

Royal Hospital for Sick Children and Department for Clinical Neurosciences - Edinburgh

RHSC / DCN RDS Environmental Matrix

Document highlighted
items amended inline
with NHS comments.

26th November 2015 &
11th February 2016

26th November
comments in red and the
11th February
comments in amber

WW-XX-XX-DC-XXX-001
Rev 05

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The following table indicates Board Comments, initial response together with the Environmental Matrix to reflect the following Board comments

	Item	Initial Response	Feed back	Reconciliation
1	Update the Environmental Matrix shall by updated by Project Co to reflect all the rooms and room types in the proposed Facility, this should be based on an updated Schedule of Accommodation that has been commented on separately by the Board. This also needs to reflect the names and room numbers in the GSU table.	Individual room numbering being applied.	OK	Agreed
2	Include the requirements contained in the Clinical Output Specification including but not limited to the requirement that theatre temperatures are to be able to be raised to 31°C for certain operations.'	We have made reference to the figure of 31°C in the Guidance Notes. 'Theatre temperatures are to be able to be raised to 31°C for certain operations.'	Temperature control in theatres is covered in the Operational Design Notes V5 14th Oct2014 for RHSC Theatres 1 & 2. Operating theatres 1-P1-032 and 1-P1-044 shall operate normally as detailed in the Environmental Matrix. These rooms shall be provided with a manual control to raise the temperature to 31°C within a period of 2 hours. This manual control function shall be logged in the BMS and the temperature requirements of the Environmental Matrix shall not apply for the duration of the elevated temperature operation. THIS HOWEVER IS NOT NOTED ANYWHERE	This statement is now incorporated within the guidance notes of the matrix
3	Measures shall be assessed, modelled and implemented to demonstrate that the internal air temperature of the following room types to reduce the temperature control from 28°C to 25°C- Treatment Rooms, Consulting Rooms; Laboratory; Physiotherapy Studio, Recovery. These room shall not exceed the maximum acceptable level of 25°C for more than 50 hours per annum	The Temp (max) column within the table has been updated to 25°C for the agreed rooms 3.1- 3.5 above.	OK	Agreed
4	Detailed proposal awaited on bedroom ventilation to achieve balanced/ negative pressure relative to corridor.,	The single bedrooms have had their ensuite extract increased to achieve a balance within the room, this has been noted within the matrix.	NOTE 26 AND VENTILATION TYPE HAVE NOT BEEN ALTERED.	Refer to Matrix
5	Colour rendering all stated as 80 where certain areas should be 90	Amended.	NEEDS TO BE CHECKED FOR ALL	Refer to Matrix
6	There also need to have a consistent approach e.g. guidance notes and ED body view room stated as 28 - 8, bereavement suite body view room stated as 25 -8.	The figure of 25-8 is now reflected within the matrix.	OK	Matrix now amended. See item 7 below.
7	Further discussion is required on the minimum temperate requirement for the Body View Room.	Awaiting confirmation on this one from the client, however discussion at the meeting on the 11/11/14 was that rather than take the room temperature down to 8°C which would require specialist cooling they would look at providing a cold blanket for the body and room temperatures would be retained as a normal room.	NHSL confirm following discussion with users that the use of a cooling blanket or cooling cot for the body is appropriate and therefore there is no requirement to have the room at 8 degrees and 25°C is acceptable	Matrix amended to minimum temperature of 18°C in place of 8°C.



NHSL Reference	NHSL Comment	Response	Environmental Matrix Status	Drawing Implication	FC Comment	Post FC Comment
1	Technical Submittal MER-XX-SL-TS-015 appears to contradict environmental note 13 by way of radiant panel controls.	Note 13 has been deleted from the matrix and Mercury's technical submittal takes precedent.	Now updated.	✗	✗	✓
2	1-B1-010 medical gas cylinder store, SHTM 02-01 states internal cylinders stores may require mechanical ventilation, please confirm no ventilation provided.	Extract ventilation has been provided. Matrix updated and drawings where appropriate.	Now updated.	✓	✗	✓
3	IPS room max/min temperatures stated as "Manufacturer Dependant", this is not acceptable, temperatures to be stated. Room has 3ac/h mechanical extract therefore heating type should be Adjacent space transfer air and temperatures accordingly.	The manufactures maximum temperature guidelines are higher than 30°C. It does not appear reasonable to indicate heating to a cupboard.	No action required	✗	✗	✓
4A	Isolation cubicles and bedrooms are not shown with any extract ventilation.	Refer to the design drawings for details. Generally, the extract is via the en-suite which is in line with SHPN 04. Where no ensuite is present, extract is via the room.	No action required	✗	✗	✓
4B	Gowning lobby, supply stated as "in line with SHPN 04" and extract stated as "To match total bedroom air volume", design development review required.	Actual figures will be noted and the note referring to the SHPN will be removed.	Now updated	✗	✗	✓
5	Technical Submittal MER-XX-SL-TS-015 shows room 1-B1-057 with a radiant panel which contradicts Environmental Matrix room 1-B1-057 warm air reheat battery.	The air is heated by a heater battery which is BMS controlled as per the matrix.	No action required	✗	✗	✓
6	Where ventilation rates 10l/s per person are stated, room occupancy to be detailed and ventilation rates calculated.	These particular areas have been designed based on occupancies; occupancy figures and ventilation rates have been added to these areas to provide clarity.	Now updated	✗	✗	✓
7	1-B1-063 Stated as supply air 4ac/h, extract via en-suite, this room does not have en-suite facilities.	Refer to the design drawings for details. Generally, the extract is via the en-suite which is in line with SHPN 04. Where no ensuite is present, extract is via the room.	No action required	✗	✗	✓
8	1-B1-090 has an area of 8m2 which is not stated in the matrix. PCo to populate areas.	A review will be carried out and any blank GIFA rates will be noted - Updated schedule of accommodation required for this item.	Now updated	✗	✗	✓
9	3-C1.2-036 review ventilation type, only showing supply when 4ac/h supply and extract.	The matrix shows 4 air changes supply and extract.	No action required	✗	✗	✓



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10	Room 1-G3-003/005/007 bathroom temperatures stated as 28 / 20 with adjacent space transfer air from area with temperatures of 28 / 18.	These bathrooms have their own radiant panel.	Now updated	✗	✗	✓
11	Similarly isolation bedroom 3-C1.4-040, temperatures stated as 28 / 21 with adjacent space transfer air from area with temperatures of 28 / 18, ventilation described as "balanced".	The adjacent area; Lobby 3-C1.4-039 is heated via heater battery and will be at least 21°C. Matrix has been updated.	Now updated	✗	✗	✓
12	3-C1.7-003, 004, 005 supply and extract "to suit location" not acceptable.	Air change rates will be noted and the "to suit location" will be removed.	Now updated	✗	✗	✓
13	G-D2-006 supply and extract "to suit location", statement "to suit location" is not acceptable.	Air change rates will be noted and the "to suit location" will be removed.	Now updated	✗	✗	✓
14	Theatre ventilation stated as "in line with SHTM 03-01", correct, this is a BCR requirement. However dental surgeries are not mentioned in SHTM 03-01, I would suggest SHPN 36 part 2. The required ventilation to be designed and detailed.	In line with the SHTM 03-01 removed and air change rates added.	Now updated	✗	✗	✓
15	1-H2-021 is currently labelled a single bedroom but it is an isolation room, review ventilation.	This room function was RFI'd and has been designed as an isolation room (matrix has been updated).	Now updated	✗	✗	✓
16	1-P1-003 and 005 are bedrooms, not bathrooms.	Bathroom changed to bedroom.	Now updated	✗	✗	✓
17	Kitchen states DW172 dependant, actual design detail to be added.	Design details will be noted and "DW172" will be removed.	Now updated	✗	✗	✓
18	Complete Estates SOA areas.	A review will be carried out and any blank GIFA rates will be noted.	Now updated	✗	✗	✓
19	Room B-S3-002 and 005 stated in Environmental Matrix as Adjacent Space Transfer Air, however shown with radiant panel on drawing.	Matrix will be updated with radiant panel noted.	Now updated	✗	✗	✓



NHSL Reference	NHSL Comment	Response	Environmental Matrix Status	Drawing Implication	FC Comment	Post FC Comment
20	ADB code reference should be confirmed.	ADB code reference is an unnecessary column for the use of this matrix so the column will be deleted from the environmental matrix.	Now updated	✗	✗	✓
21	Last column not titled. What does it refer to?	This column to the IET grouping but this column has now been superseded by the categorisation document. Column will be deleted from the environmental matrix.	Now updated	✗	✗	✓
22	B-S3-002 & B-S4-001 can min temp be increased to 18?	Temperature will be altered to 18°C	Now updated	✗	✗	✓
23	Disposal hold – can min temp be reduced to 16.	Sensor could be set to 16°C rather than 18°C but the reduction to the maximum temperature from 28°C to 25°C is problematic though so if required, cooling will be need to be added - Confirmed at meeting that 28°C is to be retained.	Now updated	✗	✗	✓
24	During a recent PG it was made clear that due to the nature of the research being carried out in the Clinical Research Department in rooms H2-013, 014, 016 and 020 the temperature cannot at any time exceed 25°C.	Cooling has been provided in H2-014, H2-016 and H2-020. H2-013 requires cooling. Matrix has been updated to reflect this but drawing requires updating.	Environmental Matrix updated awaiting instruction to update drawing.	✓	✗	✓
25	Further to the recent discussion regarding hepa filtration in the isolation rooms the matrix should have been updated to reflect this.	The matrix doesn't note HEPA filter requirements but all isolation rooms have the capability of HEPA filters being installed.	No action required	✗	✗	✓
26	G-F1 Bedrooms with 6ac/h where most bedrooms are taken as 4ac/h.	This is a CAHMS bedroom so 6 AC/H has been utilised, reference to natural ventilation will be removed.	Now updated	✗	✗	✓
27	B-S4-004, no supply air.	Supply air reference will be added.	Now updated	✗	✗	✓
28	G-S6-016, Cooling - Yes, Cooling Type – None.	Comfort cooled fresh air is now noted.	Now updated	✗	✗	✓
29	G-Q1-007, Cooling – No, Cooling Type - Comfort cooled fresh air.	Cooling note removed.	Now updated	✗	✗	✓



NHSL Reference	NHSL Comment	Response	Environmental Matrix Status	Drawing Implication	FC Comment	Post FC Comment
30	G-Q1-161, Heating type – Adjacent space transfer air, supply at 10 l/s/p positive pressure. Diagnostic rooms, "To suit location"	This room is part of corridor and shares heating and ventilation with corridor.	No action required	✗	✗	✓
31	G-A1-004, supply 4 ac/h extract 3 ac/h positive, different to other diagnostic rooms.	We have treated this room like an office.	No action required	✗	✗	✓
32	Confirm where natural ventilation, i.e. 1-B1-063/065/067.	Extent of ventilation clarified on schedule.	Now updated	✗	✗	✓
33	3-C1.3-018, supply 4 ac/h extract 3 ac/h positive , different to other offices.	Air change rates utilised are in line with cellular offices	No action required	✗	✗	✓
34	1-L1-005 Resus area 30m2 with extract at 3 ac/h.	This room has been updated on the matrix.	Now updated	✗	✗	✓
35	G-A1-028/029, Resus area with central general extract with supply at 10 ac/h extract at 6 ac/h.	Ventilation type for these rooms has been updated in line with design.	Now updated	✗	✗	✓
36	Consider absence detection to all offices, meeting rooms and node rooms.	The lighting control has generally been described in the matrix as either presence or switched. If this is causing confusion the reference to presence could be renamed automatic. As a a general note, automatic detection has been used in all suitable areas.	No action required	✗	✗	✓
37	1-D3-002 Circulation Equipment Storage Bays, all others are presence detection.	Automatic controls added.	To be updated	✗	✗	✓
38	Disposal hold, LG2 recommends 200 lux.	100 lux will be changed to 200 lux.	To be updated	✗	✗	✓
39	IPS rooms normal lux stated as n/a.	200 lux will be added to the matrix.	To be updated	✗	✗	✓



NHSL Reference	NHSL Comment	Response	Environmental Matrix Status	Drawing Implication	FC Comment	Post FC Comment
40	G-F1-028, 030, 053, 045 and 1-L1-028 are described as offices but have local lux of 1000.	Local lux figures to be removed.	To be updated	✗	✗	✓
41	Anaesthetic rooms, LG2 recommends local lux 1000 and Ra 80.	Ra 80 has been noted in the environmental matrix and 1000 lux is for local lighting but 500 lux is for general; all as noted in the environmental matrix.	No action required	✗	✗	✓
42	Theatre exit bays (transfers), LG2 recommends normal lux 300 local lux not required and Ra 80.	500 lux will be dropped to 300 lux, Ra 90 will be reduced to Ra 80 and local lux will be removed.	Environmental Matrix updated awaiting instruction to update drawings.	✓	✗	✓
43	Preparation rooms and scrub up, LG2 does not require local lux 10,000 – 100,000, or Ra 90.	Ra 90 will be reduced to Ra 80 and local lux will be removed.	Environmental Matrix updated awaiting instruction to update drawings.	✓	✗	✓
44	Theatre utility rooms, LG2 recommends local lux 100 – 150 and does not require local lux 10,000 – 100,000, or Ra 90.	500 lux will be dropped to 150 lux, RA 90 will be reduced to Ra 80 and local lux will be removed.	Environmental Matrix updated awaiting instruction to update drawings.	✓	✗	✓
45	Recovery areas, LG2 does not require local lux 1000 but does recommend Ra90.	RA 80 will be increased to Ra 90 and local lux will be removed.	Environmental Matrix updated awaiting instruction to update drawings.	✓	✗	✓
46	Nurse/touchdown bases not shown to have night lighting, confirm this achieved by dimming.	All night lighting is achieved by dimmable fittings.	No action required	✗	✗	✓
47	Resus trolley bay 1-D1-009 to be as other trolley bays, Ra 80 and presence detection.	1-D1-009 will be updated to reflect other trolley bays.	To be updated	✗	✗	✓
48	Review colour rendering, e.g. theatre suite, prep, anaesthetic, scrub utility, exit bay all Ra 80. Review consult/ examination rooms to have the higher colour rendering of Ra 90. All to be as CIBSE LG2.	RA 90 is currently shown in theatres, preparation rooms, scrub rooms, utility rooms and exit bay. Anaesthetic room will be changed to Ra90 from Ra80. We feel that the consultant room are general treatment rooms so should remain as Ra80; where Ra90 is required, it will be achieved via the examination luminaire.	Environmental Matrix updated awaiting instruction to update drawings.	✓	✗	✓
49	No absence detection or daylight control detailed included from drawings.	The lighting control has generally been described in the matrix as either presence or switched. If this is causing confusion the reference to presence could be renamed automatic. As a a general note, automatic detection has been used in all suitable areas.	No action required	✗	✗	✓



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50	Medical location column states "See Guidance Notes" for every entry and not mentioned in those guidance notes.	This has been superseded by the risk profile document which sets out the medical grouping and classification. Column has been removed.	Now updated	x	x	✓

Environmental Matrix - Guidance Notes

- 1 This workbook is prepared for the Financial Close Stage as an easier reference tool to replace ADB RDS M&E Sheets for the Environmental Criteria elements as described on these sheets.
- 2 The services matrices are produced from the Schedule of Accommodation Sheets.
- 3 The design of the HVAC systems to the theatres shall be in accordance with SHTM 03-01.
- 4 Where radiant panels are indicated in any room in these matrices, detailed design development may remove the need for these without detriment to environmental temperature. This design development is dependant on actual room layout - i.e. whether a room is located adjacent to an external wall, ground bearing floor, roof surface or is internal.
- 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 25°C (dry bulb) is not exceeded during normal occupancy. This criteria shall also apply to cellular and open plan office spaces.
- 6 Maximum internal temperatures listed relate to normal occupancy and Summer Design Conditions ; External Summer Conditions for Cooling Plant Selection as per SHTM2025, Enthalpy 54kJ/kgda.26deg°Cdb, 19deg°C wb. External Winter Conditions as per CIBSE Guide A Table A 2.2 for locality = - 6°C for Heat Losses, and as SHTM 2025 for locality = -10°C for AHU Ventilation Plant design.
- 7 Examination lamp notes where listed are provisional. Detailed requirements (fixed, mobile, illumination) will be detailed on C sheets as agreed from signed off 1:50 RDS, which shall take precedence over this schedule.
- 8 All lighting levels are derived from CIBSE Lighting Guide LG2.
- 9 Colour rendering refers to CIBSE Lighting Design Guide and will be applied throughout.
"80" : Normal
"90" - Enhanced to provide close as possible match to natural light for clinical purposes
- 10 Thermostatic Mixing Devices - SHTM 04-01 Guidance shall be employed for specific TRV Type versus listed Area/Activity.
- 11 Standby Lighting to be Grade A throughout .
- 12 The internal temperature in naturally or mechanically ventilated rooms shall not exceed the maximum temperature as listed on these Environmental Matrices provided external summer design criteria is not exceeded .
- 13 **Note Deleted**
- 14 Local Control BMS Temperature Sensors for ducted reheat zones and chilled water cassettes for hotspots shall be provided with local range adjustment to +/- 2°C of BMS Set Point. BMS set point shall be adjustable via operator/user dialogue through formal FM
- 15 **Typical bedroom** - Design Criteria - SHTM 03-01 Clause 2.11 - internal temperatures in patient areas should not exceed 28°C db for more than 50 hrs per year. Appendix 1 SHTM 03-01 gives 18°C to 28°C float range. NHSL however require that the maximum internal design temperature should not exceed 25°C for more than 50 hrs per year.
HDU bed areas - Design Criteria - HBN 57 gives specific guidance as well as SHTM 03-01 - Appendix 1 for air change rates - 10ac/hr Supply, 18°C to 25°C control range. (Capability shall be provided but not at the summer and winter external ambient design extremes against the internal maximum and minimum range conditions).
The department will be comfort cooled and controlled on a zonal basis.
Central AHU to be provided with blank section for future provision of humidification.
Post theatre recovery areas - Design Criteria - SHTM 03-01 - Appendix 1 for air change rates - 15ac/hr S&E , 18°C to 25°C control range.(Capability shall be provided but not at the summer and winter external ambient design extremes against the maximum and minimum range conditions).
Critical Care areas - Design Criteria - SHTM 03-01 - Appendix 1 for air change rates - 10ac/hr Supply for isolation cubicles , 18°C to 25°C control range.(Capability shall be provided but not at the summer and winter external ambient design extremes against the maximum and minimum range conditions). NHSL may require specific rooms to have a control range up to 28°C.
Central AHU to be provided with blank section for future provision of humidification.
- 16 **Corridor** ventilation may be either mechanical or where the opportunity exists natural. To be determined during detailed design with due regard to clinical functionality.
- 17 **Single Room WC** - SHTM 03-01 Appendix 1 suggests 3ac/hr extract air change rate only. We have applied 10ac/hr extract rate to provide a more robust rate of extract.
- 18 **Diagnostic Rooms** - (X Ray, CT Scanner, MRI Scanners, Gamma Camera) - air change rates listed at 8ac/hr. Actual air change rate must be derived through room heat gain analysis and actual equipment guidance.
- 19 **Operating Theatre Laminar Flow/UCV Requirements** - Refer to Operational Policy Documents for specific theatres which require Laminar Flow/UCV canopy style ventilation solution.
Central AHU to be provided with blank section for future provision of humidification.
Operating Theatres 1-P1-032 and 1-P1-044 shall operate normally as detailed in the Environmental Matrix. These rooms shall be provided with a manual control to raise the temperature to 31°C within a period of 2 hours. This manual control function shall be logged on the BMS and the temperature requirements of the Environmental Matrix shall not apply for the duration of the elevated temperature operation.
- 20 **Small workshop Areas** - Local Extract Ventilation (LEV) unit requirement to be determined from room equipment schedules.
- 21 **Note that Isolation Suite ventilation solutions for this project shall follow HBN 4 Supplement 1 Section 4 Item 4.8 Guidance i.e.**
A common departmental AHU shall be employed to provide supply air ventilation (and shall therefore employ duty & standby fans).
Isolation Rooms En Suite Extracts shall be provided with an independent Isolation Room toilet extract ventilation system.
Isolation Rooms En Suite Extracts shall be provided with either externally located 3 mtr high discharge stack in a safe location or with extract filters (H14) within a safe change housing outside the building on the suction side of the fan.
Heating & Cooling the Isolation Suites shall be provided via the ventilation system.
- 22 **Retail Provision** - Service provisions listed are Infrastructure only for future fit-out by retailer. (Fire detection shall be provided to assist completion).
- 23 **Comfort Cooled Fresh Air** - Where noted as such on the matrix, these are provided via departmental air handling plant via chilled water cooling coils.
- 24 **Body View Room** - A cooling blanket or cooling cot shall be used in this room.
- 25 Anti ligature rooms (17no. off) will be treated as sealed rooms with Supply at 6ac/hr and Extract to match to achieve a balanced pressure.
Single Bedroom - The design philosophy for ventilation is for a mixed mode operation where natural vent is encouraged which has benefits both physiological with users being partly in control, and from an energy stand point where mechanical vent loading is partly reduced (2/3rds). This strategy results in zero pressure differential regime within the room where supply and extract is balanced.
En suite dirty extract volume flow rate has been increased to achieve a balanced ventilation system.
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