Scottish Hospitals Inquiry
Witness Statement of Colin Macrae
22 February 2023
In response to Rule 21 Request dated 8 December 2022 (re-issued 13 December 2022)

Preamble

I have been asked to provide a witness statement in response to the Rule 21 request from the Scottish Hospitals Inquiry ("SHI"), dated 8 December 2022 (re-issued on 13 December 2022). In preparing this statement I have considered two bundles of documents provided by SHI referred to as the 'November' bundle (1764 pages) which was produced on 28 November 2012 and the 'December' bundle (600 pages) produced on 8 December 2012. The SHI has provided a list of headings and questions which are highlighted below. In so far as I am able to assist, I have provided my response underneath each question.

Role on the Royal Hospital for Children and Young People/Department of Clinical Neuroscience Project ("RHCYP/DCN project"); including particular area of expertise and the period engaged on the project

1. I am Colin Macrae, aged [redacted] years. I am a mechanical engineer. I retired in March 2020, but remain available to work for Mott MacDonald on a consultancy basis. I was a chartered engineer in building services and member of the Engineering Council.

2. I have worked for Mott MacDonald for approximately eleven years. My job title before becoming a consultant was senior building services engineer. I have around 18 years of experience in working on Private Finance Initiative type projects in the NHS. My work has mainly involved reviewing operations and design information.

3. I was not involved during the capital stage of the RHCYP/DCN project. I joined the project around the same time as Graeme Greer, in or around May 2013, in my capacity as senior building services engineer, reporting to Willie Stevenson,

who was technical principal. Along with others including colleagues with different specialisms, I was

required to consider the design documents submitted by the bidders during the competitive dialogue process, and provide comments on them. I also attended meetings relating to the design of the RHCYP/DCN project after the appointment of the preferred bidder, right up until the point at which the hospital was due to open in 2019. I also had some involvement in the subsequent remedial works which took place up until I retired in 2020.

Procurement Process – The ITPD

The assessment criteria were based on a mix of price and quality with a 60/40 split in terms of price/ quality. Did you or anyone else from Mott MacDonald express any concern as to the split with a focus on price?

4. I was not involved in the ITPD stage of the RHCYP/DCN project and I therefore cannot assist on this point.

The assessment criteria were based on a mix of price and quality with a 60/40 split in terms of price/ quality. In your experience was this usual?

5. This is the normal way to assess these projects. The split of price and quality may vary. This decision would however have been taken a high level by NHS Lothian. I had no involvement in this decision, nor did I play any part in advising on it.

With reference to bundle items 1 (A34225364- Invitation to Participate in Dialogue Vol 3 - August 2013)[1] & 3 (A34697102- Invitation to Participate in Dialogue Vol 1, Revision B)[2] do you believe that the information provided to

[1] Bundle 2 - Reference Design and Invitation to Participate in Dialogue (ITPD) Documents, Item 22, p773
[2] Bundle 2 - Reference Design and Invitation to Participate in Dialogue (ITPD) Documents, Item 23, p942

prospective tenderers in the ITPD was sufficiently clear in relation to the purpose of the Environmental Matrix and whether bidders needed to formulate their tender to comply with the requirements set out in the Environmental Matrix?

6. The preparation of procurement documents was not part of my remit, and accordingly I was not involved in the preparation of the ITPD documents[3] nor was I really aware that there had been a reference design for the NPD project. My role was to review documents which were given to me for consideration. I am therefore unable to comment on whether the information provided to bidders was sufficiently clear. The Inquiry has asked whether I had an understanding of the documents submitted to me for review, particularly in respect of compliance with the Board Construction Requirements (BCRs) and the requirements to comply with **CEL 19 (2010) (A37215536, CEL 2010 - Letter to Chief Executives, 'A Policy on Design Assurance for NHS Scotland 2010 Revision' (2) dated 2 June 2010[4]), SHTM 03-01 (A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[5])** and the Environmental Matrix. Given the passage of time, it is difficult for me to remember in detail what I did on the project, particularly in the early stages.

7. I was not familiar with the detail of **CEL 19 (2010) (A37215536, CEL 2010 - Letter to Chief Executives, 'A Policy on Design Assurance for NHS Scotland 2010 Revision' (2) dated 2 June 2010[6])**. I now understand this to be an internal NHS policy document, but I do not recall it being on my radar at the time. I have been asked whether I would have been involved in advising on whether ADB sheets should be used but this is not the kind of level of involvement I had on the project. I am not able to comment on how a tenderer could comply with **CEL19 (2010) (A37215536, CEL 2010 - Letter to Chief Executives, 'A Policy on Design Assurance for NHS Scotland 2010**

[3] Bundle 2 - Reference Design and Invitation to Participate in Dialogue (ITPD) Documents, Item 23, p942
[4] Bundle 1 Published Guidance, Item 6, P553
[5] Bundle 1 Published Guidance, Item 4, P333
[6] Bundle 1 Published Guidance, Item 6, P553

Revision' (2) dated 2 June 2010[7]) without using ADB as a design tool as that kind of strategic planning is outwith my remit as an M&E engineer.

8. While I cannot recall all the details, at draft final tender and tender stage I would be asked to review technical submissions from a mechanical and electrical perspective. In reviewing the bids, I would be focussing on what the bidders were proposing to design as a solution for the facility as a whole. I would be looking at the proposal, not just from a ventilation perspective, but also from the point of view of factors such as heating, medical gases, and lighting. By that early stage, the design had not been developed yet. Therefore I would not be looking at whether there was compliance with SHTMs[8] or with the many other applicable sources of guidance. Similarly, I would not be assessing compliance against the draft environmental matrix as the environmental matrix was going to be the bidder's document to develop.

9. The documents which were submitted to me for review would include the Environmental Matrix and later on also the PCPs. The ITPD included an Environmental Matrix produced by Hulley & Kirkwood for the capital scheme which was a draft and was not mandatory for bidders to follow. This Environmental Matrix was then developed by the preferred bidder themselves. The bidders were not expected to sign up to an Environmental Matrix produced by a third party. They had to develop the Environmental Matrix so that it complied with SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[9])** and other applicable guidance. Project Co did develop the Environmental Matrix after their appointment as preferred bidder.

10. My opinion regarding the different solutions submitted by IHSL and Bidder C is that Bidder C marked up the Environmental Matrix and made a number of changes whereas IHSL did not change the Environmental Matrix which had

[7] Bundle 1 Published Guidance, Item 6, P553
[8] Bundle 1 Published Guidance
[9] Bundle 1 Published Guidance, Item 4, P333

been provided in the ITPD documentation. There was no reason for this to be a cause for concern at that stage. That is because design development had not started at that point. I have been asked to comment on the marked up Environmental Matrix presented by Bidder C at final tender stage. I see that it has been marked up by them. While I cannot recall the detail of exactly what I did at the time, looking at the marked up matrix, this would not automatically have given me concerns with regard to the other bids. I would just have thought that bidder C was being proactive, in making a start in developing their design solution, even before they were appointed as preferred bidder. It would be normal and expected for the design of the Environmental Matrix to be developed after the Preferred Bidder was appointed.

ITPD Volume 2 was the draft contract. The Environmental Matrix is not mentioned in volume 2. Was the intention that the Environmental Matrix would be redundant by this stage?

11. I was not involved in drafting the ITPD or putting together the procurement documents. I am not in a position to comment on the intent behind the procurement documents.

When and why was the Environmental Matrix added into the contract as reviewable design data?

12. I was not involved in the decision to add the Environmental Matrix to the contract as reviewable design data. I was told that this had happened at some point, I believe this happened around the time of financial close or just after, but this was not something which was especially material to me in the particular role I was undertaking at the time, except perhaps that it extended the time during which we were being asked to undertake reviews. My role was simply to review any aspects of the design on which I was asked to comment. I am unable to say which individual provided advice on the decision to add the Environmental Matrix to the RDD.

The Inquiry understands that it was for NHSL to determine the elements that would make up the overall Quality score during tender evaluation, as well as the weightings given to the scored elements within the Quality score. Workshops were held involving the broader management team within NHSL, and the Project Team including NHSL's advisors. Were you or anyone else from Mott MacDonald involved in these workshops? If so, (a) can you describe what happened during these workshops? (b) Can you describe why M&E engineering was given a lower weighting than other elements.

13. I do not recall being part of these workshops but I do remember commenting on the various submissions on a comparison basis, along with colleagues specialising in other areas, during the competitive dialogue. I do not know whether M&E engineering was given a lower weighting than other elements or, if that was the case, why that decision was taken. I was not involved in taking that type of decision. I do need to emphasise that I never gave direct advice to NHSL at any point. I would review documents when asked, and prepare comments, which would be passed on to NHSL by colleagues such as Graeme Greer.

14. We reviewed the submissions as a group. The reviews undertaken during competitive dialogue involved a consideration of the bidders' approaches to M&E design. This did not involve a side-by-side comparison of the submissions themselves. My role was basically to highlight strengths and weaknesses of each bid. All three bids scored quite close together. In light of my limited remit, I am unable to say whether NHSL were assessing compliance with the pass/ fail elements of the tender submissions with or without input from Mott MacDonald. Similarly I was not involved in any feedback provided to bidders on their submissions. Around mid to end January 2014 I finished up for a period of leave due to pre-planned surgery. I was off from 23 January until 1 April 2014. I recall that I had quite a lengthy staged return when I was eventually able to go back to work. This meant that I returned to work part-time initially for some weeks. I returned two days per week initially then went up to three days. Colleagues would have been picking up my work in my absence.

- 'Technical Risks for Financial Close' dated 25 August 2014 (A36308781, Technical Risk Register[10]). We have been advised by other witnesses this appears to be a Mott MacDonald generated risk register. Is that correct? Do you recognise this as a Mott MacDonald risk register?

15. I have no recollection of this particular risk register but would comment that if it were a Mott MacDonald document it would be headed as such. The document on page 1648 does not contain a Mott MacDonald heading.

In relation to the items flagged as high risk in (A36308781, Technical Risk Register[11]) – "Technical Risks for Financial Close" dated 25 August 2014, how significant did you believe these risks to be? In particular do you have a view on how and where these risk should have been escalated? Do you know how these risks were escalated and resolved?

16. I was not involved in preparing this technical risk register. I am not sure that I have ever seen it before. I do not see that any of the flagged high risk items would be of major concern for engineering and technical services at that relevant stage of the project. This is because the project was still at a very early stage at that point. The risk register seems to be dated August 2014. Financial close did not happen for another 6 months. The design had not yet been done. There was a lot of development still to do at the time that risk register seems to have been prepared. I cannot recall this document and so cannot assist with confirmation of how and when these matters were escalated, or even whether they were, in light of the stage of the project. I would not have been involved in escalating any concerns. To clarify, there are no specific technical concerns evident from this risk register which are marked as high risk. Aside from Combined Heat and Power ("CHP") sizing, the matters identified as high risk which are in the "technical" category are all actually programme or contractual risk issues, such as delay or a lack of review time. In relation to CHP, that is also something which is arguably a bit premature. It is Mott MacDonald and/ or

[10] Bundle 10 – Miscellaneous Volume 1 (of 2), Item 10, p75
[11] Bundle 10 – Miscellaneous Volume 1 (of 2), Item 10, p75

NHSL looking into the future and forecasting that there might be a problem. The design had not been done yet so it was not possible to say at that early stage when the risk register was prepared that there would definitely be a problem.

'Risk Register' dated 18 November 2014 (A33337268, Project Risk Register Version 14-18 Nov 2014), records row 8 with a risk status of "red". What were the problems at this point and the actions put in place to address these issues?

17. I am not familiar with the Risk Register dated 18 November 2014. I was not involved in preparing it. I was not aware of any particular technical issues at this point, and do not recall being asked to comment on anything specific. I should highlight that this Risk Register **(A33337268, Project Risk Register Version 14-18 Nov 2014)** is not a technical risk register. It is a project risk register. This would have been much higher level than anything I would have been dealing with in the project. I would have had absolutely no involvement in that at all.

Problems with the Environmental Matrix that were highlighted before Financial Close

Discrepancies in the EM were identified by you before financial close (A35614364, Email – G. Greer to Brian Currie – Single Room Ventilation (with attachment[12]). These concerned single bed-rooms rather than multi-bed rooms in critical care. However, the detail at this stage of who was involved and what was decided is hazy. The key point is that issues had been identified yet there seems to be no wholesale reappraisal of the project and NHSL proceeded to sign a contract. What are your recollection of events?

18. I wrote the email of 12 November 2014 which is included at **(A35614364, Email – G. Greer to Brian Currie – Single Room Ventilation (with attachment[13])**

[12] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 17(i), p69
[13] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 17(i), p69

to explain to my colleagues and NHS Lothian what the overall ventilation strategy actually was and the implications of it. Broadly the concern was that the ventilation strategy proposed by IHSL was leaving an excess of air pressure which would require to be discharged. This meant that the bedroom was at positive pressure, and air would spill out into the corridor. This potentially created an infection control risk. My email prompted NHSL to prepare a document to be issued to Project Co entitled "Comments on PCP 4.9 2nd draft" **(A42059430- CM Enclosure 1- Comments on PCP 4.9 (second draft))** identifying that the proposed design did not comply with SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[14])** in terms of the overall ventilation strategy. I was commenting on the overall strategy, and where I saw some areas of non-compliance. This is why I sent this particular email from November 2014. It was not our role as technical adviser, to do a line-by-line check of the Environmental Matrix. It was IHSL's responsibility to produce a compliant design. The issue with the ventilation strategy came to light following review of the Environmental Matrix. We were undertaking sample reviews of each version of the Environmental Matrix produced by the preferred bidder. We tried to focus on a different area of the matrix each time. In response to the Inquiry's questions, I am not able to say why a particular tender was not rejected at the assessment stage; matters I spotted after the appointment of the preferred bidder might have arisen due to development of the design by them. Any reviews undertaken by us of the Environmental Matrix, including at tender stage, would not have involved line by line checks for compliance. We were not the designer. It was always Project Co's responsibility to ensure that they provided a compliant design. Our spot checks were simply aimed at ascertaining that the design development was progressing. I am not in a position to comment on whether NHSL were doing a line-by-line review of the Environmental Matrix. I recall that individuals from NHSL produced their own comments on the Environmental Matrix but I don't think it was a line-by-line review. The Inquiry has asked whether, looking back to the tender/ bidding process, whether NHSL or MML were aware that Bidder

[14] Bundle 1 Published Guidance, Item 4, P333

C had marked up the Environmental Matrix. Once again, given the passage of time, I am unable to recall the details of whether NHSL or MML were aware of Bidder C's amendment of the Environmental Matrix during the Bidding process. As I say though, the fact that Bidder C had produced a marked-up matrix at that early stage would not of itself have been a matter of concern.

19. In relation to the specific question being put to me, I was not involved in advising NHSL whether to sign the contract. I would not have been involved in considering or advising on strategy in terms of when Room Data Sheets required to be produced or anything at that level. I had a very specific role in the project, which was to comment on technical matters which were passed to me for review. I continued to comment on the various iterations of Project Co's Environmental Matrix right up to 2017. I continued to highlight areas of non-compliance, though it remained the position that it was not my, nor Mott MacDonald's role, to undertake a line-by-line review to check for compliance. Regarding the documents which were being sent to me for review, these would normally come from MML project management team members such as Graeme Greer, Maureen Brown, Kamil Kolodziejczyk or Kelly Bain. Occasionally, NHS staff would ask for things to be passed by me for review. My involvement on the project was on an ad-hoc basis and I worked on the project one day a week. On that day I would attend meetings and review documentation (a fraction of which would be related to ventilation). Of the time I spent on the project, about 5-10% was looking at ventilation. I spent the remainder of my time providing input on all other M&E matters. This included but was not limited to lighting, heating, internal function of the fire alarms, medical gases, IT, cabling and fibre optics, the energy centre, and drainage. I wasn't aware of the full scope of MML's remit and so when I was passed documentation to review I would look at that, and then feed my comments back to either Graeme, Kamil or Kelly. I believe there were 11 revisions of the Environmental Matrix and the first one I reviewed was revision 1 in late 2014 **(A32623039, Environmental Matrix dated 4 September 2014[15])**. I reviewed a different part of the document every time it was passed to me to avoid duplicating work. I kept notes of what I had reviewed

[15] Bundle 4 - Environmental Matrix, Item 1, P4

previously to help guide me along with my memory of what I had already looked at. These notes would have been summarised in the emails I would have sent to Kamil, Maureen or other colleagues, providing my comments on the matrix. My understanding is that these colleagues would then have passed my comments on to NHS Lothian. Up to financial close, the purpose of my reviews was to assist in the development of the approach to the mechanical and electrical design. I provided comments every time I was asked to look at the Environmental Matrix but I had to be careful to avoid offering suggested design solutions as MML were not the designer of the Environmental Matrix. I had to take care to avoid stepping into the role of designer. I was looking at a number of issues, not just ventilation, including temperature ranges, lighting levels and compliance with the schedule of accommodation.

NHSL appear to wish the ventilation system not to rely on opening windows. However, throughout the procurement exercise a mixed mode system was promoted. The issue is flagged in a series of emails originating with Mott Macdonald, see (A35614364, Email – G. Greer to Brian Currie – Single Room Ventilation (with attachment[16]). On 13 November 2014 Graeme Greer, (Mott MacDonald) forwarded an email to Brian Currie (NHSL). Mr Greer stated: "Further to the Environmental Matrix ….. Might be worth raising this again at the RDD meeting?" What was the issue that was emerging here and what were your concerns/ NHSL's concerns? How were these issues resolved in the 3 month period leading up to signing of the contract/ Financial Close.

20. Although SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[17])** includes the use of natural ventilation, it is well established that natural ventilation is not an appropriate means of providing a controlled environment. This was also detailed in the email from Ian Stewart, HFS to Jeanette Richards of NHSL dated 14 January 2014 (see page 1437 of the November bundle**) (A35614504, Email – G. Greer to Janette Richards –**

[16] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 17(i), p69
[17] Bundle 1 – Published Guidance, Item 4, P333

Natural ventilation)[18] I am unable to comment on how the matter of the mixed mode ventilation system was resolved as I was not asked to provide further input.

21. The first thing to consider is how is the ventilation being provided and to what extent is it being provided. SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013**[19]**)** has been updated since the version that was in force in 2014/15. The guidance gave the option of natural ventilation. I am a firm believer however that natural ventilation does not work in a hospital setting. Natural ventilation means opening a window so you have no control over the ventilation in the room. There are complex variables to consider. My opinion is that natural ventilation can only work in a corridor in a hospital setting and this can be achieved through opening corridor doors to allow ventilation to flow. However, this requires consideration of where in the hospital the corridor is, and whether the pressure of the rooms leading into the corridor are positive or negative pressure. My preference would be to see all-mechanical ventilation.

22. I am aware that Ian Stewart at HFS was asked by Janette Richards at NHSL to comment on the single bedroom ventilation. He provided his comments by way of an email dated 14 January 2015.

23. Maureen Brown at Mott MacDonald required to feed the above observations of Ian Stewart into IHSL and she requested my input before passing on comments. I sent an email to Maureen Brown on 28 January 2015 **(A42059431- CM Enclosure 3- Colin Macrae email to Maureen Brown regarding single bedroom ventilation)** that made clear:

    (1) The single room with en-suite ventilation design required to comply with the parameters set out in SHTM 03-01 **(A35610757, Scottish Health**

[18] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 13, p58
[19] Bundle 1 – Published Guidance, Item 4, P333

Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[20]).

(2) The design solution should not rely in any way on the opening of windows as these will be opened or closed by patient choice.

(3) The critical factor from SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[21])**. for infection control will be the resultant pressure within the room being balanced with or negative to the corridor.

(4) Isolation room ventilation should comply with SHPN 04 Supplement 1 **(A33662184, Scottish Health Planning Note 04, In-patient Accommodation Options for Choice Supplement 1 Isolation Facilities in Acute Settings dated September 2008[22]).**

24. Maureen Brown asked Janice Mackenzie at NHSL if she was content for the above points I had made to be issued to IHSL (Project Co). Janice confirmed "that seems fine" in an email dated 29 January 2015 **(A34225421, Email - Maureen brown to Janice McKenzie - Bedroom ventilation/HAI Scribe 29 January 2015[23])**. Janice Mackenzie also asked Fiona Halcrow to confirm she was happy with my suggested response to be passed onto IHSL and Fiona Halcrow confirmed "I'm fine with this" in an email on 29 January 2015. I have attached a copy of this email chain **(A42059434- CM Enclosure 5- email from Maureen Brown to IHSL regarding SHTM compliance)**. Maureen Brown then communicated these points, including the fact that the ventilation design should not be dependent in any way on opening windows, to IHSL in an email dated 29 January 2015 **(A42059434- CM Enclosure 5- email from Maureen Brown to IHSL regarding SHTM compliance)**.

[20] Bundle 1 – Published Guidance, Item 4, P333
[21] Bundle 1 – Published Guidance, Item 4, P333
[22] Bundle 1 – Published Guidance, Item 5, P518
[23] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 12, P56

The Inquiry has been provided with the following extract but not a full copy of minutes or detailed context. We understand a meeting took place on 19 November 2014 and related to a Healthcare Associated Infection (HAI) – System for Controlling Risk in the Built Environment (SCRIBE) ("HAI-Scribe") where the following was recorded:

<table>
<tr><td rowspan="2">2.2.</td><td rowspan="2">Is the ventilation system design fit for purpose, given the potential for infection spread via ventilation systems?</td><td>Yes</td><td></td><td>No</td><td>x</td><td>N/A</td><td></td></tr>
<tr><td colspan="6">Some concern has been raised in relation to a potential issue with ventilation with regard to negative/balance pressure in single bed rooms. Awaiting drawings and further information to fully understand if
there is a risk/issue</td></tr>
</table>

Were you aware of this meeting? If so, to whom was the issue escalated and what was the result?

25. I was not involved in any HAI-Scribe meetings that I can recall and so I can't assist in providing confirmation of how this matter was addressed.

TUV Sud/Wallace Whittle (IHSL's sub-contractor) produced a draft report for air movement to single bedrooms dated 12 January 2015, titled "RHSC-DCN Edinburgh Air Movement Report For Single Bedrooms (Draft), (A34225453, Wallace Whittle – Air movement Report for Single Bedrooms (draft) 12/01/2015)[24] . Do you recall having sight of this report and providing comments? Were NHSL satisfied with TUV Sud/Wallace Whittle report?

[24] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 15, p56

26. Yes I recall this report and recall commenting at a meeting. I have been unable to find a minute of that meeting (meetings were not always minuted) but I recall that my comments were broadly as follows:

a. NHSL had stated to IHSL that opening windows are not to be included in the ventilation strategy.

b. Scenario 1, point 3: the hierarchy of cleanliness and the pressure regime shall be that the single room is to be 0 or -ve to the corridor. No air should pass from the room to the adjacent space i.e. the corridor.

c. Scenario 2 does not mention the supply air to the bedroom.

d. Scenario 3: as comment above.

e. Conclusion: I don't recall the drawings which are mentioned in the TUV Sud/ Wallace Whittle report **(A34225453, Wallace Whittle - Air movement Report for Single Bedrooms (draft) - 12 January 2015[25])**. I see however that TUV Sud still had opening windows in their strategy at that point, despite our comments. The Environmental Matrix and overall design was always for ProjectCo to develop. Ultimately it was up to ProjectCo to comply with SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[26])**.

27. I do not think TUV Sud/Wallace Whittle's report **(A34225453, Wallace Whittle - Air movement Report for Single Bedrooms (draft) - 12 January 2015[27])** was accepted by NHSL. My recollection of the meeting I mention at paragraph 23 is that it was made clear to IHSL that what they were proposing was unacceptable. Many meetings were not however formally minuted so I am unaware of whether there was a written record of this being communicated.

Risk Registers

[25] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 15, P66
[26] Bundle 1 Published Guidance, Item 4, P333
[27] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 15, P66

According to the document entitled "Design risks to the Board at Financial Close", (A36308801, Design Risks to the Board to Financial Close[28]) the risks at 28 January 2015 included the first item which related to ventilation. The risk register bears the Mott MacDonald branding but does not state what the precise issue is nor how the issue would be resolved. The terms of the "current mitigation measures" indicate that this relates to NHSL's response to Wallace Whittle's proposed solution to single bedroom ventilation, which the Board felt was not compliant with SHTM 03-01 (A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[29]). Can you expand on what the issues were? What advice did Mott MacDonald provide and what was the proposed approach to resolving?

28. To my knowledge, the issues were set out in my answer at paragraph 18. The fundamental issue was that Wallace Whittle were maintaining that their design was compliant with SHTM 03-01**(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[30])**, while the Board disagreed. The Board did not want opening windows to be part of the ventilation strategy. Mott MacDonald did not reject the proposals of IHSL as that was not our role, any rejection would have to be by NHSL. Mott MacDonald did not provide advice on what an appropriate alternative approach might be as that would leave us in the position where we would become designers. I am unaware of how this matter was eventually resolved. I understand that there was a series of meetings in February 2015 at which this matter might have been discussed but I was unable to attend the first meeting due to annual leave and subsequent follow ups due to diary clashes. One of my colleagues would have attended, possibly Kamil Kolodziejczyk.

[28] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 21, p84
[29] Bundle 1 Published Guidance, Item 4, P333
[30] Bundle 1 Published Guidance, Item 4, P333

What is the purpose of this Risk Register(A33337268, NHSL RHSC and DCN Risk Register 18 November 2014[31]), to whom was it to be shared/escalated?

29. Like any risk register **(A33337268, NHSL RHSC and DCN Risk Register 18 November 2014[32])** it is intended to track and resolve risks and issues. I do not recall having been involved in the preparation of this risk register. I don't know who would have seen this document, and what the circulation list would have been. I similarly could not say to whom it would have been escalated.

In the period from preferred bidder to financial close, the list of RDD became more extensive than expected, to the extent that it added new risks to the project. Can you explain your understanding of the risks related to RDD? What advice did Mott MacDonald provide to mitigate all of these new risks? Did NHSL take on board this advice to mitigate these risks?

30. My role did not involve directly advising NHSL on how to mitigate risks; I provided technical assistance to others who were involved in providing this advice. I therefore can't assist with confirming what specific advice would have been given, and whether NHSL took on board any advice which they received. I am not in a position to advise exactly who from MML provided advice to NHSL on how to mitigate risks but to the extent such advice was given it would have come from the project management team.

What was your role in respect of the AEDET and HAI-Scribe reviews? Whose responsibility was it to arrange the reviews?

31. I was not involved in this aspect of the project, and I do not know who was responsible for these reviews.

Did the AEDET assessments that took place before financial close include an assessment of engineering aspects? Was RIBA stage E reached before

[31] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 10, P42
[32] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 10, P42

financial close? At what stage of a project would you expect RIBA stage E to be reached?

32. I was not involved in the AEDET assessments and am not aware of when RIBA stage E would have been reached as that is outwith the scope of my involvement and indeed my area of expertise.

Was a final AEDET assessment done to score engineering? If one was done, who attended?

33. I was not involved in this aspect of the project. I do not know whether a final AEDET assessment to score engineering was carried out.

Can you explain the role of HAI-Scribe in the procurement phase of a project? Is it mandatory before project approval?

34. There are a number of HAI-Scribes during a project. For good management of a project you would conduct these as you go along. I am not certain if they are mandatory for PFI contracts but I understand HAI-Scribes are required under Implementation Strategy Scottish Health Facilities Note (SHFN) 30: Part B.

Documentary evidence shows that a Stage 3 HAI-SCRIBE review was meant to take place before Financial Close but 'the right people weren't there' and so it didn't take place on the day it was meant to. Was this workshop rescheduled?

35. I was not involved with HAI-Scribe in relation to this project so I am unable to answer this question.

Is AEDET or HAI-Scribe required as part of the business case process? How do they fit into the overall assurance process? Do the results get reported up, or are they simply for design teams to get feedback and make improvements where required?

36. I am unable to comment on whether AEDET or HAI-Scribe would be required as part of the business case process. This would be outwith the scope of my involvement as a mechanical engineer.

We note that an NDAP was not required for the project due to transitional arrangements in place. Can you confirm whether equivalent or alternative design assessment took place?

37. I was not involved in this aspect of the project and am unable to comment.

Amongst the requirements for NDAP is "Evidence that Activity Data Base (ADB) is being fully utilised during the preparation of the brief and throughout the design and commissioning process." Was an equivalent design assessment implemented to ensure compliance?

38. I was not involved in this aspect of the project and am unable to comment.

Was any design assessment done in advance of the Full Business Case? If so, can you explain the format this took?

39. I was not involved in this aspect of the project and am unable to comment.

NHSL have indicated they were not aware of any non-compliance with SHTM 03-01 (A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[33]). However we have come across evidence of discussions about Wallace Whittle's ventilation design for bedrooms where there is concern around non-compliance of the design. Could you explain the issue that was raised and outline the advice provided by Mott MacDonald together with the proposed mitigation or resolution?

[33] Bundle 1 Published Guidance, Item 4, P333

40. I am not aware of which particular issue of non-compliance is being referred to in this question but there was certainly an issue relative to single bedrooms. This was set out at item 7 of NHSL's comments IHSL's PCP's. This was based on a comment I had raised as I mention at paragraph 18 above. I am not aware of what happened after that stage. My role was to highlight anything I spotted in my reviews and escalate it to the Board via my colleagues. It would then be for the Board, perhaps advised by my colleagues, to decide how to take things forward. IHSL were designers and had design responsibility at all times. Mott MacDonald can only provide comments and outline issues. To offer suggestions for mitigation or resolution could imply that Mott MacDonald were the designers, and we were always careful to avoid that as it was not our role. I am not able to say whether there was anyone on the Board side, either internally at NHSL or an external advisor, who undertook that role. I certainly was not aware of anyone on the Board side who was offering design proposals.

One of the points made was that IHSL had a different interpretation of SHTM 03-01 (A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[34]). Is this usual for healthcare projects?

41. It is often the case in healthcare projects, at least in my experience, for the designers to have differing interpretations of SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[35]).** This is why there is a clause in the BCRs to the effect that the most onerous standard will apply. It is common in healthcare projects for the standards to contradict each other occasionally. An example of this can be seen in audiology where there is a direct contradiction with the guidance. This is why it is standard in contracts for healthcare projects to specify that the most onerous standard will be used. To my mind this removes the ambiguity. In the event that there is a change or deviation from the guidance this should be signed off as a

[34] Bundle 1 Published Guidance, Item 4, P333
[35] Bundle 1 Published Guidance, Item 4, P333

derogation. In my opinion, all SHTM guidance is clear but is not concise and is therefore still open to interpretation. For example, SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[36])**. Table A1 provides for generic rooms but does not account for patient type or clinical need. By this I mean that it only gives sample rooms and does not include any specific guidance for different patient groups (adult/ child) or clinical department.

Was it considered a risk that IHSL had a different interpretation to SHTM 03-01 (A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[37]), compliance with which was a project requirement?

42. I would not have been involved in advising on whether it would be considered a risk that IHSL had a different interpretation of SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[38]).** In my experience as I say though there are often differing interpretations of the guidance.

The register of "design risk at Financial Close" (A36308801, Design Risks to the Board to Financial Close)[39] shows the mitigation proposed for the dispute that had emerged with IHSL, but does not actually flag the risk of non-compliance of single bedroom design proposal, or in fact that there was a differing interpretation of SHTM 03-01 (A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[40]). between IHSL and NHSL. Can you provide any further insight to this?

[36] Bundle 1 Published Guidance, Item 4, P333
[37] Bundle 1 Published Guidance, Item 4, P333
[38] Bundle 1 Published Guidance, Item 4, P333
[39] Bundle 8 - Scoring & Correspondence Regarding Issues, Item 21, p84
[40] Bundle 1 Published Guidance, Item 4, P333

43. I would not have been involved in advising the board on this point.

The Environmental Matrix

The Environmental Matrix was to be used instead of room data sheets at the early stages of the project. See Paragraph 2.5.3 of Volume 1 of the ITPD volume 1 (A34697102, ITPD volume 1[41]) which states that standard form room data sheets had not been prepared at that early stage. Guidance Note 1 to the Environmental Matrix issued with the ITPD describes the document/ spreadsheet as an "easier reference tool to replace ADB RDS M&E Sheets". During the competitive dialogue phase, room data sheets were to be prepared by bidders for certain rooms. However, "all remaining rooms" required to have room data sheets completed before financial close. At what point was it expected that the environmental matrix would be superseded/ become obsolete?

44. I was not involved at this strategic level of the project, or in any decision making around Room Data Sheets so was not aware of when they were to be produced or by whom.

In adopting the Environmental Matrix, did Hulley & Kirkwood seek clearance from Mott MacDonald or NHSL?

45. I was not involved in this aspect of the project and am unable to comment. I did not become involved until competitive dialogue stage by which time Hulley & Kirkwood were no longer involved.

Who authorised the use of the Environmental Matrix?

46. I was not involved in this aspect of the project. It was before my time.

[41] Bundle 2 - Reference Design and Invitation to Participate in Dialogue (ITPD) Documents, Item 23, p942

Was it the intention that the Reference Design – and the environmental matrix in particular – would have fulfilled its purpose by financial close? Was the intention that it would be replaced with the preferred bidder's design solution and a full set of room data sheets? How was this intention (i.e. that the environmental matrix would be redundant at financial close) communicated to prospective tenderers?

47. I was not aware at the time that a specific reference design including the environmental matrix had been created for the NPD project. I only became involved when the procurement process was well underway and from then on my role was to review documents given to me for consideration.

Was a decision taken to deviate from what was stated in the ITPD and ISFT in order to allow the preferred bidder to refrain from producing a full set of room data sheets? If so, who took this decision? When was the decision taken? Why was the decision taken? Did this prolong the use of the environmental matrix concept? What role/ purpose did the environmental matrix have at financial close?

48. I am not in a position to provide an answer to this question. My role was limited to mechanical engineering input.

The environmental matrix was included in the final contract as reviewable design data. It is not mentioned in the draft contract in volume 2 of the ITPD as reviewable design data. When was a decision taken to include the environmental matrix as reviewable design data?

49. I believe this was shortly before Financial Close. I was not involved in this decision as I say in one of my earlier answers.

What practical implications did this have for the project and the design process in particular?

50. From my own perspective it meant that design development would be delayed so that the period in which I was asked to do reviews was extended. I would not have been aware of the impact on the overall project beyond my own remit.

Why did prospective tenderers need M&E engineering information if it was up to tenderers (and ultimately the preferred bidder) to develop the design of M&E building services?

51. The information was provided as a guide for tenderers to enable them to develop their own design.

Given that the environmental matrix became "reviewable design data", was there an agreed technical specification for the ventilation system (i.e. air changes per hour, pressure regimes, etc) as at Financial Close?

52. No. There was no technical specification as at financial close. The Environmental Matrix was commented on several times detailing areas of error and non-compliance. For example, in PCP clause 4.9 (second draft) of Project Co's proposals there are comments on the Environmental Matrix and comments on SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[42])**. Item 7 comments on their PCP with air changes comments.

A decision was taken by NHSL to use an Environmental Matrix instead of Room Data Sheets produced using ADB as a briefing tool for prospective tenderers. It is not clear who took this decision, when the decision was taken or why the decision was taken. To your knowledge was this addressed at any meetings either of the project team, the Project Board or the Board of NHSL?

53. I did not attend any meetings of the Project Team, the Project Board or the Board of NHSL so I am unable to assist with this question.

[42] Bundle 1 Published Guidance, Item 4, P333

Why was the Environmental Matrix deemed to be of equal quality to room data sheets produced using the ADB system.

54. Consideration of this type of issue was outside the scope of my remit. I would not have been in a position to take a view on this or advise on it nor would I have done so.

Did Mott MacDonald advise NHSL how to demonstrate this?

55. I was not involved in considering this type of issue or in formulating any advice on this point.

Would you consider that the decision to use the concept of an environmental matrix was the cause – or part of the cause - of the errors with the ventilation system for the new hospital (in critical care rooms)?

56. The concept of an environmental matrix works well if the designers take on the responsibility to develop it in line with the Schedule of Accommodation and guidance. Those drafting the Environmental Matrix are part of the design team and as soon as they began issuing revisions of the Environmental Matrix they are deemed to have taken ownership of the document. Any ventilation errors are those of the designers rather than simply through the use of the Environmental Matrix. I am unable to confirm definitively whether it is possible to populate an Environmental Matrix from the ADB system automatically as this was not part of my role.

What are your thoughts on EM replacing Room data sheets?

57. The Environmental Matrix is not designed to replace the Room Data Sheets but to supplement them. The Environmental Matrix is a summary of the engineering detail that should allow the designers to progress the engineering design early while development of the architectural design (such as layouts) is underway. My understanding is that the Room Data Sheets would be produced from the

ADB. Similarly my understanding would be that this is also how an environmental matrix would be prepared but I do not know the details of how Hulley & Kirkwood would have prepared the particular draft matrix issued with the ITPD for this project. The ADB provides the Room Data Sheets for all room types within a hospital. The Environmental Matrix should be compiled as an engineering summary of the detail which might also be found in Room Data Sheets as and when those became available. The Environmental Matrix is a presentational tool for the data in the Room Data Sheets. If any discrepancies were discovered between the Room Data Sheets and the Environmental Matrix then the Room Data Sheets should take precedence, subject to the most onerous standard being followed in accordance with paragraph 2.5 of the BCRs. Ultimately the Board will get to decide what would take precedence in this type of situation.

Do you accept that there was an ambiguity in the environmental matrix itself?

58. Yes, I am now aware that some of the air changes in Critical Care bedrooms did not contain 10 air changes per hour. This contradicted Guidance Note 15 of the matrix, which said that 10 air changes per hour was required. I was aware that there were other discrepancies in the Environmental Matrix. For example, I reviewed the preferred bidder's first draft of its Environmental Matrix in October 2014 **(A35616783, Environmental Matrix NHSL - 31 October 2014[43])** and prepared a document setting out my views. These were as follows:

> "The submitted Environmental Matrix does not reflect the current Schedule of Accommodation, e.g. theatres and DCN acute care are not included. IHSL to provide up to date Environmental Matrix.
> Issues within the guidance notes relating to:
> i. Environmental Matrix still dated as version 13 issued 19th September 2012 **(A34691184, Reference Design Envisaged Solution – RHSC/DCN RDS Environmental Matrix – 19 September 2012[44]),**

[43] Bundle 4 - Environmental Matrix, Item 11, P220
[44] Bundle 4 - Environmental Matrix, Item 7, P131

ii. Humidification, the requirement is for the space for future installation,
iii. HK Design reference to be removed.
The detail contained in the Clinical Output Specification requires theatre temperatures to be able to be raised to 31°C for certain operations. IHSL to reflect this in the Environmental Matrix.
Body view rooms to be able to reduce temperature for body storage. IHSL to reflect this in the Environmental Matrix.
Room descriptions are given but no room numbers shown – IHSL to add room numbers."

SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[45])** clause 2.11 states;

"Internal temperatures in patient areas should not exceed 28°C db for more than 50 hrs per year", however the Board added an additional BCR clause regarding the 25°C as clarified below: "Measures shall be assessed, modelled and implemented to demonstrate that the internal air temperature of any room or area does not exceed the maximum acceptable level of 25°C for more than 50 hours per annum".

Further review and development of the Environmental Matrix is required to clarify the following;

"iv. There are some rooms at 28°C which are provided with comfort cooling.
v. There are areas / rooms in the Environmental Matrix that contradict the above BCR clause, hence once IHSL produce an updated Environmental Matrix, further discussion is required with the Board to confirm which rooms or areas are not going to meet the Clause.
vi. Bedrooms 4ac/hr, SHTM says 6 ac/hr Bedrooms have no extract Bedroom en-suites 10 ac/hr, SHTM says 3 ac/hr

[45] Bundle 1 - Published Guidance, Item 4, P333

Bedrooms stated as positive pressure, SHTM says 0 or –ve pressure The supply air to a bedroom has to be balanced with extract
e.g. Bedroom area 19m2 and 2.4m high = volume 45.6m3 x 6ac/hr =273.6 m3 / hr
En-suite area 5 m2 and 2.4m high = volume 12.0m3 x 3ac/hr = 36 m3 / hr
To achieve balanced pressure within room bedroom extract required = 273.6 – 36 = 237.6 m3 / hr
Recovery stated as 4 ac/hr, SHTM says supply and extract 15 ac/hr Query DSR at 10 ac/hr, this seems high for a predominantly empty room
– IHSL to confirm if this correct?
Query disposal hold extract 10 ac/hr, this seems high – IHSL to confirm if this correct?
Public telephone booth area of 2m2 fitted with a radiant panel – IHSL to confirm if this correct?
Colour rendering all stated as 80 where certain areas should be 90."

I undertook a number of reviews of the preferred bidder's Environmental Matrix prior to financial close and afterwards along similar lines. Once again these were sample comments not line by line audits or compliance checks. I highlighted a number of issues and areas of non-compliance in the preferred bidder's Environmental Matrix, not just issues with SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[46])**. Other people were also reviewing the matrix from the Board's perspective. It was up to the preferred bidder to produce the design and to ensure it complied with the BCRs. I understood from colleagues such as Graeme Greer that the preferred bidder was reminded that they had this responsibility. I have been asked to comment on whether the issues with air changes would have been spotted when Room Data Sheets were produced. My recollection is that Room Data Sheets were not made available to me for review prior to Financial Close. Issues with air changes might have been spotted when Room Data Sheets were produced. Once again though, even when the Room Data Sheets did

[46] Bundle 1 Published Guidance, Item 4, P333

eventually become available my role was not to undertake a detailed compliance audit, it was a sample review. The Inquiry has asked me whether a Room Data Sheet for a critical care bedroom would have automatically pre-populated with 10 air changes per hour. The answer to this is that I do not know, as I do not produce Room Data Sheets myself. The Inquiry has asked me to comment on what checks (if any) would normally be in place on a healthcare project of this nature. I can only really comment on my own role, but I would say that the level of reviews I undertook in this project was in line with the reviews I used to undertake on other projects.

Did any of the bidders raise this ambiguity during competitive dialogue?

59. From memory, I cannot recall that any of the bidders raised this ambiguity during competitive dialogue. Certainly I cannot recall that anyone specifically brought it to anyone's attention.

In relation to CEL 19 (A37215536, CEL 2010 - Letter to Chief Executives, 'A Policy on Design Assurance for NHSScotland 2010 Revision' (2) dated 2 June 2010[47]) and "design", there was originally a requirement for room data sheets for every room in the hospital to be produced by the preferred bidder by financial close. That was set out in the ITPD and the ISFT. It was not insisted upon by NHSL. Room data sheets were produced for less than 50% of the rooms in the hospital at financial close. Did Mott MacDonald advise NHSL on this issue? If so, please outline the discussions, proposals and resolution.

60. I was not involved in this aspect of the project and I wouldn't have expected to have been. Room Data Sheets would normally be produced by architects. My role was only to undertake reviews in relation to the M&E engineering side of things.

[47] Bundle 1 Published Guidance, Item 6, P553

In both the ITPD and the ISFT there was a requirement to comply with CEL 19 (2010) (A37215536, CEL 2010 - Letter to Chief Executives, 'A Policy on Design Assurance for NHSScotland 2010 Revision' (2) dated 2 June 2010[48]) (See ITPD Volume 3 (Rev c) – pages 24 and 26) (A34225364, ITPD, Vol 3, Board's Construction Requirements, Revision C, dated August 2013). It is not clear how a bidder could do so without utilising room data sheets for the design and planning of their solution for the ventilation system for the new hospital (ie as part of the tender bid). All that bidders were required to produce at the tender stage was selected room data sheets for key rooms and generic rooms. How did the successful tenderer demonstrate to that CEL 19 (A37215536, CEL 2010 - Letter to Chief Executives, 'A Policy on Design Assurance for NHSScotland 2010 Revision' (2) dated 2 June 2010[49]) would be complied with when the briefing tool used (both by NHSL at the ITPD and ISFT stage and by IHSL at financial close) was an "environmental matrix" with only a selection of room data sheets being produced?

61. I am not in a position to provide an answer to this question. My role was limited to undertaking reviews in relation to mechanical engineering. My understanding is that CEL 19 (2010) **(A37215536, CEL 2010 - Letter to Chief Executives, 'A Policy on Design Assurance for NHSScotland 2010 Revision' (2) dated 2 June 2010[50])** is an internal NHS policy. My role did not involve providing advice at that kind of strategic level.

Reference Design

To your knowledge, who within NHSL determined how much detail would be included within the reference design?

62. I was not aware of how the reference design had been developed so I do not know who within NHSL determined how much detail would be included within it.

[48] Bundle 1 Published Guidance, Item 6, P553
[49] Bundle 1 Published Guidance, Item 6, P553
[50] Bundle 1 Published Guidance, Item 6, P553

Was that decision taken by the Project Director, Project Board or Board of NHSL decision?

63. I was not involved in the project at this stage and was not involved in this decision.

Where is this recorded?

64. I do not know the answer to this question as it is outwith the scope of my involvement.

Were NHSL and Mott MacDonald briefed on the Reference design prior to the departure of Reference Design Team?

65. This would have been before my time so I am unable to assist with this question. I only became substantively involved in the project during the competitive dialogue. I was not aware there had been a reference design team. There may have been a briefing that pre-dated my involvement.

<u>Tensions in the Period up to Financial Close</u>

There seemed to be real tensions between NHSL and IHSL in the last quarter of 2014 with the project not progressing smoothly or as quickly as anticipated. What is your understanding of the root cause of these tensions and when did you become aware of the situation?

66. I do not recall being aware of any tensions between NHSL and IHSL in the last quarter of 2014. I would not have been involved in any discussions or correspondence about this kind of thing in my role.

Many issues appeared to remain unresolved into early 2015. However, NHSL proceeded to sign a contract. Can you offer any insight as to why NHSL were comfortable with doing so given the significance of the project and the sums of money that were being committed? Were Mott MacDonald asked to provide

input or advice in the period up to financial close in relation to issues with the preferred bidder, for example in relation to the failure to produce 100% of room data sheets by financial close?

67. Once again, I am unable to offer any insight into this point. I was too far down the food chain to know about anything happening at that level.

Financial Close

The Project was due to complete in Summer 2014. This was not achieved. Can you explain why financial close was not achieved until February 2015? Was there a need to achieve Financial Close by February 2015? Are you aware of particular pressure being applied?

68. This decision would have been taken at a high level. I was not involved in that kind of strategic decision making.

By Financial Close, various risk registers recorded that there was a significant amount of Reviewable Design Data, raising a number of risks to the Board. RDD related items were contained in the document titled "Technical Risks to the Board at Financial Close" [item 24] dated 30 January 2015 (A36308810, Technical Risks to the Board at Financial Close - 31 January 2015[51]). To your knowledge did NHSL have any concerns in relation to the volume of RDD?

69. I was not aware that NHSL had any concerns in relation to the volume of Reviewable Design Data. This would have been outside my remit. I was only involved in the M&E and that was limited to when I was asked to comment.

[51] Bundle 10 – Miscellaneous Volume 1 (of 2), Item 13, P87

Did you/Mott MacDonald have concerns over IHSL ventilation strategy?

70. I recall that we did have concerns and frustration due to the lack of willingness on the part of IHSL to develop and correct the anomalies in the Environmental Matrix. I had general concerns over SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[52])** compliance, which I raised, as well as with the overall strategy as I explain earlier in my statement. This was highlighted for example in my paper dated 13 October 2014. This may not have been an exhaustive list of all of the issues present in the matrix at that stage of development prior to financial close. As I say my role was not to undertake a detailed line by line audit of the design. Instead, I would highlight any issues I saw and it was then up to the designer to review their work, update any matters arising, and check and rectify any further issues present.

Why was HFS not asked for advice at this stage, particularly given Graeme Greer's comments about this coming down to a dispute over SHTM requirement, which is HFS area of responsibility?

71. I do not know why HFS was not approached, nor am I aware whether that was something within Mott MacDonald's remit. This would have been well outside my sphere of responsibility.

<u>The Project Agreement</u>

The Project Agreement contains Room Data Sheets (appendix 1 of section 6 (Room Data Sheets) (A32505840 - Project Agreement (appendix 1 of section 6 (Room Data Sheets) of schedule part 6 (Construction Matters))of schedule part 6 (Construction Matters)). The Board's Construction Requirements required Project Co to provide facilities which met the requirements specified in those Room Data Sheets (paragraph 3.6.3, section 3 of schedule part 6) (A34225364, ITPD, Vol 3, Board's Construction Requirements, Revision C,

[52] Bundle 1 Published Guidance, Item 4, P333

dated August 2013). They also required Project Co to provide, as Reviewable Design Data, Room Data Sheets which were not included in section 6 of schedule part 6 (ibid.) To what extent did the set of Room Data Sheets in section 6 of schedule part 6 fall short of a complete set?

72. Once again, the assessment of Room Data Sheets in the Project Agreement was outwith my remit. I do not recall having been aware that any Room Data Sheets had been produced prior to Financial Close, but this was not directly relevant to my role.

Who produced the Room Data Sheets which appear in section 6 of schedule part 6?

73. I believe HLM architects, on behalf of IHSL. I say this because the Room Data Sheets I saw were all labelled HLM. I would not have been specifically aware of this at the time though.

The Room Data Sheets in section 6 of schedule part 6 (A32505840 - Project Agreement (appendix 1 of section 6 (Room Data Sheets) are preceded by lists of "Generic Rooms" and "Key Rooms". What is meant by each of these categories?

74. My understanding is a Generic Room is a room that is repeated throughout other departments and may include Nurse Base, Clean Utility, Dirty Utility, Single Rooms and En-suite etc. Key rooms are unique rooms and may include different Operating Rooms by speciality, Radiology Rooms etc. The specialities may have different types of theatres depending on their requirements. Radiology rooms may differ such as CT or X-rays where a specific clinical function takes place.

The lists provide a "Code" and a "Room Number" for each room description. What is the function of these codes and numbers?

75. The Code is normally the department code while the Room Number usually comprises the floor level, the department code and a room number e.g. G-D8-001 as ground floor, Social Work, room 001, Open Plan Office.

Issues of non-compliant (or at least arguably non-compliant) ventilation systems later arose on the project. Which (if any) of the Room Data Sheets in section 6 of schedule part 6 (A32505840- Project Agreement (appendix 1 of section 6 (Room Data Sheets) are pertinent to those issues? To what extent did the issues arise in relation to rooms for which there was no Room Data Sheet at financial close?

76. I was not aware of these Room Data Sheets at Financial Close and therefore cannot comment.

The Room Data Sheets in section 6 of schedule part 6 (A32505840- Project Agreement (appendix 1 of section 6 (Room Data Sheets) carry the logo of the Department of Health and the label "Activity Data Base". To what extent did the data in those data sheets (in particular, the ventilation parameters about air changes and pressure) derive directly from information in the Activity Database? Did Mott MacDonald check the contents against the database? If any of those parameters are different from those in the database, how and why are they different?

77. I was not involved in this aspect of the project. I do not know if Mott MacDonald checked the contents against the database as this was not part of my own remit. Certainly it was not my understanding of Mott MacDonald's role, that we undertook any checks of that nature as we were not designers. I do not believe that anyone at MML would have done such checks.

The Project Agreement includes an Environmental Matrix (A32623049- Project Agreement (appendix 2 of section 6 (Room Data Sheets) of schedule part 6 Construction Matters). The Board's Construction Requirements required Project Co to comply with the Environmental Matrix (paragraph 8 of section 3 of schedule part 6) (A34225364, ITPD, Vol 3, Board's Construction

Requirements, Revision C, dated August 2013). "Environmental Matrix" was defined to mean that matrix, "as varied, amended or supplemented from time to time in accordance with the Project Agreement". At the ITPD stage the Environmental Matrix is described as a non-mandatory, or indicative, element of the reference design, provided to inform the bidders' development of room data sheets. If the environmental matrix was non-mandatory, or indicative, why did the Board's Construction Requirements require compliance with it?

78. I am not in a position to provide an answer to answer this question as I was not involved in preparing the ITPD or contract documents.

The following questions relate to the environmental matrix in the form in which it appears in the Project Agreement at Financial Close. The environmental matrix constituted Reviewable Design Data, by virtue of part 4 of section 5 of schedule part 6 (A32435789, Reviewable Design Data), and was therefore subject to the review procedure under clause 12.6 and schedule part 8. The entry in section 5 of schedule part 6 relating to the Environmental Matrix appears in a table at page 114 (A32505840 - Project Agreement (appendix 1 of section 6 (Room Data Sheets) of schedule part 6 Construction Matters), where certain Board Comments are recorded in relation to it. This indicates that the Environmental Matrix was Reviewable Design Data only insofar as necessary to meet the particular Board Comments set out in that table. Does that reflect your understanding?

79. I was not aware of the extent to which the Environmental Matrix was Reviewable Design Data at financial close though I recall that I was informed that it was Reviewable Design Data at some stage. My role was only to review the design documentation which was passed to me to consider. Matters relevant to the overall structure of the project were above my pay grade.

Amongst the Board Comments are the following: "The Environmental Matrix shall by [sic.] updated by Project Co to reflect all the rooms and room types in the proposed Facility, this should be based on an updated Schedule of Accommodation that has been commented on separately by the Board. This

also needs to reflect the names and room numbers in the GSU table." Please explain this comment.

80. The design and the Environmental Matrix have to be developed at the same time for consistency. They have to mirror each other to ensure they are aligned. This requires the architect(s) preparing the Room Data Sheets to work alongside the designers.

Why was there a need to update the Environmental Matrix to reflect all the rooms and room types?

81. The Environmental Matrix required to be consistent with the developing design as I say above. The initial Environmental Matrix would not reflect all of the rooms in the hospital and so it would need to be developed along with the design.

Please explain what is meant by the following:

(a) The "updated Schedule of Accommodation that has been commented on separately by the Board"

82. The schedule of accommodation is maintained by the architect. The board would comment separately on the schedule of accommodation and then comment separately on the Environmental Matrix.

(b) The "the names and room numbers in the GSU table"

83. This is outside my area of expertise.

"Include the requirements contained in the Clinical Output Specification …" What is meant by "the Clinical Output Specification"?

84. Every Department has its own clinical specification that describes in detail what they do and what they need to fulfil their clinical operations.

Is it a reference to the Clinical Output Based Specifications contained in Sub-Section D (Specific Clinical Requirements) of Section 3 (Board's Construction Requirements) of Schedule Part 6 (Construction Matters) (A34225364 ITPD, Vol 3, Board's Construction Requirements, Revision C, dated August 2013)?

85. I believe so.

If so, are any of the contents of these specifications pertinent to the ventilation issues which later arose?

86. I am unaware of whether the content of these specifications had any impact on the outcome.

Please explain this comment: "Detailed proposal awaited on bedroom ventilation to achieve balanced/negative pressure relative to corridor."

87. I understand this to have been a holding statement to the effect that the Board was awaiting further design development.

Is it pertinent to the ventilation issues which later arose?

88. It indicates that the Board were expecting further design development to comply with SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[53]),** but I can't say whether it was relevant to ventilation issues which arose later.

The following entry in the table states: "Project Co shall update the Schedule of Accommodation to reflect all of the individual elements of the proposed Facilities in accordance with Good Industry Practice" (in part 4 of section 5 of

[53] Bundle 1 Published Guidance, Item 4, P333

schedule part 6) (A32435789, Reviewable Design Data). Please explain this comment.

89. This would be an architectural aspect so outwith my area of expertise.

What impact, if any, would it have on the Environmental Matrix?

90. It would need to be updated to reflect any changes to align the Schedule of Accommodation with the Environmental Matrix.

The environmental matrix is apparently divided into three sections: a set of Guidance Notes; a Room Function Reference Sheet; and a table of environmental parameters for particular rooms, organised by department. What was your understanding of the function of each of these parts?

91. Guidance notes are exactly that: an introduction to and summary of the requirements. In developing their own Environmental Matrix, I would have expected ProjectCo to have had regard to the Guidance Notes in the first instance, and to start from there as a guide to the overarching requirements. As far as I can recall, Room Function Reference Sheets give departmental codes and then the table of environmental parameters is the body of the Environmental Matrix which provides the detail.

With reference to the table of room-by-room environmental parameters:
To what extent was this a complete and finalised list of all rooms in the hospital?

92. This would be a question for the architect who produced the RDS but it certainly should be a complete set.

Which, if any, of the room-by-room entries are pertinent to the issues of non-compliant (or allegedly non-compliant) ventilation which later arose on the project?

93. It was entries relevant to air changes in Paediatric Intensive Care Unit. I was not aware of this at the time though. I did not undertake a line-by-line check of ProjectCo's Environmental Matrix for compliance. This would have been a very big job and it was outside my role as a reviewer.

Where did the data derive from (in particular, in relation to air changes and relative pressure)?

94. From the designers – IHSL. Specifically I understand that the Environmental Matrix was prepared by Wallace Whittle/ TUV Sud.

Who was responsible for the accuracy of those entries?

95. The designers – IHSL and their sub-consultants, Wallace Whittle/ TUV Sud.

The table includes an ADB Code for each room. What was the purpose of that code?

96. My recollection is that the ADB code is for a specific item within the room; e.g. BMS999 is a BMS sensor, SWC025 is a light switch.

Does it allow entries in the table to be cross-referred to the Room Data Sheets (such as those in section 6 of schedule part 6) (A32505840 - Project Agreement (appendix 1 of section 6 (Room Data Sheets)?

97. Yes, there should be alignment between the Environmental Matrix and Room Data Sheets.

There appear to be inconsistencies between entries in the table and Room Data Sheets at section 6 of schedule part 6) (A32505840 - Project Agreement (appendix 1 of section 6 (Room Data Sheets). For example:

(a) The Room Data Sheet with room code B0305-01 (single bed-room (RHSC)) provides for positive pressure relative to adjoining space; but the entries in the Environmental Matrix with that code require balanced pressure.

(b) The Room Data Sheet with room code B1401 requires positive pressure relative to adjoining space; but the entries in the Environmental Matrix with that code require balanced pressure. Can you comment on these apparent discrepancies?

98. No because I do not recognise those room numbers. That is where the discrepancy may arise. Room code B1401 does not look correct. There is a department B1 and I would expect a G (ground floor) or floor reference beforehand. No such reference is present. B1 is Critical Care and I would not expect 401 rooms in that department.

(c) Do they bear upon the ventilation issues which later arose?

99. I do not know.

(d) Are there other discrepancies, material to the Inquiry's Terms of Reference, so far as you are aware?

100. I am not able to assist with this question from my own involvement in the project.

With reference to the Environmental Matrix Guidance Notes. How did you understand these to relate to the other parts of the Environmental Matrix?

101. It was an introduction and a summary of the requirements. The Guidance Note for critical care states the correct critical care air changes (per SHTM 03-01) **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February**

2013)[54]. I would expect the Guidance Note to be overarching guidance. A designer is not entitled to ignore the Guidance Notes.

The Guidance Notes include the following entries: "This workbook is prepared for the Financial Close stage as an easier reference tool to replace ADB RDS M&E Sheets for the Environmental Criteria elements as described on these sheets". Please explain this Note.

102. This appears to be a statement by the designer to the effect that the Environmental Matrix replaces the RDS sheets for the environmental criteria.

What did you understand to be the relationship between the Environmental Matrix and the Room Data Sheets (that is to say, both the Room Data Sheets in section 6 of schedule part 6 (A32505840 - Project Agreement (appendix 1 of section 6 (Room Data Sheets), and those to be produced by Project Co after financial close as reviewable design data)?

103. This was outwith my remit, but the Environmental Matrix and Room Data Sheets had to mirror / align with each other.

"The services matrices are produced from the Schedule of Accommodation Sheets". Please explain this note. What is meant by "the services matrices" and "the Schedule of Accommodation Sheets"?

104. My interpretation would be the services matrices would include the Environmental Matrix and the Schedule of Accommodation is that produced by the architects.

Ventilation air change rates and the use of natural ventilation in Patient Areas shall be reviewed throughout the detail design process to ensure a maximum internal temperature of 25C° …" Please explain this note, with particular reference to the review of air change rates and the use of natural ventilation.

[54] Bundle 1 Published Guidance, Item 4, P333

105. This note imposes stricter requirements than those set out in SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[55]).** SHTM 03- 01 states:

> "2.11 Calculations and thermal modelling should be undertaken to ensure that during the summertime, internal temperatures in patient areas do not exceed 28ºC (dry bulb) for more than 50 hours per year taking into account the level of design risk for the application."

Some Boards reduce this figure to 25ºC to improve patient comfort. This is what NHSL are doing by means of this note.

Note 15 refers to SHTM 03-01 (A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[56]). Appendix 1 for air change rates of 10 ac/hr in HDU bed areas and critical care areas. How did this relate to the entries in the table of room-by- room environmental parameters? Which entries in the table of room-by-room parameters concerned HDU and critical care areas?

106. There is a discrepancy between the air changes required in note 15, and those provided for in the room-by-room parameters. The entries relative to critical care are prefixed as "B1".

Corridor ventilation may be either mechanical or where the opportunity exists natural. To be determined during detailed design with due regard to clinical functionality." Please explain this note.

107. A corridor may have the opportunity to have natural ventilation if it has a window to external. If the corridor is designed to have mechanical extract

[55] Bundle 1 Published Guidance, Item 4, P333
[56] Bundle 1 Published Guidance, Item 4, P333

ventilation care must be exercised that this does not have a detrimental effect on the room pressure regimes off the corridor.

Single Room WC – SHTM 03-01 (A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[57]). Appendix 1 suggests 3 ac/hr extract air change rate only. We have applied 10 ac/hr extract rate to provide a more robust rate of extract." Please explain this note.

108. November Bundle page 217 item 7 details the ventilation strategy required to satisfy SHTM 03-01 **(A35610757, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A - Design and validation dated February 2013[58])** which requires extract ventilation from the bedroom. IHSL increased the extract rate from the en-suite but that increase would not achieve their proposed 4 ac/h bedroom air change rate, which would have an adverse effect on the pressure regime of the bedroom in relation to the corridor. Another adverse effect of this design is that extract from the en-suite is classified as dirty extract and does not employ heat recovery whereas extract from the bedroom is clean extract and would be available for heat recovery.

With reference to the Room Function Reference sheet. How does this relate to the table of room-by-room environmental parameters? Do any entries in it bear upon the ventilation issues which later arose on the project? Do you agree that the Environmental Matrix, read together with paragraph 8 of the Board's Construction Requirements (A34225364, ITPD, Vol 3, Board's Construction Requirements, Revision C, dated August 2013) (requiring compliance with the Environmental Matrix), constituted a requirement of the Board? If so, do you agree that it is qualitatively different from a survey report (being a matter of specification rather than information)?

[57] Bundle 1 Published Guidance, Item 4, P333
[58] Bundle 1 Published Guidance, Item 4, P333

109. The Room Function Reference sheet gives the departmental codes. The room-by-room environmental parameters (Environmental Matrix) are grouped by these departmental codes. I am not able to comment on contractual matters as these were outwith my remit.

Clause 12.5 of the Project Agreement refers to "such of Project Co's Proposals as have been initialled by the Board", and provides that those, subject to comments recorded in section 9 of schedule part 6 (A34225364, ITPD, Vol 3, Board's Construction Requirements, Revision C, dated August 2013), satisfied the Board's requirements in respect of Operational Functionality. Where are those initialled proposals to be found?

110. I am not aware of where the initialled proposals may be found.

Clause 12.6 of the Project Agreement provided for Project Co to develop and finalise the design and specification of the Works, and that the Board were to review the Reviewable Design Data. The review procedure was set out in Schedule Part 8. As at financial close, how did you anticipate this process would operate in relation to the Environmental Matrix and the Room Data Sheets? What outcome did you expect?

111. Comments were provided on several revisions of the Environmental Matrix and our expectation was that the designers would develop the Environmental Matrix to compliance. Revision 10 of the Environmental Matrix was supposed to be the outcome of a line-by-line review by TUV SUD, but my recollection is that it was never formally issued. Revision 11 was issued in late 2017.

The Reviewable Design Data was defined by reference to section 5 of schedule part 6 (A32435789- Schedule Part 6: Construction matters, section 5 (Reviewable Design Data)[59]. That document divides the Reviewable Design Data into four categories. The third category includes: Room Data Sheets (item A1); detailed specifications for all mechanical and electrical components (item

[59] Bundle 5- Contract Documents, Item 7, p767

A14); details for the control of infection (item A45); air handling systems (item H8); and ventilation (items I3 and I4). As noted above, the fourth category included the Environmental Matrix. To what extent did these identified elements of the Reviewable Design Data bear upon the issues of non-compliant ventilation which later arose? Are any other elements of Reviewable Design Data, not identified in this question, relevant to those issues?

112. I am not aware of exactly what was classified as Reviewable Design Data and cannot comment on the impact on the outcome.

Section 7 of Schedule Part 6 of the Project Agreement (A33405351- Schedule Part 6: Construction matters, section 7 (Thermal Energy Efficiency Testing Procedure) Excerpt pages 229 to 231)[60] concerns Thermal and Energy Efficiency Testing Procedure. Do you consider this to bear upon in the Inquiry's Terms of Reference? If so, please briefly explain why.

113. The change in the ventilation rate will directly impact the ongoing cost of heating or cooling the facilities. I was involved with another NHS Board who accepted a reduced ventilation rate due to the extent of the increase in those ongoing costs. This is about costs as opposed to safety / infection control. I am not however aware of how this might be directly relevant to the Inquiry's terms of reference.

Page 37, Paragraph 8 of the Board's Construction Requirements (section 3 of schedule part 6) (A33405670, Schedule Part 6: Construction matters, section 3 (Board's Construction Requirements), Subsections A, B and C Excerpt pages 1 to 149) provides, inter alia: "Project Co shall take cognisance of all the building services implications of the requirements described in Section D (Specific Clinical Requirements) and Sub-Section E (Specific Non-Clinical Requirements) of Sub-section C of the Board's Construction Requirements". Which, if any, of the provisions of the Clinical Requirements in Section D bear upon the ventilation issues which

[60] Bundle 5 - Contract Documents, Item 10, p1479

later arose? (Possibly relevant are B1 (Critical Care) and Cl.4 (Haematology and Oncology Inpatients).

The clinical output specification does not specify what ventilation is to be provided. It refers to Bl (Critical Care) and Cl.4 (Haematology and Oncology patients) and cites SHTM 2025 for ventilation guidance which is superseded. These do not have a bearing on the ventilation issues that arose later. I am not however aware of how this might be directly relevant to the inquiries terms of reference. SHTM 2025 had been superseded by SHTM 03-01 at the time of the project ITPD. SHTM 03-01 Part B VI (A33662241, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises Part B Operational management and performance verification October 2011 - SHTM 03-01 Part B v1 dated October 2011) was published in October 2011. SHTM 03-01 Part A V2 (A33662259, Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A v2.0 - Design and validation dated February 2014) was published in February 2014. Both of these have now themselves been superseded as of February 2022.

The Derogation Register in Project Co's Proposals (A41491821- Schedule Part 6: Construction matters, section 4 (Project Co's Proposals) (Disc 1 of 6: Project Co Proposals)[61] includes entries relating to the Environmental Matrix (entry 33) and Mechanical Ventilation/Air Conditioning (entry 35). The derogation request relating to the Environmental Matrix is at page 3883. It states: "Anomalies within the environmental matrix have been reviewed and proposals incorporated within the room data sheets (refer to schedule for proposed variations). This shall be further developed in conjunction with the board on the basis of the schedule of comments contained in Section 5 (RDD) Part IV". The schedule referred to in that passage does not appear in the bundle. Please exp lain your understanding of these proposed derogations. In what way, if any, do they bear upon the ventilation issues which later arose?

114. I was not aware of the proposed derogations. I do not know if they bear upon the ventilation issues.

[61] Bundle 5 - Contract Documents, Item 6

I believe that the facts stated in this witness statement are true. I understand that this statement may be used as evidence before the inquiry and be published on the inquiries website.

Signed: [redacted]

Date: 22 February 2022