SCOTTISH HOSPITALS INQUIRY

Hearings Commencing
25 April 2023

Day 1
Tuesday, 25 April 2023
Michael O'Donnell

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10:00

THE CHAIR: Good morning, ladies and gentlemen, and I am addressing those who are present in the hearing room here in Edinburgh and also those who are following the proceedings online through the live feed. We are resuming hearings in the Scottish Hospitals Inquiry, and over the next two weeks and possibly a day, we are dealing with issues in relation to the Royal Hospital for Children and Young Persons in Edinburgh.

Now, I have on my right Deputy Counsel to the Inquiry, John MacGregor KC, who is instructed by one of the Inquiry solicitors, Lesley Browne. I am assisted by Kirsten Mcmillan, who is sitting on my left, and I think, Mr MacGregor, we are probably able to begin.

MR MACGREGOR: Yes. The first witness will be Michael O'Donnell.

THE CHAIR: Good morning, Mr O'Donnell. As you understand, you are about to be asked some questions by Mr MacGregor, who is on my right. But, first, I understand you are prepared to take the oath.

THE WITNESS: Yes.

THE CHAIR: Please just remain seated, but can I ask you to raise your right hand and repeat these words after me?

Mr Michael O'Donnell
Sworn

THE CHAIR: Thank you, Mr O'Donnell. The plan will be to hear your evidence in as much of the morning as that requires. I would plan, generally, to take a coffee break about half past eleven, so there will be a break in the course of the morning. But if, for whatever reason – and you do not have to give a reason – you want to take a break at some time that seems good to you, please just indicate that and we can take a break. So, feel that you have control of this hearing.

THE WITNESS: Okay.

THE CHAIR: Right. Mr MacGregor.

MR MACGREGOR: Thank you.

Questioned by Mr MacGregor KC

Q You are Michael O'Donnell. Is that correct?

A Yes.

Q You have provided a witness statement to the Inquiry, and a copy should be available to you today if you require it. For anyone following

with the bundles, it is in bundle 13 from pages 274 to 296. Now, Mr O'Donnell, the content of that statement is going to form part of your evidence to the Inquiry, but you are also going to be asked some questions by me today. If at any point you do not understand the question, please just do let me know. Equally, if you want to refer to your statement at any point, please let me know. We can have a short break and you can refresh your memory on anything.

A Okay.

Q I just want to begin by asking you some questions about your career, which you have set out in your statement from paragraph 1 onwards. You tell us that you have been an engineer since 1988 and you joined Hulley & Kirkwood in 1989, becoming a chartered engineer in 2007, and you explain some of the work that you have undertaken for Hulley & Kirkwood where you are a company director and a shareholder in the business. I think by way of general introduction, could you explain to the Inquiry, just in a general sense, what type of work does Hulley & Kirkwood undertake?

A Hulley & Kirkwood are mechanical and electrical engineering services design consultants. We work in all sectors of the construction

industry, so residential, schools, commercial office buildings and healthcare. The business actually started 70 years ago this year, and it was a healthcare-focused consultancy originally.

Q Again, could you just give us a sort of broad overview of what your role is at Hulley & Kirkwood and what type of work you specifically undertake?

A I'm a board director. I'm director of the Edinburgh office and I lead that office in terms of submissions for new commissions, managing the designers within the office, the staff, and the business generally.

Q So, Hulley & Kirkwood would have mechanical and electrical engineers undertaking design work, and it is a team, effectively, with you at the top managing another group of engineers.

A Yes.

Q Thank you. Now, you have mentioned both today and in your statement that you have got experience in the healthcare sector and you give some examples at paragraph 2 of your statement. So, for example, you mention work that you had undertaken on the Hull oncology department. Broadly speaking, what type of work were you undertaking on

that project?

A That was a PPP procurement-type project. We were employed by the mechanical/electrical services contractor to design mechanical/electrical systems for what is now called the Queen's Centre for Oncology and Haematology. It's around 15,000 square metres. It was a £65 million project. It, from memory, commenced 2005, I think, something like that, and completed 2007/2008.

Q So, coming in on the contractor side as a subcontractor to do the detailed mechanical and electrical engineering design work?

A Well, actually, under the PPP bid process, the contractors are formed early to actually engage with the client team to become preferred bidders and then actually develop design with a design team collectively.

Q So, you were part of the design team for the contractor or part of the design team for the Health Board?

A For the contractor.

Q For the contractor. You give a second example of being involved in work in the Victoria Hospital in Kirkcaldy. What work did you undertake on that project?

A Similar. We were employed by the successful bid

contractor. That was a 50,000 square meters, new build, acute hospital. It was circa £200/250 million and commenced 2005 and completed over 2011.

Q A third example that you give is the original Royal Infirmary project. We will come on and talk about the replacement hospital for the Sick Kids in Edinburgh, but you mention at start that you were involved in the original Royal Infirmary project in Edinburgh. What work were you involved in on that project?

A The existing estate had various legacy improvement/maintenance issues, refurbishments, alterations. It was that kind of work in the early years of my career.

Q I now want to move on and ask you some specific questions about your involvement in the project for the Royal Hospital for Children and Young People and the Department of Clinical Neurosciences, and you explain in paragraph 4 of your statement that Hulley & Kirkwood were appointed as a mechanical and electrical consultant. This is at the stage in the project when it is a design and build project as opposed to a revenue funded project whereby BAM Construction are the design and build

contractors. Can you just explain, at this point in the project, why are Hulley & Kirkwood brought in and what are you doing?

A So, Hulley & Kirkwood are on the Healthcare Frameworks 2 as a consultant listed on that framework, so we can be chosen by partner contractors, principal supply chain contractors, to work with them on any particular commission that they are given.

Q Now, it might be easier if you actually just have your statement in front of you and if we could look to paragraph 5. So, within bundle 13, that should be on page 275.

A Yes.

Q So, if you see just at the start of paragraph 5, you say:

> "Due to it being a capital funded project it wasn't constrained to a set of Reference Design deliverables at that time."

Can you just explain to the Inquiry: what do you mean by this term, "Reference Design deliverables"?

A The reference design was a finite set of deliverables, outputs, to try and inform the combined Sick Kids/DCN cost model to try and set out how the services infrastructure on a constrained site should be managed and altered, and to try and inform the massing of the building such that it could be submitted for a planning in principle application in advance of the project then following through a bid process.

Q So, that is relevant if you are talking about a revenue funded project. Why is that not relevant if you are talking about a capital funded project?

A The capital funded project wasn't constrained to those specific sets of deliverables because it was following a journey who, the intention was to design it through all of the RIBA stages – so through outline design, scheme design, technical design – reach a full business case, and then a contractor is authorised to then go and construct that project. So, actually a journey encompassing the full design.

Q I just want to be clear that I am understanding you: on a capital funded project then, you are effectively trying to fix a design, whereas on a revenue funded project, you are trying to come up with, effectively, the concepts that someone would bid against as opposed to a fully-fledged design. Is that correct?

A Well, that just happened to be unique for the Sick Kids/DCN. I

think the motivation was to build upon design information that had been carried out for the Sick Kids under the original procurement process but constrain it to only a set of deliverables to inform the things that I previously mentioned, and then draw a line under that and let a bid contractor or a set of bid teams bid appoint a contractor, and then let the due process of technical design take place through that procurement route.

Q We will come on to look at this in a bit more detail, but I think one thing I would welcome your views on just at the outset is this idea that if you have design work that is being done on a capital funded project where you are trying to fix the design, whether it is always going to be relevant to lift that and try to put that into a revenue funded project. Is that design work always going to be relevant if you switch models?

A No, it's not. It's not always going to be relevant, also because the building design had changed, the schedule of accommodation had changed because the Sick Kids was combined with the DCN, and so a larger building meant other considerations had to be taken into account in the design of that larger building.

Q Just returning to your statement, at paragraph 6, you mention a meeting that we will come on to talk about, but you introduce Nightingale Architects. So, Hulley & Kirkwood are engaged on the mechanical and electrical engineering side. Who are Nightingale Architects and what is their role in the project at this time?

A They were the architects appointed on that framework to support BAM also. So, their role was to be lead designer, to provide the architectural solution for the building, work with the healthcare planner, pull together the schedule of accommodation from project briefing, set out departmental adjacencies, and then with our input, integrate the mechanical/electrical services information into the design – so plant rooms, service distribution risers, informing distribution routes, that sort of thing – in conjunction with civil and structural engineers.

Q There are two concepts I am going to keep coming back to in your evidence – one is room data sheets and the other is an Environmental Matrix. Can you just explain to the Inquiry your understanding of both those concepts? Firstly, what a room data sheet is and,

secondly, what an Environmental Matrix is.

A Yeah, so a room data sheet formulates all aspects of a particular room within a particular department in a hospital, and that room data sheet will set out the room function, it will set out things like important points on finishes, it will set out the desired area for that room, and one element of the room data sheets is the environmental data that goes with that room.

Q So, the room data sheet, a bespoke sheet for each room in the hospital with a range of characteristics, including environmental?

A Yes.

Q What then is an Environmental Matrix?

A So, the Environmental Matrix is just about the environmental parameters. It doesn't take consideration of those other measures, other than abstracting from the departmental schedule of accommodation what the department is, what the room name is, and then fleshing out the environmental approach for that particular room in a summary matrix format.

Q In terms of each of these documents, if we take them in turn, room data sheets, who within the

design team would be producing those?

A Actually, it can be the client. Original ADB room data sheets can be produced by the client. They can be produced for key rooms and then handed over to the healthcare planner or the architect to develop a full suite of information thereafter.

Q Just to be clear, we are talking about a room data sheet that would include technical engineering information. That would not be produced by an engineer. Is that correct?

A The input of an engineer is necessary, but not necessarily from the base route information.

Q In contrast, the Environmental Matrix, what entity within the design team would produce that?

A Usually, the mechanical/electrical consultant.

Q If I could ask you to have your statement in front of you, please, and if we could look at paragraph 6, so that should be on page 275 of bundle 13. We are in 2009, still within the capital phase of the project, and you state in your statement:

> "On 14 December 2009, a Design Team Meeting was held by BAM Construction, which I

attended. At this meeting it was confirmed that the DCN Reprovision would not be delivered as part of a joint build with the new RHSC at Little France. Internal summary notes set out the focus for the design on the RHSC only project going forward. Nightingale Architects were also in attendance. They advised that ADB files from NHS Lothian had been through the user review process already, that these would be issued to facilitate Codebook, that Environmental Data would be generic, and that Hulley & Kirkwood were to develop a bespoke Environmental Matrix to take over from the information contained in the ADB sheets. This was our first instruction to produce an Environmental Matrix spreadsheet."

Do you see that? If we take this in stages, there is a reference there to you being advised that there were ADB files from NHS Lothian. What were they?

A At that meeting, we did not have ADB files, so I think from the notes the reference is that the architect either had them or was told they were available. So, I know from having received them a few months later that there were ADB files for each department for the Sick Kids-only project.

Q Again, is this a database of information or is this specific room data sheets?

A This is published output from a database into PDF room data sheets, formulated into a set of room data sheets per department.

Q So, is that effectively a bespoke ADB database for this project?

A The ADB sheets are listed as draft, so whether they went through a process to get to a bespoke stage-- I'd say they were bespoke insofar as they represented the rooms that the client desired to inform the schedule of accommodation, but whether every single part of those room data sheets had been populated through a bespoke process, I would say no, having freshly viewed them.

Q Do you know who produced that, whether it was NHS Lothian or whether it was Nightingale Architects? Do you know that?

A I think the file extension – check that – but I think they're NHS Lothian ADB sheets.

Q You said, in fairness – you were not sure who had reviewed

them or what process they had been through at that stage.

A No, so the way we received them, it was April 2010 by virtue of a copy email from BAM to BMJ Architects, who were working in conjunction with Nightingale Architects on that reference-- sorry, the original Sick Kids scheme. I saw the email exchange went from BAM to BMJ Architects to say, "Here's a mail chain that stems from a couple of days before that. It originates from Nightingale Architects sending the ADB zip file to BAM to say, 'We've received this information.'"

Q Did you know whether that information had been reviewed by clinicians or people involved in infection prevention and control at that point in time?

A So, just on a fresh review of the sheets, when you inspect the actual sheets, the date, the publishing date – it would appear on the bottom right-hand corner of the sheets – is September 2009 for all of them. But, actually, there's another text cell in the top right-hand corner of the sheets, and that relates to what's listed as "revision note" and in that it says-- I think it says "initial draft" or "first draft" or "draft" even. It might just say "draft," but you can see from that that some

departments-- at least one that I viewed seems to have been commenced from year 2007, lots of other departments from year 2008 and some year 2009.

Q Whenever you got the file – I think you mentioned at this meeting, 2009 when it comes to you, 2010 – did you raise any of these issues about how this document had been created, who had created it and what clinical input there had been on it?

A I hadn't because at the time of this meeting we had no sight of them. We were simply told that the architect had obviously either seen them or had feedback that they were available. When I say in my statement it had been through the user review process already, I think in context that probably meant that the user review process was to inform the rooms, the room areas per department, but not so far as they had been through a detailed technical review for the environmental data because the environmental data is either missing or the data that's in there does not line up, in most circumstances, with the latest guidance that came out at that time, which was HTM 03-01 – so the English version – of year 2007. However, when you look back at the

timeline, that guidance came out late 2007. It came out in November 2007, so I do not know whether that data or that guidance was available or familiar to whoever published and informed those room data sheets but, from my view, it does not look like it was.

Q You mention at paragraph 6 that there is the instruction for Hulley & Kirkwood to produce the Environmental Matrix. This information that we have talked about, the ADB files from NHS Lothian, was that data being used to create the Environmental Matrix?

A It was not. It was not because at that meeting we did not have that information in any event. It only came to us four months later. So, by April 2010, and on date timelines, we did not receive a schedule of accommodation that we could use to develop a matrix until I think it was September, August/September 2010. Actually, it was July 2010 and our first Environmental Matrix was produced September 2010. So, we were informed at that meeting that the environmental data was "generic," was the term used, so-- and now, having again looked at those matrices, I think that serves to mean that the information was incomplete or not purified.

Q Just in simple terms, when you say it is generic, incomplete, impure, unpurified, is it something a mechanical and electrical engineer could have used to populate an accurate Environmental Matrix that complied with all the relevant technical published guidance?

A No. Had we used the data within those ADB sheets to populate a matrix, much of the information you would need in a matrix to serve its true function would be missing or incorrect.

Q Again, just focusing on this issue of the instruction to produce the Environmental Matrix, who is it or which entity is it that is telling Hulley & Kirkwood to develop an Environmental Matrix?

A I actually can't recall all my notes from that meeting record as the advice from the architect. I don't have a recollection that anyone else in that meeting, BAM or otherwise-- It would really ought to have come from BAM, as being our employer, that we should produce an Environmental Matrix, and I've checked and can find no follow-up formal email instruction or otherwise.

Q I just want to be clear: I appreciate these are events a long time ago, but your recollection is there

is a requirement to create an Environmental Matrix, but you are not clear if that was an instruction coming directly from NHS Lothian, BAM Construction or whether this is a discussion between Nightingale Architects and Hulley & Kirkwood?

A No, I took that advice at face value in that meeting, and we made the assumption that that was a formal instruction.

Q Was the intention that the Environmental Matrix would effectively take the place of room data sheets produced using the Activity Database system?

A That was never discussed, and it could never take place of the full content of ADB sheets. It could only take the place of the environmental data in the ADB sheets and serve the purpose of trying to go through a manageable journey to populate the information and then share it, discuss it, review it, fine tune it through the stages of design and engagement with users as normal due process would dictate.

Q If I could ask you to have a document in front of you, please, from bundle 4 at page 275 [sic, reference should be to page 278]. So, this should be an email from you sent to BAM Construction on 15 February 2010.

A Yep.

Q There is an email. You say, "Hi, David." Can you remember who David was?

A David Muir. He's BAM.

Q If I perhaps just ask you to look two thirds of the way down the page, there is a bold heading, "**HK Scheme Design**." You see just three lines up from the bottom of that paragraph, there is a sentence beginning, "With regards to environmental issues." Do you see that?

A Yes.

Q

> "With regards to environmental issues, rather than employ ADB M&E sheets, HK will produce Environmental Matrix spreadsheet for each room type for easy reference as a user sign-off tool."

Do you see that?

A Yeah.

Q If we could just take that and say what did you mean by "rather than employ ADB M&E sheets" that the Environmental Matrix would be produced?

A I guess that was formalising what had been instructed to us from that December 2009

meeting. So, this is 15 February 2010. So, it's then moving through into. The context of this email was all about fleshing out a programme and me commenting on the programme and how the interdependencies of information would be needed to inform design, and so that particular subject matter on item 169 is related to the need for information to inform design which relates to environmental data.

Q Was your understanding that there would still be room data sheets for the project?

A I think it probably was listed in the content that was being shared. So from that, I guess so. I don't know. I can't recall from that time that that was the case.

Q Just, finally, in that paragraph, you used the term "user sign-off tool." What did you mean by the term "user sign-off tool"?

A Well, it recognises that the Environmental Matrix is something that needs to have discussion. Whilst we take the lead in populating it, it needs to be shared with the client team to make sure that what we think is, for example, a treatment room is indeed a treatment room and that the environmental data that goes with that room is the correct approach. So it goes to the point that it's not always clear from briefing or from room layouts that are produced from briefing, that a particular room function is indeed that function or whether there's been some interpretation of it and then if there is, it needs to be reviewed, discussed, clarified.

Q And then who are you meaning when you talk about the user? Who is the user that would have to sign it off?

A Ultimately, the client. It's to try and get to a point where the client has gone through an engagement process and is satisfied that that's an agreement that those environmental approaches that are in the matrix do represent what they need.

Q At this stage in the project, is that BAM Construction, NHS Lothian or is it both?

A In my mind, that's the client, that's NHS Lothian because they, ultimately they and their clinical team are the ones who tell us what they want. So it comes down to that.

Q At this stage, were you having any direct engagement with any clinicians from NHS Lothian?

A I can't recall any specific names, but there may have been shared input, but normally the conduit on projects of this size are -- you have

you have to communicate through project managers to then communicate to the client side to try and, I guess, just record and formalise the flow of information.

Q In terms of that flow of information, were you sitting down directly or speaking on the telephone directly with clinicians from NHS Lothian?

A No.

Q Was that unusual in a project of this type?

A No, it's not unusual, but it can happen.

Q We are still within the email, just towards the bottom of the page you have got, "and FYI..." Do you see that?

A Yep.

Q Then you make reference to "Stage 4 Construction Period Lookahead." You say, "Pease note the following additional lookahead issues." Turn over the page onto page 279. You see the first bullet point, it says, "Detail design will be incomplete at FBC stage." By "FBC" do you mean final business case or-- what do you mean by FBC?

A Yeah, final business case or full business case.

Q You say, "Detail Design will progress beyond FBC as identified in Item 34 construction Information 3/4 of the Master Delivery Program." Can you just explain why would detail design be incomplete at final business?

A Yeah, so quite often on projects of the size and scale, the process to go through what we call spatial coordination with other disciplines, other design disciplines, architects, structural engineers, ourselves is taking your technical design and then merging and forming them into what we know can fit spatially within service risers, the openings within floor slabs, the service zones within ceiling voids, the size of plant rooms, making sure that the finite detail of it all comes together. Quite often that needs more time than is offered in programming and I think back then I was making the point that the timescales to go to FBC, in my experience, would not facilitate the time involved to do that.

Q The Environmental Matrix at that stage in the project, is it a rigidly fixed document or is it a fluid document that is still open to development?

A Well, the aim by FBC – and I think we state this in the first versions of the matrix for the original Sick Kids project – was to try and get

to an agreed position by FBC and that allows you to fulfil technical design because the air change rates that are in the matrix then inform a whole bunch of other things: duct work distribution sizing; air handling plant sizing; it then informs heat main sizing, heat plant sizing, cooling sizing, all sorts of things. So, it's a key document to allow you to then fulfil the technical design with certainty.

THE CHAIR: Mr O'Donnell, just for the benefit of my note, you used the expression "get to an agreed position." Could you just flesh out what you mean by "an agreed position"?

A What I mean is that the matrix aligns with the rooms within the final schedule of accommodation at that stage so that they're aligned and that all the room types, the room functions, the air change treatment, wherever there are discrepancies or misunderstandings or misinterpretations go through a discussion, review, purification process to get everyone to agree, "Yeah, that's correct and what should be provided."

THE CHAIR: Thank you.

MR MACGREGOR: I picked you up as saying that the aim is that the environmental parameters set out in the Environmental Matrix should be, in an ideal world, fixed at financial close. Is that correct?

A Yes, that would be ideal.

Q You say that that would be "ideal." Does that always happen on large projects of this nature?

A It doesn't always happen, no.

Q What would the risks be for all parties that was not achieved if it was not agreed?

A The risks in relation to cost, if the schedule of accommodation area isn't fully developed and agreed, then the matrix may have to be changed. If the matrix has to be changed, it may have to accommodate additional rooms or different room types, and that would then change or inform design that may or may not have progressed to detail by that stage, and then the knock-on effects of other associated information – technical schedule, specifications – that are informed by that design thereafter could all be at risk of change. Therefore, there would be a time to bring it back up to date and then time-- cost, what the changes were, time to reprogram beyond that.

Q Would it be an oversimplification to say that the contractor would not know what they had to build and the client would not

know what they were getting in terms of environmental parameters?

A I think that would be an extreme interpretation because I wouldn't expect by FBC that it would be 95 per cent wrong but 95 per cent/98 per cent right would be more like it. Perhaps some loose ends of briefing changes that might have occurred could be facilitated beyond that point because on large healthcare schemes that take time to go through designed stages-- are exposed to the fact that clinical requirements change over those periods and even guidance changes over those periods and so, you know, there's always an opportunity for realignment and rethinking things over those timelines.

Q I picked you up as saying it should be 80-90 per cent complete by financial close. In your experience, would it be unusual for the entirety of an Environmental Matrix setting out all of the environmental parameters for mechanical and electrical engineering to become reviewable design data after financial close?

A After financial close?

Q After financial close.

A All of it, yes. I would have thought that most of it would and could have been populated before financial code.

Q And, again, just so I am clear, if that did happen, if all of the environmental parameters were reviewable design data, what are the possible problems or risks that could arise on a project like this?

A The briefing has been misunderstood and therefore the design does not reflect what is required, and therefore the planning to construct would be compromised

Q Thank you. The next document that I would ask you to have in front of you is from bundle 4. It is page 280. So bundle 4, page 280, and this is an email from you, Michael O'Donnell, again, to Mr Muir of BAM Construction, this time on 8 September 2010. Do you see that?

A Yes.

Q You state there:

> "Further to recent discussions, please find attached first issue HK RDS Environmental Matrix. This document is intended as an easier tool to replace ADB RDS M&E sheets for the elements covered in the matrix. The matrix has been developed using SoA V7 issued on 25th May 2010 and is a key driver of design for M&E services."

Do you see that?

A Yeah.

Q Again, it is really just to-- if you could help with this idea that it is intended as an easier build to replace ADB RDS M&E sheets. So, was it replacing them or was there still always going to be data sheets?

A Again, it was only replacing the environmental data within ADB sheets. It could never replace the other elements of ADB sheets that would inform the client's brief and, it was produced-- When I say as "an easier tool," I meant as an easier tool to allow engagement and review because even if the ADB environmental data had been properly populated on the original drafts, there are thousands of sheets, and it becomes unmanageable when change occurs to control the flow of information and make sure that it's all still current and aligned in my experience. I think that's where the tool of a matrix probably comes from.

Q And you mentioned that it has been developed using SOA. For those of us not familiar with that acronym, what do you mean by SOA?

A That's what the architect produces, the schedule of accommodation. So that's a schedule; that's a spreadsheet that's produced to capture the whole building area

summary. All of the individual departments' net internal and gross internal areas and then, from that, within each department schedule of area, individual rooms, sometimes the briefed target area versus the drawn area if drawings have managed to be progressed to reflect that schedule of accommodation.

Q You mentioned that this would be a driver for design. What had to happen?

A The driver for design goes back to the population of the matrix with the room types, the appropriate air change rates, the appropriate pressure regime, etc., and then using that to pair with the architect floor plan layouts to then work through the design of individual services elements. By that, I mean in the mechanical services design elements, ventilation, heating, chilled water, the air handling systems that go with that information.

Q Thank you. Just before we move on to look at the Environmental Matrix produced by Hulley & Kirkwood in 2010, if I could ask you to have a look at a document within bundle 12 volume 1 at page 80. This is an appendix to a submission that has been submitted on behalf of NHS Lothian to the Inquiry, and NHS

Lothian have informed the Inquiry that this was effectively what they would characterise as the bespoke ADB database that had been produced for the project. We have already discussed that issue but, in terms of the material that you saw, is this the type of information that was being provided to you? This is just one example among many, but I just wanted to be clear, is this the type of information that you were talking about earlier? We see there, it is ADB Activity Database. It is a room environment data, and then we see a whole host of parameters being set out on the left-hand side. For example, "Winter Temperature, Summer Temperature, Mechanical Ventilation (Supply), Mechanical Ventilation (Extract)", etc. That is type of information you have been provided with?

A Yeah.

Q But you had mentioned that you had concerns over the accuracy of that information as opposed to technical guidance?

A Yes.

Q Hulley & Kirkwood then went on to produce various iterations of an Environmental Matrix, remember we are still within the capital funded phase of the project. If I could ask you

to have in front of you bundle 4, please at page 43. Bundle 4, page 43, which should be an Environmental Matrix from September of 2020. You see there, "Royal Hospital for Sick Children - Edinburgh HK Document RDS Environmental Matrix" and then we see various issues. So, there is the page number, the department code, the index. Within the index we have got Guidance Notes. Why would you apply Guidance Notes to an Environmental Matrix? Why would that be required?

A Because the suite of healthcare guidance is vast, and that guidance is at various stages of currency and the Guidance Notes here are attempting to pull together what's important to note on what's key notes with reference to current guidance. So, this being the original Sick Kids scheme, at that period, the Scottish healthcare guidance that was current was SHTM 2025 and we recognised that actually, historically, that doesn't provide air change rates for various room types in a healthcare facility other than operating space. So the new HTM 03-01 from year 2007 that had come out, we used that to flesh out what we thought was important to state in terms of the air change approach for care room types, but also

cross-refer to other important guidance like HBN 57, which relates to Critical Care departments, and try and summarise key points to note from those elements of guidance and have it out there and up front as important watch points.

Q From your perspective, Guidance Notes were important watch points for anyone that is provided with the document?

A Correct.

Q Thank you. Now, you also have a section in the index called "Comment Summary." Who were you expecting to comment on the draft?

A Essentially aimed at the users: the hospital clinical leads, the people who brief the rooms, the departments, the schedule accommodation.

Q So, just to be clear, you are an engineer, but you are anticipating that there is going to be some form of clinical input and comment on your draft?

A Yes, yes.

Q And what would that what would that involve? Because one of the issues that the Inquiry is trying to grapple with is engineers say, "Well, I am an engineer. I am not a clinician" and a clinician says, "Well, I am a clinician. I am not an engineer."

A Yes.

Q How do the two disciplines come together to make sure that both views are reflected within a technical document?

A It just requires a discussion. So, you know, if I'm an engineer and I have some doubt over the interpretation of the current guidance for a given room or a room type-- So, in the HTM 03-01 2007, big step forward as it was at that time in the appendix table of, let's say, key or typical room types in healthcare facilities, they don't always cover every single room type that's briefed or drawn in a hospital. So there has to be a discussion about what would therefore be the most appropriate selection from those room type schedules or other guidance to arrive at the correct approach.

Q Again, we will come on and look at this in more detail, but the Inquiry's already heard in earlier chapter of evidence about, of course, Health Technical Memorandums and associated guidance and you are obviously familiar with those because you said SHTM 2025 did not have any guidance in terms of specific air change rates. Is that correct?

A Correct.

Q But around about this

time, Health Technical Memorandum in England, 03-01, does introduce air change rates?

A Yes.

Q But we do not yet have Scottish Health Technical Memorandum SHTM 03-01, specific Scottish guidance, with those air change rates set out?

A That's correct.

Q If this is relatively new with Health Technical Memorandum having air change rates for specific areas, was that a judgment you could make in terms of how an Environmental Matrix was populated or was that something that you had to have a discussion with a clinician about in order to populate the document that we are looking at in bundle 4?

A No, it started-- Our approach was that we could start getting the ball rolling by taking a view on what's appropriate and then share it or review discussion, purification thereafter.

Q And when you say you shared it for review, is that you sharing it with BAM Construction or are you directly sharing it with individuals from NHS Lothian, both clinicians and Infection Prevention and Control individuals?

A No, it's through the formal communication protocols. So, our information was processed into a project intranet site. Then from there, somehow, it's shared with other parties.

Q You say "somehow" – again, I just want to be clear – did you not know, effectively, what clinical input and infection and prevention control input was being provided in the draft? You only knew what was fed back to you from BAM Construction?

A Yeah, that would be the case.

Q Was that a matter of concern to you at that time in the project?

A Well, this was the early stages of the design of that project, so still a long journey to go on and I think, in reflection, if we were going beyond what was the stage C, or stage C concept scheme design stage, into technical design, you would want to make sure that discussion took place.

Q You say before "technical design," so what is that point? At the minute you are starting with a blank spreadsheet and populating it, at what time would you want to make sure that there had been definitive clinical input into the draft?

A Definitely by FBC. So if

RIBA stage 4 technical design leads up to FBC and, ideally, it would be complete by then. Sometimes spills over as we've talked about, but certainly across that period.

Q If we could return to bundle 4.

THE CHAIR: Excuse me Mr MacGregor, entirely my fault. You have used the expression "FBC" and indeed you used it before. I am interpreting that as final business close.

A Yeah. My understanding is it's business case.

THE CHAIR: There might be confusion between final business close.

A Yeah, so, FBC, in the terminology as I understand it is final business case or full business case.

Q So, that is the client putting a business case to, for example, government.

A Yeah.

Q Right, thank you.

MR MACGREGOR: Can I ask you to have bundle 4, page 43? It might be possible to pull this up on the screen because it is quite small text, but we are now within the Guidance Note, firstly, to look at Guidance Note one. You state:

> "This workbook is to promote discussion and feedback to develop an Agreed Workbook by FBC sign off date and is intended as an easier reference tool to replace ABD RDS M&E Sheets for elements described on these sheets."

Do you see that?

A Yeah.

Q And is that effectively the discussion that we have already had about what promoting discussion meant, what the Agreed Workbook was and the fact that this was not a replacement, in your view, of room data sheets?

A No, it wasn't to replace the full suite of room data sheets, that was in order to get to go through that journey to get to something that was in order to get to, go through that journey to get to something that was…

Q You see, Guidance Note 2, you say: "The services matrices are produced Tribal SoA Sheets version 7…" which I think is what we already saw in the earlier email that we looked at, and we see Guidance Note 5:

> "Ventilation air change rates and the use of natural ventilation in Patient Areas shall be reviewed throughout the detail design

process to ensure a maximum internal temperature of 28°C… is not exceeded for more than 50 hours…"

That temperature of 28 degrees, did that change during the project?

A It did. So, that's paraphrasing from the HTM guidance. So the HTM guidance sets out that 28 degrees not exceeded by 50 hours per annum is the guidance benchmark normally, and on the original Sick Kids project the client, NHS Lothian, based on the experience of living with the original ERI project, the Edinburgh Royal Infirmary, where ward bedrooms were provided only with natural ventilation with opening windows and, obviously, closing windows, but even in summer time the feedback was that with opening windows that the spaces were uncomfortable frequently through summer times, and so their reflection was that 25 degrees would be a more appropriate standard to aim for.

Q At a later point in the process you were told that NHS Lothian want something that is better than the published guidance but not at this stage in the process?

A Yeah, I can't remember exactly when the 25 arrived, in truth.

Q We could look down to Guidance Note 14. I will not take you through all of what is set out at 14, but do you see that there is a bold subheading of Critical Care areas?

A Yes.

Q About two-thirds of the way down the page. It says:

"Design Criteria – HTM031 – esp Appendix 2 for air change rates – 10ac/hr S&E, 18C to 25C control range. (Capabilities shall be provided but not at the summer and winter external ambient design extremes)."

Can you just explain, why is there a specific reference there for Critical Care areas to 10 air changes per hour?

A Because it's one of the important areas to highlight what the approach is.

Q If we look down within the table on the spreadsheet on to page 46, page 46 should have in the top left-hand corner, "RHSC - B1 Critical Care / HDU / Neonatal Surgery." Do you see that?

A Yes.

Q Again, perhaps about halfway down the page, do you see a spreadsheet entry that says, "Open Plan Bay (4 beds)"?

A Yes.

Q Am I right in thinking that that is telling us that there is an open plan bay with four beds within Critical Care area, and then we see a range of environmental parameters?

A Yes.

Q If we look along to ventilation, we see both for supply and extract that there is 10 stated.

A Yes.

Q Is that reflecting the fact that you are within Critical Care, within a Critical Care area, you need 10 air changes per hour according to the English guidance, the HTM?

A Correct.

Q If we look slightly further down, so effectively the bottom of the paragraph with “Open Plan Bay,” so about maybe three quarters of the way down, do we see an entry, “Single Bed Cubicle”?

A Yes.

Q Do you see that? This is a single bed cubicle but you are still within Critical Care, and if we look along the environmental parameters to the ventilation supply and extract, we see that supply is stated to be 4 air changes an hour.

A Yes.

Q Why was that figure included?

A It was incorrect. We corrected that in the next version of the matrix.

Q What should it have been?

A 10.

Q Again, just in fairness to you, you say you corrected that. If we could just look, still within bundle 4, this time to page 60, please. This is a version that states that it is from 22 December 2010. Do you see that?

A Yes.

Q Is that the updated iteration that you just mentioned in your evidence?

A Yes.

Q If we look down, page 65. Right, it is page 64. You could see that the single bed cubicle entry is still about three quarters of the way down. Do you see that on the left-hand side, “Single Bed Cubicle?”

A Yeah.

Q Then if we look along, parameter for ventilation, both supply and extract, both have been changed in red to 10.

A Yes.

Q Obviously that issue that you have highlighted, the mistake spotted, do you remember how? How was that that spotted?

A I don’t. Actually, I don’t

have recollection of what provoked that particular correction.

Q Do you remember if it was fed back from clinicians or if that was something that was spotted on the Hulley & Kirkwood side?

A No, had that been fed back from clinicians I would have recorded that on the revision notes, so I think on reflection, even looking at it now, the single bed cubicle is probably a lobbied isolation room. So, I think that goes to the point I'm making that this process does require a period of reflection and purification.

Q Thank you. If I could ask you to return now to your statements, so that will be bundle 13 and page 276 please. Paragraph 10. Here, you state:

> "I do not recall any significant deviations from the reference design deliverables, other than being advised by Davis Langdon via email on 19 Jan 2012 that a decision had been taken by the PME to instruct Nightingale Associates to cease the production of room data sheets and that the room data sheets would now be produced by MML."

Do you see that?

A Yes.

Q So, again, we will come back to talk about the change from capital to revenue funded, but we are now within the revenue funded part of the project and there is a suggestion that Nightingales are not going to be producing room data sheets, but Mott MacDonald would be. Do you remember why was it that Mott MacDonald were going to be producing the room data sheets?

A I don't. It wasn't explained. It was simply an email communicating that that was the plan.

Q Just, again, to cover off one issue we discussed about the temperature range going from 28 degrees down to a lower figure of 25 that we will come on to see. Do you remember if there was a formal derogation procedure that was gone through, or were you simply informed that that was what the client required?

A No, there wasn't a derogation procedure for it and, on reflection, because it deviates from the standard, it probably should but, no, I don't think it was seen at that time, those nuances of deviation from what would be considered the standards, because that was new standard. When we go back to SHTM 2025

where there was no air change rate, nobody was thinking in their mindsets of deviation from standards, and so the notion of derogating from the ventilation guidance wasn't actually in play at that period, other than where you have a design that relates to theater suites where there was firm information. When we move from SHTM 2025 into the world of HTM 03-01, and then the catch up with the SHTM 03-01 from year 2011, in my mind, when I think back at that period, we hadn't suddenly flipped in our mindsets to thinking about, "We need to be really sharp about what we are and aren't doing with regards to the guidance."

Q Again, just so I am understanding you, at that point in time, the guidance just really having come in, you would not be expecting a formal process for a derogation from guidance. Is that correct?

A I wasn't even thinking about it at that time.

Q Just thinking about it today, if you were in the same scenario, would you be expecting there to be some formal process for a derogation, like in relation to the temperature values?

A Definitely.

Q Again, just to assist the Inquiry, what would that derogation procedure involve?

A Probably populating derogations schedule with the listed item and recording that the derogation has been formalised.

Q Again, just so I am understanding you, a formal piece of paper setting out the derogation and possibly why the derogation was required?

A Yes.

Q That really covers everything in relation to that capital stage of the project. You explain within your witness statement that, effectively, capital funding is not going to happen. Hulley & Kirkwood then are not involved in the project for a period of time. Then there is a switch to the revenue funding for the project and Hulley & Kirkwood are re-engaged at that point when the funding model switches. Can you just explain how you come to be re-engaged and how your role differs, if at all, from what you were doing at that capital stage of the project?

A So we were re-engaged through communication. I think it was through Davis Langdon, who approached us to pull our fee together to produce a set of specific deliverables against what was being

called as a reference design scope, and there were a finite set of deliverables only to inform the particular constraints of the site, building massing, planning and principle, etc., as I've mentioned before.

Q At this stage, whenever there is a change, is there any consideration or meetings taking place to discuss whether the design work that had been done on the capital funded project is going to be relevant and helpful to the revenue funded project?

A There wasn't that discussion, as I recall it, within the design team as such, and the original Sick Kids got to around stage 2 concept or scheme design with information shared with BAM to try and go through a process of market testing of various packages to help inform a cost plan, but it hadn't gone through a full journey to a stage 4 technical design. With the new Sick Kids DCN being a larger building on essentially the same restricted site within the ERI, the information from the Sick Kids was useful insofar as I don't think there was a motivation to recast the brief for the Sick Kids in terms of the schedule of area, departments, the adjacencies, etc. but build on integrating DCN in a

sensible way to provide a complete building that could then be built thereafter going through a normal process.

Q In your view, was a fully populated Environmental Matrix still required for a revenue funded project?

A No, in retrospect, it wasn't required. What it was doing was serving a purpose of formulating an envisaged approach to allow a cost model to reflect that building to help inform, I guess, business cases. That's really all it was doing. It was informing building massing for planning and principle. To inform building massing, you need input into the services strategy because you need to know how the plant rooms and risers will relate to the departments, and so that all helps to inform building massing, including size of energy centre, etc., but that was the aim of the reference design.

Q Again, I want to be absolutely clear: in your experience of revenue funded projects at that point in time, was it normal for the procuring authority to provide a fully populated Environmental Matrix, or was it more normal for the tenderer or contractor to produce their own Environmental Matrix?

A I think it's more normal

for the successful contractor and their design team to produce that matrix, yeah.

Q Again, I just want to go back to something that you said. You were thinking about, having reflected on things, whether there really was a requirement to provide the fully populated Environmental Matrix to prospective tenderers. If you were advising on a project like that now, is that something that you would be advising a client to do?

A No.

Q Why not?

A Because if it's used to then inform a particular design strategy that may well be slightly different or very different, then it needs to have a matrix that reflects that design strategy. The reference design matrix produced without having architectural elevational treatment for the reference design and that was deliberate, such that the approach was not seen to be prescriptive and it was to allow bidding contractors and their designers to come up with their own idea. In reality, that was the same for the services strategy, and we did articulate that in the thermal comfort report where we said, with regards to the mixed mode vent approach for ward bedrooms, general ward bedrooms, that that

mixed mode vent approach was not to be viewed as being prescriptive and that other solutions could be approached.

THE CHAIR: Mr O'Donnell, I just missed, I think, three words you said. You said, "The Environmental Matrix…" which I am assuming at this moment is a Hulley & Kirkwood document, probably in its first revision, "…was produced without…" and then you went on to say "architectural" and I just missed the word after that.

A Elevation treatment.

Q Elevation treatment.

A Yeah. So, the things like the building cladding, the window designs, the ventilation design of the windows, etc.

Q Thank you.

MR MACGREGOR: If I could ask you then to just perhaps have your statement in front of you. So, we are in bundle 13, page 277, paragraph 11. Bundle 13, page 277, paragraph 11. It is the second sentence, second line beginning, "For most health projects." Do you see that?

A Yeah.

Q You say:

> "For most health projects that Hulley & Kirkwood have been involved in the Environmental Matrix has been

used a standard reference briefing document."

Do you see that?

A Yeah.

Q In relation to that, are you talking about capital projects or are you talking about revenue funded projects, or both?

A I've seen it on both.

Q Would you see the Environmental Matrix being the standard reference briefing document as opposed to room data sheets produced using the Activity Database system?

A I think it has been more commonly used, yes.

Q Because, again, at earlier stages within the Inquiry, the Inquiry has heard certain evidence to say that actually it is the room data sheets produced in the Activity Database that would be the standard briefing tool that a client would use. Is that not your experience?

A Well, I have had that experience where it's been used but, more often than not, those room data sheets, environmental data, are either not populated or are a first pass at what might be appropriate and they need to go through the same journey of review and purification, and trying to achieve that when you have a very big

acute hospital with thousands of pages is very, very different.

Q Is that what you meant in terms of, effectively, what I have called the bespoke Activity Database that you were provided with at the earlier stage in the project? You said that you thought that there were problems, gaps, missing information. Is that the type of issue that you are talking about in terms of room data sheets produced using the Activity Database, full stop?

A Yes.

Q Am I right in thinking, in terms of room data sheets produced using the Activity Database, they would be automatically populated with values held on the spreadsheet?

A Well, we have never actually done it, so we don't know how that process works but, from what I understand, the user selects from the Database a schedule-- from a schedule of room types. So, if there's treatment room, which is quite a common room in every hospital, they'll pick up treatment room from the schedule but, from what I understand, there are different styles of treatment room in that ADB database, but it does not prevent users when they're populating that information to not populate the environmental data, because we can see that it doesn't

come through very often. We can see that, for example, on the ADB sheets that were provided, every treatment room has a 6 air changes applied to it. Now, it's not 6 air changes, it's 10 air changes, so I don't know how you pull from a database that should have an attribute that says 10 air changes and it appears as 6, but I do not know how that happens.

Q One of the experts engaged on behalf of the Inquiry described room data sheets produced using the Activity Database as a starter for 10 that would still have to be refined. Is that generally, within the industry, how you would understand that type of document?

A Yeah. Yeah, I think it is. The notion that it's going to be right first time is not reflected in reality.

Q It could be right for certain things, but you could not rely on it to be right for everything. That would be a fair summary?

A Yeah, that would be a fair summary.

Q Equally, if we think about the Environmental Matrix, you explain within your statement that it is produced by manually entering figures. Is that correct?

A It is.

Q So, does that not give

rise to problems as well, that there could be simple manual transcription errors when typing values in?

A Yes.

Q So, again, I would welcome your views. In terms of these two systems, it sounds like neither is a perfect system. What one, in your experience, is a better system that is used by those working in the industry?

A Well, if I reflect on the matrix we produced for the Sick Kids, instead of using the ADB sheets, the matrix produced for the Sick Kids was far superior because it populated every single room with information and, whilst it wasn't 100 per cent correct, it was almost 100 per cent correct. I take the view that that's an excellent starting point to then go through a journey of purification that could lead to a successful outcome easier than trying to do the same thing with 1,000 pages of ADB room data sheets with environmental data.

Q We will come on to discuss the potential errors within the spreadsheet but, again, just focusing on the fact you are creating the Environmental Matrix and at this point there is not the individual room data sheet produced from the Activity Database. Do you think it is possible that if room data sheets had been

produced from the Activity Database, that what crept in as an error to the Environmental Matrix might have been spotted?

A No, no, I think it's probably more likely it wouldn't have been spotted because it's harder to see and find.

Q You would not view that as a missed opportunity to spot the issue that cropped up?

A No.

Q Just returning to something that we discussed earlier: the notion of "Is it the client that prepares the Environmental Matrix or is it the contractor that prepares the Environmental Matrix?" Drawing on your experience in the industry, if you were on the contractor side and you were provided with an Environmental Matrix, how would you view that document? Would you view it as a client brief?

A It would depend on the context in which it's shared. So if it's shared as, "Here's an example from the reference design, but it's not prescriptive – it's an example, an envisaged approach," then no, I wouldn't be taking it on as being, "That's the finite brief."

Q If I could return to your statement, we are within bundle 13 at page 277, still within in paragraph 11. Three lines up from the bottom of the page, still addressing the Environmental Matrix, you say, "An Environmental Matrix attempts to abstract relevant Environmental Data." Where is the information being abstracted from?

A From guidance.

Q Can you just explain, in relation to things like ventilation, what would you specifically be talking about? What specific?

A Mostly on the original Sick Kids it was the HTM 03-01. On the reference design, SHTM 03-01 had been published just before the reference design was formulated. But not just that guidance; there's lots of other guidance like you mentioned before; HBN 57. Guidance that relates specifically to particular departments is also relevant. HBN 4 for isolation facilities, HBN 4 Supplement 1 for the engineering approach to isolation facilities; all those kind of things come together to try and provide what you feel is the best approach from the guidance. Now, it's not always black and white; it's not always clear that there's a consistent set of guidance on what to do. For example, I think you did mention – and I think it's mentioned in this witness statement –

regarding HTM 03-01 and SHTM 03-01, both of 2007 and 2011 for isolation rooms, list supply air changes in the appendix table seven: extract air changes: zero.

Yet there's also notes at the side of the tables that refer to isolation rooms could also be negative. There's text in the supporting document that tell you if an isolation room has a particular pressure requirement, supply and extract ventilation may be necessary; so there's a whole bunch of supporting information other than just the table that allows you to formulate what you would put down as an early approach, and then try and fine tune that through discussion and agreement once the design takes shape, users know what they want, the floor plans get populated, etc.

Q Thank you. (To the Chair) Lord Brodie, I am conscious it is just after half past eleven. That might be an appropriate point to take a break?

THE CHAIR: I am just completing my note. Yes, I think we are pretty square on 11.30. As I said, Mr O'Donnell, we will take a break. I hope you have an opportunity for a cup of coffee if you want it and I hope others also have an opportunity for a cup of coffee. We will try and sit again at-- Let us try and sit again at quarter to, and if we fail in that, let us definitely sit again at ten to. Thank you.

USHER: Please stand.

(Short break)

THE CHAIR: I think we are ready to resume, Mr O'Donnell. Mr MacGregor.

MR MACGREGOR: Thank you. Just shortly before the break, Mr O'Donnell, we were discussing the potential unreliability of the Activity Database and room data sheets produced using that system. Obviously, with the Environmental Matrix, you tell us that it was produced by manually entering figures and you told us about the raft of guidance that a designer would have to consider. How would a design engineer go about trying to minimise transcription errors entering into an Environmental Matrix?

A It's easy to say that it's just simply a case of reviewing and checking, but somehow this process is more difficult than that to get everything right. There's just such a lot of variables and information and different considerations that I think that's why when we reflect upon how you get to an end state that peer review is a way to do it, that sharing

the information for discussion is a way to get there.

Q Again, just so that I am absolutely clear in my own mind: is there no technical solution in place at the moment that would mean that you could take information on the Activity Database and automatically populate that into an Environmental Matrix?

A Not to my knowledge but, you know, I do believe that the ADB database is the right principle to do that. Now, I know that there's a history of the database being kept aligned with guidance up to a point, and since then it's been disconnected from continual updates. It strikes me that if it was a database that was kept aligned with current guidance, it would and should be the sole source of information, and if that database was flexible enough to populate the matrix format of environmental data, I think that would be incredibly useful. If that Environmental Matrix, wherever it was altered for good reason, repopulated the room data sheet automatically, that would be incredibly useful. Yeah, that's my thoughts on it.

Q Again, just so I am understanding you: am I right, in summarising what you have said, that you do not have an issue with the concept of an Activity Database, but your issue is really about the content of that database and how reliable the information currently stored within it is?

A Yeah.

Q Thank you. I would now like to move on and ask you some questions about a Chief Executives letter that will be referred to throughout as CEL 19 (2010). That is in bundle 1 and it begins at page 553. I will not turn up the reference from your statement, but you tell us at paragraph 37 that this document was not raised in meetings or conversations that you were part of whenever you worked on the project. Is that correct?

A That's correct.

Q But, subsequently, have you had an opportunity to consider CEL 19 (2010)?

A I have, yes.

Q So, when did you become aware of the existence of CEL 19 (2010)?

A When it was raised by the Inquiry as a piece of policy.

Q Okay. So, having worked in industry, including on healthcare projects, this document was not something that had filtered through to you?

A No.

Q Okay. If we just look at the content of the Chief Executives

letter, you will see on page 553 the action points obviously addressed to health boards. It is action point four:

"4. Addresses should ensure that a copy of this CEL with Annexes is cascaded to all appropriate staff within their areas of responsibility.

5. The revised Policy on Design Quality for NHSScotland and associated Mandatory Requirements take immediate effect."

Do you see that?

A Yeah.

Q But, again, from what you have said, I am assuming you had not seen this "revised Policy on Design Quality for NHSScotland" when you were working on the project for NHS Lothian.

A I have no recollection of seeing this.

Q If we look on to page 556, we see the document itself, "A Policy on Design Quality for NHSScotland." If we look on to page 557, we see the purpose of the document: "The purpose of this document is to provide NHSScotland Bodies with a clear statement of policy on design quality." Do you see that?

A Yeah.

Q Then if we look through

to page 566, we see there is a bold heading about third of the way down, "Mandatory Requirements."

A Yeah.

Q There is "Mandatory Requirements" and then they are listed one through-- throughout. If we look over the page onto page 567 and to Mandatory Requirement 7, which states:

"All NHSScotland Bodies engaged in the procurement of both new-build and refurbishment of healthcare buildings must use and properly utilise the English Department of Health's Activity DataBase (ADB) as an appropriate tool for briefing, design and commissioning."

Do you see that?

A Yes.

Q I would be interested in your views: for the project you were working on, was the Activity Database being used as a tool for briefing and/or design?

A Well, the original Sick Kids-only project, it was produced in draft format and dated September 2009. The context in which it was shared, I had no visibility of, so I couldn't say what the intention was for that document. All I could tell you is what we were asked to do thereafter.

So-- Sorry, your----

Q Really where I was leading on to is you have told us that at the capital phase there is this bespoke ADB database that is created. My understanding is that you did not utilise that though when you were creating the Environmental Matrix.

A We didn't utilise it because the information within it wasn't what you would need to utilise for the design.

Q Yes. At the minute, I am not even making a comment or a criticism. I am just asking, it tells us here there is a mandatory requirement on an NHS body to use the Activity Database as a tool for briefing and design. If we are now at the revenue stage of the project whereby you have created the Environmental Matrix using the Activity Database, I am just asking, for clarification, for your views on whether the Activity Database had been used as a tool for briefing or design at that stage, the revenue stage.

A For the reference design, Sick Kids/DCN, I have no knowledge of there being an ADB database for the combined scheme, so I'm not sure if there is one or not.

Q Again, just so I am

understanding you: at the capital stage, given the bespoke database, when you are then re-engaged, you are not using that bespoke database at all on the project?

A No.

Q Within Mandatory Requirement 7, there is then a section in square brackets just after the first paragraph beginning, "If deemed." Do you see that?

A Yes.

Q So it says:

"If deemed inappropriate for a particular project and an alternative tool or approach is used, the responsibility is placed on the NHSScotland Body to demonstrate that the alternative is of equal quality and value in its application."

Do you see that?

A Yes.

Q Were you ever asked by either NHS Lothian or Davis Langdon or any of the other partners involved in the project to demonstrate that the Environmental Matrix approach was of equal quality and value to the Activity Database?

A No.

Q Do you think it was of equivalent value to the Activity Database approach using room data

sheets?

A Compared to the ADB sheets for the original Sick Kids project, in my view, it was higher value.

Q Now, within your statement, you make reference to a Scottish Health Technical document, SHTN 02-01, a Sustainable Design and Construction Guide from 2021. Can you just explain in generality, why do you want to highlight that document within your statement?

A Because that document references the use of an Environmental Matrix to be created at the start of a project and to be sense-checked and reviewed at every design stage of a project with all stakeholders, which-- I reference it because somewhere, someone thinks that's a useful tool.

Q Again, just so I am understanding: there is current guidance issued suggesting that you should be using an Environmental Matrix on a project of this nature. Is that correct?

A Yes.

Q And reference within that to sense-checking by various bodies, including Health Facilities Scotland?

A Yes.

Q Thinking back to the project we are discussing today, was there any input you are aware of from Health Facilities Scotland when you were working on the project?

A Not that I'm aware of, no.

Q Do you understand why not?

A No, I don't.

THE CHAIR: Sorry, my fault, the paragraph of the witness statement you are referring to----

MR MACGREGOR: Sorry, I had not actually gone to the statement, but it is----

THE CHAIR: It was specifically Mr O'Donnell's reference that I----

MR MACGREGOR: Indeed, my Lord, I will find that. I will find that.

THE CHAIR: I lost concentration.

MR MACGREGOR: It is in paragraph 12, my Lord, on page 278.

THE CHAIR: Thank you very much. So----

MR MACGREGOR: It might be worth just turning up that reference. So, it is bundle 13, page 278, paragraph 12.

THE CHAIR: And it is a reference to SHTN 02-01.

MR MACGREGOR: Indeed, the sentence beginning, "However, I would also note."

THE CHAIR: No, it is entirely my fault. I should have been paying

closer attention to it, even closer attention to it.

MR MACGREGOR: (To the witness) Just perhaps within your statement while we are there, if we look on to paragraph 13 in in the second sentence in the second line beginning, "Ideally," you say:

> "Ideally, ADB RDS sheets reviewed by clinical leads would be provided as client briefing information at the start of any healthcare project …"

A Yes.

Q Why do you say that?

A Because there would be a better head start into the process of design if that process were to have taken place.

Q Would that be best practice?

A It would be, yeah. That would be incredible.

Q Was there a departure from that on the project that we are discussing at the revenue funded stage?

A Well, I don't know. There were no ADB sheets that I've seen, so that might imply that that didn't happen. I don't know though.

Q But if they existed, they were not in your possession when Hulley & Kirkwood are producing the Environmental Matrix?

A No.

Q I now want to move on and ask you some questions about the Environmental Matrix created within the revenue funded portion of the project, specifically the third issue that is dated 19 September 2012. We will come on to look at that document in some detail, but you tell us at paragraph 15 of your statement that it was produced by a Mr McMillan. Can you just explain to the Inquiry who is Mr McMillan and what was his role at Hulley & Kirkwood? What was he doing on the project?

A He was a design engineer and he supported me in producing the outputs for the reference design.

Q Did that include drafting up the Environmental Matrix and populating it?

A It did indeed, yeah.

Q So, again, just so I am understanding things, Mr McMillan is a qualified engineer who is undertaking this task. So, the production and population of the Environmental Matrix, that is not simply an administrative task within the office. That is a qualified engineer undertaking it.

A It is.

Q You have mentioned some of the guidance that yourself and Mr McMillan were considering. Am I right in thinking at this point in time there would now be both Health Technical Memorandum 03-01 together with Scottish Health Technical Memorandum 03-01?

A That's correct.

Q Okay. Again, if we just look briefly at some of the values that are set out there, you mentioned that really there is this change from SHTM 2025 to SHTM 03-01 whereby there are specific environmental parameters, including air changes per hour, that are being introduced into the standard guidance.

A Yeah.

Q If we look within bundle 1 and look to SHTM 03-01, if we could look to bundle 1, page 287, this is Appendix 1 to the guidance, "Recommended air-change rates." Do you see that?

A Yes.

Q Is this what you were referencing in terms of the environmental parameters that were now being set out in guidance?

A Yes.

Q We see, for example, an "Application" on the left-hand side with ventilation, air changes per hour,

Pascals for pressure, etc., in terms of the values.

A Correct.

Q If we just take two examples, if we have got a general ward, we see that the air changes per hour would be 6. If we looked further down, we would see for Critical Care, the air changes per hour should be 10.

A Correct.

Q Okay, and is that really just trying to reflect what had been created in the earlier 2010 version of the Environmental Matrix, whenever you mentioned, "Yes, we put in 10 air changes an hour because we had a health technical memorandum at that point," but now you would have the same figure as only it was set out in the specific Scottish guidance?

A Yeah, we revised the Guidance Notes to refer to the SHTM.

Q We will come on and look at all of that in fairness. When we come on and look at the Environmental Matrix, for certain areas we will see 4 air changes an hour, whereby they might look like a general ward that the value within the appendix would be 6 air changes per hour. So, why will we see 4 air changes per hour as opposed to 6 air changes?

A So, that relates to a general ward room mixed mode

ventilation approach. So, in this table, the general ward supply/natural 6 logically cannot mean 6 air changes natural if you have your natural ventilation windows closed. So, I don't take it to mean that the 6 air changes is apportioned to a natural vent approach. If you also refer to other text in this document, it sets out the criteria of assessing approaches in relation to natural ventilation first, mixed mode ventilation second and mechanical ventilation third, the motivation being to attempt to come up with the most energy-efficient solution for a hospital for obvious reasons, and so we adopted an approach that was aligned to a mixed mode – mechanical plus natural – approach, which we think is a valid approach described in the guidance.

Q So, for certain of those areas that we might come on to look at, if we see 4, for the reasons you have given, that would still be a system that was complying with the rates set out in Appendix 1?

A Yes.

Q Again, we will come on and look at the individual room function reference sheet, but at this stage in the project, as I understand it, Hulley & Kirkwood introduce into the Environmental Matrix an additional

sheet called the room function reference sheet. What is a room function reference sheet and why did you want to include it?

A A room function reference sheet attempts to summarise all of the repeatable room types that make up the full schedule of accommodation and then address each of those repeatable room types with the appropriate air change rate approach and so on. The reason we created that was trying to make a review process easier and more streamlined because it was reflecting on the fact that on the original Sick Kids project, whilst we had produced the original matrix and then a revision, there was very little feedback, so we thought that this was a good way try and make that review life easier. That was the motivation.

Q In terms of what we would see in terms of the room functions, obviously we are still looking in Appendix 1, there are various applications, so things like general ward, Critical Care areas. When we come on to look at the room function reference sheet, we do not see those applications being mirrored. Why not?

A Because we were taking the room names from the schedule of accommodation and listing the room

names, rather than repeat listing rooms that actually may not be relevant to this particular project.

Q In terms of working out the room function values that would be ascribed, who is doing that? Is that Hulley & Kirkwood? Is it clinicians? Is it a mixture of the two?

A That's Hulley & Kirkwood.

Q Again, if we just look within your statement, so it would be bundle 13, page 283 at the bottom of paragraph 23, you say, "Determining the room function was a judgement made by the engineer in the development of the Environmental Matrix." Do you see that?

A Yes.

Q Why is that a judgement for an engineer as opposed to a clinician or a decision being taken by both an engineer and a clinician?

A Well, I guess it goes back to-- the process has to start somewhere and we started it in the knowledge we had from the original Sick Kids project and were confident that we could pair that together as a starter for Sick Kids DCN to allow it to be reviewed similarly.

Q Were you anticipating that this was going to be reviewed? Who were you anticipating was going

to do the reviewing?

A I guess the client side, the clinicians again.

Q And you say, "I guess." Do you know if that took place?

A I'm not sure if clinicians reviewed it. I couldn't say. I do know that there was correspondence from-- documents shared through project protocols and I think there were evidence of feedback on this one. Yeah, the second issue is noted as revised with NHS Lothian comments, which I think was NHS Lothian project managers and Estates reviewed, or people within the Estate, so yeah.

Q You got some comments back from NHS Lothian, but in terms of who had reviewed it and what type of review they had undertaken, that is outwith you? We could then look to the Environmental Matrix from the 19 September 2012. So that is within bundle 4 and it begins at page 131. Page 131, we see broadly similar in terms of the index with the cover, the Guidance Notes, see inserted at item 3, the "Room Function Reference Sheet" and then it continues then with listing the various areas and putting ones that we've looked at before including B1. We see in the description section, of course, that this is the third issue, see in the second

issue that "Ward Room T Max Reduced from 28 to 25 Degrees Celsius." Do you see that? Page 131, second bottom box, second issue, "Ward Room T Reduced from 28 degrees to 25 Degrees Celsius." Do you see that?

A I'm not. I'm viewing----

Q Okay. Bundle 4, page 131. I think you might have the wrong document in front of you, but you see now, "Cover, Guidance Notes, Room Function."

A I do.

Q And then at the bottom we see "Ward Room T Max Reduced from 28 to 25 Degrees Celsius."

A Yeah, I do.

Q What is that telling us?

A The change from the guidance approach of 28 has been commented upon and 25 is a desired temperature for a ward bedroom.

Q Thank you. We then look on to page 132, which should be "Guidance Notes", and if we could perhaps just zoom in, we are going to look at 1 and 5. "1. This workbook is prepared for the Reference Design Stage." Again, telling us is here in the Guidance Note it is going to be prepared for the reference design stage. What is going to happen to it after the reference design stage?

A For information, but nothing more than that.

Q It uses "…an easier reference tool to replace ABD RDS M&E sheets for the Environmental Criteria elements described on these sheets." We then see at Guidance Note 15, "Critical Care Areas." This time it is updated saying, "Design Criteria - SHTM 03-01 - esp Appendix 1 for air change rates - 10 a/v/hr supply, 18C to 25C control range." Is that again referencing the guidance that we have looked at, the SHTM 03-01?

A It is.

Q If we then look on to page 133, this is what you have described as the "Room Function Reference Sheet."

A It is.

Q And, again, if we just zoom in to look at the very top, the text under "Room Function Reference Sheet" the final sentence there says, "Refer to individual department sheets for individual room environmental conditions." Why did you include that? What does it tell us?

A The individual department sheets have other information in them that is abstract from this table really.

Q If we look within that, we

see the room functions. We see a room function of “HDU,” about halfway down if we zoom in.

A Yeah.

Q HDU would have a supply air change of 10 air changes per hour. What was your understanding of HDU? What did that stand for?

A HDU is a high dependency unit which is also known as critical care areas.

Q Why was it called HDU as opposed to critical care?

A So it was in the schedule of accommodation.

Q These room functions are coming from the schedule of accommodation as you told us as opposed to coming from the appendix of SHTM 03-01?

A Yeah.

Q And, again, if we look perhaps five or six entries down below HDU, an entry for “Multi-bed Wards.” If we look along there, we can see that the supply air change per hour for them is 4. Is that right?

A Yes.

Q So, I’m right in thinking that would be for a multi bed ward that was not within a critical care area?

A Yes.

Q So, if you were dealing with a multi-bed ward that was within a critical care area what values would it be?

A It would be HDU 10.

Q If we look on page 135, this is the area that is “B1 - Critical Care / HDU / Neonatal Surgery.” See that?

A Yes.

Q If we look to the second box down, you see an entry called “PICU - 8 beds.” See that box?

A Yes.

Q And then to the right of that in the room name, final entry is “Open Plan Bay (4 beds).”

A Yes.

Q We then look to the “Room Function,” which is two entries across, we are within critical care/HDU but there is a room function of “Multi-bed Wards.” Why do we see “Multi-bed ward” rather than HDU?

A It’s incorrect.

Q And, again, is that tracked through that if we look across, we see the supply air changes per hour being 4. What should they be?

A Ten.

Q Again, just if we return to the department subgroup, just as another example, if we look to the box that says, “High Acuity - 6 beds.” Do you see that?

A Yes.

Q And then if we look to the "Room Name, Open Plan Bay (4 beds)." Do you see that?

A Yeah.

Q Look across to "Room Function" again, we see "Multi-bed Ward." Do you see that?

A Yes.

Q Was that correct or was that an error?

A That's an error.

Q And again if we look across to the "Ventilation," you see the supply air changes per hour being 4. Was that correct or was that an error?

A Error.

Q Just thinking back to this type of error seems to be that we have got 4 rather than 10. Was that not the type of error that got spotted back in 2010 from the two versions that we looked at before the break this morning?

A It was.

Q Again, can you explain how were these issues that we are looking at in this spreadsheet, how were they not flagged up at this stage?

A Reflecting upon what happened, I think the Room Function Reference Sheet has, in a way, blinded me from actually seeing that in the department sheets. So, I can't explain any other way that it's been an honest human error.

Q Given that in terms of comments that you got in the 2010 version it was spotted during the review process, even if you had spotted it in your draft, is that the type of issue that you thought would have leapt off the page to anyone else that was reviewing the Environmental Matrix?

A Probably, but I think anyone else reviewing has also probably looked at the Room Function Reference Sheet and gone with that.

Q Again, just so that I am understanding, whenever we are looking at these types of errors, we are simply talking about human error in terms of the wrong room function being described which results in the wrong environmental parameters being put in for care?

A Correct. We did something to try and improve by creating the room reference sheet as distinctly different from the original Sick Kids versions of the matrix. We tried to improve it but instead created this opportunity for transcript error. So, on reflection, we would not do that again.

Q You say you would not do it again. How would that be

avoided in the future? Is it simply not using a room function reference sheet?

A Yes.

Q In relation to the Environmental Matrix that you had produced, the Inquiry's heard evidence saying that the reference design team was not involved in the production of the procurement document, the idea being that anyone in the reference design team could potentially join a bid team. Was that your understanding?

A Yes.

Q So, in terms of the work you were doing, did you know what other people involved in the project were doing in terms of using the invitation to participate in dialogue that would go out to prospective tenderers?

A No.

Q Again, just so I am understanding you, you are producing this information that you asked to produce. You produce an Environmental Matrix. Do you know how that is going to be used during the procurement exercise?

A No, as I say, in our thermal comfort report, I think that's where it's best articulated that we were presenting an envisaged design approach that wasn't intended to be prescriptive in the drawings that we

produced for the reference design. We stated they were in the context of the reference design only and indeed in the Guidance Note 1, it says it's in the context of the reference design only. So our mindset was this was end of journey for that information.

Q Is that why you say at paragraph 17 you did not think that it was meant to be prescriptive and that it would be for bidders, particularly the preferred bidder, effectively be responsible for an Environmental Matrix at the end of the project?

A Yes.

Q But, again, given that you were not involved in the production of the procurement document, is it fair to say that is an assumption on your part?

A Yes.

Q Could I ask you to have in front of you, please, it is bundle 4 and it is page 322. This should be an email from Andrew Duncan dated 28 February 2012 to Thomas Brady and some other individuals. Do you see that?

A Yeah.

Q What it says is:

"Tom

There is action on the Reference Design Team to confirm that the

Reference Design complies with NHS Guidance and key legislation."

See that?

A Yes.

Q

"I attach the requirement schedule for each of the reference designers to respond to. We require a statement from each designer to confirm that the Reference Design complies with the Requirements Schedule. Should it not fully comply then each designer shall confirm that the Reference Design complies with the Requirements Schedule with a schedule of derogations."

See that?

A Yes.

Q Okay. If we then look on to page 324, we see a document that has got Nightingale Associates, BMJ Architects, Hulley & Kirkwood and Arup.

A Yes.

Q Have you seen this document before? It is called a derogations list.

A (No audible response).

Q What was it and what input did Hulley & Kirkwood have to it?

A It was a document that summarised the design team's view of

where guidance was not specifically complied with for any particular reason.

Q If we look on then to page 325:

"The following are the comments compiled by Nightingale Associates, BMJ Architects, Hulley & Kirkwood and Arup regarding Mott MacDonald document 'Reference Design Compliance Statement Requirements' dated the 28th of February 2012 and matters relating to compliance generally and derogation."

Do you see that?

A Yes.

Q Paragraph two, "Reference Design Compliance Statement Requirement" and we see that the third entry, "Health Building Notes – We followed these where there is no equivalent Scottish guidance." Do to see that?

A Yeah.

Q

"Health Facilities Notes & Scottish Health Facilities Notes – We follow SHFNs where applicable or where they are referred to by NHS Lothian staff; HFNs only when advised of a need to do so by NHS Lothian.

[And] Health Guidance Notes and Scottish Health Guidance Notes – As above. [And finally] Health Technical Memoranda and Scottish Health Technical Memoranda – We have followed SHTMs and also HTMs when there is no Scottish equivalent." Is that right?

A Yes.

Q What checks had yourself and your colleagues undertaken on the Environmental Matrix to allow that definitive statement?

A Well, checks were made in relation to the Guidance Notes that are on the matrix. It's evident that we moved from HTM 03-01 to SHTM 03-01 and then we focused on any of the other Guidance Notes that had to be updated with respect to that statement and then, again, reflecting back at that time in that period. We didn't have a mindset of listing what might be considered a deviation from a particular piece of guidance because it never existed before SHTM 2025 and the transition to the new standards which were more explicit, but we hadn't caught up in our minds that you had to be absolutely explicit at that point as to what you were definitely not in accordance with and register it. So

that was that was our mindset.

Q Again, just for my understanding, the Guidance Notes within the Environmental Matrix are correct-- set the correct standards? Is that your position?

A Yes.

Q Okay, but you have accepted that, actually, within the detail, some of the sub-entries within the spreadsheets do not comply with the guidance set out in the Scottish Health Technical Memorandum?

A Yeah, yeah. I'm going to say the Guidance Notes and the room function reference sheet is correct. It's how we translated the data into some of the cells which was a human error. If we weren't aware of it, it would not be recognised as a derogation and if we had been aware of it, we would not have left it there at that time and listed it as a derogation because it was clearly wrong.

Q You were asked to give this confirmation in February, but as we have seen from the Environmental Matrix that we looked at, the design work that Hulley & Kirkwood undertook, including an Environmental Matrix, has continued until at least the September of that year. Is that correct?

A There actually wasn't a

lot of design work in between those two periods. In fact, I don't think there was any. There was a re-establishment of communication from-- I can't remember. It was David Stillie, I think, who said the schedule of accommodation has moved on beyond where we had established a point by March of 2012, so it moved on from version 10 to version 13 and he asked us to refresh the matrix on that schedule of accommodation.

Q At this point the document that we are in, February/March, then there is the refresh that is done in September. It does not seem that Hulley & Kirkwood or any of the other reference design teams were asked the same question again about compliance with the final version of the Environmental Matrix. Is that correct?

A Correct.

Q Do you know why that was?

A No.

Q Just while we are within context of the Environmental Matrix, one issue that seems to be controversial among certain of the core participants is within the Environmental Matrix itself, what values would take precedence? So, you have said you have got the Guidance Notes which

set out the correct values for critical care areas and then we have looked at certain of the sub-entry which you accepted there are some errors in. Now, certain individuals that may give evidence suggest that it is the detail of the spreadsheet that takes precedence; others suggest that it is Guidance Notes that take precedence. What is your view?

A The Guidance Notes and the room reference sheet are both going with 10. There's a thermal comfort report that also mentions an approach of 10 in critical care. If I had three statements that had 10 in a cell that said 4, I would be going with 10. As an engineer, if there was any doubt, I would always sit on the side of caution, go with the most onerous case until it was clarified.

Q Again, in fairness, that is what you say at paragraph 33 of your statement which is, as an engineer, your understanding is that you would always go with the most onerous requirement. Is that correct?

A Yes.

Q And if there was any doubt, if you spotted that disconnect between a general guidance note and a specific value 50 per cent less than that Guidance Note value, what would you do?

A I would clarify it. I would query it. I'm sorry, I would query it.

Q Again, after the final Environmental Matrix is produced by Hulley & Kirkwood, do you recollect anyone from Mott MacDonald, Davis Langdon or NHS Lothian coming back and asking Hulley & Kirkwood for clarification on that?

A (No audible response).

Q Can I now ask you to have in front of you, please, bundle 4, page 203? I think this is a document you referred to before and it is called a "Thermal Comfort Analysis."

A Yes.

Q What was this document and why did Hulley & Kirkwood would produce it?

A It was produced because we needed to analyse that the mixed mode ventilation approach for ward bedrooms could achieve the 25 degrees maximum temperature limit, in summertime, in every possible orientation of that type of room. So the analysis was done to determine what combination of natural and mechanical ventilation could actually achieve that. We simulated a natural ventilation only option to demonstrate actually that the numbers showed that summertime temperatures would go beyond 25 up to 28 and even beyond 28 degrees,

and that with the mixed mode ventilation approach that 25 degrees could be achieved.

Q If we look on to page 288 within bundle 4, paragraph 1.2, "Simulation Progression." Do you see that?

A Yeah.

Q And then the bold heading indented:

> "**Simulation 1** – Ward rooms served by mechanical fresh air supply, rated to 4 Air Changes per Hour, cooled to control, zone temperatures to 25°C or less. Windows in simulated spaces are closed continually."
>
> Do you see that?

A Yeah.

Q And then:

> "**Simulation 2** – Ward rooms served by mechanical fresh air supply related to 4 Air Changes per Hour, cooled to control zone temperature to 25°C degrees or less."
>
> Do you see that?

A Yes.

Q Again, the answer may be obvious from what you have already said, but why do we see that being four air changes per hour?

A Well, the benefit of

minimising the amount of mechanical ventilation in combination with natural ventilation is-- manifests in reduced energy consumption and reduced capital cost.

Q And why not model it on 6 here?

A Six air changes per hour is more air, more consumption, more cost, and if you have the opportunity to take beneficial advantage of our climate for natural ventilation, why would you automatically go to a more onerous condition?

Q In terms of the thermal comfort analysis that was done, was there any analysis done on 10 air changes per hour for Critical Care rooms?

A There wasn't.

Q Why not?

A Because experience shows that where you have 10 air changes of comfort cooled supply air in almost any healthcare environment, but definitely in Critical Care, that the maximum temperature of 25 degrees is not exceeded.

Q If we look on within the report on page 293, bundle 4, paragraph 2.6 about the building geometry.

THE CHAIR: Sorry, it was just I did not quite get that. The question whether any analysis was done on the basis of 10 air changes per hour, you said, "No, experience indicates that the maximum temperature of 25 degrees…" Did you then go on to say, "…will not be exceeded in the event that there are 10 air per hour?"

A Correct.

THE CHAIR: Got it. Thank you. Sorry, Mr MacGregor.

Q If we then look on to page 294, "Building Geometry," I think we see that set out just in the paragraph just above the diagram. There is one there beginning, "As such critical care…" Do you see that?

A Yes.

Q "As such critical care and high dependency type ward rooms which receive air change rates in the region of 10 ACH, have not been analysed…" Do you see that?

A Yes.

Q So, firstly, a narration there that if you are in Critical Care, 10 air changes an hour. There is no need for you to do thermal comfort analysis because if you have 10 air changes, you are going to be at at least the 25 degrees.

A Yes.

Q Thank you. In relation to ventilation strategy and energy use, did energy targets in relation to the project have any impact on the design from a mechanical and electrical engineering perspective?

A Yeah, they're intrinsic to the mechanical/electrical design approach. So, the more mechanical ventilation, the higher the air change rates, the higher the energy burden that goes with that. So, all healthcare bodies, healthcare trusts right across the UK, are focused on trying to have the most efficient and least energy burden and lowest carbon profile healthcare estate that they can have. So, yes, it's always an influence for every healthcare project, every building project.

Q Again, we have looked at some of the errors in relation to Critical Care rooms within the body of the spreadsheet, recognising that the Guidance Notes are correct. If the correct values had been used in relation to those Critical Care rooms, would that have impacted adversely on the energy strategy?

A Yes. The higher the air change rate, the more energy consumption. It would have increased the consumption of

energy. I would say, though, that if you've got a 50,000 square meter hospital full of accommodation and you increase 2 or 3 per cent of the total area by 4 to 10 air changes, it will not have a huge impact, but it will have an impact. Everything in healthcare has an impact, and it's the sum total that the minutiae-- where the focus is to try and reduce consumption where possible.

Q Thank you. I think the final thing that I would wish to raise with you, I think you have covered quite a lot of this in your evidence already, but we have covered the problems you say exist with the Activity Database, problems of manually creating an Environmental Matrix, and we have looked at some of the potential errors that cropped up in the project. In your view, someone who has worked on the project, works in this area, looking to the future, how could things be improved to try to make sure issues like the ones we have discussed do not crop up in future?

A Yeah, I've reflected on that, and I think one of the fundamental things is the naming of rooms – the naming of rooms being what might manifest in a schedule of accommodation versus what's

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

Q Thank you, Mr O'Donnell. I do not have any further questions for you at this stage, but Lord Brodie might have some questions or, equally, there might be some applications from core participants, but thank you for your engagement today and for answering my questions.

A Thank you.

THE CHAIR: There are no questions that I have at this stage. Do any of the core participants have a question or, I suppose, anything that arises from Mr O'Donnell's evidence? I am taking that as a unanimous no. So, Mr O'Donnell, can I thank you again for your attendance and also for the preparatory work carried out to allow you to give evidence. A general theme, I think, applies to the Inquiry as to many public inquiries: the more visible part is, for example, you giving evidence this morning, but I appreciate you have done a lot of work to allow you to do that, so I express my thanks for that.

A Thank you.

(The witness withdrew)

(Short break)

13:20