Scottish Hospitals Inquiry

Royal Hospital for Children and Young People/ Department of Clinical Neurosciences

Closing Submission by Counsel to the Inquiry

Hearings covering the period from the commencement of the Project to Financial Close

Introduction

1. Two hearing sessions have taken place in relation to the Royal Hospital for Children and Young People/ Department of Clinical Neurosciences ("RHCYP/DCN"). The first session covered two broad themes: (i) the theory and practice of ventilation in hospitals; and (ii) the background to the project for the RHCYP/DCN. The second session covered the period from the start of the procurement exercise to financial close.

2. In addition to the witness evidence and associated documentation considered at the hearings, four provisional position papers (PPPs) have been produced by the Inquiry Team. These address the reference design, the environmental matrix, the procurement exercise and the contract. A lot of detailed background information is set out in the PPPs. The PPPs, and the responses from Core Participants ("CPs"), should be considered by the Chair in addition to these closing submissions. In Appendix 1, we have highlighted some issues with certain of the provisional conclusions set out in the PPPs. Subject to those issues, the Chair is invited to make the findings set out in the conclusions sections of the PPPs.

3. These submissions do not seek to review all the evidence adduced at the hearings. They seek to focus on the key issues that are potentially relevant to the Terms of Reference ("TOR"). The central issue, in our view, is the clarity of the procurement documents and the contract. We wish to highlight at the outset that it is not the function of the

Inquiry to make any determination about parties' rights and obligations, or to resolve disputes between them as to the meaning of documents.

4. The closing submissions shall address:

1. The task of the Chair and the approach to the evidence

2. Ventilation requirements in hospitals

3. The Activity Database System, Room Data Sheets and Environmental Matrices

4. The background to the RHCYP/DCN and the need for a new hospital

5. Initial Planning and Preparation

6. The Reference Design

7. Errors in the Environmental Matrix

8. The Procurement Exercise

9. The Contract

10. Governance

11. Findings and Potential Recommendations

Executive Summary

5. NHS Lothian ("NHSL") intended the ventilation system at the RHCYP/DCN to fully comply with the guidance set out in SHTM 03-01. This is best practice guidance aimed at ensuring a safe and effective hospital. There is a dispute between the CPs as to whether the specification for the ventilation system for the RHCYP/DCN, as at financial close, fully complied with SHTM03-01. The Chair is invited to find that there was a lack of clarity as to whether the specification for the ventilation system fully complied with SHTM 03-01.

6. The genesis of the problem was an error in a technical spreadsheet called an Environmental Matrix. The status of that document both at the procurement stage and in the final contract is controversial. It is submitted that ambiguity in both the procurement documentation and the terms of the final contract contributed to a situation where there was a disconnect between what NHSL wanted the ventilation system to achieve and what the successful tenderer believed the ventilation system required to achieve. A misunderstanding as to whether the Environmental Matrix was a fixed brief (intended to form the basis for the design of the ventilation system) or a document upon which no reliance could be placed is at the heart of the matter.

7. The Environmental Matrix was produced by manually inserting figures into a spreadsheet. The initial versions of the Environmental Matrix contained appropriate environmental parameters, including air changes rates, for critical care rooms. A decision was taken by the engineers developing the Environmental Matrix to insert a "*room function reference sheet*". In the preparation of this sheet, room functions for various areas in the hospital were determined by engineers without consulting with clinicians or infection prevention and control specialists. For certain critical care areas, air change rates for a standard ward were inserted when the values for a high dependency unit should have been inserted. It is unlikely this mistake would have

happened if there had been direct discussions between the engineers producing the Environmental Matrix and the clinicians responsible for using the specific rooms.

8. The errors in relation to critical care rooms were not detected by NHSL or its technical advisors before the contract was signed with the successful tenderer. This was a mistake. The Inquiry has seen no evidence indicating any deliberate concealment or failure to disclose wrongdoing.

9. NHSL's lead technical advisors were engaged to develop the procurement documents. They required to confirm that the reference design complied with published guidance. They did this by asking for confirmation from the engineers who produced the Environmental Matrix. Such confirmation was duly provided. The engineers accept that this statement, although honestly made, was inaccurate as the Environmental Matrix did not fully comply with the published guidance, namely SHTM03-01. The confirmation was sought six months before finalisation of the Environmental Matrix which was used in NHSL's tender documents. Had the engineers been asked to refresh the statement of compliance, there is a possibility that the errors could have been spotted.

10. The Environmental Matrix was issued with the invitation to participate in dialogue ("ITPD"), and the invitation to submit final tenders ("ISFT"). NHSL's intention was that tenderers place no reliance on the Environmental Matrix. Given this intention, it is not clear that the provision of the document was of any meaningful benefit to tenderers. Before using it, they would have to check all the values set out in it. The decision to include the Environmental Matrix with the procurement documents was made due to an understandable desire to ensure that work undertaken on the project (when it was to be capitally funded) was not wasted and could be utilised when the funding model changed (to a revenue funded model). It does not appear that any detailed consideration was given to whether the inclusion of an Environmental Matrix populated with

parameters could give rise to confusion on the part of tenderers. In particular, there appears to have been no consideration of whether such a document could be misinterpreted as a fixed client brief for the ventilation system.

11. The ITPD, and ISFT, contained ambiguous statements in relation to the status of the Environmental Matrix. It was not clear whether it was a document that tenderers required to comply with. NHSL's intention, namely for design risk associated with the selection of parameters in the Environmental Matrix to sit with the successful tenderer, was not clearly communicated. The ITPD and ISFT contained a range of statements which contradicted NHSL's intended approach to the Environmental Matrix. These included: (i) a statement that room information to be incorporated by bidders into room data sheets was contained in the Environmental Matrix; and (ii) a statement that tenderers required to "*comply with the Environmental Matrix*".

12. The procurement documentation was not drafted with sufficient clarity to allow for one universal interpretation by tenderers.

13. The lack of clarity is demonstrated by the fact that different tenderers proposed different solutions in their tender bids to meet the stated requirements. One tenderer changed the values in the Environmental Matrix and stated it would comply with published guidance, including SHTM03-01. By contrast, the successful party stated it would comply with the published guidance, including SHTM03-01, by using the values in the Environmental Matrix provided to tenderers. It is not clear why one tender was not excluded as a variant bid.

14. There was a low intensity review of tenders at the stage the preferred bidder was appointed. The ITPD and ISFT stated that tenders would be assessed on a pass/ fail basis in relation to compliance with the Board's Construction Requirements. There was

no meaningful assessment or review of statements made by tenderers, or solutions put forward by tenderers, at the tender assessment stage. Rather, statements of compliance with the Board's Construction Requirements were taken at face value. Tenderers effectively self-certified compliance with the Board's Construction Requirements. A more intense review could have identified the issues with the Environmental Matrix. However, this would have required a significant amount of extra work and an issue arises as to whether such work would be proportionate at the tender assessment stage.

15. The low intensity review is exemplified by the lack of any consideration of room data sheets provided by tenderers with their bids. The successful party provided room data sheets for critical care rooms with values lower than those set out in the published guidance. Had the room data sheets been reviewed by an engineer, the issue could have been spotted before the contract was concluded. It is not clear why the limited number of room data sheets produced by tenderers (for key and generic rooms) were not reviewed before the contract award was made. This was a missed opportunity to detect the problem.

16. Prior to financial close, engineers acting for NHSL identified certain respects in which the Environmental Matrix did not comply with SHTM 03-01. This was an indication that the statement of compliance by the engineers who produced the matrix was erroneous. Those issues were the subject of discussion, prior to financial close, between NHSL and the IHSL consortium. They included concerns that room pressure parameters specified in the matrix were contrary to the guidance and gave rise to a risk of spreading infections such as MRSA and norovirus. This did not prompt a review by NHSL or its technical advisers of the other parameters in the matrix for compliance with the guidance. Rather, entries in the matrix were classified in the Project Agreement as "*reviewable design data*" to be resolved after the agreement was signed. The issue with air change rates for rooms in the critical care department was not detected. A more detailed review of the Environmental Matrix at this stage could potentially have identified that issue. However, this would have required a significant amount of extra

work and an issue arises as to whether such work would be proportionate at the tender assessment stage.

17. Due to the delays in the project, and the need for a new children's hospital, NHSL was under pressure to sign the contract and reach financial close. This resulted in a large amount of reviewable design data being included in the contract. That included the Environmental Matrix and the room data sheets.

18. The Project Agreement reflected the unresolved status of the Environmental Matrix. The matrix was included in it as a schedule, and the Board's Construction Requirements *prima facie* required compliance with it. An express derogation in the contract excused that compliance because the matrix was known to feature anomalies. As reviewable design data, the matrix was, after financial close, to be submitted by Project Co to NHSL for approval. The schedule which gave the matrix status as reviewable design data suggested the matrix was part of Project Co's Proposals. By treating the matrix in part as if it were one of NHSL's requirements, and in part as if it were one of the contractor's proposals, the Project Agreement reflected the confusing presentation of the matrix in the tender documents.

19. The Project Agreement included room data sheets for certain key and generic rooms; required Project Co to comply with them; but also classified room data sheets as reviewable design data. The room data sheets in the Project Agreement included some for patient areas in the critical care department setting a pressure parameter which conflicted with the Environmental Matrix.

20. Approval by NHSL of reviewable design data after financial close would constitute confirmation that the submitted data met its requirements for Operational Functionality, but involved no greater acceptance of design risk. Project Co was otherwise responsible

for the submitted item, including warranting that it used reasonable skill and care in the design. There was no derogation from NHSL's requirement for compliance with SHTMs.

21. The complexity of these arrangements left scope for argument about exactly how they were intended to work after financial close, and where contractual responsibility lay for the ventilation parameters in the matrix and the room data sheets.

22. The problem with the air change rates for certain critical care rooms in the Environmental Matrix arose through human error. There were opportunities to detect it prior to financial close which were not taken. The Chair may wish to consider whether the error was attributable to a flaw in the system for procurement of such projects, or whether it was attributable to features of this specific project. The Chair may consider it significant that the version of the Environmental Matrix included in the tender documents was prepared by engineers who understood it would be used only as a non-definitive reference design and not as a definitive statement of NHSL's brief; but was received by different engineers whose understanding of its purpose was determined by the ambiguous statements in the tender documents.

23. A range of issues are relevant for the Chair to consider. These include:

    - The lack of a sufficiently reliable database of technical information to populate a briefing document (either room data sheets or an environmental matrix) such that engineers require to manually insert values into a spreadsheet or room data sheets. This increases the likelihood of transcription errors.

- The wisdom of a procuring authority supplying bidders with detailed ventilation parameters which it does not intend to be taken as their brief.

- The ambiguity in the procurement documents in relation to the status of the Environmental Matrix and the failure of, or lack of, procedures to prevent that.

- The fact that statements of compliance by tenderers were taken at face value with a very low intensity "sample" review.

- The ambiguity in the contract as to the status of the Environmental Matrix.

- The lack of a robust system for reviewing the Environmental Matrix before financial close.

1. The task of the Chair and the approach to the evidence

24. Many witnesses gave evidence by written statement and oral evidence. It is submitted that all witnesses were endeavouring to assist the Inquiry.

25. Mr Brian Currie, NHSL's project director, having given evidence to the first hearing session, was unable to do so for the second. This was through no fault of Mr Currie, the NHS's Central Legal Office or the Inquiry Team. Mr Currie would likely have provided a counterpoint to the evidence of several other witnesses (particularly witnesses that worked for IHSL and Multiplex). As a matter of fairness, the Chair should bear this in mind when assessing the evidence. The Chair should also keep under review whether

there is any possibility of obtaining a statement from Mr Currie as the work of the Inquiry continues.

26. A number of witnesses gave evidence in relation to the meaning of provisions in the procurement documents and terms in the contract. Witnesses did this to seek to be helpful to the Inquiry and to provide context to the wider views expressed. However, while the views of witnesses on the intention of the provisions may be relevant to the issues the Chair requires to determine, we would respectfully submit that the Chair should disregard the subjective views of witnesses in relation to the meaning of various documents. These should be assessed objectively.

27. In additional, a large volume of contemporaneous documentation is available to the Chair.

28. The Chair will require to consider contractual documents to address the TOR. The Chair should avoid making any determination on any liability arising under any contract (Inquiries Act 2005 (the "2005 Act"), section 2(1)). However, the Chair should not be inhibited in the discharge of his functions by any likelihood of liability being inferred from facts he determines or recommendations he wishes to make (2005 Act, section 2(2)).

29. The matters covered at the hearing concerned events that took place a long time ago. In some instances, witnesses were addressing matters that took place over a decade ago. It is inevitable, and entirely understandable, that memories will have faded with time. While the weight to be accorded to any item of evidence is a matter entirely for the Chair, the Chair may wish to consider whether greater weight should be given to contemporaneous documents that record decisions and key events rather than to the recollection of witnesses.

30. In *Gestmin SGPS (SA) v Credit Suisse (UK) Ltd* [2013] EWHC 3560 (Comm) ("*Gestmin*"), Leggatt J made the following observations in relation to memory in the context of contested litigation:

"*15. An obvious difficulty which affects…oral evidence based on recollection of events which occurred several years ago is the unreliability of human memory.*

16. While everyone knows that memory is fallible, I do not believe that the legal system has sufficiently absorbed the lessons of a century of psychological research into the nature of memory and the unreliability of eyewitness testimony. One of the most important lessons of such research is that in everyday life we are not aware of the extent to which our own and other people's memories are unreliable and believe our memories to be more faithful than they are…

17. …psychological research has demonstrated that memories are fluid and malleable, being constantly rewritten whenever they are retrieved…

18. Memory is especially unreliable when it comes to recalling past beliefs. Our memories of past beliefs are revised to make them more consistent with our present beliefs. Studies have also shown that memory is particularly vulnerable to interference and alteration when a person is presented with new information or suggestions about an event in circumstances where his or her memory of it is already weak due to the passage of time.

19. …The nature of litigation is such that witnesses often have a stake in a particular version of events. This is obvious where the witness is a party or has a tie of loyalty (such as an employment relationship) to a party to the proceedings. Other, more subtle influences include allegiances created by the process of preparing a witness statement and of coming to court to give evidence for one side in the dispute. A desire to assist, or at least not to prejudice, the party who has called the witness or that party's lawyers, as well as a natural desire to give a good impression in a public forum, can be significant motivating forces.

20. Considerable interference with memory is also introduced in civil litigation by the procedure of preparing for trial. A witness is asked to make a statement, often…when a long time has already elapsed since the relevant events. The statement is usually drafted for the witness by a lawyer who is inevitably conscious of the significance for the issues in the case of what the witness does nor does not say. The statement is made after the witness's memory has been "refreshed" by reading documents. The documents considered often include statements of case and other argumentative material as well as documents which the witness did not see at the time or which came into existence after the events which he or she is being asked to recall. The statement may go through several iterations before it is finalised. Then, usually months later, the witness will be asked to re-read his or her statement and review documents again before giving evidence in court. The effect of this process is to establish in the mind of the witness the matters recorded in his or her own statement and other written material, whether they be true or false, and to cause the witness's memory of events to be based increasingly on this material and later interpretations of it rather than on the original experience of the events.

…

22. In the light of these considerations, the best approach for a judge to adopt…is, in my view, to place little if any reliance at all on witnesses' recollections of what was said in meetings and conversations, and to base factual findings on inferences drawn from the documentary evidence and known or probable facts. This does not mean that oral testimony serves no useful purpose – though its utility is often disproportionate to its length…."

31. In *Kogan v Martin and Ors* **[**2019] EWCA Civ 1645, the Court of Appeal described *Gestmin* as:

"*…one of a line of distinguished judicial observations that emphasise the fallibility of human memory and the need to assess witness evidence in its proper place alongside contemporaneous documentary evidence and evidence upon which undoubted or probable reliance can be placed*." [paragraph 88]

32. The Chair will wish to consider whether the observations in the cases outlined above are equally applicable to the Inquiry. If so, the Chair may wish to place greater reliance on contemporaneous documents than on statements and oral evidence provided by witnesses, particularly in relation to past beliefs. This should in no way be interpreted as a criticism of the witnesses. Rather, it is simply a reflection of that fact that witnesses were being asked for their recollection of events that took place a significant time ago.

2. Ventilation requirements in hospitals

33. The requirement for ventilation in a hospital was addressed at the hearings in May 2022. Full details are out in the reports and oral evidence of Dr Fitzgerald, Mr Maddocks, Mr Poplett and Professor Humphreys. It is also covered in the paper produced by Mr Steven Bentley.

34. As Dr Fitzgerald explains in his report:

> *"The primary purpose of ventilating a building is generally to help provide a space which is pleasant and safe in terms of air quality…"* [2022 Bundle 6, p33]

35. In a hospital, ventilation, has three main functions: (1) the removal of odours or noxious smells, (2) the maintenance of a comfortable temperature for patients and staff, and (3) assisting in the prevention and control of infection. When designed, installed and operated correctly, ventilation systems can help reduce the risk of infection. However, when not designed, installed or operated correctly then ventilation systems can not only fail to protect people but can increase the risk of infection.

36. Ventilation can be provided naturally by the effects of wind pressure (e.g. by opening a window). As the motivating influences of natural ventilation are variable, it is almost impossible to maintain consistent flow rates and ensure that minimum ventilation rates will be achieved at all times. This variability is normally acceptable for general areas including office accommodation, general wards, and similar areas. For specialist areas, mechanical ventilation is required to ensure that the ventilation system performs consistently regardless of the prevailing weather conditions.

37. Professor Humphreys explained that ventilation is important in preventing infection. From the perspective of infection prevention and control, the more that contaminated air is diluted, the better.

38. However, appropriate ventilation is just one of a series of infection prevention and control measures that require to be in place to prevent healthcare acquired infections. Other measures would include prophylaxis antibiotics (antibiotics used to prevent as opposed to treating infections) and appropriate hand hygiene (2022 Bundle 6, page 8).

39. Professor Humphreys gave examples of situations where poor ventilation could put patients at risk of harm. For example, he explained that inadequate air filtration in clinical areas housing patients with haematological malignancy may result in aspergillosis (a fungal infection that does not infect patients without immunosuppression) and that sub-standard operating theatre ventilation can result in an increase in surgical infections. However, Professor Humphreys explained that it is challenging to quantify the risk when there are deviations from recommendations and standard guidance.

40. Professor Humphreys addressed research conducted by Dr Lidwell. Applying the principles developed by Dr Lidwell, after four air changes approximately 98 per cent

of contaminants will be removed. The research indicates that each successive air change will remove a smaller and smaller number of contaminants.

41. In relation to air changes, Professor Humphreys stated that there is no precise cut off point at which ventilation will be dangerous to a patient. For example, as a matter of generality, he could not say that 5 air changes per hour is significantly worse that 6. However, if 10 air changes are recommended by published guidance and fewer than 5 air changes were achieved, the ventilation system would be unlikely to provide sufficient protection to a patient. Professor Humphreys addressed the issue in terms of an increase in risk of infection as opposed to a causative link to a specific adverse outcome.

42. In section 4.4.3 of his report, Professor Humphreys stated that:

"…failing to implement guidelines is likely to increase the risk of adverse events occurring, such as infection, even if quantifying this increased risk would be challenging generally and especially in the case of an individual patient." [2022, Bundle 6, p15]

Relevant legislation

43. The Health and Safety at Work etc Act 1974 is relevant to hospital ventilation given that the ventilation system is intended to prevent contamination, control closely the environment, dilute contaminants and contain hazards.

44. The Building (Scotland) Regulations 2004 set standards for buildings in Scotland. Building Standard 3.14 concerns Ventilation. It states that:

"Every building must be designed and constructed in a way that ventilation is provided so that the air quality inside the building is not a threat to the building or the health of the occupants".

45. In Scotland, section 3.14.5 of the Mechanical Ventilation, Environment (Non-domestic buildings) Technical Handbook 2017 provides that at least 8 litres/second of fresh air per occupant should be provided. There is no further specification as to the air quality for a building such as a hospital. The Buildings Standards Technical Handbook does not contain any references to published guidance or associated standards. That is in contrast to the regime in England. There, the Building Regulations 2010 introduce the concept of "Approved Documents". These set out what, in ordinary circumstances, may be accepted as one way to comply with the Building Regulations. Approved Document Part F "Ventilation requirements vol 2" contains specific reference to published guidance such as Health Technical Memorandums as a method of complying with the building regulations.

Guidance

46. A series of published guidance, including Scottish Health Technical Memorandums (SHTMs), provides guidance on hospital ventilation.

47. SHTM 00 "Best Practice Guidance for Healthcare Engineering – Polices and Principles" sets out general guidance. The February 2013 version states that the aim of the guidance is to seek to ensure the safe and efficient operation of a hospital:

"Healthcare-specific technical engineering guidance is a vital tool in the safe and efficient operation of healthcare facilities. Scottish Health Technical Memoranda guidance is the main source of specific healthcare-related guidance for estates and facilities professionals." (2023, Bundle 1, page 7)

48. The guidance states that:

"Only by having a knowledge of these requirements can the healthcare organisation's Board and senior managers understand their duty of care to provide safe, efficient, effective and reliable systems which are critical in supporting direct patient care. When this understanding is achieved, it is expected that (in line with integrated governance proposals) appropriate governance arrangements would be put in place, supported by access to suitably qualified staff to provide this 'informed client' role, which reflect these responsibilities." (2023, Bundle 1, page 10)

49. SHTMs are described as *"...a best-practice framework..."* (2023, Bundle 1, page 14). This view was endorsed by Mr Maddocks.

50. SHTM 2025 originally provided guidance in relation to hospital ventilation systems. It did not contain any specific air change rates. However, it did state that specific requirements for individual spaces and departments were included in the "Activity Data Base (ADB) A-Sheets" (2022 Bundle 1, p41 and 222). Guidance on specific air change rates was introduced in England through Health Technical Memorandum 03-01. It was only when SHTM 03-01 "Ventilation for Healthcare Premises" was introduced in Scotland that specific air changes rates for particular spaces in a hospital were set out in Scottish guidance. The Chair should be aware that the guidance in HTM 03-01, and SHTM 03-01, was relatively new, and evolving, during the Project.

51. SHTM 03-01 is described in SHTM 00 as:

"...best practice guidance on the design and installation of ventilation systems and the close-control (mechanical cooling or air- conditioning) of general and 'specialised' healthcare environments." (Para 2.9, 2023 Bundle 1, page 16)

52. Paragraph 1.7 of SHTM 03-01 provides that:

"If the ventilation plant has been installed to dilute or contain harmful substances, its failure may expose people to unacceptable levels of contamination. Proven breaches of the statutory requirements can result in prosecution and may also give rise to a civil suit against the operators." (Para 1.7, 2023 Bundle 1, p112).

53. Design parameters for new installations are set out in Part A of SHTM 03-01. Part B deals with operational management of systems. It provides that, on periodic inspection and verification, critical ventilation systems (which include those in critical care departments) should achieve not less than 75% of the design air-change rate given in Appendix 1 of Part A, or its original design parameters. Pressure must be similarly maintained (2023 Bundle 1, page 129, paragraph 4.16).

54. Paragraph 2.60 of Part A provides that:

"Specific requirements for individual spaces and departments are included in the Health Building Notes (HBNs) and Activity Database (ADB) A-Sheets, or Scottish Health Planning Notes (SHPNs)" (2023 Bundle 1, pages 177 and 362).

55. Paragraph 3.6 provides that:

"For most applications involving human occupancy, the dilution of body odours is the critical factor in determining ventilation requirements" (2023 Bundle 1, page 178).

56. Specialised ventilation is required in critical areas and high-dependency units of any type (paragraph 7.2). The supply of air to a room has four main functions:

- to dilute airborne contamination;

- to control air movement within such that the transfer of airborne contaminants from less clean to cleaner areas is minimized;

- to control the temperature and if necessary the humidity of the space;

- to assist the removal of and dilute waste gases where used.

57. Paragraph 7.13 provides that the air change rates given in Table A1 have been found to give sufficient dilution of airborne contaminants, provided the mixing of room air is reasonably uniform. The recommendation for a general ward is 6 ac/h. For critical care areas, 10 ac/h is recommended (2023 Bundle 1, pages 287 (February 2014) and 473 (February 2013)).

58. The number of air changes per hour is not an exact science. The regime set out in SHTM 03-01 is a compromise agreed between contributors (which included engineers and IPC professionals). It is based on research conducted in the 1970s by Professor Lidwell. For obvious reasons, the system has never been tested to the point where the environment is known to be unsafe. Therefore, it would be an oversimplification to say that if the air change rates in SHTM 03-01 are not followed that there will always be a risk to patients. However, the levels set out are an agreed consensus that provide a safe environment for patients. Non-compliance could create a danger to patients. However, for the reasons set out by Professor Humphreys in his evidence, whether there is a significantly increased risk of infection for any particular patient would be highly dependent on the specific facts.

59. If the ventilation recommendations set out in SHTM 03-01 are to be departed from, this should be based on a risk assessment. It is submitted that a ventilation system that does not comply with published guidance, and for which there has been no individualised risk assessment, is "defective" for the purposes of the TORs.

60. The Chair will require to consider whether there are weaknesses in the current guidance. The Inquiry has heard evidence that the guidance is open to different interpretations. The Chair will therefore require to consider whether ambiguity could arise from a statement that there must be "*compliance*" with published guidance (such as SHTM 03-01) if such compliance is a matter of interpretation on which views could differ. This is perhaps exemplified in the divergence of views between Mr O'Donnell and Mr McKechnie. Mr O'Donnell stated that the air changes rates in the Environmental Matrix for critical care were wrong and did not comply with SHTM 03-01. In contrast, Mr McKechnie maintained that in critical care departments only isolation rooms required the specialist ventilation regime set out in SHTM03-01 and that general areas in such departments did not. Therefore, his position was that the Environmental Matrix complied with SHTM 03-01.

3. The Activity Database System, Room Data Sheets and Environmental Matrices

61. The Inquiry has before it much evidence about these matters. The following is a summary of what it is submitted are the key points about them.

62. When building a hospital, it is necessary to specify the parameters to be achieved by its ventilation system. This is just one of many elements in defining what is to be built.

63. Recommended parameters for ventilation in Scottish healthcare facilities are set out in guidance documents. The relevant guidance at the time of the RHCYP/DCN procurement included SHTM 03-01.

64. The guidance is not in itself mandatory but reflects distilled knowledge and consensus built up over time by those involved in healthcare engineering. Health boards will therefore typically wish to comply with it as a means of satisfying their various legal duties.

65. The policy of the Scottish Government from 2006 was that the NHS in Scotland, when procuring new healthcare facilities, was to use the English Department of Health's Activity Database ("ADB") as an appropriate tool for briefing, design and commissioning (2022 Bundle 3, volume 1, page 125 (2006 design policy); 2022 Bundle 4, page 99 (2010 design policy)). This was, and still is, a mandatory requirement, although alternatives may be used if the ADB is deemed inappropriate for a particular project. In those circumstances, the NHS body is responsible for demonstrating that the alternative is of equal quality and value to the ADB.

66. The ADB system was explained by many witnesses including Mr Maddocks and Ms Grant. It is the latest in a line of standardised hospital design tools used by the NHS in the UK. It is a digital database of hospital design information, including detailed requirements for clinical spaces in hospitals. Having originally been set up by the English Department of Health, it is now run by a private sector company called Talon Solutions Limited.

67. A key feature of the ADB is that it is based on the guidance relevant to the design of hospitals in England, including Health Building Notes (HBNs) and Health Technical Memoranda (HTMs). The contents of the database, which include room data sheets

and room layouts, should therefore automatically comply with that guidance. The database does not automatically comply with Scottish-specific guidance, but there is a large degree of overlap between Scottish and English guidance. The Scottish Government's policy warns that Scottish NHS bodies, whilst required to use the database, also require to take extreme care to ensure compliance with Scottish-specific guidance which the database does not take into account.

68. Room data sheets are the traditional briefing tool for hospital projects. They specify various features to be present in a given hospital room, including environmental parameters to be achieved by its ventilation system. The ventilation parameters appear on a sheet for the room environmental data, along with others such as lighting and noise parameters. An example is given in the appendix to Mr Maddocks' report (2022 Bundle 6, page 88). When room data sheets are generated from the ADB, the ventilation parameters will in most cases be derived from HTM 03-01. For the room types maintained in the database, the intended outcome is that a room data sheet generated by the ADB will automatically contain the appropriate parameters from the guidance applicable to that room. Mr Maddocks explained the history and use of room data sheets, and described them as "*the most critical design document for a designer*" (2022 Bundle 6, page 66).

69. ADB does not contain data for every type of room which a hospital may require. Project-specific requirements for a given room or department may differ from those maintained in the database. It may be appropriate to use parameters which differ from those set out in the underlying guidance. The room data for such project-specific elements will be inserted manually, having been selected on the basis of professional judgment. This process of 'tailoring' the ADB's template room data sheets into project specific room data sheets was explained by Mr Greer (2023 Bundle 13, page 150, paragraph 60). Tailored room data sheets prepared in this way can then be stored digitally for use by those working on the particular project. This need not be done within the ADB itself, and other software packages can be used. Ms Grant's view was

that the use of other software packages may be necessary to encourage client engagement with the brief (2023 Bundle 13, page 470, paragraph 64).

70. Several witnesses spoke to limitations on the ADB system. Some of those are summarised above (it has not historically included parameters derived from Scottish-specific guidance; and it does not include all rooms which a board might wish in a hospital). In addition to those, it was said that the ADB is no longer maintained by the Department of Health, that there was often a time lag between the introduction of new guidance and the ADB being updated to reflect it, and that it sometimes contains information that is inaccurate or incomplete. On the other hand, Ms Grant gave evidence about work now being done by HFS (Health Facilities Scotland, a division of the NHS in Scotland) with Talon to update the database and to produce a suite of repeatable rooms consistent with Scottish guidance (2023 Bundle 13, page 461, paragraphs 34 to 38).

71. To design a ventilation system, an engineer will need to know what parameters the system is to achieve. If not given such parameters, for example in the form of a completed room data sheet, an engineer will have to interpret the relevant technical guidance and may have to make assumptions to determine the parameters to be achieved (Mr Maddocks, Transcript, page 89). In Mr Maddocks' view, the room data sheet is the only way for a client to inform the design team of their requirements; and should be completed by the client or its advisers prior to conclusion of the construction contract (Transcript, page 90). Mr Maddocks considers that room data sheets should be generated *"...early in the briefing and design process"* (2022 Bundle 6, p66). He described the room data sheet as a "*starter for ten*", by which he meant it could be used as the basis for dialogue between clinicians and engineers about the brief (2022 Bundle 6, p67; Transcript, page 92). Mr Poplett said that in reality the process of refining or fully developing the room data sheets will continue until the detailed design has been completed (Transcript, page 147).

72. There was broad agreement amongst the witnesses with experience of hospital construction projects that there were limitations with room data sheets when communicating the parameters of a ventilation system. A typical hospital will contain hundreds of rooms. A room data sheet typically runs to four or five pages. For a hospital of any size, a full set of room data sheets will therefore run to several thousand pages. To facilitate communication about environmental parameters, engineers devised the environmental matrix.

73. An environmental matrix is a spreadsheet which gathers together in one place, for all rooms in a building, certain parameters bearing upon its mechanical and electrical engineering systems. The parameters will typically be abstracted from guidance and be refined through client engagement to reflect project-specific requirements (O'Donnell, Transcript, page 56). The matrix can be used in this way to establish the client's brief for the ventilation system.

74. It is possible in principle for the parameters in the matrix to be derived from the Activity Database, at least insofar as the database includes parameters for the room type in question. Activity Database and environmental matrices are not therefore necessarily mutually exclusive (Greer, 2023 Bundle 13, page 145, paragraph 44; Grant, 2023 Bundle 13, page 471, paragraph 66). However, there does not appear to be any way to automatically populate an environmental matrix with the information contained in the Activity Database.

75. An environmental matrix is not usually intended to completely replace or supplant the room data sheets for all purposes. The room data sheet provides all elements for a room briefing; an environmental matrix summarises only the environmental data. By the time a hospital is built, there should be a completed room data sheet for every room in the hospital. Mr O'Donnell described the environmental matrix as a tool to get through the journey which would conclude with completed room data sheets (Transcript, page 38).

76. The balance of the evidence was that environmental matrices are now commonly used in hospital construction projects. (This was the evidence of Mr Cantlay, Mr Macrae, Mr Greer, Mr Stevenson, Mr McKechnie and Mr Hall, although cf. Mr Maddocks, who could not recall a healthcare project where one was used and did not consider them to be helpful for briefing an engineer about a client's requirements (Transcript, page 88 onwards). Many witnesses spoke to their usefulness and practicality when it is necessary to discuss environmental parameters. Ms Grant explained that matrices are useful in any context where briefing requires consideration of numerous details, and their use is not confined to environmental data. SHTN 02-01 (October 2021) was said now to require the use of an environmental matrix (O'Donnell, Bundle 13, page 278, paragraph 12).

77. However, an environmental matrix for a hospital will typically contain thousands, or tens of thousands, of individual parameters. These have to be entered manually (O'Donnell, para 11; Transcript, page 54). That is so even though many of the parameters will be those recommended in guidance such as SHTMs. The creation of an environmental matrix is therefore a process which involves an inherent risk of data entry error. It does not benefit from the automatic drawdown of guidance-compliant parameters which is available for at least some room data sheets produced from ADB. A further risk is that the summary nature of an environmental matrix means parameters will be listed without the detailed clinical activity which will be apparent from a room data sheet (Greer, 2023 Bundle 13, page 161, paragraph 95). There is therefore scope, if using only an environmental matrix to develop a set of ventilation parameters, that the particular clinical significance of a particular space will be misunderstood.

78. The Chair may wish to consider whether the utility of environmental matrices is sufficient to outweigh the risks of using them. One way or another, an appropriate body of environmental parameters has to be specified for a hospital to be built. In a hospital of any complexity, that is a task which seems likely always to require engineering judgment, discussion amongst stakeholders including the designers and clinicians, and a process of refinement. It is submitted that the Inquiry should be slow to recommend

that engineers do not use a tool which they have devised to facilitate this process and which they have found to be helpful. That is particularly so when there are significant limitations associated with the pre-existing solution (i.e. the room data sheets produced using ADB). The Chair may consider that the key objective is for the client brief to be clearly communicated to those undertaking the design of the ventilation system.

79. The Chair may wish to consider whether there is an issue about the way in which environmental matrices are used. It may be that they are highly practical as tools for certain purposes, for example to form the basis for discussion about environmental parameters with clients and other stakeholders, and when attempting to gain an overview when designing ventilation and other systems. It may not follow that they are necessarily suitable for elevation to contractual significance, as on the RHCYP/DCN project.

80. Related to this, the Chair may consider it important for parties using an environmental matrix to be explicit, and clear, about its function on a particular project. Since matrices, by their nature, contain highly particularised parameters for individual rooms in a hospital, they are plainly capable of being understood as a detailed and finalised brief. If they are not in fact being used for that purpose – for example, being presented only as an example, or as a set of "work in progress" parameters on which no reliance is to be placed – it would reduce the risk of misunderstanding for that to be stated explicitly on the document. Indeed, it may be inadvisable for a procuring authority to issue a set of detailed parameters at all if they do not intend them to be taken as requirements for the project. This was recognised by Ms Goldsmith, whose evidence was that in hindsight NHSL should not have included the Environmental Matrix in the tender documents (Bundle 13, page 435, paragraph 20).

81. The Chair may wish to consider whether other steps might be taken to mitigate the risks associated with the use of environmental matrices. For example, is there a technical solution that would permit an environmental matrix to be populated automatically with

the data from the ADB? Might that be done in a way that ensures an environmental matrix for a project is automatically consistent with its room data sheets? Reviewing, checking and discussing the contents of documents are processes which ought to reduce the scope for error (Mr O'Donnell, Transcript, page 58). Good processes for quality management and document control will contribute to that (Ms Grant, 2023 Bundle 13, page 470, paragraph 64). These are matters with which those involved in construction projects, especially those for complex buildings like hospitals, will already be familiar. It may be that guidance on standardised approaches to matrices may be helpful. The Inquiry heard evidence that the innovation of the room function reference sheet may have been implicated in errors. Whilst well-intentioned, this innovation might in hindsight have been better avoided. Guidance on a standardised approach might help identify the most efficient and helpful form of matrix, whilst reducing the scope for innovation through trial and error.

82. The Chair may also wish to consider whether steps might usefully be taken to ensure the ADB is kept as up to date as possible with applicable guidance.

83. At a more general level, it will be important to ensure that whichever method is used to decide upon environmental parameters for a hospital, it ensures those parameters meet the clinical needs of the hospital and are consistent with applicable guidance. This seems likely to require scope for sufficient engagement between engineers and clinicians to ensure a meaningful dialogue between them, capable of generating a robust set of compliant and suitable parameters. Given the complexity of a modern hospital and the technical guidance applicable to it, it cannot be assumed that the different professions will automatically understand each other.

84. Mr O'Donnell's position was that it would be helpful to have a room naming convention, so that the same room names can be used consistently across technical guidance, schedules of accommodation for new hospitals, room data sheets and matrices used on projects (Mr O'Donnell, Transcript, page 95). This would reduce the

scope for ambiguity and misunderstanding. Ms Grant gave evidence more generally on issues that can arise from terminology (2023 Bundle 13, page 466, paragraph 51).

4. The background to the RHCYP/DCN and the need for a new hospital

85. The original Royal Hospital for Sick Children, Edinburgh, was located at Sciennes near Edinburgh city centre. It was built in 1895 and had several structural developments over the last 100 years.

86. NHSL's Property and Infrastructure Strategy, published in November 2005, identified that the hospital was not fit for purpose:

- 56% of the buildings were non-compliant with fire standards;
- 56% of the buildings were non-compliant with other statutory and non-statutory standards;
- 69% of the property was not in an acceptable physical condition;
- 18% was deemed unfit for its present purpose; and
- 7% of the hospital was overcrowded.

87. The Project Execution Plan of September 2011 records similar information (2022 Bundle 2, page 212).

88. The NHSL Property and Infrastructure Strategy for 2011-15 recognised that the RHSC and DCN required significant modernisation to ensure an appropriate environment for the provision of high-quality paediatric and neuroscience services. Physical building and site constraints, together with practical phasing difficulties, limited the ability to achieve such modernisation in a successful and cost-effective manner on the respective sites.

89. The 2011-15 property strategy concluded that the buildings were no longer appropriate as healthcare facilities in the 21st century. It would have been uneconomic and highly disruptive to adapt the existing sites to achieve the required improvements. Re-location of the RHSC to Little France, Edinburgh, next to the Royal Infirmary of Edinburgh (RIE), would ensure the safest possible hospital care for children. Re-location of DCN to Little France was considered to deliver national clinical strategy to co-locate adult and paediatric neurosurgery on the same hospital site, and also on the same site as Lothian's principal Emergency Department in the RIE.

90. The need for the new hospital is addressed in detail in the Outline Business Case and the Final Business Case.

5. Initial Planning and Preparation

Site Location and Planning

91. In September 2005, the Board of NHSL approved the development of an options appraisal for the reprovision of the Royal Hospital for Sick Children (RHSC) in Edinburgh. The Board noted a need to look at building a new hospital environment as the current facilities were not conducive to 21st Century care.

92. Two possible sites were considered: (a) a site near the Royal Infirmary on the Little France, Edinburgh, Campus, or (b) at St John's Hospital, Livingston. The outcome of appraising the benefits of these options, as well as financial assessment, both favoured a new build hospital at Little France (See para 28 of Ms Cosens' statement).

93. An Initial Agreement for the reprovision was approved for submission to the Scottish Executive Health Department Capital and Investment Group (CIG) in April 2006. The purpose of this document was to seek agreement from the CIG for NHSL to progress to the development of an Outline Business Case (OBC) for the project, as required under the Scottish Capital Investment Manual (SCIM) business case process. The Scottish Executive approved this Initial Agreement in May 2006.

94. In November 2006, the Board of NHSL agreed to the planning of a new RHSC proceeding on the basis of relocation to Little France, co-located with the Royal Infirmary of Edinburgh (RIE). The new hospital would be located with adult and maternity services to provide a gold standard children's hospital. The new RHSC would later come to be known as the Royal Hospital for Children and Young People (RHCYP). At this stage, the Department of Clinical Neurosciences was not part of the Project.

Capital Funded Phase

95. The RIE development at Little France was part of a Private Finance Initiative (PFI) contract signed in 1998 with Consort Healthcare (Consort). A limited range of procurement options were therefore considered appropriate by NHSL for the new hospital.

96. Delivery of the project required ‘enabling works’ by Consort and others as the proposed site was constrained by existing buildings, services and infrastructure. ‘Enabling works’ was the name used to describe the various arrangements required for the new hospital to be located at Little France with the RIE.

97. In April 2008, a procurement workshop with external, specialist advisors and senior NHSL representatives confirmed that a capital procurement was the preferred option. The recommended route in light of the delivery timescales, design development and support from CIG was the utilisation of ‘Framework Scotland’.

98. ‘Framework Scotland’ was a construction framework for use by NHS Scotland bodies in the delivery of capital projects. The objective was for ‘one stop shop’ Principal Supply Chain Partners (PSCPs) to be responsible for delivering both design and construction projects via an integrated supply chain. It was also intended for framework advisors to support the NHS Board under Professional Services Contracts (PSCs).

99. NHSL contracted BAM Construction Limited (BAM) as PSCP under the Framework Scotland regime for the RHCYP project in March 2009. Davis Langdon was appointed PSC project manager and Thomson Gray was appointed PSC cost advisor in January and February 2009 respectively. Mott MacDonald Limited (MML) were appointed as Supervisors for the project in April 2009.

100. In June 2008, the RHCYP OBC was approved for submission to the Board of NHSL and CIG.

101. Interim guidance issued in December 2006, and adopted as national policy in November 2008, included a presumption that all patients in new-build hospitals would be accommodated in single rooms, unless clinical reasons existed for multi-bedded rooms to be available (CEL 48 (2008)). The RHCYP OBC of 1 July 2008 proceeded on the working assumption that at least 50% single rooms would be planned for the project. Discussions with children, young people and their families revealed a desire for a mixture of single and four bedded bays. It was also considered that children, as part of their development, required social interaction and benefited from being cared for with other children. Additionally it was considered that nurse to patient ratios would require to be higher with 100% single rooms due to the dependence of babies and young children. The RHCYP OBC dated 1 July 2008 was later approved to have a mixture of single and shared accommodation for children, to meet the specific needs of that age group. This mixture of accommodation was approved by the Chief Medical Officer in 2008.

The inclusion of the Department of Clinical Neurosciences

102. An Initial Agreement for the Department of Clinical Neurosciences (DCN) was developed in 2008 to address the view that the Western General Hospital accommodation was not fit for purpose. Linking the DCN with the RHCYP project at the RIE was the preferred option. The CIG approved this Initial Agreement in July 2008. The financial appraisal for DCN was still to be completed and there was a requirement for SGHD funding to deliver the project.

103. In 2009, a technical option appraisal exercise for the Little France site identified four options to be considered for the DCN. The principal proposal was to appoint BAM to take forward the design for a joint development of the RHCYP/DCN on 'Car Park B'. This was a car park managed by Consort within the PFI contract.

104. NHSL's Director of Finance, Susan Goldsmith, has given evidence to the Inquiry indicating that the strategic case for a joint build was that it would bring both children's services and adults neurosciences together on to the same site at RIE, providing one major trauma site for NHSL and other health boards who used the service. By joining the RHSC and DCN to the RIE Emergency Department, NHSL could deliver integrated emergency services for all ages on the Little France site, including planning for major incidents and decontamination. With adult and paediatric neurosurgery on site, the combined facilities at Little France met the criteria of a major trauma centre (see para 6 of Ms Goldsmith's statement).

105. The 'enabling works' required for the hospital to be located at Little France with the RIE would later come to be resolved between NHSL and Consort in Supplementary Agreement 6 (SA6) and Supplementary Agreement 7 (SA7). SA6 and SA7 negotiations took approximately two years to resolve (see para 18 of Mr Currie's statement).

106. SA6 was required to secure the land for construction of the RHCYP/DCN on Car Park B. This included the construction of an alternative car park at the Little France site, to allow BAM and Balfour Beatty Construction access to the site earmarked for the new hospital. The site for this alternative car park (later referred to as Car Park F) was proposed as a purchase from Scottish Enterprise of Plots 14-16 in the BioQuarter. The working assumption was that Car Park F would be constructed and operated thereafter by Consort in direct replacement to the existing Car Park B within the PFI contract. SA7 facilitated the required infrastructure for the project, providing for the physical linking of the RHCYP/DCN and RIE, the diversion of utilities under Car Park B, and flood prevention works needed to meet new flood risk requirements (see para 9 of Mr Currie's statement).

107. The site constraints existed when it was a standalone project for the re-provision of RHSC but the physical scale of the project was increased further by the inclusion of

DCN in the Project. This added more pressure on an already constrained site. Despite these constraints, it was NHSL's view that the benefits offered by delivering a major trauma centre, with its safety and quality benefits, adjacencies and proximity to University teaching facilities, outweighed the disadvantages of the constraints (see statement of Ms Goldsmith at para 14).

108. An OBC for the DCN was submitted to the SGHD for approval in November 2009. The preferred option of that OBC was a joint RHCYP/DCN build at Little France, with capital funding.

109. In December 2009, SGHD advised that the need for capital support for the DCN went beyond previously planned capital allocations. NHSL was subsequently advised by SGHD to develop revenue funded options for provision of the DCN. A formal instruction was given to BAM to cease design on the joint build and to progress with the design for the RHCYP on Car Park B.

Change in funding model

110. At a meeting of the Scottish Parliament on 17 November 2010, the Cabinet Secretary for Finance and Sustainable Growth, John Swinney MSP, announced the publication of SG's draft budget for 2011 to 2012.

111. Mr Swinney advised that the Scottish budget would be cut by £1.3 billion. Within that, Scotland's revenue budget would be around £500 million lower and the capital budget £800 million lower. Priority capital projects such as the Forth replacement crossing would proceed. A new programme of infrastructure investment worth £2.5 billion in health, education and transport projects would be supported by revenue finance and delivered using the non-profit distributing (NPD) model. This

would be taken forward by the Scottish Futures Trust (SFT), working with partners across the public sector.

112. The RHCYP and DCN were specifically highlighted as projects to be procured for the new programme using the NPD model. A report for NHSL described NPD as a distinct type of Public Private Partnership (PPP). Under an NPD model, a private company limited by shares was established (the Special Purpose Vehicle or SPV) to enter into a design, build, finance and maintenance contract with the public sector body. There was private sector participation and expertise to deliver public sector infrastructure, but unlike traditional PFI projects, the organisations profits could not be distributed in the usual way and needed to be reinvested by the organisation. The model aimed to retain the benefits of revenue finance, such as optimal risk allocation between the public and private sector partners and performance based payments, while removing the potential for excessive profits. At the time the funding model was changed for the RHCYP/DCN there was only one NPD project underway in NHS Scotland – a mental health development in NHS Tayside.

113. The project and design team engaged through the Frameworks Scotland regime for the standalone RHCYP were 'stood down' to await confirmation of a future role. All knowledge and information produced through the standalone RHCYP design process was captured for future use.

114. The main impact of the change in funding was the change in procurement route available to NHSL. Ms Goldsmith has informed the Inquiry that NHSL's objective was to minimise both the delay to the programme and the abortive and on-going costs. To achieve this, NHSL explored the procurement options with both SFT and SGHD. The preferred option was to utilise the existing design team to complete the design process.

115. The desire to utilise work done on the capital project is understandable. Approximately £2m had been spent by NHSL. However, it is not clear that there was any detailed consideration of whether the design work – including the development of the Environmental Matrix – was suitable for a revenue funded project.

Preparation for the Procurement of the NPD Project

116. Following the change in funding model, and in light of NHSL's preferred option for an integrated facility incorporating both the RHCYP and the DCN in one building, an addendum was required to the RHCYP OBC of 1 July 2008 demonstrating the non-financial benefits for the joint development and detailing the financial analysis. In addition, advisers had to be appointed to provide support to the NPD procurement process, including legal advice, financial advice and technical advice, subject to funding agreement from the SGHD.

117. NHSL appointed MML as Technical Advisor for the revised project with the new funding model in March 2011. NHSL also appointed MacRoberts LLP as Legal Advisers, and Ernst & Young as Financial Advisers.

118. The Business Case Addendum supplementing the 2008 RHCYP OBC and the DCN Initial Agreement, and setting out the options for delivering both reprovision projects on the Little France site using an NPD procurement route, was approved by NHSL and submitted to SG on 23 March 2011. On 21 June 2011, the Acting Director-General Health & Social Care and Chief Executive of NHS Scotland wrote to the Chief Executive of NHSL supporting the Business Case Addendum, giving approval to develop an OBC for an integrated RHCYP and DCN at Little France.

119. The OBC for the revised RHCYP/DCN project was approved by NHSL on 25 January 2012, subject to the approval of SA6 and the transfer of Car Parks B and F, and was submitted to the CIG on 30 January 2012.

120. SA6, transferring Car Park B to NHSL and resolving the enabling works required for the build, was signed on 10 August 2012. On 18 September 2012, NHSL received from the Director General for Health and Social Care and Chief Executive of NHS Scotland confirmation of the approval of the 2012 RHCYP/DCN OBC and approval to proceed to procurement. SA7, representing the remainder of the enabling works, completed in December 2012.

121. In terms of the planning stage, NHSL appointed advisers to assist. They identified a suitable site. While it was a difficult site to build the new hospital on, due to the presence of the existing RIE, there is no information available suggesting that it was unsuitable. There was an obvious benefit to having the new hospital included on the site of the RIE. There is no evidence available to the Inquiry indicating that the choice of site gave rise to an increased risk to patients of environmental organisms causing infection.

6. The Reference Design

122. A reference design was adopted for the Project. The Chair will require to consider whether this contributed to the problems with the Project.

123. An exemplar design is one example of a potential solution that is provided to bidders. Bidders have significant latitude to develop their own proposals. A reference

design provides a more specific solution to bidders. There is an output specification with certain fixed requirements that the procuring authority expects to see in the final design. Both an exemplar design and a reference design are intended to be a springboard for bidders to develop their own design. The key difference is the level of specificity in relation to fixed requirements.

124. NHSL received advice on the reference design from MML. This was addressed in the "Approach to Reference Design" paper produced by MML. The perceived benefits of the reference design were: (1) a reduction in the timescale for the procurement exercise, (2) a reduction in clinical user consultation, and (3) greater certainty as to the final solution.

125. The "Approach to Reference Design" paper noted that for the NPD project, there would be a requirement for a more complete set of room data sheets. Originally, room data sheets were to be produced by NHSL (2023 Bundle 2, page 21). A decision was taken that room data sheets would not be provided. Rather, bidders would be required to develop their own room data sheets.

126. NHSL did not use room data sheets as a briefing tool prior to awarding the Project Agreement. It had produced a bespoke database of room data sheets, but these were not used to populate the Environmental Matrix and NHSL took no steps to ensure that they were. Further, NHSL's position is that the Environmental Matrix was not to be relied upon so it cannot be taken as a brief. In these circumstances, it is not clear that by conclusion of the Project Agreement NHSL had provided an adequate briefing of their requirements for environmental parameters. The Chair may wish to consider whether this approach complied with CEL 19 (2010), which required boards to develop a clear brief and to use ADB, or an alternative of equal quality and value, to do so. The evidence of Mr O'Donnell, that the Environmental Matrix was at least equivalent in value to room data sheets produced by the ADB system, is relevant to this issue, but the

significance of that may be much reduced if NHSL did not intend the Environmental Matrix to be taken as its brief.

127. NHSL's Finance and Performance Review Committee approved the use of a reference design. The decision to use a reference design was a departure from the usual approach for revenue funded projects. The evidence does not indicate that it was inappropriate for this specific project. However, the Chair will wish to consider whether NHSL's requirements were clearly conveyed in the procurement exercise.

128. The Chair may wish to consider the perception that the reference design would reduce the need for consultation with clinicians. It would only do so to the extent that bidders were entitled to rely on the reference design as a statement of NHSL's requirements. To the extent that the reference design, or parts of it, were supplied for information only, it may not be realistic to expect any reduction in the time needed for engagement between clinicians and designers. Time would still be needed to ensure that the authority's actual requirements were understood and would comply with applicable guidance. Mr McKechnie described the limited input from clinicians during the procurement phase to be unusual. That was also the position of Mr O'Donnell.

129. NHSL's intention was for the design risk to sit with the private sector partner with the exception of "operational functionality". That reflected the structure of the SFT's standard form agreement for NPD projects. There is an issue as to whether this was communicated to bidders with sufficient clarity in the particular context of the environmental matrix.

7. Errors in the Environmental Matrix

130. Hulley & Kirkwood (H&K) were the engineers appointed to act on the Project at the initial capital funded stage. H&K were asked at a design team meeting on 14 December 2009 to develop a bespoke environmental matrix. The project was at that stage for a capital-funded RHCYP excluding the DCN. The matrix was to be used as a basis for discussing environmental parameters. That was to be part of a process for generating a full set of room data sheets for the hospital, to be included in the construction contract (e.g., 2023 Bundle 12, volume 1, page 73; O'Donnell, Transcript, page 38).

131. NHSL had arranged for the production of a set of ADB sheets for the project, which H&K received in April 2010. These were dated September 2009 and marked as drafts. NHSL, in a note to the Inquiry, described them as having been developed following "*significant consultation with the clinical user groups*" (2023 Bundle 12, volume 1, page 72). Mr O'Donnell's evidence was that the sheets H&K received showed that room types had been chosen to form departments in the new hospital, but that the associated environmental data for those rooms did not appear to have undergone a detailed technical review. The environmental data was, in his view, neither complete nor consistent with the latest technical ventilation guidance in place at the time (the English HTM 03-01 from 2007) (Transcript, page 14 onwards).

132. For those reasons, H&K did not use the environmental data from the ADB sheets to produce their environmental matrix. It was produced by an engineer manually inputting data into a spreadsheet.

133. There does not appear to have been any record kept as to why NHSL considered that the Environmental Matrix – produced by an engineer manually inputting values into a spreadsheet – was of equivalent quality and value to room data sheets produced

using ADB. No witness has provided evidence on this point. There is therefore a live issue as to whether this approach was compliant with CEL 19 (2010). It should be kept in mind, however, that this particular edition of the matrix was intended by Mr O'Donnell as a method of arriving at a set of room data sheets to be included in the capital-funded contract. That way of proceeding was interrupted by the decision to fund the project in an NPD structure and to provide the Environmental Matrix to bidders as part of a reference design.

134. The first version of H&K's matrix is dated September 2010 (2023 Bundle 4, page 42). It was produced "*for easy reference as a user sign-off tool*" (O'Donnell, Transcript, page 20). Mr O'Donnell explained that a matrix needs to be discussed with clients (i.e., NHSL as ultimate user of the hospital) to ensure intended room functions are properly understood and that appropriate environmental parameters are chosen to meet those intentions (Transcript, 21). The objective at that time was for the parameters in the matrix to be agreed with NHSL by financial close (Transcript, 24).

135. This version of the environmental matrix included guidance notes drawing attention to HTM 03-01 and its recommended air change rate of 10 ac/hr for the high dependency unit and critical care areas (2023 Bundle 4, page 43, guidance note 14). The comparable Scottish guidance at the time (SHTM 2025) did not feature recommended air change rates albeit it did make reference to the ADB (2022 Bundle 1, p41 and 222). In the section of the matrix setting parameters for particular rooms, an air change rate of 10 ac/hr was set for multi-bedded areas in the critical care department. For the single bed cubicles in critical care, the matrix provided for 4 ac/hr (2023 Bundle 4, page 46). Mr O'Donnell regarded this as a mistake, and said that the air change rate for those rooms should have been 10 ac/hr (Transcript, page 42).

136. That mistake was corrected in H&K's second version of the matrix, dated 22 December 2010, in which the air change parameter for single bed cubicles is 10 ac/hr (2023 Bundle 4, page 64).

137. After the announcement that the RHCYP project was to be combined with the DCN, and funded in an NPD structure, H&K were engaged to produce an environmental matrix as part of the reference design. Three versions of H&K's reference design matrix are available to the Inquiry, dated 3 February 2012 (2023 Bundle 4, page 77), 13 March 2012 (2023 Bundle 4, page 103) and 19 September 2012 (2023 Bundle 4, page 131). The last of these was the version included in the ITPD and ISFT documents issued by NHSL during the procurement exercise.

138. Each of these versions of the matrix includes the guidance note referring to the recommended air change rate of 10 ac/hr for rooms in HDU and critical care, but with the reference to HTM 03-01 having been revised to refer to SHTM 03-01 (2023, Bundle 4, pages 78, 104 and 132, guidance note 15). SHTM 03-01 had been published in October 2011 (2023 Bundle 13, page 291, paragraph 41).

139. Each of these versions of the matrix also includes a "Room Function Reference Sheet". This was an innovation by H&K. It was a list of the repeatable room types which were used throughout the more detailed part of the matrix, together with the environmental parameters for those room types. H&K's intention in creating it was, by summarising the room types into a shorter list, to make the process of reviewing the matrix easier and more streamlined. It was hoped that this would encourage feedback on the matrix, very little of which had been received on the matrix they had produced during the capital-funded phase (O'Donnell, Transcript, page 71).

140. The room functions in the room function reference sheet correlated with, and were derived from, the schedule of accommodation for the hospital. That was the document produced by the architects to list the rooms which the hospital was to contain. Those room functions were not the same as the room functions used in SHTM 03-01 as the basis for its recommended ventilation parameters (O'Donnell, Transcript page 72).

141. The room function reference sheet in these versions of the matrix included the following room functions: “Bedroom” (with an air change parameter of 4 ac/hr) and “Multi-bed wards” (4 ac/hr). The first version of the reference design matrix also included the room function “HDU” (10 ac/hr) (2023, Bundle 4, pages 79, 105 and 133). H&K used the term “HDU” because it was the term used in the schedule of accommodation, and understood it as a synonym for a critical care area (O’Donnell, Transcript, page 77).

142. The parameter of 4 ac/hr for bedrooms and multi-bed wards differed from the recommendation in Table A1 of SHTM 03-01 for general wards and single rooms, which was 6 ac/hr (e.g., 2023, Bundle 1, page 473). This was, however, a deliberate choice which Mr O’Donnell considered to comply with the overall tenor of the guidance, which permitted natural ventilation for general ward areas (Transcript, page 70).

143. The room functions from the reference sheet, and their associated parameters, were used to populate the part of the matrix setting out the rooms in each department. In the section for department B1 (Critical care/HDU/Neonatal Surgery), each of the bedded areas (except those for isolation facilities) is given a room function of either “Bedroom” or “Multi-bed wards” with the associated air change rates stated for them in the room function reference sheet. The listed air change rates for those bedded areas is accordingly 4 ac/hr in each case (2023 Bundle 4, pages 81, 107 and 135). The “HDU” room function was unused in the main body of the spreadsheet.

144. Mr O’Donnell confirmed that the use of the “Multi-bed wards” room function in the critical care area, and its associated parameter of 4 ac/hr instead of 10 ac/hr, was an error (Transcript, page 78). It was inconsistent with both the guidance note and with Table A1 in SHTM 03-01, which referred to 10 ac/hr for critical care areas. It was not an intended derogation from the guidance and, if H&K had been aware of it, they would

have corrected it rather than seek a derogation in respect of it. The use of the "Bedroom" room function reintroduced the erroneous parameter of 4 ac/hr for single bed areas.

145. Support for the conclusion that the selection of 4 ac/hr for critical care rooms was indeed an error may be drawn from a Thermal Comfort Analysis report prepared by H&K on 17 February 2012 (2023 Bundle 4, page 283). This was produced to demonstrate that NHSL's preferred upper temperature limit of 25°C could be achieved with a mixed-mode ventilation approach. The analysis was confined to rooms with lower intended air change rates: as the report states, "*critical care and high dependency type wards rooms which receive air change rates in the region of 10 ACH, have not been analysed in this study*" (ibid., page 293; O'Donnell, Transcript, page 89 onwards). That may be taken to confirm that the critical care and high dependency wards were intended to have 10 ac/hr. It should be noted, however, that Mr McKechnie's evidence was that in critical care departments, 10 ac/hr was needed only for isolation rooms; if that view is correct, the foregoing quotation from the report may be taken to refer only to isolation rooms and to reveal nothing about the intended air change parameters for other rooms in the critical care department (Transcript, page 156).

146. This error was similar to the one which had existed in the first version of the environmental matrix, but which H&K had detected and corrected in the earlier iterations of the matrix. When asked if he could explain why the error was detected previously but not on this occasion, Mr O'Donnell thought perhaps the room function reference sheet had "*blinded*" him and others to the error (Transcript, page 79). For that reason, he thought room function reference sheets should not be used (Transcript, page 80).

147. The second version of H&K's reference design environmental matrix (13 March 2012) bears to have been "*Revised to suit NHSL comments*", implying that its contents had been discussed with them at least to some extent (2023 Bundle 4, page 103).

148. On 16 March 2012, H&K contributed to a statement that the reference design complied with SHTMs and HTMs (2023 Bundle 4, page 324). In light of the error in the specified air change rates for critical care bedded areas, Mr O'Donnell accepted that the statement was incorrect, although the guidance note and room function reference sheet correctly reflected the guidance (Transcript, page 86).

149. The third version of H&K's reference design environmental matrix (19 September 2012) was revised to reflect an updated schedule of accommodation but H&K were not asked to update their compliance statement (Transcript, page 86). The errors remained in it.

150. Having produced the environmental matrix for the reference design, H&K were not then involved in the procurement process. That was so that they could, if they wished, join a bid team (O'Donnell, Transcript, page 81). It meant that they were not involved in preparing the tender documents to be issued by NHSL which included H&K's environmental matrix as part of the reference design. Nor were they available to deal with queries about the reference design. Mr McKechnie described it as not "*a great idea to have somebody prepare … a reference design and not keep them in place*" (Transcript, page 119). Mr O'Donnell understood that the reference design environmental matrix was being prepared only for information and was not intended to be prescriptive (Transcript, pages 75 and 81).

151. Mr McKechnie's evidence was that Wallace Whittle (engineers engaged by IHSL) understood the reference design environmental matrix sent out with the tender

documents to be the client brief (Transcript, page 56 onwards). He understood, however, that if there were ambiguities in the environmental matrix, or between it and the SHTMs, it was one of Wallace Whittle's responsibilities to bring those to the attention of NHSL (Transcript, page 76). Wallace Whittle were asked, and agreed with misgivings, to take on the matrix as a Wallace Whittle document (Transcript, page 79).

152. Wallace Whittle reviewed certain key parameters in the matrix during the procurement phase. Whilst this did not include detailed consideration of every room, it did include rooms with specialised ventilation requirements (McKechnie, Transcript, page 14 to 16). Mr McKechnie did not recall picking up any anomalies during the competitive dialogue phase (page 17). IHSL, based on Wallace Whittle's input, indicated during the tender process that they did not envisage making changes to the environmental matrix.

153. During the preferred bidder period, from around July 2014, Wallace Whittle made some changes to the environmental matrix (McKechnie, Transcript, p101 onwards). These were, for the most part, in response to comments made about the matrix by, or on behalf of, NHSL. That approach was consistent with an understanding that the Environmental Matrix was NHSL's brief. Mr McKechnie's understanding was that NHSL retained responsibility for those parameters which had been included in the reference design matrix and remained unchanged (Transcript, page 109).

154. The queries raised by NHSL included noting apparent discrepancies between the environmental matrix and SHTM guidance. These included (a) the matrix's requirement of 4 ac/hr in bedrooms, compared to the SHTM requirement of 6 ac/hr, and (b) the matrix's requirement of positive pressure in single bedrooms, compared to the SHTM requirement of balanced or negative pressure (2023 Bundle 4, page 218).

155. If those comments are read against Table A1 in SHTM 03-01 (2023 Bundle 1, page 287), it might be thought they were concerned with "standard" single rooms (for which the SHTM recommendation is 6 ac/hr and balanced or negative pressure), and that they were not concerned with rooms in critical care (given the recommendation in Table A1 of 10 ac/hr and positive pressure for such areas). Mr McKechnie's understanding, however, was that the comment concerned all single bed rooms in the hospital, whether in critical care or not, because in the context of these discussions about single room ventilation, no distinction was drawn between departments (Transcript, page 122 onwards; especially page 134). Mr McKechnie placed weight on the fact that balanced pressure in the single rooms was what NHSL's infection control team required (Transcript, page 143). It did not occur to him that the significance of air pressure for infection control might be different for critical care bedrooms than for normal bedrooms (Transcript, page 166).

156. As noted already, the parameter of 4 ac/hr in 'standard' single rooms instead of 6 ac/hr was intended by NHSL as part of its mixed-mode ventilation strategy. On NHSL's comment about pressure in bedrooms, Wallace Whittle's response was to amend the environmental matrix to show balanced pressure in single bed rooms (2023 Bundle 4, page 219).

157. Wallace Whittle produced an environmental matrix on 31 October 2014 (2023, Bundle 4, page 220). This added a guidance note to explain the design philosophy in single bedrooms being "mixed-mode", allowing the mechanical ventilation load to be reduced to two thirds (i.e., 4 ac/hr instead of the recommended 6 ac/hr) (guidance note 26). In the room function reference sheet, the pressure parameter for "Bedroom" was changed from "Positive" to "Balanced". The pressure parameter for "Multi-bed wards" was left unchanged, as "Positive". For both, the air change parameter was left as 4 ac/hr. These parameters were applied throughout the matrix wherever those room functions were used. That included in the critical care department, where the stated requirement for single bed areas was thus for balanced pressure and 4 ac/hr, and for multi-bed areas was positive pressure and 4 ac/hr. In addition, Wallace Whittle

removed the room function of HDU from the room function reference sheet on the basis it was not used in the department sheets. They retained the guidance note about air change rates of 10 ac/hr for HDU and critical care (page 221, guidance note 15).

158. The position at this stage was, therefore, a matrix with the following features:

- A guidance note referring to SHTM 03-01 as recommending 10 ac/hr for HDU bed areas and critical care areas, without any explicit indication this was limited to isolation rooms
- No room function option for "HDU"
- A room function option for isolation bedrooms with a reference to HBN4 and, separately, a reference to 10 ac/hr for those rooms
- Critical care single rooms with 4 ac/hr and balanced pressure
- Critical care multi-bed wards with 4 ac/hr and positive pressure

159. The air change rate of 4 ac/hr for single rooms and multi-bed wards in critical care were, on Mr O'Donnell's evidence, errors when they appeared in the H&K reference design environmental matrix. Mr McKechnie did not regard them as such. This was because he construed the recommendation in Table A1 of SHTM 03-01 for critical care (10 ac/hr and +10 pascals pressure) as not applicable to critical care areas in general, or even to patient areas in critical care departments, but only to isolation rooms within critical care. On that basis, he construed guidance note 15 as referring only to isolation rooms, and considered the requirement for 4 ac/hr for particular bedded areas in critical care to be consistent with both the guidance note and SHTM 03-01.

160. As for the matrix's requirement of balanced pressure for single rooms in critical care, that could be said to conflict with the recommendation for critical care areas in Table A1 of SHTM 03-01, of positive pressurisation. Once again, though, on Mr McKechnie's approach there is no such conflict because on that interpretation the recommendation is intended only for isolation rooms and not all patient areas in critical

care. Mr McKechnie also drew support from the fact that he could find no reference in NHSL's clinical output specification for critical care to pressurised rooms being required, except for isolation facilities (Transcript, page 146).

161. Prior to financial close, Mr McKechnie was not aware of anything, apart from the environmental matrix itself, to confirm that NHSL had made a conscious choice to have 4 ac/hr in critical care (Transcript, page 152 to 159). He agreed, contrary to initial suggestions by other witnesses, that H&K's thermal comfort report (Bundle 4, page 184) did not provide such support (Transcript, page 154; cf. Hall, Transcript, page 64 onwards). He did not believe any of the energy use calculations assumed there would be 4 ac/hr in single bed rooms (Transcript, page 158; cf. Hall, Transcript, page 69 onwards).

162. The Chair may wish to consider the merits of Mr McKechnie's interpretation of SHTM 03-01. It may be of some significance that two engineers involved with the matrix (Mr McKechnie and Mr O'Donnell) had differing views about what that guidance requires. The difference in opinion still endures. Competing interpretations of SHTM 03-01 and the environmental matrix may bear upon the way in which issues were handled during the construction phase of the project. Since that phase is to be explored in the third part of the Inquiry's hearings into the RHCYP/DCN, the Chair may wish to avoid reaching a concluded view on these issues at this stage. The Chair may also wish to consider whether, if the guidance is reasonably open to heavily divergent interpretations, it is sufficiently well expressed to achieve its purpose.

163. In considering these matters, the chair may also wish to consider the following:

- SHTM 03-01, in making provision for specialised ventilation, deals separately with critical care/high dependency units (on the one hand) and isolation facilities (on the other). It provides that the requirements of specialised ventilation apply to "*critical*

care areas and high-dependency units ***<u>of any type</u>***" (paragraph 7.2, emphasis added).

- Table A1 of SHTM 03-01 (e.g., Bundle 1, page 287) has separate entries for critical care areas and ward isolation rooms, without any express indication that the former is intended to refer only to isolation rooms.

- SHTM 03-01 is explicit in the context of its recommendations for specialised ventilation that one of the functions of air supply to a room is the dilution of airborne contaminants (paragraph 7.6). It might be inferred that in recommending air change parameters for critical care areas in Table A1, SHTM 03-01 did so in part for the protection of patients accommodated there, a view with which Mr McKechnie appeared to disagree, considering that the air change recommendation was more concerned with helping achievement of the requisite pressure arrangements (Transcript, page 27 onwards).

- The basis cited by Mr McKechnie for his view being, first, that SHPN 4, Supplement 1 (to which Table A1 refers for ventilation parameters in ward isolation rooms) did not apply to critical care, and, second, that a critical care department required rooms of different types and it was unreasonable to assume that all required the same ventilation arrangements (Transcript, page 25 onwards).

- The clinical output specification for the critical care department (the version of which from the contract is at 2023 Bundle 5, page 376), which Mr. McKechnie took to indicate pressurised facilities were needed only for isolation cubicles. In a section headed up "*Environmental and Services Requirements*" it noted that lobbied single bed isolation cubicles were required, and needed pressure control with positive pressure lobbies. That section also noted that "*Flexibility in the use of Critical Care beds for both High Dependency and Intensive Care is key to maintaining efficient use of high specification beds. All three Critical Care Areas must be co-located"*; and "*All PICU and HDU bed spaces are required to be of the same specification to allow greatest flexibility of use*". The Chair may wish to consider whether those latter references might be taken to indicate a requirement for a ventilation specification at the highest level appropriate for non-isolation rooms in critical care.

164. The Chair may also wish to consider whether there should be any recommendations made in relation to the input that clinicians/ Infection Prevention and Control personnel should have when room functions are being determined.

8. The Procurement Exercise

165. The procurement exercise is addressed in detail in PPP 3 (volumes 1 and 2). NHSL adopted the competitive dialogue procedure. The competitive dialogue procedure was appropriate for the Project. It allowed NHSL to discuss complex aspects of the Project with prospective tenderers, in order to seek to ensure that a solution was provided to meets its needs.

166. The Chair will require to assess whether there were problems with the implementation of the procurement exercise. The Chair is invited to find that there was ambiguity, and inconsistency, in the procurement documents provided to tenderers which contributed to problems with the Project. The Chair should be aware that this issue is controversial and a number of CPs dispute that any such finding should be made.

167. Issues the Chair may wish to consider include:

- The role of advisers
- The clarity of the procurement documentation including the mandatory requirements
- The tender submitted by Bidder C
- The intensity of review of tenders
- The period to Financial Close

The Role of Advisers

168. NHSL did not have the internal expertise to produce the detailed procurement documentation including the specification setting out the required technical information. They engaged MML as lead technical adviser to assist. MML was engaged to produce the Invitation to Participate in Dialogue (ITPD). MML required to produce the reference design information and to check the reference design for compliance with all appropriate NHSL and legislative guidelines and requirements. MML also required to assist with the evaluation of tenders.

169. H&K were engaged as the engineers tasked with producing the reference design Environmental Matrix, the final version of which was included in the ITPD. As outlined above, H&K were not available to provide input in advance of the contract being concluded. This meant that there was no scope for potential tenderers to raise with H&K why values in relation to critical care rooms were lower than those set out in SHTM 03-01. The Chair may wish to consider whether this contributed to the risk of errors not being resolved before financial close.

170. MML checked with H&K that the work they had undertaken complied with published guidance, including SHTM03-01. The assurance was sought, and provided, approximately six months before H&K finished working on the Project.

171. During the procurement exercise, MML conducted "spot checks" on the tenders submitted. There was no detailed review of material provided. This is addressed further below.

The clarity of the procurement documentation including the mandatory requirements

172. The Chair is invited to find that the procurement documentation (namely the ITPD and the ISFT) contained ambiguous, and inconsistent, provisions in relation to the specification for the ventilation system. In particular, there was a lack of clarity as to whether the Environmental Matrix was a draft document that could not be relied on or a fixed client brief. This resulted in confusion as to NHSL's requirements for the ventilation system.

173. The Chair should be aware that this matter is controversial. In their responses to the PPPs, various CPs (including NHSL, Multiplex ("MPX") and MML) all contend that the procurement documentation was clear and unambiguous. However, the CPs put forward radically different views as to what was required of tenderers.

174. NHSL and MML maintain that the procurement documents clearly required compliance with SHTMs and no reliance could be placed on the Environmental Matrix. They contend it was described as a "draft" and that the hierarchy of standards (provision 2.5) meant that SHTMs would always take precedence over any lower standard. They also point to the fact that the environmental matrix was developed by MPX/ IHSL in the period to financial close and thereafter. Therefore, it could not be seen as a fixed specification.

175. MPX and IHSL maintain that there was a clear requirement for the Environmental Matrix to be complied with. Where values in the spreadsheet differed from SHTMs, the spreadsheet entries took precedence. They point to provisions identifying the environmental matrix as a source of Room Information for inclusion in room data sheets. They highlight that compliance with the Environmental Matrix was a stated requirement with any derogations being specifically highlighted. They also point to the statement in the guidance note of the Environmental Matrix which states

that it was being used in substitution for room data sheets produced using ADB. Therefore, they contend it was the client brief.

176. Notwithstanding the views expressed by CPs, the Chair is invited to find that the language used in the procurement documents was ambiguous, and inconsistent, such that they could not be interpreted uniformly by the reasonably well informed and ordinarily diligent tenderer.

177. Volume 1 of the ITPD set out general guidance for tenderers. Volume 3 of the ITPD contained the Board's Construction Requirements. Broadly similar requirements are set out in the Invitation to Submit Final Tenders (ISFT).

178. In volume 1 of the ITPD, the "Environmental Matrix" was defined as:

"…the matrix contained in ITPD Volume 3, Schedule Part 6, Section 3, Appendix C"

179. The Chair may consider it significant that the Environmental Matrix was defined as the specific document contained in volume 3, appendix C. That was a well-populated document rather than a blank pro forma that required to be populated by tenderers. At no point in the definition section is there any reference to the Environmental Matrix being a draft or a document that required to completed or revised by prospective tenderers.

180. In Volume 3 of the ITPD, the Environmental Matrix is defined as:

*"… the Environmental Matrix, **which details the room environmental condition requirements of the Board required within each department / unit / space / area.** The title is Reference Design Envisaged Solution – RHSC / DCN Environmental Matrix version third issue as set out in Appendix C of this Section 3 (Board's Construction Requirements) of Schedule Part 6 (Construction Matters) (as varied, amended or supplemented from time to time in accordance with the Project Agreement);"*

[Our emphasis]

181. The defined term again refers to the specific document included in Appendix C. This is stated to detail *"…the room environmental condition **requirements** **of the Board**…"*. The Chair may consider this wording to be significant. As a matter of ordinary language, it indicates that the Environmental Matrix was a document created by NHSL which outlined its requirements. It is therefore perhaps understandable that MPX/ IHSL interpreted the document as a "client brief". It is difficult to understand how a tenderer could be expected to know, or create, the "requirements of the Board".

182. The term "Environmental Matrix" is not described in the definitions section as a "draft". While there are further provisions that potentially indicate that the Environmental Matrix was a draft, the Chair may consider that this was not clearly, and consistently, conveyed to tenderers in the published documents.

183. Volume 1, paragraph 2.5, set out the "Reference Design and Mandatory Reference Design Requirements". The mandatory elements concerned "Operational Functionality". The Environmental Matrix was not listed as a mandatory requirement. This supports the view that the Environmental Matrix was not a fixed document or a client brief. However, such a view is inconsistent with the manner in which the document was defined.

184. Volume 1, paragraph 2.6, is entitled "Indicative Elements of the Reference Design". It states that *"…other information has been generated both as a by-product of preparing the Reference Design itself and as a general Project requirement".* This included: *"Building services engineering solutions*". The ITPD stated that:

"Such information is issued to the Bidders for "information only" so that they may understand the intent of the Reference Design."

185. On one view, this communicated to prospective tenderers that the Environmental Matrix was included for information only and could not be relied upon. However, that is inconsistent with the definition section in Volume 3 which outlines that the Environmental Matrix contains NHSL's requirements.

186. Volume 1, C 8.2 states that:

"The following information should be also be provided to help demonstrate the design proposals noted above, including:

…

x. An environmental conditions / room provisions matrix for both mechanical and electrical services for each room in the Facilities…"

187. This indicates that it is for bidders to develop, and submit, their own Environmental Matrix. This provision is inconsistent with the Environmental Matrix being a fixed brief for tenderers.

188. Volume 1, C8.3 provides that:

"Whilst Bidders are required to undertake their own design, ***the Board has provided a draft Environmental Matrix*** *as part of the ITPD documentation.* ***Bidders must confirm***

acceptance of the Board's Environmental Matrix, highlighting any proposed changes on an exception basis*."* [Our emphasis]

189. This is the first time that the Environmental Matrix is described as a "draft". This is inconsistent with the definition of the document which indicates it is a document setting out NHSL's requirements.

190. Volume 1, C21 provides that:

"Bidders must confirm their compliance with the Board's Construction Requirements. If as their design has been developed there are specific areas of the Board's Construction Requirements that Bidders would seek to change, these shall be scheduled and provided in support of the statement. The Board shall not be required to accept any proposed amendments."

191. This indicates that, broadly, the Board's Construction Requirements (which include the Environmental Matrix) should be followed. Any changes were to be raised and agreed by NHSL.

192. There are further relevant provisions in Volume 3. The Project-wide requirements were stated to include the provision of: *"…high-quality, patient-centred services from modern Facilities."* (Bundle 2, p791). Bidders were to comply with this "*general ethos*" while also addressing the detailed requirements.

193. The ITPD provided that:

"Project Co shall ensure that the design of the Facilities draws upon and endeavours

to further develop, improve and exceed current best practice (and Good Industry Practice) standards achieved in other similar schemes, and meets the requirements of the prospective patient groups, staff and the public."

194. The Chair may consider the requirement to "*improve and exceed current best practice (and Good Industry Practice) standards…*" is significant. It is not clear how a tenderer could seek to meet this general ethos without checking that the ventilation requirements in the Environmental Matrix it included as part of its tender complied with (or exceeded) best practice guidance. Given that the SHTMs are described as "*best practice*" guidance, it is not clear how the general ethos could be complied with without a tenderer checking that the ventilation requirements complied with (or exceeded) SHTM03-01.

195. Paragraph 2.2 (b) stated that Project Co required to ensure that Facilities complied with a range of requirements. These included:

"Adherence to the requirements set out in CEL 19 (2010) "A Policy for Design Quality for NHSScotland, 2010 Revision published by the Scottish Government;"

196. Given that CEL 19 (2010) required ADB to be used as a design and briefing tool, it is not clear how a tenderer could comply with this requirement without using ADB (or an equivalent which they had demonstrated to be equal in quality and value) to produce the ventilation requirements. Doing so could potentially have flagged the problems with critical care rooms in the Environmental Matrix.

197. Paragraph 2.3 is entitled "NHS Requirements". It provides that:

"In addition to the standards listed in paragraph 2.4 of this Sub-Section C, ***unless the Board has expressed elsewhere*** *in the Board's Construction Requirements, a specific and different requirement,* ***the Facilities shall comply with but not be limited to the provisions of the NHS Requirements*** *as the same may be amended from time to time:*

…

h) HTM and SHTM;

…

p) Health Department Letters (or Management Executive Letters) as appropriate published by SEHD and SGHSCD…"

[Our emphasis]

198. This is a general requirement to comply with SHTMs. However, compliance is not required if NHSL has expressed a specific and different requirement. On one view, the Environmental Matrix is a specific and different requirement. If the intention was for there to be absolute compliance with SHTMs, this could have been stated. It is not clear from the available evidence that there would ever be a situation where NHSL would want a different requirement. This could have been clearly stated to avoid ambiguity. The Chair may consider that the language used in this provision contributed to creating confusion and ambiguity as to the ventilation requirements for the hospital.

199. The Chair should also consider the terms set out in the section entitled "Health Technical Memoranda & Scottish Health Technical Memoranda (HTM & SHTM)". This provides that:

"Project Co shall, in relation to all SHTM and all HTM (except HTM where an SHTM exists with the same number and covering the same subject matter): take fully into account the guidance and advice included within such SHTM and HTM; ensure that the Facilities ***comply with the requirements of such SHTM and HTM****; and adopt as mandatory all recommendations and preferred solutions contained in such SHTM and HTM."*

[Our emphasis]

200. The provision is stated in absolute terms. There is no qualification that the guidance should only be complied with unless a contradictory standard is set out elsewhere. This sits uneasily with the provision outlined above that requires compliance with SHTMs unless a contradictory standard is stated. The Chair may consider that there is an inconsistency between these sections.

201. The concept of "compliance" also appears ambiguous. The Inquiry has heard evidence that the SHTMs are guidance that is open to interpretation and that engineers would not necessarily offer the same view on what "compliance" means. This is exemplified by the difference in views between Mr McKechnie and Mr O'Donnell. Mr O'Donnell considered that the values in the Environmental Matrix did not comply fully with SHTM 03-01 as all rooms in critical care did not have 10 air changes per hour. However, Mr McKechnie interpreted SHTM 03-01 as only requiring 10 air changes in isolation rooms in critical care.

202. When it comes to recommendations, the Chair may wish to consider whether the guidance is sufficiently clear about the standards to be achieved, and whether a requirement of "compliance" with guidance is sufficiently specific to identify what the procuring authority wants.

203. The Chair should also note the section in the ITPD entitled "Scottish Government Health Directorates Circulars (CEL and HDL)". This provides that:

"Project Co shall, in relation to all CEL and HDL take fully into account the guidance and advice included within CEL and HDL. Project Co shall ensure the Facilities comply with the requirements of CEL and HDL and shall adopt as mandatory any recommendations."

204. CEL 19 (2010) requires the ADB system to be used as a design and briefing tool or an equivalent system. If the ADB system had been used, the discrepancy between the values in critical care rooms, as compared with the Environmental Matrix, may have become apparent.

205. Volume 1, paragraph 2.5, contained a provision entitled "Hierarchy of Standards" which is relevant to the analysis of the clarity of the drafting. It provides that:

*"**Where contradictory standards / advice are apparent within the terms of this Section** 3 of Schedule Part 6 (Construction Matters) and the Appendices then subject to the foregoing paragraph then (1) **the most onerous standard / advice shall take precedence** and (2) the most recent standard / advice shall take precedence. When the*

more onerous requirement is to be used the Board will have the right to decide what constitutes the more onerous requirement.

Where there is a conflict of interest resulting from the use of the standards / advice Project Co shall involve the Board in the decision making process. The Board shall be entitled to make the final decision regarding the standards / advice to be used for the Facilities including any contradictions that may arise between items (1) and (2) above."

[Our emphasis]

206. The most onerous standard is stated to take precedence where there is contradiction. This is relevant at two levels. At a general level, if there was a disconnect between the Environmental Matrix and SHTMs, with the latter setting a more onerous standard, the values in the SHTMs should arguably take precedence. Moreover, the Environmental Matrix itself contained internal inconsistencies. The correct values for critical care areas were outlined in the "Guidance Notes" section. However, different values were stated in relation to certain critical care areas. On one view, the hierarchy of standards clause should have required a tenderer to apply the more onerous standard set out in the "Guidance Notes" section if a tenderer considered that the Environmental Matrix was a derogation from the general requirement to comply with published guidance. There is also a competing view, that the hierarchy provision was intended to resolve a conflict between two sources of guidance, and not to override what was presented as a requirement of the board.

207. Confusion is introduced by the terms of Volume 1, section 2.5.3. It sets out the requirements for the production of Room Data Sheets and mentions the Environmental Matrix as a source of 'room information' to be used to compile room data sheets:

"Standard format Room Data Sheets have not been prepared by the Board for the Project. ***The specific room requirements (the 'Room Information') are detailed in*** *a combination of the following documents*

…

The Environmental Matrix;

…"

[Our emphasis]

208. As a matter of ordinary language, tenderers were told that the room requirements were contained within the Environmental Matrix. This statement indicates that the document contained NHSL's requirements and could not simply be ignored by tenderers. The wording is inconsistent with other provisions in the ITPD. Given the inconsistency, the Chair may consider that there was ambiguity in relation to the status of the Environmental Matrix and whether it could be relied upon by tenderers as a source of relevant information and/ or was akin to a client brief.

209. NHSL did not produce room data sheets for the procurement stage. However, paragraph 3.6.3 stated that:

"For the avoidance of doubt, Project Co shall provide mechanical ventilation, comfort cooling and air conditioning ***to suit the functional requirements of each of the rooms in the Facilities****. Irrespective of the ventilation requirements in Room Data Sheets,* ***where rooms are clearly intended to be occupied and / or become internal spaces***

during design development and natural ventilation is not possible, mechanical ventilation and / or extract ventilation shall be provided as appropriate to suit the function of the space*."* [our emphasis]

210. The Chair may wish to consider whether this provision alerted tenderers to the need to ensure that ventilation requirements in critical care areas were appropriate for the space, regardless of what was stated in the Environmental Matrix.

211. Paragraph 5.2 concerned "Infection Prevention & Control". It states that:

"Project Co shall ensure all aspects of the Facilities allow for the control and management of any outbreak and/or spread of infectious diseases in accordance with the following:

…

f) Ventilation in Healthcare Premises (SHTM 03-01);"

212. The Chair may wish to reflect on how a tenderer could meet this requirement if it was offering a solution that had air change rates, and pressure regimes, that were not fully compliant with SHTM 03-01. It is not clear how this provision could be met by simply adopting the Environmental Matrix given the evidence of Mr O'Donnell.

213. The lack of clarity in the procurement documents concerning the status of the Environmental Matrix is exemplified by paragraph 8 "Mechanical & Electrical Engineering Requirements". It states as follows:

"8. Mechanical and electrical engineering requirements

Project Co shall provide the Works to comply with the Environmental Matrix.

Project Co shall in carrying out the Works comply with the following non-exhaustive list of mechanical & electrical requirements.

Project Co shall provide mechanical and electrical systems that help create a "state-of-the-art" building with innovative design.

…

For the avoidance of doubt the hierarchy of standards and advice detailed in paragraph 2.5 shall apply to this paragraph 8."

[Our emphasis]

214. This is a direct instruction to tenderers that they require to comply with the Environmental Matrix. It is difficult to understand why this wording was included if the intention was that the document was a draft which bidders could place no reliance upon. The requirement is stated to be subject to the hierarchy of standards provision. However, the Chair may consider that it was not made clear to bidders whether the Environmental Matrix was a derogation from the overall requirement to comply with SHTMs or a document tenderers could not rely upon.

215. If, properly construed, it was a derogation, the tenderer would still have to grapple with the disconnect between the Guidance Notes section (which contained the intended specification for critical care rooms) and the parameters specified in the critical care department sheet. The hierarchy of standards provision would suggest that the more onerous standard in the "Guidance Notes" section should have been adopted.

216. Section 8 contained further guidance for tenderers. Paragraph 8.1 was entitled "Minimum Engineering Standards". It stated that:

"In addition to the publications in paragraph 2 of this Sub-Section C Project Wide Requirement, Project Co shall ensure that the design, construction and selection of components for the mechanical and electrical works comply with, including but not limited to, the following design reference documents :

…

SHTM 03-01: Ventilation in Healthcare Premises"

217. On one view, this provision further indicates that there was an overriding requirement for the minimum engineering standards to comply with SHTM 03-01. That cuts across the argument that the Environmental Matrix was potentially a derogation from those standards.

218. Furthermore, section 8.7 was entitled "Mechanical Systems". It provided that

"The Project Co shall design, supply, install, test, commission, operate and maintain all mechanical building services necessary to support the Clinical Services at the Facilities. The following systems are indicative of those anticipated by the Board but are not exhaustive and sole responsibility shall be Project Co's to determine all necessary systems are included.

Systems shall be designed, supplied, installed, tested, commissioned, operated and maintained all in accordance with ***the regulations and standards****."*

[Our emphasis]

219. The term “regulations and standards” is not defined. However, given the status of SHTMs as best practice guidance, the Chair may consider that the term was a shorthand reference to the standards (including SHTMs) set out in earlier sections of the document. Given the requirement to instal, test, commission and operate the mechanical systems in accordance with “regulations and standards”, it is not clear how a bidder could offer to comply without ensuring that the minimum standard (i.e., SHTM03-01) was going to be met by the system.

220. Linked to this is paragraph 8.7.8 which provided that:

“Project Co shall demonstrate how the proposals facilitate the control and management of an outbreak and spread of infectious diseases in accordance with SHTM 03-01, SHFN 30 and HAI-SCRIBE. “

221. It is not clear how a tenderer could offer to meet this requirement if it had not designed a solution that met the requirements of SHTM 03-01 and had simply offered to comply with the parameters set out in the Environmental Matrix.

222. The analysis above considers the ITPD. There were no material changes in the ISFT. Therefore, the same issues arise in relation to the entire procurement exercise.

223. In conclusion, the Chair is invited to find that the procurement documents generated for the Project were ambiguous, and inconsistent, in relation to the status of the Environmental Matrix. This gave rise to a real risk of confusion on the part of tenderers in relation to the status of the document and the requirements for the ventilation system. There was no clear statement that the Environmental Matrix was a document that could not be relied upon and that tenderers required to develop their own

solution to comply with published guidance and could place no reliance on the Environmental Matrix.

The tender submitted by Bidder C

224. The Chair may consider that the differing tenders submitted by IHSL and Bidder C exemplify the problems with the drafting of the tender documents. IHSL offered to comply with the Board's Construction Requirements (which included compliance with SHTM 03-01) and did not offer to change any values in the Environmental Matrix. Bidder C offered to comply with the Board's Construction Requirements (which included compliance with SHTM 03-01) but required to make changes to the Environmental Matrix. It is not clear why one tender was not rejected as a variant bid.

225. Section 5.0 of IHSL's tender "Specification for the Ventilation System" stated: that

"The Ventilation System shall accord with all appropriate Hospital Technical Memoranda, Codes of Practice and relevant British and European Standards and Appendix A." (2023 Bundle 6, p8)

226. Response U10 states that:

"The hospital ventilation systems shall be in accordance with SHTM 03-01" (2023 Bundle 6, p13)

227. IHSL made the following statement in relation to the proposed Air Handling Units:

"The supply and extract air handling plant shall in all respects comply and align with the requirements and recommendation detailed within the Health Technical Memoranda, in particular SHTM03-01 and 08-01, except where specifically noted within this specification."

(2023 Bundle 6, p35)

228. The "Building Services Deliverables" section of IHSL's tender stated that:

"The ventilation systems to the Hospital are designed in accordance with Scottish Health Technical Memorandum SHTM 03-01. Ventilation shall be provided to suit both the operational and statutory requirements of the development. Although the development has been designed to maximise the use of natural ventilation, it is intended that rooms will not be reliant on natural ventilation alone, unless they comply with maximum temperature limits listed in the RDS Environmental Matrices."

(2023 Bundle 6, p350, Paragraph 5.9.7).

229. Therefore, IHSL was offering to meet SHTM 03-01 but did not propose any changes to the Environmental Matrix.

230. In contrast, Bidder C marked up changes in red. Bidder C stated that it was committed to meeting SHTM requirements. It did not state in its tender that it was looking to exceed the standards set out in the SHTMs.

231. It is not clear why one of these tenders was not rejected as a variant bid. Both stated that they would comply with the published guidance. However, Bidder C stated that it would do so, having changed the values in the Environmental Matrix.

232. The Chair will need to consider the differing views expressed by Mr O'Donnell and Mr McKechnie. Mr O'Donnell accepted that the values in the Environmental Matrix for critical care rooms did not fully comply with SHTM 03-01. That was because the critical care parameters from Table A1 were not used in the Environmental Matrix for the patient rooms in critical care. In contrast, Mr McKechnie contended that the Environmental Matrix did comply with SHTM 03-01 because the critical care parameters in Table A1 applied only to isolation rooms in critical care.

233. The Chair will also require to consider whether the different solutions submitted by different bidders should have alerted NHSL and its advisers to possible problems. Mr Greer and Mr Cantlay gave evidence indicating that at this early stage of the Project, such issues would not be significant or highlight that there were problems. They maintained that it would be unnecessary and disproportionate to conduct a detailed audit of solutions at this early stage. That was particularly because they considered that with a revenue funded model, the design risk is placed on the bidder rather than the procuring authority.

The intensity of review of tenders

234. The evidence indicates that there was a low intensity review of tenders. Mr Greer accepted that statements of compliance with the BCRs by tenderers were essentially taken at face value. There were some sample reviews of tender submissions but they were not rigorous. This was consistent with the evidence of Mr Macrae and Mr Stevenson.

235. The low intensity review is exemplified by the approach to the room data sheets. Room data sheets for key and generic rooms required to be produced by tenderers. IHSL submitted room data sheets for critical care rooms which contained air changes inconsistent with SHTM 03-01. The air changes complied with the values set out in the Environmental Matrix for rooms in critical care. The room data sheets do not appear to have been reviewed when tenders were assessed. It is not clear why tenderers were required to produce room data sheets as part of their bid if there was no intention to review them at the assessment stage.

236. Compliance with the Board's Construction Requirements was to be assessed on a pass/ fail basis. A pass was to be awarded if the bidder's approach:

"demonstrates a satisfactory understanding of the Board's requirements; and delivers a satisfactory level of compliance with the Board's requirements."

237. IHSL's tender was assessed as a pass despite:

"Lacking detail on design philosophy and BCR compliance." (2023 Bundle 8, p92)

238. In relation to various aspects of the Board's Construction Requirements, it is not clear how NHSL (and those involved in assisting NHSL with the assessment of tenders, including MML) could have been satisfied that there was satisfactory understanding of the requirements without a more intense review being undertaken. For example, there was a requirement for a tenderer to demonstrate how an outbreak of infection would be managed in accordance with SHTM 03-01. It is not clear how a satisfactory level of compliance was demonstrated by reliance on the Environmental Matrix.

239. The Chair will wish to consider Mr Macrae's evidence that, had he been instructed to review the room data sheets, the errors in relation to critical care rooms could potentially have been spotted. Therefore, the Chair may consider that there was a missed opportunity to spot the errors at this early stage. It is not clear that a review of the limited number of room data sheets would have been a difficult or time-consuming task.

240. However, it is important to note that MML had secured confirmation from H&K that the Environmental Matrix complied with published guidance, including SHTM 03-01. Against that background, the Chair may consider that a more intense review of solutions where a bidder stated that would comply with, or exceed, the values in the Environmental Matrix would have been unnecessary and disproportionate. The Chair will wish to have in mind the evidence of Mr Greer and Mr Stevenson in relation to the volume of work involved in undertaking a more intense review at the level of an audit of a technical solution.

The period to Financial Close

241. There were problems and difficulties in the period from IHSL being appointed as preferred bidder until the contract was signed and financial close was achieved. The Chair will wish to reflect on whether issues at this stage potentially contributed to the problems associated with the Project.

242. Ms Goldsmith gave evidence of the significant pressure that NHSL was under to deliver the new hospital. As outlined above, significant problems with the RHSC had been identified as early as 2005. By 2014, the problems were significant and there was still no contract awarded for a new hospital. The need for a new hospital was now acute. The Chair may consider it understandable that, in reality, NHSL considered that a new procurement exercise or approaching another bidder were not realistic options even if there were issues and problems in the period to financial close.

243. Problems emerged from summer 2014 onwards. The minutes of the meeting of the Special Project Steering Board on 22 August 2014 record the difficulties (2023 Bundle 8, page 11). The minutes record statements made regarding a *"…genuine mismatch in NHSL's and IHSL's expectations…"*. The minutes indicate that there was no common understanding of the requirements to sign off operational functionality. IHSL considered that there was a lack of trust on the part of NHSL.

244. The minutes of the Steering Board Commercial Sub-Group held on Friday 31 October 2014 (2023 Bundle 8, page 15) indicate that IHSL considered that NHSL was changing what it had asked for since the tender documents were issued. Mr Ballantyne is noted as stating that there was a difference of opinion over the level of detail expected in the Project Co Proposals. IHSL appeared frustrated by the desire on the part of NHSL to be satisfied with various issues before a contract was signed.

245. The issue of whether there were fundamental changes being made by NHSL to the stated requirements was raised with witnesses at the oral hearings. No witness was able to provide any example of a radical change by NHSL to the stated requirements that increased the requirements placed on IHSL. One significant change was the decision by NHSL to agree to waive the requirement for room data sheets for all spaces in the hospital to be complete by financial close. However, that did not increase the requirements placed on IHSL.

246. NHSL made comments on the Environmental Matrix during the preferred bidder stage, in October 2014. These included observations that it did not comply with SHTM 03-01. They included a concern that the pressure parameters for certain rooms gave rise to a risk of the spread of infections. In November 2014, Mr Macrae highlighted that:

"*Mott MacDonald concern is that the room will be at a slight positive pressure relative to the corridor which would allow infection such as MRSA or Norovirus to spread*" (2023 Bundle 8, page 71).

247. This issue was not resolved before the contract was signed. It was included as reviewable design data in the contract.

248. Mr Greer explained that this was not something that caused any concern or alarm given the stage the Project had reached. However, on one view, this highlighted that the confirmation of compliance with published guidance (including SHTMs) provided by H&K was not accurate. If the Environmental Matrix complied with SHTM 03-01, there should have been no such risk. The failure to re-visit the Environmental Matrix at this stage was a missed opportunity to potentially spot the problems with the critical care rooms.

249. There was a requirement for the preferred bidder to produce room data sheets for every space in the hospital by financial close. IHSL did not comply with this requirement. NHSL agreed to waive the requirement. Had the requirement been insisted upon, there would have been a full suite of room data sheets by financial close. This would arguably have supplied a clear brief of NHSL's requirements for ventilation parameters; made the Environmental Matrix obsolete; and removed the need to include it as a contractual document.

9. The Contract

250. The Project Agreement at financial close included in its schedules a set of room data sheets and the environmental matrix (schedule part 6, Section 6, appendices 1 and 2 respectively: 2023 Bundle 5, pages 882 and 1454). The room data sheets were for

certain key and generic rooms in the hospital. They included sheets for multi- and single-bedded areas in critical care, which set ventilation parameters of 4 ac/hr and positive pressure relative to adjoining space (2023 Bundle 5, pages 885, 1010, 1024, 1030, 1034, 1039). In requiring positive pressure for the single-bedded areas, they conflicted with the environmental matrix which set a requirement for balanced pressure (2023, Bundle 5, pages 1024, 1039, 1460).

251. The Board Construction Requirements in the Project Agreement required IHSL to comply with those room data sheets, and to produce sheets for the remainder of the hospital as reviewable design data (paragraph 3.6.3 of the Board's Construction Requirements: 2023, Bundle 5, page 231). The schedule which defined the reviewable design data listed "Room Data Sheets", without any qualification to limit it to those which had not been included in the schedule (Schedule Part 6, section 5, Part 3: 2023 Bundle 5, page 860). There was therefore ambiguity about whether or not the room data sheets forming part of the Project Agreement were, or were not, reviewable design data.

252. The Board's Construction Requirements in the project agreement required IHSL to provide the contract works "*to comply with the Environmental Matrix*" (2023 Bundle 5, page 289, paragraph 8). "Environmental Matrix" is defined as the version included in the Project Agreement, as varied, amended or supplemented from time to time in accordance with it (2023 Bundle 5, page 199). The effect of this provision, taken on its own, is to treat compliance with the Environmental Matrix, in the form in which it stood from time to time, as one of the Board's Construction Requirements. As noted above, the environmental matrix at financial close conflicted with the room data sheets by requiring balanced pressure for single-bedded areas in critical care.

253. However, IHSL's obligation to comply with the environmental matrix was the subject of an express derogation. To the extent of the derogation, IHSL was not obliged

to comply (Board's Construction Requirements, paragraph 2.7: 2023 Bundle 5, page 217; the derogation is at 2023 Paper Apart to Bundle 5, page 3861). There is room for argument about the extent of the derogation (and thus IHSL's release from the obligation to comply with the environmental matrix): on one view, the derogation relates to the whole of the environmental matrix. On another view, the derogation is from complying with the environmental matrix to the extent it was the subject of the Board's comments recorded in the reviewable design data schedule. The extent of the derogation had the potential to be significant, to the extent that parameters in the environmental matrix were in conflict with guidance such as SHTMs. The Board's Construction Requirements in the Project Agreement required compliance with such guidance, except insofar as they expressed a specific and different requirement (e.g., paragraphs 2.3 and 8: 2023 Bundle 5, pages 211 and 289 and following). The environmental matrix was, at least arguably, a specific and different requirement capable of overriding compliance with guidance, but that argument was at least weakened if compliance with the matrix was excused by the derogation.

254. The environmental matrix was also classified as reviewable design data. Its status as such derives from its inclusion in a table (in part 4 of Section 5 of schedule part 6 to the Project Agreement). That part is headed "Non-Approved Project Co's Proposals Design Data comments" (2023 Bundle 5, page 869). It provides that IHSL was to submit, and the Board was to review, "*the following Board comments in respect of relevant Project Co's Proposals (which shall be deemed to be Reviewable Design Data) … with such Project Co submission addressing the following Board comments in relation to such Reviewable Design Data*". A table then follows in which comments by the Board are listed beside references to specified sections in Project Co's Proposals. The table includes an entry for the environmental matrix (2023 Bundle 5, page 880). The associated comment provides that "*Project Co shall update the Environmental Matrix to reflect the following board comments…*". The listed comments, in seven bullet points, are those agreed at a meeting to discuss the environmental matrix during the preferred bidder phase, on 11 November 2014 (2023, Bundle 4, page 245). The intention appears to have been that IHSL would update the environmental matrix to address these comments, then submit the matrix for review under the applicable

contractual procedures. There is, however, room for argument about whether the environmental matrix was reviewable design data in its entirety or only in relation to those comments.

255. The procedures for submission and review of the reviewable design data were to be those in clause 12.6 and schedule part 8 of the Project Agreement. Clause 12.6 made provision for IHSL to develop and finalise the design and specification of the works, and for the Board to review the reviewable design data. Approval by the Board was limited in its effect to confirmation that the submitted item met its requirements for Operational Functionality (cl. 12.6.2; 2023 Bundle 5, page 25). IHSL would otherwise be responsible for the submitted item, including warranting that it had used reasonable skill and care in the design (clause 12.3; 2023 Bundle 5, page 24), and ensuring that it met the Board's Construction Requirements (which for these purposes would be subject to the derogation from compliance with the environmental matrix; no such derogation applied from compliance with NHS Requirements, such as SHTMs (e.g., clause 2.3: 2023 Bundle 5, page 211; and clause 8: 2023 Bundle 5, page 289)).

256. As things stood at financial close, therefore, there was neither a full set of room data sheets for the hospital, nor an approved environmental matrix with a complete set of binding parameters for the ventilation system. Both were, at least to some extent, to be produced by IHSL and submitted through the review procedure. There was scope for argument about the extent to which the environmental matrix and the room data sheets were reviewable design data, and therefore about the extent to which they were subject to the contract review procedure. There was also scope for argument about the extent to which IHSL were obliged to implement parameters in the environmental matrix or were, due to the derogation, excused from doing so.

257. A further point is notable. The environmental matrix was treated in the reviewable design data schedule as if it were one of Project Co's Proposals. That is

noteworthy, because the matrix was not itself formally part of those proposals: it is not included in the part of the project agreement schedules in which those proposals are set out (schedule part 6, section 4: 2023 Paper Apart to Bundle 5). Further, the Board's Construction Requirements are drafted on the basis that compliance with the environmental matrix forms part of them (2023 Bundle 5, page 289, paragraph 8).

258. The project agreement therefore reflects uncertainty about the status of the environmental matrix: is it one of the Board's Requirements, or is it one of Project Co's proposals? This indicates that the parties did not satisfactorily resolve the character of the environmental matrix. Both in the ITPD (at the start of the procurement process) and in the project agreement (at the end of the procurement process) there is ambiguity and uncertainty about its status. The evidence of the witnesses reflected this ambiguity: as far as the Board and its representatives were concerned, the matrix was to be taken on by IHSL and they were to be responsible for the suitability and adequacy of its contents; as far as IHSL (in this context, Multiplex and Wallace Whittle) were concerned, it set out the Board's requirements and was not to be revised except to include new rooms or insofar as the Board required it, and IHSL/Multiplex/Wallace Whittle's responsibility was limited to those parameters which they themselves added to the Board's version.

10. Governance

NHSL - Internal Governance

259. The Chair will require to consider governance arrangements at various stages of the Project. This submission only seeks to address the period to financial close.

260. NHSL put in place a range of governance structures. There was a Project Director who had day to day responsibility for the Project. The Project Director was supported by a wider project team and external advisors. The Project Director reported to a "Senior Responsible Officer" (who was a member of the Board of NHSL).

261. A Project Board was in place at the initial stages of the Project before a Project Steering Board was created. Issues could be escalated to the Project Board/ Project Steering Board if deemed appropriate. The Project Board/ Project Steering Board monitored the overall progress of the Project. Representatives of Scottish Government and SFT sat on the Project Board/ Project Steering Board. This provided a further layer of oversight.

262. The Project Board/ Project Steering Board could escalate matters to the Finance and Resources Committee. The Finance and Resources Committee was chaired by the Senior Responsible Officer and provided further oversight for the Project.

263. The governance structure is summarised in the Project Execution Plan (2022 Bundle 3, volume 2, p501).

264. The division between decision making and assurance was not always clear. For example, it is not clear why NHSL was content to conclude the Project Agreement without the full set of room data sheets which they had originally intended be available by that stage. Nor is it clear how, if at all, NHSL considered that proceeding in this way would comply with their duty under CEL 19 (2010) to use ADB room data sheets, or an equivalent, to brief their requirements. The evidence indicates that this decision was taken by the Project Director/ Project Team but the decision and rationale are not recorded in any document available to the Inquiry. There does not appear to have been any meaningful oversight of this decision. Furthermore, there is no record to indicate that NHSL intended the Environmental Matrix to be used as an equivalent to room data sheets produced using the ADB system. This is relevant because NHSL maintains that the Environmental Matrix could not be relied upon by tenderers. Therefore, it is hard to see that the Environmental Matrix was intended as a briefing tool. However, if it was intended as a briefing tool, there is no record as to why NHSL was satisfied that it was of equivalent value to room data sheets produced using the ADB system. While the relevant oversight structures were in place, they do not always appear to have worked effectively.

265. Similarly, the decision to utilise design work from the capital-funded phase appears to have been taken with the laudable objective of salvaging some value for the

cost incurred in that work (around £2m). However, there appears to have been little consideration given to whether this was appropriate for a revenue-funded project. In particular, little consideration appears to have been given by the oversight bodies to whether it was appropriate to include a detailed set of engineering parameters in the tender documents if the bidders were expected to generate their own, or to the risk that those bidders might misconstrue those parameters as requirements they were to follow.

266. NHSL recognised the lack of internal technical expertise for the Project and appointed a range of advisors. That included appointing MML as lead technical advisor. MML required to produce the ITPD (and ISFT) and to check that the reference design complied with published guidance. It did this by checking with H&K. H&K confirmed that the reference design complied with published guidance including SHTM 03-01. In light of that assurance, the Chair may consider it unsurprising that there was little interrogation of the technical aspects of the reference design by the Project Board/ Project Steering Board and the Finance and Resources Committee.

267. At the Finance & Resources Committee meeting of 5 March 2014 (2023 Bundle 10, volume 1, page 5), the following statement is recorded as being made by Mr Cantlay of MML:

"Mr Cantlay, representing Mott MacDonald, advised the Committee that as technical advisors for the reprovision of the Royal Hospital for Sick Children and Department of Clinical Neurosciences at Little France NDP project he believed from a technical perspective that the technical evaluation had been carried out in a manner consistent with the evaluation methodology. From their involvement in this process, the considered scores awarded for the technical evaluation criteria seemed to be correct and it appeared appropriate for the Board to conclude the evaluation process and appoint the bidder identified as having the most economically advantageous tender as the preferred bidder."

268. Ms Goldsmith explained in her evidence that NHSL placed reliance on the technical expertise of MML and the assurance that was provided by Mr Cantlay on the assessment of tenders. Having received this assurance, NHSL was content to approve the appointment of IHSL as preferred bidder. In the period to financial close, MML did not raise any concerns with NHSL in relation to the technical solution proposed by IHSL. There is no evidence indicating that the Board of NHSL should have conducted any more detailed assessment or that any such steps would have identified the problems outlined in the earlier part of this submission.

269. Having checked with H&K that the reference design complied with published guidance, the Chair may also conclude that there was little more that MML could – or should – have done to ensure that the reference design complied with published guidance. However, the Chair will have to determine whether MML should have re-appraised the matter when issues surrounding potential spread of MRSA and norovirus emerged. We have addressed this issue earlier in the submission.

National level governance

270. The Scottish Government provided funding approval for the RHCYP/DCN project. It had in place a range of processes and procedures to be followed before funding was approved. These included steps concerned with design. The Chair will wish to consider the adequacy of these processes and procedures and determine whether any failings in respect of them contributed to the ventilation issues which later arose.

271. In doing so, it is important to keep in mind the apparent source of the ventilation issues: the use of an environmental matrix containing ventilation parameters for certain rooms which were arguably non-compliant with technical guidance issued by the NHS. Further, it is important to keep in mind that, to the extent there was non-compliance, it was unintended both by NHSL and by the engineers responsible for the matrix.

272. In our submission, this particular issue is not one which the Scottish Government's processes and procedures were intended to detect. Further, it is not an issue which the Government's processes and procedures ought to be set up to detect. Rather, the issue was one of highly granular technical detail which it was the responsibility of those working at the project level to detect and, if appropriate, resolve.

Scottish Government

273. The Inquiry received evidence about the Scottish Government's procedures for approval of funding requests from health boards for new hospitals. Such requests were considered by the Capital Investment Group, a body within the Health and Social Care Directorates of the Scottish Government. Its function was to advise the Director General for Health and Social Care whether or not the health board's business case satisfied the requirements of the Government's Scottish Capital Investment Manual.

274. The approval of the CIG was needed at various stages, including to begin the procurement process (based on approval of the board's outline business case) and to award the contract (based on approval of the full business case at the end of the procurement process).

275. In 2010, the Scottish Government issued a revised policy on design quality (2023 Bundle 1, page 553). The policy aimed to ensure that health boards fully integrated design quality throughout all stages of the healthcare building procurement process. The government committed to provide guidance to health boards on compliance with certain requirements particular to the procurement, design and delivery of healthcare buildings and guidance on best practice. In the case of technical requirements, this guidance was to come from Health Facilities Scotland, a division of NHS National Services Scotland which supported NHS Scotland bodies on issues including engineering.

276. The 2010 policy introduced a new element to the government's business case approval processes – an assessment of design quality which became known as the NHS Scotland Design Assessment Process, or "NDAP". There was evidence that one reason for its introduction was that health boards' design teams were not making sufficient reference to NHS technical guidance (Henderson, 2023 Bundle 13, page 341).

277. The new policy took immediate effect from its introduction on 2 June 2010, but the NDAP was subject to transitional arrangements. Under these, the NDAP applied automatically only to projects for which an initial agreement was submitted for approval after 1 July 2010. Projects which had been submitted before that date, but for which Outline Business Case approval had not been given by 1 July 2010, would be considered for the assessment process on a case-by-case basis (2022 Bundle 8, page 69). An Outline Business Case for the RHCYP was approved before that date. The combined RHCYP/DCN project did not therefore clearly fall within either category to which the NDAP was intended to apply.

278. The policy emphasised that a key role of the board was to develop a clear, well-defined brief, and advised they must allow for effective consultation with all stakeholders to do so.

279. When the Scottish Government announced in its draft budget for 2011/2012 that various capital projects such as the RHCYP were now to be funded by NPD, it also announced an enhanced role for the Scottish Futures Trust in supporting those projects.

NHS Scotland Design Assessment Process – "NDAP"

280. Supporting Guidance about the NDAP, and its operation in the CIG's business case approval process, was added to the Scottish Capital Investment Manual in July 2011 (2022 Bundle 8, page 63).

281. That guidance stated that "*projects submitted to the Capital Investment Group (CIG) for business case approval will be assessed for compliance with current published guidance. To facilitate this, Boards will be requested to submit a comprehensive list of the guidance that they consider to be applicable to the development under consideration … together with a schedule of derogations that are required for reasons specific to the project's particular circumstances*" (2022 Bundle 8, page 65). The guidance to which the compliance assessment extended included SHTMs, HTMs and the use of ADB (ibid., page 66).

282. Staff from Health Facilities Scotland were to provide support to NHSL and verification to the CIG, but the assessment and verification were described as "*high level*" and "*should not be seen as a replacement for the project team's in-depth consideration of technical and other standards*" (ibid., page 68). The Guidance described the process as "*advisory*" and a "*service … provided to Health Boards at no cost to the board*" (ibid., page 70). The aim was to turn around submissions within up to 28 days (ibid., page 71).

283. A failure to meet national guidance (which in context included SHTMs) could lead either to refusal of CIG approval or a requirement to address shortcomings before approval would be forthcoming (ibid. pages 72 and 73).

284. The process's assessment of compliance with guidance was largely dependent upon the board's own listing of the guidance with which its project was required to follow and a schedule of intended derogations. In NPD projects, at the final business case stage, there was a requirement to submit design proposals from the preferred bidder (ibid., page 78).

285. A board undergoing NDAP was also required to produce evidence that ADB would be, and was being, fully used during the preparation of the brief and throughout design and commissioning.

286. Mr Henderson's evidence emphasised that it was never HFS's role to carry out detailed checks for compliance with all areas of technical guidance: that was the responsibility of the designer (2023 Bundle 13, page 343, paragraph 45). Further, during the period relevant to the RHCYP/DCN project, HFS's resources were limited: they had only a single engineer dealing with NDAP (McLaughlan, Transcript, page 5).

287. Largely for these reasons, the Chair may consider it unlikely that, even if the RHCYP/DCN project had undergone an NDAP, it would have detected the particular issue affecting the environmental matrix. The Board intended to comply with SHTMs, not to derogate from them. That is therefore what they would have told HFS. Moreover, NHSL would likely have asked MML for input on such a technical issue. MML would likely have highlighted the assurance provided by H&K that the reference design complied with published guidance, including SHTM 03-01. Therefore, in our view, it is unlikely that an NDAP review would have identified the problems with the Environmental Matrix.

288. It is not clear that the environmental matrix would have been submitted as part of the NDAP, but even if it was, a check of its detailed parameters for compliance with

guidance is unlikely to have taken place: the NDAP was not intended to replicate the project team's detailed consideration of technical standards. HFS, in any event, had very limited resources and time to conduct an NDAP, and it seems unlikely that even if they had considered the environmental matrix they would have detected issues which had evaded the notice of the engineers who had worked on it to date. The NDAP was intended not as an audit of the technical details of a project, but as a means of ensuring health boards had identified at a high level the guidance applicable to their projects and intended to comply with it. In the words of Mr Henderson, it was "*an 'assessment' of design quality, that is an 'evaluation' of the design, not an 'assurance' of compliance with standards*" (2023 Bundle 13, page 338, paragraph 19).

289. There was confusion during the Project about whether or not it should undergo the NDAP process, and confusion afterwards about whether it did so. NHSL's outline business case suggested it had undergone an NDAP, as did Mr Baxter when he gave his statement (Baxter, Transcript, page 156; 2022 Bundle 3, volume 2, page 685 at paragraph 1.70). The Project almost certainly did not undergo an NDAP. The evidence available to the Inquiry indicates that some very limited and high-level engagement took place with HFS, but such evidence as there is about this does not equate to the NDAP process described in the SCIM guidance. What occurred was that Mr Henderson, HFS's principal architect, reviewed a report which Atkins had prepared at the behest of SFT. That report (as discussed below) was not concerned with ventilation, or indeed mechanical and electrical matters more generally, or the technical guidance applicable to it. Mr Henderson did not receive any mechanical and electrical information to consider. As an architect, he would not in any event have had the professional expertise to assess it meaningfully. Mr Henderson suggested that NHSL produce a comprehensive schedule of the guidance they were following so that bidders were clear on the standards they were expected to comply with, a suggestion which bears some similarity to the first stage of an NDAP (2022 Bundle 3, volume 2, page 880). Email correspondence at the time suggests HFS offered a high-level check of the reference design scheme against guidance. It is not clear what, if any, further engagement took place with HFS. The reference design included the Environmental Matrix but, for the reasons set out above, it is unlikely that this would have been the

subject of detailed scrutiny by HFS even if it had been sent to them for a formal NDAP. (See 2022 Bundle 3, volume 2, pp655, 879 to 886; 2022 Bundle 5, page 63; 2023 Bundle 13, page 345.)

Scottish Futures Trust

290. SFT is a non-departmental public body of the Scottish Government. It was established in 2008 with a remit focused on improving the value for money of infrastructure investment by the public sector in Scotland. When the Scottish Government announced that the RHCYP/DCN, amongst other projects, was to be funded by an NPD structure instead of capital funding, it gave the SFT a major role in support for those projects. The RHCYP/DCN was the first acute healthcare project in the NPD programme (Reekie, 2022 Statement, paragraph 16(i)).

Scottish Futures Trust: Design Review

291. At an early stage in its involvement, SFT commissioned an Independent Design Review on the RHCYP/DCN by Atkins, a firm of consulting engineers (report dated 12 December 2021, 2022 Bundle 3, volume 2, page 567). SFT described the purpose of this review as providing "*an independent review and challenge to the overall size of the facility and its specification*" and "*independent validation of some of the key high level metrics of the proposed design and a valuable external benchmark on value for money*" (2022 Bundle 3, volume 2, page 399). This was to be used in agreeing the scope of the project and setting a cap on the maximum construction cost to be funded by the Scottish Government (ibid., page 400). That reflected the funding conditions for NPD projects (2022 Bundle 3, volume 2, page 377). It is clear from the remit described in the report that it did not involve, and was not intended to involve, a detailed assessment of intended ventilation parameters (2022, Bundle 3, volume 2, page 579). In any event, at the time of the report, the reference design version of the environmental matrix was yet to be produced (2023 Bundle 4, page 77: First Issue of the Reference Design Environmental Matrix dated 3 February 2012).

292. The report discussed the reference design, but made clear that its purpose in doing so was "*to assess value for money in the creation of the environment for patients and staff*" (2023 Bundle 3, volume 2, page 636). The report made recommendations which, it said, were "*intended to indicate actions which will help to de-risk the specification and the reference design as the project progresses towards OBC and the preparation of tender documentation and to improve value for money*" (ibid., page 571). In reporting on the report to the Scottish Government, SFT noted the importance of delineating the negotiable and non-negotiable elements of the reference design, so that bidders would be free to propose their own solutions (2022, Bundle 7, page 465, paragraph 2.3). This was, once more, a point about ensuring the project maximised value for money (Reekie, 2022 Statement, paragraph 136 onwards).

Scottish Futures Trust: Standard Form NPD Project Agreement

293. SFT was responsible for the standard form project agreement used in NPD projects (e.g., Reekie, 2023 Statement, paragraph 29 onwards; 2023 Bundle 13, page 364). The standard form was intended to allocate design risk to the private sector project company, with the risk of operational functionality placed upon the procuring authority. That was an important feature of the commercial structure of NPD projects, and the approval of SFT was needed for any intended derogation from that risk allocation. Mr Reekie explained, however, that SFT's interest in risk-allocation was at the high-level provisions of the "front end" of the contract. The derogation process therefore applied only to those parts of the contract which were included in the standard form (Reekie, Bundle 13, page 365, paragraph 30). SFT were not concerned with the detailed technical schedules negotiated individually for each particular project – the "back end" of the contract. Whilst those would have an impact on the precise allocation of risk in relation to the technical matters within them, those were matters for the procuring authority and their technical advisers.

Scottish Futures Trust: Key Stage Reviews

294. SFT operated a Key Stage Review process for NPD projects, the broad purpose of which was to review the readiness of the project to progress through the various stages of procurement (2022 Bundle 3, volume 2, page 382; 2022 Bundle 3, volume 2, page 650; Reekie, 2022 Statement, paragraph 37 onwards). It carried out five Key Stage Reviews on the Project between December 2012 and February 2015, prior to each of the following procurement stages: issue of the OJEU notice; issue of the ITPD; closure of competitive dialogue; appointment of preferred bidder; and financial close (Reekie, 2022 Statement, paragraph 41).

295. The Key Stage Reviews focused on the organisational and commercial aspects of the project rather than the technical ones (D Stevenson, Transcript, page 15; Reekie, 2022 Statement, paragraph 14). As Mr Baxter confirmed, it was not SFT's function to test the Project's compliance with technical standards, whether through external advisers or otherwise. Insofar as SFT was interested in design, it was in relation to its effect on cost and value for money (Baxter, Transcript, pages 63, 140-149).

296. The Key Stage Reviews were carried out by Donna Stevenson, a solicitor employed by the SFT. She had spent time working with NHSL on the RHCYP/DCN project. Having her conduct the reviews was in line with SFT's approach of appointing a reviewer who was familiar with the project, to lighten the burden that the project team might otherwise face from answering the questions (Reekie, 2022 Transcript, page 129). The review process involved Ms Stevenson considering the status of the project against a list of pro-forma questions based on her knowledge of the project and any additional information supplied by the Board (Reekie, 2022 Statement). She would fill in the review and send it in draft to NHSL for discussion (Stevenson, Transcript, page 12); and once it had been agreed, send it, still as a draft, to SFT's secondary reviewer who would identify further recommendations or clarifications (ibid., page 14).

297. The Key Stage Review process was not and was never intended to be a detailed audit by the SFT of the project, or even of the information supplied by the project team in response to the Key Stage Review questions. Rather, it was an opportunity for NHSL to reflect, in response to the questions, on whether the project was ready to progress (Reekie, 2023 Bundle 13, page 373, paragraph 52 onwards).

298. It therefore depended on a relationship of trust, that NHSL would provide full and frank answers and accurate representations of its, and its technical advisers', views (Reekie, 2023 Bundle 13, page 377, paragraph 63). Whilst Ms Stevenson said she would have questioned answers she knew to be inconsistent with other information about the Project she had gleaned for her involvement in it, there is inevitably a limit to what that could achieve, given her role, the fact she was a single person, and the fact that by she was by professional background a lawyer.

299. The concerns about the ventilation system which had been raised by the Project team in late 2014 were not raised with Ms Stevenson (Transcript, page 35 to 39). She explained that technical issues (such as compliance of the ventilation system with guidance) would be relevant to a key stage review if they gave rise to a commercial issue (Transcript, page 39).

300. The system was plainly not intended to detect unintended non-compliances with technical guidance about matters such as ventilation, and it is not therefore surprising that it did not do so. The questions, and answers, about technical matters (such as design, the bidders' capability of meeting NHSL's requirements, and the timetables for production of technical information) in the Key Stage Reviews at the Pre-Close of Dialogue, Pre-Preferred Bidder Appointment and Pre-Financial Close must all therefore be considered from that perspective (2023 Bundle 9, pages 3 and 50; 2023 Bundle 7, page 3).

11. Findings and Potential Recommendations

301. The Chair may wish to defer making any formal findings until all of the evidence has been considered. Moreover, it is possible that further evidence may become available that is relevant to this stage of the Inquiry. For example, Mr Currie may be able to provide a witness statement at a later stage.

302. However, subject to those caveats, based on the information currently available, the Chair is invited to make the findings set out in the provisional conclusions sections of PPP1 – 3 subject to the issues highlighted in appendix 1.

303. In addition, the Chair may wish to consider making the following findings.

TOR 1

304. The Chair is invited to find that the specification for the ventilation system for the RHCYP/DCN – as at financial close – did not clearly conform to relevant guidance and good practice. That is due to the fact that there was ambiguity in the contract in relation to whether the ventilation system required to fully comply with SHTM 03-01. This is relevant to the Chair's ultimate consideration of whether any key building systems at the hospital were defective.

TOR 2

305. The Chair is invited to find that the arrangements for the strategic definition, preparation and brief, and concept design contributed to the problems that arose in

relation to the ventilation system for the RHCYP/DCN. There was a lack of clarity in the brief for the ventilation system provided to tenderers during the procurement exercise. There was a lack of clarity in relation to whether tenderers required to fully comply with published guidance (including SHTM 03-01) or whether the Environmental Matrix was a derogation from published guidance.

306. There was an error in the Environmental Matrix in relation to the parameters for certain critical care rooms. This was a transcription error that arose from human error. Had this error not been present, problems with the ventilation system are unlikely to have arisen.

307. The problem was exacerbated by the decision that the reference design team (including the engineers that designed the Environmental Matrix) would be ring fenced from the procurement exercise. They had no involvement in the procurement exercise and did not know how the Environmental Matrix would be used during the procurement exercise. Bidders had no opportunity to discuss matters with the engineers that produced the Environmental Matrix. Had they been able to do so, the engineers could have explained that the Environmental Matrix was not a fixed client brief. There was no scope for any discussion as to whether the values that did not comply with SHTM 03-01 were deliberate or a mistake.

308. A further problem that contributed to the issues with the strategic definition and brief was the lack of input from clinicians into the Environmental Matrix. The engineers that produced the Environmental Matrix determined to include a "Room Function Reference Sheet". Once a room function was ascribed to an area, the ventilation parameters for that room function were used regardless of the area in the hospital. This judgment as to room function was made by an engineer with no clinical input and no input from an infection prevention and control expert. Had clinician input been obtained, it is unlikely that inappropriate room functions would have been ascribed to rooms in critical care.

309. A further problem arose from the lack of direct contact between clinicians and bidders during the procurement exercise. This was highly unusual for a project of this nature. Had here been more clinical input, there is a chance that the problems could have been identified and spotted.

310. The Chair is invited to find that there was no overarching problem with the procurement procedure chosen by NHSL. Competitive dialogue was entirely suitable for the Project. However, problems arose in the procurement exercise from the ambiguities, and inconsistences, in the ITPD and ISFT. It was not clear whether the Environmental Matrix was a fixed client brief or a document on which no reliance could be placed. Had the status of the document been made clearer, the problems with the ventilation system are unlikely to have occurred.

311. Tenderers effectively self-certified compliance with the Board's Construction Requirements. A more intense review of tenders could have identified the issues with the Environmental Matrix. However, this would have required a significant amount of extra work and an issue arises as to whether such work would be proportionate at the tender assessment stage.

TOR 3

312. At the procurement stage, NHSL appointed technical advisers to design the ITPD and to confirm that the reference design complied with published guidance. It is not clear that NHSL could have done anything more to seek to avoid errors in technical

specification for the ventilation system. The Chair may consider it unrealistic for any committee formed by NHSL to have spotted the errors in the Environmental Matrix given the highly technical nature of the problem.

313. In relation to MML, having asked H&K for confirmation that the reference design complied with published guidance, it is not clear what more MML could have done to spot the non-compliance of the Environmental Matrix with published guidance beyond instructing a separate audit by another engineer. The Chair may consider that to be a disproportionate measure for the reasons outlined above. However, the Chair will equally require to consider whether there came a point where it was clear that the assurance provided by H&K was potentially incorrect. For example, when Mr Macrae identified that the proposed ventilation design gave rise to a risk of the spread of MRSA and norovirus. There appears to have been no escalation of such issues which potentially indicates a flaw in the governance procedures. However, the Chair should reflect on the evidence of Mr Greer that such issues were part and parcel of a large project and it was not unusual for such matters to be included in the contract as reviewable design data.

314. The Chair will wish to keep under review whether the governance structures were adequate and effectively implemented at later stages in the Project as the work of the Inquiry continues.

TOR 4

315. There is no evidence indicating any deliberate concealment or failure to disclose wrongdoing. The evidence indicates that the errors in the Environmental Matrix arose

from human error. This was a genuine mistake that was not spotted in the period prior to financial close.

TOR 5

316. There was a degree of national oversight of the Project in the period to financial close. This included the scrutiny and approval by the Capital Investment Group, within the Health & Social Care Directorates of the Scottish Government, of NHSL's Outline and Final Business Cases for the Project.

317. The Project did not undergo the NHS Scotland Design Assessment Process (NDAP), which the Scottish Government had introduced for new projects in 2010 with objectives which included improving health boards' compliance with NHS technical guidance. Whilst this process was intended to help ensure compliance with guidance including SHTMs and ADB, it was not intended to detect unintentional non-compliance resulting from data-entry mistakes at the granular level of individual room parameters. It is therefore unlikely that, even if the Project had undergone an NDAP, that it would have detected the issue with the environmental matrix.

318. National oversight and support for the Project also came from SFT. This involved assistance for NHSL in preparing the Project for procurement under an NPD structure and in carrying out Key Stage Reviews at important stages in the procurement process. SFT's focus, consistently with the nature of its expertise, was on the commercial and financial aspects of the Project. This included an interest in design and the terms of the project agreement but only insofar as they impacted upon those aspects. It was never part of SFT's role to consider compliance with technical guidance such as SHTMs, never mind to detect errors at the level of detailed parameters in an environmental matrix of which the Board and its advisers were unaware.

319. Mr Baxter, an employee of the Scottish Government, and Mr Reekie, an employee of SFT, attended many of the key meetings. Ms Stevenson, another employee of the SFT, worked closely with NHSL's project team. There is no evidence from which to conclude, having regard to their roles, that they could or should have done more to detect the issue which arose with the Environmental Matrix.

320. There was no independent, technical, evaluation of the Project to seek to provide comfort to national government. The Chair may wish to consider whether such an assessment would have been appropriate for a project of this nature as the work of the Inquiry continues. Our view, however, is that the sort of independent technical evaluation which would have been needed to detect the sort of issue which arose with the Environmental Matrix would require a disproportionate duplication of technical expertise at an undue cost.

TOR 10

321. The Chair is invited to find that the choice of site was appropriate. It allowed the hospitals to be situated beside the existing RIE. There is no evidence available to the Inquiry indicating that the choice of site gave rise to an increased risk to patients of environmental organisms causing infection.

Recommendations

322. The Chair is not invited to make any recommendations at this stage. However, there are issues that the Chair may wish to keep under review as the work of the Inquiry continues. Several witnesses put forward positive suggestions as to how some of the problems with the RHCYP/DCN could be avoided in the future. These are summarised in appendix 2. At the conclusion of the evidence, the Chair may wish to consider circulating a paper to interested parties setting out potential options to seek to address

any problems the Chair identifies in relation to the Project. The Chair may wish to consider a symposium or round table meeting to discuss the various proposals with stakeholders before any formal recommendations are made in his report.

John MacGregor KC (Deputy Counsel to the Inquiry)

and

Ross McClelland, advocate (Junior Counsel to the Inquiry)

2 June 2023

Appendix 1 – Suggested Corrections to PPPs

PPP1 – Reference Design

The PPP includes the following draft conclusions:

"5.1.14 ADB would automatically comply with guidance and legislation applicable in England. The NHS Scotland body would need to ensure compliance with Scottish guidance, including SHTMs.

5.1.16 NHSL did not use ADB as a tool for the briefing and design stages relating to the environmental information for the RHCYP/DCN project.

5.1.17 The Inquiry has seen no documentation demonstrating: (i) why NHSL determined to deviate from using ADB; and (ii) why it considered that the alternative approach that it adopted was of equal quality and value to ADB.

5.1.28 There is currently no material available to the Inquiry indicating that the Environmental Matrices were produced using ADB."

The Inquiry has heard evidence that there were issues with the ADB system including the accuracy of some of the information contained within the system. Therefore, the Chair may consider that using ADB would not always automatically result in compliance with published guidance.

H&K were provided with a set of room data sheets produced using ADB at the capital funded stage of the Project. These were not used by H&K to create the Environmental Matrix. Therefore, some use was made of the ADB system by NHSL. However, it was not used to create the Environmental Matrix. In any event, so far as NHSL was concerned, the Environmental Matrix was not intended as its brief. A live issue for the Chair to determine is whether the creation of the room data sheets at the capital stage was sufficient to comply with the requirements of CEL 19 (2010) which required the ADB system (or an equivalent) to be used as a design and briefing tool; or whether the steps otherwise taken by NHSL by financial

close were sufficient to meet those requirements. Whilst the Chair may have regard to the evidence of Mr O'Donnell, namely that, in his view, the Environmental Matrix created by a qualified engineer reviewing the published guidance was superior to room data sheets produced using the ADB system, the relevance of this to compliance with CEL 19 (2010) may be doubtful if NHSL did not intend the Environmental Matrix to constitute its brief.

PP2 – Environmental Matrix

The PPP includes the following draft conclusions:

"13.1.3 Room data sheets produced using ADB automatically comply with guidance and legislation applicable in England

13.1.5 NHSL did not use ADB as a tool for the briefing stage of the RHCYP/DCN project.

13.1.8 The Inquiry has seen no documentation demonstrating: (i) why NHSL determined to deviate from using ADB as a briefing tool; and (ii) why it considered that the alternative approach that it adopted was of equal quality and value to ADB."

The same issues arise as in relation to PPP1.

PP3 – Procurement Exercise

The PPP includes the following draft conclusions:

"23.1.24 NHSL did not produce ADB room data sheets and issue them to prospective tenderers."

The same issues arise as in relation to PPP1.

Appendix 2 – Evidence Potentially Relevant to Recommendations

As outlined in the submission, the Chair is not invited to make any recommendations at this stage. However, points the Chair may wish to note from the evidence heard at the hearing diets include the following.

Professor Humphreys

Raised the potential need for a review of ventilation in hospitals (Transcript, page 67).

"There is a need for a review of ventilation quality in healthcare facilities, particularly for vulnerable patients even if risks are complex and there are a number of factors, which affect the development of infection."

"I think that over the last 10 or 15 years, the complexity of care has increased in hospitals and particularly in in critical care areas, and we're now seeing a much greater, I think, number of vulnerable patients who are immunocompromised and a more heterogeneous group of patients, some of which may not be recognised as vulnerable…"

"…in the context of the COVID-19 pandemic, we have realised that…our hospitals were under huge pressure because of the transmissibility of COVID and because we had very, very defined and, in many instances, very limited facilities in which to care for these patients because most of our areas within hospital were naturally ventilated and we had no control over where the airflows were going. So we often had to come up with innovative ideas in terms of, for example, putting fans on windows to extract the air from a core area where there might be COVID patients to make sure the air from those COVID patients was not going back into the rest of the ward."

"…we need to review and I think probably either increase the number of air control ventilated facilities or avail of alternative technologies such as portable HEPA filtration systems, or there are various air purification systems that are marketed out there commercially that may be worth looking at."

"I think we need to look at the categories of patients we now have in hospital compared to 10 or 15 years ago because most of the facilities that many of us work in are not only 10 or 15

years old, but would be older, much older than that, and we need to look at the proportion of those patients that are low risk, medium risk, high risk, and maybe very high risk, such as our neutropenic patients. We need to look at what current facilities we have for those patients and whether we believe that those are adequate or not. Then I think we need to incorporate into that some sort of future planning not only for increased numbers of some of those patients that I talked about, but perhaps a bit more flexibility such that if we have another pandemic, we can perhaps react better. So those would be, in very broad general terms, the kind of things I'm talking about."

"…[the review] would need to…involve, obviously, management and healthcare planners, it would need to involve infection prevention and control and infection specialists, it would need to involve clinicians looking after these patients, engineers, architects and probably health economists as well amongst others…"

Mr O'Donnell (H&K)

Highlighted a potential problem regarding the naming of rooms. He also considered that a database with up to date standards, with the potential to populate an environmental matrix automatically, could reduce the risk of human error (Transcript, page 94).

"…one of the fundamental things is the naming of rooms – the naming of rooms being what might manifest in a schedule of accommodation versus what's referenced in guidance might not be aligned. Quite often they're not aligned, and it would have been a good thing if they were aligned, if there was a room naming convention and guidance, and everybody involved in healthcare, building design and briefing used. So, that would be a good step forward, and I think the idea I mentioned before that if the ADB database could be aligned with current standard and kept up to date with current standard, and within that there was a tool to populate an Environmental Matrix such that it was derived from that database, that would be a big step forward"

Mr Macrae (MML)

Highlighted that the guidance is open to interpretation. That creates a situation where there can be ambiguity and misunderstanding in relation to what is required (Transcript, page 47).

"The biggest problem with these type of projects, in my opinion, is that the guidance is too open to interpretation, and the table of rooms within SHTM 03-01 is not comprehensive enough and doesn't detail the different clinical needs or patient needs, i.e. if you've got Critical Care, there may be a different factor involved in an adult's Critical Care to children's Critical Care, but also the terminology of both of those rooms where it's a Critical Care area. In the past, that Critical Care area was like a Nightingale Ward, where it was an open plan area, and to prevent infection control, 10 air changes would be appropriate. When you come down to the modern Critical Care where there are individual bedrooms, it may be relevant to reduce the air flow because you don't have the infection control risk because you have the boundaries of the room. It's my view, to stop this happening again...improve the guidance."

Mr Stevenson (MML)

Highlighted the potential benefits of an Environmental Matrix maintained by the NHS. Such a system would avoid the need to create a bespoke environmental matrix for each project (Transcript, page 41).

"…it would be good if we had, say, an NHS- provided Environmental Matrix for the industry to use. That would certainly get rid of a lot of conflicts and discussions over variations…If we had something produced by the NHS, give a definitive list from the schedule of accommodations and the provisions, the industry could feed back into that as things develop and change – because they always change, technologies change, procedures change, rooms change – the industry could then be bringing that back to the NHS, HFS, etc. and saying, "Look, we've got a new room type here. Can we agree on this as a criteria?" for that criteria to then be embedded into the master matrix, say. So, again, that would be the industry giving active feedback back into a centrally held NHS document. I think that would be a worthwhile exercise."

Mr Cantlay (MML)

Raised the complex nature of such projects and the fact there is no simple solution. Potential solutions could include more specific healthcare guidance and addressing the problems with the ADB system (Transcript, page 93).

"…there's a whole series of the sort of things that the industry could do to move on, whether it is pulling together the healthcare-specific design guidance, because at the moment design guidance is – in Scotland – this kind of combination of, well, you comply with the SHTM, and if there's not one, you comply with the English HTM unless the SHTM's a bit old. There's this kind of-- it's quite a confusing sort of guidance situation. There is obviously ADB. One school of thought through this Inquiry is if you use ADB, then everything's going to be fine, but I think there's also another clear school of thought that, actually, ADB isn't necessarily the answer to all things and doesn't necessarily mean there won't be mistakes. There are so many different opportunities to think about how you do it that…I don't have any specifics here and now as to what we should do to avoid anything happening like this. There is lots of opportunities, and I know people approach these projects with best endeavours…Health care buildings are complicated in themselves, so how do we avoid things like this in the future? I think there's a whole plethora of opportunities. I'd have to go away and think about them in detail to give you a response that merits the question…"

Mr Greer (MML)

Raised the possibility of digital solutions (Transcript, page 105).

"NHS [Assure]…has been a good initiative and the guidance has been developed as well. The guidance is continuing to be developed. I think particularly in terms of SHTM 03-01, the patients that classify for a Critical Care area for the enhanced ventilation, that's been clarified in the latest guidance, which wasn't in the previous guidance. So I think there is, yeah, there's good work being done already in that guidance. I think there's also got to be more digital solutions that can support that. We mentioned the ADB database, and having that more up to date and having platforms to look at that, I think. Digitally, there's got to be ways ahead which can mitigate the risk going forward."

Ms Goldsmith (NHSL)

Highlighted changes arising from the creation of NHS Assure (Transcript, page 88).

"I think there have been changes made now within the health system, which is the establishment of NHS Assure, and so it is a different, sort of, environment now to what it looked like in 2010/2012/2014. I think that the significance of compliance with technical standards probably, at that point, had less emphasis than affordability…there is much more emphasis on the due diligence of delivering technical standards. Inevitably, that will bring a price to it…"

Mr Graham (NHSL)

Raised the problem of the same term being used for different outputs (Transcript, page 61).

"…one of the areas that I would reflect on is our use of the same term for different documents, or the same output but different versions of the document, so that perhaps might improve. I think that we took all advice, obtained all the assurances, followed due process. The bit that we didn't get was any reaction to the anomalies, so there's a kind of a duty of candour of professionals to ensure that, if there are things that are wrong, it's flagged, and we didn't get that. That's probably my main reflection."

Ms Edwards (MPX)

Highlighted the need for a clear brief to be provided to tenderers potentially through a full suite of room data sheets (Transcript, page 45).

"They need to make clear what the brief is. A way that they could have done that would be to produce a full suite of room data sheets as is intended by their own guidance. Room data sheets are there as a briefing tool and they allow you to see the activity within the room, the purpose of each room type and the environmental data associated with it, and if that full suite had been produced as a full briefing document, perhaps some of these issues may have been picked up. The brief should have been clear."

Mr Serkis (MPX)

Raised the issue of key individuals meeting in person to try to avoid any confusion as to what is required (Transcript, page 71).

"I think, first and foremost, if you start with a suite of documents and have them up as you're getting closer and closer to financial close but have gateways before you even get to financial close and have the key documents up on a screen with everyone in a room so that we're all looking at one document and you're not relying on emails or documents being sent via Aconex…You have a core team of people and the key documents. You sit with them on a screen so that everyone's looking at the same document and, going back to my earlier statement, if you then rewrite a document that says, "This is what we want, has everyone agreed on that? Yes? This is how much you're paying for it? Yes?" Those two then should align because, collectively, you sat in the room and agreed what's up on the screen, and it's grey we want for those rooms. It's not black or grey. It's that collective working relationship that everyone agrees and buys into and that's, again, making sure that the right people are in the room, the right resources are committed and that you have the time and the desire from everyone to achieve that common goal"

Mr Ballantyne (MPX)

Highlighted that any new system to eradicate human errors would be costly and difficult to achieve. It would also lengthen the period required for such projects (Transcript, page 76).

"…the only other way to resolve it is to take even longer and apply even more diligence to eradicate any and all errors. Will we ever do that in construction? That's a big question"