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NHS Lothian Internal Audit Report

Report for the Audit and Risk Committee 31 July 2020 and the NHS Lothian Board 12 August 2020

Governance and Internal Controls: Royal Hospital for Children and Young People, and Department of Clinical Neurosciences Edinburgh

Contents

	Page
1. Introduction	2
2. Overall summary	3
3. Contextual factors	9
4. Key events	12
5. Further observations not within NHS Lothian's influence	31
6. Recommendations	35

Appendices	Page
1. Internal Audit scope and limitations	42
2. Project Timeline	45
3. Environmental Matrix	46
4. NHS Lothian project and governance arrangements	54
5. Advisers and other parties involved, external to NHS Lothian	59

This report is confidential and is intended for use by the management and directors of NHS Lothian only. It forms part of our continuing dialogue with you, in our capacity as internal auditors. It should not be made available, in whole or in part, to any third party without our prior written consent. We do not accept responsibility for any reliance that third parties may place upon this report. Any third party relying on this report does so entirely at its own risk. We accept no liability to any third party for any loss or damage suffered or costs incurred, arising out of or in connection with the use of this report, however such loss or damage is caused. See further limitations of scope as set out on page 44 of this report.

It is the responsibility solely of NHS Lothian's management and directors to ensure there are adequate arrangements in place in relation to risk management, governance, control, and value for money.

1. Introduction

1. This report sets out our observations arising from our review of the governance and internal controls over the RHCYP project. Our internal audit scope (**Appendix 1**) was agreed in October 2019 following discussions at the Finance and Resources Committee and the NHS Lothian Board.

2. The scope of work was planned in two phases. Phase one, and a potential later phase depending on the work undertaken. As our internal audit work commenced, it was identified that phase one and phase two were in part linked.

3. This report covers:

   - Understanding the key events timeline.
   - Roles and responsibilities of the parties involved, linked to the key event timeline and decisions.
   - Respective controls including governance and assurance.

4. We reviewed documentation retained by NHS Lothian. Documentation included: project board minutes, project steering board minutes (from 2015 onwards), Finance and Resources committee minutes, Board minutes; workstream notes, retained email correspondence; reports and status updates, procurement documentation and settlement agreement.

5. To support our understanding of events and the documentation, we met with several individuals internal to NHS Lothian. In addition, we also spoke with Scottish Futures Trust, MacRoberts UK LLP, Mott MacDonald Limited, and Arcadius. This was to support our understanding only.

Previous reports into the RHCYP project

6. In scoping our work, we recognised previous reports commissioned. We sought not to duplicate previous work. This report builds on the work commissioned by Scottish Government, reported in August 2019, and is focused on seeking to understand why events occurred to compliment the “what happened”, which has been articulated.

7. Following the public inquiry announcement, it is intended that our work will support NHS Lothian in preparing for the inquiry.

Non-Profit Distribution (NPD) model and definition of Project Co

8. The project was delivered using the Non-Profit Distribution (NPD) model. Project Co is the Special Purpose Vehicle (SPV) established to deliver the project. The SPV is Integrated Health Solutions Lothian (IHSL) who are a separate corporate entity, set up to deliver the design, construction, and operation of the facility for the concession period. NHS Lothian’s contract is with IHSL. IHSL have senior debtor holders (EIB and M&G) and junior debt equity interests (Dalmore and Macquarie). The supply chain includes Multiplex (contractor appointed by IHSL to design and construct, supported by other parties including Wallace Whittle as mechanical engineers) and BYES (service provider appointed to deliver hard facilities management post completion).

9. For ease of reference we have referred to Project Co throughout or Multiplex where specifically that is appropriate.

2. Overall summary

Scope of work

10. In our capacity as internal auditors, we were commissioned to review the key events within the Royal Hospital for Children and Young People (RHCYP) and Department of Clinical Neurosciences (DCN) project. Throughout the report we refer to the project as RHCYP. Whilst run as a single project, using the NPD model our review focused on the reasons for the material ventilation issues which delayed the opening of the RHCYP.
11. This report builds on the themes identified in the Scottish Government commissioned review of governance and internal controls (August 2019) and the Auditor General for Scotland's Section 22 Report (December 2019).
12. Our recommendations will support NHS Lothian in strengthening its control environment over capital projects. The RHCYP project spanned a decade so we recognise the controls at the beginning of the project have been developed and enhanced.
13. In addition, the report will support NHS Lothian's planning for the public inquiry as it has identified wider considerations beyond the environmental matrix.
14. To date the focus has been on the environmental matrix. This is the matrix used on the project to set out mechanical and ventilation requirements, alongside other design factors, for all spaces in the new hospital. An error existed over critical care ventilation (and the other four bedded rooms within the hospital) within the versions of the matrix developed first by NHS Lothian (2012) which continued into the versions created by Project Co (2014 onwards).
15. All projects require decisions to be taken which balance risk, delivery, quality, and financial implications. Factors influencing the RHCYP project over the past decade included financial affordability, the site of the hospital, clinical services now and the future, the timescale to deliver a new hospital, alongside external factors beyond the direct control of NHS Lothian. There is currently a suite of guidelines on building a hospital, which may contradict and/or be subject to interpretation, coupled with a lack of clarity over what guidelines are fundamental requirements and must be built into the design specification.

Ventilation

16. Ventilation is important to control infections and is designed considering the functional and clinical use of the space. SHTM 03-01 is the guidance outlining ventilation requirements within a hospital.
17. The error in the RHCYP was an air change rate delivered for the critical care department which did not comply with SHTM 03-01 guidelines. Later in the project, an air change rate of four air changes per hour was accepted in single rooms and the four bedded rooms, which also did not comply with SHTM 03-01.
18. SHTM 03-01 states, amongst other things, the air change rate in critical care should be 10 air changes per hour. SHTM 03-01 is guidance. However, the need to comply with SHTM 03-01 was within the contract and therefore a contractual requirement of the RHCYP project. The settlement agreement signed by NHS Lothian (February 2019) derogated the responsibility for Project Co to comply with SHTM 03-01 and agreed an air change rate of 4 changes per hour within critical care. This is accepted by NHS Lothian to be an error.
19. The settlement in February 2019 cemented the error contractually. However, the lack of clarity and understanding of requirements over ventilation in critical care, including four bedded rooms, existed in the RHCYP project since 2010/11.
20. SHTM 03-01 guidance includes other aspects of ventilation. Ventilation also includes air pressure, which can be positive, balanced, or negative depending on usage of the room. Required temperature ranges are set out, for example between 18 degrees to a maximum of 28 degrees. Lastly, the ventilation solution designed can be mechanical, natural or a combination of both and this alongside other factors influence the energy consumption of the building. Within the RHCYP project air changes, air pressure and air temperature were all factors which contributed to non-compliance with the SHTM 03-01.

Responsibilities – NHS Lothian and Project Co

21. NHS Lothian, the client, set the requirements for the new hospital. These are set out within the Board Construction Requirements of the contract. These requirements consider the use of the clinical space, including space for equipment, and are defined using the concept of operational functionality. NHS Lothian therefore approve the designs created by Project Co which will deliver operational functionality.

22. Project Co are responsible for designing and building the hospital, to meet the Board Construction Requirements. IHSL document the way in which they intend to design and build the hospital to meet the Board Construction Requirements in a set of Project Co Proposals.

23. In practical terms, given the nature of the project and its importance, NHS Lothian, and technical advisers, reviewed design elements beyond operational functionality. This is evidenced through the review comments on the environmental matrix. This may have resulted in confusion or a blurring of responsibility between NHS Lothian and Project Co.

24. The contract, through derogations and change control procedures, allow for inconsistencies when identified to be addressed between both parties. Where any party does identify inconsistency or design not aligned to requirements (within or beyond operational functionality) then it should be identified through the processes established within the contract.

25. However, the inconsistency of interpretation over four bedded rooms and further inconsistency between the Board Construction Requirements, Project Co proposals, and reviewable design data was never identified.

26. The Independent Tester validated requirements back to agreed reviewable design data, including the environmental matrix, where the inconsistency was built in. As what was delivered agreed to the reviewable design data and in the knowledge of the matters to be resolved following the February 2019 settlement agreement, the Independent Tester certified the building complete.

Early inconsistency in the project which was built into the later design

27. Between 2011 and 2014, our view is that NHS Lothian's requirements were ambiguous and may have been applied inconsistently or remained open to interpretation. This led to unintended contradictions and lack of clarity over what NHS Lothian required.

28. In this period there was no contractual obligation between NHS Lothian and Project Co. However, the lack of clarity here may have contributed to ongoing differing views between NHS Lothian and Project Co throughout the project.

29. Examples of this lack of clarity include:

    - Four bedded rooms being classified as generic rooms by NHS Lothian, although the three situated in critical care department would require differing ventilation.
    - Advice on mechanical and natural ventilation to give a maximum temperature range of 25 degrees, not the 28 degrees allowable in the SHTM 03-01, and the consequences of this on the design of ventilation in the RHCYP.
    - The inclusion of the draft environmental matrix within Volume three of the tender documentation.
    - The language used within the tender documents, including in the Board Construction Requirements, referring to the environmental matrix.

30. The final unresolved ambiguity is the Board Construction Requirements section within the contract. This sets out NHS Lothian's requirements and we believe, a potentially incorrect reference to the environmental matrix is included. This reference may confuse ownership of the matrix from Project Co to fall under some NHS Lothian responsibility. Although it is emphasised as internal auditors, we are not legal experts or contract specialists.

31. The contract and subsequent positions between both parties is legally and technically complex. This is evidenced in the differing views of experts commissioned to look at the ventilation pressure designed in the four bedded rooms (NHS Lothian's expert and Project Co expert). It is also evidenced by the differing opinions expressed by the two separate QC opinions obtained by NHS Lothian and IHSL, respectively. Views expressed include questions over the contractual status of the matrix, what was designed within reference design, the application of guidance within STHM 2025 (which was superseded with SHTM 03-01), Health Building Notices (HBN), RDS, and other guidance referenced.

Overall conclusion

32. NHS capital projects by their nature are complex. The RHCYP project spanned twelve years and encountered a complex series of circumstances. Alongside ventilation there were other difficulties and layers of issues during the life of the project that together created unique challenges for NHS Lothian. By 2018/19 significant matters were being considered and resolution sought in parallel to each other, not just ventilation.

33. Our review identified a collective failure from the parties involved. It is not possible to identify one single event which resulted in the errors as there were several contributing events.

34. Additionally, there were a series of factors external to NHS Lothian which influenced and shaped the project which were not within the direct control of NHS Lothian. These factors contributed to the complexity.

35. Ultimately the matters identified were of a very technical nature. The contract sets out that Project Co are responsible for designing and constructing the RHCYP to meet NHS Lothian's Board Construction Requirements. NHS Lothian are contractually responsible for approving design and construction matters only to the extent that they relate to operational functionality.

36. However, NHS Lothian and the technical advisers have a professional obligation where there is identified non-compliance to identify and highlight this for Project Co's attention. Significant dialogue between NHS Lothian and the technical advisers was identified with Project Co over reviewable design data. As many areas of non-compliance were identified, it is difficult to understand why the inconsistencies and lack of clarity set out within this report were not identified and/or acted upon. This includes critical care but also the differing interpretations which were unresolved.

NHS Lothian's arrangements

37. Our review identified three principal factors, alongside missed opportunities, where further questions were not asked by the NHS Lothian project team and the technical advisers.

Four bedded rooms

38. A determining factor in the project was the decision, taken in 2010, to have twenty, four bedded rooms. The SHTM 03-01 guidelines do not recognise four bedded rooms as a room type. The option, from a ventilation perspective, would be either single rooms or general wards. In both cases, 6 air changes per hour would be required with differing pressure regimes.

39. In error, it was assumed at an early stage of the project that the four bedded rooms would require the same mechanical and engineering solution and were classed as "generic rooms". However, three of these rooms were designed within critical care and therefore required different ventilation to achieve 10 air changes per hour. This was missed from the outset of the project and remained unidentified until June 2019.

Temperature

40. Clinical groups were engaged throughout the RHCYP project. From the outset, clinicians wanted the temperature capped at 25 degrees. The temperature range in the SHTM guidance allows for a maximum of 28 degrees. The decision by the clinicians was influenced by legacy issues within the Royal Infirmary Edinburgh.

41. In seeking to cap temperature, this informed a certain mechanical and natural ventilation solution. Based on a study undertaken by Hulley and Kirkwood in 2012 (mechanical and engineering advisers at the point of creating a reference design) it was agreed that a mechanical and natural ventilation system could be introduced which would deliver 4 air changes per hour. The SHTM 03-01 guidance sets out 6 air changes per hour, as referenced in the report produced by Hulley and Kirkwood. From the outset 4 air changes per hour was then captured in the environmental matrix and ultimately what Project Co delivered in February 2019 when the building was handed over.

42. The inclusion of 4 air changes per hour in the reference design produced by NHS Lothian instead of the required 6 air changes per hour was never raised for further consideration by the project team at this stage of the project, from what we can evidence.

Sharing the environmental matrix

43. An environmental matrix was produced by Hulley and Kirkwood (2012) for inclusion in the tender documents to support reference design. This matrix incorrectly showed in the detail against critical care 4 air changes per hour, not the 10 air changes per guidance. Although the cover worksheet referenced the need to comply with critical care 10 air changes, this was not in the matrix itself.

44. The draft environmental matrix was included alongside the Board Construction Requirements in Volume three of the tender documents and certain language within the tender documents imply, in error, that the environmental matrix is an NHS Lothian matrix and that bidders need to comply with the matrix.

45. Project Co are responsible for the environmental matrix and they took responsibility at preferred bidder stage for the matrix (September 2014), including making certain changes to the earlier version. Our understanding is that Project Co are responsible for the matrix, as linked to room data sheets, which is a Project Co deliverable in the contract. However, there may be potential ambiguity in the contract. The earlier errors in 2012 remained unidentified, with further errors made, for example, the inclusion of ensuites in the critical care rooms and the insertion of the word "isolation" in the critical care guidance note.

Missed opportunities

46. Our review noted missed opportunities to identify the error, which was subsequently built into the RHCYP project. These included:

    - NHS Lothian and Project Co did not identify the lack of clarity on requirements for four bedded rooms and that this was not explicit in the Board Construction Requirements.
    - The decision to include the matrix alongside the Board Construction Requirements in the tender documents. In addition, the apparent absence of a review of the matrix, and no documented quality check over the accuracy of the matrix.
    - One bidder submitted a revised environmental matrix with the correct air changes identified for critical care which did not raise questions on the matrix submitted by Project Co.
    - The inclusion of ensuites within critical care by Project Co in the environmental matrix in September 2014 was not identified until 2016. Although ensuites were flagged as incorrect, it was not identified that air changes were incorrect.
    - The change by Project Co in their environmental matrix (2015) which added in the word "isolation" to the critical care air changes per hour guidance note in the first tab of the environmental matrix. This was not identified and demonstrates that Project Co were planning 10 air changes per hour only in the critical care isolation rooms.
    - Numerous review comments on the environmental matrix between 2014 and 2017, although none related to critical care. Whilst NHS Lothian and the technical advisers were not responsible for checking on a line by line basis, we understand there was a professional obligation where an error or potential non-compliance was identified for this to be raised.
    - Reviewable design data was moved to a category B (approved to progress) despite reservations by the NHS Lothian project team and technical advisers on ventilation compliance (pressure) and other non-compliance in design compared to Board Construction Requirements.
    - Air pressure was considered from 2016 to 2018. When air changes were discussed, it was in relation to achieving the desired pressure and was not discussed for critical care.
    - The clinical risk assessments completed by NHS Lothian in 2017 only considered air pressure and although three were completed for the critical care rooms, differing requirements for critical care were not identified.
    - The Independent Tester did not identify the non-compliance with the guidance within critical care.
    - Settlement signed in 2019 did not identify three of the four bedded rooms were within critical care and derogated in error the air change rate to 4 per hour. The settlement, also in error, derogated the single rooms in critical care to 4 air changes per hour.

47. These opportunities were not identified by the clinical director for the project, the Project Director, the project team, the technical advisers, those parties involved in reference design, Project Co including Multiplex, and the Independent Tester. Collectively the error was missed by all parties.

External contributory factors

48. In addition to the above, external to NHS Lothian were direct and indirect events which influenced decision making.

Delivery through an NPD model

49. Scottish Government announced in 2010 that the project would be delivered and funded through the Non-Profit Distribution Model (NPD). This model was new to Acute NHS Hospitals and as such un-tested, albeit the predecessor model (PPP) was not new.

50. Therefore, the project team and governance arrangements already established for the capital project, which commenced in 2007, were retrofitted into the NPD model. Between 2007 and 2010, NHS Lothian had invested in design work on the new hospital and significant consultation with clinical groups. This resulted in financial and time costs to NHS Lothian. Alongside this, the change in funding announcement delayed the project for at least twelve months at the time.

51. Recognising the delay in the project delivery timeline, the costs incurred on design, and the clinical engagement undertaken to date, it was decided that elements of the design within a reference design were to be shared within the procurement exercise. This decision was taken on the advice of Scottish Futures Trust and Scottish Government and noted in minutes as being helpful in reducing the procurement timeline.

52. Sharing a reference design is an option within the NPD model. However, with hindsight, this created potential ambiguity over design requirements by NHS Lothian, including how the environmental matrix was shared compared with Project Co's understanding of their responsibility to design and construct the hospital.

Financial standing of Project Co

53. The procurement for a supplier took place in March 2013 and resulted in a preferred bidder being appointed (Brookfield Multiplex). Then the funders were sought and appointed. The project agreement (contract) was signed between NHS Lothian and IHSL (Project Co) in February 2015. Decisions over this time period, fully supported by Scottish Futures Trust and Scottish Government, sought to minimise any risk to NHS Lothian as a result of the potential economic impact of the referendum and the general economic climate on funders and those interested in the project.

54. There were two key external events, in respect of Project Co, which necessitated certain decision making by NHS Lothian to either avoid additional costs to them and/or significant delays in the project which was already behind agreed timescales. We believe these to also have influenced decision making.

    - In February 2015 when the contract was signed, Project Co's Proposals (i.e. their design to meet the Board Construction Requirements) was not agreed by both parties. Accordingly, the parties agreed that many elements of the developing design would be classified as Reviewable Design Data. Reviewable Design Data is a further articulation, including additional detail on how Project Co will deliver the Board Construction Requirements. This was substantial. However, Project Co wanted the contract signed so they could start receiving money, and Scottish Government and Scottish Futures Trust were keen to not delay the project further whilst this got agreed. We understand it is usual to not have Project Co's Proposals fully agreed at contract stage. However, post February 2015, this did result in significant back and forward discussions between NHS Lothian and Project Co and extensive time in following the change control processes set out in the contract. The pressure regime was one aspect of Reviewable Design Data not agreed in February 2015.

    - Prior to the settlement in 2019, there was an increasing risk to the existence of Project Co due to a lack of cash flow between IHSL and Multiplex. This was recognised by NHS Lothian and Scottish Government and considered within the risks of agreeing a financial settlement. It was felt that without a settlement being reached, the viability of Project Co was under threat. This would have indefinitely stopped the project whilst a new project Co and associated funders were sought.

Recommendations

55. Our review focused on NHS Lothian's arrangements and documents we reviewed which were retained by NHS Lothian. During our review we noted certain wider observations which may be further explored during the public inquiry.

56. Our recommendations are focused on actions NHS Lothian can take now going forward to strength the control environment. Some of the points we identified were at a point in time, and the environment has already been amended. We acknowledge these recommendations may need to be taken forward in partnership with the NHS Scotland centre of excellence which is being developed.

Overall management commentary:
The Executive team welcomes the report and is committed to implementing its recommendations. We would like to acknowledge the extent of analysis that the Chief Internal Auditor has undertaken, particularly the review of complex and significant documentation over a 12-year period. This will assist the Board's preparations for the Public Inquiry. This overview sets out some of the issues the Board will require to consider in preparation for the Inquiry. Inevitably the audit could only examine documentation held by the Board and it will be for the Public Inquiry to consider the relevant documents from other parties. This is particularly relevant to the key findings in the Audit that there was a collective failure by all parties to identify that 3 of the 4 bedded rooms were in critical care and SHTM03-01 applied. By the time the Settlement Agreement was signed in February 2019 the Hospital had already been designed and built with critical care ventilation to provide 10ACH in the isolation rooms and 4ACH in the 4 bedded and single rooms within critical care.

3. Contextual factors

57. During our review we identified contextual factors which shaped the project. The RHCYP project spans nearly twelve years. The project by its nature is complex. Alongside the complexities that come with building a new hospital, there were specific factors unique to NHS Lothian.

58. The factors summarised below contributed to the project timeline and decisions taken. Whilst not contributing to the root cause, they did shape and influence the project and are relevant considerations.

Early decision making

59. The need for a new children's hospital was first discussed in 2006. An option appraisal exercise was concluded, with the preferred site being adjacent to the Royal Infirmary Edinburgh (RIE). This decision followed guidance which recommended children's hospitals are co-located with an adult acute hospital. Once the preferred site was approved, the project developed through outline business case (OBC) and early capital design work in the period 2008 to 2010.

The site

60. The RIE is a Public Finance Initiative (PFI) hospital. This was an older, non-standard contract with an underlying ground lease which needed amended. The RIE was designed, built, financed, and maintained by Consort. Complex negotiations took place between NHS Lothian and Consort between 2010 to 2015. Negotiations focused on, but were not limited to, access to the land, the site of the RHCYP, drainage, and car parking. This was legally complex, and NHS Lothian were supported by the legal advisers, MacRoberts UK LLP.

61. Resolving the matters with Consort took significant focus by the NHS Lothian RHCYP project board particularly between 2011 and 2013. These discussions ran alongside the procurement exercise being undertaken.

62. Legal matters were resolved in an agreed settlement between NHS Lothian and Consort in 2014/15 (SA6 agreement) to allow the new hospital development to commence.

63. NHS Lothian, as evidenced in the project board documentation, had a difficult contractual relationship with Consort due to legacy RIE matters.

64. Given the relationship between both parties and the complexity of the matters being agreed, the focus of the project board including Senior Responsible Officer (SRO) and Director of Finance was on this contractual matter.

First Acute Hospital Non- Profit Distribution (NPD) and the change of funding arrangement

65. The RHCYP was initially to be delivered through Scottish Government capital funding. However, in 2010, the Scottish Government introduced a policy change and announced that the RHCYP would be funded instead as a Non- Profit Distribution (NPD) model.

66. The RHCYP was the first acute children's hospital to be built in Scotland, and NHS hospital under the NPD model. This funding model was new to NHS Lothian. NHS Lothian were actively supported by Scottish Futures Trust in understanding the procurement and governance arrangements and received their guidance and hands on support between 2010 and 2015.

67. NHS Lothian were not consulted on the change in funding model in advance of the decision being taken. Scottish Government representatives confirmed they could not identify a risk assessment being completed at the time.

68. Between 2006 to 2010, NHS Lothian commissioned design work on the new hospital, appointed a framework of advisers, and constructed a project team to oversee the delivery of the new hospital.

69. The change in approach required a new business case to be submitted and signed off by the Scottish Government in 2011 and did delay the planned timeline for delivering a new RHCYP by circa 18 months.

70. In 2010/11, NHS Lothian undertook a new procurement exercise for technical, legal, and financial advisers. The contract in place with principal design consultants (BAM) was stopped, and discussions took place, involving legal advice, over the aspects of the early design work BAM completed. This focused on what design work was the property of NHS Lothian and for NHS Lothian future use.

71. The RHCYP project board structure set up previously by NHS Lothian remained for the new project, as did the NHS Lothian team including the externally appointed programme director, to oversee the project.

72. By the time of the procurement commencing in 2012/13, NHS Lothian's initial timelines for the new hospital had already been pushed back by three years. In the period 2008 to 2010, there had been financial costs incurred to date and clinical time involved, when the project was to be capital funded. There was a desire, by the project team, fully supported by Scottish Government and Scottish Futures Trust, that this work was not lost. A decision was taken by the NHS Lothian project board that this work could inform the reference design to be shared within the procurement.

73. No assessment was completed by NHS Lothian on whether this early work was still applicable, particularly given the Department of Clinical Neurosciences (DCN) was then built back in, when funded through the NPD model.

74. In addition, although work had been progressed to create all the documents shared with bidders in the tender process, a substantial amount of additional work was undertaken through a series of contractors, overseen by the technical adviser appointed by NHS Lothian. The resultant reference design was shared within the tender documents. Further detail on this is set out in Section 4 key findings.

Department of Clinical Neurosciences (DCN)

75. In early considerations, the Department of Clinical Neurosciences (DCN) was to be co-located next to the new RHCYP. This was subsequently reconsidered by NHS Lothian and the Scottish Government and was determined to be run as a separate project on a different site. Therefore, this was not included in the capital OBC submitted. However, when the funding of the RHCYP changed, it was decided that DCN would in fact be co-located with the new children's hospital. This was finally decided in 2010/11. This resulted in the DCN and RHCYP projects being run as one project overseen by the same project team.

External factors outside of NHS Lothian's control and influence

76. Based on our review we noted certain factors, external to NHS Lothian, that influenced the decisions taken by NHS Lothian. These included:

   - The need to issue the tender in 2012/13 and complete the procurement phase. The project was already behind planned timescales and any delays in procurement would push the project back further.
   - There was a downturn in the economy at the time the tender was being advertised through the Official Journal of the European Union (OJEU). This created a concern for Scottish Futures Trust and Scottish Government that any extended timeline for procurement, alongside the economic outlook, would result in a reduction in potential bidders. There was a risk the economy would also impact interest from funders.
   - The desire in 2012/13, expressed by Scottish Future's Trust and Scottish Government, to re-look at the competitive dialogue timeline and make that as short as possible. This was linked to the interests of funders and a concern on number of bidders and timeline to complete the new hospital.
   - The need to keep to the planned financial close timetable agreed due to potential risks on funding leading up to and post the Scottish Independence Referendum.

Project Co financial position during the project

77. Out with the control of NHS Lothian is the underlying financial viability of the Project Co over the life of the project. Under the NPD model, Project Co consisted of IHSL and a series of funders who financially backed the project. At key points in time we can evidence in documentation the financial position of Project Co influencing decisions and project direction:

   - NHS Lothian signed the Project Agreement (the contract) in 2015 as approved by the Finance and Resources Committee and the NHS Lothian Board. At this point in time, several matters were not agreed between both parties related to reviewable design data. However, IHSL and Multiplex, the builders, were keen to start the construction work. Up until this point IHSL and Multiplex had invested heavily in design and contract discussions so were keen to be on site so payments could be received. This was needed to support the cash flow of Multiplex.

- Leading up to the settlement (February 2019), given the ongoing discussions and disputes between IHSL and NHS Lothian, it was noted that there was a risk through a lack of cash flow that IHSL were no longer financially sustainable and would in effect collapse. If this happened, potentially a new Project Co and alternative funders would be required further delaying the project. This influenced NHS Lothian (with Scottish Government approval) to agree to the £11.2 million financial settlement.

NHS Lothian contextual matters

78. The RHCYP project started in 2006. From 2006 the landscape of the NHS in Scotland has changed. In addition, guidelines and best practice for new hospitals continues to be issued, including for example revised guidance on infection control. The design of the RHCYP was modelled using forecasted patient data and forecasted clinical needs with the aim of having a flexible space which can meet future service demands.

79. An external Project Director was appointed, pre-dating the NPD decision. A project team was created, and this project team remained in place over the life of the project, albeit individual roles changed.

80. NHS Lothian recognised from the outset that they required additional skills to deliver the project and appointed financial, legal, and technical advisers. The technical adviser role, undertaken by MML, was key to the project and the timeline of key events.

81. The Project Director and the Clinical Project Director were full-time project roles. Others, including the SRO, were involved in the project alongside fulfilling their wider NHS Lothian roles and responsibilities. Clinical groups were brought in to support the early design work alongside an ongoing engagement and sign off role and remit. Skills were brought into the project from within NHS Lothian for their clinical knowledge and experience.

Ventilation matters

82. From our review of the guidelines, including SHTM 03-01 and Health Building Notices (HBN) relevant to ventilation, we would note there are several key components to ventilation of a new hospital.

    - Temperature. The ability to control temperature and the ability for that temperature to operate within a range, varying depending on what the clinical function of the space is used for.
    - Natural and/or mechanical ventilation and how these operate together.
    - Air change rates per hour.
    - Air pressure, including how air is extracted between rooms and corridors. Depending on clinical use pressure can be positive, balanced, or negative.
    - Energy consumption and environmental factors.

83. These do not operate in isolation. For example, to achieve a certain temperature would require a mechanical engineering solution which may only drive a certain air rate change per hour, based on an assumption that pressure between the room and the ensuite would need to be positive. There are 1700 rooms in the RHCYP with different clinical usage and therefore specific ventilation requirements.

84. The error within the RHCYP was on air change rates. Within the key timeline of events, air change rates were discussed, relative to pressure, but were never contentious. Air pressure was the dispute from 2015 onwards alongside a focus on temperature control.

4. Key events

85. Our internal audit work identified key points in time and/or decisions which we believe are important to the RHCYP project in respect of ventilation. These are set out in this section of the report, and where possible aligned to the project timeline.

Procurement through to preferred bidder stage (2011 to 2014) [1]

The twenty, four bedded rooms designed in the RHCYP

86. The initial design work (2008 to 2010) for RHCYP was for the hospital to be all single rooms.

87. In 2010 the Clinical groups involved in the project determined the design should include four bedded rooms. This would allow patients with similar clinical needs to be treated together, recognising the social and wellbeing benefits for the children. This was also decided to best fit a financially affordable workforce model for the new hospital.

88. A Chief Executives Letter (CEL 1999) required all new hospitals to be designed as single rooms. Therefore, four bedded rooms were a variation on this requirement. A request was submitted by NHS Lothian to the Scottish Government Chief Medical Officer for approval. Approval was granted in 2011 for the inclusion of twenty, four bedded rooms in the RHCYP. Of the twenty, four bedded rooms, three of these rooms were planned within the critical care department.

89. At this stage, and then throughout the project, it was not identified by NHS Lothian and the other parties involved[2] that the SHTM 03-01 guidelines on ventilation did not set out what the ventilation requirements would be for the twenty, four bedded rooms. Model room types referenced in Appendix 1 of the SHTM 03-01 include single rooms, critical care, theatres, isolation single rooms, and general wards.

90. Where no guidance exists, NHS Lothian should set out what they require within the Board Construction Requirements (within the contract). Where the contractor cannot comply with the Board Construction Requirements or has a different design solution proposal then Project Co, under the terms of the contract, should submit a derogation for approval. The contract sets out that where competing guidelines exist, the more onerous should be followed. However, it is silent on when there are no guidelines.

91. In our view, based on review of documentation and our understanding, the ventilation requirements for the four bedded rooms remained open to interpretation. First within NHS Lothian and then subsequently between NHS Lothian and Project Co. There was never clarity and agreement reached over this matter.

Four bedded rooms designed within the critical care department

92. The lack of clarity noted above is further complicated by the inclusion of three, four bedded rooms designed within critical care.

93. SHTM 03-01 includes requirements for critical care. Critical care, as set out in Appendix 1 to the SHTM, requires 10 air changes per hour and positive pressure. Whilst what constitutes critical care is not defined in the SHTM 03-01, it is our understanding that all space used to treat patients within critical care is a clinical area and would require 10 air changes per hour.

94. However, from the outset there is a failure by NHS Lothian to identify that the four bedded rooms within critical care require a different ventilation regime from the rest of the four bedded rooms within RHCYP. This is subsequently not identified by Project Co.

95. There is then a continued failing within the project, when the four bedded rooms are being disputed over air pressure, to subsequently identify those within critical care. This is not acknowledged by NHS Lothian or by Project Co.

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[1] This stage shaped the project design and decisions taken by NHS Lothian and other parties involved in the project. It is noted that between 2011 and 2014 NHS Lothian had not entered a contract. The contract signed in February 2015 legally binds both parties contractually, and only from this date onwards.
[2] Mott MacDonald Limited (MML) and other technical advisers appointed, Multiplex Brookfield Construction (design and build), Wallace Whittle (mechanical engineers appointed by Multiplex), and Acadis (Independent Tester).

96. Throughout the project, discussions and review took place between the NHS Lothian technical advisers, the NHS Lothian project Team including Clinicians, IHSL, and Multiplex, yet no party identified firstly the lack of clarity and secondly that three four bedded rooms (out of the twenty) were located within critical care.

Generic and key rooms at design stage

97. The report produced, outlining the creation of a reference design (2012), recommended that within the ITPD reference design only drawings and specifications which should be shared are those for the rooms determined as "generic" and for the list agreed as key rooms.

98. Generic rooms were defined as "rooms which occur multiple times in the new RHCYP and require the same design". The generic room clinical output specification was produced and agreed by NHS Lothian with input from MML and the clinical project team members.

99. There are 1,839 rooms within the RHCYP design. Of these, 756 rooms (41%) were covered by 31 generic room specifications.

100. We believe at this stage that four bedded rooms were incorrectly classified as a generic room. This is what was subsequently shared with bidders through clinical output specifications and broader reference design information. Given three four bedded rooms are within the critical care department and per SHTM 03-01 guidelines require a differing air change rate and pressure, the same mechanical and ventilation criteria cannot be applied to these rooms.

101. The critical care department was determined as a key room and a separate clinical output specification was shared in 2013 for critical care.

102. At this stage NHS Lothian and MML did not identify a risk of differing interpretation, and how the generic specification was to be interpreted and applied within critical care, and the differing requirements both of which are contradictory.

103. Both the generic room specification and the critical care clinical output specification were marked as approved by the clinical Project Director. Both documents were shared within Volume three of the tender documents.

104. The importance of this lack of clarity is demonstrated in the creation, and subsequent updates of the environmental matrix. Each room is classed per type of room. Four bedded rooms were specified as having 4 air changes per hour. Within the critical care department, where a four bedded room is referenced the generic specification was automatically copied across. This failed to identify that the four bedded room was in critical care. It is this error which is later not identified through review.

Early design work completed by NHS Lothian and determining how to use this work within the new procurement required

105. In January 2011 it was decided by the Project Director and project board to use the completed early design work through the creation of a reference design. This was to recognise early work completed including involvement of clinicians in design and the costs NHS Lothian incurred between 2008 and 2010 on the project.

106. Sharing of the reference design was intended to provide guidance to prospective bidders over the design principles and requirements of NHS Lothian.

107. This approach was endorsed by Scottish Government and Scottish Futures Trust to reduce the procurement timeframe. This also ensured work to date was not wasted.

108. Technical advisers MML produced a procurement option paper for the project board to consider and approve.

109. The paper outlined three options on reference design including the benefits to NHS Lothian and the bidders in adopting the differing approaches:

- Option A: Mandate clinical functionality (clinical functionality was the terminology used in the paper but within an NPD project the language is operational functionality).
- Option B: Mandate full design. This would mean that bidder needed to comply with the full design as already prepared by NHS Lothian.
- Option C: Mandate more detailed design with room for innovation from bidders. This was a hybrid approach which would still allow the bidders to innovate in design, which they would not be allowed to do under option B.

110. The options paper presented recommended the project board approve option A. This is not clearly captured in the project board minutes but we understand through discussions that option A was endorsed.

111. In our opinion, based on the review of the documentation and the subsequent reference design that was shared with the bidders during procurement, we believe what happened in practice went beyond what was approved by the project board. There is not a rationale documented that sets out why this was the case and how decisions on reference design were later taken by the reference design team and brought back into the NHS Lothian project team.

Operational functionality

112. Operational functionality is recognised NPD terminology. Operational functionality is a spatial concept.

113. NHS Lothian's responsibility is to define room layout, adjacencies, and how each individual clinical space will be utilised, including equipment.

114. Operational functionality is the only risk that NHS Lothian retain under the contract whereas design and construction risk rests with Project Co. If NHS Lothian incorrectly define operational functionality, for example the space no longer fits the equipment needs, then the cost to rectify the design, including any delay to the project, is solely incurred by NHS Lothian.

This boundary, between NHS Lothian and Project Co needs to remain clear.

Operational functionality is defined in the Project Agreement (Page 160 to 163 within definitions) as:

1. The following matters as shown on the 1:500 scale development control plan and site plans: point of access to and within the site and facilities; the relationship between one or more buildings that compromise the facilities; and the adjacencies between different hospital departments and within facilities.
2. The following matters shown on the 1:200 scale plans: point of access to and within the site and facilities; the relationship between one or more buildings that compromise the facilities; the adjacencies between different hospital departments and within facilities; and the adjacencies between rooms within hospital departments within the facilities.
3. The quality, description, and areas (in square metres) and the minimum critical dimensions of those rooms and spaces as indicated on drawings.
4. The location, and relationship of equipment, furniture, fittings and user terminals as shown in 1:50 plans in respect of: all bed and trolley positions; internal room elevations; actual ceiling layouts; the non-clinical services and supplies, storage distribution and waste management spaces; and ICT requirements.
5. The location of and the inter-relationships between rooms within the departments within the facilities.

115. Based on the above definition, mechanical and engineering requirements do not fall into the definitions of one to five as these are spacial in nature.

Creation of a reference design

116. NHS Lothian worked with MML between June 2011 and May 2012 to agree an approach to the creation of a reference design.

117. Approval was sought and granted to use early design work produced by BAM as principal consultants between 2008 and 2010. The decision to make use of this work was supported by Scottish Government and Scottish Futures Trust. The benefit of this was set out in the project board minutes as being able to make the procurement timeline as short as possible.

118. MML produced a report entitled “Reference design approach” dated May 2012. This was approved by the project board.

119. The report defines operational functionality and how within the reference design created, NHS Lothian would be mandating operational functionality. As operational functionality was to be mandated, the bidders could not make any amendments to these requirements and had to demonstrate compliance in the final proposals submitted.

120. Various versions of the reference design approach were considered and captured in differing drafts of the overall report produced by MML. This recognises the evolution of the approach and how the approach and thinking was developed between NHS Lothian, MML, Scottish Futures Trust, and Scottish Government. As the first Acute NPD in Scotland, thinking was still being developed and tested.

121. The report sets out that alongside mandated operational functionality, other information will be shared with bidders as helpful for bidders in articulating their proposals. This was noted as including room data sheets, output specifications for all generic rooms (including four bedded rooms), and key rooms (of which critical care was included).

122. In earlier versions of the reference design report produced by MML we noted:
    - In one version the environmental matrix is classified as being mandated operational functionality.
    - An updated draft states, “Similarly the environmental matrix specifies parameters and criteria that need to be met and for which bidders will be required to advise the levels that will be achieved in their particular design”.
    - There is reference to the environmental matrix forming an appendix of the Board Construction Requirements.

123. Whilst the above points were updated in the final reference design report, there was no mention of the environmental matrix. We believe this evolution of thinking then moved through to the work of the reference design team and further ambiguity was seen in documentation. As a result, not all parties involved in the creation of the reference design may have had the identical level of understanding. Ambiguity, unintentionally, may have continued also into the documents which were shared within the tender process, and clarity over the purpose of the documents being shared.

Involvement in reference design team

124. A reference design team was established to oversee the development of the agreed reference design and the documents agreed for inclusion in Volume three and four of the tender documentation (Invitation to Participate in Dialogue, ITPD).

125. The reference design team consisted of:
    - Hulley and Kirkwood, mechanical engineering
    - Davis Langdon (led design team)
    - Nightingale Associates (concept architects)
    - Turner and Towsend
    - BMJ (clinical architect)
    - ARUP (infrastructure, transport, and fire)
    - Montague Evans (limited town planning role)

126. In addition to the external parties noted above, NHS Lothian representatives attended the reference design team meetings, including the clinical Project Director.

127. Davis Langdon were appointed as the principal sub-contractor by MML. The role of Davis Langdon was project management.

128. Prior to 2010, Davis Langdon, Hulley and Kirkwood, Nightingale Associates, and BMJ were working with NHS Lothian on the capital RHCYP project. We understand, given their roles previously, they continued to be involved. As noted, David Langdon were sub-contracted by MML. Davis Langdon further sub-contracted to the other parties involved.

129. During 2012, Davis Langdon ceased to exist as an organisation and at that stage any roles fulfilled by Davis Langdon were transferred to MML.

130. A concern was highlighted by Scottish Futures Trust over the reference design team arrangements. The concern was over the number of advisers and that the advisers could gain a competitive advantage by joining the organisations who were bidding on the procurement.

131. NHS Lothian took steps to ring fence the work of the reference design team and ensured that this team had no access to the wider procurement information, which could give a competitive advantage. Once the reference design was completed, all parties involved were no longer contracted and could join bidding teams.

132. However, the point on the number of advisers involved, and their contracting arrangements, remained unaddressed. The concern by Scottish Futures Trust did not appear to be escalated within a key stage report and we noted no further discussion.

Reference design team project arrangements

133. The reference design team worked separately from the NHS Lothian project team and board. The linkage was between MML and Davis Langdon and the lead clinicians. From what we can evidence there was no clear reporting line in place between the reference design team and the project board. As a result, it may have been possible for this group to expand on the agreed remit and go beyond what was agreed by the project board. The reference team appeared to work independently on decision making.

134. As the reference design team left the project as the tender documentation went to bidders, they were unable to answer any questions of design detail the bidders may have had during competitive dialogue. This was acknowledged as a risk. However, this would be addressed by the Project Director and MML if design questions raised in competitive dialogue.

135. Given Hulley and Kirkwood created the matrix, and also supported wider on mechanical and engineering advice, specific thinking on the planned 4 air changes per hour through a combination of mechanical and natural ventilation may not have been fully understood by all parties.

136. We reviewed a series of project plans produced which governed the documentation and timeline for producing the reference design for inclusion in the tender. Inconsistencies were noted in the project plan, including:

   - The incorrect inclusion of the environmental matrix as a mandated document.
   - Environmental matrix referenced as included in an appendix.
   - No reference to the environmental matrix as a shared document in either Volume three or Volume four.
   - Documentation listed as within Volume three subsequently changed to Volume four.

137. This demonstrates a further lack of clarity over the status of the environmental matrix in the tender documents, and for what purpose the environmental matrix was being shared.

Documentation produced by reference design team

138. Whilst we could locate some minutes and documents produced by the reference design team, we do not believe these were the full suite of documents. As well as retaining documents on a shared internal NHS Lothian drive, an additional portal system was used to exchange documents between Project Co and NHS Lothian. The search functionality and overall user friendliness of the portal is limited.

139. Based on our understanding of the documentation reviewed, it is noted that the reference design team decided not to produce standard room sheets. However, the information to be included in the Invitation to Participate in Dialogue (ITPD), some of which would traditionally be in room sheets, included:

    1. General requirements
    2. Clinical output specifications (generic rooms and key rooms including critical care)
    3. Environmental matrix
    4. Design notes and schedule of operational equipment
    5. Accommodation schedule
    6. Operational functionality by reference design, as described in the documentation

140. It is unclear what control was in place to review the suite of ITPD documentation for completeness, accuracy, and consistency. In addition, the differing schedules were signed as approved by different members of the NHS Lothian project team, depending on the nature of the output.

141. Disclosable design data and information only was implied rather than explicitly stated in each of the documents shared within Volume three and Volume four of the tender documents. We believe a bidder, experienced in similar projects, would understand what NHS Lothian's responsibility was compared with Project Co's responsibility. However, there could have been a risk of misinterpretation, particularly where there was contradictory information.

142. Within the suite of documents listed, contradictions existed in:

    - The environmental matrix showed single rooms and four bedded rooms to have 4 air changes per hour
    - Clinical output specifications record the need for Project Co to comply with SHTM 03-01, which is 6 air changes for single rooms, 10 air changes for critical care, and no definition of guidelines for four bedded rooms.

Tender documentation – Inclusion of the environmental matrix in Volume three of the ITPD

143. The draft environmental matrix was included in Volume three of the ITPD. Volume three was overseen and produced by the reference design team. Sitting within Volume three were the clinical output specifications and schedule of accommodation, which directly relate to NHS Lothian requirements and what was defined as operational functionality. Hulley and Kirkwood produced the environmental matrix dated 2012 for inclusion in the tender. The matrix is identifiable as Hulley and Kirkwood via the logo. The matrix does not, and never, included NHS Lothian's branding.

144. Hulley and Kirkwood were specifically commissioned by Davis Langdon to deliver a mechanical and engineering project specification. Within this specification, an environmental matrix is recorded as a deliverable.

145. We noted an earlier matrix produced by Hulley and Kirkwood when working for principal consultants BAM. This version produced in 2010, correctly records critical care as requiring 10 air changes per hour in accordance with SHTM 03-01. This earlier version would have been produced on a design that pre-dated 2010. At this stage, four bedded rooms were not within the design.

146. The environmental matrix dated 2012 which was included in the tender documentation records, in the detail, includes critical care as requiring 4 air changes per hour. The guidance note tab at the front of the matrix (an excel document) correctly stages the SHTM 03-01 critical care guidelines of 10 air changes per hour. It is unclear how this is then subsequently incorrect in the detailed matrix. This looks to be, based on our review, human error in copying across the four bedded room generic ventilation criteria into the critical care room detail.

147. It would be reasonable to conclude that a control should have existed for Davis Langdon to confirm the accuracy and completeness of the environmental matrix. In addition, MML, as Davis Langdon was a sub-contractor, are contractually responsible for the quality of work undertaken.

148. NHS Lothian should have had a control in place to seek and be provided with assurance over the technical accuracy of the environmental matrix, and wider documentation related to reference design prior to inclusion in the tender. We have not been able to evidence a control within Davis Langdon, MML or NHS Lothian.

Mechanical and Engineering considerations by Hulley and Kirkwood on Temperature Control

149. In February 2012 Hulley and Kirkwood produced a report titled “Ward room thermal comfort analysis”. This focused on mechanical and engineering solutions to achieve temperature control.

150. Based on our review of documentation, we identified strands of discussions (but not one paper or articulation of the problem and potential solutions) on:

- The clinical teams desire to cap temperature in the RHCYP to 25 degrees. This appears to flow from historical issues at the Royal Infirmary Edinburgh where temperatures were considered too high. The SHTM 03-01 allows for a temperature range with a maximum of 28 degrees. However, the clinical teams wanted to ensure no more than 25 degrees was reached.
- The desire to achieve this temperature while obtaining the most efficient energy solution for the building resulted in a mechanical and engineering solution which would have the optimum result.

151. The report outlines a ventilation solution to achieve the maximum 25-degree temperature cap. The solution set out is for ventilation with an air change rate of 4 air changes per hour.

152. We understand, based on discussion with the Project Director and Director of Capital Planning this would be a combination of mechanical ventilation (4 air changes per hour) and natural ventilation. The combination of mechanical and natural ventilation would result in 6 air changes per hour. This is what is required in the SHTM.

153. However, the combination of ventilation to that effect is not explicitly set out in the Hulley and Kirkwood report.

154. It appears that this report was accepted as the reference design, as articulated in the draft environmental matrix, which sets out air change rates of 4 per hour. We believe this is the origin of the 4 air changes being in the matrix from the outset.

155. However:

- The report did state that critical care required 10 air changes per hour and therefore did not inform the study undertaken by Hulley and Kirkwood. Given this acknowledgement, it is unclear why Hulley and Kirkwood did not ensure 10 air changes per hour was reflected in the environmental matrix for critical care.
- The draft environmental matrix states 4 air changes for all single rooms and four bedded rooms. There is no reference in the matrix to a combination of natural and mechanical ventilation to achieve the 6 air changes per the SHTM 03-01 guidelines.
- Natural ventilation includes the ability to open a window. Within critical care, due to infection control, a window would not be able to be opened.

Invitation to Tender documentation – The structure

156. The ITPD had four Volumes:

Volume	Content
One	Background and structure to the Invitation to Tender. Included NHS Lothian overview and financial and technical pro-forma.
Two	Project Agreement (draft contract, Project Co would be required to sign). Articles of association.
Three	Board Construction Requirements. This included clinical output specifications and the draft environmental matrix as an appendix.
Four	Data including reference design, civil/engineering structures, site drawings, planning, mechanical and engineering concept drawings, and energy outlines.

157. What information was included in the tender and where it was located evolved as the ITPD was built. From our review we were unable to note a rationale for why the draft environmental matrix was included in Volume three. As Volume four included reference design, this would have been the more obvious place for inclusion, if required at all.

158. The ITPD states there is no legal obligation between the bidder and NHS Lothian at this stage. A contractual obligation exists when the contract is awarded and signed by both parties. There are caveats within Volume one of the ITPD in relation to sharing of information only. However, individual documents are not marked information only (or as disclosable data). Recognising Volume four contains the reference design based on our understanding from how reference design was developed, this would be information only. However, the environmental matrix is included in Volume three alongside NHS Lothian requirements including clinical output specifications. Therefore, it is potentially less clear the overall status of the matrix – as a requirement or to inform the bidders design.

Approval of the ITPD

159. As evidenced in the project board minutes, significant time was spent reviewing Volume one and Volume two. Both documents were developed through ongoing iterations including legal adviser input.

160. It is noted that whilst the legal adviser's input into the project agreement included in Volume two, they did not write the Board Construction Requirements. We understand Board Construction Requirements were drafted by MML, reviewed, and signed off by the Project Director. However, we cannot evidence this in the documentation we reviewed.

161. From a review of the Board Construction Requirements shared within the tender documents, we noted within the mechanical and engineering section a statement that "Project Co shall provide the works to comply with the environmental matrix." This further creates a question over the status of the matrix. In addition, given the Board Construction Requirements list all guidelines for Project Co to comply, we believe this statement is not required.

162. The project board minutes note the approval of the ITPD for issue to the bidders shortlisted. However, from the project board minutes, it is unclear if Volume three and Volume four were reviewed.

Competitive dialogue phase (2012/13)

163. Three bidders participated in the competitive dialogue stage of the procurement. This stage took place between March 2013 and November 2013. An agreed structure was established, and a series of individual bidder meetings were held. These meetings were facilitated by the NHS Lothian project team and attended by MML for the technical input. After each stage, feedback was given to the bidder to support them in preparing their final tender submission. Where non-compliance was identified or a response at this stage was considered below expectation this was fed back.

164. We noted one bidder, not the appointed Project Co, outlined in their submissions that reference design was 4 air changes per hour and not 6 changes per hour as required in the SHTM guidelines, but this was acceptable to NHS Lothian. In the same submission, the bidder also notes the positive pressure to corridor, built into reference design, and acknowledges this is one option allowable, the alternative being balanced or negative pressure. We were unable to identify any further discussion or approval of this, by the NHS Lothian project team, in the documentation we reviewed.

Tender evaluation

165. Design and construction were one of the workstreams established. Guidelines for evaluating the tenders was produced and approved by the project board. This was to ensure consistency in approach and scoring within each evaluation workstream.

166. Mechanical and engineering submissions were evaluated within the design and construction workstream. The evaluation team comprised the Project Director, a representative from estates and facilities, and a technical adviser from MML. The team evaluated all three bidders mechanical and engineering submissions.

167. Design and construction submissions were allocated 23% of the quality assessment (out of 40% set for quality). Within this, the mechanical and engineering score constituted 3% (3 marks out of a possible 100).

168. Of the three bidders, Multiplex scored the lowest on the mechanical and engineering submission. Based on our review of the three bidder responses, the Multiplex bid appeared to lack detail compared to other tenders received. As we are not technical experts, we cannot comment on the quality of the technical information submitted.

169. Question eight within the submission required the bidder to answer: "Bidders are asked to confirm they comply with the NHS Lothian environmental matrix. Where they do not comply, to explain areas of non-compliance". Multiplex's response noted, "We comply with the environmental matrix".

170. Another bidder responded to this question noting compliance alongside the inclusion of a revised environmental matrix where the bidder had identified changes they would propose. The changes included by this bidder did correct the environmental matrix to record critical care as requiring 10 air changes per hour. Other corrections were also made.

171. We note:

- The language used in the tender document implies the matrix is the responsibility of NHS Lothian, which bidders must comply with in their tender response, rather than a document shared by NHS Lothian to inform the bidders design only.
- Multiplex included a contradiction in the response which was not identified. The submission confirms compliance with all guidelines, including SHTM 03-01, whilst also confirming they will comply with the environmental matrix included in the tender (which is now known not to comply with SHTM 03-01).
- 3% for assessing mechanical and engineering is low, given the significance of this to the design and construction of the hospital (although at the time the high-profile issues were not reported and it is acknowledged a number of matters are important in the design and construction of a hospital).
- The evaluation team did not identify that one bidder corrected the error within critical care in the environmental matrix and there was not a read across between bidder responses.
- If one of the requirements was to demonstrate the mechanical and engineering design complied with the guidelines, including SHTM 03-01, two out of three bidders in confirming compliance with the draft environmental matrix may have submitted a non-compliant tender.

Clinical output specifications

172. A clinical output specification (COS) was prepared by each individual clinical team for all RHCYP departments. These were all approved by the Clinical Project Director. The output specifications and wider decisions, involving clinical engagement, were approved by the Clinical Project Director. Although the Clinical Project Director was a member of the NHS Lothian project board, little clinical discussion took place at the project board.

173. Healthcare planners were commissioned by NHS Lothian in 2011 to support with the preparation of the COS. The remit was to review the COS's focused on ensuring that single clinical solutions were not presented in error, and incorrectly transferring risk to NHS Lothian which should rest as Project Co risk.

174. COS's set out:

- Anticipated patient numbers modelled
- Number of rooms and room types including clinical and non-clinical spaces
- Equipment required including IT requirements

175. Each COS includes a section entitled environmental criteria.

176. Certain COS's were included in reference design and the tender, including the critical care specification. The remainder were completed during 2014 and included as an appendix to the Board Construction Requirements within the signed contract.

177. A paper was presented by the Clinical Project Director to the project board. This set out an overview to producing the COS and an example COS. The full pack of COS's was not submitted to the project board for review or approval. These were signed as approved by the Clinical Project Director.

178. Between 2011 and 2012, there were eight versions of the COS for critical care produced. There was little difference between the eight.

179. The final version dated October 2014, included in the contract, did not reflect all the review comments shared by the healthcare planners in early reviews. Annotations by healthcare planners noted where the COS was setting out one clinical solution, and a risk re operational functionality being prescribed. Not all these references appeared to be removed.

180. From our review of the final COS for critical care we note:

- The environmental section references the need to comply with SHTM 03-01, as well as Health Building Notices.
- Whilst the environmental section cross references to guidelines, other sections do stray into environmental requirements, for example “positive pressure lobbies”. It is not clear if this is across all rooms, or only limited to isolation rooms, which we believe was the intention.
- There is a reference to cohorting patients and all rooms requiring the same specification, but this is not further articulated, and the implications are unclear.
- It is not clear, based on our review, if the COS’s are more detailed than they needed to be as in places they were prescriptive when the cross reference to the guidance to be complied with may have been sufficient, to avoid contradictory comment.

181. From 2016/17 there was an ongoing dispute between Project Co and NHS Lothian regarding pressure regimes. This focused on the four bedded rooms. NHS Lothian determined rooms were to be balanced or negative in pressure. Project Co had designed the rooms as positive pressure. Project Co interpreted positive being what NHS Lothian required per the COS. There is ambiguity over the COS which may have led to either interpretation, based on our review.

Room data sheets

182. Room data sheets are contractually the responsibility of Project Co. There is a requirement, within the contract, that these are produced and submitted to NHS Lothian. The project team review the room data sheets and mark these as approved, where the information contained relates to operational functionality. Room data sheets show in greater detail the design and construction elements of the RHCYP including mechanical and engineering requirements.

183. Room data sheets are connected to the environmental matrix. The environmental matrix is the one document which captures all requirements for the 1,839 rooms. It is used by Project Co as a reference point without the need to refer to individual room data sheets.

184. Room data sheets are a recognised element of new build projects. There is not a prescribed way that these are created. In the case of the RHCYP, the environmental matrix was developed first, and this information replicated in the room data sheets.

185. The room data sheets submitted by Project Co at preferred bidder stage in September 2014 included:

- Generic four bedroom (multi-bed) within critical care specifies 4 air changes per hour with positive pressure.
- High acuity room in critical care incorrectly identifies 4 air changes per hour with positive pressure.
- Single bed isolation room in critical care is recorded correctly as 10 air changes per hour in accordance with the SHTM.
- Reference to ensuite facilities being within the design of critical care rooms.

186. As at September 2014 the project team did not approve the room data sheets. This unapproved status was acknowledged in the contract and formed reviewable design data which was not approved at point of contact.

187. The inaccuracies in the individual room data sheets correspond to what is set out in the environmental matrix. The inclusion of ensuites within critical care is a new error that first appears in the September 2014 environmental matrix produced by Project Co.

188. There are two reviews by the project team at this stage (and beyond) which may have identified the ventilation errors: the environmental matrix and the room data sheets. Despite numerous review comments being captured on both the matrix and room data sheets by the project team, and MML on behalf of the project team, these errors were missed.

Infection Control

189. The Board Construction Requirements include the need for Project Co to comply with Infection Control requirements (including specific reference in the mechanical and engineering section). This references guidelines:
    - SHFN 30 "Infection control in the built environment: Design and planning"
    - HAI-Scribe
    - Health Facilities Scotland – Healthcare Associated Infection – Systems for controlling risk in the built environment
    - NHS Lothian Infection Control manual
190. Throughout the project there are key prescribed points for Infection Control engagement, via the HAI-Scribe process.
191. The NHS Lothian Infection control team undertook, at preferred bidder stage, a review of the design to assess compliance with infection control requirements (HAI-Scribe 2). The review is based on the design drawings, room data sheets, and other information provided by Project Co. The assessment in November 2014 included a "no" response, against ventilation. The response included comment that further drawings were awaited to allow infection control to confirm ventilation was appropriate.
192. As drawings were not agreed at the point of contract, caveats were included in the contract over the respective status of the reviewable design data submitted by Project Co to NHS Lothian.
193. Based on our review we did not evidence the ventilation assessment being escalated through to the SRO and project board.
194. In November 2014, there was a flag that infection control was not able to assess ventilation as being compliant with infection control requirements. This issue got wrapped up into the wider outstanding reviewable design data between both parties. This was an early warning sign over ventilation which was not acted upon until later in the project, when both parties disputed ventilation pressure.
195. We can evidence infection control input during the project and consultation, or inclusion of infection control representatives, within specific design and construction consultations. Infection control also supported the clinical groups at points in time.
196. From review of the timeline of Infection Control engagement we note:
    - Infection control involvement in the decision to endorse the environmental matrix to status B in 2016 was not evident
    - Attendance at meetings with Multiplex to discuss the pressure requirements during 2016
    - Involvement in July 2017 four bedded clinical risk assessments considering pressure. Whilst involved, we did not identify any evidence that Infection control raised concerns over critical care's inclusion in the pressure discussions and need for different air changes.
    - Representatives attended the project operational commissioning group meetings
    - Infection Control were copied into emails between clinical teams and between clinical teams and the project team.
197. It is unclear, based on the limited documentation we have reviewed relevant to Infection Control, the relationship between the clinical teams and Infection Control in respect of who's view would take precedence over the other. It is also difficult to fully understand how Infection Control were engaged in decision making compared with being included for information or action. In certain emails Infection Control were one of many receiving the email.

The Project Agreement (contract, signed in February 2015 at financial close)

Derogations agreed at financial close between Project Co and NHS Lothian

198. When the Project Agreement was reached, 42 derogations were agreed between NHS Lothian and Project Co. Derogations are where Project Co are unable to deliver a requirement within the Board Construction Requirements or propose an alternative solution. These need to be approved by NHS Lothian.

199. Of the 42 derogations, those relevant to our review were:

- Identification by Project Co of the incorrect guidance reference in a clinical output specification (an HBN is noted instead of the SHTM) and corrected to relevant SHTM.

- One in respect of the environmental matrix. The detail captured in this request by Project Co is less detailed than others and looked incomplete. Through discussion we understand this derogation arose to recognise at the time of signing the contract not all reviewable design data was agreed between both parties, and the matrix was included within reviewable design data.

- Derogation to accept non-compliance with the guidelines on 100% single rooms.

200. Although derogations were agreed, at this stage Project Co appears to have not identified that the SHTM 03-01 was silent on four bedded rooms, and that the Board Construction Requirements did not articulate NHS Lothian's specific requirement for these rooms.

Project Agreement (Contract)

201. Scottish Futures Trust have a model NPD contract, although this model contract does not include the technical specification element (Board Construction Requirements). The model contract was reviewed and updated by the legal advisers where changes were required.

202. The contract is 750 pages with numerous sections. Certain sections of the contact are owned by NHS Lothian, others are Project Co sections. The contract sets out what the change control requirements are, and how derogations to the contract are to be managed and agreed.

203. A draft project agreement was issued with the tender documents. This is what was signed by both parties in February 2015. The contract was considered by Finance and Resources Committee who recommended approval. This was endorsed by the NHS Lothian Board and approved by the Scottish Government. Scottish Government approval was required given the financial value of the contract.

Contract sections relevant to our review were:

Schedule 6 construction matters:

- Section 3: NHS Lothian's Board Construction Requirements
- Section 4: Project Co proposals
- Section 5: Reviewable design data (Project Co's expansion in more detail on how Project Co proposals will be delivered to meet Section 3)

Other relevant schedules include:

- Schedule 8: Review procedures (Derogations) including clause 12.6 (Board design approval-RDD review)
- Schedule 12 Change control

204. The contract, within Schedule 6, Section 3 states that where contradictory guidelines are within the Board Construction Requirements then the more onerous shall take precedence, and the more recent guidelines take precedence. NHS Lothian would determine what constitutes the more onerous requirement.

205. Where there is a conflict resulting from the use of the guidelines, Project Co should involve NHS Lothian in the decision making. The final decision rests with NHS Lothian.

Board Construction Requirements

206. Board Construction requirements are where NHS Lothian set out clinical and operational requirements for the RHCYP including specific design or construction requirements NHS Lothian want, which Project Co are to comply with. Within this section there is a list of all guidelines that Project Co are to comply with. This listing includes SHTM 03-01.

207. Therefore, we understand as at February 2015 there was a contractual obligation for Project Co to design and construct the RHCYP to comply with SHTM 03-01. Specifically, the critical care department should have had 10 air changes per hour. However, there is, we believe, an incorrect reference to the inclusion of the environmental matrix within the BCR's, which may, depending on legal interpretation, mean Project Co had to comply with the matrix and SHTM 03-01 guidance, which are now known to be contradictory.

208. SHTM 03-01 are guidelines. Our understanding is that as guidelines, they can be deviated from. However, the inclusion of the SHTM 03-01 in the contract makes this contractual.

Reviewable Design Data (RDD)

209. Reviewable design data includes detailed drawings of the RHCYP, room data sheets, and the environmental matrix. RDD is an extension of detail, setting out how Project Co proposals will be implemented to comply with the Board Construction Requirements. This will include detail that was not yet known or fully articulated when Project Co proposals were produced.

210. At the point, the contract was signed, RDD was not agreed by both parties. RDD had been assessed by NHS Lothian. Where the RDD item has been assessed as being category A or B in status then this was accepted, and Project Co could proceed with that build element. Where an RDD item was categorised as C or D this was not accepted, and review comments were outstanding to be able to move the categorisation.

211. The listing and corresponding categorisation of all RDD items was collated by MML and reviewed by the project team. This listing was included in the contract, with legal advice sought on how to contractually reflect the position.

212. Following the contract being signed, the contract protocol was followed by both parties to sign off the outstanding RDD items. NHS Lothian would only sign off RDD where it concerned operational functionality. It is difficult to understand, on review of the environmental matrix in particular, how this constituted operational functionality.

213. Where a design change was identified by Project Co, this had to follow the change protocol. Agreeing outstanding RDD was not a mechanism to agree changes to design and construction which were not previously captured in Project Co proposals.

214. The Volume of RDD that was outstanding at the point of the contract being signed was in our view substantial. Whilst we understand through discussion it is not unusual to have RDD matters outstanding at the point of contract, agreeing RDD and the exchange of paper work back and forward between both parties between 2015 and 2017 was extensive.

215. We could not identify a risk assessment as at February 2015 on the outstanding RDD and the need to enter the Contract, and the consequences for NHS Lothian on both possibilities. However, we do note the desire from Project Co to start the construction, to support their cash flow, given significant work on design to date had been incurred and payments could not start until the contract was signed. We also noted in project minutes the impact on a further delay on the timeline for delivery.

216. The assurance paper prepared by MML for the Finance and Resources Committee in 2015 did not identify any significant technical risks to NHS Lothian regarding the outstanding RDD.

Construction (2015 to 2019)

Environmental Matrix

217. An environmental matrix was included within the tender documentation.

218. Project Co took ownership for the matrix, in 2014 and the environmental matrix was a live document, subject to review by NHS Lothian project team and updates by Multiplex as the building construction commenced.

219. Some comments were successfully closed off and amended in the matrix. However, based on our review of the comments across each version of the matrix, no explicit concern was noted on the environmental matrix recording that what was set out in the matrix for critical care was incorrect. This remained the case throughout the entire project.

220. As noted earlier, the environmental matrix was an aspect of RDD which was not agreed by both parties prior to the contract being signed.

221. The environmental matrix was given a level B endorsement in 2016 from the project team. This allowed Project Co to carry on with the construction, as set out in the matrix. At the stage, the project team approved the environmental matrix and the ventilation equipment had started to arrive on the RHCYP site.

222. However, in endorsing the matrix, we note the following comments by MML:

"The Board have serious concerns over the upgrading Environmental Matrix to Status B considering some of the issues raised (as per MM-GC-2084) being the same as the issues that had been raised since FC. There are also concerns over the potential inaccurate information being transferred to the Room Data Sheets being submitted through RDD.

However, as requested by Project Co, the Board has upgraded the Environmental Matrix to status B, noting the Board still does not believe the Environmental Matrix and resultant design complies with the Project Agreement. Project Co's failure to comply with the BCRs / PCPs (as per MM-GC-002084) the Board believes would result in a non-compliant Facility.

The Board would suggest that Project Co resolved the non-compliant and other issues as a matter of urgency, and requests that Project Co issues a strategy for resolution of these issues."

223. Given the comment, and the ongoing concern of non-compliance, it is unclear why the matrix was subsequently endorsed. And whether full consideration was given by the project team, including advisers, on any implication for this to the future project delivery. The non-compliance referred to included pressure of the four bedded rooms, which was only resolved via Settlement in February 2019, four years after the comments were raised.

224. As no flag was included in the matrix as the principal route to start with of identifying non-compliance with the Board Construction Requirements, the default position was that critical care arrangements were assumed to be correct.

225. Further commentary on versions of the Environmental Matrix, the requirements set out for critical care, and the comments by the project team are set out in **Appendix 3 of the report.**

Ventilation correspondence

226. In the documentation reviewed, we identified certain ventilation correspondence between Project Co and NHS Lothian. The first one was in 2016, then further dialogue in early 2017. The correspondence did not relate to critical care. However, they did indicate a potential confusion between Multiplex's mechanical engineers and the clinical commissioning team on exact ventilation requirements. This included ventilation requirements to meet HSCRIBE infection control, and what arrangements would need to be in place to satisfy these requirements. The responses back to the queries by the project clinical director, copied to others in the project team, including MML give short responses and re-direct Project Co back to the incorrect environmental matrix.

227. This correspondence, if identified at the time, may have raised an increased flag to the project team on ventilation and the understanding of Project Co and whether this was aligned to NHS Lothian's understanding.

Relationship between Project Co and NHS Lothian

228. From our review of project documentation, we note a deterioration in relationship between NHS Lothian and Project Co. Many matters were submitted back and forth between both parties, and either partially or unresolved for longer periods of time. Examples include:
    - Comments on the environmental matrix and up to a six-month gap before an updated environmental matrix was shared.
    - Communication coming to NHS Lothian direct from Multiplex, rather than via IHSL, and equally NHS Lothian corresponding directly with Multiplex not IHSL, in attempts to see resolution.

- Pressure was flagged as a review comment on the environmental matrix in 2015 but only started to get resolved in 2018.

229. At the same time, from 2016 onwards the project team and MML were identifying concerns over design and installation compliance. As a result, the project team and MML increased their review and commentary on the submissions by Project Co, within the RDD process.

230. Our understanding is that the NPD contract ensures that Project Co are fully responsible for design and construction. The remit of NHS Lothian, and therefore the technical advisers supporting the project, only relates to operational functionality. However, when on review, an area of non-compliance is identified, then under professional obligations to deliver the project, this was notified to Project Co for correction. From 2016 onwards parallel matters were being debated between both parties routinely.

Four bedded rooms and pressure regime

231. There was an assumption by all parties that by 2016/17, everything already set out to date had been agreed and was correct.

232. When future discussions shifted to the pressure regime, this did not trigger the need to re-look at air changes, and wider compliance with the guidelines. Although comments existed in the environmental matrix, none were specifically raised within critical care.

233. The environmental matrix references ongoing comment by the project team on pressure regimes. This is not specifically related to the critical care department. The design of the four bedded room was positive pressure. The project team comment is that pressure should be balanced or negative. This was identified firstly in the four bedded room within Haematology and then broadened out to all four bedded rooms.

234. Project Co submitted in May 2016 a ventilation derogation request, for pressure and adjusting pressure via ensuite extracts. This was rejected by NHS Lothian and further discussion took place.

235. Comments in response from Project Co is initially to make the adjustment to ventilation in the ensuites, to give the room ventilation pressure desired. However, on further review, this was leading to excessive air changes per hour being required, impacting on energy efficiency.

236. It is on the review of the annotations by Project Co within the environmental matrix to change air rates to achieve desired pressure that it is identified by the project team and MML that critical care incorrectly references the inclusion of ensuites. However, no comment is made on critical care ventilation, pressure, or air changes.

237. Ongoing discussions took place between Project Co and the project team on pressure regime. This included NHS Lothian reviewing what they required, and what changes would be necessary.

Risk assessment for critical care (ventilation)

238. The subsequent risk assessments completed by the clinical teams in 2017/18 for the multi-bed rooms focused on the ventilation pressure regime, not air changes. The risk assessments were completed when it became apparent that Project Co, were not planning on changing the ventilation pressure designed. Risk assessments were completed to support the project team's evaluation of options available.

239. However, the opportunity to identify that three out of the twenty rooms were in critical care, and that critical care requirements were set out in the SHTM 03-01 was missed.

240. The completed risk assessments were undertaken by the clinical teams and did not appear to consider the guidelines that needed to be complied with, for example SHTM 03-01, and how these were complied with or otherwise.

241. Each risk assessment was signed off by the Deputy Associate Nurse Director. These were then assessed by the project clinical director and two commissioning managers. The risk assessments were first undertaken in 2017, but not signed off by the project clinical director until February 2018. It is unclear why there was delay in signing off these assessments.

Independent tester

242. The independent tester is a joint appointment between NHS Lothian and Project Co and is built into the contract.

243. The Independent Tester routinely visited the RHCYP site and reviewed the testing that Multiplex, and others, were completing. Following the Independent Tester visit, a report was produced for NHS Lothian and Project Co which identified a list of matters arising. Matters identified were categorised by the Independent Tester using a red/amber/green rating. A red rating was used to identify significant deficiencies which would delay the project delivery.

244. Within the contract there is a scope of work for the Independent Tester. This includes:

> Undertake regular inspections during the works, as necessary, in accordance with the Project Agreement. Report on the completion of the project identifying any work that is not compliant with the Board Construction requirements, Project Co's proposals and the Approved Reviewable Design Data (Approved RDD) and/or the completion criteria.
>
> Within Section 3 of the scope of services (design review) it states:
>
> Monitor the detailed working drawings and specifications for a sample number and type of rooms which in his professional judgment is appropriate to be selected by the Independent Tester to verify that they comply with the Approved RDD as described in the Project Agreement.

245. From a review of the contract, it does allow for the Independent Tester to certify based on the approved Reviewable Design Data. How this sits with the clause on identifying work not compliant with the Board Construction Requirements is unclear.

246. It is unclear if the Independent Tester should be responsible for identifying non-compliance with guidelines, including SHTM 03-01 within approved RDD, or where there are discrepancies between the guidance and what is agreed within RDD.

247. Reviewable design data agreed between Project Co and NHS Lothian includes the individual room data sheets.

248. Within the SHTM 03-01, it is stated "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)".

249. In discussion with the Independent Tester it was noted, in their view, the specific requirements contained in the A-Sheets (the room data sheets) as incorporated into the environmental matrix takes precedence.

250. Schedule Part Ten "Outline Commissioning Programme" notes that the Independent Tester reviews the commissioning test results against the room data sheets, and the environmental matrix, not the general requirements within SHTM 03-01. However, this interpretation still appears to be subject to agreeing what is delivered is in accordance with the contract.

251. The room data sheets for critical care were not compliant with 10 air changes per hour as set out in the SHTM 03-01. The room data sheets were developed using the information in the environmental matrix, which shows critical care as being designed to have 4 air changes per hour.

252. Between financial close to approval of the environmental matrix, within the RDD process there were no changes to critical care.

253. From review of the Independent Tester reports, we note they were aware of the dialogue between Project Co and NHS Lothian on ventilation in the four bedded rooms. They did not identify any non-compliance within critical care testing as the testing validated what was in the agreed critical care room data sheets – 4 air changes per hour.

254. In discussion with the Independent Tester, we noted this role is not an arbitrator in disputes. From our review of the project steering board minutes, we note references to both parties, NHS Lothian, and Project Co, seeking to engage the Independent Tester in providing a view over which judgement on pressure within the four bedded rooms was correct.

255. The dispute between NHS Lothian and Project Co only related to ventilation pressure. It did not at any stage cover the air change rates designed. Both parties felt the other was unreasonably trying to influence the work of the Independent Tester and therefore compromise the independence of the role.

256. In 2018, following requests by Project Co and NHS Lothian, the Independent Tester provided a view. The view set out that there were conflicting views regarding the standards for the four bedded rooms and that in the circumstances the Board had the final decision regarding the standards. Following the commercial and technical meetings, NHS Lothian delegated the 6 air changes to 4 air changes within the settlement for the four bedded rooms.

257. In February 2019, the Independent Tester signed off the completion certificate and the building was handed over to NHS Lothian. The Independent Tester references the agreed financial settlement between IHSL and NHS Lothian in February 2019 and notes this resolves the disputed items between both parties.

258. Given the Independent Tester's expertise and knowledge, including SHTM 03-01, it would not be an unreasonable assumption that non-compliance within critical could have been identified and raised with Project Co and NHS Lothian.

Site visits by MML

259. In 2018 MML, on behalf of NHS Lothian, commenced a programme of site visits.

260. We understand this was considered necessary given the increasing number of concerns MML and the project team had on design compliance and the quality of work being undertaken. This was separate from the work of the Independent Tester.

261. The MML reports produced after the site visits focused on identifying poorer construction or evidence where the contractor appeared to be behind the project schedule. These were considered by the project team and raised in liaison meetings between NHS Lothian and Project Co.

Identification of ventilation and pressure regime

262. From 2016 to 2019, certain matters were subject to ongoing discussion between NHS Lothian and IHSL.

263. Ventilation was identified through comments in the environmental matrix on non-compliance with SHTM 03-01. Initial comments were noted in September 2014. This was in respect of the pressure regime, not air changes. It related to how Multiplex were proposing to ensure pressure within the room, between pressure in the room to ensuite. This was designed as positive. In achieving pressure overall in each room, it was identified there would be an impact on energy consumption and temperature under Multiplex plans. It is emphasised this non-compliance was identified as pressure only. No comments on ventilation were annotated on the matrix on critical care. The only annotation, through review by both parties on the matrix, was the identification in 2016 that critical care was identified incorrectly as having ensuite facilities.

264. The points raised continued to be unaddressed in subsequent updates of the matrix. Initially Project Co agreed to resolve the comments on pressure (February 2017). However, subsequently on review, determined they did not agree with the comments and would not make a change. When this happened, the issue was escalated. An early technical workshop was held by both parties and a resolution agreed, which was later withdrawn.

Differing view and interpretation

265. The project team and MML disagreed with Project Co, specifically Multiplex on the design of the ventilation pressure in the four bedded rooms. NHS Lothian stated the design should be balanced or negative pressure, not positive as was designed.

266. NHS Lothian commissioned an expert to consider the design on their behalf and form a view (David Rollinson, October 2017). This view was considered by Project Co, who separately commissioned DSSR Consulting engineers (December 2017). Subsequently two QC opinions were sought, as both parties considered legal action, prior to agreeing to seek contract resolution.

267. As internal auditors we are not legal experts, in what is a complex legal matter. Our review of these reports, and the QC opinions, recognising the legal privileged nature of these documents, noted:

    - Reference to a Chief Executive Letter (CEL) 19 (2010) and SHTM 2.60 which require compliance with ADB sheets. ADB sheets require balanced or negative pressure to corridor in multi-bedrooms. There is a note on the Environmental matrix, from 2012 throughout, which implies the existence of the environmental matrix is in replacement of ADB sheets on the project.
    - Industry guidelines for infection control set out the need for balanced or negative pressure.
    - SHTM 03-01 allows for positive pressure on general wards

- Project Co understanding that the design of the four bedded rooms were the same in design as a general ward. A general ward, per SHTM 03-01, can have natural ventilation and therefore a different pressure regime.

- Question of was there clarity over whether the design was to treat the four bedded room as a single room or a general ward, and did both parties have the same view in design from the outset.

- Reference to Scottish Health Planning Notes (SHPN 04-01) and how these interfaces with SHTM 03-01. SHPN 04-01 – is Adult In-Patient facilities guidelines which reference four bedded rooms.

- 8.5.3 of the Board Construction Requirements references Air Quality. The section notes that "Project Co shall provide natural ventilation wherever possible, except where……e) Clinical requirements, as detailed in the Room Data Sheets, do not allow in areas such as isolation rooms, where positive or negative pressure are required…".

- Understand the Board may have an issue with air change rates but not subject to this report.

268. The expert report commissioned by NHS Lothian in October 2017 records "Understand the Board may have an issue with air change rates but not subject to this report". We believe this was about the 6 air changes versus the 4-air change rate. We identified no future further consideration of air change rates, the focus up to settlement continued to be on air pressure.

Dispute Resolution

269. Alongside ventilation significant matters of disagreement existed between Project Co and NHS Lothian. NHS Lothian explored options on how these matters could be resolved, including potential legal action. Several contract commercial meetings were held between both parties, on advice from NHS Lothian's legal advisers. At one stage resolution looked unlikely and NHS Lothian planned to pursue legal action through Court proceedings. At this point Project Co indicated a willingness for further discussion and resolution, resulting in ultimately the settlement in February 2019.

270. At this stage it is understood Project Co were experiencing cash flow difficulties. A risk was identified that the funders of the project could withdraw their funding support. The consequences, for NHS Lothian, would have been significant including a substantial time delay on the project and a risk that new funders may not be identified. Following discussions at the NHS Lothian Board and with Scottish Government approval, NHS Lothian entered commercial discussions to reach a settlement.

271. To reach a settlement (February 2019) there were a series of technical workshops, alongside commercial negotiation throughout 2018, to seek resolution on the technical matters. This included ventilation pressures.

Signed settlement agreement (SA1)

272. The settlement agreement was signed in February 2019. This followed a period of 18 months of discussions and negotiation. Whilst discussing and agreeing the more significant matters (including ventilation, but also discussions on drainage, fire dampeners and heater batteries), smaller items were agreed between both parties.

273. MacRoberts had a significant role in advising and concluding the settlement agreement. This included supporting NHS Lothian in contract negotiations, reviewing the legal contract and liaising with IHSL's legal advisers. This did not involve the completeness or accuracy of the technical items collated and included in the settlement, as this was technical in nature.

274. In reaching the settlement agreement, the position on ventilation and the accepted change happened within the technical workshops. We have not located all the minutes and decisions taken in the various technical workshops that led to the settlement agreement. We note certain documents are legally privileged and these are retained by MacRoberts. However, MacRoberts were not involved in the technical workshops.

275. The listing for inclusion in settlement was firstly developed by Project Co and subject to iterations through the commercial and technical workshops. The Project team, including MML, were involved in reviewing the listing. We did not identify an independent review of this listing, from anyone who had not been involved in the discussions, and therefore were removed from the detail history and look objectively.

276. As ventilation had been agreed, unlike drainage, heater batteries and fire dampeners it was not prominent in the papers prepared for the NHS Lothian Board.

277. NHS Lothian approved the signing of the Settlement Agreement in February 2019, following Scottish Government approval over the financial settlement. The settlement agreement approved for signing included a list of 81 items.

278. Within the settlement agreement it was agreed that the pressure within all twenty, four bedded rooms would be changed to negative or balanced.

279. The settlement agreement re-iterates what was already shown throughout the project in the environmental matrix that these rooms would have 4 air changes per hour. Captured in the settlement is the formal sign off that the three four bedded rooms within critical care were to have 4 air changes per hour. It was not identified at this stage, as it had not been previously identified, that critical care required 10 air changes per hour in accordance with SHTM 03-01.

280. Included in the settlement was the confirmation that all single rooms were to have 4 air changes per hour instead of 6. Whilst this was designed from the outset, this settlement inadvertently accepted 4 air change rates per hour within the single rooms located in critical care, in error.

5. Further observations not within NHS Lothian's influence

281. Within our review we identified further observations, which were not within the direct control or influence of NHS Lothian. These factors shaped the project and are points of context. As outside of our agreed internal audit scope, we have captured these observations below. These observations may be further explored within the public inquiry. Considering these points may lead to further improvements in delivering projects within the NHS and may fall under the remit of the centre of excellence being established within NHS National Services Scotland.

Guidance vs requirements

282. As set out in the Board Construction Requirements (of the contract) there is a substantial listing of all relevant documentation a contractor must comply with in their design and construction.
283. These include SHTMs, HBNs, and Chief Executive Letters (CELs). The documentation referred to has been developed and built up over a period. Consequently, there is not one comprehensive guide. In addition, there is no real clarity over what a guideline is, and open to interpretation and local decision, compared with what is a requirement and must be delivered.
284. The current suite of documentation cross-references multiple times to further guidelines or requirements. It is unclear how any contradictions across all these documents are subsequently addressed, and what would take precedent.
285. Lastly, in the case of the RHCYP project, when a project spans a lengthy period, if new guidelines are introduced over this timeframe at what point do you change approach. Albeit there would be a likely time and cost associated with the change.
286. It is a complicated map which needs greater clarity including what must be complied with, what is optional, and how contradictions are addressed. There should be one comprehensive source of standards setting out a clear framework.
287. Within the contract there is a list of requirements and guidelines that the contractor must comply with when building a hospital. What is unclear is whether these are requirements, so need to be in place, or if guidelines, what is the degree of interpretation that both NHS Lothian and/or IHSL have. There is not one suite of comprehensive standards that set out a clear framework.
288. A clarity over requirements versus guidelines would also help NHS Board's forecast in the costs and/or time of complying with all requirements, from the start of the project.

Assessment of mechanical and engineering requirements at procurement stage

289. The procurement for RHCYP took place in 2013. NHS Lothian followed the Scottish Futures Trust model weighting at the time which was sixty percent price and forty percent quality. Now greater weighting is given to quality than price in procurements.
290. The forty percent allocated to quality was segmented into elements with a combination of pass/fail questions and weighted questions. Mechanical and engineering accounted for three percent of the forty percent.
291. Given the history of ventilation, alongside wider design and build issues across the public sector, how much weighting mechanical and engineering should be given in the future should be considered.

Infection Control

292. The role of infection control is principally set out in Scottish Health Facilities Note 30 Version 3 "Infection control in the built environment: design and planning" (January 2007).
293. Infection control involvement is described in an advisory capacity. Infection control offer advice and guidance at certain points in time during the project.
294. The guidance and advice should be currently weighted up alongside financial implications, project delivery, and clinicians who are providing the services. It is not seen as more or less significant.
295. The role of infection control in future projects should be considered and built in. This could include role and remit through attending the project board, the sign off at points in time, and the weighting of the advice particularly where there are conflicting views.

Independent Tester role on NPD projects

296. Within NPD projects, the role of an Independent Tester is set out in the contract. This is an independent role appointed by both parties (NHS Lothian and Project Co). The contract sets out that the Independent Tester will validate that the design and build is following the Board Construction Requirements, Project Co proposals, and Reviewable Design Data.

297. The Independent Tester is an independent role and does not mediate between both parties. The contract sets out the need to comply with Board Construction Requirements and Project Co proposals, and the Independent Testers duties in respect of this obligation. However, it is not clear on what happens when there is an identification of inconsistency in requirements, what is the process in this circumstance, and what is the role of the Independent Tester.

298. The Independent Tester validates compliance through own testing and overseeing Project Co testing, completed by Project Co.

299. The Independent Tester asserts it is not a role that provides blanket assurance that all guidelines will be met, and that the building complies with all guidelines. The final certificate issued by the Independent Tester allows the building to be handed over and confirms the design as agreed is what is delivered.

300. Once the building was handed over, NHS Lothian were required to validate ventilation before moving patients into the new RHCYP. A third party, IOM, was commissioned in May 2019 to undertake this validation. IOM were commissioned to check ventilation against the SHTM 03-01 standards. This did not consider what was designed and contracted.

301. In future, there may be options to expand or better articulate the role of the Independent Tester. For example, if the Independent Tester had been validating back directly to SHTM 03-01, the error would have been identified. There is also consideration of whether the Independent Tester could have a broader role and/or be complemented through an on-site clerk of works role.

Building handover – sequencing

302. SHTM 03-01 requires an independent validation of ventilation to be commissioned. This is post building handover but before the facility is open to patients. This can only take place when building work is completed. For RHCYP, this stage was reached in May 2019. The building was handed over in February 2019.

303. Currently this is a client activity. Any non-compliance would then be discussed between both parties and resolved within the terms of the contract in place.

304. Given the significance of ventilation, it could be better to have the sign off on ventilation compliance before the building is handed over.

Technical Expertise

305. In March 2011, Scottish Government wrote to all NHS Board Chief Executives setting out the Scottish Government's conditions for delivering projects through the NPD model.

306. Within the letter it notes that the project team should provide a challenge function to advisers. In the case of NHS Lothian, technical advisers were appointed as NHS Lothian did not have these skills. The technical advisers worked alongside the project team, providing advice and guidance, which was subsequently followed by NHS Lothian.

307. Given the technical matters that arose, and the need for technical input and expertise, it is unclear how the project team would be able to effectively challenge the advice provided.

308. Going forward, a framework on how technical advice should be followed on these projects which considers much of this expertise will rest with advisers rather than within the NHS, would be beneficial. In particular, how a reasonable challenge can be established over the accuracy of advice and what assurance can be formally sought from technical advisers via the project director role.

Clinical involvement

309. Significant clinical engagement and direct involvement occurred over the life of the RHCYP project. Clinical groups are brought in for their clinical expertise. Those brought in to the project, do so for a period typically in addition to their clinical roles. Whilst fully understanding clinical requirements, they may be less familiar with the balancing, on capital projects, over clinical service delivery, financial impact, and project impact.

310. There may be merit in exploring how future clinical engagement takes place, including supporting clinical groups in whether the contribution is clinical services or supporting the delivery of the project, to achieve clinical requirements within the framework of guidelines for building new hospitals. At times, given the multiple guidelines, the two roles may contradict. There is also limited clarity on what the guideline states compared with what solution clinical groups may prefer, and how this is determined.

Timescales

311. By their nature capital projects bring complexity and delivery over a long period. It would be beneficial for clarity over how changes in guidelines or potential difficulties identified in other capital projects across the NHS and wider public sector are captured and factored into ongoing projects. All project decisions need to consider financial implications, quality factors and impact on project delivery timelines.
312. Building on this would provide greater clarity over decision making within the governance framework and how decision-making flows through the project governance established.

Scottish Futures Trust

313. The RHCYP project was the first large Acute NPD being undertaken in Scotland. NHS Lothian worked with Scottish Futures Trust to develop arrangements and inform NHS Lothian understanding. The project evolved rather than followed a descriptive set out pathway, particularly in the early stage.
314. Scottish Futures Trust had a dual role – advice and guidance to NHS Lothian and assurance over the project through key stage reviews. This assurance was undertaken on behalf of Scottish Government.
315. Observations relevant to Scottish Futures Trust are:

    - Between 2010 and 2014 Scottish Futures Trust were represented on the NHS Lothian project board providing advice and supporting decision making. Alongside this role, they were providing independent assurance. Whilst each key stage report has a second reviewer, there may remain a potential conflict in fulfilling both roles.

    - Based on our review of NHS Lothian project board minutes there was not always clarity on what decision was solely NHS Lothian's decision, or what decision needed to be taken based on advice from Scottish Futures Trust and Scottish Government to satisfy their requirements.

    - The key stage review reports (five in total) identified areas for further consideration by NHS Lothian. The further considerations/actions were not risk assessed. On review, it was not clear what action NHS Lothian must take to progress to the next stage, and whether the observation was an improvement or a gap in NHS Lothian's arrangements to be addressed. In turn, the reports could have been clearer on what Scottish Government needed to be aware of, in terms of project delivery.

    - Scottish Futures Trust appointed a Public Interest Board Member (PIBM). The PIBM is a member of Project Co Board and fulfils their responsibilities as an independent company director. The PIBM is to represent the public interest, fulfilled through the Board member role, as set out in the job description. When both parties encounter difficulties, the independence of the PIBM may be challenged.

Scottish Government Health and Social Directorate remit and responsibility

316. During the project, Scottish Government Health and Social Care Directorate sought and received assurances through a range of sources. In particular:

- Active attendance at NHS Lothian Project Board between 2010 to 2015 by the Deputy Director of Finance and Capital planning (at the time).
- Through Scottish Futures Trust key stage assurance reports.
- Formal sign off by Scottish Government on outline business case, full business case, prior to Financial Close and in 2019 in approving the financial settlement.
- Routine meetings between the NHS Lothian Director of Finance and/or NHS Lothian Chief Executive and relevant individuals within Scottish Government.

317. Going forward there may be benefit in greater clarity between the organisation, Scottish Futures Trust and Scottish Government over the expected sources of assurance over the life of the project and reporting lines. This should be clear on decision making responsibility versus assurance.

318. Where there is a change in Scottish Government policy, Scottish Government should work with the organisation to understand the impact, including unintended consequences. This should include a risk assessment.

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6. Recommendations

319. During our review we identified recommendations for management consideration. These are focused on the more significant matters arising from our review, designed to support NHS Lothian in strengthening its internal control environment. It is acknowledged that recommendations here may become superseded or impacted by the creation of the new National Centre for Reducing Risk in the Healthcare Build environment, which may result in a different framework for delivering projects.

Project route map outlining management activity and assurance activity

<table>
<tr><td rowspan="2">Report reference

Section 4 and Appendix 4</td><td>Recommendation:

Capital projects are governed by the scheme of delegation and standing orders. In the case of the RHCYP there was a project board, the involvement of Finance and Resources Committee and the NHS Lothian Board. Responsibility for decision making on the RHCYP project was not always clear and there was potentially less of a distinction between management and assurance. For future capital projects a road map approved from the outset, setting out the following would be beneficial:
The activities management have in place to identify and mitigate project risk and how this is to be reported
Role and remit of the SRO and the interface between the SRO and governance structures
The role of the Accountable Officer
The required skills, including capacity, and how this is going to be achieved
The structures in place to provide assurance to the SRO, to support the SRO in decision making.
Who has oversight of the “whole” project e.g. a single pair of eyes, in particular linked to contract responsibilities and ensuring delivery of the contract and can triangulate matters across the project.
How advisers are engaged, direct to support decisions or in an assurance role, and their interface into the project reporting lines
How governance structures, for example Finance and Resources and the NHS Lothian Board will receive assurance over the mitigation of risk and project decisions, and when and how this assurance will be received.
The distinction between assurance compared with updates for information, and the differing role anticipated
This road map may then evolve during the project but would give clarity of management vs assurance, and the respective roles individuals, groups, and committees have within the project.</td></tr>
<tr><td>Management Response:

Within our current Scheme of Delegation, we have already defined for capital projects the roles of Senior Responsible Officer, Project Director, Project Manager, and Director of Capital Planning & Projects. Within that we have stipulated that the Director of Finance may not be a Senior Responsible Officer. There is also a link to the national capital process.

It should be noted that the content of the Scheme was not in place at the start and during most of this project.

A framework for decision making will be developed for capital projects. This will identify any required amendments to the Board’s Standing Orders/Scheme of Delegation, and distinguish the role of management from those of the Board’s Committees

Action owner: Director of Finance

Timescale: December 2020</td></tr>
</table>

Responsibility for making and approving decisions

<table>
<tr><td rowspan="2">Report reference

Section 4

Appendix 4 and 5</td><td>Recommendation:

The RHCYP project was complex, involving significant complex negotiations, both of a legal and technical nature. Throughout the project decisions were made routinely for example by clinical teams, the project team including technical advisers and project director. It is not always clear based on the project documentation retained what decisions were made when and by who, and how these were shared with the SRO, through the project board or project steering group or an alternative reporting process. Examples include:
Advice by the technical advisers and how this was formally captured as advice
How the project director and project team received assurance from the technical advisers and how this was assessed
The engagement of technical advisers direct with Project Co and how this was recorded as on behalf of NHS Lothian, and the clarity of who has a relationship with Project Co and for what purpose
How project changes and/or derogations are documented, assessed, and approved
There should always be clarity over who, within NHS Lothian, is responsible for decision making, and what assurance has been provided to support that decision.</td></tr>
<tr><td>Management Response:

A process for agreeing and documenting technical changes/derogations is currently being developed for all Capital Projects. This will require to take account of the role and responsibility of the Centre of Expertise, as well as that of Technical advisers.

This process for all Capital projects will be agreed by the Executive team

Action owner: Director of Finance

Timescale: December 2020</td></tr>
</table>

Clinical engagement

<table>
<tr>
<td rowspan="2">Report reference

Paragraphs 86 – 88, 172-181, 189-197, 238-241

Appendix 4</td>
<td>Recommendation:

Clinical stakeholders were identified and very involved in the project. However, there was not a clarity over the alignment (or otherwise) of the clinical need compared with guidelines and in which instance, what, would take a greater importance over the other.

In addition, where clinical decisions were set out, how these linked and/or impacted on other decisions within the project.

A framework for clinical engagement on future projects would support:

• Clinicians being engaged and actively bought into the planned NHS Lothian outcomes.
• Clarity over the specifications including how clinical practices, quality, financial, delivery is aligned and the weighting of the respective factors.
• An understanding of the purpose of the engagement and involvement e.g. clinical expertise for a specific service. This could include how clinicians are trained to be involved in capital projects compared with trained through experience.
• The balance between local ownership in the project vs responsibility for overall design
• Involvement of Infection Control and how Infection Control advice, links to advice of others and how potential conflicting views are resolved

If this framework were supported by greater clarity over what is a requirement compared with guidelines and a minimum requirement for a new hospital, this would support a greater understanding of what could be changed and what is required.</td>
</tr>
<tr>
<td>Management Response:

The Centre for Expertise will provide the clear framework for the minimum requirements for capital builds including an explicit determination of what is guidance and what is mandated.

Inevitably local engagement with clinical teams will continue to be a key feature of capital projects going forward, given the need for local ownership and the rapidly changing nature of healthcare delivery.

This requires the organisation to define from the outset what the Board’s outcomes and specifications need to be, and each Project explicitly linked to the relevant Clinical Strategy

A framework for clinical engagement, training requirements, and the process and delegated authority for derogations will be developed. This will be in line with the process for the agreeing and documenting technical changes referred to in Recommendation 2

Action owner: Director of Finance

Timescale: December 2020</td>
</tr>
</table>

External Advisers

<table>
<tr><td rowspan="2">Report reference:

Section 4
Appendix 5</td><td>Recommendation:
NHS Lothian had technical, legal, and financial advisers. How each adviser engaged in the project, depended on the role and remit. The advisers with the most significant input through the project were MML as technical advisers. Over time the engagement with MML developed and whilst change orders were established, to approve new scopes of work, how NHS Lothian worked with MML on the project became less clear.
Going forward, when working with external advisers we would recommend:
• Ensuring clarity over reporting line
• The distinction is clear between when the adviser is offering technical advice directly contributing to the decisions to be taken, compared with providing assurance to support NHS Lothian is taking a decision
• How the advisers formally report into the project vs informal custom and practice as a member of the project team
• Steps are taken to maintain the adviser's independence and objectivity
We noted during our review the advice and input from the legal advisers was formal in nature, captured either through reports or formal email correspondence. This practice could be something to consider across all advisers.</td></tr>
<tr><td>Management Response:
It is fully accepted that there requires to be more clarity of the role of advisers, and their responsibilities at each stage of a capital project.
The Board's Scheme of Delegation sets out that the Director of Capital is responsible for the implementation of the Board's overall capital plan through delivery of capital projects and applying project management resource and practices. This includes resource for Technical advisers.
It is proposed that a review of the procurement of technical advisers is undertaken. This will include how the appropriate due diligence is undertaken on their brief, and how changes to this are managed. This review will include input from both the Board's Head of Procurement and the Centre of Expertise
Action owner: Director of Finance
Timescale: December 2020</td></tr>
</table>

Role, remit, and involvement in project boards

Report reference	Recommendation:
Appendix 4	In the case of the RHCYP project although the project board (and then the project steering board) had an agreed term of reference, this was not clear about who should attend, for what purpose and how this particular board was to support decision making. In particular, the project steering board (from 2015 onwards) had over 30 routine attendees. Going forward a clear framework for project boards for capital projects should be in place. This should include: • Ensuring right attendees are involved and defining what should be input into decision making. This should be a core group to facilitate the strategic discussions and focus on decisions. • The attendees have the capacity and skills required • Smaller sub-groups could support the project board and report to the project board, and this should be a defined reporting line. • Reporting lines from the project board into NHS Lothian's governance structure, including SRO (as referenced in earlier recommendations).
	Management Response: Over the last 15 years there has been a range of reports on how Projects should be managed. This includes the Scottish Capital Investment Manual which was updated during the course of the project. This is now reflected in the Board's Standing Orders with the role and responsibilities of the SRO, Project Director, Director of Finance, and Director of Capital Planning in relation to Capital projects set out. The Standing Orders requires that all Business Cases should be prepared in accordance with SCIM. The capital programme currently has several significant projects in comparatively early development. It is intended to undertake a rapid gap analysis of the membership, skills, and experience for Strategic Project / Programme Boards, in line with SCIM business case requirements and taking into account any emerging advice from the Centre of Excellence. This will be reported to Finance and Resources Committee. Action owner: Director of Capital Timescales: December 2020

NHS Lothian Framework for decision making

<table>
<tr><td rowspan="2">Report reference:

Paragraphs 66, 77, 107

Appendix 4 and Appendix 5</td><td>Recommendation:

Whilst most decision making rested directly with NHS Lothian, other parties were involved in either directly supporting the decision-making process or approval. In particular, the role of Scottish Futures Trust, as a member of the project board alongside producing key stage reviews. Without the sign off at key stages, NHS Lothian would not have been allowed to progress to the next project stage. The key stage reviews informed Scottish Government decision making, and the sign offs on the project as out with NHS Lothian's delegated authority.

Based on our review of documentation the respective roles and responsibilities were not always clearly understood, by all parties involved in the project.

On future projects it would be helpful for NHS Lothian to set out an overarching framework and timeline for the project, which can be approved by the NHS Lothian Board and/or Finance and Resources Committee (depending on delegations) This can build in:

• Decisions to be taken by the NHS Lothian Board
• Decisions where authority rests with Scottish Government and what informs Scottish Government decision making
• How parties out with NHS Lothian inform decision making.

This could be linked to the broader capital project route map, and built in here, or as a separate project document.</td></tr>
<tr><td>Management Response:

Scottish Government essentially defines health strategy and policy, and all Boards operate within the delegated authority that they have. Any capital scheme over £10m (and previously £5m) is beyond the Board's authority to take forward autonomously.

NHS Lothian routinely works closely with Scottish Government and Scottish Futures Trust on capital and infrastructure projects/issues. For all major capital projects NHS Lothian requires approval from Scottish Government at key stages of the Project. Equally for Non-Profit Distributing (NPD) projects there was a gateway approach adopted by Scottish Futures Trust as the "owners" of the NPD process. NPD projects no longer exist.

To address this recommendation further dialogue will be required with Scottish Government and Scottish Futures Trust colleagues.

It is proposed that the outcome of this dialogue is incorporated within the actions set out in the Management responses above so that there is clear distinction in responsibilities amongst Scottish Government/Scottish Futures Trust/ NSS Centre of Expertise/NHS Lothian

Action owner: Director of Finance

Timescales: December 2020</td></tr>
</table>

Appendices

Appendices	Page Number:
1: Internal Audit scope including limitations	42
2: Project Timeline	45
3: Environmental Matrix	46
4: NHS Lothian project and governance arrangements	54
5: Advisers and other parties involved, external to NHS Lothian	59

The following appendices set out additional information and detail, expanding further on commentary in the main body of the report.

Appendix 1 Internal Audit scope including limitations

Review of NHS Lothian's internal controls and governance, including engagement with advisors, over the period of the project to seek to understand why NHS Lothian ended up in the current position.

Background

A1 In July 2019 the opening of the new Royal Hospital for Children and Young people (RHCYP) and Department of Clinical Neurosciences was deferred. Following this announcement, the Cabinet Secretary for Health and Social Care commissioned two separate reports which were published in September 2019. The KPMG report focused on certain aspects of governance and decision making ("the what") and the report from NHS National Services Scotland – Health Facilities Scotland (NSS – HFS) focused on the technical aspects of the new hospital and the failings identified. In addition to the two reports commissioned by the Cabinet Secretary, NHS Lothian's External Auditors (Scott-Moncrieff) reported on certain arrangements in their Annual Report to those charged with governance, focused on financial management, as requested by Audit Scotland.

A2 Following the publication of the two reports the Scottish Government announced the appointment of a Senior Programme Director who will oversee the actions taken to ensure that the facility is fit for operation, reporting directly to SGHSCD.

A3 The Cabinet Secretary for Health announced that there would be a public inquiry into the delay, and the NHS Lothian Chief Executive and Chairman have been having ongoing discussions with the Director General for Health and Social Care/Chief Executive for Scotland in respect of the NHS Lothian action plan. As part of the creation of the action plan the NHS Lothian Finance and Resources Committee (alongside the NHS Lothian Board) are keen to explore various aspects of accountability over the timeline of the project, who was involved and when (in what decision making capacity) and the how and why NHS Lothian found themselves in the situation they did.

A4 The Finance and Resources Committee met in September 2019 and considered the NSS and KPMG Reports and agreed that given the Board's responsibilities on governance and internal controls it was important that action was taken to develop a robust action plan in response, to allow NHS Lothian to make the necessary improvements in its control environment and learn lessons for the future. The Committee also recognised the accountability of NHS Lothian and that there may be a need to take appropriate internal action, depending on the contractual arrangements in place with the respective advisors and/or follow NHS Lothian HR arrangements (depending on the findings identified in the review).

A5 Given the wider link to internal control and governance the Finance and Resources Committee in September 2019 discussed and agreed the involvement of internal audit.

Scope

A6 The scope is set out in phases and depending on the outcome of phase 1, phase 2 will be undertaken. This will allow us to better understand the internal controls and governance in place over the period of the project, and will support management in determining if there is further action NHS Lothian can take, either in respect of individuals or the advisors, which may then require specific HR and/or legal advice.

A7 It is recognised in the scope of our work that this was a complex project involving multiple project roles and stakeholders, and as an NPD project needed to operate within certain arrangements, including financial arrangements, and throughout the project these complexities and requirements would have informed decision making.

A8 Our work is designed to support NHS Lothian in collating a factual record in advance of the public inquiry, clarifying the timeline of events and critical decision making and to support NHS Lothian in pulling the findings of the three reports together to come up with an action plan to be agreed and implemented, demonstrating how lessons have been learned within the organisation.

Phase 1 (reflecting discussions within Finance and Resources Committee and a follow up conversation with the Deputy Director of Finance, as internal auditor sponsor):

- To produce a timeline of the key events and decisions over the project lifecycle up until the announcement to delay the opening. The timeline will seek to build in the context for the decision making, and the rationale for how/why events occurred, where this can be determined. This timeline will act as a formal record for all NHS Lothian Board members, supporting the timeline for the public inquiry and providing a factual record of events.
- Linked to the timeline we will consider the scope and remit (including commissioned role and expertise, ownership and involvement in decision making, alongside roles in providing assurance) for all advisors* to the project over the timeline. For each advisor, a record will be maintained of the involvement in the project, outlining respective roles, providing a factual record. Where we identify potential failings or gaps in internal control/governance this will be identified, and this will cover NHS Lothian staff and advisors.

A9 *Advisors will include for example those internal to NHS Lothian for example Accountable Officer/Chief Executive, Project Sponsor, project owner as well as external parties including MacRoberts, Mott MacDonald, Independent Tester, Scottish Future's Trust and Scottish Government. To explore the root cause of the underlying issues (focused on why). This will help understand any gaps in NHS Lothian's governance or internal control arrangements so that management can devise new or amended internal controls (detective and preventative) to demonstrate lessons have been learned and the future approach at NHS Lothian is strengthened, particularly in relation to programme management.

Phase 2:

A10 Phase 2 is dependent on the outcome from phase 1. If during the course of our work we identify any matters which indicate that either individuals and/or advisors did not act in accordance with the agreed role and remit we would look to use our healthcare advisory specialists to support a further review to determine any potential failings and the actions the NHS Board could consider taking.

A11 Grant Thornton specialists that would be available to support this work include specialists in NPD and PFI models, Health Estate, procurement and contract management and forensics. We also have access to relevant technical advisors who we can utilise, if required.

Internal Audit review sponsor

A12 The internal audit review will be overseen by the agreed internal audit sponsors. They are the Deputy Director of Finance; Chair of Finance and Resources; and Chair of Audit and Risk. Internal audit is an independent assurance function. The three sponsors are named in an overseeing role only not to direct the work or influence the conclusions of internal audit. The Internal Audit sponsors, as set out, have seen and agreed this scope.

Approach

A13 For phase 1 our approach will include:

- Reviewing the three reports and pulling out key messages and synergies
- Speaking to KPMG to understand the methodology for their review and process followed
- Reviewing all documentation that has been collated by NHS Lothian for the project, focusing on understanding and evidencing the internal controls in place, the governance arrangements, timeline, and role/remit of advisors and their involvement.
- Based on the above 3 points we will then determine what interviews are required and the interviews will be based on our documentation review, and questions arising from that - focused on internal control, governance, and key roles (internal and external to NHS Lothian).

Limitations of Scope

A14 Our review was undertaken in our capacity as NHS Lothian's internal auditors, and under the Public Sector Internal Audit Standards framework. Our work focused on governance and internal control based on review of documentation and meetings with relevant individuals. The content of this report is solely based on the documentation retained by NHS Lothian which we reviewed alongside meetings with individuals we considered necessary to support our understanding.

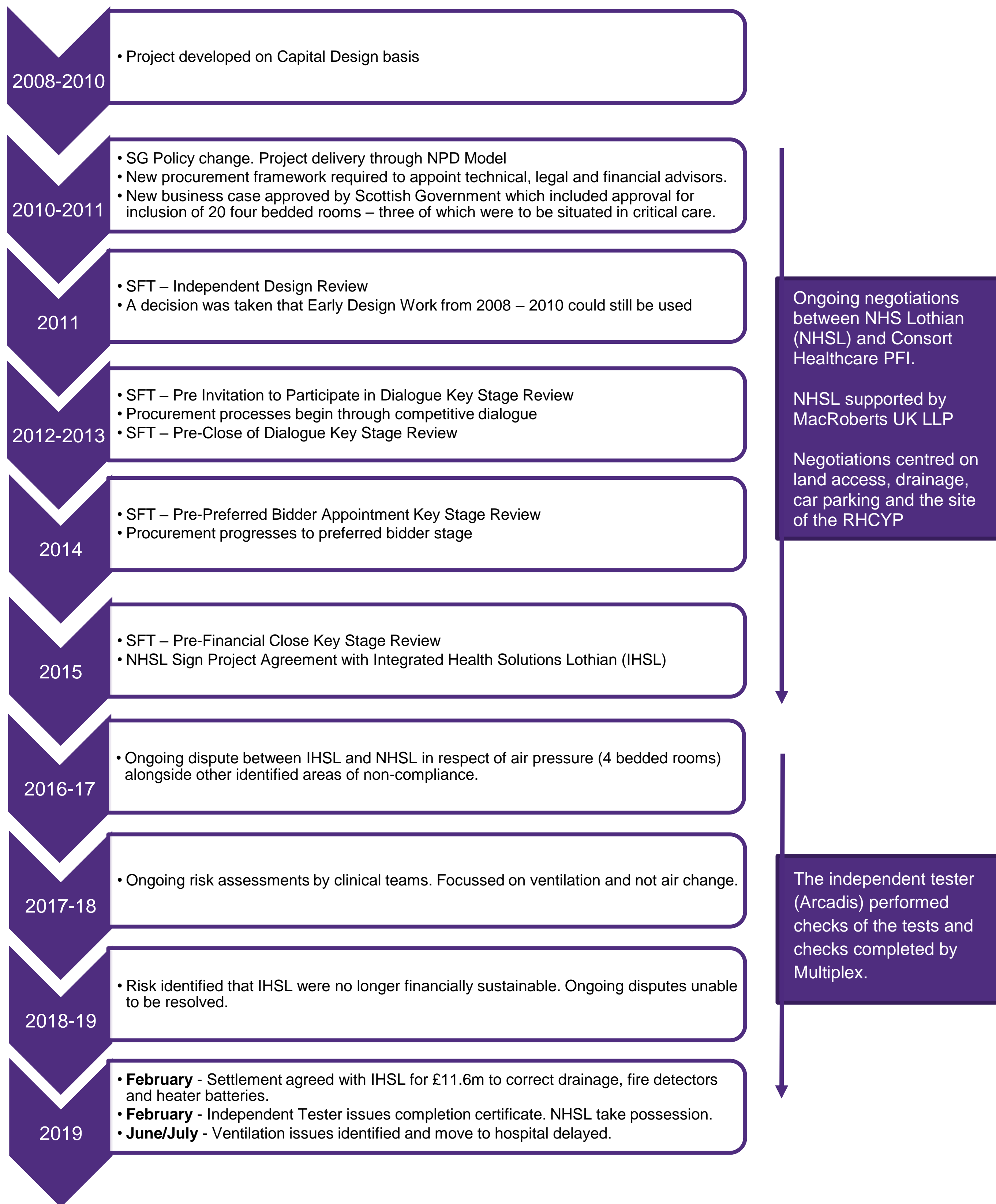
A15 Comments and conclusions made by internal audit in this report are based on our review of the documents we obtained and should not be regarded as offering legal advice or opinion. It is a matter for NHS Lothian to consider whether our findings merit further consideration and action and seek external views where appropriate.

A16 We identified several recommendations to support NHS Lothian going forward alongside certain wider observations which may be further considered within the public inquiry. These recommendations and observations are made in the context of our experience as internal auditors and may not represent all future actions. Should any additional information or documentation subsequently become available, relevant to our scope, we reserve the right to amend our findings considering that information.

A17 This report has been produced solely for the benefit of NHS Lothian and in our capacity as internal auditors for NHS Lothian. In preparing this report we have not considered the interests, needs, or circumstances of anyone apart from NHS Lothian.

A18 Any other party, other than NHS Lothian, that obtains access to this report or a copy under the Freedom of Information (Scotland) Act 2002 or through NHS Lothian's publication scheme or otherwise and chooses to reply on this report (or any part of it) does so at their own risk. To the fullest extent permitted by law Grant Thornton UK LLP does not assume any responsibility and will not accept any liability in respect of this report to any other party other than NHS Lothian.

Appendix 2 Project Timeline



Appendix 3 Environmental Matrix

A19 The environmental matrix is a tool which captures mechanical engineering requirements (as well as other data) for the hospital in an excel workbook.

A20 The mechanical engineering requirements set out in the matrix, in the case of RHCYP, were then replicated in the individual room data sheets and detailed drawings.

A21 The matrix has 3 worksheets:

- One: Guidance notes. These reference specific requirements NHS Lothian requested, per the Board Construction Requirements, alongside specific SHTM and HBN guidelines which need to be complied with.
- Two: Sets out all the room types within the new hospital for example single bedroom, corridor, office, theatre etc. This includes for each room type the mechanical and engineering requirements have
- Three. Records all rooms in the hospital, split by department. There is a column showing room type, and data for this room type from worksheet two is copied over.

A22 There are 1,839 rooms/spaces within the RHCYP and therefore the environmental matrix is large. Alongside air change rates it captures heating, type of ventilation, pressure and other mechanical engineering aspects related to the plant to be installed.

A23 As the matrix is mechanical engineering in focus, we understand it is the responsibility of the Project Co, as Project Co are responsible for the mechanical and engineering design.

A24 The report into governance and internal control (August 2019) referred to the environmental matrix as an NHS Lothian document. Whilst a version of a matrix was included by NHS Lothian in the tender documents this matrix was never branded with an NHS Lothian logo.

A25 Under the NPD model, all NHS Lothian should retain responsibility for is operational functionality and the mechanical engineering of the RHCYP does not, we believe, meet this definition.

A26 We reviewed the copies of the environmental matrix retained by NHS Lothian. Where we have included dates, these reflect the dates per the NHS Lothian document being saved. Not all versions of the matrix included formal dates. Our comments on the matrices are set out below, for each version we obtained and reviewed.

When*	Who	Purpose	Internal Audit Comments
2010	Hulley and Kirkwood employed by BAM (principal consultants) for when the project was capital funded.	Early mechanical and engineering considerations to support the design of the RHCYP.	• Correctly identifies critical care as requiring 10 air changes per hour. • Does not include four bedded rooms, as these did not form the early design. • The matrix was not complete, representing the status of the design work in 2010.

*When is determined using the date of the document retained by NHS Lothian. It is noted that in agreeing RDD, including the environmental matrix, Project Co's system was used to support the sharing and review of documents by both parties. Therefore, the dates may differ between parties depending on how records were saved and filled.

When	Who	Purpose	Internal Audit Comments
2012	Hulley and Kirkwood. This version was commissioned by Davis Langdon under a mechanical and engineering specification to support reference design.	This version was commissioned by Davis Langdon (sub-contractor of MML) under a mechanical and engineering specification to support reference design. The specification included specific reference to the environmental matrix to support design. This matrix was included in Volume three of the tender documents, alongside Board Construction Requirements and Clinical Output Specifications. The tender specification, and all four volumes were NHS Lothian documents.	The guidance note worksheet (worksheet one) includes the following guidance: • **HDU**: HBN57, SHTM 03-01 and 10 ac/hr • **Critical care**: SHTM 03-01 and 10 ac/hr Worksheet two, the master room type, records four bedded rooms as requiring 4 air changes per hour. For critical care (worksheet three) all rooms are recorded as being 4 air changes per hour, positive pressure. Worksheet one notes: *'This workbook is prepared for the Reference Design Stage as an easier reference tool to replace ADB RDS M&E Sheets for the Environmental Criteria elements as described on these sheets.'* The narrative above continues in all future versions. This arises later, in the independent engineering specialist report commissioned to support Project Co, in their interpretation of pressure and NHS Lothian requirements, as a potential source of interpretation difference between the parties. Whilst the guidance note (worksheet one) is correct the detail shown within the critical care department is not in compliance with the SHTM.

When	Who	Purpose	Internal Audit Comments
September 2014	Wallace Whittle (Multiplex mechanical and engineering design consultants).	This version of the matrix was produced at preferred bidder stage, leading up to Financial close. This formed Project Co proposals.	On review of this matrix we note the following: • Hulley and Kirkwood logo has been removed • Guidance notes (worksheet one) remain the same, alongside a reference referring to preparation for financial close • Guidance for Critical care and HDU is still recorded as 10 ac/hr in accordance with SHTM 03-01 (worksheet one) • In worksheet two, the room master type, it sets out "Bedroom" (4 ac/hr and balanced) • HDU as a room master type has been removed • Bedroom 4 ac/hr via ensuite and balanced pressure (worksheet two) • Multi-bed wards 4 ac/hr via ensuite and positive pressure to ensuite (worksheet two) • B1 (Critical care) open plan four bed (multi-ward) 4 ac/hr via ensuite and positive to ensuite (Worksheet three) The room master type states the four bedded rooms as having ensuites and this is what has then been copied into worksheet three for all 20 four bedded rooms in the RHCYP. The three four bedded rooms in critical care do not have ensuites so this is an error. The first version of the matrix (2012) did not show critical care as having ensuite facilities. The air changes shown for critical care continues to not be in accordance with SHTM 03-01 guidance (4 air changes per hour not the 10 specified). The air-change rate for the individual bedrooms is not in accordance with SHTM 03-01 as the SHTM 03-01 appendix one shows bedrooms as requiring 6 air changes per hour. Within the matrix all bedrooms have 4 air changes per hour.

When	Who	Purpose	Internal Audit Comments
2015 (Version 3, post Project Agreement being signed)	Project Co	Project Co proposals, forming part of Reviewable Design Data (RDD) discussion. Noted in Project Agreement (February 2015) as part of RDD not agreed.	In addition to the three worksheets a tracker has been added into worksheet one tracking comments received by the NHS Lothian project team. The NHS Lothian project team included MML as technical advisers. Whilst comments are recorded it is not possible to determine who in the project team made what comments. Note 4 annotated on the matrix states “detailed plans awaited on bedroom ventilation to achieve balanced/negative pressure to corridor. Single bed ensuite extract to be increased noted”. Whilst not specific to critical care it indicates a review comment by NHS Lothian querying pressure regime. Worksheet one (guidance) has had the word “isolation” inserted after the note “critical care air changes 10 per hour”. The insertion of isolation implies 10 air changes per hour only applies to the isolation rooms in critical care. Who inserted the work isolation is unclear, but a reasonable assumption would be this was Multiplex as they are responsible for the matrix and have ownership for the changes to the matrix.
Version ww-xx-dc-xxx-001 (Revision 2)	Project Co	Iteration of the matrix as design was being developed.	This version of the matrix does not have a date. On review there are no material differences between this version, and the version dated 26 November 2015.

When	Who	Purpose	Internal Audit Comments
Version 5 (dated 26 November 2015 and 11 February 2016)	Project Co (branded with the Wallace and Whittle logo)	Environmental matrix with tracker, tracking changes made by Project Co following NHS Lothian review. Part of process of agreeing RDD, including detailed drawings.	There is a reference in here to 2nd batch of comments There is a schedule (built into worksheet one), which is marked up with either a tick or a cross noting if there is a drawing implication, comment received at financial close, or a comment post financial close. This schedule includes a column headed NHS Lothian reference. Comments from the NHS Lothian project team include references back to guidance and relevant SHTM detail and whether Multiplex are complying with the guidelines in their design. A comment by NHS Lothian includes “refer back to reference design drawings. Extract via ensuite (SHPN-04). If no ensuite – via room”. Specifically related to critical care we noted: • B1 Room 063: 4 air changes extract via ensuite. Response states “refer to reference design drawings if no ensuite extract is via room”. There is then a tick to say this was a post financial close comment, and a note saying no action required. • B1 Room 090: Area of 8m squared. Project co to populate areas. Response: review carried out; update schedule of accommodation required for this item. Now updated. From our review of the project team comments it is noted that a substantial number of comments are raised, identifying questions over design and subsequent compliance with guidelines. However, no comments were raised directly against critical care, specific to air change or pressure (other than the point on ensuites above).

When	Who	Purpose	Internal Audit Comments
Environmental matrix Version 7 (19 September 2016)	Project Co	Updated following NHS Lothian comment – continuing to track changes.	Note included stating this version had been updated to suit revised accommodation schedule and general mechanical updates per drawings. There is a specific comment from the NHS Lothian project team which notes critical care does not have ensuites and the need for this to be updated. The NHS Lothian review comment is only in respect of the inclusion of ensuites. It does not state that what is included in the matrix for critical care does not comply with the guidelines in SHTM 03-01. From review of comments and correspondence to Project Co on this version, we noted the following relevant comments from MML: *"The Board have reviewed the Environmental Matrix and still has significant concerns on items that do not appear to comply with the BCRs...some ventilation rates don't appear to comply with BCRs. The Board would like to point that is still awaiting response from Project Co to the issued raised as per MM-RFI-00172 & MM-GC-002006 relating to ventilation rates.".* Based on our review, and looking at the comments, this is specific to pressure. The NHS Lothian project team endorsed the EM to status B. However, it was noted by MML on 7 November 2016: *"The Board have serious concerns over the upgrading Environmental Matrix to Status B considering some of the issues raised (as per MM-GC-2084) being the same as the issues that had been raised since FC. There are also concerns over the potential inaccurate information being transferred to the Room Data Sheets being submitted through RDD.* *However, as requested by Project Co, the Board has upgraded the Environmental Matrix to status B, noting the Board still does not believe the Environmental Matrix and resultant design complies with the Project Agreement. Project Co's failure to comply with the BCRs / PCPs (as per MM-GC-002084) the Board believes would result in a non-compliant Facility.* *The Board would suggest that Project Co resolved the non-compliant and other issues as a matter of urgency, and requests that Project Co issues a strategy for resolution of these issues.".* This comment was made by MML direct to Project Co.

When	Who	Purpose	Internal Audit Comments
Version 9 May 2017	Project Co	Continued dialogue between Project Co and NHS Lothian.	This notes that the matrix has been updated to reflect comments from the meeting on 17 January 2017, and responses (by Multiplex) dated 18 May 2017. For critical care this shows the following revision: • Open plan. 4 ac/hr. 1.8 positive pressure. • Open plan (3 cots). 4 ac/hr 1.9 positive pressure • Open plan (4 beds). 4 ac/hr. 0.5 positive pressure The guidance front cover tab remains unchanged and still records 10 air changes per hour in critical care (isolation rooms).
Version 10 September 2017	Project Co	Continued dialogue between Project Co and NHS Lothian.	This matrix notes updated NHS Lothian comments 28 August 2017 and then 12 September 2017 The tracker of comments between NHS Lothian and Multiplex are still recorded. There are now a cumulation of 50 review points NHS Lothian have raised in this matrix since 2015. Critical care in this version has changed: • B1 063 4 bed. 4 ac/hr. Extract of 3 and positive pressure • Open plan (cots). 4 ac/hr. Extract of 4 and balanced pressure Changes are still being made in red, to support tracking, and updated in the front tracker The guidance front cover tab remains unchanged and still records 10 air changes per hour in critical care (isolation rooms).

When	Who	Purpose	Internal Audit Comments
Version 11 October 2017	Project Co	Continued dialogue between Project Co and NHS Lothian.	NHS Lothian project board comments still included and notes revised schedules of accommodation. The information on critical care is still the same as previous, including the front cover tab referenced 10 air changes per hour in critical care (isolation rooms).

Summary

A27 Based on our review we note the following:

- No explicit comments were included by the NHS Lothian project team (and MML) related to critical care and compliance with SHTM 03-01
- Versions 3, 4, 6 or 8 could not be obtained. These may not exist; it may be due to referencing.
- The change to insert "Isolation" in the guidance tab was not marked in red by Multiplex, when at that stage all changes were to be marked in red to ensure easily identifiable. This change went unidentified by NHS Lothian.
- Each version of the matrix was reviewed by the NHS Lothian project team. MML in their project management support role collated comments and annotated the matrix directly with their observations as well, based on our understanding.
- Technical comments were made, including areas of non-compliance with guidelines, including non-compliance with SHTM 03-01 (out with critical care). None of these were in respect of critical care.

A28 There were substantial NHS Lothian project team (including MML) comments on the environmental matrix. Given NHS Lothian's role was only to comment on operational functionality it is difficult to understand the connection between the matrix and operational functionality, given the purpose of the matrix and its focus on mechanical and engineering design. In addition, in reviewing the comments made, and other areas of non-compliance with guidelines identified, it is difficult to understand, why non-compliance with critical care was not identified.

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Appendix 4 NHS Lothian project and governance arrangements

A29 From the outset, as capital and then NPD NHS Lothian identified the need to appoint technical, legal, and financial advisers to support the project. The change to NPD delivery required a new procurement exercise to appoint advisers, including relevant experience of NPD/PPP projects.

A30 Project team arrangements were established pre 2010 and these remained the same, including the project director who was appointed on a full-time basis to the project.

A31 Scottish Futures Trust wrote to NHS Lothian outlining conditions of funding and support for the project. Within this letter, Scottish Futures Trust raised a question over the PPP/NPD experience within the project team and whether that was considered sufficient.

A32 Following the Scottish Futures Trust correspondence, and the change in funding, NHS Lothian reviewed the respective roles and responsibilities within the project. As part of this review, the SRO and project director reviewed the model roles provided by Scottish Future's trust with the NHS Lothian arrangements. The project team structure, roles and remits were discussed at the Finance and Resources Committee and approved.

A33 The full business case submitted to the Scottish Government in 2014, summarised NHS Lothian's roles as:

Role	Summary of Role
Senior Responsible Owner (SRO) (Director of Finance)	Overall responsibility for the project, being directly accountable to the NHS Lothian Board. Provides strategic direction and leadership and ensures that the business case reflects the views of all stakeholders.
Project Director	Lead responsibility for delivering the facilities and services agreed in the business case. Provides strategic direction, leadership and ensures that the business case reflects the views of all stakeholders.
Board Observer	NHS Lothian representative who will attend and participate (but not vote) at Project Co board meetings after financial close. This was determined to be the project director.
Project Clinical Directors	Represents clinical services in the project. Works with preferred bidder to financial close to complete design in line with the Board's Construction Requirements within the financial limits. Leads the implementation of the agreed service model in respective clinical services to deliver the associated benefits.
Head of Commissioning and Service Redesign	Ensures that the clinical enabling projects required in the RIE are delivered. Leads the overall service change and workforce planning implementation for the project. Leads planning for and co-ordinate the transition of services into the new facility in conjunction with Project Co.
Commercial lead (Director of Capital planning)	Manages the legal, commercial, and financial workstreams for NHS Lothian. Liaises with SFT regarding the funding competition. Interface with the RIE PFI contract. Supports the project director in relation to wider Board capital plan requirements.
Head of Property and Asset Management Finance	Responsibility for all finance aspects relating to NHS Lothian's capital plan / programme and lead financial input into the project.
Contracts Manager	Ensures that NHS Lothian expenditure is effective and efficient and that a productive relationship is established and maintained with Project Co. This role is endorsed by SFT and described in SCIM Guidance.

A34 A project board was created, chaired by the SRO. Whilst including the roles above this also included financial, estates and facilities representation from within NHS Lothian alongside the Director of Finance for Scottish Futures Trust and the Assistant Director of Finance and Capital for Scottish Government Health Directorate.

A35 A pivotal role was the project director. The project director was the interface between the project delivery teams, the professional advisers appointed, and the project board and SRO. Based on the organisation chart agreed in 2011, there were thirty different individuals, via groups, reporting to the project director.

A36 Project governance was fulfilled by the Finance and Resources Committee, the NHS Lothian Board and then Scottish Government (as the level of investment required ultimate decision making to rest with Government).

Observations

A37 Below we have identified our main observations in respect of NHS Lothian's governance and project management arrangements. Over a decade the control environment within NHS Lothian has changed. Given the nature of the technical matters, it is unlikely that differing management and governance arrangements would have identified the problem.

Governance observations	
NHS Lothian Board	NHS Lothian Board delegated business case consideration to Finance and Resources, as would be the usual arrangement for capital projects. Assurances over the project were received from Finance and Resources. In addition, update papers were presented. The NHS Lothian Board approved the contract in February 2015 and the settlement agreement in February 2019. Whilst routine updates were provided, often for information, they could have been more clearly structured to provide assurance to the Board. Despite the scale and the new NPD model, the Board, in terms of engagement, treated the project like any other capital project.
Finance and Resources Committee	Finance and Resources Committee can approve business cases within delegated financial limits. The NHS Lothian board approved an increase in delegated limits to Finance and Resources for the RHCYP project. The Committee were predominantly focused on the financial assurances for the project. Regular updates were provided either by the Director of Finance (in capacity as SRO and/or Director of Finance capacity) and/or the Director of Capital planning. The project director also attended the Finance and Resources Committee to present certain papers but was not a consistent attendee. Regular papers were presented, but like the Board there could have been greater clarity over what was an information paper, a paper providing assurance and a decision paper. Finance and Resources, following papers from the SRO and the advisers to the project reviewed the contract, which was ratified by the Board. From the outset there was no agreement, that we could evidence, which articulated the assurance needs of finance and resources over the project and how the assurances would be sought and achieved. If this had been agreed, there would have been a framework for reporting and clarity. Two Non-Executive members of the Committee attended the project board. Based on the documentation this was determined by Finance and Resources Committee, designed to support the project team. This was at the stage of complex Consort discussions and then the procurement of Project Co. We believe this created less of a distinction between the Finance and Resources non-executive assurance and scrutiny role, and that of operational management.
Scottish Futures Trust	Scottish Futures Trust have a role in providing assurance over the procurement and governance arrangements. This is done through formal key stage reviews. If Scottish Futures Trust were unable to provide assurance, Scottish Government would not approve.

Scottish Government	The RHCYP project was beyond the Board's delegated authority. Therefore, decision making rested with Scottish Government including the approval for NHS Lothian to sign the contract, and also the settlement in February 2019.

Project management observations	
Project Board (2010 to 2015)	SFT and the Scottish Government were members of the project board, contributing to discussions and providing advice. Whilst decisions rested with NHS Lothian, their roles were influential. The project board had many attendees and many groups supporting the project, who provided updates to the board or were in attendance. Collectively the project board made decisions. An alternative would have been to retain the larger project board structure, which then reported into a smaller leadership group. This would have allowed a strategic overview to be maintained as the SRO would not have been so close to detail.
Project Steering Board (2015 onwards)	This group had over 30 members and was too large to fulfil a steering board remit. On review of minutes it was more an information sharing group. Whilst the disputes between NHS Lothian and Project Co were outlined via project director updates the underpinning technical matters were not set out and discussed in detail. Ventilation is mentioned three times in the minutes between 2015 and 2019. Within the minutes there is no evidence over the scale of the difficulty and the exact dispute. Actions are noted including correspondence with the Independent Tester and Project co but follow up action and resolution is not reported back in a consistent way.
Clinical engagement	The appointed project clinical director was a member of the project board. Supporting this role was a myriad of clinical teams and clinical engagement. All these workstreams reported to the clinical director who updated the project board. From a review of project board minutes there is little updates on the clinical aspects of the project. Sign off, of documents relevant to the clinical aspects of the project were all signed by the clinical project director. In the governance structure, the clinical project director and the project director sat side by side. In practice, for sign-off of drawings (for operational functionality) if a clinical space the project clinical director signed off, if non-clinical the project director signed off. Although the project board was designed to include clinical input clinical engagement and decisions ran alongside but out with the project board.
SRO role and remit	When a capital project, an SRO was appointed. The first project SRO, due to a change in circumstance, had to step down and the Chief Executive asked the Director of finance to act in the SRO role. At the time of this decision NHS Lothian did not have a Chief Operating Officer. The SRO changed again in 2015 to the Deputy Chief Executive (Chief Operating Officer). The change was made by the Chief Executive. In practice, given the contract disputes, whilst the SRO was formally the Deputy Chief Executive, the Director of Finance was still involved heavily. It wasn't clear in the documentation we reviewed whether this was due to the significant financial and legal inputs required and acting in capacity as Director of Finance or whether the SRO was fully understood by all involved and who was doing what, as SRO. The Chief Operating Officer role is not a Board Member role, whilst they attend the Board. Therefore, Board updates continued to be provided by the Director of Finance. Lastly for a period the Deputy Chief Executive acted in capacity as Accountable Officer, whilst doing the SRO Role. This is an example of poor internal control, creating a risk over segregation of duties and review and oversight.

SFT Key stage reports	SFT produced key stage reports. These were acknowledged and referred to in update papers to the Finance and Resources Committee. The full reports were not shared with the Committee. Given the focus on this committee seeking assurances, the decision to share reports would rest with management.
Advisers	A framework for how advisers would report to NHS Lothian, including differentiating between technical input vs assurance over decision making was not clearly set out. Custom and practice built up over time, particularly with the technical advisers, who had the bigger adviser role on the project. The project team operated as one project team. When the technical advisers liaised directly with Project Co it is understood this was on behalf of NHS Lothian, but this was not articulated that we could evidence. From the outset, based on project team diagrams the technical advisers (finance, legal and technical) reported to the project director. Over time, the legal advisers, whilst still involving the project director, reported to the SRO for the project. An alternative could have been for day to day management this to rest with the project director, with the advisers then preparing papers for the project board, covering their remit, advice and assurance provided. At two stages in the project the advisers directly reported into NHS Lothian's governance structures. First, in 2015 when each adviser provided a supporting paper to give assurance to Finance and Resources and the NHS Lothian Board prior to signing the contract. There was varying degree of detail between the three advisers in these assurance statements. Subsequently there were legal assurances in February 2019 over the legal process, to support the NHS Lothian Board in agreeing the settlement. It is noted there was not the same degree of detail or input from the technical advisers to the NHS Lothian board at the stage of the settlement.
Liaison meetings and dispute resolution	A series of meetings were in place, providing project oversight between NHS Lothian and Project Co including liaison meetings. These became more important as disputes between both parties arose. Most dialogue and decision making appeared to take place in this forum. The minutes and agreed actions for all these meetings are not all retained by NHS Lothian. Although many will relate to legally privileged discussions and therefore, we understand will have been retained by the legal advisers. These discussions involved the Project director, Director of Finance, Director of Capital Planning and SRO. The Accountable Officer was not involved in these discussions. Evidence of Accountable Officer engagement and involvement is only at the NHS Lothian Board meetings contributing to discussions during the Board and certain Finance and Resources Committee meetings.
Settlement agreement	The dispute and discussions between both parties commenced in late 2017 and formal settlement was only reached in February 2019. This resulted in commercial dialogue alongside technical workstreams. The listing of items agreed within the settlement was developed over this time. Ventilation was an agreed settlement item. The full settlement agreement was presented to the NHS Lothian Board alongside statements from MacRoberts as the Board's legal advisers. Significant items including drainage and heater batteries were referenced explicitly in the covering papers as these remained disputed. Based on our review we could not evidence an independent review of the technical items compromising the settlement agreement. Everyone who was close to the detail, prepared the detail with no objective overview. Given the size of the listing, and that the error had been built into the project at an early stage the likelihood of it being picked up, would be reduced, but this was another opportunity missed.

Capacity and skills	Advisers were sought from the outset to support NHS Lothian. The technical advisers fulfilled general project management support and technical specialists. This skill was required and was brought into the project team with the project team working jointly together. Other roles in the project were fulfilled either through 100% project team for example project director, seconded into the project on a full-time basis from their substantive post e.g. clinical project director or fulfilled the role alongside other NHS Lothian roles and responsibilities. This was the case for the SRO, which is currently normal practice. Clinical input was through the views of clinicians aligned to clinical practices. Their role was not to understand the balance of clinical decisions vs project delivery and financial impact. They were not trained in project management or the delivery of capital projects. Recognising the scale and complexity of the project it is necessary to ensure individuals have the right skills but also the capacity to deliver the roles.

Appendix 5 Advisers and other parties involved, external to NHS Lothian

A38 The RHYCP is a complex project which evolved over a decade. The NHS Lothian project team recognised expertise was required for a project of this scale. In 2007/8 NHS Lothian appointed BAM as principal Supply chain partner to support the capital design.

A39 BAM appointed a series of consultants to work with them in fulfilling this role. NHS Lothian appointed Davis Langdon at this stage in a project manager capacity. In addition, as a capital project Ernst and Young UK LLP (EY) were appointed financial advisers.

A40 When the funding changed to an NPD, NHS Lothian, in accordance with procurement rules, undertook a procurement exercise to appoint technical, legal, and financial advisers, under procurement framework contracts.

A41 In 2010/11, the following advisers were appointed:

- Financial Advisers. Ernst and Young UK LLP (EY). This was a continuation of advice.
- Legal Advisers. MacRoberts UK LLP (MacRoberts). The CLO were not used as they did not have the required PPP/NPD experience or construction contract law expertise.
- Technical Advisers. Mott MacDonald Limited (MML). Prior to this stage MML had a small role, directly appointed by NHS Lothian as NEC Supervisor within the capital procurement process.

A42 There were two other key parties, external to NHS Lothian, involved in the project:

- Scottish Futures Trust (SFT). SFT were involved in providing advice and guidance to NHS Lothian on the NPD approach alongside assurance (procurement and governance) via key stage reviews.

- Scottish Government as project sponsor with ultimate approval through minsters from outline and full business case submissions.

A43 Role and responsibilities were set out in the covering paper to Finance and Resources in 2014, alongside the full business case. Extracted below is the summary table. What is set out remained the case throughout the project.

Role	Responsibilities
Project Manager – Mott Macdonald	The project manager will be co-ordinate the inputs of the appointed advisers and their interface with NHS Lothian and Project Co.
	Following financial close: • Coordinate due diligence on bidder solutions
Legal Advisers – MacRoberts LLP	The role of the legal adviser is to give appropriate advice in their areas of expertise, including up to financial close: • Evaluating and advising on all legal and contractual solutions. • Developing the contract documentation for the project, using SFT specific standard documentation where appropriate; and • Undertaking legal due diligence on Project Co's solutions.
	Following Financial Close: • Supporting the Commercial Lead in clarification and fine tuning of legal aspects. • Assisting NHS Lothian on implementation of the contract

Role	Responsibilities
Financial Advisers - Ernst & Young LLP	The role of the financial adviser is to give appropriate advice in their areas of expertise, including up to financial close: • Supporting the development of financial aspects of the FBC. • Developing the payment mechanism in conjunction with the technical advisers. • Reviewing funding and taxation aspects of the solutions; and • Preparing the accounting opinion for the Director of Finance.
	Following financial close: • Supporting the Commercial Lead in clarification and fine tuning of financial aspects. • Assisting NHS Lothian on implementation of the contract, for instance in the operation of the payment mechanism and reviewing calculation of the annual service payment.
Technical Advisers - Mott MacDonald Limited	The role of the technical adviser is to give appropriate advice in their areas of expertise, including up to financial close: • Supporting the development of technical aspects of the FBC. • Review of Project Co's proposals to ensure they meet NHS Lothian's objectives. • Developing the payment mechanism in conjunction with the financial advisers. • Undertaking technical due diligence and scrutinising costs of Project Co's proposals • Reviewing Project Co's planning submission. • Supporting the Project Director in clarification and fine tuning of technical issues.
	Following financial close: • Assist with general queries and assist with technical due diligence. • Support the Project Director in the construction and commissioning phase.

A44 Based on our review of documentation, other relevant points are below.

MacRoberts UK LLP

A45 Following early discussion between NHS Lothian and the Central Legal Office (CLO) by the Director of Finance and SRO for the project it was agreed that the CLO did not have the contract legal skills required for the project and sufficient legal expertise over NPD contracts.

A46 Key areas of legal input were:

- The SA6 agreement, which was the agreement between NHS Lothian and Consort Healthcare around the site, including the inclusion of the DCN.
- Any amendments to the contract templates for NPD projects, provided by SFT.
- Review of any legal documentation and/or contracts before signing, including the contract between NHS Lothian and IHSL.
- Litigation advice between 2017 and 2019 as contract discussions were ongoing between NHS Lothian and IHSL.
- The SA1 agreement which was the signed settlement in February 2019.

Mott McDonald UK LLP (MML)

A47 MML were the appointed technical advisers in 2011. Their services were procured via a public sectors contract framework and the contract signed by the SRO for the project in June 2011. The costs of the technical advisers were the largest costs NHS Lothian incurred, on external advisers for the project.

A48 MML employed sub-contractors Davis Langdon and Turner Townsend. We understand the appointment of Davis Langdon was requested by NHS Lothian as up to 2010/11 Davis Langdon had invested in the project, had cumulative knowledge, and had an established role. The contract in place was between MML and Davis Langdon.

A49 Within the 2011 contract a scope of work was included which broke down activities into deliverables, days input and who was responsible.

A50 The contract with MML, signed in 2011 has remained in place. In addition to this contract, project work orders were produced by MML throughout the project which were approved by NHS Lothian. These work orders consider changing scope, from the initial contract and additional work undertaken by MML. There are a substantial number of these over the life of the project.

A51 Specific roles that different individuals within MML have had on the project to date include:

- Technical advisers across a suite of specialist areas including mechanical and engineering advice.
- Developed the approach to reference design in 2011 following agreement by the NHS Lothian project board on procurement options.
- Involvement in the reference design work.
- Project management services providing support through project management working alongside the NHS Lothian project team.
- Involvement in technical workshops where technical advice was required.
- Supporting the technical evaluation of the three tenders received.
- Providing commissioned specialist advice for example an engineering report on the site of the RHCYP to support the SA6 agreement.
- Site visits. These were ad hoc and at the request of NHS Lothian.

A52 Based on the agreed roles and remits within the project, MML's principal reporting line with the NHS Lothian Project Director.

Number of advisers involved in the project between 2011 and 2013

A53 The number of parties, external to NHS Lothian involved between 2011 to 2013 was substantial and involved differing contractual arrangements.

A54 NHS Lothian directly contracted with:

- MML (contract signed in June 2011)
- Tribal Consulting. Tribal were appointed healthcare planners. Subsequently Tribal were taken over by Capita and between 2010 and 2012 both organisations were named in documentation.

A55 MML undertook work directly alongside the two sub-contractors MML entered into an agreement with – Davis Langdon and Turner Townsend. In addition, Thomson Gray were a sub-contracted party of MML's providing a cost advisory service.

A56 Davis Langdon, further sub-contracted work under their contract with MML to:

- Hulley and Kirkwood (H&K). Overseeing the mechanical and engineering project advice
- Nightingale Associates. As architects they were original appointed by BAM in the early stage of the project and this appointment retained their knowledge and experience to date.

A57 Davis Langdon initially acted in a project management role and oversaw the reference design work. Once reference design work was completed Davis Langdon left the project. At this stage (March 2013) the project management function transferred to MML. From March 2013 onwards MML were the only technical advisers working on the project.

Scottish Government remit

A58 Scottish Government:

- Representative attendance the project board to contribute to discussions and decisions. The project board was attended by the Scottish Government's Deputy Director of Finance and Capital planning covering the period 2011 to 2015.
- Scottish Government decision making and approval for example full business case.

A59 Scottish Government took the policy decision to change the project from being funded from capital to being funded as an NPD project. This decision was announced in 2010 without any prior discussion with NHS Lothian on potential implications or consideration of options.

A60 The deviation from the guidance in an NHS Scotland letter to Chief Executives (CEL) for all new hospitals to have 100% single rooms was signed off by the Chief Medical Officer for the Scottish Government in 2011. This allowed NHS Lothian to design the RHCYP with four bedded rooms.

A61 In addition, Scottish government signed off the revised outline business case in 2011, the final business case in 2015 to allow the contract to be signed, and the sign-off of the settlement sum in February 2019.

A62 Over this time Scottish Government approval was informed by the assurances from Scottish Futures Trust via key stage review reports, and direct representation on the NHS Lothian project board.

A63 Throughout the project, as they would with other capital projects, NHS Lothian kept the Scottish Government updated, and Scottish Government signed off the respective plans.

Independent Tester – Arcadis LLP

A64 In 2015 NHS Lothian and Project Co procured the services of an Independent Tester. This is a recommended role for NPD projects. The role is based on a risk assessment, to consider compliance with the build phase of the hospital with the contract between NHS Lothian and Project Co (namely the board construction requirements, project co proposals and reviewable design data). Routinely the Independent Tester provides reports to both parties and this included risk assessed actions, to be rectified, typically by Multiplex as the builder. The hospital cannot be handed over to NHS Lothian without the Independent Tester's final completion certificate.

Post building handover ventilation – I.O.M.

A65 As required in SHTM 03-01 post building handover an independent compliance check should be undertaken on the ventilation before the building is occupied. NHS Lothian commissioned I.O.M. to undertake these required checks. This is in accordance with the current guidelines in the SHTM 03-01. Although the building was handed over in February 2019 this only happened in May 2019 as the remaining work had not yet been completed by Multiplex for the testing to take place.

Scottish Futures Trust

A66 The role of SFT was notified to NHS Lothian in a letter, related to conditions of the NPD model. Within an update on the project to Finance and Resources, covering the funding change, the role of SFT was set out. SFT were automatically involved in the project, as agreed by Scottish Government and SFT.

A67 SFT attended the project board meetings between 2010 and 2015. In addition, SFT were also represented on the project steering group board established in 2015 and attended on an ongoing basis. SFT were the only party external to NHS Lothian who had membership of the steering group beyond 2015.

A68 SFT were engaged from an early stage. SFTs role is providing assurance, on behalf of the Scottish Government that the project is being delivered effectively and within the financial model agreed. This is done through the completion of key stage reviews. Key stage review reports are produced and signed off by NHS Lothian, submitted to Scottish Government. Without SFT sign off at each stage, NHS Lothian would be unable to progress to the next stage of the project.

A69 Alongside assurance, SFT also provided advice. Advice included sharing experiences of NPD projects, what skills and experience were required, key points in time, and templates. In addition, specific to this project, additional advice was needed over the site and the arrangements between NHS Lothian and Consort.

A70 There were 5 key stage reviews completed and reported by SFT:

- Stage 1: Approval of project pre-OJEU stage 2012
- Stage 2: Pre-ITPD stage. March 2013
- Stage 3: Pre-close of dialogue. December 2013
- Stage 4: Pre-preferred bidder appointment. February 2014
- Stage 5: Pre-financial close. February 2015

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