/12/16.

Paul Allan noted as AP(V) for period 05/01/15 to 04/01/18 on AE (Ventilation) annual audit (Dec 2015 - See below), however no internal paperwork found.

2AE(V) Audit Summary dated 23 Dec 2015

VENTILATION SYSTEMS SHTM 03-01

AP Training and Appointments Matrix

AP Name	David Brattey	Cyril Dowson	Paul Allan		
Status	AP (V) des	AP (V) des	AP (V)		
Based at	QEUH	QEUH	QEUH		
Appointment Certificate	Not yet	Not yet	GG&C V 07		
Issue Date	N/A	N/A	05-Jan-15		
Expiry Date	N/A	N/A	04-Jan-18		
Sites covered	N/A	N/A	SGH		
AP(V) Training Expiry Date	TBA	27-Apr-18	30-Oct-17		
First Aid Expiry Date	TBC	TBC	30-Jun-16		
Permit-to-work to support inspection & maintenance.	0	53	0		
Quarterly inspection of critical ventilation systems.	0	0	0		
Annual verification of critical ventilation systems.	5	0	4		
Annual inspection of non-critical ventilation systems.	0	0	0		
Number checked by AE	2	6	1		

Training Comments

David Brattey
Mr David Brattey should attend AP (V) training and forward a copy of his training certificate to the AE on completion. He should also forward a copy of his first aid training certificate to the AE .

Cyril Dowson
Mr Cyril Dowson should forward a copy of his first aid training certificate to the AE .

Paul Allan
Mr Paul Allan should attend emergency first aid training by 30 Jun 16 and he should forward a copy of his training certificate to the AE .

SHTM 03-01 SPECIALISED VENTILATION FOR HEALTHCARE PREMISES

AP Training and Appointments Matrix

AP Name	Paul Allan	Cyril Dowson			
Status	AP (V)	AP (V)			
Based at	QEUH	QEUH			
Appointment Certificate	GG&C V 07	GG&C V 16			
Issue Date	05-Jan-15	12-Dec-16			
Expiry Date	04-Jan-18	11-Dec-19			
Sites covered	QEUH	QEUH			
Ventilation Training Expiry Date	30-Oct-17	27-Apr-18			
First Aid Expiry Date	11-Dec-19	22-Jun-18			
Permit-to-work	0	0			
Number checked by AE	0	0			

Comments

Paul Allan should attend an AP refresher course.

Another AP (V) should be nominated to carry out training.

One of the AP (V) should be designated the lead AP.

Answer

b) What steps did you take to ensure that these appointments were filled?

A It is the responsibility of the QEUH Site Manager Operational Estates (SMOE) to nominate to the Compliance Manager (Ventilation), any staff who are to become Authorised Persons (Ventilation). Training is then put in place for these staff by the Compliance Manager and, after successful completion of training, are then assessed by the AE(Ventilation) on their competence to become an AP(Ventilation) for the site. Once successfully assessed by the AE(Ventilation) the Compliance Manager (Ventilation) is then informed by the

AE(Ventilation) who then informs the Head of Corporate Estates. The Head of Corporate Estates then appoints the individual in writing as an AP(Ventilation).

There is now a strict governance around appointments of Authorised Person (Ventilation) and Competent Persons (Ventilation), however this did not come into play until after the compliance team were formally established which was late 2016.

Numbers of AP's are reported through the respective compliance manager reports and discussed at bi-monthly Statutory Compliance and Risk Tool (SCART) Steering Group Meetings with all senior and operational estates managers.

c) What training and qualifications were required in respect of these appointments?

A Authorised Person Ventilation HTM 03-01 (APV) – City & Guilds Assured (CPV) – **See attachment**

Authorised Person Ventilation Refresher HTM 03-01 (APV) – City & Guilds Assured (CPV) – **See attachment**

Competent Person Ventilation HTM 03-01 (APV) – City & Guilds Assured (CPV) – See attachment – **See attachment**

Specific Events in Relation to Ventilation System

235. Can you recall any specific events in relation to ventilation?
For example:

a) In 2015 prior to patient migration there were checks to the ventilation in Ward 2A in particular, with there being issues in relation to breaches around the trunking, ceiling lights etc with the extract grills not being compliant with SHPN

A I was not involved.

b) Lack of HEPA filters and general concerns ward 2A/B **refer to Estates Bundle, documents 35 and 37**. Tell me about how the issues were managed, what was your responsibility, outcome. Highlight any concerns you had with regards to work/ testing being carried out.

A I was not involved.

What awareness, if any, at the time did you have regarding these issues? Was this within your remit as Estates Manger to have an awareness of these issues? If not, why not?

c) Dr Brenda Gibson raises there concerns **refer to Estates Team Bundle, documents 17 & 18.**

Describe your involvement and any actions taken in respect of this matter.

A I was not involved.

d) Air permeability tests not carried out **refer to Estates Team Bundle, document 47 Capita NEC3 Supervisor's Report (No 53) - dated September 2015.**

A I was not involved.

e) Issues with rooms 18 & 19 Ward 2A **Estates Team Bundle, documents 46, 67 and 68.**

A I was not involved.

f) Dr Christine Peters raised issues with the air change rates in Ward 2A.

A I was not involved.

g) In December 2015 you emailed David Wilson, Brookfield Multiplex stating that the *'pressure in the isolation rooms presenting an unacceptable risk to the vulnerable patients present within these protective environments.'*

i) Explain your concerns

A I was not involved.

In your role, did you have an awareness of these issues? Please explain what awareness you had, what the issue was, and what involvement, if any you had in resolving the issue.

ii) Tell me about the issues

A I was not involved.

iii) Potential patient impact

A I was not involved.

iv) What was done to resolve matters and your involvement.

A I was not involved.

h) In February 2016 Ian Powrie prepared a report regarding the action plan for proposed increase of extract in the ensuite rooms in the Schiehallion ward **refer to Estates Team Bundle, document 93:**

i) Explain your knowledge of the issues

A I was not involved.

Did you have an awareness of the issues at the time? How did you satisfy yourself that these matters were resolved appropriately?

ii) Detail the issues

A I was not involved.

iii) Potential patient impact

A I was not involved.

iv) What was done to resolve matters and the extent of your involvement.

A I was not involved.

i) Issues in respect of the safety of the PPVL rooms and adequacy for isolating infectious or immunosuppressed patients:

A I was not involved.

j) Issues detailed in Estates Team Bundle documents 94, 95 and 96.

A I was not involved.

k) Issues detailed in Estates Team Bundle, document 104.

A I was not involved.

l) Fungal growths in a number of rooms in ward 2A.

A I was not involved.

m) Dr Inkster tells us that she wrote an SBAR regarding Ward 4C and recommended a feasibility study for the ward to improve the specification. This was discussed at the Specialist Ventilation Group in July 2019. What was your involvement, understanding of the issues and what action did you take?

A I was part of this Specialist Ventilation Group and remember this being discussed. As I understand it the focus at that time was Ward 2A and as such all resources were concentrated to that ward and the high risk patient group.

(i) What specific ventilation qualifications did you hold in order to sit on the ventilation specialist group?

A None

(ii) What was ward 2A the focus at the time? What was your understanding of the issues with Ward 2A at the time? Describe your role, involvement and action taken? In respect of Ward 4C what action did you take?

A From my recollection there was concern around air changes in critical areas especially ward 2A given the patient type.

In respect of Ward 4C no feasibility was carried out that I am aware of as Ward 2A was deemed as the priority at that time.

n) Any other issues/ incidents not mentioned above.

A None

In providing your answer please tell us:

a) What was the issue?

b) The impact on the hospital (include wards/areas) and its patients (if applicable)

c) Who was involved?

d) What was the escalation process?

e) Were any external organisations approached to support and advise?

f) What was the advice?

g) Was there opposing advice and by whom?

h) What remedial action was decided on and who made the decision?

i) Was the issue resolved – consider any ongoing aftercare/support/monitoring?

j) Any ongoing concerns witness had herself or others advised her of?

k) Was there any documentation referenced during or created after the event. For example an incident report?

l) Did anyone sign off to say the work had been completed and issue resolved/area safe?

Write your answers in the relevant answer boxes above.

236. What level of awareness should a General Manager of Estate have of the ventilation issues?

A From a compliance perspective there should be a ventilation register in place for site.

a) Was there a ventilation register in place during your time as General Manager for Estates? Was responsibility did you have to ensure that this was in place? If it was not in place, why was it not in place? What action should have been

taken to address this and why was it not? What was the impact of this not having been in place? Did this result in the system not being compliant?

A A 'Board Ventilation Register' is now in place for critical ventilation across NHSGG&C, not just QEUH. In 2015 this was not in place. All the functionality around compliance to SHTM's sat with each site and the respective management who were responsible to deliver the governance and compliance to the respective SHGTM's.

The lack of a ventilation register would not mean the system is non-compliant as the ventilation register is exactly that, a register. The important documentation is the validation/verification reports which are in place to support the compliance of the system.

Isolation Rooms

237. You signed the **Stage 3 Sectional Completion Certificate Estates Team Bundle, document 3** on 29th January 2015, HEPA filters in isolation rooms were listed as incomplete **Estates Team Bundle, document 3, page 25:**

a) What was missing?

A I was not involved.

b) While you did not sign the certification, what was your understanding of the situation when you began your role in August 2015? What action, if any, did you take in order to address matters?

A I was not made aware of any situation

c) Why was the completion certificate signed when there were incomplete works to the isolation rooms?

A I was not involved.

d) Was this discussed with other members of staff? If so, who?

A I was not involved.

e) Was this issue escalated to Board level? If so, to whom and who escalated matters?

A I was not involved.

f) Explain what works were carried out to resolve this matter, your involvement and when matters were resolved

A I was not involved.

238. What was the issued referred to in the email at **Estates Team Bundle, document 34?** How did this happen?

A I was not involved.

Should you have had an awareness? If you did not, why not?

239. Discuss the air permeability testing carried out in respect of the isolation rooms **Estates Team Bundle, documents 37 & 41:**

a) why was this work carried out?

A I was not involved.

Should you have had an awareness? If you did not, why not?

b) What was the result of this work?

A I was not involved.

c) What was your involvement in the work?

A I was not involved.

d) What if any issues arose?

A I was not involved.

Refer to Estates Team Bundle, document 47 Capita NEC3 Supervisor's Report (No 53) - dated September 2015. Estates Team Bundle, documents 51 & 55.1. to assist with your answer.

e) Should you have had an awareness? If you did not, why not?

A I was not involved.

f) Were patients in these isolation rooms at this time?

A I was not involved.

g) Potential impact on patients?

A I was not involved.

h) Your involvement with the HAI Scribe

A I was not involved.

240. **Refer to Estates Team Bundle, document 26** Christine Peters states that you were dealing with sealing light fittings:

a) What was the issue?

A I was not involved.

b) What was the potential impact on patients?

A I was not involved.

c) What did you do to resolve this matter?

A I was not involved.

241. There were issues in August 2015 with isolation rooms **refer to Estates Team Bundle, documents 44 & 45:**

a) Explain your understanding of the issues

A I was not involved.

Should you have had an awareness? If you did not, why not?

b) Were the affected wards/ areas complaint with the relevant guidance at the time

A I was not involved.

c) Tell me about your understanding of whether the affected areas/ wards had been built to contractual specification at the time

A I was not involved.

Are you aware of whether the affected areas and wards had been built to specification? Was this matter ever discussed during your time at QEUH? What was your understanding of the situation?

d) Tell me about your involvement in carrying out/ instructing work to remedy any issues

A I was not involved.

e) Whether there were patients in the affected wards/ areas at the time

A I was not involved.

f) Your understanding of the potential impact on patients

A I was not involved.

242. There remained issues regarding testing in September 2015 **refer Estates Team Bundle, document 61:**

a) Explain the issues

A I was not involved.

Should you have had an awareness? If you did not, why not?

b) Your involvement

A I was not involved.

c) Work carried out to resolve any issues

A I was not involved.

d) Potential patient impact

A I was not involved.

243. **Refer to Estates Team Bundle, document 70**, David Loudon stated that the Board would not be taking handover until they were confident that the rooms were fully compliant:

a) At the time how were the room not fully compliant

A I was not involved.

Should you have had an awareness? If you did not, why not?

b) Explain your involvement

A I was not involved.

c) What work was carried out and how was this recorded?

A I was not involved.

d) When did the rooms become fully complaint?

A I was not involved.

e) When did the Board accept handover of the rooms?

A I was not involved.

f) Who advised the Board to accept handover of the rooms?

A I was not involved.

g) What document did you see to confirm that the rooms were fully complaint?

A I was not involved.

244. Discuss the issue with the manual controller in isolation rooms in ward 2A **Estates Team Bundle, document 83**:

a) Your understanding and involvement

A I was not involved.

Should you have had an awareness? If you did not, why not?

b) Work carried out

A I was not involved.

c) Potential patient impact

A I was not involved.

Pentamidine Rooms

245. Discuss Pentamidine Rooms:

a) What are Pentamidine Rooms?

A These are rooms which allow pentamidine to be given to patients

b) What is your understanding of the purpose of these rooms?

A As above

c) The guidance applicable to these rooms for water and ventilation?

A For ventilation they should be following SHTM 03-01 and sitting at a negative pressure with between 10 & 12 ac/hr; For water they should be following guidance given in SHTM04-01

d) Discuss any issues with the specification of these rooms during 2015 **Estates Teams Bundle, document 38.**

In particular consider any issues with:-

i) the air change rates

ii) air pressure Estates team Bundle, document 78.

iii) compliance with guidance

iv) any issue(s) arising from the testing

A I had no involvement with these types of rooms so I cannot answer questions (i) to (iv) above

Ward 4B

246. What was the intended purpose of Ward 4B?

A I was not part of the design team or project team for the new QEUH so I do not know.

a) As at August 2015, what was the stated proposed of Ward 4B? What sort of ward did you understand this to be?

A I cannot answer this as I do not know.

247. How did this purpose change prior to January 2015? If so, what changes were made?

A See Q200 above

Are you are of any changes to the purpose of the Ward being made prior to January 2015? During your time at QEUH was this ever discussed with you?

248. What, if any, changes were required to the ventilation system? Why were they made?

A See Q200 above

249. How involved were you with the changes?

A See Q200 above

250. There were issues with Ward 4B though almost straight away with an SBAR being prepared on around 7th June 2015:

a) Discuss the concerns about Ward 4B. **Refer Estate Team Bundle, document 30** - What was the purpose of the SBAR?

A See Q200 above

From August 2015 please describe any issues you were aware of in respect of Ward 4B?

b) How long after migration to ward 4B were patients decanted back to the Beatson?

A See Q200 above

c) On commencing your role at QEUH, what, if anything, were you advised regarding patients in Ward 4B returning to the Beatson? What reason, if any, were you given for this happening? Describe your understanding of the issues at the time, and your involvement, if any, in dealing with these issues.

A I did not have any information as to why patients were being returned to the Beatson. This was a clinical decision.

d) To what extent were issues raised in the SBAR from June 2015 present at the point of NHS GGC taking occupation in January 2015, and when Ward 4B was handed over to NHSGCC? Add in re CP and ¾ rooms no HEPA.

A See Q200 above

251. How could these issues arise immediately between handover and patient migration when the Ward was signed off and handover accepted?

A See Q200 above

252. **Refer to Estates Team Bundle, document 36:**

a) What were the early testing being carried out?

A See Q200 above

b) Why were tests being carried out?

A See Q200 above

c) Explain your involvement.

A See Q200 above

d) To what extent, did the test result provide assurance regarding Ward 4B's suitability for the intended patient cohort? If so, how?

A See Q200 above

253. **Refer to Estates Team Bundle document 23:**

a) Were there issue(s) with the particle counts?

A See Q200 above

b) If so, when was the issue(s) identified?

A See Q200 above

c) What was your role?

A See Q200 above

d) What action was taken and by whom?

A See Q200 above

e) What action resolved the issue(s)?

A See Q200 above

254. **Refer to Estates Team Bundle document 39:**

a) What were the issue(s) with the pressure gauges?

A I was not part of any handover/defect team so I'm not aware of the issues

b) When was the issue(s) identified?

A See (a) above

c) What was your role?

A See (a) above

d) What action was taken and by who?

A See (a) above

e) What action resolved the issue(s)?

A See (a) above

f) Why was the issue(s) not identified sooner than July 2015?

A See (a) above

255. **Refer to Estates Team Bundle document 40:**

a) Provide information on the upgrade works referred to, what the works were, why they were required, when the matter was identified and by who, what was your involvement. Were matters escalated, if so, by who and who was the situation escalated to?

A I had no involvement with this upgrade works

256. **Refer to Estates Team Bundle document 62:**

a) What is this document?

A This is a ventilation commissioning report

b) Have you seen it before? If so, when?

A No

c) What was the purpose of carrying out a ventilation report in October 2015?

A A ventilation commissioning report is to ensure the system performance complies with the existing/original design specification

d) Did any issues arise from this report?

A I was not aware of this report as I was not part of the handover team

(i) Should you have had an awareness from the point of commencing your role? If you did not, why not?

A No. The QEUH issues were still being taken forward by the Project/Handover/Estates Operational teams.

e) How involved were you?

A I was not involved

f) What matters, if any, did you escalate arising from this report? If so, to whom and why?

A I was not involved

g) If yes to (f) what action was taken?

A I was not involved

257. **Refer to Estates Team Bundle document 66:**

a) Discuss the issues referred to in this email chain.

A I was not involved

(i) Should you have had an awareness? If you did not, why not?

A This was still part of the handover/defect works for the QEUH and I had no involvement or awareness.

b) What was your involvement?

A I was not involved

c) What works were required?

A I was not involved

d) Why were works required?

A I was not involved

e) Were all necessary works carried out?

A I was not involved

258. **Refer to Estates Team Bundle document 69:**

a) What is his document?

A Test Report for Compliance to HBN04 Supplement 1 for Isolation Rooms within QEUH Ward 4B

b) Have you seen it before?

A No

c) How did this document inform your decisions and actions taken?

A I was not involved

259. **Refer to Estates Team Bundle document 71:**

In this email Peter Moir states that Ward 4B was ready for handover:

a) How confident were you that the ward was ready for handover?

A I was not involved in this project

(i) At the time, as General Manager of Estates should you have had an awareness? If you did not, why not? If you did have an awareness, please confirm your understanding of the position.

A This did not fall within my responsibilities. I can only assume the project team & operational team were leading on this project.

b) To what extent did the ward meet the relevant SHFN and SHTM 03-01guidelines for the intended patient cohort?

A I was not involved in this project

c) What reservations, if any, did you have at that time?

A I was not involved in this project

d) If so, when did you escalate these concerns and to whom? If not, why not?

A I was not involved in this project

e) Was any further work carried out to Ward 4B at this time?

A I was not involved in this project

260. **Refer to Estates Team Bundle document 73** detail the remaining defects at this stage, did this prevent handover of Ward 4B?

A I was not involved in this project

261. **Refer to Estates Team Bundle documents 77 & 77.1:**

a) Discuss this email

A I was not involved in this project

b) Explain your involvement

A I was not involved in this project

c) Explain any assurances given

A I was not involved in this project

262. In her statement Dr Teresa Inkster tells us that at a meeting on 7th December 2015 in respect of the proposed patient move back to Ward 4B that *'Ian Powrie highlighted that it was still unclear what specifications the original design team worked to.'*

To what extent is this statement accurate? What concerns did you have at the time regarding Ward 4B? What concerns did you have at the time about the ward specification? If so, explain what your concerns were and why? Had any of your concerns been resolved by December 2015?

A I was not involved in this project

263. **Refer to Estates Team Bundle, document 87** – Why was NSS involved in the issues? Actions taken in response, your involvement.

A I was not involved in this project

264. **Refer to Estates Team Bundle, documents 88 and 89**

a) Describe the situation

A I was not involved in this project

b) Any action taken

A I was not involved in this project

c) Your involvement

A I was not involved in this project

d) Any concerns and whether matters were escalated and if so to who.

A I was not involved in this project

265. **Refer to Estates Team Bundle, document 101**

a) Describe the situation

A I was not involved in this project

b) Any action taken

A I was not involved in this project

c) Your involvement

A I was not involved in this project

266. In respect of Ward 4B describe the works carried out, why, your involvement and when. Use the below to assist and detail issues you were aware of in respect of Ward 4B, your involvement and any remedial works – works done and why.

A I was not involved in this project

(i) While you were not involved, at the time what was your understanding of the works being carried out to Ward 4B, why were the works carried out? What specification did the remedial works bring the ward to?

A I had no involvement in this project and therefore cannot answer this question.

Refer to the following when answering:

a) **Estates Team Bundle, document 71**

b) **Estates Team Bundle, document 72**

c) **Estates Team Bundle, document 97**

d) **Estates Team Bundle, document 115** - why was there 'pre-start' meeting – what was the issue with this?

A I was not involved in this project

267. Involvement and knowledge to HAISCRIBE – what was this and what was the issue – **refer Estates Team Bundle, documents 117 and 118.**

A I was not involved in this project

268. **Refer to Estates Team Bundle, documents 120 & 122**

a) Describe the situation

A I was not involved in this project

b) Any action taken

A I was not involved in this project

c) Your involvement

A I was not involved in this project

269. Ward 4B:

a. When were Ward 4B patients decanted from Ward 4B back to the Beatson

b. Why did this happen?

c. When patients initially transferred from the Beatson to Ward 4B was the specification of Ward 4B the same spec as the Beatson?

d. If not, then why were patients transferred from the Beatson initially if the specification?

e. What works were carried out to Ward 4B during this time? Why, Was it an issue when the ward initially started taking patients, who signed off on the works, how did it become known that the works were required.

A I was not involved in this project therefore I cannot answer any of the above

(i) Were you aware of the Ward 4B decant? Why they returned and what works were carried out despite not being involved in the project?

A No I was not aware. I understand this was a clinical decision to move patients back to the Beatson.

Decision to Close Wards 2A/B and Move to 6A and 4B

270. Discuss the issues surrounding and leading up to the decant of patients from Ward 2A in 2018.

a) What was the lead up and background to this refer to Estates Team Bundle, document 133.

A I understand that there were ventilation and potable water concerns highlighted within the Ward by Ian Powrie

b) What was your involvement.

A I had no involvement prior to the closing of ward 2A

c) What risk assessment and additional measures were put in place to ensure patient safety?

A I had no involvement prior to the closing of ward 2A

d) What concerns, if any, did you have about where the patient cohort was being moved to?, If so, why did you have these concerns? **IMT Bundle, document 39** you flagged concerns, were these ever followed up? Did you escalate

these concerns? With the benefit of hindsight, what steps could have been taken to progress this matter further?

A I had minimal involvement of IMT Meetings around Wards 2A and attended 1 or 2 to give an update on drain cleaning and PoU filters only

(i) What was the purpose of drain cleaning, what prompted it be carried out? Did the drain cleaning have any impact? If so what impact?
Describe your involvement in respect of PoU filters, describe any issues and action taken.

A It was identified at an IMT that the drains in sinks could be a source of contamination. A drain cleaning regime was pulled together by the Facilities Team and, as I may recall, an SoP or simple instruction given to the domestic staff around how this should be done which included pouring of disinfectant down the drain and in some cases having to put a small brush down the drain. On recollection I don't think there was an improvement in water quality although the drains were cleaner. The general healthcare guidance is not to clean drains.

The installation of PoU Filters mostly fell out of IMT meetings where water quality was discussed.

e) Tell me about the works done to Ward 2A/B and what was required to be done and why, what has been done and when the work was completed. Please include details of your involvement. **Reference IMT Bundle to assist.**

A I had no involvement around the works done in Ward 2A (Minor Upgrade) this was led by Ian Powrie.

(i) What was your knowledge of the situation at the time?

A I attended IMT meeting around Ward 2A/B and this is documented. There were a number of issues mainly around water quality and taps which were of concern and which has been discussed in this question set

f) Any other relevant information, for example mould behind the IPS panels in Ward 2A, the plasterboard used in the en-suites in 2A/B.

A I cannot provide any information to support this

271. Discuss the issues surrounding the ward 2A patients when in occupation of ward 6A. In particular, views you may have in respect of:

a) Chilled beams;

b) Gram Negative Bacteraemia

c) Water filters

d) Ventilation, including HEPA filters

e) issues/ testing/ escalation/ response/ IMTs/SBARs impact on patients

f) Patient communication

g) Internal escalation - HAIIT scoring

h) External escalation

A It was a clinical decision to relocate patients from Ward 2A to Ward 6A. I was never asked for my views although I was not a main player in the decision making process. There is a patient placement protocol which I assume the clinicians followed to the rule.]

i) SBAR relating to Ward 6A **Estates Bundle document 141**

A A significant Action Plan was derived from the SBAR in an effort to upgrade Ward 6A. All actions were carried out. This is included as **Attachment 7.**

<u>Reports Prepared by Innovated Design Solutions October 2018</u>

272. **Refer to Bundle 6 – Miscellaneous Documents – Documents 33 and 34.** These documents are feasibility studies regarding increasing ventilation air change rates within Wards 2A and 2B by Innovated Design Solutions.

a) Who commissioned these reports?

A I think this was commissioned by Ian Powrie after discussion with Mary-Anne Kane

b) What was the background to these reports being commissioned?

A There were concerns about the ventilation system in Ward 2A as annual verification reports were highlighting that ac/hr in single bedrooms was approx 3

c) Why were these reports commissioned? What issues prompted the instruction of these reports?

A To address the concerns mentioned above and to see if there was a potential solution

d) What concerns, if any, did you have regarding the ventilation system in Ward 2A?

A Ventilation verification reports were identifying air changes of just under 3 ac/hr when the SHTM specifies this should be 6 ac/hr.

e) When did these concerns arise? Was anyone else in estates concerned? Why?

A These concerns, I believe, have been in place since handover and have been escalated previously by Ian Powrie

f) What was the impact on patients?

A I cannot answer this question. That is for the clinicians to answer

What concerns, if any, were there regarding patients that you were aware of at the time?

Answer

g) What concerns were raised with anyone?

A I understand the IDS report was escalated but to whom I do not know.

h) What concerns, if any, did you have regarding the ventilation system in Ward 2B?

A There were concerns around the air changes which were approx. 3 ac/hr

i) When did these concerns arise? Was anyone else in estates concerned? Why?

A I cannot recollect when these concerns arose.

j) What was the impact on patients?

A This would need to be answered by my clinical colleagues.

k) What concerns were raised with anyone?

A See i) above

l) What happened in response to these reports? For example, the SBAR you prepared.

A I did not prepare an SBAR

m) What matters were escalated arising from these reports? If so, to whom, and if not, why not?

A See i) above

n) What works, if any, were carried out in response to any findings in these reports?

A As I understand it this document potentially was the catalyst for the Wards 2A & 2B Upgrade.

o) Following the works being carried out, what was the ward specification? To what extent did it meet the requirements of SHTM 03-01 guidance?

A I have no visibility of the ward specification, however this upgrade is now complete and ventilation is now fully compliant to SHTM03-01

273. When did you instruct Innovated Design Solutions before these reports, if at all? If so, in what capacity? Describe any further action taken in response to any recommendations by Innovated Design Solutions.

A I did not instruct IDS

Cryptococcus

Refer to the Cryptococcus Bundle and SBAR bundle to assist.

274. Recall your understanding of the Cryptococcus infections in 2018:

a) What is Cryptococcus?

A It is a fungi

b) What was your experience of Cryptococcus in a healthcare setting prior to QEUH?

A No experience

c) Describe concerns, if any, you had in respect of pigeons at QUEH/RHC? If you had concerns when did these concerns initially arise, and for how long/ how often did such concerns arise?

A As I recall I only became aware of pigeons at QEUH/RHC through attending IMT meetings, up till then I was not aware of any issues. This would normally be addressed and actioned by operational estates.

d) Describe your involvement, if any, in respect of pest control management in relation to pigeons at QEUH/RHC? Describe your involvement, if any, in respect of instructing works to be carried out in respect of pigeons at QEUH/RHC?

A I had no involvement.

e) What were the issues with Cryptococcus at QEUH? When did you first become aware of these issues? What happened in response to these issues? Who, if anyone, did you report these issues to?

A Cryptococcus was found in ventilation plantrooms in the QEUH. It is airborne and can get into the hospital via ventilation systems so there was a general fear that it could contaminate wards. Cryptococcus was isolated in Wards 6A. It is thought that Pigeon Guano can be attributable to this.

f) Describe your visit to the plant rooms? When did you go, why did you go at that time, what did you see? Did cleaning take place before the visit – if so why – what was evidence prior to the cleaning?

A I visited several plantrooms when it was highlighted about pigeon droppings (Guano). On my visits I saw some evidence of guano but this was limited. I was informed that cleaning had not taken place before my visit.

g) Do you recall photos – what did they show?

A I recall a number of photographs of Guano in plantrooms.
Describe what the pictures showed. Did this concern you? What action did you take following being show these pictures?

h) Describe your involvement, if any, in air sampling from the plantrooms. When was this carried out? Why was this carried out? Was this routine carried out prior to December 2018, if not, why not? Describe any concerns you had in respect of the air sampling results from December 2018, or at any other time?

A I was not involved in air sampling of plantrooms. This would have been an operational estates task in conjunction with Infection control.

i) Describe your involvement, if any, with cleaning of the plant rooms at any time but in particular, in early 2019. Including instructing cleaning to be carried out, to whom, why and when? Was the cleaning more specifically done in 2019?

A I was not involved. The instructions to do this work was, I believe carried out by Operational Estates.

j) If cleaning was carried out, why was it carried out?

A I can only assume it was to remove pigeon droppings

Refer to document from GP Environmental Ltd dated 8th January 2019:

275. What concerns, if any, did you have on reading that there was *'a very large population of feral pigeons present at various locations…*'

A I had no visibility of this particular paper. As I recall at that time

276. What concerns, if any, at the time did you have about the *'Significant Health and Safety Issue'* what further action was taken, was this escalated? If so to whom? Were HPS/ HFS involved? If not, why not? What concerns, if any, in this regard do you have now?

A I did not have visibility of this paper and I do not know whether this Feral Pigeon Trapping Programme took place. This would have been managed by Operational Facilities.

277. What action, if any, was taken follow receipt of this document from GP Environmental Ltd?

A I had no visibility of this paper and I was not party to any actions, however what I recollect is that a number of plantrooms were cleaned using both GP Environmental and NHS staff.

278. What methods of cleaning were used by GP Environmental Ltd and why? Did this resolve the issue(s)?

A I do not know the answer to this question as this was managed by Operational Estates and Operational Facilities teams.

279. Were GP Environmental Ltd instructed previously in respect of pigeons at QEUH/RHC, if so when, and by whom?

A I cannot answer this question as this would have been managed by Operational Estates and Operational Facilities teams.

a) What concerns, if any, did you have about water cascading down the walls? Is so, why and what was the consequence of this?

A I cannot recollect this issue

b) Discuss your involvement at the Cryptococcus Sub-Group Meetings - actions taken, internal escalation: HPS involvement.

A I had no involvement in these groups

c) What, if any, external reporting occurred?

A None that I am aware of.

d) PAGs/ IMTs/ AICC and BICC involvement.

A I was involved in IMT's around Wards 2A & Wards 6A which discussed cryptococcus

e) What steps were taken in response/ precautions put in place?

A Action plans for both IMT's were put in place to address cryptococcus and other issues within the wards

f) Did you read John Hood's report?

A No, I was not given visibility of the report

g) When did you read John Hood's report?

A See k) above

h) What observations, if any, did you make after reading John Hood's report? What actions were taken following the John Hood report?

A See k) above

i) What else could have been done? How could matters have been handled differently? What concerns, if any, did you have about how matters were dealt with?

A I cannot answer this question

Staffing and Working Environment

280. What were the staffing levels like in estates at the point of handover? Where did the staff come from – were they mainly transferred from old site?

A The staff came from Old Victoria Hospital, Western General Hospital and existing staff from Southern General Hospital

281. Concerns if any about staffing following handover – to what extent did the staffing levels manage the workload? Refer to Bundle 8, document 40.

A I had been aware of concerns around staffing & workload from Ian Powrie who was the Sector Estates manager at the time.
Please describe what these concerns were, what impact, if any these concerns had on the operation of estates, and what action, if any, you took in response to these concerns?

282. Was appropriate training in place for new and existing staff on using new systems and working within the QEUH? How did you ensure that new and current staff were appropriately trained? Refer to Estates Team Bundle, document 5 - what was this and what was the training like? How did this assist you and staff with working at QEUH – was it equipment focus, asset focused please describe.

A I had no visibility of any of this as this would be down to the Operational Estates Managers

283. Who was responsible for providing staffing? Who was responsible for ensuring staffing was maintained at sufficient levels?

A This would be down to the Senior Operational Estates Managers and GM(Facilities) at that time.

284. What concerns did you have regarding staffing levels?

A I had no visibility of staffing levels
Standing your lack of visibility, did you have any concerns regarding staffing levels?

285. What was the working environment like when QEUH opened – work life balance/ workplace culture? What issues, if any, did you have? If so, what concerns did you raise? Who did you raise these concerns with?

A I was not 'Operational' but was aware from colleagues that the workload was very high

286. Who was on site to manage and assist with carrying out works relating to equipment? How did this assist your workload in estates? To what extent, if any, was there a reliance on commercial third parties such as Multiplex when it came to staffing levels?

A This would be down to Operational estates which I was not part of.

287. Generally – discuss the workplace environment and culture – What concerns, if any, did you have?

A Although I was not involved in the operational day to day workplace environment, I was aware that it was extremely busy.

288. Describe the handover process – did it run smoothly or not? What concerns, if any, did you have in the run up to handover? What matters did you feel went to plan and what, if any, matters, had not gone to plan?

A I was not part of the handover process

289. GGC took handover from Multiplex earlier than initially contracted for – what did you think about this? Why did it happen? What was the rationale for the early handover?

A I was not part of the handover process

290. Were the concerns raised by infection control colleagues regarding the general build of QEUH/RHC taken seriously? What action did you take in response to these concerns, not already mentioned in your answers? Refer to Estates Team bundle document 100 and 116 in considering your answer.

A Whilst not privy to any of the meetings between estates and infection control colleagues about the QEUH/RHC build, I would reply that estates department have always taken the concerns of out ICT colleagues seriously no matter what project or area of work.

291. Is there anything further that you want to add that you feel could be of assistance to the Inquiry?

A No

Declaration

292. I believe that the facts stated in this witness statement are true. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief in its truth.

293. The witness was provided the following Scottish Hospital Inquiry Bundles / documents for reference when they completed their questionnaire statement (Appendix A)

294. The witness introduced / provided the following documents to the Scottish Hospital Inquiry for reference when they completed their questionnaire statement (Appendix B)

Appendix

A48807918 – Bundle 1 – Incident Management Team Meeting Minutes (IMT Minutes)
A48807956 – Bundle 4 – NHS Greater Glasgow and Clyde – Situation, Background, Asse
A43293438 – Bundle 6 – Miscellaneous Documents
A48806285 – Bundle 8 – Supplementary Documents for the Oral Hearing commencing on 12 June
A48808157 – Bundle 9 – QEUH Cryptococcus Sub-group Minutes
A47395429 – Bundle 10 – Water Technical Group/Water Review Group Minutes
A48808145 – Bundle 11 – Water Safety Group
A48807604 – Bundle 12 – Estates Communications
A48245730 – Bundle 18 – Documents referred to in the export report of Dr J.T. Walker
A48408984 – Bundle 19 – Documents referred to in the Quantitative and Qualitative Infection Link export reports of Sid Mookerjee, Sara Mumford and Linda Dempster
A49267796 – NHS – Karen Connolly – Feral Pigeon Infestation – QEUH - 08012019

Appendix B

A49382482 – Attachment 1 – CV dated June 2024
A49382484 – Attachment 2 - General Manager Estates Lead NHSGGC Jan 2015 (10)
A49382486 – Attachment 3 - Ward 6A Action Plan
A49382487 – Attachment 4 - Enhanced ClO2 treatment schedule of affected areas (2)
A49382489 - Attachment 5 - QEUH 1 2ppm Clo2 Dosing Proposal v2
A49382490 - Attachment 6 - WTG Water Review Meeting 21st June 2019
A49382491 - Attachment 7 - WARD 6A Estates Action Plan - Ongoing Compliance Works - 20 Aug 19
A49382492 - Attachment 8 - Water Quality Incident Action Plan 2018
A49524265 – Legionella and water hygiene control within hot and cold water systems
A49524266 – Legionella control refresher and update
A49524267 – Legionella management for water systems SHTM-04-01
A49524270 – Level 3 legionella control responsible persons
A49532696 – Authorised person ventilation htm-03-01
A49532703 – Competent person ventilation htm-03-01
A49532709 – Authorised person ventilation refresher htm-03-01

Alan G Gallacher

[redacted]

PROFILE

I am a professional engineer having been employed within the Ministry of Defence, Local Government and Healthcare sectors within the field of expertise of property management, operational maintenance, compliance, fire, Net Zero and delivery of capital projects. I am currently employed by NHS Greater Glasgow & Clyde (NHSGG&C) as the Head of Corporate Estates

I have over 37 years experience in working in a senior management role in various positions but all within the property management field which is where I am passionate.

I am an enthusiastic individual who can bring a wealth of experience in both operational and strategic estates management including bringing to the fore the whole issues around sustainability, its impact on the organisation and how best to deliver the tough energy and carbon targets expected by both the Scottish and British Governments against ever diminishing revenue and capital budgets.

I strive on staff development ensuring that the organisation can, where practicable, develop from within. This would assist and contribute enormously towards any future succession planning requirements needed by the organisation due to retiral's etc and which in turn will also lead to staff satisfaction and better relations with union colleagues.

KEY ACHIEVEMENTS

- Increased the Legislative Compliance Level of NHSGG&C to 85% (from 60%) therefore reducing the impact of NHSGG&C breaking the law;
- Implemented Net Zero energy & carbon reduction schemes within a number of large acute and smaller sites which resulted in a substantial reduction in the energy consumption and by relation the carbon footprint of these sites. A small number of case studies have since been produced on the back of these schemes;
- Managed the operational budgets of the Clyde Sector successfully ensuring no overspend situation arose at year end without prior warning and approval of senior financial accountants;
- Overseen the management of NHSGG&C's utilities budget;
- Led in the successful implementation and appointments of estates apprenticeships within NHS Tayside and most recently at NHS Greater Glasgow & Clyde;
- Produced a 'career pathway' which would allow NHS Staff in the lower bands of estates (i.e. unskilled) to move up the pay bands by up-skilling accordingly. This subsequently won a national award in 2013.

EMPLOYMENT EXPERIENCE

NHS Greater Glasgow & Clyde **February 2020 to present**
Head of Corporate Estates

- Provision of technical expertise leadership planning and communication on policy development and implementation impacting on the safe operation of the Board service provision (statutory and mandatory compliance).
- Be responsible for the management of Contractors and project manage minor works schemes of Capital and Revenue developments involving feasibility studies, production of specifications and drawings, preparation of quotation/tender documentation, evaluation of returned quotations/tenders and the management and control of the Contractors throughout the duration of the project to ensure compliance with specification and all

statutory obligations. This will include budget management and ensuring compliance with SFIs.
- To lead and coordinate the Boards approach to Sustainability, Carbon Management, Energy Management and Environmental initiatives.
- To lead and coordinate the Boards approach to Fire Management, Asbestos Management and Asset Management (ie CaFM).
- To lead the development and implementation of robust standards and policies to ensure consistent working practice throughout Estates, including Statutory compliance, Planned Maintenance Schedules and robust financial management
- Work with Estates operational management to develop practical workable governance structures.
- To ensure compliance with national and statutory legislation and local policies in terms of Health and Safety for staff and others.
- Contribute to the development, implementation and ongoing review of new and improved processes to reflect compliance to SHTM's with the introduction of national and statutory compliance throughout the Board.
- Advise on PPI/PFI Hard FM compliance and professional service delivery standards
- Participate in Business case preparation as required.
- Liaise directly with the Boards Asset Team ensuring that information retained within all data bases informing decision making reflect the current position
- Work in conjunction with Senior SEHD and HFS staff to develop / establish and deliver effective national Strategies and Policies for Operational Estates and Environmental matters.
- Effectively work with other Health Boards / Agencies and contractors to develop and manage local national and regional projects as required.
- Effectively represent NHSGG&C on national and Regional Projects.
- Liaise with other Health Boards and Agencies to effectively deliver best practice in NHSGG&C.

NHS Greater Glasgow & Clyde **August 2015 to February 2020**
General Manager (Estates)

- Lead on the Operational Estates Strategy for NHSGG&C aligning it to the Boards Clinical & Property Strategies;
- Provision of technical expertise leadership planning and communication on policy development and implementation impacting on the safe operation of the Board service provision (statutory and mandatory compliance).
- Coordination of effective recruitment, management and development of NHSGG&C operational estates staff ensuring clear roles, responsibilities and accountability are in place to provide value for money, comply with standing Financial Instructions, KPI's statutory and mandatory Professional standards.
- Development of workforce planning tools and arrangements supported by demonstrable changes in culture to patient focussed / customer focussed delivery of service.
- To lead and coordinate the Boards approach to Sustainability, Carbon Management, Energy Management and Environmental initiatives.
- Deliver single system working approach to Estates
- Advise on PPI/PFI Hard FM compliance and professional service delivery standards
- Development of effective and robust reporting mechanisms for all aspects of operational estates.
- Participate in Business case preparation as required.
- Liaise directly with the Boards Asset Team ensuring that information retained within all data bases informing decision making reflect the current position
- Work in conjunction with Senior SEHD and HFS staff to develop / establish and deliver effective national Strategies and Policies for Operational Estates and Environmental matters.
- Effectively work with other Health Boards / Agencies and contractors to develop and manage local national and regional projects as required.
- Effectively represent NHSGG&C on national and Regional Projects.
- Liaise with other Health Boards and Agencies to effectively deliver best practice in NHSGG&C.

NHS Greater Glasgow & Clyde **September 2011 to August 2015**
Sector Estates Manager (Clyde)

- Lead Estates Manager for the Clyde Sector of NHSGG&C taking responsibility for the safe maintenance, operation and use of 2 acute hospitals and 7 Health Centres along with the Largest NHS laundry and Call Centre in Scotland. This brings with it an operational maintenance budget of £3m, 8 senior managers and 65 tradespersons;
- NHSGG&C Lead Manager for Energy & Carbon Management taking 'Boardwide' responsibility for this subject including driving solutions to support NHSGG&C to meet government energy and carbon targets. This brings along with the position the management of the Utilities Budget of £35m per annum, a £1m energy projects budget and 3 Energy Managers. I interface strategically with external agencies including Health Facilities Scotland (HFS), Resource Efficient Scotland (RES), Scottish Futures Trust (SFT) and the Scottish Government (SG) around energy and environmental strategic issues including funding;
- Lead Manager within NHSGG&C for Sustainability ensuring NHSGG&C environmental management system (EMS) remains accurate and robust through chairing the relevant Steering Group and ensuring regular audits are put in place;
- Lead Manager for estates staff development including fronting and supporting the estates 'apprenticeship' programme;
- I am part of the Senior Management Team (SMT) for estates ensuring all important strategic issues are dealt with on time and to agreed deadlines. This can include such matters as Asset Management, Tendering Procedures, Planning, Business Continuity Plans, manpower resources etc.
- I am chair of a number of NHSGG&C strategic groups including Water Safety; Greencode (i.e. environmental management system); SCART (i.e. statutory compliance); Staff Development including Apprenticeships, CAFM. I also represent NHSGG&C at a number of senior executive meetings, (both technical and non-technical).
- Represent NHSGG&C facilities team on numerous 'external' national groups which oversee the performance of NHSScotland on activities such as:
    - Hard FM activities;
    - Sustainability (including energy and carbon management);
    - Legislative Compliance;
    - Asset Management;
    - Staff development;

NHS Tayside **January 2006 – September 2011**
Engineering Maintenance Manager

- Lead Engineer at Ninewells Hospital in Dundee taking responsibility for the safe maintenance and use of the site within the mechanical and electrical areas of work. This brought along with the position the responsibility of managing an operation maintenance budget in the region of £2.2m, 6 senior engineers and 58 tradespersons
- Lead Manager for all Energy Management issues within NHS Tayside addressing many of the roles I currently carry out at NHS GG&C.
- Manage the minor works upgrade projects within the hospital ensuring they were delivered on time and in budget.
- I interacted with managers and senior managers of all grades up to Chief Executive and Director Level on all issues relating to operational and strategic issues around the Mechanical and Electrical Services of Ninewells Hospital.

Highland Council **January 2004 – December 2005**
Estates Engineering Manager

- Lead engineer for ALL Highland Council properties from large office blocks to small community centres. I had 4 estates managers working directly for me based in 4 different areas of the Highlands. I managed an operation budget on £1m which included using local companies to carry out all remedial works required;

- I produced specifications for tendering on ALL mechanical, electrical and grounds services including plumbing, drainage etc;
- I interacted with the local senior managers around all aspects of services which affected their properties.
-

Ministry of Defence, Paderborn, Germany **January 2004 – December 2004**
Garrison Establishment Works Consultant

- I was the Garrison Engineering Works Consultant involved in all aspects of delivering projects, ensuring maintenance was carried out and that the Garrison was technically compliant;
- I produced feasibility studies on all proposed estates development programmes to ensure value for money and achievability;
- I produced an in-year, 3 year and 5 year plan for estates development to enable funding to be sourced accordingly to support these plans.

EDUCATION & TRAINING

Glasgow Caledonian University
BEng (Honours) in Mechanical and Electrical System Design
1998 - 2004

I have attended numerous technical training courses to ensure my technical knowledge is always up to date.

I am currently participating on an 'accelerated' management course leading to my Diploma in Management and ultimately become a Chartered Manager.

PROFESSIONAL MEMBERSHIPS

Member of the Institute of Mechanical Engineers (IMechE) since 2002 (Chartered Engineer)

INTERESTS

I enjoy golf, football, watching rugby, reading and gardening

References available on request

SCOTTISH HOSPITALS INQUIRY

Bundle of documents for Oral hearings commencing from 19 August 2024 in relation to the Queen Elizabeth University Hospital and the Royal Hospital for Children, Glasgow

Witness Statements – Week Commencing 19 August 2024 – Volume 1

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