

**Scottish Hospitals Inquiry Witness
Statement of Kenneth Hall**

Personal Details

1. My name is Kenneth William Hall. I am currently employed with Multiplex as a Package Manager.

Education and Career Background

2. I joined DSSR, who are mechanical and electrical consulting engineers, back in 1986, as an apprentice design engineer. Whilst employed, I was provided with day release at college for ONC and HNC education. Then in 1991, I went to Strathclyde University to study Bachelor of Engineering (Honours), which I achieved in 1994. In 1998, I became a Chartered corporate member of, what was then, the Institute of Electrical Engineers.
3. In 1999, I became a corporate member of the Chartered Institute of Building Services Engineers, which is called CIBSE. Between 2000 and 2003 I studied part time, graduating in 2003 with an MBA with distinction. Then, in 2012, I became a fellow of the IHEEM which is the Institute of Healthcare Engineering and Estates Management.
4. I have always been involved in mechanical and electrical engineering, starting with DSSR who specialised in hospitals at that time. I have held various positions as my career progressed. I was at Buro Happold from 1999 to 2005 as an Associate. It was all building services projects, so that is Mechanical, Electrical and Plumbing (“MEP”) type projects. I then moved to Rybka, who again are a mechanical and electrical building services consulting engineers and that was around 2005 to 2008 as Regional Director. I was at Morgan Professional Services as an Associate Director between 2008 and 2009. In 2009 and 2010, I was a self-employed consultant which included working on Projects at Glasgow Royal Infirmary. I joined Multiplex in 2011 as a Mechanical and Electrical Manager.

5. Before joining the Multiplex team on RHCYP/DCN I had worked on hospitals before. I was involved with QEUH in Glasgow. Prior to joining Multiplex, I was also involved with other large-scale type projects such as The State Hospital which was a new build project. It provides psychiatric care to patients, so it was a project that straddles mental health and hospitals. Then various minor works, such as upgrades in wards or just a range of projects within healthcare. My experience can be summarised as:
- January 2011 – March 2014 – QEUH
 - 2009 – 2010 – Glasgow Royal Infirmary
 - 2006 – 2009 – The State Hospital. Ward Upgrades

Current Role

6. My role deals with managing design packages in MEP, so I am responsible to Multiplex for delivery of that element.
7. I was not involved in the Royal Hospital for Children and Young People (“RHCYP”) and Department of Clinical Neuroscience (“DCN”) project in 2012 for the procurement process as I only joined the project in March 2014 at the preferred bidder point.

Environmental Matrix

8. An environmental matrix is a useful document, in that it summarises the mechanical and electrical requirements that are necessary to design and build the hospital. I have seen it done in various guises, but it was certainly used at QEUH as well. The function of using the matrix can be driven by the form of contract. In some cases, it could be the client that produces it or in some cases it could be the design and build team.
9. My experience has been that the environmental matrix is produced manually and not populated automatically by way of a computer software package.

10. The RHCYP/DCN project used a Non-Profit Distributing (“NPD”) model. I have been asked by the Inquiry what my understanding of the function of the matrix was. When I became involved at the preferred bidder stage, the first thing I had to do was consider what documents we had to get us through to Financial Close. It was an audit of what we had, and one of the key documents was the environmental matrix which summarised all of the requirements that Lothian Health Board (“the Board”) wanted. I saw this as a positive because it then meant that the process had been completed and it was not required to be done. This would vary from project to project and sometimes the matrix would not have been developed to the extent it had been at that point. In some cases, it can be the contractor team or the client team that has to produce it. It is a document that you require to be able to do so many things mechanically and electrically, to design the project to what your client ultimately wants. There are a lot of technical figures in it and some people look at that and they just think it is numbers, but the information in that is so critical for so many aspects of a project that you cannot underestimate it. I was pleased to see this environmental matrix had already been prepopulated.
11. The information contained within the environmental matrix was taken as the client's briefing document which allowed the basis of the MEP design to be developed. The Board's environmental matrix was reproduced by Wallace Whittle, and through dialogue, discussion and meetings, the document was ultimately reviewed by the Board prior to Financial Close.
12. I have been asked to comment on 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) and the requirement for Activity Data Base to be used by health boards as a design and briefing tool. I note this requirement was introduced in 2010. My experience has not been acting for health boards at this early stage of a project. I am unable to comment if health boards are working to CEL 19 (2010).

13. My understanding is that the document and data within the environmental matrix are fixed at certain points in time. During the life of a project, there can be additions and omissions as the project goes on. The duration of a hospital project could be three years plus. The client's requirements may change, so my experience with the matrix is that you could get instances where, say, some rooms have had their function changed. At that point, the environmental matrix would be updated or altered as the project progresses. It is never a document that is 100 per cent fixed at day one. However, you do need it populated at day one otherwise you cannot inform the design principles that you have to develop at that point. When I received this environmental matrix within the paperwork, I saw it as encapsulating the Board's requirements for the hospital build. Any amendments to that would have been in respect of any potential changes that came along as the project was developing because ultimately with the matrix, every room gets defined within it, and it is labelled to an actual room number. For instance, further down the line if some rooms were changed. It would mean that, as an example, if a store was changed into a bedroom, you would look at the criteria that you had at the start and you would think about the criteria that we have agreed for the bedrooms already. We would then insert revised data into the matrix, and then submit the environmental matrix for client review.
14. I have been asked what is the basis of my understanding that an environmental matrix may change during the life of a project. My experience on other projects is that on such a large and complex project with so many room types may well be subject to change as the project progresses; be it operational policy, new policy or regulation change, new technology or a requirement for different clinical needs or other reasons. Any changes are led by the client and instructed accordingly in line with the contractual procedures.
15. I have been asked to comment did I ever see the Board's Construction Requirements (BCR) (A33405670 – Schedule Part 6: Construction matters, section 3 (Board's Construction Requirements), Subsections A, B and C Excerpt pages 1 to 149) that made compliance with SHTM03-01 mandatory. I was provided with a copy of the BCR when I joined the project team. The BCR was seen as more than simply compliance with the SHTM. For example,

paragraph 2.3 listed out the standards to be complied with, unless the Board had expressed elsewhere in the BCR a specific and different requirement. The different requirement being section 8 of the BCR where the works had to comply with the environmental matrix.

16. In relation to the question of the values being fixed within the environmental matrix, my understanding is they were fixed at certain points in time.
17. I have been asked to comment on the reference to “see guidance” on the Hulley and Kirkwood environmental matrix, Third Issue dated 19.09.12 (A34691184 – Reference Design Envisaged Solution – RHSC/DCN RDS Environmental Matrix – 19 September 2012) . The spreadsheet includes specific values for the majority of entries. There is a general “see guidance notes” under notes at the far right of the spreadsheet in column “AC”. As I understand it, Wallace Whittle used the specific values within the environmental matrix to formulate their design.
18. I have been asked to comment if the values within the environmental matrix are required to price the job / tender. I am not directly involved in the costing of a project; this is the remit of the commercial team along with the subcontractor(s). However, ventilation rates are required to assess spatial requirements and equipment selection and capacities to build up a cost model.
19. The matrix was a really comprehensive document. It was not a generic spreadsheet that when you looked at it including the backup information; we also had what I would call a reference design pack. This included items such as the Hulley and Kirkwood design intent document. Also, we had the thermal comfort document, and they all aligned with the matrix. My interpretation of the environmental matrix was this is a really good piece of work that has been done, it has been thorough, and it takes out the need to, effectively, have to produce one because the process had already been carried out.
20. I have been asked to clarify the contents of the back-up information referred to in the previous paragraph. This relates to the Hulley and Kirkwood report that identifies previous issues on the existing RIE hospital bedroom overheating,

and the computer modelling carried out to show mechanical ventilation at 4ACH resolved the overheating issue(s).

21. I have been asked to clarify what was seen as being the definitive requirement of what the Board desired in relation to environmental requirements. My understanding was the Board's environmental matrix defined the Board's requirements, and this was aligned to the Board's Construction Requirements Section 8 where it was defined that the works had to comply with the environmental matrix.

Role at the Preferred Bidder Stage

22. My discipline is mechanical and electrical (M&E). Multiplex employ designers, so we do not do any design in-house. My role within Multiplex was as mechanical and electrical Design Manager, where I was to facilitate and manage the interaction between our designers who, in this case, were Wallace Whittle and the Board.
23. At the point of looking at the matrix, I felt it was not simply as having a duty to check to see if it was complying with Scottish Health Technical Memorandum ("SHTM") and the Scottish Health Protection Network ("SHPN") regulations, and all the other relevant regulations. My understanding was that the Board were responsible for interpreting the guidance and then producing their requirements, because within the guidance, there are many considerations to be made. We talk about guidance but there are so many aspects to guidance. Maybe visualising it, you have the environmental matrix in a mind map in the middle, you then have so many other aspects that inform your environmental matrix. Taking SHTM 03-01 (A33662259 – Scottish Health Technical Memorandum 03-01, Ventilation for healthcare premises, Part A – Design and validation dated February 2013) as an example, within that, there are selections to be made on clinical requirements. It is not just about air changes. That document is 184 pages to do with ventilation. It is a huge document that covers many areas, and so it is not a document that you would just decide if there were compliance or not. There are so many aspects that need to be

analysed and discussed, and that is what feeds into the environmental matrix. Then there are other aspects that can be competing. You will have input from Estates in terms of say, energy efficiency. Or Infection Control input as well as clinical input requirements. Some of these can be at odds with one another and that is where the client process to decide, effectively, what they really want is so important. It is not just about compliance with a standard; you need to understand operational policies. You need to understand how certain wards are going to be used or the reasons for certain air changes. With pressure regimes, that is an issue that a builder cannot exclusively decide. The end result is questioning and confirming whether it is what the client wants.

24. I have been asked if I was aware IHSL had to develop its own environmental matrix and state compliance with SHTM03-01 at tender stage. I was not involved at the tender stage of the Project, and not aware of what was discussed. I cannot assist the Inquiry with this question.
25. I have been asked to comment who would decide the ventilation pressures in relation to a department. In my opinion this would involve a range of stakeholders who represent the Board. Operational policy would form part of the decision-making process, and if it is to be positive or negative pressure for example depending on the type of infection the patient is likely to have. The combination of stakeholders would include for example, clinicians, infection control team, estates, nursing staff and others. A technical advisor may run simulations or checks and provide engineering input on what could be possible based on any ventilation design being discussed at an early stage. In summary the clinical expert sets out their requirements for the engineering solution to then be determined.
26. With room datasheets, from my experience generally I would have expected to have seen a comprehensive set of room datasheets in tandem with the environmental matrix which lags the room datasheet process. However, Wallace Whittle would not produce room datasheets because it is part of the architectural role to lead this, with input from MEP. My understanding is that your starting point would be that the health board would use the Activity Data

Base (“ADB”) system which then gives you a selection of rooms, and that becomes your starting point for the room datasheets. Within that, you have your architectural elements, and you have your mechanical and electrical elements. Then, if you imagine a large project, you have got the architectural plus the M&E per room, so you could have volumes and volumes of documents. They are very bulky, and they are not really what I would call a reference for M&E designers who have to look at key aspects regularly. My understanding is that what normally happens is that the information contained in the room datasheets, so your air changes and also things like lighting, that information then gets inserted into the environmental matrix.

27. I have been asked to comment on ADB process and the stage they would be introduced. As I understand it the employer decides how this will be set out in the client brief produced. As the starting point I understand NHS Scotland Bodies information relating to CEL 19 (2010) should be formulated from the ADB process. The process is not something I have been directly involved in.
28. I have been asked if I was concerned by the lack of room data sheets. I was not concerned because I understood the client’s environmental requirements had been defined within the environmental matrix. In my experience any RDS should have reflected the same environmental information.
29. The two design elements – architectural and MEP - are split very early on. The architects have their user group meetings, and they may be altering the room layouts based on what the users are feeding in because, in my opinion, they are a starting point. You get a generic layout from Activity Data Base which may be relevant to a particular type of room, that then must be reviewed with the user group team to understand their specific requirements. For the MEP there are also workstreams developing the MEP principles based around for example the environmental matrix. In my experience the environmental data gets spilt from the RDS process at an early stage. Both workstreams develop their respective deliverables, and at certain points in time the information contained within the environmental matrix is brought together with RDS.

30. During this process Wallace Whittle and the architect had regular dialogue where for example user group meetings were led by the architect; where there was any impact on Wallace Whittle design elements this was fed back via the room layouts marked up from each user group session, and further dialogue held accordingly to assess the impact and capture the requirements.
31. I was provided with a pre-populated environmental matrix as part of a pack with all the other reference design elements, and one of the requirements was to produce room datasheets by Financial Close. I did not see anything unusual about this because the environmental information was already provided in the form of the environmental matrix. In simplistic terms, it is the environmental information MEP are more interested in to develop the design principles.
32. During the detailed design phase, post financial close, as I understand it the architect coordinated the user group requirements and reviewed any changes with the Board.
33. If there is a conflict between the environmental matrix and guidance, in my opinion, the matrix would prevail because the interpretation of the guidance has already been done which then produced the matrix, because there are many aspects to the guidance. If you look at the environmental matrix, there are some notes at the front. For instance, in respect of the WC toilets, there was a note there, I think it's note 17 that says, "The SHTM says three air changes, but we want 10." There is another one about temperature, note 12, where maximum temperatures have not to be exceeded as contained within the matrix, typically 25 degrees for patient bedrooms, whereas the SHTM codes say 28 degrees. The Board and their advisors have made a decision they want 25, so it is not a generic document. This is a document that somebody has worked through and have really analysed their requirements and they are telling you what they want and inserted the figures that they do want within the environmental matrix. I think the decision in relation to guidance is already made because the environmental matrix is spelling out what Multiplex have to design and build.

34. I have been asked to confirm if I was aware of the BCR requirement to comply with SHTM03-01. The BCR requirement was seen as more than simply compliance with the SHTM. For example, 2.3 listed out the standards to be complied with, unless the Board had expressed elsewhere in the BCR a specific and different requirement. The different requirement being section 8 where the works had to comply with the environmental matrix.

35. The notes referred to above relate to Hulley and Kirkwood Environmental Matrix, Third Issue dated 19.09.12, tab Guidance Notes.

36. I have been asked to comment on the environmental matrix being made Reviewable Design Data and therefore subject to change, and how this relates to the matrix being fixed from the outset. In my opinion the RDD process does not mean any of the design element would necessarily be subject to change. RDD is a process that introduces a check process that verifies the Board are in agreement the document under review meets their client requirements. Any changes that are made to the stipulated values contained within the environmental matrix have to be agreed, and this is where the RDD process would capture this. However, any such changes would originate from the employer and follow the contractual change process. Other changes that could perhaps be considered in the context of the environmental matrix could be to cover any room types not included for, room numbers added as the design develops, or simply clarification points as detailed design progressed. The environmental matrix in my opinion is fixed at a point in time only, not fixed for the duration of the contract.

37. We were co-located in Morningside in Canaan Lane, so that was off-site. It was a project office with the NHS, Multiplex, Integrated Health Solutions Limited ("IHSL") team and others. We were off-site because we were still going through preferred bidder stage. That was useful because you had close contact with lots of interaction to build relationships. The key MEP designers for Multiplex were Wallace Whittle, and they had been involved in the bid stage, so it was the same people involved as well as our supply chain, Mercury. There was a

continuity there; both of those parties had been involved in the initial stage. Then we were, effectively, in the preferred bidder stage and we were taking what had been developed and discussed at the first stage with the documents that we had, so that was the Board's construction requirements and the reference design. It was all about trying to take that and get us to financial close and developing those elements to show our design intent that would satisfy the Board.

38. Then workstream wise, there were probably three key elements: the architectural, civil structure and the MEP disciplines. Given the size and complexity of the project each discipline tends to operate in workstreams. The MEP designers work with me and we interact with the Board, but you also have Wallace Whittle interacting with the architect as well, separately. If the architects have user group meetings and there are maybe issues or changes, Wallace Whittle and the architect had their own meetings about that as a design team and get kept up to date accordingly. In addition to that, we are trying to develop the mechanical and electrical principles to complete Financial Close. What you have is the architectural design always gets developed ahead of the MEP; you cannot design MEP unless you have the architectural room layouts. You always have this kind of staggered process where the architect needs to develop their drawings and have the layouts and then the MEP would develop from this point. But you cannot wait that length of time, so what you are trying to do is get a design intent agreed in tandem with the architects' work and with the layouts.
39. I would not say I felt under pressure with time, despite the short period up to financial close from preferred bidder stage. However, we were busy which was normal and had a job to do which we got on with.
40. I have been asked to make comment on what a standard time period would be, and also was there sufficient time allocated for the volume of work to do, In my opinion there are too many variables to define what a standard time would be. I know that time pressures were tight, initially I recall September was a target that proved to be unrealistic. The revised programme on the basis of MEP was

not unrealistic given the Board's Requirements were already set out in the environmental matrix, and detailed design was not being carried out until after FC. MEP detailed design was the production of a full set of construction drawings based on the agreed architectural layouts. The MEP design would detail and coordinate all of the MEP design layouts for all areas, and the provision of equipment schedules to allow procurement of plant and equipment.

41. The room layout was led by the architectural team. As I understand it the architect was having their own meetings with Wallace Whittle

42. There was no clinician involvement attending the MEP workshops. As I understand it there was attendance at the user group meetings, and those are really led by the Architect and developing 1:50 layouts and going through that process. I did not attend the user group meetings. If there was something specific Wallace whittle required clarification on, our route was really through Mott MacDonald who attended the MEP meetings and workshops. They would take anything away and then feed it back in to us. We were one step away from having any direct involvement with the clinical team.

43. We were working with Wallace Whittle and Mott MacDonald in 2014 when I joined. We looked at the project and then decided how we were going to get the MEP design principles to where we needed it to be. What we decided was we would have weekly workshops on the MEP. We produced a list of topics going right into the future so that the Board would have the relevant people attending. How we split it was, there were various workstreams so you could have things like fire, security and Information Technology and so on, but I would say the three main workstreams were energy, electrical, and mechanical. The two relevant ones, I think in terms of ventilation that we are talking about here, would be the mechanical workstream and the energy workstream. We had people identified because these were technical issues not general. The way it was resourced was Wallace Whittle had key people for each one of those disciplines, and then Mott MacDonald then identified their technical people for each one. There were issues, for example, we said who from estates would be joining these workshops and I think Mott MacDonald tried to get estates along

but in the end they did not regularly attend. Mott MacDonald were really the front and centre in their capacity as technical advisors to The Board. They introduced themselves at each of the meetings as the technical advisors to the Board. We were liaising with the Board through Mott MacDonald. It was useful that they brought people in who were designers in the relevant workstream, so it was not administrators. The way that they resourced it was almost like a shadow design team. When we brought along mechanical solutions to talk about, Mott MacDonald would attend with the mechanical person, so that both parties were talking the technical language. That was for mechanical, electrical, and the energy side. The whole idea with these workshops was to take the client on a journey and not at the end, in six months' time produce a set of drawings and documents to review in isolation. It was all about early involvement, and the designers were tabling drawings and concepts, so it was very much a hands-on process. The drawings would be opened, Wallace Whittle would give an overview of key principles. We would get feedback. If there were questions, then Mott MacDonald would have to take them away to the Board and bring them back for further dialogue at the next workshop. It was really a journey so that by the end, we would have a position that we were all in agreement with the proposals.

44. I was involved in all of these workstreams in managing the process. The Energy Model workstream required key individuals from Wallace Whittle and the technical advisors who understood the modelling process. I use the energy workstream as an example because that is relevant to the environmental matrix and the design principles, so it is a key workstream.
45. In relation to the environmental matrix and the energy workstream, there was a contractual requirement to meet energy targets. The energy was quite complicated because, it not only had to meet targets, but it was also going to be used as the basis of measurement for the operational phase of the hospital, so it was quite a significant piece of work. Within that, to be able to produce an energy model you are collating all the components of a building that uses energy and agreeing a set of inputs, and then the actual output of the model provides you with how much energy you are going to use.

46. My understanding was the energy requirements were critical and formed part of the contractual requirements. For example, Boards Construction Requirements Part 6 Section 3 point 5.25 Sustainability, 5.25.1 Very good BREEAM and 5.26 Energy Strategy define the energy considerations to be considered (A41179262 – Schedule Part 6: Construction matters, section 3 (Board's Construction Requirement's), Subsection D Excerpt pages 360 and 780) . Project Co Proposals 4.10 Sustainability and Energy Model prepared by Wallace Whittle details the sustainability and energy model considerations encapsulated for the Project at Financial Close.
47. There were also two reports prepared by Hulley and Kirkwood for the thermal comfort. This inputs into the energy workstream. Within the energy, it was very much about what inputs you put in as this will influence what you get out. If we take mechanical ventilation as an example, you need to know, how many air changes you are having in all these spaces because that uses energy, and that provides the output result. What was agreed was that there were templates for all the different areas and if you take, say, a single bedroom, for example, requiring four air changes, that template was developed, and Mott MacDonald had to go through each one of them and through dialogue the inputs that Wallace Whittle proposed were agreed. There was dialogue and debate to reach agreement, but the combined focus was what the input was in each one of the items. In the single bedroom, it was four. That is what developed, effectively, the Project Company Proposal (PCP) for energy. There are appendices at the back of PCP 4.10 within that document, there are templates for all of the rooms that were modelled, and if you look at the single bedroom, you can go to the relevant page and you can see that it was based on four air changes. That is the kind of level of dialogue that was being carried out and reviewed during our preferred bidder stage on energy. When referring to a single bedroom, I mean a single bed so single bedroom space. There were also multi-beds as well, so that is in it as well, and again it shows it as the four air changes.

48. The thermal comfort report produced by Hulley and Kirkwood provided technical information on ventilation simulations. My interpretation of the document was that the client had issues at Edinburgh Royal Infirmary of bedrooms overheating, and that is noted in the conclusions of the document, where it appears the builder of that hospital provided a natural ventilation solution. My interpretation of the report was the client wanted to apply lessons learned for the new build hospital to prevent bedroom overheating. The simulations within the report detailed how much mechanical air would be required. There were various iterations within the report as noted within the front cover, and the conclusion was: four air changes mechanically resulted in the bedroom not overheating.
49. I have been asked to clarify what I mean by natural ventilation within the existing hospital, Edinburgh Royal Infirmary (ERI). Whilst not having been involved with the design of ERI, this is an existing hospital that appears to have had a natural ventilation solution within bedrooms where there has been overheating issues which appears to have been a key driver to ensure lessons learned are captured for the new hospital. A piece of work has been commissioned, forming part of the Reference Design contained within the Hulley and Kirkwood paper, section 4 conclusions of Thermal Comfort Analysis Report, dated 21 February 2012 (first issue) (A34225373 – Hulley & Kirkwood Thermal Comfort Analysis Report – February 2012) . It would appear energy efficiency versus overheating of the bedroom have been considered. The conclusions of the report state 4ACH mechanically resolve the overheating concerns based on the authors modelling carried out.
50. The other aspect is that, when you look at the figures contained within the environmental matrix, it appears as simply figures within a table. However, changing the figures can have major implications. For example, if you want more air in a room from the mechanical ventilation, it is going to require more energy. The running cost of the building would increase. Increased mechanical ventilation will require larger ventilation ducts that take air to and from the room. So spatially, ductwork going along corridors would increase, and with the plant and equipment increasing in capacity larger plantroom may be and so on.

Wallace Whittle developed the design principles based on the figures contained within the Environmental Matrix.

51. The design of the ventilation system was based on the requirements contained within the Environmental Matrix. If air change rates change at a later date, there is the possibility larger plant would be required given the increase in equipment capacity and equipment size. This also impacts on spatial requirements in corridors.
52. I have been asked to comment if the requirements were finalised or not at Financial Close, and how an accurate price could be put forward if the requirements were not finalised. My understanding was the environmental matrix did provide finalised requirements in relation to environmental parameters at Financial Close.
53. Mott MacDonald were involved in the weekly workshops; MEP principles were being discussed and they were liaising with the Board and coming back to us. It was a collaborative and working process, and an enjoyable and exciting time. We all had the same vision about this hospital that we all wanted to build, and so we were all contributing and working well through dialogue period. If there was something that was tabled by Wallace Whittle, then there might be a discussion and then there might be more information required to be provided. It was fluid, it was flexible. Our starting point on the journey was, "what is it that you want?" This was the time to get it right before the detailed design and construction started. That is why these workshops and all the reviewing that was going on was to get us to an agreed position.
54. There were no specific discussions that I can recall in the work streams that I was party to that focused in on critical care values contained within the environmental matrix. For Financial Close, Wallace Whittle was not producing a full detailed design. It was not possible before Financial Close, so it was very much the design principles that were getting developed. Everything is time dependent; we had around six months. If you think what is required, what you are trying to do is get all the items that could be contentious, could be

significant, so that when you do get the agreement to proceed, you have the correct level of information to hand to allow the detailed design to progress. It is about getting all of the items with a design intent clarified and agreed,

55. There was an issue with pressure brought up before Financial Close. The pressure regime noted in the Boards Environmental Matrix required positive pressure. This had to be changed following dialogue. We had a meeting with Wallace Whittle, Graeme Greer and Colin McRae on 8 July 2014. It was very much about the project's environmental matrix, how Wallace Whittle was going to produce it, and we requested we obtain the Board's environmental matrix in Excel format to allow Wallace Whittle to produce the environmental matrix. It was developed from the Hulley and Kirkwood environmental matrix that was contained within the reference design. Wallace Whittle produced the environmental matrix, and it was sent to Mott MacDonald on 29 September as draft for comment.
56. I have been asked to comment on the requirement to produce RDS at FC and when and why this was not done. I was not party to any discussions that agreed what room types would be included as part of Financial Close. Wallace Whittle produced document PCP4.9 and within MEP section 4 this details the sample rooms selected to show the MEP elements.
57. Then on 14 October, the NHS fed comments back, of which there were 12 points, and one of them related to the debate about the six air changes and the pressure regime within the bedroom. There were two issues essentially. There were other items, but air changes and pressure were the key ones.
58. I have been asked to comment if the 12 comments produced cause concern or provide pause for thought in terms of the content of the environmental matrix. At the time of receipt of comments, it did not provide cause for concern. In my opinion the level of engagement had been good throughout the Preferred Bidder period, and we were complying with the Board's Requirements already set out. Similar to all of the submissions Wallace Whittle prepared, the environmental matrix first issue was "draft format" where the Board were

encouraged to make comments that could be worked through prior to the actual document being formally submitted for review. Formal submission then followed after the draft submission capturing the Board's comments made. Comments were worked through in the usual manner, from both the Technical Advisors, and the designers Wallace Whittle; and through dialogue and meetings the list was reduced from twelve points to seven.

59. On 28 October, Wallace Whittle then responded with their commentary. It was Wallace Whittle's comments, Multiplex forwarded the comments on to the Board. It is the designer that responds to these sorts of technical issues.
60. In respect of the air change rates, the debate about four or six and the pressure type, when I read the response back from Wallace Whittle, it seemed satisfactory to me. They were quoting the reference design. If it had been something that you thought does not seem right, then you would have got further involved or challenged the response, but to me it was perfectly legitimate. Looking at the process, we had many months of workshops and dialogue. We had agreed energy strategies on the 4ACH figures, the design principles had been tabled based on the environmental matrix, all of which informed the design principles.
61. I have been asked if I was surprised that the air change rate had not been resolved at Financial Close. I was of the opinion 4ACH was accepted as part of the dialogue and meetings held, where the final list from the meeting of 11.11.14 resulted in twelve points reduced to seven points, with the 6ACH comment dropped (A39975851 – Email dated 11 November 2014 re Environmental Matrix NHSL Comments Feedback) . Given Wallace Whittle had added clarification to the guidance notes within the environmental matrix, note 26 added in relation to 4ACH as per WW-XX-XX-DC-XX-001 Rev01 the item was considered to be accepted as 4ACH mechanically.
62. I have been asked to comment on a perceived differing interpretation of guidance and did this not require to be resolved before FC. In my opinion there was not differing interpretations of the guidance with the technical advisors.

What we had was the guidance said 6ACH, and the BCR was calling for 4ACH. The clarification was included within the environmental matrix WW- XX-XX-DC-XX-001 Rev01, note 26.

63. In reference to what was being fed back from the Board, we would normally on a day-to-day basis only see correspondence from the technical advisors. Mr Kamil Kolodziejczyk from Mott MacDonald was part of the team from Mott Macdonald as Technical Advisors to the Board, but behind the scenes I do not know who was feeding that in. I was just liaising with Mott MacDonald as they were technical advisors to the Board. Rarely did I speak to anyone like Brian Currie for example on MEP related items, Mott MacDonald were the team that I dealt with on a day-to-day basis.
64. At this stage, many months of collaborative meetings and dialogue had passed. We had come together regularly and therefore I was surprised at the comment coming back in relation to 6ACH. My initial thoughts were perhaps it was somebody back at the Mott MacDonald office that had not been involved in the job on a day-to-day basis and was not familiar with the environmental matrix.
65. The other aspect to that was that the environmental matrix stated positive pressure in the single-bed rooms, and the Boards comment was saying that they wanted it balanced or negative pressure. Wallace Whittle then updated the matrix, and that was sent back to the Board on 31 October 2014 (A40162625 – Environmental Matrix Published – 31 October 2014) . Wallace Whittle had changed the positive pressure in the environmental matrix to balanced, and the four air changes were left unchanged. That was sent back to the Board and then we requested the meeting, which was then held on 11 November (A39975851 – Email dated 11 November 2014 re Environmental Metrix NHSL Comments Feedback) . After discussion of the twelve items, the output of the meeting was seven action points. Awaiting proposals on the pressure side of things was then an action to be resolved.
66. Of the seven points, the pressure issue was one that we had to close out before Financial Close. We requested Wallace Whittle to draw up the air

movement sketches, and they were tabled with the Board in January 2015. The date of the meeting was 13 January 2015 (A35614476 – Email from Janice Mackenzie to Fiona Halcrow w/attachments – 12 to 14 January 2015) . At that point, the Board I recall were reviewing with Infection Control as part of the HAI Scribe process. The Board's environmental matrix required positive pressure to the single bedrooms.

67. Then on 19 January 2015, I issued a request for information seeking confirmation and acceptance that the Board had reviewed the sketches with Infection Control.,. That was in relation to bedroom pressure, and then on 29 January (A34225421 – Email – Maureen Brown to Janice McKenzie – Bedroom Ventilation/HAI Scribe – 29 January 2015) we received the response back from the Board via their Technical Advisors. The conclusion on that was the discussions around the Wallace Whittle paper had resolved the issue. The environmental matrix showed the pressure balanced. There had been meetings and discussions, and there was no rejection of the Wallace Whittle proposal. So, the assumption was the discussions were resolved for Financial Close.
68. It was intended that Financial Close was going to be September 2014, but it had to be extended. Production of the required information is simply a function of time, and the dialogue required, and production of information takes time to produce. The objective for Financial Close was to bottom out all MEP key principles to allow the detailed design to progress after Financial Close.
69. The Reviewable Design Data came about, I think in reality because most MEP documents had been made Level C. If you look at the NHS process in terms of the Contract, you have Level A, B, and then you have C and D. A and B are basically approved, and I think this came perhaps from the NPD type process. The feedback we received on the MEP Financial Close documents were that if the pack of documents that we had produced had been Level B, then the way the contract was set up, the Board would not get to review them again. That was just the nature of the process, so they had to be Level C, in their opinion. However, it was disappointing, given the dialogue period that we went through and everything that had been discussed, that was all documents were Level C. In one sense, it was positive because it was not Level D, meaning rejected.

Level C is subject to amendment and then proceed with a resubmission. There is a definition for the various levels. What we said was, “We hear what you are saying about the contract in terms of Level B. What we will introduce is, we will resubmit so if the Board make something a Level B, even though we did not need to resubmit anything, we said in the MEP side, “We will take your comments on board, and we will resubmit the drawings for information, so that it is quite clear how we are interpreting your comments.” That was something that we introduced post Financial Close, and it was a lot of extra work during the detailed design process, but again it was about keeping the client informed and showing how we were interpreting their Level B comments; so we added a table format to the documents, noting the Board's comment and a response included showing how we were dealing with the comments. It was again just about avoiding any misinterpretation of information, but this process adopted was at the next stage, post Financial Close. As far as I was concerned right up to Financial Close, it was very collaborative working and we were really doing everything possible to detail the design principles so we had full agreement from the Board, and thus ensure Financial Close would be achieved.

70. With all the MEP design strategy documents at Financial Close where the principles were settled that then were classified as Level C, and the set-up of the contract if the document was given Level B the Board were unable to review again, there's always a nervousness from a client's point of view if they have not been able to review the detailed design in its entirety that follows the design strategy phase. I took it at face value and listened to what the Board said, and we put in procedures that the Board would be reassured by having visibility with Level B comments and the response to their comments.
71. I have been asked to comment if the concern surrounding the Board reviewing documents at Level B pre-Financial Close related to RDS not being produced in all areas. In my opinion the concern related to the detailed design drawings not being available until after Financial Close. The Board wanted visibility of the entire design, not just the design concept drawings and principles settled before approving the documents. As I understand it if the strategy documents were

made status B at Financial Close, this meant Multiplex could proceed on the information tabled without further review by the Board.

72. I have been asked to comment on the procedure adopted in the above paragraph. Post Financial Close the procedure agreed with the Board over and above the contract requirements for MEP Reviewable Design Data was that any drawing made status B by the Board (with comments), we would capture the comments made on the document in a table format on the actual document, add the designers response responding to the comments, and then reissue the document "for information" at the next revision so that it was visible to the Board on how the comments had been interpreted, and they had a record documented. As I understand it under the contract for Level B drawings there was no requirement to resubmit the drawing.
73. With the room data sheet process at the point of Financial Close, I had no involvement in the decision-making process other than I have seen that Wallace Whittle had specific generic rooms, and that was contained within the Project Co Proposals. There were a series of rooms that were included within the Project Co Proposals with the actual drawings of rooms of how they would be serviced mechanically and electrically. I do not know why there was a decision taken just to produce that set of room types, as opposed to the full complement of datasheets.
74. I have been asked to comment on what the Project Co Proposals were for the project, and the significance they play. PCP 4.9 relates to Mechanical and Electrical Engineering, and PCP 4.10 relates to Sustainability and Energy Model. These were the contractor's proposals prepared on basis of the dialogue during Financial Close. My understanding is these documents were reviewed by the Board as well as the NPD Legal Team and formed part of the contract at Financial Close.
75. I have been asked to comment on why not all of the RDS were being produced at Financial Close, and if I considered this an extra layer of risk. I did not consider this as an additional risk as detailed design for MEP was not being

produced until after Financial Close. The environmental matrix contained the employer's requirements for the environmental requirements, and in my opinion this information would simply have been replicated on the RDS.

76. Regarding the relations with people I was working with, in terms of the MEP design, I thought the relations were strong and working effectively. My experience is you are working with people for a number of years, so you have to maintain relationships and treat them as respected colleagues.
77. In terms of the Reviewable Design Data, I had no concerns over the amount of data that was to be categorised as reviewable design data. The thought was that we had the MEP design intent agreed. With mechanical and electrical, there are a lot of drawings and there is a lot of reviewable information that is required, and so there was not a concern.
78. Mott MacDonald were our day-to-day contacts in their capacity as Technical Advisors to the Board, and it ran well, however they could be vocal. At the end of the day, we would not have reached Financial Close if there was something that was not acceptable as it would have been made status Level D, defined in the contract as "rejected".
79. At Financial Close, I am not aware of any discussions around air change rates being incorrect for Critical Care, and we were not directly involved with any clinical input. If the Board were wanting to change Critical Care, we were reliant on that being fed back by Mott MacDonald. Presumably, as part of the environmental matrix review to get the twelve comments down to seven, it was a range of stakeholders including infection control and clinical input, and so the comments we received was the conclusion of the review on, "does this meet what they want?"
80. The architects would have their user group meetings, and that might be with clinicians and other stakeholders attending that workstream. If there was anything relevant from those meetings that would relate to MEP issues, I understand it was fed back to Wallace Whittle. Wallace Whittle and the

architect had their regular meetings. I think the format was that drawings were marked up during that the workshops, and then that would then be distributed to the team, but it was Wallace Whittle that would have had the direct feedback on anything. Wallace Whittle would have then fed back anything relevant to Multiplex or reflected it in what they were working on if it was significant.

81. I was not involved in the Project Steering Board.
82. I have been asked to comment on room function sheets contained within the Hulley and Kirkwood Issue 3 environmental matrix. This is not something I was involved with however I understand this detailed the room function which informed the rest of the environmental matrix.

Closing Statement

83. I believe that the facts stated in this witness statement are true. I understand that this statement may form part of the evidence before the Inquiry and be published on the Inquiry's website.