Scottish Hospitals Inquiry

Witness Statement of

Steve Pardy

Personal Details and Professional Background

1. My full name is Steven Pardy. My address for the purposes of this Inquiry is c/o BTO Solicitors LLP, One Edinburgh Quay, 133 Fountainbridge, Edinburgh, EH3 9QG.

2. This statement has been produced in response to a questionnaire from the Inquiry in relation to the Glasgow IV Inquiry hearings on the design, construction and commissioning process in respect of the Queen Elizabeth University Hospital (hereinafter referred to as "QEUH") and Royal Hospital for Children (hereinafter referred to as "RHC") construction projects.

3. I have sought to provide as full details as I am able to regarding any questions which I am in a position to answer. Where I consider that others may be better placed to answer any questions I have advised as such.

4. In terms of my professional background, I am a Chartered Engineer (CEng) and a Fellow of The Chartered Institution of Building Services Engineers (CIBSE), as well as The Institution of Mechanical Engineers (IMechE).

5. Prior to my retirement in December 2024, I had been a building services engineer approaching 50 years, having trained at the Polytechnic of Southbank and graduating with a Batchelor of Science degree in Environmental Engineering in 1981. Since the late 1980s I have specialised in more complex projects, mainly in the field of Healthcare and Scientific Laboratories of various types.

6. I joined Consulting Engineers, Zisman Bowyer & Partners (hereinafter referred to as “ZBP”) in 1994 and became a Partner in 2005. I have led many major projects in my field of specialism. Following the Administration of ZBP in January 2013 I joined TUV-SUD Wallace Whittle (hereinafter referred to as “TSWW”) who had acquired some of ZBP’s ongoing projects. They formed a team of around 15 former members of the original ZBP staff to continue with these projects in a local office in Kingston-upon-Thames. After a few months we were moved to Wallace Whittle’s London office in Victoria. I left Wallace Whittle in August 2014 to join BDP to lead the design on projects where I remained until my retirement. A full copy of my CV is appended to this statement.

7. My healthcare project background includes leading roles in the building services design for the following:

- Dorset Hospital Phase 2 (1990 – 1994)
- Barnet Hospital (1994 – 2002)
- Princess Royal University Hospital at Farnborough (1998 – 2002)
- Peterborough City Hospital (2005 – 2010)
- Harefield & Brompton Hospitals various projects (2010 – 2019)
- New South Glasgow Hospitals (2009 – 2014)
- Great Ormond Street Hospital (2018 – 2019)
- Epsom & St Helier Emergency Care Hospital (2020 to 2024)
- St Georges University Hospital Renal Unit (2020 to 2024).

8. In most of the healthcare projects that I have been involved in the client, usually via their Estates Team, have had a significant influence on the direction of the engineering brief and the way that services have been configured. This has been through early engagement with key estates personnel discussing proposals and considering existing systems used elsewhere on the hospital estate.

9. For example, Great Ormond Street Estates Team were heavily involved in setting the engineering solutions for the new Children’s Cancer Centre building

with specific ways of delivering ventilation to the Bone Marrow Treatment rooms which were an enhancement to the HTM Guidance. The GOSH team did not always follow HTM guidance but did get agreement from NHS England before implementing alternative approaches.

10. Similarly, the Estates Team at St Georges made it clear from the beginning of the Renal project that there would be no deviation from the HTM guidance, although some derogations were agreed to deliver more practical, buildable solutions for the hospital. The Estates Team were, however, overruled by the Project Team on the aspect of lift type (motorless rather than traditional overhead traction) to reduce cost on the project. I cannot recall any significant discussion with the Estates Team on the QEUH during the design process.

11. My science background includes leading the building services design for:

- DSTL Porton Down (1996 – 2001)
- Li-Ka Shing Laboratories for Cancer Research UK (2000 – 2007)
- AstraZeneca Global Headquarters, Cambridge (2014 – 2018)
- Ray Dolby Centre, Cavendish Laboratories, University of Cambridge (2018 – 2024)

Laboratories, by their nature of experimentation, are normally bespoke in the services requirements and more often than not the brief is based on current methods used by the client with a willingness to incorporate future provision to address evolving science.

Involvement at QEUH/RHC

12. ZBP were appointed to undertake the design of the mechanical, electrical and public health services for the QEUH project, excluding below ground drainage and vertical transportation. I was the project partner and team lead.

13. Whilst involved in the project during the bid stage in 2009, ZBP were not formally appointed on the project by Multiplex until contract signature in 2010. ZBP reported to the design management team of Multiplex (hereinafter referred to as “MPX”), which remained the case throughout my involvement.

<u>Employer’s Requirements</u>

14. I was not involved in the preparation of the Employer Requirements (hereinafter referred to as “ERs”) **(Bundle 16, Document 13, Pages 1357 – 1591)** which had already been produced before ZBP commenced the design work.

15. I would expect that the Clinical Output Specifications (hereinafter referred to as the “COS”) were prepared by the NHS GGC Project Team and included in the ERs under their direction, though I cannot be certain of that as I was not involved in this part of the project. I believe that those at Currie and Brown (hereinafter referred to as “C & B”) or NHS GGC will be better placed to answer this question.

16. I would expect that the relevant NHS guidance was confirmed by the GGC Project Team and the technical advisers, however again I was not involved in that part of the project and so I am unable to make any definitive comment there. I would think that those at C & B or NHS GGC would be better placed to answer this question.

17. I recall that the carbon target of 80 kg/m2 was a key driver for the project to achieve and be, at the time, one of the most energy efficient hospitals in the UK. That was heavily emphasised during the bid stage, and we made presentations during that period on how this could be achieved. I understood that demonstrating how this target would be met carried some weight in the scoring of submissions.

18. To meet this target, close attention was given to the building thermal performance and active engineering systems specification and design. BREEAM was less of an issue to the building services design and many of the credits were not significantly related to our design. BREEAM itself did not therefore have a significant impact on the aspects of design ZBP had responsibility for.

19. As noted above, there was however great emphasis on meeting the 80 kg/m2 target throughout the bid stage. The Board had appointed an energy specialist, Susan Logan, who had set the target and was responsible for monitoring the design to ensure that this was demonstrated as being achieved. As lead for ZBP I kept this is in focus throughout so that the team were aware of the constraint in design decisions.

20. The building and systems were thermally modelled to assess the building fabric performance and a spreadsheet system formed to input the building's active engineering systems and impact of the CHP system operation. Due to the scale of the project the building services design was split into sequential sections and a review of the target was made at regular intervals with the Board's technical advisory team, C & B, so that corrective actions could be made to the design to maintain the target.

21. I do not recall the proposal to remove the maximum temperature variant, however, whilst the document **(Bundle 17, Document 26, Page 1063)** states that the maximum temperature variant has been removed, it then goes on to give limits on winter and summer temperature limits. This appears to be a contradiction. Through thermal modelling, and without seeing the detail of the analysis, I believe that the systems were designed within the prescribed limits.

22. Whilst I cannot recall the Potential Value Engineering Items schedule **(Bundle 43, Volume 1, Document 11, Page 35)**, it is however common practice to come up with ideas to save money, particularly if a project is running over budget. I cannot recall the reasons for preparing this schedule. These VE suggestions may not

have been accepted by the GGC Project Team and I do not know how many, if any, were implemented through agreement. With regard to item 6 relating to ward ventilation rates, again I am not able to advise whether this was agreed by the GGC Project Team and implemented without seeing the detailed calculations.

23. I have however noted from minutes of meetings included in Bundle 41 under minute 7.2 of the Monthly Progress Report from July 2011 that a *"Joint Value Engineering Register"* was being maintained which included reference to Hospital Wards Air Change Rate **(Bundle 41, Document 8, Page 321)**. A year later the Monthly Progress Report, again under section 7.2 mentions *"No major VE items implemented since last report"* **(Bundle 41, Document 11, Page 407)** which seems to be a repeated comment over the period.

24. Similarly, from the Adult and Children's Hospital Design Group meeting minutes (item 9.3) which were attended by various members of the ZBP team, including myself, item 9.3 of the minutes noted that *"ZBP request clarification on VE items. BM/NHS/C&B to review and agree which items they would like ZBP to pursue in the design development"* **(Bundle 40, Document 143, Page 548)**. This minute did repeat from March 2011 through to September 2011. It is suggested from the minutes of November 2011 that the VE items were resolved **(Bundle 40, Document 150, Page 641)**, however, this was a considerable period into the design programme so it is questionable how VE items would have been introduced part way through the design which would have caused significant disruption. I cannot recall such disruption occurring.

25. Clause 2.38 of SHTM 03-01 allows the use of chilled beams and gave the opportunity to provide ventilation and room temperature control through one device, particularly in a sealed building **(Bundle 16, Document 5, Page 371)**. Furthermore, Clause 2.4.3 of Appendix M&E 3 of the Employers Requirements describe the use of chilled beams for the project **(Bundle 16, Document 14, Page 1594)**. I would expect that the IPC and clinical team had been involved in the decision through the NHS GGC Project Team and their advisers, though I do not have any direct knowledge of this.

26. Having reviewed Bundle 40, I note from minutes of the February 2010 Technical Design Group, item 1.01 notes *“BCL asked who the infection control representative was. NHS advised the post was yet to be appointed”* **(Bundle 40, Document 119, Page 354)***.* From the minutes of the March meeting *“NHS advised the post was now appointed. Jackie Stewart will be working with the Project Team”* **(Bundle 40, Document 119, Page 354)***.* I do not personally recall any direct dealings with the infection control representative.

27. I am aware that following many years of chilled beams being installed and maintained in healthcare environments, the last version of HTM 03-01 (2021) **(Health Technical Memorandum 03-01: Specialised Ventilation for Healthcare Premises: Part A - Design and Validation*,* not bundled by the Inquiry)** no longer permits their use, which I understand is mainly due to maintenance requirements.

28. Clause 4.144 of SHTM 03-01 permits the use of thermal wheels **(Bundle 16, Document 5, Page 402)**. As can be seen at Clause 4.145 of the Guidance thermal wheels offer the highest energy recovery efficiency **(Bundle 16, Document 5, Page 403)** and with the key carbon emission target the best possible energy recovery was deemed necessary. To the best of my recollection thermal wheels were not used on critical care systems, such as operating theatres and intensive care areas. However, their use was considered appropriate elsewhere provided there was a surge sector which was specified **(Bundle 20, Document 75, Page 1583)**.

29. I do not know who provided the specification for environmental data relating to air change rates, pressure differentials and filter requirements, but would have thought that it would have been part of the ERs developed to design information in conjunction with the NHS GGC Project Team and MPX. I would imagine that NHS GGC would be better placed to answer this question.

30. I do not personally know who was responsible for HAI-SCRIBE assessment regarding the proposed site development, design and planning and new construction but would imagine that the relevant assessments were undertaken

by the GGC Project Team and C & B. They would be better placed to assist. I cannot recall any discussion or meetings relating to this assessment.

Design and Specifications

31. I cannot recall any of the intended uses of Ward 4B, Ward 4C, Renal, Level 5, Critical Care, Ward 2A & 2B or PICU at the QEUH. I am also unable to recall the extent of intended immune compromised or infectious patients but would have thought that they would be accommodated in the specific isolation rooms. I did not and do not however have the clinical expertise to comment on the appropriateness of various ward types for such patients. These aspects of the design would have presumably been subject to clinical and IPC input.

32. I noted from reviewing Bundle 41 that the Monthly Progress Report minutes from April 2010 under section 7.3 do record that *"BCL advised of omission of specialist ventilation from 4 (nr) bedrooms and 4 (nr) day rooms in Oncology Ward"* **(Bundle 41, Document 2, Page 96)**. This was confirmed in the minutes of July 2010 as being instructed under PMI 021 **(Bundle 41, Document 5, Page 210)**. I am not sure how relevant this is to the question, but the GGC Project Team may be able to clarify this further.

33. There were changes during the design period, although I cannot recall any specific ones. To address change ZBP and latterly TSWW prepared a design pack with relevant drawings and specification and submitted them to MPX. I did not have any involvement in the sign off process with the Board but would expect that MPX then passed the change pack onto the GGC Project Team for sign off. I do not know how the changes were signed off. I would imagine that NHS GGC or MPX are better placed to answer this question.

34. I have been asked about my awareness of the use of HEPA filters in Ward 2A. If the filters were a requirement then these would have been included in the design. I had left the project by the time of handover so have no knowledge of the handover status of the filters.

Currie and Brown, Contractors, NHS GGC Project Team

35. I would expect being part of the GGC Project Team advisers that C & B had a significant role in the analysis of competitive bids and the ultimate appointment of Brookfield and their team. As far as I am aware ZBP had no previous working relationship with the C&B team.

36. ZBP only reported through MPX as their employer and had limited day-to-day involvement with C&B generally at joint meetings with MPX. As I recall there was a positive relationship when ZBP were present with C&B. I understand that C&B had been appointed before the tender stage and our involvement.

37. ZBP also had a good professional working relationship with MPX and IBI Nightingale, having worked together on the Peterborough Hospitals PFI scheme, which was reaching its conclusion at the time of our initial involvement with the QEUH project. I do not recall Capita's role in the QEUH.

38. ZBP had no prior working relationship with NHS GCC prior to the tender process for the QEUH, but I do consider that we had a good working relationship with the NHS GGC Project Team. There were various discussions with them, largely during the 1-50 layout process and ad-hoc meetings thereafter. For our part there was no routine contact. I was not personally involved in all meetings with the Project Team and cannot remember most of the individuals' names. I do however recall Alan Seabourne as the lead of the team.

39. The only party that ZBP reported to on a day-to-day basis were the MPX design managers, having been appointed directly by them. I recall that Darren Pike was the M&E Design Manager.

Competitive Dialogue

40. ZBP prepared various technical proposal papers describing the engineering solutions to meeting the tender brief. We also contributed to the building layout

proposals developed by IBI. We attended the engagement meetings with NHS GGC during the competitive dialogue period and we were part of the tender presentation team. We also assisted in addressing any clarifications that arose from the NHS GGC Project Team after tender submission. As noted above, I led the ZPB team as project partner.

Ventilation Derogation

41. I have been asked about the ventilation design strategy as contained in the Contractor's Tender Return Submission (11 September 2009) **(Bundle 18, Document 8, Pages 205 – 626)**. The analysis at Pages 311 and 312 of this document looks at three forms of ventilation to the building, namely purely natural, mixed mode and fully mechanically ventilated systems **(Bundle 18, Document 8, Pages 311 – 312)**.

42. The conclusion was that the majority of clinical rooms would be sealed and fully mechanically ventilated **(Bundle 18, Document 8, Pages 311 – 312)**. This requirement was also driven by noise and down draught as a result of the roof mounted helipad as well as the odour generated by the sewage plant site adjacent to the hospital. Small non-clinical rooms looked to use purely natural ventilation and larger non-clinical rooms might employ a mixed mode approach. I cannot recall where the latter two strategies were employed in the hospital, if at all.

43. The ventilation design did not follow the recommended air-change rates given in SHTM 03-01 Appendix 1 **(Bundle 16, Document 5, Page 483)** based upon the discussion below on the use of chilled beams for environmental control and the required supply air rate for them to operate satisfactorily. The introduction to the SHTM on page 7 gives its purpose as giving advice and guidance **(Bundle 16, Document 5, Page 349)**, and whilst mandated in the ERs, the ERs were produced as a bespoke document by NHS GGC and alternative proposals were offered for consideration. As noted in the Clarification Log the departure from the recommended air-change rate in the SHTM was discussed between

parties to the project on the basis that rooms were generally single occupancy and cross contamination between patient areas was less likely, particularly with a slight negative pressure provided between the room and corridor **(Bundle 16, Document 23, Pages 1664 – 1665)**.

44. As noted in the Clarification Log, using chilled beams for the room for environmental temperature control as a low energy solution was a key aspect of the ERs **(Bundle 16, Document 23, Pages 1664 – 1665)**. The chilled beams required less primary fresh air to operate than the six air changes per hour noted in the SHTM.

45. The design was accepted by the GGC Project Team based on the strategy paper and discussion, and I would expect that they undertook their own review with the various technical advisers (including clinical and IPC advisers) though I had no involvement in that process so cannot advise whether that took place. As I have noted above, a low carbon solution and hence energy efficient solution was a key driver for the hospital, so I expect that that played a significant role in the acceptance of the design.

46. I was the primary author of the ZBP Ventilation Strategy Paper dated 15 December 2009 **(Bundle 16, Document 21, Pages 1657 – 1658)**, supported by the ZBP team with relevant calculation data and QA reviewing, both inhouse and with MPX. I was supportive of the proposals made within the document, in view of the fact that it was drafted by ZBP, including myself. I had no concerns regarding the proposals within the document.

47. The background work undertaken in the preparation of the Ventilation Strategy Paper involved thermal analysis and ventilation arrangement which was carried out to determine the proposed ventilation strategy. **(Bundle 18, Volume 1, Document 8, Pages 311 – 312)** summarise this process.

48. I was not personally involved in any escalation of the Ventilation Strategy Paper to the NHS GGC Board or its Project Team and so I cannot comment on that process. I have however reviewed the email document referred to at Page 2855

of Bundle 17, Document No. 70, which appears to show that this was raised and discussed with the NHS GGC Board by C & B as their advisers **(Bundle 17, Document 70, Page 2855)**. I would therefore imagine that they would be in a better position to assist with this question.

49. In terms of reliance to be placed on the Ventilation Strategy Paper, this document would have formed part of the agreed Contractor's Proposal between the GGC Project Board and MPX and following discussion between all interested parties to the decision the paper would have formed part of the information to be relied upon. I would expect the GGC Project Team would be better placed to answer the query as the ultimate decision makers on acceptance of the proposal.

50. My understanding is that SHTM 03-01 is primarily driven by Clause 1.4 of the SHTM **(Bundle 16, Document 5, Page 352)** and notes that ventilation is provided for the comfort of occupants of buildings but then notes that specialist ventilation, such as in operating theatres, laboratories and those noted in Clause 1.26 **(Bundle 16, Document 5, Page 356)**. Ventilation is also noted as controlling air movement to contain, control and reduce hazards from airborne contaminants, dust and harmful micro-organisms **(Bundle 16, Document 5, Page 356)**. Traditionally bed areas utilise natural ventilation through opening windows supplemented by mechanical ventilation. In this case, with wind pressure the movement of air is completely uncontrolled, whereas a sealed building has the ability to much better control air movement between patient spaces (Clause 1.23) **(Bundle 16, Document 5, Page 356)**. Further reference to Clause 2.3 of the SHTM refers to the use of natural ventilation for general wards provided via opening windows **(Bundle 16, Document 5, Page 366)**.

51. As noted elsewhere, great emphasis was placed on the energy efficiency and Carbon target for the hospital. Ventilation fans can consume a significant proportion of electrical energy and thus increase carbon emissions, therefore consideration to the sizing of ventilation systems was an important criteria. Furthermore, and as noted earlier, the maximum ventilation air demand for the active chilled beams was less than the six air changes given in SHTM 03-01. It

is possible that the wording *“not necessary”* was referring to the need for the ventilation rate needed to maintain environmental conditions given that chilled beams were being proposed to deal with heat gains and losses to the spaces.

52. The Ventilation Strategy Paper was prepared as an alternative approach based on environmental control using chilled beams, single occupancy bedrooms and reducing energy consumption. The proposals in the Ventilation Strategy were submitted to the GGC Project Team for agreement as part of the tender process and could therefore be considered as a derogation to the SHTM.

53. The GGC Project Team agreed to the proposal, which was implemented, and so I would expect that a view was taken that compliance with SHTM was not mandatory as described in the ERs, following discussion with their technical advisers. I was not however a part of that process and so I cannot offer any further comment on those discussions. I would also have expected NHS GGC to obtain IPC or clinical input on any patient safety issues (which were outside of my remit or expertise) prior to accepting the proposal but would suggest that NHS GGC or C & B would be better able to answer any questions in that regard.

54. ZBP had a professional working relationship with Wallace Whittle as would be expected between engineers appointed by the client and contractor. I cannot recall exact conversations with Wallace Whittle given the time that has passed, but I do remember that the strategy was discussed with the reasoning behind the proposal. I cannot recall whether the exact issue of compliance was raised but I would expect this was taken into account in the acceptance of the proposal.

55. The proposal in the Ventilation Strategy Paper **(Bundle 16, Document 21, Pages 1657 – 1658)** was considered to meet the minimum fresh air ventilation rates for single rooms with occupancy limited to the patient, visitors and attending clinical staff. The CIBSE codes give engineering guidance across a whole range of buildings. The Building Regulations and CIBSE codes generally offer minimum standards. Clauses 3.6 and 3.7 of SHTM 03-01 refer to the recommended minimum ventilation rate of 10 litres/second/person **(Bundle 16,**

Document 5, Page 375) which was considered in the Ventilation strategy Paper **(Bundle 16, Document 21, Pages 1657 – 1658)**. When designing buildings, whether a hospital or other type of building, the design criteria will consider the building's massing, fabric and use, amongst other factors. There are many sources of guidance available, and it is often necessary to consider these jointly to develop the most appropriate criteria for design.

56. The ventilation strategy for the isolation rooms followed the principles set down on HBN 04: Supplement 1 **(Bundle 16, Document 4, Pages 314 – 341)**.

57. I do not know how the proposal for isolation room ventilation strategy was approved by the Board as I was not party to these discussions. I would have expected that the proposal for the isolation rooms ventilation strategy was discussed between their Technical Advisers and relevant interested parties within the Project Team to come to acceptance.

58. I do not know if NHS GGC undertook any form of risk assessment regarding the ventilation strategy given that I was not part of the conversations within the GGC in accepting the proposal. I would imagine that those at NHS GGC and Currie & Brown would be better placed to answer this question.

Ward 4B and 4C

59. I do not know how Change Order Request in July 2013 by Jonathan Best **(Bundle 16, Document 29, Page 1699)** in respect of the transfer of the Bone Marrow Transplant (BMT) service to Ward 4B in the QEUH, and the move from Ward 4B to 4C of the haematology patients that were originally planned to accommodate Ward 4B was communicated to C & B. I recall that I was on extended sick leave in July/August 2013 recovering from major surgery so cannot recall the exact detail of this change, and as noted previously, other changes were issued by the designers to the contractor as a discrete design pack. My colleague at the time, Mark Harris may be able to further assist with this question.

60. I cannot recall the type of ceiling installed in Ward 4B. I would expect that the architect would know more regarding the change of ceiling type. I would expect solid (plastered) ceilings to achieve a sealed room, and it is likely that as engineers we would have brought this to the attention of the architect. I cannot recall whether C & B passed any comment on this.

61. I do not know who approved the reflected ceiling plans, but I would imagine that the architect would be in a better position to assist with this. I do not know whether the suspended ceilings were highlighted as non-compliant during the construction works phase.

62. I cannot recall the specific use for Ward 4C or whatever guidance was applicable to this area.

<u>Ward 2A/ 2B RHC</u>

63. To the best of my recollection, Wards 2A and 2B (Schiehallion unit) had a number of isolation rooms in the curve for treating patients. The design criteria for spaces would have been given in the ERs. The ZBP QA process would have the individual room design reviewed against the required design criteria. This was a specialist unique facility, but we were not invited to view the existing facilities and method of ventilation arrangement that the new unit was replacing, so had to rely on the content of the ERs.

64. I am not aware of any changes made to the design of this area during the construction stage. MPX would be better placed to comment on this. I am also unable to recall any direct involvement by IPC during the design period, although this may have been indirect via the NHS GGC Project Team, or C & B.

65. I cannot recall any concerns with the design as, to the best of my recollection, the design had followed the brief. The isolation rooms were designed in

accordance with HBN 04: Supplement 1 **(Bundle 16, Document 4, Pages 314 – 341)**.

Isolation Rooms

66. In terms of how the number and departmental location of isolation rooms was agreed, I believe that the number and departmental location of isolation rooms would have been identified as part of the Schedule of Accommodation prepared by the NHS GCC to meet their clinical needs, however, I cannot comment on that definitively as I was not involved in that process. I do not know who approved the numbers involved. I would imagine those involved in the project from NHS GGC would be better placed to answer this question.

67. ZBP were responsible for the design drawings and specification for the isolation rooms, but these were transformed into installation drawings by Mercury Engineering. I do not know who approved these from the NHS GGC Project Team. I would imagine that NHS GGC or MPX would be better placed to answer this question.

68. I do not recall having any concerns in relation to the isolation rooms or compliance with SHTM/HTM.

69. I have been asked about the entry in the RDS which reads as follows:

    "WARNING NOTICE: This room is based on a theoretical design model; which has not been validated (see paragraph 1.8 of HBN 4 Supplement 1). Specialist advice should be sought on its design. The lamp repeat call from the bedroom is situated over the door outside the room."

    I cannot recall any details of the RDS or this note in the RDS.

70. In terms of the specialist advice sought on isolation room design, the design would have followed the standard NHS guidance documents. I am not

personally aware of any further specialist advice having been sought, though I would imagine that NHS GGC would be able to answer this question.

71. I believe that the final agreed design for isolation rooms was part of the Reviewable Design Data and would have been signed off by NHS GGC and their advisers, however I am not personally aware of whether or not that took place, having no involvement in the approval process. I would imagine that NHS GGC or Currie and Brown would be in a better position to assist with this question.

72. In terms of why part of the main extract was placed in the patient bedroom and not totally from the ensuite as outlined in SHBN 04 Supplement 01 **(Bundle 16, Document 4, Pages 314 – 341)**, as a designer, I and other colleagues have adopted 'splitting' the extract between the ensuite and bedroom as taking all of the extract from the ensuite can lead to excessive air changes in the ensuite and can cause noise in transferring the whole air volume through a restricted opening in connecting door to the ensuite. The key criteria to maintain isolation is to maintain the pressure regime between the room/lobby/corridor.

<u>Water and Taps</u>

73. I am unable to comment on any concerns which may have arisen in relation to the water systems at the QEUH/RHC, in view of the fact that I do not possess the relevant expertise of that of a qualified public health engineer. I do believe however that the systems were designed in line with SHTM 04-01 **(Bundle 18, Documents 5, 6 and 7, Pages 102 – 164)** and other relevant water hygiene regulations. I did not have any concerns regarding the design of the systems.

74. In respect of the decision to use Horne taps, the architect was responsible for specifying the taps. As MEP engineers we would only have checked the tap was compatible with the pressure characteristics of the water systems. Whilst I am not a public health engineer, I recall from other projects that Horne taps

were becoming popular in use in healthcare buildings due to the benefits in maintenance.

75. I am further asked about whether the use of Horne Taps was dependent on thermal disinfection. Whilst I do not believe that I have the relevant expertise to comment on this given that I am not a qualified public health engineer, I believe this question may relate to exposure to high temperature hot water occasionally.

76. Unfortunately, I cannot comment any further than that as these matters are outside of my expertise, and because I have no knowledge as to whether this was included in the tap specification, which was prepared by the architect. I would imagine that the architect and manufacturer would be better placed to assist with this.

77. I am unable to answer whether the water system was filled prior to handover on 26 January 2015, in view of the fact that I had left the project by August 2014.

Any Further Matters

78. I do not have any further input on any issues raised, however I am more than happy to answer any further questions which may be of assistance to this Inquiry in so far as my role in the project was concerned.

Declaration

79. I believe that the facts stated in this witness statement are true to the best of my knowledge, information, and belief. I understand that this statement may form part of the evidence before the Inquiry and be published on the Inquiry's website.

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

Appendix A

A47851278 – Bundle 16 – Ventilation PPP

A49342285 – Bundle 17 – Procurement History and Building Contract PPP

A48235836 – Bundle 18 – Documents referred to in the expert report of Dr J.T. Walker – Volume 1 (of 2)

A49618520 – Bundle 23 – Queen Elizabeth University Hospital and Royal Hospital for Children, Isolation Rooms PPP

A52281466 – Bundle 40 – Miscellaneous Minutes from Design and Construction Phase

A52319736 – Bundle 41 – Monthly Progress Reports

A32353809 – SHTM 03-01 Part A – Ventilation for healthcare premises – Design and Validation - Bundle 1 (A45195174), Document 15

A52449706 – Bundle 43, Volume 1 - Procurement, Contract, Design and Construction, Miscellaneous Documents

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

Appendix B

A52742418 - Steve Pardy - CV

Steve Pardy - CV

Qualifications: BSc (Hons)

CEng FCIBSE FIMechE

February 2025

BIOGRAPHY

Steve joined BDP in 2014, and has over 40 years' experience as a mechanical engineer. Steve undertook an apprenticeship with Thorn Benham Ltd, obtaining an Honours Degree in environmental Engineering at Southbank Polytechnic. He joined DSSR Consulting Engineers in 1982 to broaden his design skills where he also commenced his knowledge in healthcare projects. After 12 years with DSSR, Steve joined Zisman Bowyer & Partners (Building Services Consultants specialising in labs & healthcare) in 1994 as Executive Engineer, progressing to Senior Associate before becoming a Partner in 2005. During this time Steve was responsible for leading some of the largest projects in the practice's 55 year history. Following the administration of ZBP, Steve was recruited as a Director with TUV SUD Wallace Whittle between February 2013 and August 2014.

Steve retired from practice with BDP in December 2024.

Steve took overall responsibility for the delivery of the mechanical and electrical services designs and for integrating the engineering specialisms of lighting, acoustics, sustainability and infrastructure into the process. Steve is committed to integrating innovative sustainable engineering solutions with the architecture and structure to produce passive low energy designs. Steve has, for much of his career, specialized in complex laboratory and healthcare projects. to produce passive low energy, low carbon designs.

SKILLS

- Healthcare sector expert
- Research/Science sector expert
- CDM Representative for Environmental Studio
- Hands on engineer

EXPERIENCE
BDP; 2014 - 2024

Healthcare and laboratories

Epsom and St Helier, Specialist Emergency Care Hospital, Sutton
2020-2024; [redacted]; Role – Engineering Director to RIBA Stages 2/3
The new hospital centralises emergency care from the Trust's two existing hospitals to provide a state of the art facility. The new building will accommodate the emergency department and support departments, women and children's centre, operating theatres and intensive care and wards providing over 500 beds.
The new development is part of the NHS New Hospitals Programme and is one of the leading Pathfinder schemes.
The hospital is being designed to meet the NHS agenda for Net Zero Carbon and uses heat pump technology for all heating and cooling energy, together with an extensive roof mounted photo-voltaic array. The scheme will also maximise the use of Modern Methods of Construction through standardisation, pre-fabrication and off-site manufacture

St George's Hospital, London, Renal Unit
2020-2024; [redacted]; Role – Engineering Director To RIBA Stage 4
A new unit rationalising Renal services across South West London. The new hospital accommodates Dialysis, Outpatients, Surgical and Medical Wards with links to the remainder of the St George's campus.
The designs are based on achieving a Net Zero Carbon building and has standalone energy generation from heat pumps rather than being connected to the campus' fossil fuelled steam system.

John Innes Centre, Next Generation Infrastructure, Norwich
2018-2020; [redacted]; Role – Engineering Director to RIBA Stage 2
A replacement of the John Innes Centre (JIC) and The Sainsbury Laboratory facilities at Norwich Research Park will transform the science accommodation into next generation facilities that encourages cross-disciplinary working. Our designs incorporate new research and office buildings along with state-of-the-art horticulture facilities and glasshouses, accommodating JIC and TSL's research, increasing industry and academic collaboration, and public outreach.

Cavendish III, University of Cambridge
2017-2024; [redacted]; Role – Engineering Director RIBA Stages 3 to 5
New state-of-the-art laboratory on the West Cambridge campus providing a purpose-built centre for world-leading research for the university's department of physics. The building provides a range of laboratories, offices, cleanrooms, workshops and multiple

lecture theatres, alongside an independent Shared Facilities Hub offering catering, collaborative teaching, and meeting, study and library spaces

Astra Zeneca Research Centre, Cambridge
2014-2019; [redacted]; Role – Design Lead to RIBA Stage 4
Executive architect, working with Herzog and de Meuron, and full engineering services, for the new office headquarters and laboratory complex located on the Cambridge Biomedical Campus for their highly-skilled workforce of approximately 2,000. The 55,000m2 facility has been designed to be readily adaptable for the changing needs of research science. The Research Building is supported by an energy centre incorporating a number of low energy solutions including an extensive ground source heat pump system and combined heat and power plant.

Bloomsbury Research Institute, UCL
2014; £35m; Role – Engineering Director to RIBA Stage 4
New 6,000 sqm building for the Bloomsbury Research Institute (BRI) including CL2 and CL3 laboratories. Scope includes feasibility study of existing services and their integration for the new facilities. Flexibility will be a key part of the design strategy. Future adaptability and expansion will be incorporated into the M&E services design to allow the building to continue to meet the occupants' requirements as they change.

Royal Brompton & Harefield NHS Foundation Trust
Continuing Steve's long relationship with the Trust included the following projects:

Royal Brompton Hospital – respiratory lab and consulting room relocation
2015-2016: [redacted]; Role – Engineering Director
Conversion and remodelling existing department areas to provide additional consulting rooms and staff accommodation

Royal Brompton Hospital – CFD Analysis into dispersal of fumigant from safety cabinets at roof level
Year 2015: [redacted]; Role – Engineering Director

Following Steve's prior involvement with the project before joining BDP, Steve was appointed to undertake a CFD study of dispersal from local fume discharges in relation to new plant to confirm that there would be no impact of theatre air quality. BDP appointed a specialist modelling company to carry out an analysis which formed part of a report confirm that there were no issues.

Harefield Hospital – Private Patients Wing
2017; [redacted]; Engineering Director for RIBA Stages 2 to 5

Refurbishment of existing office area into 18 single ensuite bedrooms, 4 bed HDU and support facilities to provide private patient accommodation to 5-star hotel standard. All rooms have air conditioning and lighting scheme has been developed to provide a high quality environment

Royal Brompton Hospital – Intensive Care Isolation Rooms
2016; [redacted]; Engineering Director for RIBA Stages 2 to 5
Refurbishment of an existing 4 bed ICU bay to provide two new lobbied isolation rooms. The design has following HBN04:Supp1 with separate ventilation plant for each room mounted at roof level and using a redundant lift shaft to create riser space.

UCL Queen Square House
2016 – 2017; [redacted]; Design Lead to RIBA Stage 2
New 16,000m^2 high rise laboratory building to provide laboratories and specialist imaging suite for research into Dementia and brain disease. The project also involve a significant enabling works project to reorganise the adjacent service yard serving two major hospitals

Great Ormond Street Hospital, Child Cancer Centre
2017-2019; [redacted]; Engineering Director to RIBA Stage 2
Multi-disciplinary design solution as part of a completion for the new outward facing development to give the image of GOSH.
The project is on a particularly restricted site and plant disposition in largely accommodated in a deep basement to give a free and airy roof line.

Zisman Bowyer & Partners / Tuv-Sud Wallace Whittle (1994 – 2014)

Healthcare

South Glasgow Hospital Campus
2009-2014; £840m; Role – Project Partner/Director
New 170,000m2 campus constructed on the site of the existing Southern General Hospital in Govan. The new hospital centralises acute services currently provided by three different hospitals. It comprises a 14-storey, 1,109-bed adult hospital and a five-storey 256-bed children's hospital.
The hospital was designed to have one of the lowest carbon footprints for UK hospitals.

Peterborough Hospital PFI Acute Hospital
2006-2010; £347m; Role – Project Partner
New clinical facilities for the £350m Peterborough Hospitals NHS Trust consisting of a new five-storey Acute Hospital, Mental Health Unit, and an Integrated Care Centre. Steve played an active role in the PFI process from PITN stage through to financial

close, providing overall continuity in the level of M&E design service through to completion and handover.
The acute hospital included a day treatment chemotherapy unit, an outpatients department and inpatient cancer care ward. Two Linac bunkers were provided as well as a lead lined Orthovoltage room and RDR CT Simulator.

Peterborough City Hospital Linac Extension
2014; £3m; Role – Project Director
Extension to the existing Radiotherapy department by the construction of two additional bunkers and fitting out of Linac machines. Following completion of the main acute hospital a further project was undertaken to provide two additional Linac bunkers and support facilities including a dedicated reception area. One additional Linac unit was fitted out with the second bunker being shell space for further future growth.

Other projects following the completion of the PFI scheme included new CT scanner unit and remodelling of outpatient areas.

Guys and St Thomas' Hospitals,
Cancer Day Unit
2012; £2.5m; Role – Project Partner
Project involved two Cancer Day Units (CDU), one located at St Thomas' Hospital and one on the 10th floor of the tower block at Guy's Hospital, were combined to form a single unit – the 10th floor Oncology offices provided the most appropriate space for this development.

Block 8 TWINS Project; £1.3m
2011; £1.3m; Role – Project Partner
Reinstatement of the 4th floor of Block 8 of St Thomas' Hospital in order to provide additional office facilities. Block 8 is a Grade II listed building and incorporates original features of the Florence Nightingale design.

Evelina Children's Hospital
2010; £NA; Role – Project Partner
Forensic investigation into the performance of the engineering services within the hospital to determine compliance with NHS standards.

Royal Brompton & Harefield NHS Foundation Trust
2010-2012; £10m; Role – Project Partner
Various projects undertaken at the Royal Brompton and Harefield Hospital sites. A selection of these projects is:

Harefield Hospital; site masterplan, MRI/CT building, extension to ITU, extension to ward block, refurbishment of redundant training into simulation labs, restaurant lighting,
Royal Brompton Hospital: theatres option study and appraisal. Hybrid operating theatre, upgrading two theatres, office expansion by creation of infill area at roof level, Gamma camera suite, refurbishment of private patients unit.

Bromley Hospitals PFI
1997-2002; £118m; Role – Senior Associate
New 500 bed Acute Hospital (Princess Royal University Hospital) and rationalization of Orpington Hospital. Since completion of the PFI in 2002, Steve had an ongoing relationship with the FM Provider undertaken a number of upgrade and refurbishment works within the live hospital including; IT cooling upgrade, UPS expansion, Private Patients Units, Maternity Consultant Lead Delivery Unit, A&E remodelling and new training centre.

Homerton University Hospital, Perinatal Unit
2006; £8m; Role – Project Partner
A phased redevelopment of the perinatal and maternity services unit including the construction of a three-storey structure housing the new delivery suite and the complete refurbishment of four wards comprising a 25-cot SCBU and a 22-cot NICU. The works were carried out around an operational department, and careful phasing was required to avoid disruption to the day-to-day activities of the existing maternity services.

Homerton University Hospital Framework
2008-2012; £6m; Role – Project Partner Project
Four year M&E framework covering a number of projects including ward refurbishments, new MRI, Endoscopy, X Ray, Physiotherapy Unit and boiler house feasibility study.

Kings College Hospital
2003-2012; £10m; Role – Project Partner
Golden Jubilee Wing (PFI building) refits and refurbishments. Projects included;
- A&E CT Scanner
- Christine Brown HDU Ward
- Bi-plane cardio-angiographic scanner
- PET scanner
- Expansion of maternity department
- Review of medical compressed air system

Barnet General Hospital redevelopment

1994-2001; £65m; Role – Senior Associate

New build 459-bed District General Hospital. A two-phased, part traditional, part PFI procurement process undertaking the services designers on both phases, as well as the original site master planning. Phase 1 included the Operating Department, ITU, A&E, Maternity, Radiology and wards. Phase 2 PFI (£40m) included the Coronary Care Unit, Renal Dialysis, Pharmacy, Pathology, Aseptic Suite, Ophthalmology, IT Centre and the remaining wards. The overall development also included a new Energy Centre including generators, boilers and CHP.

Whittington Hospital

2004; £5m; Role – Senior Associate

Fit out of the Imaging department as part of the PFI project for Asteral which is the UK's leading independent provider of export equipment to the NHS. As part of the PFI project at Whittington Hospital in London, Asteral was engaged by the Trust to provide the managed equipment service for the whole of the Diagnostic Imaging Department. This included:

- CT
- MRI
- Fluoroscopy
- Interventional Imaging, and
- X-ray rooms

The project was to provide the fit-out services design within the shell and core left as part of the PFI project.

Laboratories

Pirbright Institute, DP1 Project

2013-2014; £120m; Role – Project Director

New state-of-the-art research laboratory comprising a new 14,000 sq.m. main laboratory building and 862 sq.m. Energy Centre. Laboratory building comprises three wings of laboratories centred on a central hub to SAPO4 containment. The engineering services are highly resilient to maintain environmental conditions in the event of component failure.

Centre for Advanced Electronic and Photonics, University of Cambridge

2004 - 2006; £14m; Role – Project Partner

New 4,700m2 facility forming part of the University of Cambridge's Department of Engineering including laboratories and a large number of clean rooms. Appointed as Commissioning Manager for the EEDBA extension to the building in 2014

Li Ka Shing Centre, University of Cambridge Hutchison/Cancer Research UK
2000-2007; £40m; Role – Project Partner
Cancer research centre with ACDP Cat 2 and 3 laboratories. Following completion Steve was appointed to lead the fit out of specialist science areas leading up to occupation.

Poplar Block Laboratory Clare Hall, Cancer Research UK
2010; £15m; Role – Project Partner
Overseeing the M&E design of the laboratories including a BRU and support facilities.

DERA, Porton Down
1996-2000; £40m; Role – Senior Associate
Specialist laboratory complex including new CL2/3 biological and chemical research facilities totalling 16,000m2.

Ovagen Laboratories, Ireland
2011; £30m; Role – Project Partner
Unique research laboratories to develop a germ free egg production facility for vaccine manufacture in the pharmaceutical industry.

Responsible for the mechanical and electrical design of a large scale, germ free (GF) chicken egg production unit consisting of a unique bio-secure pressurised isolation poultry room with all facilities to enable 4,000 GF chicks, previously hatched in isolators, to be transferred, raised to full maturity and breed naturally to produce GF eggs in commercial quantities.

Barts & The London NHS Trust
Royal London Hospital Pathology and Pharmacy Building
1999-2001; £35m; Role – Senior Associate to RIBA Stage 2
Centralised the Pathology and Pharmacy services for the Royal London Hospital, St. Bartholomew's Hospital and the London Chest Hospital.

The 16,600 sq.m building houses the conflicting departmental requirements of Pathology, Pharmacy and Mortuary.

The project also includes a pharmacy manufacturing suite of approximately 2,500 sq m, 1,000 sq.m of which are occupied by an Aseptic Suite clean room environment, which is one of the largest NHS Pharmacy Production facilities. The Mortuary Department is approved for police forensic work and is able to operate to level 3 containment.

Cancer Research UK Long Term Accommodation, London EC1
2011; £6m; Role – Project Partner
Cat B fit out of 120,000 sq.ft. office building, known as the Angel Building, that brings together all non-scientific CR-UK staff in Greater London area under one roof.

The London Institute Cancer Research UK
2008 - 2010; £5m; Role – Project Partner
Following a comprehensive survey of the building the replacement of central heating and cooling plant was identified as a major operational risk to the institute during the period before the integration into the proposed Crick Institute.

Steve was responsible for replacement of the central boiler plant and chiller/cooling towers during the seasonal shutdowns.

Workplace

Lancaster Road, Wimbledon
2010; £1m; Role – Project Partner
The refurbishment of an existing building to create a new high specification trading office involving the design of the M&E and drainage services and acoustics and low carbon advice.

Residential

Home Park Road, Wimbledon
2011; £6m; Role – Project Partner
The design of new mechanical and electrical systems associated with the major refurbishment and extension of this residential property, applying on-site low and zero carbon technologies using a Ground Source Heat Pump system and Photovoltaic panels.

Education

Magdalen College Auditorium, Oxford
Year 2001; £5m; Senior Associate
150 seat auditorium designed to achieve extremely low noise levels.

Hatcham Temples Grove Primary School, Lewisham
Year 2008; £5.1m; Role – Project Partner
Replacement of all engineering services associated with the proposed extension of the school. Following a full condition survey, detailed designs were produced to provide full M&E design services for this BSF scheme.

The Attenborough Centre for Creative Arts
University of Sussex
Year 2013; £10m; Role – Project Director
Refurbishment of the centre to meet modern theatre standards and including a 350-seat main auditorium, dressing rooms, teaching studios and a front-of-house area made up of an entrance foyer, café and bar. It will host conferences, workshops and exhibitions, stage live music performances, dance, film and media events, and encourage learning through creative and experimental activities.

Based on the campus of the University of Sussex and housed in a Grade II listed building designed by Sir Basil Spence, the Gardner Arts Centre was opened in 1969 as the first university campus arts centre. It was closed for refurbishment in 2007.

Throughout the design, careful consideration was given to the integration of the service routes and containment so as not to damage the heritage elements of the listed building, in particular, the exposed decorative brickwork and concrete finishes. This required regular consultation with English Heritage.

Heritage
The National Gallery
Year 2013; £1m; Role – Project Director
Restoration of Gallery 33 including replacement of air conditioning system, lighting control systems and BMS monitoring for this Grade 1 listed building.

Further works included engineering services infrastructure in association with major roof replacement works for galleries 41 – 46.

St. Josephs, Mill Hill
Year 2008; £30m; Role – Project Partner
Refurbishment and conservation of a Grade II listed building, involving the conversion of an 11,000 square metre missionary training college into a luxury care home for the elderly. A core element of the development was the careful refurbishment of a 19th century chapel and the preservation of artwork and stained glass windows. The project featured the addition of a new glazed roof over an existing courtyard to create a graceful space which acts as a focal point for residents and visitors. A thermal performance study was undertaken to predict the range of summertime temperatures. Two new wings were also added to the existing building.
A study was undertaken to consider means of delivering 20% reduction in carbon emissions through renewable energy. The building was subsequently provided with a biomass boiler and a solar water heating system.

The Clothworkers Centre, The V&A Museum, London
Year 2012; £3m; Role – Project Partner
Four-year M&E framework agreement with the Victoria & Albert Museum (V&A). This project at Blythe House next to Olympia was to provide the M&E design for the new Textile and Fashion Study and Conservation Centre which brings one of the most important collections of fashion and textiles in the world together under one roof. This was an ideal opportunity to develop up-to-date and appropriate storage to enhance the safety and long-term care of the collection and its management.

National Archives, Kew
Year 2011; £1.3m; Role – Project Partner
Option appraisal relating to the replacement of part of the central cooling plant supplying Kew 1 (originally known as the Public Records Office). The option appraisal included outline designs reflecting 'sustainable' thinking, taking into account energy performance, environmental impact and whole life costings.

Miscellaneous

Search & Sea Rescue – Helicopters
Year 2012; £30m; Role – Project Partner
Supporting the Soteria consortium in its bid for the PFI contract to deliver the Search & Air Sea Rescue Service – Helicopters (SAR-H) across the UK (including the Falkland Islands). The deal to outsource the service in a 20-to-30 year contract was overseen by the Ministry of Defence. The contract included the construction and management of a number of new buildings. The commission involved providing M&E design advice, including outline proposals and specifications, for structures at the following seven locations:

- RAF Lossiemouth, RNAS Culdrose and Glasgow Airport – hangars providing space for maintenance of the helicopters along with accommodation for pilots and administration facilities.
- RAF Valley – flight training centre including a double height area for a helicopter simulator (provided by Thales), office accommodation, training/classrooms, briefing room, computer room and administration facilities.
- Stornoway Airfield – accommodation building/mess facilities for pilots.
- RAF Wattisham and RMB Chivenor – 'double width' fire stations.

The project also provided M&E services input into the DREAM assessments for the buildings.