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NHS England

Health Building Note 16-01: Facilities for mortuaries, including body stores and post-mortem services

Preface

About Health Building Notes

Health Building Notes (HBNs) give best practice guidance on the design and planning of new healthcare buildings and on the adaptation/extension of existing facilities.

They provide information to support the briefing and design processes for individual projects in the NHS building programme.

Language usage in technical guidance

In HTMs and HBNs, modal verbs such as "must", "should" and "may" are used to convey notions of obligation, recommendation or permission. The choice of modal verb will reflect the level of obligation needed to be compliant.

The following describes the implications and use of these modal verbs in HTMs/HBNs (readers should note that these meanings may differ from those of industry standards and legal documents):

- "Must" is used when indicating compliance with the law.
- "Should" is used to indicate a recommendation (not mandatory/ obligatory), i.e. among several possibilities or methods, one is recommended as being particularly suitable – without excluding other possibilities or methods.
- "May" is used for permission, i.e. to indicate a course of action permissible within the limits of the HBN or HTM.

Typical usage examples

- "Design teams **must** have due regard to the protected characteristics as defined in the Equality Act 2010." [obligation]
- "All clinical areas **should** have access to natural light." [recommendation]
- "Where it is not necessary to access both sides of the couch, the single-sided room layout **may** be used." [permission]

"Shall", in the obligatory sense of the word, is never used in current HTMs/HBNs.

Project derogations from the Technical Guidance

Healthcare facilities built for the NHS are expected to support the provision of high-quality healthcare and ensure the NHS Constitution right to a clean, safe and secure environment. It is therefore critical that they are designed and constructed to the highest and most appropriate technical standards and guidance. This applies when organisations, providers or commissioners invest in healthcare accommodation (irrespective of status, for example Foundation and non-Foundation trusts).

This guidance is not mandatory (unless specifically stated). However, any departures/ derogations from this HBN – including the measures implemented – should provide a degree of safety not less than that achieved by following the guidance set out in this HBN.

Statutory standards plus technical standards and guidance specific to NHS facilities:

- Health Building Notes
- Health Technical Memoranda
- Complete list of NHS estates-related guidance

The need to demonstrate a robust process for agreeing any derogation from Technical Guidance is a core component of the business case assurance process.

The starting point for all NHS healthcare projects at Project Initiation Document (PID) and/or Strategic Outline Case (SOC) stage is one of full compliance.

Derogations to standards will potentially jeopardise business case approval and will only be considered in exceptional circumstances. A schedule of derogations will be required for any project requiring external business case approval and may be requested for those that have gone through an internal approvals process.

While it is recognised that derogation is required in some cases, this must be risk-assessed and documented in order that it may be considered within the appraisal and approval process.

Derogations must be properly authorised by the project's senior responsible owner and informed and supported by appropriate technical advice (irrespective of a project's internal or external approval processes).

Sustainability and "Net Zero Carbon" targets

The UK is leading the way on tackling climate change and improving sustainability, and the NHS is leading the way in England.

In 2019, the UK became the first major economy to commit to net zero emission by 2050. In 2020, the NHS set out its intent to support this ambition through its 'Delivering a "Net Zero" National Health Service' report. The report sets a clear target for achieving a net zero health service for direct emissions by 2040 and indirect emissions by 2045.

In 2021, NHS England published supporting guidance for the NHS estate in its 'Estates Net Zero Carbon Delivery Plan' and further guidance is planned over the coming years.

The NHS estate has a critical role to play in achieving net zero carbon emissions. It is vital that every opportunity is seized across the NHS to do so, and the NHS estate is an area where direct and cost-effective action can be taken with a high degree of confidence.

Executive summary

Health Building Note (HBN) 16-01 replaces guidance on the design of mortuaries and post-mortem facilities published nearly two decades ago. It builds on the work of the NHS in Scotland and the Scottish Health Planning Note 16-01: 'Mortuary and Post Mortem Facilities: design and briefing guidance', by adding specific English requirements and incorporating legislative and policy changes and latest best practice.

HBN 16-01 is aimed at both the senior management within NHS organisations and those tasked with designing modern, fit-for-purpose facilities that meet current statutory and social needs. Whilst aimed specifically at the NHS, this guidance has been designed to be of use to all parties responsible for planning and operating mortuaries and body stores, both within ordinary operating parameters and in emergency planning situations.

At the heart of this document is a renewed vigour to provide respect and dignity to the deceased and their bereaved relatives and friends. Mortuaries must provide a safe environment for the deceased to be handled with dignity and privacy, and to prevent unauthorised access to bodies. For relatives and friends, many of whom are experiencing times of extreme vulnerability, safety and security comes in the form of providing a space that allows grief to be expressed in an environment that is comforting and supportive, cognisant of each individual's identity, religious and cultural needs.

This guidance does not cover end-of-life facilities or bereavement and medical examiner services, but when designing mortuaries planners and designers should give consideration to those areas outside the scope of this guidance. It is also not within the scope of this document to cover working practices and Trust-level policies, including those relating to employment checks for staff with mortuary access, as recommended by the Fuller Inquiry.

A 2022 Lancet Commission report on the Value of Death stated that: "how people die has changed radically over recent generations. Death comes later in life for many and dying is often prolonged. Death and dying have moved from a family and community setting to primarily the domain of health systems." This means that mortuaries play an increasingly important role, and in a small but increasing number of cases are one of the only places where bereaved relatives and friends can visit their loved ones before a funeral.

This guidance will also help planners to create spaces that are able to flex in response to unplanned situations.

Equality and health inequalities impact assessments should be undertaken (see https://www.england.nhs.uk/publication/the-nhs-long-term-plan-equality-and-health-inequalities-impact-assessment/). Diversity requirements including religious and/or cultural needs should be considered.

Finally, this document provides some high-level guidance on how the NHS, acting as a system partner, can support partners with the management of mass fatality events.

The schedules of accommodation spreadsheet and room component sheets can be downloaded as separate files along with this document from the HBN 16-01 web page (https://www.england.nhs.uk/estates/health-building-notes/).

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Malcom Hoggart, Technical Author, Estates Engineering Compliance Consultant Ltd.

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1.0 Purpose and introduction

Purpose and scope of HBN 16-01

1.1 This publication replaces HBN 20 – 'Facilities for mortuary and post-mortem room services' (2005).

1.2 It is based on more recent guidance issued by the Scottish Government in the form of Scottish Health Planning Note 16-01 – 'Mortuary and Post Mortem Facilities: design and briefing guidance' (Version 2, November 2017). In many places HBN 16-01 references the Scottish guidance directly, but with important additions to reflect feedback from experts working in this sector.

1.3 In addition to updating the context of SHPN 16-01 to reflect legislation and guidance within England, this document provides additional guidance relating to:

- system planning considerations
- emergency planning resilience and response.

1.4 HBN 16-01 provides guidance for NHS premises used for mortuary and post-mortem services and should be used to support:

- the design of new buildings
- the adaptation or extension of existing buildings
- the consistent assessment of the standards of existing facilities.

1.5 This publication has been produced for use by NHS Trusts and Foundation Trusts. However, it has been designed to be useful for other organisations involved in the operation, planning or use of mortuary and post-mortem facilities in England, for either joint/shared service or individual organisation use. This includes local authorities, police forces, Coroner, plus partner organisations such as universities and private providers, funeral directors and private hospitals.

1.6 In recent years there has been a growing need for consistent and high-quality mortuary services, whilst ensuring this provision is sustainable. Resource is limited, with key challenges in the recruitment and retention of highly-experienced and skilled staff, as well as the provision of fit-for-purpose facilities and modern equipment.

1.7 This document is structured in three parts:

- Part 1 – Chapters 2–4 which set out general considerations when planning a mortuary.
- Part 2 – Chapters 5–8 setting out the design considerations for the functional content of a mortuary.
- Part 3 – Chapter 9 which considers estates considerations for emergency spaces.

1.8 This HBN considers the following key functional elements:

- considerations for planning capacity and capability
- location of facilities in the wider hospital context
- body receipt, storage and removal facilities
- post-mortem facilities, with or without criminal forensic cases and observation
- facilities for bereaved visitors
- staff and support facilities, with or without post-mortem services
- teaching and research
- emergency preparedness, resilience and response (EPRR) planning.

1.9 This will allow a project-specific solution to be developed to suit local needs. The key functions for a given location, and their scale and quantity, should be planned on an inter-agency basis, at a national, regional and local level, with service quality, resilience and safety for the population as key considerations.

1.10 Periods of increased death rates are referred to within this document as:

- 'Excess death events' – deaths during a particular period above the usual expected number of deaths under normal conditions, which can show the effect of something planned or unexpected.
- 'Mass fatality events' – incidents where the number of fatalities is greater than normal local arrangements can manage.

1.11 In Chapter 9, this document provides a summary of emergency preparedness, resilience and response (EPRR) considerations of temporary accommodation for a mass fatality event and excess death events, the spatial considerations and the support engineering services needed. It is not an operational policy document and does not define how the spaces should be used, nor when they should be used.

1.12 NHS Trusts will need to work in partnership with local system partners, including the Coroners and their staff, police, local authorities and other stakeholders, to establish local arrangements and planning requirements for hospital-based mortuaries. System arrangements for dealing with excess death events and mass fatality events will be specific to the area that the hospital serves, and each facility should plan for an appropriate service flexibility and resilience that supports the wider system capability.

1.13 Trusts should also work with local funeral directors to ensure that there is sufficient capacity external to the hospital site to ensure a timely turnaround of the deceased and also to establish protocols regarding remote sites located away from the main mortuary.

Who should use this guidance?

1.14 This document is aimed at planners, designers, suppliers, installers, estates and facilities managers and operations managers. Elements of the document will also be relevant to managers concerned with the day-to-day management of healthcare facilities and senior healthcare management.

1.15 Within this document, where reference is made to planners and designers, the following definitions apply:

- planners are those responsible for specifying the function and scale of the facility. This will include mortuary managers, senior managers and healthcare planners
- designers are those responsible for designing layout and specifying the equipment required within the mortuary, including healthcare planners, architects,

engineers, manufacturers, suppliers and installers.

Changes since the previous guidance

1.16 Since the publication of the predecessor of this document, HBN 20, there have been several changes to the legislative environment. This document will signpost the current legal requirements affecting the consideration and planning of mortuaries and post-mortem facilities:

- Civil Contingencies Act (2004)
- Human Tissue Act (2004), establishing the Human Tissue Authority (HTA) and a regulatory framework that is relevant to post-mortem facilities
- Coroners and Justice Act (2009)
- Births and Deaths Registration Act (1953, revised 2020)
- Coronavirus Act (2020) – whilst this Act is based on the governments' phased response to a specific pandemic situation, the outcome of this pandemic will enhance the health services' understanding of large-scale excess death events and how to respond to such issues.

1.17 The HTA is the independent regulator of organisations that remove, store and use human tissue for research, medical treatment, post-mortem examination, education and training, and display in public. The HTA also give approval for organ and bone marrow donations from living people. The HTA produces regulatory standards and professional guidance for mortuaries requiring licensing by the HTA, which are available from their website. The HTA, however, encourages that all facilities which may store the deceased adopt the standards and guidance as best practice. When designing a mortuary, planners and designers should familiarise themselves with HTA standards and any associated guidance.

1.18 Since the publication of the previous guidance, new guidance, standards and recommendations have also been introduced which affect the delivery of mortuary and post-mortem services. These include:

- HTA Codes of Practice (see https://www.hta.gov.uk/guidanceprofessionals/), with which licensed establishments must demonstrate compliance:

1.19 Code A – Guiding Principles and the Fundamental Principle of Consent

Code B – Post-Mortem Examination

Code B – Post-Mortem Examination Standards and Guidance

- BS EN ISO 15189:2012, Medical laboratories – Requirements for quality and competence (ISO 15128:2012)
- HSG283 Managing infection risks when handling the deceased, Health and Safety Executive (2018)
- Approved Code of Practice and guidance L24: Workplace health, safety and welfare, Health and Safety Executive (2013)
- The Kerslake Report: an independent review into the preparedness for, and emergency response to, the Manchester Arena attack on 22 May 2017 (2018)
- The Hutton Report: a review of forensic pathology in England and Wales (2015).

1.20 Additional guidance has also been introduced by regulators and the NHS in England in response to the COVID-19 pandemic. Whilst this is in part a response to a particular pathogen, the broad principles are pertinent to other excess death events.

1.21 Whilst this document will allow planners to consider how emergency provision could be

provided on hospital sites, if needed by the local system, it should be noted that permission to provide emergency mortuary facilities is regulated by the HTA where activities falling within scheduled purposes must be licensed.

References to other HBNs and HTMs

1.22 Guidance on generic spaces and systems are contained in the following publications, which should be read alongside this document:

- HBN 00-02 – 'Sanitary spaces'
- HBN 00-03 – 'Clinical and clinical support spaces'
- HBN 00-04 – 'Circulation and communication spaces'
- HBN 00-07 – 'Resilience planning for the healthcare estate'
- HBN 00-10 – 'Sanitary assemblies'
- HBN 00-09 – 'Infection control in the built environment'
- HBN 00-10 – 'Design for flooring, walls, ceilings, sanitaryware and windows'
- HBN 08-02 – 'Dementia-friendly health and social care environments'
- HTM 03-01 – 'Specialised ventilation for healthcare premises'
- HTM 04-01 – 'Safe water in healthcare premises'
- HTM 05-02 – 'Firecode: Fire safety in the design of healthcare premises'
- HTM 06-01 – 'Electrical services supply and distribution'
- HTM 06-02 – 'Electrical safety guidance for low voltage systems'
- HTM 06-03 – 'Electrical safety guidance for high voltage systems'
- HTM 07-01 – 'Safe and sustainable management of healthcare waste'
- HTM 08-01 – 'Acoustics'.

Part 1: General considerations

2.0 System planning considerations

2.1 Users and communities are at the heart of our mortuary and post-mortem services. Ensuring care, dignity and respect for the deceased and bereaved visitors, together with everyone's health and safety, is key to success and compliance.

2.2 HBN 16-01 provides guidance on the planning, design, and standards to achieve the above for a range of mortuary and post-mortem services. It covers stand-alone facilities or units which form part of a larger complex and operate on behalf of either one or multiple public agencies within a contractual agreement.

2.3 Current facilities for mortuary and post-mortem services in England have the challenge of providing appropriate services in a large variety of physical, geographical, commissioning and organisational contexts. As a one-size-fits-all approach is not possible, pragmatism in collaboration with partner organisations is essential.

2.4 Deciding on the level of service provision within the design brief requires close collaboration between partners including local authorities, Coroners and their staff, police and other stakeholders involved in mortuary and post-mortem services (hereinafter referred to as "local system partners").

2.5 The Public Health Act 1936 states that local authorities may, unless otherwise instructed to do so by the Secretary of State, provide public mortuaries and post-mortem facilities for all those in their area who require those services. It is also the responsibility of local authorities to coordinate and plan for mass fatality events. In many areas, local authorities contract with the NHS to fulfil these obligations.

2.6 By defining the core facility requirements for each functional element, this guidance helps to ensure that care, dignity and respect are integral to mortuary and post-mortem public services across the wide range of facilities in the NHS.

2.7 Where existing facilities do not meet the defined quality for a particular function, investment or an alternative means of delivering this with care, dignity and respect should be sought. For example, bereaved visitors should not be taken to a facility that does not adequately provide for their needs.

Hierarchy of facility types

2.8 In conjunction with local system partners, planners should determine the level of service required within each facility relative to the health and governance system it operates in.

2.9 The level of service can be categorised into the hierarchy of facility types shown in Table 1, and should be considered when planning facilities.

Table 1 Hierarchy of facility types

Level	Service provision	Functional content	Example of host facility
0	None	None. Operational policies needed to address management of bodies.	• Intermediate care centres, supported living, and community hospitals.
1	Body store only	Body store	• Community hospitals
2	Basic mortuary	As above plus: • bereaved visitors' suites • dedicated staff facilities	• District general hospitals • Small tertiary centres
3	Full mortuary	As above plus: • post-mortem facilities • high risk/isolation post-mortem facilities (potential)	• District general hospitals, teaching hospitals and larger regional hospitals where the centre of excellence exists elsewhere regionally
4	Regional centre of excellence mortuary	As above plus: • non-invasive diagnostic facilities • high risk/isolation post-mortem facilities	• District general hospitals and larger regional hospitals, where the centre of excellence does not exist elsewhere regionally

2.10 Key functional elements of a mortuary or post-mortem service are shown in Table 2.

Table 2 Functional elements of a mortuary

	Service provision	Body store	Basic facility	Full facility	Regional centre of excellence
A	Receipt, storage and removal of bodies	•	•	•	•
B	Staff and support facilities	o	•	•	•
C	Bereaved visitors' suite				
	viewing rooms	o	•	•	•
	counselling rooms		o	•	•
	religious washing facilities	o	o	o	o
	access to garden	o	o	o	o
	waiting area	o	•	•	•
	dedicated vehicle access		o	o	o
D	Post-mortem services				
	general			•	•
	paediatric			•*	•
	criminal forensic			•*	•
	high risk/isolation room			o	•
E	Non-invasive imaging				o**
F	Teaching and research		o	o	•

Key: o Optional • Essential

* subject to local system planning requirements

** subject to non-invasive imaging provision within the system being provided by another provider

2.11 Whether a facility is classed as a body store or regional centre of excellence, each mortuary should provide quality facilities that meet the minimum standards of the key functional elements needed for the services offered.

2.12 The core aim of any facility should be respect and dignity towards the deceased and their bereaved visitors, within an overall context of public health, safety, security and sustainability.

2.13 Table 2 sets out the various levels of provision for consideration by those managing existing or commissioning new facilities. It is essential that a facility has sufficient and suitably trained staff and is of sufficient size to sustain its agreed functional elements.

2.14 When considering the type of facility and its functional content, it is important that planners take into account the wider local context, assessing what other facilities across the region exist, their capability, capacity, and quality of infrastructure.

2.15 It is the responsibility of local authorities to manage and look after non-hospital community deaths. Planners should confirm the contractual relationship between the hospital and local authority when considering the future capacity of a hospital mortuary.

2.16 Planners should also assess local civil contingency plans, considering the role and operation of hospital facilities during mass fatality and mass casualty events and ensuring that plans meet both the normal operational needs and those required in extraordinary events. Chapter 9 addresses considerations about emergency planning in more detail.

2.17 Mortuary premises should be reviewed regularly with a view to ensuring sustainability and improving resilience, processes and resource sharing. This requires continued collaboration between all local system partners including funeral directors and crematoria. Members of the local community should also be involved in this process.

Joint agency, shared mortuary, and post-mortem facilities

2.18 The current policy to encourage collaboration and integration of clinical services also applies to the planning and provision of mortuary and post-mortem services.

2.19 All relevant bodies for this service provision in England, including NHS Trusts, local authorities, police, Coroners and their partnership organisations, such as universities, should consult and collaborate to ascertain whether joint agency, shared mortuaries and/or post-mortem resources could best meet the needs of the public. Where this is the case, all stakeholders should endeavour to ensure this happens and seek to apply the standards set out in this HBN.

2.20 The key advantages of joint agency or shared provision should include:

- enabling the deceased and their bereaved visitors to be treated consistently, without segregation or differentiation, simply due to the place where death occurs
- mortuary services, accommodated in a sustainable “centre for excellence”, can better maintain a high-quality service and reduce duplication of resource
- encouraging shared resource; best practice, staff skills, latest equipment, training (etc), thus providing resilience and improving service sustainability
- potential to reduce capital and revenue costs because of economies of scale and joint management of staff and facility resources

2.21 Where joint provision is part of a wider service, for example a regional pathology service, healthcare campus or university research facility, advantages should also include:

- improved access to key support resources and facilities, such as a pathology laboratory, specialist imaging, training and conference rooms, research, spiritual sanctuaries, cafes/ restaurants, and public transport
- improved briefing on clinical events related to death and, with the correct protocols in place, direct access to medical records
- improved accessibility to/from related services to support skills development, staff awareness and future recruitment.

2.22 In line with HSG283, a risk assessment of all aspects of proposed mortuary functions and service provision should be carried out. This will inform design development.

Digital technologies

2.23 All healthcare organisations should implement a comprehensive digital strategy which requires adoption of digital transformation across the entire organisation.

2.24 Digital systems selected will be critical to the success of mortuary and post-mortem services, not just within the hospital but across the whole system.

2.25 Digital systems should offer a wide range of interoperability, compatibility and amenity for the potential multiple agencies and partners involved in the facility (for example NHS Trusts, local authorities, Coroners, police and universities), satisfying each of the agencies' security protocols and policy requirements.

2.26 Any system implemented should be resilient to exceptional demand created throughout excess death events and mass fatality events.

2.27 As the NHS implements digital transformation technologies, consideration should be given to the use of digital systems to support elements of activities within the mortuary (such as reporting and monitoring of site capacity and patient identification/tagging).

2.28 Examples of IT data handling needs (which will include audit systems) to be met by the installation include those shown in Table 3.

2.29 Digital systems implemented within the mortuary must be flexible and adaptable to meet the varying reporting needs of external agencies, such as NHS England. A robust system should be in place to ensure no unauthorised access. (Regular access audits should be undertaken to ensure that people who do not need access are removed.)

2.30 Telecommunications cabling and related ICT infrastructure should comply with the Institution of Engineering and Technology's (IET's) most recent guidance, for example 'Code of Practice: building infrastructures for healthcare ICT' (2020).

Table 3 Examples of IT data handling needs

Within mortuary and post-mortem facility	From and to other areas/agencies
• admin/records for deceased	• results from labs and imaging
• traceability of organs and tissues removed at PM stage	• patient records
• general communications	• Coronial notifications (etc)
• managing materials and stores	• police records, etc
• managing statistical information	• university communications (etc)
• direct dial phones (including VOIP)	
• audit systems	
• security and access control tracking	

Calculating capacity requirements

2.31 It is reported that prior to the recent pandemic, many mortuaries in England were already operating at capacity. When planning a mortuary, it is critical that calculating capacity with a sound basis is undertaken by the mortuary manager in conjunction with local system partners, using all available evidence to substantiate the final estimate.

2.32 It is unfeasible and unaffordable for the NHS to plan provision for all scenarios, but planners should base estimates on realistic and economically feasible levels of provision. Space should be identified for temporary surge capacity to be located when needed.

2.33 Factors that will be taken into consideration regarding local activities include whether the facility has body storage and PM activity for just hospital caseload or hospital and Coronial, which will have an impact on turnaround times.

2.34 At a system level, where there is a divergence between the calculated economic requirement and the worst-case scenario, a centralised overflow capacity is a logical solution to achieve economies of scale. This should be agreed between all system partners.

2.35 When the cause of death is known, families can engage a funeral director and plan bereavement services on receipt of a medical certificate of the cause of death; often, this is within hours of death.

2.36 It is allowable, in smaller facilities, for the NHS to follow this pattern and have contracts with local funeral directors (where families do not choose their own funeral director) to collect the deceased within four hours of the time of death. This process may be extended if death occurs overnight, and arrangements are unable to start until the next morning.

Calculating body storage provision

2.37 Death rates have remained relatively stable over the past decade (with the exception of the recent pandemic). However, during the same period, facilities report a growth in body storage requirements.

2.38 A combination of economic, social, demographic and legislative pressures has increased the quantity and the length of stay in many mortuaries; for instance, funeral poverty can delay funeral director appointment and subsequent body collection. Meanwhile, public and private sectors are under economic pressure regarding both the capacity and quality of facility provision.

2.39 This results in a service with little or no resilience, even for regular excess death variations, such as seasonal flu and winter pressures. Multi-agency planning on a national, regional and local level is required to ensure that mortuary and post-mortem resources are in the right location, monitored and sustainable.

2.40 The recent COVID-19 pandemic has resulted in a greater appreciation for planning mortuaries more robustly with greater emphasis on ensuring appropriate, sufficient and secure capacity in body store provision. However, it is not cost-effective to cater permanently for excess death events.

2.41 HTA guidance states that planners should provide sufficient long-term permanent storage resilience, which takes into account predictable peaks in demand, for example through the seasonal effect often reported as “excess winter deaths”.

2.42 When calculating the size and capacity of a mortuary, planners should consider the following factors:

- the clinical services offered within the hospital: for instance, paediatric and maternity services, infectious diseases and/or high-consequence infectious diseases, centre of excellence status for

trauma, transplant etc will affect the fridge sizes required, the potential demand for hospital post-mortems and isolation requirements for post-mortems

- the demographic profile for the local area generally and patient catchment for specialist services. This will include regional and national population trends in provision, including BMI percentiles for people living with excess weight, ethnic and cultural diversity, and so on
- any sites of particular risk within the hospital catchment area, including high-risk employment sites, large entertainment venues and retail venues will inform the need for the potential of mass casualty events and isolation rooms
- historic and projected volumes analysis, including length of stay trends, regular and exceptional event risks and capacity planning available from local records and the Office for National Statistics (ONS))
- any previous reliance on or need for temporary storage facilities within the current or neighbouring facilities. This will require collaboration and consultation with local system partners.

2.43 Following the calculation of total capacity requirements, planners will then need to specify the proportions of each type of fridge and freezer required. Table 4 sets out the range of fridge/freezer widths that should be considered.

2.44 The number of tiers included in each fridge size will be determined by the height of the internal spaces and the equipment available to load and offload bodies from the fridges/freezers.

2.45 Planners should consider how temporary, cost-effective extensions to capacity can be delivered with ease to allow seamless operational integrity.

2.46 Planners should assess the likely demand against the total provision locally, taking into account agreement for sharing resources with local system partners including funeral directors.

Post-mortem room provision

2.47 Coroner statistics for 2021 show that post-mortem examinations were carried out on 43% of all deaths reported in 2021. There were 84,600 post-mortem examinations ordered by Coroners in 2021, a 7% rise compared to 2020. The proportion of reported deaths requiring a post-mortem has increased by five percentage points over the same period.

2.48 Except for child cases where genetic indicators may be sought, it is increasingly rare for post-mortem examinations to be requested by the NHS or relatives. For many, death occurs after a known illness in hospital or at home, and their clinical notes will already capture the key cause(s) for certification.

2.49 If a body is on premises not licensed by the HTA, at the point it is known that a post-mortem is required, the body must be moved to HTA licensed premises as soon as possible, and this must be done within seven days.

Table 4 Range of fridge/freezer sizes

Type	Tray width range in mm	Notes for use
Narrow	500 – 600	This size should only be used for paediatric storage and infill spaces
Standard	600 – 700	
Wide	700 – 800	This size should be the predominant size
Bariatric	800 – 950	

2.50 There is an increasing risk to post-mortem service sustainability, particularly in terms of staff accreditation, training and recruitment, and any further volume falls will exacerbate this. Service viability is currently dependent on individual agency economic pressures. The future locations, levels and quality of this service are dependent on an increasing ability to jointly plan and operate a post-mortem service network across public agencies.

2.51 The demand noted above does not include the use of the post-mortem facilities for non-post-mortem functions, including training and organ and tissue retrieval. Trainees and professional observers may be in the post-mortem room or the observation area.

2.52 Factors that need to be considered in deciding the number of post-mortem tables are:

- the existing number of post-mortems performed, especially historic and projected figures, local and national risks, regular and exceptional event planning and workload distribution
- the need for pathologists to be able to perform efficiently, for instance carrying out more than one post-mortem examination at a single attendance in the mortuary
- an assessment of the length of time required to perform a post-mortem, and the time required for preparation, prior to and after the examination
- the need for criminal forensic investigations, high-risk cases and training; usually these are segregated by time slots, or where volumes justify, a separate room.

3.0 General functional and design requirements

3.1 Once the scale and functional content of the mortuary is confirmed, it is important to consider the siting of the facility within the hospital context along with general design considerations.

3.2 This chapter provides guidance on a range of key technical issues to consider when briefing, planning or assessing facilities for mortuary or post-mortem services.

3.3 Historically, mortuaries have been in spaces that are either separated from the main service delivery locations or are in inaccessible places within the main building, thus demeaning the significance of this space. It is important that siting of the mortuary is considered fully in order to provide security for all mortuary users, dignity to the deceased, respect to bereaved visitors, and to maintain the safety of staff.

3.4 Decisions on where to locate mortuaries should be made in collaboration with the community, security services and other service providers who may operate from the building. These groups include: the local community (including local religious and cultural groups), staff of the facility, the local police force and Coroner's office, local funeral directors and any other groups expected to be making use of the site in the future.

3.5 Consideration should also be given to the following factors:

- compliance with local planning policies on sustainable development
- ecology measures to enhance the ecological value of any site, if a peace garden/reflective space is required
- climate change resilience needs to be taken into consideration through selection of materials, consideration of modern methods of construction, and control of increased temperatures and reliance on predicted higher temperatures and wind factors.

Choosing the mortuary location

3.6 The following aspects should be considered when choosing the location of the mortuary:

- discreet location and secure external access for vehicles, suitable for the planned volume of traffic at any time of day or night
- discreet and secure yard/routes – for instance, sleeping accommodation and public areas such as waiting rooms and corridors should not overlook the body receipt and removal entrance
- subtle and secure internal access for intra-hospital transfers, ensuring that members of the public are shielded from

viewing mortuary trolleys accessing the space, as far as is reasonably practical

- where hospitals have viewing facilities, there should be a separate, secure access for bereaved visitors (and where possible, external access should also be provided)
- the need for functional flexibility, including proximity to hard landscaping, which should be provided directly adjacent to the mortuary to allow for temporary facilities in the case of excess death events and mass fatality events.

3.7 Where post-mortem services are included, the requirements set out above should be considered, plus:

- increased volume and complexity of throughputs, extra storage, and multiple agency use (such as increased space and more complex adjacency layout)
- increased security and discretion, particularly from the press/media (for example an entirely secure and enclosed garage space for vehicular body loading)
- increased access/relationship to services such as histopathology laboratories (including CT scanners), imaging, clinical research, police, local authority, NHS, child services, training, etc.

3.8 The access route for the deceased should be separated from other activities and secure where possible. It is essential that patients and their visitors, who are emotionally vulnerable and possibly traumatised, are protected from witnessing the transfer of the deceased where reasonably practicable.

3.9 The provision of bereavement services and medical examiner services does not need to be in immediate proximity to the mortuary; however, the siting should allow a clear and easily navigable route between these spaces for bereaved visitors.

3.10 Access into the facility for the deceased's visitors should be well considered. Access routes should be well-lit, appropriately decorated and free from obstruction. They should not be storage corridors. Respect and empathy should be shown to bereaved visitors at all times.

3.11 The number of entrances into the mortuary should be kept to a minimum, yet balanced with the need for appropriate separation between the different end-users:

- there should be a dedicated entrance into the mortuary for the deceased which is not shared with visitors
- there should be staff entry which can be combined with the visitors' entrance or deceased entrance for smaller facilities (depending on the size of the facility, staff numbers and operational model)
- larger facilities will provide separated entrances, creating a more serene ambience for bereaved visitors
- entrances should not be in close proximity to each other, and the entrance for the deceased should not be seen from the visitors' entrance.

3.12 Site constraints may determine whether the mortuary is a stand-alone facility or integrated into the curtilage of a larger facility, such as the main hospital building. The choice of location should be based on spatial and operational considerations, such as discreet transfer routes, health and safety of staff during inclement weather, and vehicular traffic flows affecting patient accommodation.

3.13 Siting the mortuary on the ground floor is often ideal; however, dependent on scale, vertical links may actually improve otherwise excessive circulation. Splitting over two levels may offer the advantages of better acoustic separation between public and working areas and the security of spaces at upper levels. (This benefit will be offset by the additional costs incurred through the incorporation of lifts which will need to be dedicated to the

department.) To ensure that service resilience is maintained, there will need to be a minimum of two lifts. There should be a clear cost–benefit analysis for such decisions.

3.14 It should be ensured that the general public can go about their daily business without overlooking the mortuary body entry. However, staff safety issues must take priority when transferring the deceased during hours of darkness or inclement weather, and so the design should balance minimising overlooking with the need for passive surveillance and routes of escape.

3.15 If a mortuary has post-mortem facilities, there may be times when the facility is used by the Home Office pathologist for criminal forensic examination. In these situations, there may be an increased presence from the police, security services and members of the press. Discreet access for the deceased, police and security service representatives in such cases is essential. The space provided must be capable of being shielded from intrusion from the press and onlookers.

3.16 Sufficient space needs to be made available elsewhere on site in cases where there is a significant press presence.

Layout and flow

3.17 It is essential that the internal layout of the mortuary facility, particularly the provision of separate access and circulation routes for visitors and staff, is considered to obviate the risks of:

- visitors straying into work areas and witnessing situations that could be distressing and cause emotional harm
- not protecting the deceased from unwarranted intrusion.

3.18 There are two distinct activity areas within a mortuary, these being:

- a clinical area
- a non-clinical area.

3.19 The activity areas with the mortuary should be sub-divided into the following zones, which will reflect the scale and scope of the facility required:

- **Public zone:** the bereaved visitors' suite contains viewing rooms for bereaved visitors; some counselling may take place; *this is a non-clinical area*
- **Staff zone:** staff welfare and administration spaces; *this is a non-clinical area*
- **Transition zone:** where the deceased are stored and subjected to non-invasive procedures; *this is a clinical area*
- **Post-mortem zone:** the post-mortem suite contains one or more post-mortem rooms where invasive procedures are undertaken on the deceased; *this is a clinical area*
- **Diagnostic zone:** non-invasive diagnostic facilities (if required); *this is a clinical area*.

3.20 The above terminology is adopted in order to maintain synergy with other NHS technical guidance publications (principally HBNs and HTMs). Readers should note that external guidance, in particular guidance released by the Health and Safety Executive, refers to "dirty", "transition" and "clean" zones. For clarity:

- both non-clinical areas are classed as "clean" zones under external guidance
- the post-mortem zone is classed as a "dirty" zone under external guidance.

3.21 The relationship of key functional elements to each zone is shown in Table 5.

3.22 The eventual layout should comprise of activity areas and work zones co-ordinated to reduce and eliminate the movement of people and materials unnecessarily between other activity areas and zones. A generic layout is included in Appendix B

Figure 1 Indicative zonal adjacency diagram for a full mortuary

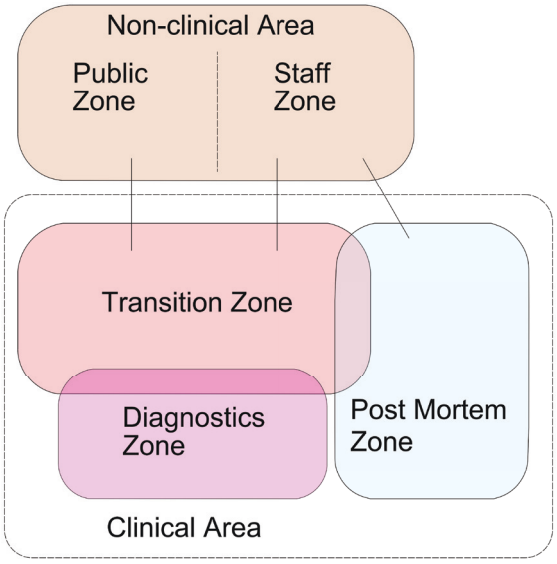


Table 5 Zonal separation of functional content

Non-clinical areas	Clinical areas
Public zones include:	**Transition zones include:**
• the reception area • waiting area(s) • visitor/interview room(s) • visitors' toilets • viewing rooms	• bier room(s) • body store • body receipt vestibule • store room • body preparation and ritual washing facilities • bier storage room(s)
Staff zones include:	**Post-mortem zones include:**
• staff welfare spaces • offices, meeting and training rooms • general and linen store • post-mortem observation area • staff changing areas • staff support facilities • housekeeping store	post-mortem room • dirty utility/instrument store • waste disposal room • housekeeping store • specimen store • specimen collection and packaging
	Diagnostic zones include:
	• diagnostic facilities (either dedicated to mortuary or as part of the wider hospital)

3.23 Key flow considerations are:

- The body receipt vestibule(s) should be dedicated secured space(s) for staff to manoeuvre, hand over and administer to the deceased in dignity. Ideally one single room/route for all internal and external transfers should be used, for ease of security, space and staff resource (albeit separate accesses are acceptable for external and internal transfers). The vestibule(s) will adjoin a vehicular service yard/garage and/or a main hospital/campus circulation route, where the deceased can be transported discreetly. The vestibule(s) should directly link into the body store through access-controlled doors or lifts. Bodies should not enter or exit the mortuary via any other access route.
- The body store should link directly to a corridor serving the bier/viewing room(s), housekeeping store, staff zone and post-mortem room(s) through body

pass-through fridges, including walk-in fridges for people of size.

- The only access point for staff working in the post-mortem rooms should be through the transit lobby. Operational policies should be put in place to ensure that staff do not use the refrigerated store room as a normal access point into the PM room.
- The bereaved visitor suite (public zone) should be a serene and calming space and therefore segregated visually and acoustically from the secured staff zone and clinical areas, which includes the body store and post-mortem room.

3.24 The staff and support facilities, including teaching and research suite if included, should ideally be secure and close together to minimise circulation, but need to link to and serve each of the other key functional elements.

3.25 Operational practice should ensure that all contact with bodies, organs and unfixed specimens is strictly limited to the clinical areas. The transition zone should only allow minimal, non-invasive contact.

3.26 An example department layout drawing is included in Appendix B.

Storage

3.27 The safety and security of storage in a mortuary may go beyond the routine need to safeguard supplies against misuse or theft. Specific considerations include:

- **belongings of the deceased:** secure storage for the personal items and valuables of the deceased:
  - items removed from infectious or contaminated bodies must be handled in line with the principles of standard infection control precautions (SICPs) and transmission-based precautions (TBPs), which continue to apply while deceased individuals remain in the care environment. Such measures will be included in the 'Care of deceased persons infection prevention and control (IPC) policy', (hereinafter referred to as the 'IPC policy') – covering, for instance, safe, segregated storage/disposal
  - items removed from criminal forensic case bodies must be handled and stored in accordance with criminal justice guidelines and police policy (for example in criminal forensic physical evidence secure storage)
  - all items should be returned, including clothing
- **specimen storage and packaging:** secure refrigerated and freezer storage should be provided for tissues and samples taken from the deceased. Segregation of clinical research samples and criminal forensic case samples is required. (Caseload volumes will determine whether this is simply a separate shelf, a separate refrigerator, or separate rooms.) All fridges/freezers containing samples will need to be monitored for temperature variation and alarmed – this is especially important for the storage of criminal forensic samples
- **staff changing:** lockers for personal clothing and valuables, plus shelving for personal protective equipment (PPE) including coverall suits, boots and breathing apparatus. Small sites may use general staff change areas for mortuary staff.

Care, safety and security

3.28 Everyone should receive the care, dignity and respect in death that they would wish during life. It is the responsibility of all public bodies to collaborate and deliver this to their communities, within the overall context of public health and safety provision.

3.29 As part of the IPC policy, appropriate risk assessments must be undertaken for the facility at all stages of design and operation, to identify and mitigate the key risks to:

- care
- safety and security (such as is required for lone working)
- access control and monitoring
- out-of-hours collection and deliveries
- environmental infestations
- infection transmission
- refrigeration failure.

3.30 The nature of the work undertaken by these services can attract unwanted attention. Unauthorised access must be prevented for reasons of both health and safety and security. Entry points into the mortuary, and to the secure areas within it, must:

- always be controlled by staff, for example through video/audio intercoms
- be access-controlled through a digital system for staff, for example swipe card, fob or other intelligent solution, with visitors escorted when in the facility
- allow mortuary and other NHS Trust managers the ability to regularly audit matters such as access arrangements, CCTV and trends.

3.31 Active surveillance of each entrance and the body store area is to be provided both within the mortuary facility and to an appropriate, constantly staffed area, for example a Trust security hub. Such equipment should be located so as to comply with data protection legislation.

3.32 All active surveillance measures should be capable of being isolated and turned off in cases of extreme public interest.

3.33 Notwithstanding the need to ensure that entrances that receive bodies are not overlooked, there is a need to consciously allow a level of passive surveillance covering foot entrances and the approach to body entrances. Passive surveillance measures are a cost-effective way to support good behaviour and discourage opportunistic malfeasance.

Internal environment considerations

3.34 Good interior design can contribute to visitor and staff wellbeing, and the aim should be to create a serene, comfortable and safe environment throughout the facility (within the constraints of mortuary best practice). Interior design should be particularly sensitive to the needs of bereaved visitors.

3.35 Interior design (such as colours, textures, space, fittings, furniture, finishes and lighting) should work holistically
to facilitate the function of the accommodation and provide an efficient, robust and safe working environment appropriate for the activities in each area, including ease of cleaning and environmental decontamination. As visitor areas are non-clinical, they may be more “domestic” in style, for example through the use of non-coved skirtings and timber handrails.

3.36 Art, wayfinding, daylight and greenspace views should also contribute to a serene, calming and reassuring experience for visitors and staff. Providing connection to nature is particularly evidenced to benefit improved wellbeing and stress reduction.

3.37 When designing facilities, it is essential that consultation with members of staff and the local community is undertaken to ensure that the internal environment is optimised for the local community’s specific identity and needs.

Natural and artificial lighting

3.38 Reference should be made to the following guidance documents:

- HBN 00-10 Part D – 'Windows and associated hardware'
- CIBSE LG2 – 'Lighting for healthcare premises'.

3.39 The benefits of natural light, ventilation and visual links to the outside, especially to green space, are well evidenced, for example memorial gardens or nature walks. Appropriate windows are to be encouraged wherever staff and/or visitors spend time.

3.40 Daylight should be incorporated wherever possible, with windows that maximise light but maintain privacy. There should be access to daylight for rooms that are deemed to be the main workspace for staff and for the main staff welfare, rest and recuperation spaces. All areas, including post-mortem rooms where staff work, should be prioritised to benefit from natural lighting.

3.41 Glare should be minimised, and may be controlled by curtains or blinds. Solar gain can be mitigated by external screens or by the shape of windows and depth of reveals.

3.42 The position and design of windows and roof lights should ensure that the key sensitive internal mortuary and post-mortem spaces cannot be seen by the public.

3.43 Viewing rooms, and all other areas where bereaved visitors spend an extended time, should benefit from natural lighting, a view, and an opening window where possible. If possible, access to green space such as a memorial or peace garden should be provided, either as part of the facility or close by.

3.44 Artificial lighting design can significantly contribute to the aesthetic appeal of the interior and should complement natural lighting where possible:

- reception, waiting spaces and viewing rooms should have feature and dimmable lighting
- post-mortem suites should contain high-performance, robust task lighting and low-contrast glare-free background lights
- observation rooms should have dimmable lights and task lights for individual working.

3.45 When considering the general lighting in post-mortem rooms, consideration should be given to lighting providing appropriate colour rendition and red balance control (in order to optimise the visualisation of red tissues when assessing post-mortem lividity and decomposition).

Acoustics and noise

3.46 Reference should be made to HTM 08-01 – 'Acoustics'.

3.47 The acoustic environment for both staff and bereaved visitors should be carefully briefed early in the design process.

3.48 The layout design should mitigate the noise transmission between the clinical and non-clinical areas. There is a particular vulnerability via the viewing rooms.

3.49 The specification of finishes, furniture and equipment should be carefully considered in order to mitigate intrusive noise transfer, for example acoustic "art" wall panels, heavy curtains, soft-closing bin lids and doors. All must be compatible with cleaning and decontamination requirements and not compromise IPC or maintenance.

Infection prevention and control

3.50 NHS England's National Infection Prevention and Control Manual is an evidence-based practice manual for use by all

those involved in care provision in England. It should be adopted as mandatory guidance in NHS settings or settings where NHS services are delivered, and the principles should be applied in all care settings.

3.51 Collaborative multi-disciplinary risk assessments should be undertaken periodically and at key stages in the production of the design brief, site selection, master plan, design development, maintenance and operational use of these facilities. These risk assessments will inform the IPC policy.

3.52 HSG283 – 'Managing infection risks when handling the deceased', Health and Safety Executive guidance and industry-specific guidance for the handling, storage and examination of bodies, specimens and their facilities, must be followed.

3.53 Designers should also reference HBN 00-09 – 'Infection control in the built environment' and HBN 00-01 – 'General design'.

3.54 The COVID-19 pandemic has identified the need to consider potential pathogenic pathways which may be encountered in these facilities in future epidemics and pandemics. Avoiding the risk of infection transmission should be considered at the design stage of future facilities, for instance including adequate ventilation throughout the mortuary to reduce aerosol and droplet transmission, which during the COVID-19 pandemic saw staff and visitor areas became a hazard due to inadequate ventilation – windows were not sufficient alone, except perhaps in office areas.

Fittings and equipment

3.55 Fittings and equipment should be made of robust, impervious, non-rusting, non-decaying, non-staining materials.

3.56 Fittings and equipment should be designed for ease of cleaning (on all sides, wherever possible) and to be free from sharp corners or projections to mitigate accidents.

3.57 Body store and post-mortem suite fittings and junctions, particularly around dissection bench or observation room glazed screens, are continuously exposed to water, spray and heavy traffic and are subject to daily cleaning. They must be of durable design, robust, impervious specification, and subjected to regular assessment.

3.58 Ledges and gaps in fittings, floors, walls, doors and junctions must be eliminated where possible with sealed joints, impervious, robust, and durable to heavy traffic.

3.59 Door location, configuration, width, closers and door materials/finishes must all be designed to reduce damage by heavy traffic, trolleys, water and other contaminants. Ideally, locate doors away from splash zones or protect by a smooth impervious finish. Visual and acoustic privacy should be considered, particularly if "auto" opening doors are utilised. "Swing-free" closures are the preferred solution for fire doors, easing public or trolley access.

Floors and drainage

3.60 Floor coverings should contribute to each environment (for instance, serenity in visitor spaces) but reduce risk for slips, trips and infections, and endure heavy traffic. The floor should reflect the functions and risks of each space and effective maintenance regimes. For example:

- visitor areas: timber-effect acoustic vinyl, with sit-on skirting
- post-mortem suite and body store: anti-slip heavy-duty vinyl or equal and approved material, with a minimum of 100 mm self-coved skirting suitable for hose-wash and scrub daily and which can be replaced as required. The replacement and life cycle of the heavily used areas such as the post-mortem room need to be considered

- locations where biological or chemical spills are likely should ensure design mitigations are in place, such as stain resistance
- colour, pattern and tone should be used to define spaces and zones, traffic flows and room edges (but should pay due regard to the potential needs of those with neurodiversity – see HBN 00-03 for details).

3.61 Body store and post-mortem suite floors need to fall to drainage gullies, and also coordinate with fittings and equipment where a level surface is needed, such as for post-mortem tables, body storage and handling systems.

3.62 The falls to, location and type of gullies need careful design and robust specification for easy and regular maintenance, for example easily lifted short section channel gratings, allowing disinfection by submersion in a sink or container. The fall to drainage gullies must not be so great that it interferes with trolley manoeuvrability.

3.63 Water pooling is not acceptable; this must be tested and eliminated before handover.

3.64 Design and positioning of the post-mortem boot wash will require careful consideration and must support the Equality Impact Assessment (see paragraph 3.74). Options include:

- a boot trough floor recess within the post-mortem doorway of the transit lobby, which will require careful design to enable easy filling, cleaning and drainage whilst reducing risks such as slips and trips
- a “step-over” barrier, with a boot wash station on the dirty side of the transit lobby.

Maintenance and cleaning

3.65 This section should be read in conjunction with the National Standards of Healthcare Cleanliness published by NHS England.

3.66 Within the mortuary the number of housekeeping stores should be reviewed in line with the zoning strategy. It is anticipated that up to three independent housekeeping stores may be required in order to prevent cross-contamination between the functional areas:

- one serving the non-clinical area, located in the staff zone
- one located in the body store, serving the transition zone
- one located in the main post-mortem room, serving the wider post-mortem zone.

3.67 In addition to the housekeeping stores, a cleaning station should be provided within each isolation post-mortem room to allow simple cleaning actions when needed.

3.68 The equipment and functions of the housekeeping store(s)/bays should be determined by local policy.

3.69 Within each housekeeping store should be space for a lockable cupboard space to store COSHH and space for the secure storage of stock, with shelving for in-use materials. There should be adequate space for manoeuvring machines, emptying and filling buckets and bowls, and routine servicing and cleaning of equipment.

3.70 Mortuary and post-mortem facility structure and finishes need to be appropriately robust to withstand operational use, for instance trolley impact and vigorous cleaning regimes.

3.71 Materials specified must be fit-for-purpose within a mortuary context and not necessarily consistent with those used across

the rest of the hospital building. Specifications should minimise redecoration and replacement where possible (for example, post-mortem floor and wall surfaces should be to full height and impervious).

3.72 The junctions and interfaces of each fixed and free-standing component should be carefully designed so that as a unit they withstand wet/heavy operational use and required cleaning regimes. All joints should use antifungal material. Gaps or inadequately specified/constructed joints should be designed out or eliminated wherever possible.

3.73 All furniture and finishes in bereaved visitor areas should be able to withstand cleaning regimes required in health facilities, including exposure to advanced technologies (for example steam, UV, HPV). This includes all soft seating, artwork, ceiling finishes, wall finishes and floor coverings.

Equality Act 2010

3.74 This guidance must be read in conjunction with the public sector equality duty in the Equality Act (2010) and the Equality Act 2010 (Specific Duties) Regulations (2011), or current equivalents.

3.75 These Acts state that public authorities, including the NHS and local authorities, must give “due regard” to the need to eliminate unlawful discrimination, advance equality of opportunity and foster good relations. There must be an integrated response across services, facilities, training and communications to ensure the characteristics protected by the Acts are appropriately served. All proposed public investments need an Equality Impact Assessment at the outset of project development.

3.76 BS 8300 for design of buildings and their approaches to meet the needs of disabled users provides the minimum standard for both visitor and staff access needs.

3.77 HBN 00-02 – ‘Sanitary spaces’ provides guidance on sanitary spaces, including both public and clinical toilet facilities. HBN 00-03 – ‘Clinical and clinical support spaces’ provides guidance on clinical and clinical support rooms. HBN 00-04 – ‘Circulation and communication spaces’ provides guidance on corridors, stairs and circulation spaces, including widths for trolley movement.

3.78 It is essential that this public facility appropriately promotes equality and respect for everyone. This includes visitors, staff and the deceased, with a wide range of specialist needs (for example mobility, cultural, language, communication, religion, gender, orientation and age).

3.79 This approach is to be fully adopted in the design, with a particular emphasis on the needs of the elderly, for instance the height of viewing screens, clear and dementia-friendly signage, distinguishable wall and floor junctions and finishes, and acoustic design considerations for the hearing impaired. HBN 08-02 – ‘Dementia-friendly health and social care environments’ provides guidance on elderly and dementia-friendly environments, and should be used for all bereaved visitor areas, and for staff and teaching areas. See also HTM 08-01 – ‘Acoustics’.

3.80 Reception and interview areas will require an induction loop and inductive coupler phones. See HBN 00-03 for guidance.

3.81 The design and equipment specifications in changing, body handling, post-mortem and other staff areas should be as inclusive as reasonably practicable, all relevant decisions being recorded and justified in the project Equality Impact Assessment.

4.0 Specific risks for mortuary and post-mortem services

4.1 A mortuary and post-mortem facility poses several specific health and safety risks, which require collaborative assessment and mitigations, including:

- **physical risks:** accidents and injuries that may be associated with the following are significant risks in the post-mortem and body store suite:
  - the use of equipment and heavy loads
  - manual handling issues associated with the lifting and moving of bodies, especially in light of increased numbers of people with excess weight
  - slipping and falling due to the presence of fluids on the floor
  - accidental cuts, from sharps, instruments, bone fragments or corners of a fitting
- **infection risks:** exposure to infectious agents already present in bodies received for storage and/or post-mortem or other materials received
- **electrical risks:** these can arise from incorrect or poorly maintained fittings or connections. Where electrical equipment such as appliances, light fittings, switches etc will be subjected to water in the form of splashes, jets or submersion, it should be specified to have the appropriate Ingress Protection (IP) rating to prevent electrocution hazards and damage. Alternatively, electrical equipment may be positioned such that the water risk and required IP rating is reduced (for example use of hanging sockets)
- **chemical risks:** associated with noxious or flammable chemicals such as fixatives, solvents or disinfectants, which are used regularly in the mortuary and post-mortem room
- **radiation risks:** from radioactive materials following their use for diagnosis or treatment, still present in the body; or from imaging equipment used post-mortem.

Design to minimise risks

4.2 The risks associated with a mortuary and post-mortem can be minimised not only by careful work practice, but also by good collaborative design. It is essential that the design team and others involved with procuring a new or refurbishing an existing mortuary and post-mortem facility appropriately consult with all those operating and using the services. Project team membership, under the leadership of a project director, should include:

- an NHS Trust representative

- a local authority director-level representative (as required)
- a histopathology manager and mortuary manager
- representatives of public bodies involved in operation or use
- representatives of staff and key users of the mortuary service, including mortuary anatomical pathology technologists (APTs), pathologists, hospital ward and hospital mortuary administrators, technical support, bereavement care officers etc
- representatives from IPC, health and safety, radiation protection, IT and estate teams, such as the Trust's safety groups and facilities group
- community representatives (for example, representation from local access groups and local faith groups).

4.3 This team should draw on both past experiences and future plans for the mortuary/post-mortem service. It is important to canvass the views of a wide range of stakeholders including other organisations affected by the proposed changes. This will include regulators, commissioners, local mortuary service providers, local system partners and users (for example universities, laboratories, external pathologists and members of public/community groups). Current and future mortuary equipment, materials maintenance contractors and suppliers should be widely consulted.

4.4 Reference should be made to good practice (for example as rated by the CQC) in other similar operations, both locally and nationally.

4.5 HTA-licensed establishments must inform the HTA of changes to premises. Consideration of HTA standards must be factored into designs to ensure compliance.

4.6 All equipment should be able to withstand regular decontamination, and should be assessed by the IPC lead when being specified. Pre-procurement questionnaires (PPQs) may be used to ensure that equipment can be adequately decontaminated and will not pose an IPC risk.

4.7 Equipment manufacturers may also be consulted at a very early stage in the design process, as the type of post-mortem tables, benches, refrigerators, hoists and trolleys selected can have a significant impact on working and handling procedures, and can impact on the area requirements within which they need to operate.

4.8 Well-considered design, subjected to assessment, is paramount to success. The early establishment of workflows that lessen the contamination risk from the outset can be key. It is established that to effectively control and minimise the risk of infection, a mortuary and post-mortem facility should comprise of distinct zones separating the various activity areas and functional zones. This needs to be considered early in the planning stage, and will determine working practices and flows within these areas.

4.9 Recommended decontamination schedules/standards, including appropriate cleaning and disinfection agents, together with the immunisation, staff health surveillance and provision and training of suitable PPE and protective clothing, are essential.

4.10 All entrances must be controlled and must facilitate authorised access only (as set out in paragraphs 3.28–3.33 'Care, safety and security'), with bereaved visitors being greeted and directed upon arrival to a waiting room or interview room with WC facilities nearby.

4.11 If the entrance is shared between staff and visitors, an open waiting area is not appropriate, and staff traffic through the public areas should be kept to a minimum.

4.12 Appropriate access controls should be provided, with practical consideration given to how limited staff can control varying entrances, especially out-of-hours or at busy times.

4.13 Security should be tailored to local requirements, functions and scale (for example, use of a dedicated local alarm panel or a more complex security system that forms part of a larger campus).

4.14 Security features to consider may include panic alarms, motion detectors, door contacts, window contacts/seismic window sensors and sounders with remote monitoring to a continuously monitored station.

4.15 CCTV security systems should be provided at all entrances, the site perimeter, and body stores. This may also be an option for the service yard, reception and visitors' area.

Risks related to infection

4.16 See UK Health Security Agency (UKHSA), NHS England and the Health and Safety Executive (HSE) websites for current guidance, in particular:

- HSG283 – 'Managing infection risks when handling the deceased' (2018), Health and Safety Executive, provides service planners with guidance on the management and handling of the deceased
- NHS England's 'National infection prevention and control manual' (NIPCM) for England
- the UKHSA's Advisory Committee on Dangerous Pathogens Secretariat advises on risks and handling of Hazard Category 4 Viral Haemorrhagic Fever in its 2015 Code of Practice. Facilities should be designed to address the directions of this Code of Practice.

4.17 The principles of standard infection control precautions (SICPs) and transmission-based precautions (TBPs) continue to apply whilst deceased individuals remain in the care environment. This is due to the ongoing risk of infectious transmission via contact (although the risk is usually lower than for living patients).

4.18 Washing and/or dressing of the deceased should be avoided if the deceased is known or suspected to have had an invasive streptococcal infection, viral haemorrhagic fevers or other Category 4 infectious agents. Appendix 11b of the NIPCM should be referred to.

4.19 Staff should advise relatives of the precautions following viewing and/or physical contact with the deceased, and also of when this should be avoided.

4.20 Deceased individuals known or suspected to have had a Category 4 infectious agent should be placed in a sealed double plastic body bag with absorbent material placed between each bag. The surface of the outer bag should then be disinfected with 1000 ppm available chlorine before being placed in a robust sealed coffin.

4.21 Risks related to the transmission and acquisition of Pulmonary Mycobacterium Tuberculosis should be identified at the earliest opportunity through review of patient records and a full risk assessment. Post-mortems where the patient has been infected with Mycobacterium Tuberculosis should be subject to a full and detailed risk assessment of those within the area, including the use of appropriate PPE. Further risk assessments may need to be made where the patient has been found to have multi-drug resistant Mycobacterium Tuberculosis (MDR) or extremely resistant Mycobacterium Tuberculosis (XDR-TB). If there is a high risk of potential acquisition of an infected patient, the high-risk post-mortem procedure should be considered within the design brief.

Risks related to formalin use

4.22 Formalin (which is a solution of formaldehyde gas in water) is commonly used as a fixative to preserve tissues for microscopic examination. The vapour that arises from solutions exposed to the air is pungent, and an extreme irritant to the eyes and respiratory tract even at very low concentrations. Skin exposure may lead to sensitisation. ECHA (EU 605/2014) re-classified formalin as a Carcinogen Cat 1B "presumed carcinogen". Formaldehyde gas is also flammable.

4.23 The Control of Substances Hazardous to Health (COSHH) Regulations 2002 state that exposure to formaldehyde must be controlled to be as low as possible below the maximum exposure limit of 2 ppm (2.5 mg m^3) in the air for both the eight-hour and 15-minute reference periods. Refer to HSE guidance, EH40/2005 'Workplace Exposure Limits', and EH40 2011 (or their current versions).

4.24 COSHH Essentials sheet SR10 provides useful information on local exhaust ventilation (LEV) as an engineering control for the use of formaldehyde. See http://coshh-tool.hse.gov.uk/assets/live/SR10.pdf.

4.25 The users of the facility should be consulted to determine precisely what activities involving formalin are being planned. This should be followed by a robust risk assessment to ensure that the proper use of this chemical is properly considered.

4.26 As well as strict controls over the use, storage and transport of formalin, continuous mechanical ventilation is necessary in areas where formalin is handled in order to minimise the formaldehyde concentration in the air to be as far below the prescribed limit as possible: this should be no less than six air changes per hour. Examination and testing of local exhaust ventilation must be undertaken at a maximum of 14-month intervals.

4.27 Personal exposure to formaldehyde must be monitored regularly, at least every 12 months, or when any change occurs that may affect exposure.

4.28 Formaldehyde should be provided on tap. The mixing and storage of formalin should then preferably take place in the specimen store, but can be made up in the dirty utility room: in both situations continuous ventilation must be provided. Alternatively, formalin may be provided on tap at the point of use, for instance at the dissection benches, or can be purchased ready made in sealed containers and used in ventilated areas, thus removing the need to mix it.

4.29 Operational practice should ensure that all work with bodies, organs and unfixed specimens is strictly limited to the post-mortem zone. Specimens should be brought out of the post-mortem room in suitable containers, and only after surface cleansing and decontamination. The specimens store should adjoin the post-mortem room, ideally with a separate access for collecting the specimens. The holding and transfer of specimens within the facility and subsequent transport onwards such as to the pathology laboratory, require local policies and risk assessment.

Risks related to waste disposal

4.30 HTM 07-01 – 'Safe and sustainable management of healthcare waste' should be referenced when considering waste management risks.

4.31 Waste products in the mortuary and post-mortem fall into six categories, as shown in Table 6.

Table 6 Waste categorisation in mortuaries

Waste type	Waste category
1. Human tissues	Anatomical waste (if no hazards are present)
2. Body fluids	Offensive waste (if no hazards are present)
3. Disposable, generally single-use items, such as paper shrouds, swabs, dressings, disposable protective clothing and gloves	Offensive waste, unless contaminated with a known infectious or hazardous material
4. Discarded syringes and other sharps; may include some implants	Sharps waste
5. Discarded chemicals, such as used fixative solutions	As advised on manufacturer safety data sheets and COSHH regulations
6. Non-clinical waste arising from office or general activities	Recyclable or domestic waste

4.32 Human tissues and body fluids should be treated with respect and dignity at all times.

4.33 Information is also available from the 'National guidance for healthcare waste water discharges' (2014) published by Water UK.

4.34 In a mortuary and post-mortem facility, two basic provisions are necessary to enable the safe management of waste. These are:

- a sluice or sluices for material suitable for direct discharge to drains, subject to the consent of the appropriate water authority (see paragraph 4.33)
- adequate secure storage and ventilation of no fewer than six air changes per hour for material in bags, packages or drums awaiting removal for appropriate treatment and disposal.

4.35 All post-mortem rooms should have direct access to a disposal hold for waste produced during procedures.

4.36 All post-mortem room sinks, floor drains and sluices etc will be prone to the build-up of tiny elements of clinical waste and therefore should be designed to allow capture wherever possible, facilitating easy removal and daily cleaning.

4.37 An appropriate rigid container clearly marked with waste stream and identification tags should be used for transporting clinical waste. An appropriate lockable space should be provided for storage of waste prior to collection.

Risks related to radioactive bodies

4.38 Planners are asked to refer to the Ionising Radiations Regulations 2017, Approved Code of Practice, and guidance for working with ionising radiation produced by the Health and Safety Executive.

4.39 Where mortuaries are separate from hospitals and are handling a radiation hazard for the first time, an Ionising Radiation Notification must be sent to the Health and Safety Executive (further information is available on its website).

4.40 Where radioactive compounds have been used for treatment or diagnosis during the life of the subject under examination, this may present a radiation hazard. This hazard extends to clothing and bed linen.

4.41 The majority of diagnostic investigations are undertaken with a radioactive isotope known as Technetium-99m. This isotope has a short half-life of only six hours, and thus post-mortem examinations and embalming, burial etc can usually take place 48 hours after administration of the substance. The external radiation hazard associated with most diagnostic investigations will be small, and special requirements are usually not necessary.

4.42 A number of therapeutic procedures are undertaken in cancer centres that involve large doses of unsealed radioactive substances being administered. Most notable amongst these is the use of Iodine-131 to treat thyroid cancer and Strontium-89 for bone

metastases. Virtually all the substances used have relatively long half-lives.

4.43 The design of the facility should adhere to guidelines set out in the Ionising Radiations Regulations and statutory requirements of the Radioactive Substances Act 1993.

4.44 The special problems of infection and radiation risks associated with a mortuary and post-mortem facility should be discussed at a local level, and the advice of the hospital health and safety advisor, IPC lead and Radiation Protection Adviser should be sought in the early stages of planning.

Risks with communication and information technology (ICT)

4.45 The safety and security in a mortuary and post-mortem facility go beyond the routine need to safeguard data privacy or misuse. Specific considerations include compatibility with potentially multiple agencies and systems involved in service delivery, but also press/media intrusion and communications resilience during an exceptional event or major incident. Such risks should be identified early in the design process and be assessed accordingly.

4.46 For communications and IT resilience, the project team should:

- consider multi-agency needs holistically at an early stage
- review relevant agencies' current policies and ICT equipment compatibility
- ensure sufficient account is taken at the infrastructure design stage in terms of architecture, engineering and needs of communications and IT, including:
  - data storage and data backup needs
  - flexibility of design – particularly for exceptional events/major incidents
- ensure reliable internet and telephone access in all areas that can be challenging, particularly where post-mortem facilities are located at basement level, they have dense or solid wall construction, or their body storage refrigerator units obstruct signals.

4.47 Inadequate ICT systems and reporting processes can present a major risk when coordinating a regional/national response to mass fatality and excess death events. For instance, the huge variety of systems and processes used by different sites to monitor their capacity presented huge logistical challenges during the recent pandemic response. This should be considered when specifying future systems – smarter working systems with open protocols to allow ease of use and information sharing and exchange should be utilised.

Part 2: Design considerations for the functional content of a mortuary

5.0 Clinical areas

5.1 Mortuaries contain two types of clinical accommodation:

- the body store
- the post-mortem suite.

5.2 The body store is designated as the transition zone in this HBN.

5.3 The body store is contained within all types of facility and will have the following rooms as a minimum:

- body receipt vestibule
- main body store room, including body fridges and freezers
- bier storage room(s)
- personal effects store
- body preparation and ritual washing facilities
- domestic services store.

5.4 Viewing rooms are a bridge between the transition zone and the bereaved visitor suite, due to the location of the deceased when being viewed. See paragraphs 6.20–6.41 ‘Viewing facilities’ for details.

5.5 The post-mortem suite is part of the clinical area in this HBN (it is classed as a “dirty zone” within external guidance).

5.6 Post-mortem facilities are contained only within full facilities and regional centres of excellence. These facilities will contain the following rooms as a minimum:

- post-mortem room
- isolation post-mortem room
- post-mortem dirty utility
- specimen store
- waste disposal room
- domestic services store.

Transition zone: body receipt, storage and removal facilities

5.7 The transition zone provides space for a number of activities:

- receipt of bodies on trolleys from within the hospital and from external sources
- labelling or identification of bodies and logging the details onto the information management system
- storage of bodies in refrigerated or freezer units
- removal, recording and storage of personal effects
- preparation, cleaning and placing of shrouds/bags on bodies
- non-invasive examination of bodies
- transfer by trolley/hoist of bodies to the body fridges and/or freezers

- removal and transfer of bodies from the body store to viewing rooms (where provided)
- removal, identity confirmation and handover to funeral director or police.

Entrance for body delivery and collection

5.8 Within this zone, there should be a separate room for receipt and releasing of bodies. This acts as a vestibule between the body store and the wider hospital and/or external vehicle area. The body receipt vestibule will provide access security between general, publicly-accessible areas and the body store. All doors should be access-controlled and alarmed.

5.9 Internally, a shared approach off a communal street is common, with different entrances provided for the deceased, staff and bereaved visitors. In this case, careful consideration should be given to the discrete flow and arrival of bodies.

5.10 All external entrances must be access-controlled to facilitate authorised access only.

5.11 Entrances to the body receipt vestibule should be screened from general public view and should not be overlooked from bereaved visitor areas, bedroom windows or public spaces (such as waiting areas, cafe and so on).

5.12 The external entrance into the vestibule should either have a canopy overhead or be a covered parking area that helps prevent overlooking and protects the body from the elements.

5.13 The layout should naturally inhibit the public looking into the body handling areas by the provision of a chicane, lobby, window height, screening – for example planting – or other means. The body entrance should be overlooked by a staffed area within the mortuary where possible, for example a technologists' office, unless audiovisual intercoms and CCTV are in operation. Security controls, alarms, dedicated parking bays and sufficient space for large vehicles to safely manoeuvre and load/unload discreetly are required.

5.14 A dedicated approach/exit route is desirable but not essential, as most vehicles for body transportation are inherently designed to be discreet.

5.15 Regional facilities, which include large criminal forensic post-mortem suites, should have an entirely secure service yard that cannot be overlooked by the general public. The facility's body entrance should be covered or entirely enclosed, for example a drive-in garage, to secure against intrusion during body transfer to vehicles.

5.16 The body entrance may be used for delivery and collection of facilities management items, such as consumables, laundry and waste.

Bier storage

5.17 Consideration should be given to the storage of biers, which does not require a separate room and can be located within the vestibule or body store. Departmental designs should allow for sufficient and safe storage that does not impede circulation spaces or the operation of the mortuary.

Body store

5.18 Suggested room layout diagrams are available in Appendix A1 (main body store) and Appendix A2 (bariatric body storage).

5.19 The body store should be designed to be isolated both visually and acoustically from the public zone.

5.20 The following types of body storage should be provided within all types of facility, and require security, temperature control and continuous monitoring:

- refrigerated body storage for short-term storage
- freezers for longer-term storage.

5.21 The freezers and refrigerated body storage are required to:

- limit decomposition while burial or cremation arrangements are made
- hold bodies and specimens for longer periods in conditions of security
- maintain bodies and specimens in a condition suitable for optimal scientific findings from a post-mortem and any subsequent analytical investigations
- hold all perinatal loss remains occurring on NHS premises.

5.22 Some storage units can both refrigerate and freeze, but these are comparatively expensive and are less energy-efficient, so will often only benefit rural or local facilities with either space constraints or where demand might be quite low.

5.23 Bodies normally remain in the mortuary for between one and four days. However, the period can extend to weeks and occasionally months if delays occur (for instance when next-of-kin are difficult to trace, a public health funeral is required, disputes arise, or particularly complex investigations are required). Storage temperatures should be in line with the following requirements:

- refrigerated storage should be 4–6ºC for storage of less than 30 days or necessary to preserve the body's integrity
- freezer storage should be at –20ºC if stored for over 30 days (or sooner – depending on the condition of the body).

5.24 The size of refrigerated and freezer compartments should be carefully considered to reflect the needs of the local population. Whilst it is not economically feasible to specify a full range of storage facilities with the largest possible sizes, sufficient capacity should be made for such requirements. The proportion of different sizes and length of stay provision, i.e. fridges/freezers, is estimated as a result of length of stay trends, operational and service procedures and demographic trends. Paragraphs 2.37–2.46 set out the approach needed to calculate the capacity of the body store.

5.25 The growth in cases of people with excess weight should be carefully assessed, and appropriate refrigerated storage and handling provided. In full facilities and regional centres of excellence, planners should consider an appropriate "cold store room" for people with excess weight who exceed normal expectations, to remain on trolleys in order to minimise unnecessary handling of the body. This space can also be used to provide additional service resilience during times of excess deaths and can be able to accommodate open rack trays if required.

5.26 Planners must also consider appropriate storage for infants and still-birth facilities. CMO (2015)7 – 'Guidance on the disposal of pregnancy remains following pregnancy loss or termination' published by the HTA and RCN/ICCM (2015) – 'Managing the loss of pregnancy remains' published by the RCN, both mandate dignified storage for all pregnancy loss. Where facilities are known to accommodate deceased infants, Trusts should allow for specific infant fridges to separate infants from adults where possible. Placental fridge and freezer storage should also be provided.

5.27 All fridges and freezers must be continuously monitored, with alarms located locally within the mortuary (see paragraphs 8.185–8.190). These alarms should also be linked to the estates and/or switchboard function to allow for 24/7 observation. The use of technology that allows alarms to link to mobile phones and internet-based solutions alerting on-call managers may also be used and is encouraged.

5.28 The body storage will consist of a number of labelled compartments. Each bay contains between three and five tiers holding the body trays, upon which bodies are stored. Individual compartment bays may either be physically separated from one another or may be open between one another in a continuous run. The former is useful to isolate high- and unknown risk bodies.

5.29 Body storage safety is a prime concern. A robust security policy and design response is required, particularly but not only for criminal forensic cases. This should be integral to the layout design, access controls etc and/or locks on each body store bay. If locks are used, they must be operable from inside the body store bay for safety. All doors to the refrigerated compartment bays should open out to give access to the body trays and should also be constructed in such a manner that they will not fall closed while in use. High-quality, robust hinges and ironmongery are required.

5.30 All compartment bays should be robustly designed for easy and regular maintenance, including ease of decontamination. Internal rollers and racking holding body trays should be removable to permit clear entry to the compartment bay for cleaning.

5.31 The refrigeration plant must be resilient and fully accessible for maintenance. Components located in outside areas should be secured to prevent unauthorised access. Maintenance provision should be implemented as per the manufacturer's instructions, and an engineering services risk assessment should be undertaken to inform requirements for plant and services distribution resilience and redundancy. Resilience considerations should include the provision of duplex plant or other contingency arrangements for business continuity in the event of a prolonged outage.

5.32 Where a post-mortem room is required, the body store and handling area should adjoin the post-mortem room directly, but only be connected using double-sided pass-through fridges.

5.33 Space is required for parking and manoeuvring trolleys and body weighing (if required); either on a separate weighing machine or on a trolley that incorporates a weighing mechanism.

5.34 A bay within this area may also be required for live, secure video link identification to a viewing room.

5.35 A doorway between the body store and post-mortem room is not recommended, in order to minimise cross-contamination of evidence in criminal forensic cases, and between zones for infection control considerations. If a door is provided for access by facilities management staff, this door should be locked in normal operational conditions, and only opened to allow maintenance and the like.

5.36 Careful consideration should be given to the dimensions, manoeuvrability and storage of body trolleys and mobile or fixed ceiling hoists. This equipment can have a vast impact on space, fittings and finishes; for example, some hoists are incompatible with some refrigerated body compartments.

5.37 Hoists, body storage units, post-mortem tables etc need to be fully coordinated through the planning and procurement process so that ceiling heights, fixtures, services and floor surfaces allow their smooth operation. Hoists should be able to go high, low and deep enough to efficiently engage the retraction/insertion mechanism and retrieve bottom and top trays within the body store. Turning circles of the largest equipment should be agreed.

5.38 The parking of trolleys and hoists when not in use requires a large bay or alcove, readily accessible, but also out of the way to avoid collisions. Charging points for powered trolleys should be provided in this area.

5.39 The body store should contain a writing surface and space to operate a computer with appropriate services and data connections, to record the receipt and discharge of bodies and personal effects.

5.40 If a facility handles the bodies of deceased children and infants, a worktop/table for moses baskets, cribs or other small carrying devices should be provided to place these on. This will preserve the dignity of the deceased whilst the admission is being registered. On no account should such carrying devices be placed on top of unsuitable equipment.

5.41 Note that all body storage spaces will need regular decontamination and cleaning, the timing and level of which will depend on where the body has come from (for example hospital deaths as opposed to bodies collected from the community). See HSE guidance HSG283 (2018).

5.42 Clinical wash basins (see HBN 00-10 Part C – 'Sanitary assemblies') and wash-down points should be provided in the body store area.

Body preparation room

5.43 All body stores should contain a separate room in order to allow the preparation of the body in a dignified manner. This room should:

- contain washing facilities for normal cleaning of bodies received and be capable of facilitating religious washing if required. This room should be capable of being accessed by the public without accessing the main body store
- be capable of allowing blackout conditions for non-intrusive UV examination
- act as a viewing room if required, albeit because of the above functionality, this room will need to be of a clinical specification and should not be the primary viewing room in full facilities and regional centres of excellence.

Figure 2 Example body preparation room, Barking, Havering and Redbridge University Hospitals NHS Trust

5.44 Planners should consider where tissue retrieval for donation purposes will occur in facilities with no post-mortem rooms. The preparation room can be used for the removal of some tissue, for example corneal tissue, but other tissue will require an operating theatre.

Personal effects store

5.45 A specific secured and controlled room must be provided for the storage of personal items and effects, including clothing, from the deceased. Some of these items may be valuable: consideration should be given to the specific storage of such items in a safe.

Finishes and fittings

5.46 The floor of the body handling area should be robust, non-slip and impervious to withstand daily hose cleaning and disinfectant. The floor should self-drain. It should fall to frequent drainage gullies and/or short section channels without ponding. The whole floor system should be easily maintained, jointless, durable and self-coved at wall junctions.

5.47 Wall and ceiling finishes should be robust and withstand daily washing.

5.48 The frequent movement of heavily-laden mortuary trolleys and mobile hoists has potentially severe safety and maintenance implications. Corners, doors and exposed areas of walls must be protected against damage. Doors and frames should be robust and wide enough to reduce the chances of collision and consequent damage to property and injury to staff.

Post-mortem zone

5.49 Post-mortem rooms serve to carry out several functions. These include the opening of bodies, the weighing and dissection of organs, and demonstration of post-mortems to clinical and criminal justice staff. For this reason, the post-mortem suite is classed in this HBN as a clinical area.

5.50 Post-mortem facilities will vary in requirements based on the service profile of cases passing through them. There are effectively two types of facility:

- post-mortem facilities without criminal forensic cases
- post-mortem facilities with criminal forensic cases.

5.51 Physically, the difference between the spaces is minimal. Criminal forensic post-mortems will contain a much larger number of staff and must also contain spaces dedicated to the storage of evidence in a location suitable to satisfy criminal justice requirements where it will not be contaminated by matter from any other cases. Non-forensic cases can rely on a more generic, shared storage facility.

5.52 When planning a mortuary with criminal forensic post-mortem facilities, the following factors should be considered:

- the need for appropriate security arrangements, for example lockable body stores or swipe access to facilities, in order to preserve the continuity of evidence chain. It is allowable to have a single fridge available with a different locking mechanism to the main set of fridges
- dedicated parking bays, including for the police
- the need for an observation gallery and/or room, for between four and 16 people to view criminal forensic post-mortems. Police and other staff will need to work whilst awaiting post-mortems, and provision of seating and desks/writing surfaces should be considered
- the need for remote viewing, especially if the facility is used for training purposes
- a separate post-mortem viewing area will be required where crime scene investigators (CSI) would be handling exhibits

- the need to separate workload and provide different high-risk post-mortem rooms to the criminal forensic post-mortem room(s)
- the need to appropriately deal with a wider range of deaths, such as disease, decomposition or dismemberment, and the higher risks these may bring
- the need for additional IT and communications, including mobile phone/police radio, and audio/video communication from the post-mortem room to the observation gallery and teaching/conference facilities
- the need for additional storage, staff training and support areas.

Post-mortem rooms generally

5.53 A suggested room layout diagram is included in Appendix A3 for a three-table post-mortem room.

5.54 Bodies should be brought from the body store directly through a pass-through fridge and transferred onto a post-mortem table on a hoist or trolley.

5.55 A dual-sided refrigerated body store should be provided to transfer bodies between the body store and post-mortem room. Appropriate space is needed in the post-mortem room for safely manoeuvring trolleys/hoists in front of body fridges, loading or transferring bodies onto the post-mortem table, and for storing and using a second hoist (if required), without risk of collision. Equipment selection has serious consequences for space and layouts.

Figure 3a Example of a post-mortem room, with observation windows © Paul Murphy Architects

Figure 3b Example of a post-mortem room, with observation windows © Paul Murphy Architects

5.56 In the case of full-body handling systems, the body remains on the store body tray during the post-mortem, secured to a post-mortem station. This option must ensure that the deceased is cleaned and dried fully underneath prior to being returned to the body store.

5.57 The dissection of organs should take place on a nearby dissecting bench, often running along a length of wall.

5.58 Post-mortem rooms are to be sized for anticipated volume of cases plus resilience, as set out in Chapter 2 'System planning considerations'. Three post-mortem tables will permit one pathologist to carry out examinations efficiently in one attendance.

5.59 Tissues, organs and/or fluids obtained during post-mortem examination are infused in fixative in various-sized containers. This work is carried out at the dissection bench. These samples may be held for a short time within the post-mortem suite or specimen store prior to dispatch, for example to the pathology laboratory. An option for a dual-access specimen store between the post-mortem room and staff corridor could benefit

Figure 4 Example of dissection bench
© Paul Murphy Architects

flow, but only if appropriate security and ventilation solutions are in place.

5.60 Post-mortem rooms should not be connected to any remotely monitored CCTV system. Whilst CCTV is permitted, if installed it should be recorded locally.

5.61 A wash-hand basin should be provided near to the room exit, adjacent to the post-mortem transit lobby.

Post-mortem tables

5.62 Post-mortem tables/trolleys must be easy to clean, free from traps for potentially infected material and must allow provision for water flow.

5.63 Down-draught ventilated post-mortem tables are often preferred, despite their challenges to install, clean and maintain, as they offer some microbiological and odour benefits over conventional post-mortem tables. These need regular system verification and easy cleaning access to the underside of the perforated top, for example removable short sections. Frequency of system verification for down-draught post-mortem tables will depend on manufacturer specifications; it is generally every 14 months. Down-draught tables require a floor slab. A straightforward solid table with peripheral linear extract for the entire space may be preferable; down-draught tables can desiccate bodies.

5.64 Some post-mortem rooms use a full-body handling system where the body tray is moved by ceiling hoist and “plugs” into the table on brackets, or has plug-in tilting trolleys. These both simplify manual handling and floor services, but require complex ceiling coordination and possible large open-plan cold stores.

Figure 5 Post-mortem tables at St Pancras Mortuary © Paul Murphy Architects

5.65 Adjustable-height tables should be provided to comply with Health & Safety at Work and Manual Handling Regulations for working heights. Also consider dissection bench height(s). A 180º rotating table adds flexibility and demonstrates the “other side” to viewers in the observation area, though a video link with multiple HD cameras may negate the need for this.

5.66 Consideration should be given to at least one table being provided with an overhead examination lamp, capable of providing different colour lighting to suit the requirements of the procedure being undertaken.

5.67 Each post-mortem table should have a hot and cold water supply and a waste outlet of approximately 75 mm diameter, fitted with a suitable, easily accessible trap and drain pipe. The table should be fixed to the floor, in proximity to a floor drain.

5.68 During post-mortem examination, there may be a need to dictate findings, take X-rays, examine CT scans or X-rays taken earlier, and use portable electrical equipment. Safety precautions are required when using fixed and portable electrical equipment in the post-mortem room. Services outlets should be provided both overhead and on the table plinth for ease of access.

Dissecting benches

5.69 There should be a dissecting bench provided for each post-mortem table.

5.70 The dissecting bench should have raised edges and slope to a sink or sinks, which should be deep enough for the washing of organs. There should be provision for running water over the bench itself. The drainage flow of water should be checked and confirmed. The positioning of sinks along the dissecting bench should suit the pattern of working agreed upon by the staff.

5.71 A dissecting bench with integrated sluice is required for the opening of intestines and disposal of their contents. A low-pressure water pipe should be provided, preferably in the wall of the sink(s). A standing waste is required, and a filter trap is necessary.

5.72 The observation area should overlook a dissecting bench. Access to power outlets, where required, should be either water-resistant IP65-rated with robust hinged covers, or if possible, should be located away from direct exposure to water and splashes.

5.73 Risk assessment should be undertaken on post-mortem staff safety, for instance an emergency eye-wash station or appropriate tap/shower in or near the post-mortem suite.

5.74 The dissecting bench and immediate surrounding splash area must be robust and easily cleaned daily, regularly maintained, and have no traps or gaps in which infected material can be lodged. Ideally it should be wall-mounted with integral splashback and have a specific dissecting station for each post-mortem table, with access to a sink, raised stands and weighing machine. Each station should also have a linear exhaust ventilation grille to reduce infection risk and odours.

5.75 Consideration should be given to providing both left-handed and right-handed dissection benches in the post-mortem room.

Post-mortem rooms with criminal forensic facilities

5.76 If a post-mortem room is designated or used for criminal forensic examinations, the following additional considerations and equipment should be considered:

- an observation room, with two-way audio/visual communication; this will be located in the staff administration and welfare facilities (see Chapter 7 ‘Non-clinical areas: staff zone’ for details)
- audiovisual recording and two-way communication to a large meeting/

exceptional event/major incident room and/or to an off-site facility

- additional office accommodation/hot desks for other agencies
- an additional area around the post-mortem table for additional staff and equipment
- ceiling mounted white screens for photography
- UV light and blackout screens for DNA work
- additional and secure storage for items such as evidence or equipment.

5.77 It is feasible for up to six staff in addition to the pathologist to be present in the post-mortem room at the time of a criminal forensic post-mortem; therefore the design should ensure sufficient space is provided within the post-mortem room.

5.78 Criminal forensic post-mortems may also require multiple agencies to observe the procedure remotely, such as police, legal and medical professionals. A series of cameras may be required which will be linked directly to equipment in the observation room. Whilst the camera system will be activated by the pathologist, operational control of the system will be in the observation room.

Isolation post-mortem rooms

5.79 A suggested room layout diagram is included in Appendix A4 for an isolation post mortem room.

5.80 Early in the briefing process consideration should be given to the benefits of providing a post-mortem table in a separate room or rooms for:

- **criminal forensic post-mortems** – allowing lengthy examinations, privacy, and visitor attendance such as police and photographic crew/equipment, and minimising cross-contamination risks to both result reporting and chain of custody
- **paediatric, teaching or research post-mortems** – as above, but additionally allowing a more secure area for storage
- **high-risk post-mortems** – required for deceased people with high levels of body deterioration or known/suspected infection or hazards, reducing the area where there is risk of contamination and extent of cleaning.

5.81 The common benefit for all use categories identified above of an isolation post-mortem room, otherwise known as a “high risk” room, will be to reduce disruption of routine work, which can continue in the main post-mortem room unabated.

5.82 An isolation room is not essential, as most post-mortem facilities will undertake some or all of the above functions and will simply segregate the various procedures in the schedule to improve efficiency; for example they may carry out specialist post-mortems at the end of a “normal” post-mortem session or on a separate day. A room can be justified when case volume/resilience requirements are high.

Specimen store

5.83 Tissue samples for microscopic examination in the pathology department, together with retained organs in fixative, may be kept in the specimen store for certain periods. Shelves made from impervious material will be required for holding jars or containers of various sizes. Plinths, or spaces below high benching, may be required for formalin containers.

5.84 The room must be ventilated continuously because of the hazard arising from formalin used in the specimen containers. Ideally this store should be linked to the post-mortem room through a hatch, to allow specimens to be taken from the post-

mortem room without walking from the post-mortem room directly into a non-clinical area.

Criminal forensic specimen store

5.85 Facilities that conduct a significant volume of criminal forensic post-mortems should consider, with partners, whether a separate dedicated room is required for evidence collection in which scene of crime officers/CSI are located during post-mortems.

5.86 The separated room will be designed to the same specification as the main specimen store but also provide dedicated securable storage for criminal forensic post-mortem equipment and packaging required in criminal forensic post-mortems. These cupboards should only be accessed by ISO-accredited staff.

5.87 The post-mortem viewing room should be located in such a way that it can be used as a briefing area, as not all staff will be allowed into a CSI area under the new regulations.

Post-mortem dirty utility

5.88 A suggested room layout diagram is included in Appendix A5 for a post mortem dirty utility.

5.89 The post-mortem dirty utility can be either a room directly off the post-mortem room or a space within the post-mortem room.

5.90 The functional content of the post-mortem dirty utility is distinct from that ordinarily associated with a standard dirty utility (as described in HBN 00-03) because the whole area within a post-mortem suite is deemed to be a “clinical” zone and therefore the need for separation of contaminated items is not predicated on reducing contact with clean spaces. For instance, instrument storage can be located in this room and a separate clean utility is not necessarily required.

5.91 The post-mortem dirty utility may be used for instrument cleaning and decontamination. For instance, a local or central ultrasound cleaner, washer-disinfector and autoclave may be used in accordance with current guidance (including BS EN ISO15883 and HSE guidance). This function should be risk-assessed. (It is noted that the use of autoclaves is becoming less common.)

5.92 Chemical solutions may also be prepared or dispensed in this room, according to local policy.

5.93 Sinks should be provided for washing and disinfecting bowls and instruments.

5.94 Waterproof aprons, if used, will also be washed in this space, and facilities should be provided for aprons to be hung to dry.

5.95 The reserve stock of instruments, unused specimen jars and chemical solutions may be held in this room.

5.96 A flushing sluice may be sited in this room or immediately outside it within the post-mortem room.

5.97 If this function is provided as a separate room, a hand-wash sink should be provided. There may also be a need to change PPE.

Post-mortem domestic services room

5.98 This room should open directly off the main post-mortem room. It should house the cleaning equipment required to ensure that all rooms within the post-mortem zone are kept clean, safe and hygienic at the end of every post-mortem session, such as the floor scrubber and cleaning agents. Equipment and materials in this room must be segregated from all other zones within the mortuary.

5.99 This room may also be used for cleaning contaminated equipment such as trolleys.

5.100 If there are multiple post-mortem rooms, consideration should be given to the

incorporation of an independent “cleaning station” within each of the isolation post-mortem rooms. These cleaning stations would not store all of the cleaning equipment and consumables, but only those required for spot cleaning between sessions.

Post-mortem transit lobby

5.101 A suggested room layout diagram is included in Appendix A6 for a post-mortem transit lobby.

5.102 Controlled access to and from the post-mortem room is essential via the post-mortem transit lobby, adjoining the staff changing area. The transit lobby should be the only access point into the post-mortem zone for people working in the department.

5.103 The post-mortem transit lobby will contain a physical barrier that separates the staff zone and post-mortem zone. It is recommended that the barrier is a stub wall approximately 300 mm wide which people entering the post-mortem zone can sit on to remove their clean shoes and don their post-mortem boots. It is feasible that this barrier could be a proprietary bench solution; however, the choice to use this solution should be based on a full assessment of the cleaning and maintenance requirements. It is not recommended to use a sunken foot bath or shower tray.

5.104 There should be a shoe rack provided at the clean side of the transit lobby for “clean” shoes to be stored. A boot rack should be provided on the dirty side of the barrier which is easily reached by someone sitting on the barrier without the need to stand up. Adjacent to the boot rack should be a boot wash unit.

5.105 All persons entering the post-mortem room must change into PPE, protective clothing, boots etc. Suitable shelving, racks and hooks are to be provided within the post-mortem transit lobby for the storage of PPE and its decontamination/disposal. The facility should have a standard operating procedure covering use of PPE for HG3 pathogens. For management of pathogens, see HSE Advisory Committee for Dangerous Pathogens – ‘Management and operation of microbiological containment laboratories’ (2018).

Figure 6 Example of boot wash unit © Leec Ltd

5.106 All persons should discard used protective clothing within the post-mortem transit lobby or post-mortem room. Separate bins should be provided for the disposal of single-use items, and collection of re-usable items pending decontamination/cleaning.

5.107 The space and layout must reinforce non-clinical and clinical flows to avoid cross-contamination.

5.108 Clinical hand-wash facilities with mixer taps in accordance with HBN 00-10 Part C and HTM 04 01 should be provided for washing hands, following the removal of protective clothing. A mirror should be provided to allow staff to check for contamination and cleanliness.

Finishes and fittings

5.109 The specification of mortuary and post-mortem facility fittings, finishes etc needs to be appropriately robust to withstand heavy use, such as regular trolley impact as well as

vigorous cleaning regimes. Materials should be selected to be fit for purpose, requiring minimal redecoration and replacement.

5.110 Wall surfaces to at least shoulder height (no less than 1450 mm above the floor), or ideally to the ceiling, should be impervious to water and disinfectant and durable to daily hose/wash-down cleaning.

5.111 Post-mortem room walls and partitions should be appropriately robust, sealed and jointless, with access panels, ledges or gaps carefully designed to be minimised or eliminated wherever possible.

5.112 Post-mortem room doors should be appropriately robust, sealed and jointless. If vision panels are required, they should be specified with no ledges or gaps. They should withstand high levels of humidity and regular wash-downs.

5.113 Post-mortem room floors must be very hard-wearing, jointless, non-slip, coved and sealed at wall junctions. The floor should fall sufficiently and evenly, to be self-draining towards gullies or channels. It is imperative that outlets are at the lowest floor level, with falls to drains to ensure no water pooling, and to minimise slipping and infection hazards. Drains are to be designed for easy and regular cleaning and disinfection, such as channel gratings in easily lifted short sections, allowing disinfection by submersion in a sink or container.

5.114 Post-mortem room ceilings should be sealed and jointless, with access panels minimised. They should withstand high levels of humidity and occasional wash-downs. Acoustic design should also be considered, as the ceiling is the easiest surface to provide the sound absorption essential to ensure appropriate staff audibility and wellbeing.

5.115 Post-mortem room fittings are to be appropriately robust, sealed and jointless. All fittings should be ergonomically designed, with minimal ledges, gaps or dishing. Porcelain and stainless steel are suitable materials for sinks and benches; although porcelain has a high-quality finish, it is expensive and liable to damage. Plastic, laminate, wood and wooden fittings are not suitable as benches/work surfaces.

5.116 Post-mortem room sinks and drains must include a sump pot to reduce the accidental risk of human tissue washing away. Drains should be of sufficiently large diameter to limit blockages, for instance of sink waste pipes. All taps should be elbow-operated or hands-free. Refer to HBN 00-10 Part C for guidance.

5.117 Special design consideration should be given to joints at entrances, corners, walls, fittings etc that will be subject to heavy and/or wet use. Careful detailing and specification to prolong the life cycle of materials in vulnerable areas is required.

5.118 When specifying the post-mortem tables, body storage and handling systems, specifiers should ensure that all systems are coordinated with each other and with surface finishes; for example, dual-sided body storage needs a level floor zone of approximately 2 m for safe hoist operation.

5.119 Users should be consulted at an early stage to risk-assess activities and the design of post-mortem facility fittings, finishes etc. Identified key risk areas will require rigorous assessment, such as a full-scale mock-up for user testing and agreement, constructed at the earliest opportunity, and certainly prior to handover acceptance.

Lighting and acoustics

5.120 The post-mortem room is an area where staff can be working for extensive and intensive periods of time. Where practicable, daylight should be considered to promote wellbeing, through either windows or skylights, positioned or frosted to prevent unauthorised viewing. All windows and skylights should be capable of achieving blackout conditions.

5.121 The distribution and location of windows should take into account the need for ample daylight, yet maintain security and privacy, and prevent glare or excess solar gain. Windows are generally preferable to rooflights, but consideration must be given to minimise ledge design and ensure easy cleaning and maintenance.

5.122 Windows should be capable of achieving blackout conditions for criminal forensic work/photography.

5.123 Post-mortem window units must be fixed and non-opening to avoid loss of control of air movement by the ventilation system, which is crucial in this area. Glazing should preferably face north or be diffused to minimise shadows and should not affect colour tones.

5.124 Artificial lighting in the post-mortem room should supplement natural lighting, providing low-contrast glare-free background illumination and high-performance, robust task lighting:

- ceiling lighting should provide good, even, general illumination of ≥300 lux at workbench height
- local task lights must provide ≥1000 lux. Situated on articulated arms, they must cover the whole length of each post-mortem table and the dissecting benches
- all lights should be an approved colour-rendering light source and should be high-efficiency luminaires sealed or designed to ensure no dust ledges, as set out in the CIBSE Lighting Guides LG02.

5.125 Acoustic control and sound absorption measures are needed in the post-mortem room to provide a suitable working environment, particularly where intercom or electronic dictation is required. The option to play music should be considered, for example the incorporation of ceiling-mounted speakers.

5.126 There should be control of noise breakout to any bereaved visitors' areas.

6.0 Non-clinical areas: public zone

6.1 With the exception of Level 1 body store only facilities, all mortuaries will contain spaces for bereaved visitors to view the deceased and potentially receive counselling and support during their bereavement. This document will refer to this space as a bereaved visitor suite.

6.2 The bereaved visitor suite is designated as a non-clinical area within this guidance.

6.3 The suite will comprise of some or all of the following spaces:

- access lobby
- entrance and waiting area
- visitor toilet
- reception and waiting rooms for centres with high access rates
- viewing room(s) and directly adjacent bier room(s) and/or combined viewing and bier rooms
- body washing facilities, depending on cultural requirements at a local level
- interview room, which can also be used for counselling.

6.4 The bereaved visitors' suite should be a serene and reassuring environment. Choice of colours, textures, art and lighting are important. This should be designed in consultation with members of the community and local faith groups.

6.5 Acoustic design should be carefully specified to minimise noise transference from other parts of the mortuary.

6.6 There should be clear wayfinding provided within the hospital and wider hospital grounds, that minimises the journey distance and time for bereaved visitors and avoids areas that may be distressing to the bereaved, such as walking past ED or ward settings where loved ones may have died.

Entrance and waiting area

6.7 As previously outlined, the number of entrances and approaches to the mortuary will be determined by the scale of the facility, its location and how it may relate to adjacent services.

6.8 Entrances should be obvious in terms of their function and be kept to a minimum for security. The facility may require the following entrances:

- one for bereaved visitors
- one for body delivery and collection, which should be through a vestibule that separates the body store from the entrance
- one for staff, although in smaller facilities this can be shared with visitors.

6.9 It is acceptable, but not encouraged, for there to be two body entrances, one from within the hospital and one external, used for

discharge to funeral directors and potentially receiving community admissions. Any entrance/exit point used for bodies should connect to the body store through a vestibule.

6.10 Only the external body entrance can be used for facilities management functions, including deliveries, waste disposal and disposal of any other dirty material such as linen and equipment.

6.11 The visitors' entrance should be separated and clearly identified, with the body entrance distant and concealed from view.

6.12 Multiple visitors' entrances should be avoided, as they are not supportive of equality, security or wayfinding. If possible, nearby parking, including disabled parking, is required for visitors and visiting professionals, for example police or scene of crime officers.

6.13 Visitors should be able to report to a staffed reception, or be seen and escorted immediately to waiting or viewing facilities.

6.14 Preferably, the visitors' external entrance will be lobbied. Where possible, the lobby should have an internal access into the main hospital and an external access. Ideally, consideration should be given to the soft landscaping surrounding the external entry point, to provide healing spaces and hide from view any external access point for body delivery and collection.

6.15 Access should use an audio/visual intercom in order to secure staff against incidents of violence and aggression, and where possible should be overlooked by a staffed area. Where there is 24-hour access or criminal forensic use, consider both CCTV monitor and visual intercom.

6.16 Entry should lead to visitors' waiting area(s), with interview/counselling room(s) and WC facilities off. Clear and appropriate signage and visual/audible notice should be provided so visitors know when mortuary staff are available or are being summoned.

6.17 The visitors' waiting area can double as an interview/counselling room for most facilities, and will be the first area visitors are escorted or directed to upon arrival. It should be visible from the visitors' entrance and the admin/reception area, if provided. It should be serene and non-institutional.

6.18 An adjacent wheelchair-accessible WC should be provided in this area, close to the body viewing room and readily accessible to mortuary staff.

6.19 An open waiting area is not recommended, as it may be distressing and uncomfortable for visitors to be in public view. An open waiting area should only be provided if a used for short-term wait (for instance less than 10 minutes).

Viewing facilities

6.20 Appendix A8 includes suggested room layouts for viewing facilities.

6.21 Viewing facilities may consist of some or all of the following:

- separate viewing room and bier room
- combined viewing and bier room
- ritual body washing and preparation rooms, for which the body store body preparation room can be considered in smaller facilities.

6.22 Viewing facilities should be compassionately designed to provide a serene viewing facility that allows individuals the space and time to grieve. The environment should promote calm reflection without affinity to any particular religion or world view.

6.23 There will often be a mixed caseload of age, religion and gender of deceased people being viewed, so mortuary staff may accessorise the viewing room sympathetically. The decor and design should consider how this can be achieved and how items such as cool cots, cribs and other decoration and

Figure 7 Example of viewing room decor © Grosvenor Interiors

religious paraphernalia can be stored outside of the room.

6.24 Large regional centres should provide appropriate criminal forensic viewing and dedicated infant suites.

6.25 All spaces must be compliant with the Equality Act (2010). Equality of access for all is essential, including young, elderly, those with hearing or visual impairments and wheelchair users, etc. Considerations such as glazing height between the viewing and bier room will allow both sitting and standing viewing. The addition of a handrail for support for the ambulant disabled should be considered.

6.26 A mobile phone signal is needed, and access to a cordless phone is required in case of emergency.

6.27 Provision of tea, coffee and drinking water facilities should be considered. This should be risk-assessed and reflect all maintenance requirements.

Separate viewing room and bier room

6.28 The viewing room will directly connect with the bier room.

6.29 The access between the viewing room and bier room should be managed by an access-controlled door. There should be a viewing window provided which includes curtains, blinds or similar to separate these rooms visually. This will allow visitors both time to prepare and choice in how they interact with the deceased. In some criminal forensic cases bereaved visitors may be suspects, and so physical interaction may not be allowable.

6.30 Controls for curtain/blinds are to be accessible by the escort from the viewing room. Curtain/blinds are required to both sides, for example an integral blind operated by staff in the bier room, and a heavy curtain to cover the full viewing wall. A handrail at the window, or furniture nearby, will provide support to viewer.

6.31 When visitors are ready, the escort will open the curtain/blinds or connecting door for those who may wish closer access to the

Figure 8 Example of concept design for a separated waiting/viewing room © Grosvenor Interiors

body. The length of stay may vary, and the staff escort may leave to allow privacy, but be close at hand.

Combined viewing and bier room

6.32 In smaller facilities where viewings will be arranged with mortuary staff in advance, it is feasible for bereaved visitors to arrive and be escorted directly to the viewing without the need for a separate viewing and bier room. A combined room is allowable.

General environment

6.33 The environment should be serene, with soft acoustics and privacy from the rest of the mortuary. Furnishings are to be homely, with a range of soft chairs and space for wheelchairs and other mobility aids.

6.34 Controls for doors, blinds, dimmable lighting, heating and ventilation are to be accessible by the escort from the viewing room.

6.35 The number of viewing/bier rooms will vary for each facility and be calculated on the expected throughput of bereaved visitors within that setting. In large facilities, multiple viewing/bier rooms may be required, particularly where providing NHS and criminal forensic services. In this situation at least one room may be provided with a wall-mounted CCTV monitor, again controlled by the staff escort. This CCTV will link to a camera in the body handling area and will allow for body viewing remotely in monochrome for those visitors who wish it, as well as criminal forensic identification.

6.36 Both types of viewing room will have access from a waiting room in the public zone and the body store in the transition zone. The doors into both zones from the viewing facilities must have access control, which should be an electronic system that allows only authorised staff members to operate it. Members of the public must not be able to exit the viewing facilities into the transition zone.

6.37 The body may be prepared for viewing in the body handling area and laid out on a draped bier trolley which is then wheeled into this room. Careful design of the connecting doors is required to allow easy, noiseless passage of the trolley, and to provide visual and acoustic isolation while viewing is in progress. For infection control, the bier room flooring should be impervious, and walls should be washable but as non-institutional as practicable, for bereaved visitors to view the body.

6.38 Ritual washing and/or preparation is often left to funeral directors or local religious venues; however, if the Equality Impact Assessment determines that this

facility is required, it should be sited in a wet room accessible to visitors and to the body store. Religious beliefs may have an effect on the orientation of this body wash station. As set out in Chapter 5 'Clinical areas', it is feasible to use the body preparation room within the transition zone to fulfil this function.

6.39 Natural lighting, ventilation and thermal comfort control should be provided where possible, to allow user control and choice, and to offer pleasant external views where possible.

6.40 Artificial lighting should further enhance the internal environment, using soft lighting, subtle wall washing and dimmable controls within the viewing and bier rooms.

6.41 Ventilation should be carefully designed to prevent odour transfer from all other parts of the mortuary. HTM 03-01 – 'Specialised ventilation for healthcare premises' provides further details on the prevention of odour transfer.

6.42 Where practically possible, facilities should provide access to nature, such as a garden or outdoor seating. This is considered greatly beneficial to the health and wellbeing of bereaved visitors.

Interview/counselling room

6.43 There should be a sufficient number of interview/counselling rooms to allow appropriate visitor gathering and segregation if required, both pre- and post-viewing.

6.44 The environment should be non-institutional, with soft furnishings, art, comfortable chairs and a small table, and heating and lighting should be controlled in-room, with natural light and ventilation if possible. Beverage facilities may be provided.

6.45 These rooms may be shared across agencies, so may be used by mortuary staff, police or others to comfort the bereaved, explain procedures following a death or post-mortem, or discuss tissue donations, findings from post-mortems etc. An adjacent wheelchair-accessible WC is required. The room should be near the visitor entrance and body viewing, but also easily accessible by staff.

6.46 Consideration should be given to the location of the bereavement centre which may be provided within the mortuary or located elsewhere within the hospital or community. If located within the mortuary, special care and attention should be given to avoid bereaved visitors witnessing the transfer of the deceased.

6.47 The bereavement centre will deal with many aspects of counselling following a death, including issuing the death certificate, retrieval of the deceased's belongings, tissue donations and advice/information on dealing with bereavement. Different elements are often provided by multiple agencies, for instance social care, charities and the voluntary sector.

Project option: separate infant and child viewing suite

6.48 Centres which include specialist paediatric and maternity facilities may benefit from a dedicated infant viewing room.

6.49 The decision to include a dedicated room will be based on the expected quantity of infant and child deaths, plus stillbirth and perinatal loss volumes to justify the addition of a dedicated viewing room. High volumes of activity are likely to benefit from a dedicated combined viewing/bier room. This more comfortable environment, without a screen barrier, enables parents to sit and hold their child.

6.50 It is likely that such rooms will be used for prolonged periods and will require measures to keep the bodies cool. Recent research into bereaved parents' experiences of using cooling facilities conducted by York University demonstrates the benefits of providing such facilities to those highly traumatised by the death of a child.

6.51 Rooms providing this facility should have the ethos of a “cooled bedroom” using cool cots, cooling systems and/or cooling blankets to facilitate multiple hours of contact between parents and their deceased children. Any cooling system should have an element of local control within limits established by mortuary staff.

Project option: quiet room/spiritual space or garden

6.52 Access to or provision of a quiet room/spiritual space or garden where visitors may spend contemplative or remembrance time is to be considered. It may be part of, or slightly separate from, the mortuary, such as part of larger campus gardens and/or bereavement centre facilities. This option could benefit from endowment or charitable funding.

6.53 If a garden is provided it should be designed to enhance the ecological value of the site, provide places for reflection that can be designed to protect users, and include appropriate ambient lighting.

7.0 Non-clinical areas: staff zone

7.1 Staff welfare facilities and administration spaces will be required independently of the main staff facilities elsewhere in the building.

7.2 The majority of mortuary facilities will contain a staff administration and welfare suite, which can be separated into two distinct functions:

- staff administration and welfare facilities
- teaching and research facilities.

7.3 The staff zone is designated as a non-clinical area within this guidance.

7.4 The staff administration and welfare facilities will comprise of some or all of the following spaces:

- pathologists' office
- technologists' office
- administrative office
- multi-disciplinary team office/meeting room
- staff changing and showers
- staff WCs
- staff rest and kitchen
- meeting room
- observation room
- linen store
- housekeeping store.

7.5 Some mortuaries will provide additional facilities for teaching and research purposes; these facilities will comprise of some or all of the following spaces:

- meeting/seminar rooms
- open-plan office
- library.

Staff administration and welfare facilities

7.6 The functions and scale of the overall facility will affect the quantity and type of activities in the staff and support provision, including storage, offices and meeting rooms. Although it is beneficial to keep these functions contiguous, to provide staff support, often the location of these facilities is and should be driven by a need to support the other key functions, for instance a technician office oversees the body entrance; an admin office oversees the visitors' entrance.

7.7 Small "body store only" facilities should provide, as a minimum, a staff WC and wash-hand basin, with nearby access to shared changing, lockers, shower and rest provision.

7.8 A staffed area, such as the technologists' office, should oversee the body receipt, storage and removal facilities.

7.9 Larger facilities, with higher volumes of storage and post-mortems, should provide all of the staff administration and welfare provision needed for mortuary staff to be dedicated to the mortuary.

7.10 All administrative rooms should have appropriate data connectivity and telephone connections.

Pathologists' office

7.11 The function of the pathologists' office(s) is to provide space for consultations and writing reports. It should benefit from natural ventilation and light.

7.12 The room should be accessed from the circulation route leading to the staff changing facilities and the body handling area.

Technologists' office

7.13 This room(s) should be situated adjacent to the body store and, where possible, body entrance/service yard for passive security. It should benefit from natural ventilation and light and be accessible from the main circulation route leading to all parts of the mortuary. A close proximity to both body viewing and bereaved visitors' facilities will enable quick response times.

7.14 The staff call, bells, audio or visual intercoms for funeral directors' and visitors' entrances are likely to be located here. Consideration should be given to how the proposed call systems will practically work without the need for multiple pieces of equipment in the office but also during staff breaks and out-of-hours.

7.15 This office is also the most likely place for local plant and equipment alarms and any equipment that allows the remote control of any specialist plant and equipment.

Staff changing

7.16 Staff changing has two functional requirement levels:

- **core:** for all staff – storage of coats and personal belongings; standard toilet and shower provision with changing facilities. These should be within, or in very close proximity to, this facility/department
- **post-mortem suite:** for all authorised personnel, staff and visitors, prior to entering or exiting the post-mortem room(s) – storage for all outer garments (overcoats, jackets and hospital white coats, worn outside the mortuary). Toilets, showers and changing facilities are also required. This will be dedicated to the mortuary and should link from the controlled staff zone corridor into the post-mortem transit lobby, which leads to the post-mortem room. It can provide facility for core use.

7.17 Changing facilities should suit local policy and follow the Equality Act range of "protected" characteristics, including disability etc, as identified in the project Equality Impact Assessment. There are two main layout options:

- **open-plan:** providing a single flexible locker room, with WC and shower room(s) and changing cubicle(s). Designers must ensure that there is at least one of each functional unit accessible to each agreed "protected" equality characteristic
- **traditional:** multiple gender-segregated, small changing rooms, each with lockers, WC and shower, so that all functions are accessible to each agreed "protected" equality characteristic.

7.18 The functions and scale of the mortuary and post-mortem services will affect the extent of the staff changing suite provision. However generally, the "open-plan" option above is more flexible and may also be more economic in space/operation.

7.19 Post-mortem suite WC/wash areas should allow face and hand washing in a clinical or general wash basin. A mirror should be provided to allow users to check for cleanliness. An option to provide a WC within the post-mortem zone may be considered to allow use during long post-mortem sessions, without compromising 'clean' zones. If a post-mortem WC is provided it should only be

accessed from the dirty area within the transit lobby.

7.20 The requirements for staff changing should be established early in the briefing process, when the overall scale, key activities and projected numbers are known. Consideration should be given to factors such as off-floor storage for outdoor footwear and clothing and a drying room for wet-weather clothing and helmets.

Staff rest room

7.21 In all but the very smallest facilities, a dedicated staff rest room should be provided in the staff zone. Staff should be able to take breaks and relax without disruption.

7.22 The room size is dependent on numbers likely to take breaks at one time, but should include food preparation, dining and soft seating. The area should benefit from natural daylight and ventilation, with views and/or access to green space where possible.

7.23 This room may contain general staff lockers.

7.24 The staff rest room and staff lockers should be separate from, but nearby, any offices. A joined-up office and staff rest room may be permissible in smaller-scale, more remote facilities, or when determined by a lone working risk assessment.

7.25 If required, a joined-up office and staff rest room should contain clearly separated clerical, rest and pantry zones, as food preparation and social functions are likely to disturb work functions and vice versa, unless staff numbers are extremely small, for instance fewer than three.

7.26 Staff change and rest areas would also benefit from mechanical ventilation/heating/cooling. The recent pandemic demonstrated that staff-to-staff transmission was increased in welfare/rest areas due to poor ventilation.

Post-mortem observation area

7.27 A suggested room layout diagram is included in Appendix A7 for an observation room.

7.28 Depending on the scope of the facility, a post-mortem room may require an observation area for police, students etc to view post-mortem procedures. There are two options:

- an open-plan area, accessed directly from the staff circulation space
- a physically separate room.

7.29 The only entrance to the observation area should be from within the staff zone. Designs should consider how to combine observation, study/work spaces and hot desks into a multi-purpose space.

7.30 The observation room should ideally be located on a raised platform if observation is going to be direct, so that those observing a post-mortem are looking down on the procedure and dissecting bench.

7.31 It is allowable to provide a remote observation room within the mortuary, elsewhere within the larger facility or externally. This room can be multi-functional.

7.32 Video links and audio intercom facilities enabling two-way speech should be provided in both direct and remote observation rooms. The observation area should accommodate between one and 16 people, depending on the anticipated use, such as teaching or oversight by clinicians or police officers.

7.33 Audio facilities providing two-way dialogue will be turned on by the pathologist in the post-mortem room. Within both the observation room and post-mortem room there will be functionality to mute discussions to the other side.

7.34 The video link between the two rooms will be dedicated to the post-mortem facility; it must not be shared with the general CCTV system. The video link will connect to several

Figure 9 St Pancras Mortuary main observation room © Paul Murphy Architects

HD cameras located around the post-mortem table and dissection bench. The system will be powered on by the pathologist in the post-mortem room but controlled by those in the observation room. The system may be linked to external secured connections, for instance to police facilities or universities. The need to record or take photographs should be confirmed.

7.35 All audiovisual equipment located in the post-mortem room should be accessible and amenable to cleaning and decontamination.

7.36 The Equality Impact Assessment will determine access requirements for this as a restricted "public" area, for example whether a tiered floor/fixed seating used to optimise sight lines or a flat area (or CCTV) for wheelchair observation is required.

7.37 The availability of an observation area will obviate the need for some personnel attending a post-mortem to change into protective clothing. The observation area size will vary according to local arrangements and facilities required, for instance a workbench and phone for police use.

7.38 If there are overwhelming reasons for clinical staff or others to be admitted into the post-mortem room, they will be required to enter via the post-mortem transit lobby, change into the protective clothing provided and observe the agreed local protocol.

7.39 Local policy may seek to limit direct observation during post-mortem examination and arrange for a demonstration of case findings to take place remotely, such as in a local meeting/training room or off-site facility.

General-purpose and linen store

7.40 A general-purpose store should be provided to house a wide variety of stock

items and linen that do not require special conditions such as for security and contamination. As stock dimensions vary considerably, adjustable shelving should be used. Adequate space should be allowed for the storage of bulky goods. Good natural or mechanical ventilation is required.

7.41 Arrangements for supplies and storage facilities will be in accordance with local policies. This may require alignment and agreement of protocols across multiple agencies to ensure a sustainable and efficient service.

7.42 The store should be accessible to staff servicing all areas of the facility, for instance body handling, visitor viewing areas and the post-mortem suite.

Waste disposal room

7.43 The safe disposal of used items will depend on local policy and must be in accordance with current legislation and NHS guidance, for example COSHH and HTM 07-01 – 'Safe and sustainable management of healthcare waste'.

7.44 A secured waste disposal room must be provided, with adequate space for the temporary storage of securely packed, segregated, recycled refuse and dirty linen bags (appropriately colour-coded, labelled and carrying identifiable location source tags), with easy access from both the dirty utility room and externally, for their collection by the waste management company.

7.45 The post-mortem room access to the waste disposal room is also a key consideration to prevent access via clean areas. If the waste disposal room is located directly off the post-mortem room, consider:

- waste and dirty linen generated in the post-mortem suite must be placed in the correct container or bag, complete with identification labels and source tags, within the post-mortem suite before being deposited in the disposal hold
- control of air movement in the whole post-mortem suite
- control of entry to the post-mortem suite and mortuary, and the means by which unauthorised movement is prevented.

7.46 Disposal areas should be organised so that clinical waste, linen and domestic waste are not mixed together, including waste recycling segregation prior to collection.

Teaching and research facilities

7.47 Staff training, accreditation and continuous professional development are an integral part of all professional bodies including mortuary and post-mortem services. Major regional centres should have dedicated space for teaching and research; other facilities will require access to a shared resource, ideally nearby.

7.48 Teaching rooms for conferences, seminars and training should be both flexible and adaptable. For example: provision of visual and audio communication with the post-mortem room allows both clinical training and temporary expansion of observation/office facilities in an exceptional event/major incident; it should also be bookable across agencies.

7.49 Research is often multi-agency, for example university, NHS and the coroner service, and may require temporary additional staff and facilities. Potential implications include increased ICT, security and storage, and flexible office space including hot desks and touchdown spaces.

7.50 If the teaching of post-mortem services for undergraduate medical students is to take place in the proposed facility, and their numbers justify it, a dedicated seminar room should be provided. Such rooms will most likely only be located in major regional centres. These rooms should be available to multiple agencies to support post-mortem skills

resilience for all local system partners and their university partners. This investment is further justified if these spaces are required under regional exceptional events/national major incident plans.

7.51 If the teaching of post-mortem services for undergraduate medical students is to take place in the proposed facility, and their numbers justify it, a dedicated seminar room should be provided. Such rooms will most likely only be located in major regional centres. These rooms should be available to multiple agencies to support post-mortem skills resilience for all local system partners and their university partners. This investment is further justified if these spaces are required under regional exceptional events/national major incident plans.

7.52 In facilities where a seminar room is a project option, the following should be provided:

- teaching, seminar and presentation equipment, such as IT, a projector, a screen, a whiteboard, a smartboard and conference call/video conferencing equipment
- the opportunity to transmit a post-mortem via a live visual and audio link to trainees, including cameras above the post-mortem table and dissection benches with a clear view of all procedures with the option of recording for further analysis
- an area for exceptional events/major incident coordination with police and other agencies, which is also useful for major criminal cases
- a small kitchen/beverage bay serving this room that can be part of/shared with other mortuary staff welfare facilities.

7.53 In facilities where a hot-desk office is a project option, provide a flexible space for administration, study, research, tutorials and storage for visiting staff, post-grad students etc who need a work base.

8.0 Engineering

Introduction

8.1 General and specific technical guidance on engineering services for hospitals and healthcare facilities is provided in the HTM series of documents. Users of this HBN should refer to the core document HTM 00 – 'Policies and principles', which provides comprehensive guidance on engineering services, and to:

- HTM 01 – Decontamination
- HTM 02 – Medical gases
- HTM 03 – Heating and ventilation systems
- HTM 04 – Water systems
- HTM 05 – Fire safety
- HTM 06 – Electrical services
- HTM 07 – Environment and sustainability
- HTM 08 – Specialist services.

8.2 Everyone concerned with the management, design, procurement and use of the healthcare facility should understand the requirements of business-critical building and engineering technologies in order to ensure optimum safety for all present.

8.3 The resilience and maintenance of critical engineering services and business continuity – linked to policies for emergency preparedness and the ability to respond to major incidents – should be high on a provider organisation's agenda.

8.4 Documented evidence that shows compliance with the technical guidance should provide supporting material to underpin evaluation of the healthcare facilities.

8.5 All engineering systems and equipment should be fit for purpose and designed to have an initial capacity to safely accommodate peak maximum loads plus an additional suitable allowance for future expansion. A regular review of systems' capacity should be maintained to ensure that they are capable of meeting the demands required by the services being provided.

8.6 All principal items of plant and equipment should have an indicative life expectancy as described in CIBSE Guide M – 'Maintenance engineering and management'.

8.7 Materials and components that will require maintenance and replacement during the life of the facility should be selected, located and fixed in such a way as to minimise future inconvenience and disruption and to avoid temporary closure of all or part of the facility.

Scope of this chapter

8.8 This chapter sets out recommendations for engineering services for rooms/areas described by this HBN, providing specific advice and guidance on their design, installation and effective operation.

8.9 Specific engineering services requirements should be formulated in discussion with end users such as:

HTM 00 explains:

"It is recommended that boards and chief executives, as accountable officers, use the guidance and the references provided:

- when planning and designing new healthcare facilities or undertaking refurbishments
- when developing governance and assurance systems which take account of risk and the safety of patients, staff and visitors
- to establish principles and procedures which:
  - recognise and address both corporate and individuals' responsibilities
  - recognise the link between business-critical engineering systems and emergency preparedness capability
  - reflect the important role that engineering policies and principles, as implemented by suitably qualified professional and technical staff, have in support of direct patient care.

Once boards and chief executives have embraced the principles set out within this document and taken the necessary actions, their duty of care responsibilities are more likely to be fulfilled, as will their ability to maintain public confidence in the NHS at local level."

- clinicians
- FM and estates professionals
- design teams
- all relevant specialist Safety Groups including:
  - the Ventilation Safety Group (VSG) – see HTM 03-01
  - the Electrical Safety Group (ESG) – see HTM 06-01
  - the Fire Safety Group (FSG) – see HTM 05-02
  - the Water Safety Group (WSG) – see HTM 04-01
- manufacturers of specialist equipment.

8.10 Consultation should take place at the outset of the design process to determine whether any equipment proposed for use has particular environmental requirements, so that these can be met by the design.

8.11 Designers should aim to create an environment that is conducive to the wellbeing of staff and visitors (see HBN 00-01).

Inclusions

8.12 This chapter is not intended to cover every possible scenario; it provides appropriate standards and principles that should be adhered to and highlights specific issues relating to engineering services for this HBN, including:

- management
- design
- commissioning
- validation and verification.

Exclusions

8.13 This chapter does not cover any areas outside of the rooms or infrastructure. Reference should be made to the associated HTMs, with which the designer should be familiar.

General engineering considerations

Achieving "Net Zero" (NZ) carbon

8.14 Targets for achieving NZ are being set out by NHS England in the NHS NZ Building Standard.

8.15 Design teams will be aware that engineering services can play their part to assist in meeting NZC; for example, wherever possible, natural ventilation is the preferred option. Where mechanical ventilation is required, it should be efficient and controllable to minimise energy consumption.

8.16 Measures to reduce the lifetime carbon footprint for the rooms/areas will be described in the NHS NZ Building Standard.

Energy performance

8.17 Minimum energy performance of new and refurbished buildings is governed by legislation and guidance such as:

- Building Regulations Part L2 – 'Energy conservation', which contributes to compliance with over-arching legislation for net zero carbon emissions
- HTM 07-02 – 'Making energy work in healthcare' which gives advice on energy-efficient design and operation
- the Chartered Institute of Building Services Engineers (CIBSE) TM39 – 'Building energy metering' which gives recommendations for metering to facilitate operational monitoring of energy use
- CIBSE technical memoranda, which provide further information that will inform the evaluation of the whole-life carbon impact and should support the production of the cost model. Examples include:
  - TM63 – 'Operational performance: building performance modelling'
  - TM65 – 'Embodied carbon in building services: A calculation methodology'
  - TM66 – 'Creating a circular economy in the lighting industry'
- BREEAM, which is a science-based suite of validation and certification systems for a sustainable built environment. It provides criteria and assessment tools for evaluating the energy efficiency and performance of buildings. In addition to the legislative requirements, implementation of best practice guidance and advice should be incorporated into the design to help deliver energy efficiency.

8.18 All meters should be linked to a building management system to allow usage to be monitored and inefficient areas to be targeted for improvement.

Engineering services capacity

8.19 Consultation should take place at an early stage of the design process to determine whether any equipment proposed for use has particularly demanding services requirements (electricity, water, data etc) so that provision can be made within the design. Other guidance for specific engineering services provides advice on maximum demand, diversity and spare capacity for future use.

8.20 Where specific equipment requirements are not known at the main services design stage, typical requirements based on other installations and consumption data may be used to ensure sufficient capacity without over-designing.

8.21 This strategy will allow the healthcare provider time to select the latest equipment that best suits their requirements in line with their procurement strategy.

Routing of engineering services

8.22 Consideration for the routing of the main services should take into account maintenance access requirements and any disruption this could cause to the normal functioning of the building. Main services should be routed through non-clinical areas, and only the services required for any particular transitional and post-mortem zones should enter that area, including ceiling and floor voids. Services should be concealed within the fabric of the building so that they do not present difficulties for cleaning and infection control measures. Where items of adjustment are unavoidable within sealed ceiling spaces, suitable (cleanable) easy access for items of equipment that may need adjustment must be included, i.e. duct cleaning access doors, fire dampers, sensors, and volume control dampers access.

Engineering services isolation facilities

8.23 Health and safety regulations require that plant and equipment is made safe before work is carried out, and this is often achieved through the use of lockable isolation devices such as electrical disconnect switches and shut-off valves. These devices should be located in areas such as plantrooms and service risers where access is restricted to authorised maintenance personnel. For some engineering services and equipment, it may be necessary to provide emergency isolation devices such as shut-off valves and emergency stop push-buttons for end-users. These devices must be accessible for emergency use services and protected against inadvertent use and misuse. All isolation devices should be clearly labelled. HTM guidance documents for specific engineering services provide further advice.

Commissioning of engineering services

8.24 The engineering services commissioning programme and management should form part of the project planning. During the design of engineering services, any particular facilities required specifically for commissioning should be identified and included.

8.25 The contractor should install and test individual components of the system, followed by commissioning of the overall system. This consists of operating the system, taking measurements and making any adjustments required to meet the design specification. The contractor should demonstrate the compliant system to the commissioning engineer and Authorising Engineer for witnessing and validation. Commissioning data should be recorded and provided to the client in the commissioning report. Client representatives, such as estates teams and end-users, may provide preferred settings for implementation as part of the commissioning process. Commissioning data should be recorded and provided to the client in the commissioning report, inclusive of all witnessing signatures.

8.26 HBNs, HTMs, CIBSE and IHEEM guidance provide advice on the commissioning process and its management for specific types of facilities and engineering services. Guidance from CIBSE includes a range of commissioning codes, technical memoranda and digital engineering guides.

8.27 The services for some equipment, including imaging equipment, may need to be commissioned before the final completion of the engineering contract programme to allow the equipment commissioning to be completed prior to occupancy. If this commissioning is concerned with radiation safety, the approval of the radiation protection adviser (RPA) must be obtained.

Waste management

8.28 HTM 07-01 – 'Safe management of healthcare waste' covers a range of waste streams produced directly from healthcare activities.

8.29 The management of healthcare waste is an essential part of ensuring that healthcare activities do not pose a risk or potential risk of infection and are securely managed. HTM 07-01 guidance provides a framework for best practice waste management in order to help healthcare organisations, and other healthcare waste producers, to meet legislative requirements as well as to identify opportunities to improve waste minimisation and reduce the associated environmental and carbon impacts of managing waste.

8.30 When designing access and egress for healthcare properties, an assessment is carried out on the transportation of all waste streams.

Mechanical services

Heating

Healthcare buildings generally

8.31 The heating system should be designed to provide a safe and comfortable environment. Thermal modelling should be utilised to accurately calculate the heating requirement and produce an energy-efficient heating system design.

8.32 Consultation should take place at an early stage of the design process to determine the most appropriate method of heating that meets the criteria for the room or area, the level of resilience required, the maintenance access requirements and the room occupancy type and schedule. The control system should ensure that the environmental parameters are met and that energy use is minimised – in addition to minimising the carbon impact, with consideration to site-wide changes in the move towards NZ targets (for example mean water temperatures to be utilised).

8.33 Heating-system components located in clinical areas should be designed to be easily and effectively cleaned as part of IPC measures.

8.34 The maximum surface temperature of any accessible heat emitters should be controlled within safe limits.

8.35 The ventilation system may be used to provide or assist the heating system in accordance with HTM 03-01.

Mortuary and post-mortem facilities

8.36 Reference should be made to the heating, ventilation and air-conditioning (HVAC) guidance in HTM 03-01.

8.37 Spaces heated by low-pressure hot water systems should use low-surface-temperature radiators or overhead radiant ceiling panels. The surface temperature of wall-mounted radiators should not exceed 43ºC. Ceiling radiant panels can exceed this surface temperature and allow space savings.

8.38 Radiators should be located under windows or against exposed walls. There should be space between the top of the radiator and the windowsill to prevent curtains reducing the output. There should be adequate space underneath to allow cleaning machinery to be used. Removable grilles will enable cleaning and decontamination behind the radiator.

8.39 Where a radiator is located on an external wall, back insulation should be provided to reduce the rate of heat transmission through the building fabric.

8.40 All radiators should be fitted with thermostatic control valves. These should be of robust construction and selected to match the temperature and pressure characteristics of the system. The thermostatic head should

incorporate a tamper-proof facility for pre-setting the maximum room temperature. It should be controlled via a sensor located integrally or remotely. To provide frost protection, the valve should not remain closed below a fixed temperature.

8.41 Radiators should be used to offset only building fabric heat loss in mechanically ventilated rooms. All rooms should have local heating controls. The facility should be controlled throughout by the building management system (BMS). Natural ventilation is preferred wherever practical.

Ventilation

Healthcare buildings generally

8.42 Ventilation provision should comply with HTM 03-01.

8.43 Ventilation is used extensively in all types of healthcare premises to provide a safe and comfortable environment for patients and staff and to control odours. More specialised ventilation is provided to help reduce airborne infection risks in some areas – such as operating departments, critical care facilities, isolation rooms and primary patient treatment areas.

8.44 The Ventilation Safety Group should assess all aspects of ventilation safety and resilience required for the safe development and operation of healthcare premises. The assessment should inform the following areas:

- the design process for new healthcare premises
- the design process for modifications to existing premises
- the commissioning and validation process
- operational management and maintenance
- annual verification and performance testing
- prioritising the plant replacement programme
- decommissioning and removal of redundant equipment.

8.45 Choosing the least energy-consuming ventilation method that meets the criteria for the area will reduce energy costs, provide a more sustainable healthcare estate and support the declared NZC target.

8.46 Within post-mortem rooms, consideration should be given to providing a suitable and comfortable working environment for staff wearing full PPE for a large number of hours – measures will need to include controlling the temperature and humidity of the room when in use.

8.47 When designing the ventilation system, natural ventilation should be the first method considered, followed by mixed-mode ventilation where natural ventilation is assisted by mechanical means, followed by mechanical ventilation as required to meet the design specification and designation of the room or area including occupancy schedule.

8.48 Selection of the ventilation method should take into consideration that in certain rooms or areas it may be required to help control airborne substances hazardous to health, for compliance with the Control of Substances Hazardous to Health (COSHH) regulations and also within rooms where aerosol-generating procedures are undertaken.

8.49 The control strategy system should meet the design criteria while minimising energy use.

8.50 Consideration should be given to the level of resilience required, which may have an influence on the configuration of the ventilation system such as the zoning of any rooms or areas served by common plant.

8.51 The location of air supply diffusers or similar should be chosen to avoid draughts

being experienced by the occupants of the room or area.

8.52 The level of maintenance required and any disruption this may cause to the normal function of the building should be considered during the selection and location of equipment. Ventilation equipment requiring regular routine maintenance should have appropriate access provided and should not be located within clinical areas.

Mortuary and post-mortem facilities

8.53 Designers should reference HTM 03-01, Part A, Appendix 2, which details ventilation requirements for some of the rooms included in this document. A full risk assessment should be undertaken to confirm the ventilation rates based on the chosen equipment and expected use of the space, with specific reference to any COSHH requirements.

8.54 The significant findings from the HSG-283 risk assessment should inform design. A holistic approach needs to be taken for all possible airflow pathways and requirements for the facility to include any specialist equipment, down-flow tables, dissection benches, safety cabinets and body storage equipment. This will give the overall “air in” requirement, which then needs to consider the return air pathways and make-up air routes either specifically by dampers (or variable air volume (VAV) configuration) or by free flow non-draught ventilation grilles/ducts. This is not to be underestimated, as the combined air change rates for a post-mortem suite can be significantly in excess of the minimum rates stated within HTM 03-01.

8.55 Mechanical ventilation must be provided to all rooms in the clinical areas and rooms linking the non-clinical area to the clinical areas. This includes all rooms within the transition zone and post-mortem zone, including any rooms linking directly to those areas, such as transit lobby, specimen store, plantrooms, toilets and disposal areas.

8.56 The clinical area must have negative ventilation pressure and cascade from the non-clinical areas into the transition zone and then into the post-mortem zone. Therefore, the ventilation system should extract greater volumes than is supplied. If an isolation post-mortem room is required, this will require specialist engineering advice.

8.57 The mortuary should follow a cascade approach to ventilation pressures to ensure that odour and contaminates never reach non-clinical areas and the wider hospital:

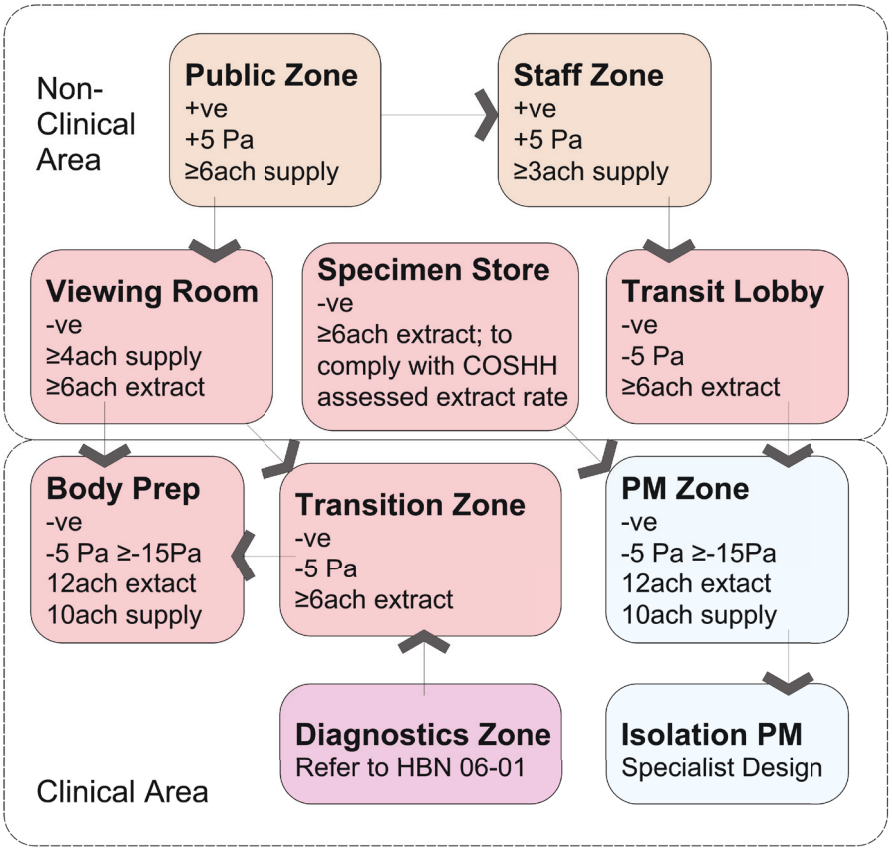
- non-clinical area, both staff zone and public zone, should be positively pressured, except for bier rooms/ combined viewing rooms, which should be neutrally pressured
- transition zones, including the body store and body preparation room, should be negatively pressured
- the post-mortem zone, excluding the isolation post-mortem room, should be negatively pressured
- the isolation post-mortem room and any associated rooms should be specifically designed by an engineer to ensure that they are sufficient for the services provided. It is anticipated that these rooms will be negatively pressured to a greater negative rating that the main post-mortem zone rooms.

8.58 The post-mortem room should be designed with supply and extract systems designed to maintain negative pressure. Negative pressure will range from –5 Pa to –15 Pa. They should normally use 100% fresh air. Temperature control should be achieved by means of reheat coils in supply air systems.

8.59 The shape of the building and/or spatial relationships should be optimised for sustainability and whole lifecycle costs.

8.60 Internal rooms are to be minimised, but where they exist, they should be reserved for:

Figure 10 Mortuary and post-mortem suite ventilation requirements



- room functions that require mechanical ventilation irrespective of whether their location is internal or peripheral (for example the body store or post-mortem dirty utility room)
- spaces that only have brief/transient occupation and will benefit less than others from daylight and views, requiring less mechanical ventilation (such as toilets or stores).

8.61 No naturally ventilated space should link directly with the post-mortem room without an intervening lobby or corridor to reduce the dirty air outflow risk from the post-mortem room.

8.62 Special attention must be given to the need for adequate ventilation in the post-mortem room, and the provision of local extract systems (LEV):

- to minimise the spread of offensive odours
- to minimise the possibility of infection of staff and visitors by contaminated airborne droplets
- to maintain a comfortable working environment
- for public safety and security (for example COSHH and LEV safe discharge locations).

8.63 Consideration should be given to the following potential hazards:

- leakage/recirculation between intake and exhaust air streams
- biohazards to maintenance staff
- chemical reaction on plant
- LEV impacting on air distribution and achievement of designed air changes for the room as a whole.

8.64 The air supply to the post-mortem room in conjunction with the extract should promote

good air distribution without generating undue turbulence at the working stations. The system should be designed to minimise noise (especially that which interferes with sound recording equipment and intercoms) and draughts and should ensure that the designed rates are obtained whilst ensuring the comfort of staff working in the environment.

8.65 Some users prefer the specification of down-draught post-mortem tables along with appropriate ventilation design to help reduce risk of infection and odours for staff. Such solutions may require floor ducts to be provided, which need to be sealed but accessible for cleaning and inspection purposes.

8.66 Where down-draught post-mortem tables are not preferred, ventilation methods for the room should be employed which help reduce risk of infection and odours.

8.67 The air supply and extract requirements for down-draught tables and similar equipment can alter the designed air flow and air change rates for the wider room. The potential effects should be factored into any design.

8.68 Ventilation at the rear of the dissecting bench is essential, and the exhaust volume resulting from a properly designed bench and table will comprise a significant proportion of the total extract from the post-mortem room. Supplementary exhaust grilles should be sited at low level. The control of air movement in the post-mortem room may be achieved partly by using air supplied to the body handling area, the observation area (when provided), and by air drawn into the post-mortem room from other areas of the accommodation.

8.69 Ventilation systems in the post-mortem rooms should have an alarm or visual warning system to notify staff of ventilation failures. The air flow failure alarm should be located in each of the post-mortem rooms, with a repeater panel located in the office area.

8.70 The ventilation within the post-mortem room should be linked to sensors that activate the ventilation system when there is any activity in the room.

8.71 The functionality of the ventilation system for the post-mortem room should include a run-on timer to allow it to run for a fixed period of time (minimum 30 minutes) after last sensing any activity in the room. This will purge any residual odours and assist in the drying of washed surfaces. Shutting down the system when not needed will contribute to the efficient use of energy within the building. An out-of-hours “boost” button will be used to override settings as necessary.

8.72 When the post-mortem room is not in use, there should be a low level of continuous extract ventilation provided; the rate of this ventilation should be determined by a thorough risk assessment. Low levels of continuous ventilation will also prevent a build-up of heat which may affect the efficiency of adjacent body storage units.

8.73 Consideration should be given to the ventilation system’s resilience and provisions to facilitate maintenance while continuing to deliver services as required.

8.74 Mechanical ventilation to internal rooms other than to the post-mortem suite should conform to the requirements of the building regulations. In some cases, cooling will be necessary to maintain thermal comfort/safety. A low-velocity mechanical ventilation system should be used.

8.75 Diffusers and grilles should be located to encourage uniform air movement without causing discomfort to staff. The design should allow for airflow from naturally ventilated spaces/spaces with a mechanical supply to spaces that have only mechanical extract ventilation, via transfer grilles in doors or walls.

8.76 The design should avoid the introduction of un-tempered air and should not prejudice other performance needs, including fire safety, privacy, security and comfort.

8.77 The supply air distribution system should not distort the unidirectional and stable airflow pattern required for the mortuary tables. Supply air ceiling diffusers or grilles should not discharge directly towards mortuary tables, unless the terminal velocity is such that the airflow pattern is unaffected.

8.78 The design should ensure that air movement patterns occasioned by the opening and closing of doors or windows in the facility do not have an adverse effect on the performance of the mortuary tables. A door closing/damping mechanism may assist.

8.79 The airflow rate for the mortuary spaces will be determined by the following:

- infection and odour control, for example min. ac/h (when occupied)
- internal heat gains, such as equipment, plant or services/service voids
- operational and environmental heat gains.

8.80 Design of ventilation systems for summer conditions should be in accordance with current guidance, including CIBSE Guide A, HTM 03-01 and TM52.

8.81 Extract fans should be located close to the point of discharge to ensure that the extract system within the building is maintained at negative pressure.

8.82 External discharge arrangements for extract systems should be protected from back pressure from adverse wind effects and located to avoid contamination, including exhausted air re-entering the building via air intakes and windows. Refer to HTM 03-01.

Dissecting benches

8.83 Dissecting areas should have bench extract systems that ensure that air flows away from operators' faces. Low-level extract should be provided adjacent to equipment for use when solvents are employed, or when specimens in formaldehyde are opened. All are subject to risk assessment, such as COSHH and Healthcare Acquired Infections.

8.84 Air should flow towards dissecting benches from adjoining spaces. Local ventilation should limit the concentration of formaldehyde vapor within the breathing zone of the operator. The threshold limit should be 2 ppm (parts per million).

8.85 The following parameters are aimed at maintaining a concentration below 1 ppm:

- a continuous run of benching (with a continuous up-stand at the rear) should be provided for dissecting activities. Benches should be a maximum of 650 mm deep, from front to rear
- each dissecting position should have a linear extract grille mounted with its face flush with the upstand
- the bottom of the grille should be as close as practicable to the level of the working surface. For cleaning purposes, the minimum height of the bottom of the grille opening above the working surface should be 75 mm
- each dissecting position should be ≥1.2 m long. The extract grille should be the same length and ~150 mm high. It should be mounted on a purpose-designed plenum box to ensure a minimum uniform face velocity of 1 m/s along the total length, and across the full height of the grille opening
- the grille should be easily demountable to permit periodic internal cleaning of the plenum box and any guide vanes
- filtration of the extract system is not necessary.

NOTE:

Ventilation systems provided to meet the foregoing will be classed as Local Exhaust Ventilation (LEV) under the COSHH Regulations. And as such the complete installation will be subject to a Statutory Inspection.

Cooling

Healthcare buildings generally

8.86 Cooling may be required to provide a safe and comfortable environment.

8.87 Thermal modelling should be utilised to identify and minimise unnecessary heat gains and hence minimise the cooling requirement, leading to a more energy-efficient design.

8.88 Where cooling is required, it should be achieved via the ventilation system in accordance with HTM 03-01.

8.89 Consideration should be given to the required level of resilience of the cooling functions as part of the overall ventilation system design.

8.90 The control system should ensure that the environmental parameters are met and energy use is minimised.

Mortuary and post-mortem facilities

8.91 Cooling is to be minimised, but where required, sustainable passive systems should be considered. As a last resort, chilled water-cooling systems should be used rather than the direct expansion type. If the location permits, the mortuary facility could be connected to the main hospital or campus chilled water plant.

8.92 Evaporative-type heat rejection plant should not be used. If cooling cannot be provided from a central chilling plant, a separate low-noise, anti-vibration and energy-efficient air-cooled chiller plant using environmentally friendly refrigerant should be used.

8.93 Any cooling system will be designed to meet the requirements of HTM 04-01, HSG274 and ACoP L8 to prevent the growth of water pathogens.

8.94 On refurbishment projects, assessment should be made of the overall performance of the HVAC system installed by the inclusion of peripheral cooling equipment.

8.95 There may be a need to maintain temperatures within specified limits to prevent equipment failure. Temperature limits should be obtained from equipment manufacturers.

8.96 Consideration should also be given to the selection of a chilling plant that offers low ambient free cooling to applications requiring year-round cooling, for instance chilled water circuits serving fan coil units in equipment rooms.

Domestic water services

Healthcare buildings generally

8.97 Water services should be designed in accordance with HTM 04-01 and agreed with the Water Safety Group (WSG).

8.98 The Water Safety Group (WSG) is pivotal in ensuring that decisions affecting the safety and integrity of the water systems and associated equipment do not go ahead without being agreed by them. This includes consultations relating to decisions on the procurement, design, installation and commissioning of water services, equipment and associated treatment processes.

Mortuary and post-mortem facilities

8.99 Hot and cold water systems to mortuary and post-mortem facilities should be designed safely, for example independent of hospital cold water storage tanks and hot water

generators. Signage should state where the water is non-drinkable. The system should contain type 'A' backflow prevention separation to prevent any contaminants entering the supplier's water system. The system design should be issued for comment to the water supply company.

8.100 The hot water may be point-of-use, or ≥60ºC at the storage vessel outflow, ensuring a return minimum of 55ºC.

8.101 Safe outlet temperatures and fittings for washbasins, sinks and showers should be designed to prevent scalds.

8.102 All water supply pipework, valves, flanges etc should be insulated and vapour-sealed.

8.103 Hot and cold water systems must be designed in accordance with regulations and guidance to limit the risk of legionellae, including HTM 04-01, HSG274 and ACoP L8.

8.104 The cold water system should be designed and maintained at a safe temperature, of ≤ 20ºC, to inhibit microbiological growth. Water storage, pipe location, size, flow etc must evidence the limit to thermal gains, for example "realistic" DSM model.

Acoustics

Healthcare buildings generally

8.105 HTM 08-01 has been written for healthcare professionals to understand acoustic requirements and to help those involved in the development of healthcare facilities.

8.106 It sets out acoustic criteria for the design and management of new healthcare facilities.

8.107 The Health Technical Memorandum does not give solutions to meet the acoustic criteria; designers on each individual project should develop these.

8.108 A specialist acoustic adviser should be used to take a holistic approach to the acoustic design.

8.109 A detailed acoustic theory is not included in this Health Technical Memorandum, although sufficient detail is given for a basic understanding of the acoustic issues. It would be unwise to design a healthcare development without specialist acoustic advice right from the outline design stage.

Mortuary and post-mortem facilities

8.110 The acoustic environment for both staff and bereaved visitors requires careful briefing and early design consideration.

8.111 The layout design should mitigate the noise transmission from the post-mortem suite, body handling and storage areas to bereaved visitor areas. This noise is particularly transmissible via the viewing areas.

8.112 The transmission of noise between spaces within the non-clinical area should also be attenuated, providing privacy for the bereaved in viewing spaces and confidentiality for people in interview rooms/offices. Consideration should also be given to provision of cross-talk attenuation on ventilation systems.

8.113 The specification of services, systems and acoustic measures, such as ceilings, soft finishes, furnishings and equipment, to mitigate intrusive noise is required, for instance acoustic "art" wall panels, floor coverings, heavy curtains and soft-closing bin lids.

8.114 IPC and maintenance should be considered when designing acoustic measures.

Pneumatic tube systems

Healthcare buildings generally

8.115 Following risk assessment, for instance chain of evidence and formalin fixed specimens, a pneumatic tube system is a project option for the transfer of specimens to and from other departments.

Mortuary and post-mortem facilities

8.116 There may be a requirement to transfer specimens to the pathology department. Following risk assessment, for example chain of evidence and formalin fixed specimens, a pneumatic tube system is a project option for the transfer of specimens to and from other departments. The system may be designed to SHTM 08-04A & B – 'Pneumatic tube systems'.

Building management system

Healthcare buildings generally

8.117 Specialist engineering plant and equipment should be monitored and regulated by the BMS. The systems operational data should be recorded and reported through the BMS system.

8.118 A building management system (BMS) may be utilised to monitor and control engineering services within the building. Equipment and devices such as heating, ventilation, cooling, lighting, emergency lighting and window switches may be connected to the BMS network.

8.119 Consultation should take place with relevant stakeholders, such as engineering estates teams, at an early stage of the design process to determine the BMS strategy. Examples of energy-efficiency measures include using occupancy sensors together with normal working patterns to switch off lighting in non-critical areas, setting heating and ventilation systems to set-back mode out of hours, and switching off heating when windows are open. Other examples of BMS functions include automatic testing of emergency lighting out of hours and monitoring of fire alarm and security systems.

8.120 A BMS can enable substantial energy savings to be made by optimising control strategies.

Mortuary and post-mortem facilities

8.121 All supply and extract systems should have local control systems. These should be integrated with the overall Building Management System (BMS).

8.122 Engineering plant and equipment should be monitored and regulated by the BMS.

8.123 Plant and system operational data should be recorded and reported. The BMS should also monitor, measure and record energy consumption and incoming water temperatures etc for the facility. All data collected should be capable of being presented in an appropriate format to prove compliance, reporting to safety committees and into annual validation data sets such as ERIC and PAM.

8.124 If the main site has a BMS, the mortuary facility should be set up as an outstation so that systems serving the facility can be monitored and controlled at a central station. The engineering systems within the facility should be capable of management from both the central station and the outstation itself.

8.125 Controls should include temperature, pressure and time-switching functions. Their selection should take account of the extent to which they can be linked to the BMS serving the whole hospital.

8.126 Supply and extract fans should be interlocked. The extract fan should start first and air flow be established in the extract system before the supply fan starts. This will ensure that the post-mortem suite always remains at negative pressure relative to

surrounding areas and that odours are contained when the system is in use. If the extract fan fails, the supply fan should shut down.

8.127 All heater battery coils and filters should be provided with frost protection control.

8.128 Control systems should incorporate energy-efficient equipment; this may include the following technologies amongst others:

- high-efficiency motors
- suitable air-to-air cross-flow heat exchanger.

8.129 Mortuary air-conditioning systems should be controlled to ensure comfort, operational safety and regulatory compliance, and should also satisfy process constraints. A well-controlled system should provide flexibility, sustainability and minimise whole life cycle costs.

8.130 A control system should provide the following minimal safety responses:

- detection of equipment failure by the BMS and automatic initiation of standby equipment
- maintenance of relative negative pressures in the post-mortem rooms
- The control of supply air volumes using a variable air volume (VAV) type system is recommended for large post-mortem rooms. Supply and extract air volumes should be balanced to achieve desired pressurisation levels. The VAV supply system is to provide temperature control and maintain the minimum room ventilation rate
- Mortuary spaces should be comfort cooled without local humidity control. Large mortuary spaces should be zoned, with each zone/room equipped with a thermostat for individual control
- It may be necessary to have one microbiological safety cabinet within or adjacent to the post-mortem room. Therefore, local controls for operating any associated ventilation plant will be necessary. Note this will be classed as an LEV system under the CoSHH Regulations
- Where “make up” air is provided by mechanical ventilation, a supply air failure warning system should be provided. If any safety enclosure or room extract system fails, the associated supply system should be capable of being shut down automatically or reduced, to prevent pressurisation of the room and possible contamination of adjacent areas due to reverse air flows
- The ventilation control system for safety cabinets should incorporate a five-minute delay timer. This will ensure that the system will continue to run after work has finished and purge any remaining contaminants
- The BMS control functions should be fully developed and agreed at the design stage to ensure that all of the required engineering functions correctly integrate with one another to ensure that facility functionality and safety are maintained at all times whilst managing the energy and operational issues to maximise efficiency.

Electrical services

Electrical Engineering Services

8.131 The primary objective is to deliver designs that are both safe for staff, patients and visitors, and available when they need to use these systems. HTM 06-01 provides guidance on electrical distribution within a healthcare estate, addressing both of these issues, and forms the basis on which design proposals should be assessed.

8.132 As required by HTM 06-01, regardless of the method of project procurement (design, design and build, or design, build and facilities

management), the design team should collaborate with the Electrical Safety Group at the initial design stage of the project and before any fundamental decisions are taken on the electrical infrastructure. Regular progress meetings should be convened by the chair of the Electrical Safety Group with all stakeholders throughout the life of the project (including the operational phase) to address any issues and record the risk.

8.133 The Electrical Safety Group is a multidisciplinary group formed to assess all aspects of electrical safety and resilience required for the safe development and operation of healthcare premises, and it should inform the following areas:

- the design process for new healthcare premises
- the design process for modifications to existing premises
- commissioning
- operational management
- maintenance
- decommissioning and removal of equipment.

Electrical power distribution

Healthcare buildings generally

8.134 Risk is addressed from two different viewpoints: the effect on the patient (clinical risk, life safety) and on continuity of service (business continuity); that is, while a patient may be safe, the loss of a facility such as IT servers over a prolonged period will prevent the functioning of the hospital.

8.135 The planners and designers should agree the level of clinical and business risk that could be seen through loss of power in an area.

8.136 Electrical supply connections to all medical electrical equipment should comply with BS 7671 and associated guidance notes.

8.137 Designers should ensure that the electrical loads are balanced across the infrastructure network and that there is sufficient capacity to meet current and potential future demands.

8.138 The requirements for backup systems should be determined within the design brief and may be different for a building within a hospital site or a stand-alone building. In either case, the capacity of the system required would need to be determined with the client clinicians and the design team. The design brief should determine the systems which require backup UPS/IP back-up systems, shutdown processes and governance.

Mortuary and post-mortem facilities

8.139 Electrical installations should comply with BS 7671 and guidance from HTM 06-01. Care should be taken to avoid mains-borne interference and electrical radio frequency interference affecting diagnostic and monitoring equipment, computers or other sensitive electronic equipment. The installation should comply with current codes and standards.

8.140 The facility's main electrical intake houses the main isolators and distribution board. It should be:

- sited within the facility/department away from public areas
- accessible directly from a circulation area providing clear, adequate and safe access for maintenance staff (access space may be part of the circulation area; but care should be taken to ensure that safety is not compromised during maintenance by passing traffic or the opening of adjacent doors)
- sited away from water services, and lockable.

8.141 Equipment should be mounted at a height that gives safe and easy access from a standing position. All switchgear should be lockable in the "off" position.

Emergency electrical supplies

8.142 Emergency electrical provision should comply, as a minimum, with the requirements of HTM 06-01 – 'Electrical services supply and distribution'.

8.143 The emergency generator providing electricity in the event of a mains supply failure should be capable of providing appropriate mortuary backup as determined during the resilience risk assessment.

8.144 Body store fridges and freezers must take priority on any emergency backup system. There should be an alarm system provided which alarms locally, usually within the technologists' office, and which is monitored remotely. The alarm system may also be connected to the on-call manager system and notifies on-call managers' mobile phones of power failures and temperature failures.

8.145 Backup is not required for comfort cooling.

8.146 If an existing generator is to be used, the extent of emergency coverage will be dependent on the spare capacity available, subject to a minimum provision. If this minimum requirement cannot be met, it will be necessary to either replace the existing generator or provide an additional generator dedicated to the facility.

8.147 Equipment and systems that are unable to sustain a break in service inherent in bringing a generator supply on line, such as computers, should be protected against outages by the provision of solid-state non-interruptible power supplies.

8.148 In the event of a main supply or local final circuit failure, escape routes should be illuminated by self-contained, battery-powered luminaires charged continuously from the main supply and capable of providing illumination for a period of three hours.

8.149 The local exhaust ventilation systems (LEV) should be connected to emergency essential supplies, and in the event of post-mortems continuing during power failures, the ventilation plant and down-draught tables should continue to operate.

Small power distribution systems

8.150 Depending upon the available capacity of the emergency generator installation it may be necessary to provide separate essential and non-essential small power distribution systems; to comply with HTM 06-01 and BS 7671. 13-amp switched and shuttered socket-outlets in accordance with the room data sheets requirements should be provided and connected to ring or spur circuits.

8.151 Consideration should be given to the need for socket-outlets supplied by backup generators and/or UPS systems, and where they are provided, they should be labelled/coded in accordance with BS7671.

8.152 Medical IT systems are primarily used to ensure patient safety in the theatre environment within hospitals and other Group 2 locations within hospitals. It is highly unlikely that this level of isolated power supplies/infrastructure would be required in this environment. The specification of suitable electrical protection and suitably rated accessories fit for the environment should be sufficient to ensure the protection of users.

8.153 It is preferable to locate power outlets outside of cleaning "hose down" zones, or areas where they will come into frequent contact with water/fluids. Where locating sockets in such areas is unavoidable, they should be water-resistant IP65 (min) rated, IEC 60309 type socket-outlets that require a plug to be inserted or the integral cover to be securely tightened down before cleaning commences. Where equipment is permanently installed, or where there is a possibility of

equipment theft, switched double-pole 13-amp spur-outlets should be used in preference to socket-outlets. The spur-outlet should incorporate a red neon lamp indicating when the supply to the equipment is live.

8.154 Equipment requiring a three-phase supply should be permanently connected to a separate sub-circuit. The sub-circuits, incorporating a circuit breaker, should be fed from the distribution board and should terminate in a local isolator.

8.155 Adequate provision should be made in circulation areas, for instance corridors and lobbies, to permit the use of domestic cleaning equipment having flexible cords up to 9 m long.

8.156 Lockable isolation switches should be provided immediately next to all engineering plant and equipment, and clearly labelled to identify the equipment they serve.

8.157 Refrigeration, heating appliances and automatic equipment should be provided with red neon lamps indicating when they are live. The neon lamps should be incorporated in the control panel of the equipment, in the control switch, or in the socket-outlet or spur-outlet from which the equipment derives its supply.

Lighting

Healthcare buildings generally

8.158 The use of as much natural daylight as possible will help in creating a bright and airy feel to the space.

8.159 Artificial lighting should be provided to supplement as required and achieve the desired light levels and environment conditions while considering energy consumption. This can be manual, by switching individual groups of lights, or dimming the overall lighting as required, or it can be automated by using daylight sensors to control the dimming.

8.160 Where daylight sensors are specified, proposals should reflect the guidance set out in CIBSE Lighting Guides with particular reference to LG02 – 'Hospitals and healthcare buildings'.

Mortuary and post-mortem facilities

8.161 To achieve energy efficiency, lighting systems should be designed to:

- maximise natural daylight
- avoid unnecessarily high levels of illumination
- incorporate efficient luminaires, control gear and lamps
- incorporate effective controls.

NOTE

See CIBSE guides F and LG2 for further information.

8.162 For detail regarding illumination levels and luminaires, consult BS EN 12464, BS EN 60598-2-25, IEC 60598-2-25 and CIBSE Guide LG2.

8.163 Lighting should be closely coordinated with architecture/interior design. In particular, ensure decorative finishes are compatible with the colour-rendering properties of lamps and the spectral distribution of the light source is not adversely affected. Lighting should be well distributed and located, with space for maintenance access. See NHS-funded research 'Lighting and colour for hospital design' (2004).

8.164 Lighting switches to be provided in easily accessible positions within each area, and at appropriate locations in corridors and general circulation areas. In areas with multiple luminaires, switching should permit the selection of luminaires appropriate only to that area requiring illumination. In areas of more complex lighting layout design, it is recommended that signage detailing lighting

controls is located near the corresponding light switches.

8.165 Where local circumstances permit, timed switches with absence/occupancy detection, using acoustic or ultrasonic detectors, should be considered.

8.166 Generally, luminaires should be fitted with high-efficiency LED sources with ultra-low-loss drivers or highly-efficient fluorescent lamps equipped with low-loss or high-frequency control gear. Where luminaires are infrequently used, or where the interior design ambience dictates, compact fluorescent, LV or tungsten lamps may be used.

8.167 Colour-corrected lighting to CIBSE LG2 should be provided in all work rooms.

8.168 Where necessary, general lighting should be supplemented with dedicated task lighting.

8.169 In the viewing room, bier room and other areas used by relatives, lighting should be provided and selected to create a domestic rather than an institutional ambience.

8.170 Lighting installations within viewing rooms and bier rooms should have the facility for the lighting levels to be reduced by means of local dimmer switches.

8.171 In areas where VDUs are in use, lighting should be designed to avoid any bright reflections from the screen.

8.172 Safety escape lighting should be provided on primary escape routes in accordance with the provisions of HTM 06-01, BS EN 12464, BS EN 60598-2-25, IEC 60598-2-25 and BS 5266.

8.173 Within the visitor and staff areas where people spend greater amounts of time, such as >10 or >30 minutes respectively, should be located where they can benefit from daylight, and preferably have natural ventilation with views of green space.

8.174 Distribution and location of windows should take into account the need to maintain security and privacy. Post-mortem rooms and any directly linked rooms must have fixed, non-openable windows.

8.175 Glazing solutions should achieve good daylight in all occupied spaces, without glare. Consideration should be given to the use of high-performance glazing in order to balance daylight and natural light penetration whilst controlling solar gain. Controls systems are now incorporating GPS tracking to open and close windows for natural ventilation and blind adjustments for solar gain.

Lightning protection

8.176 Protection of the building against lightning should be provided in accordance with HTM 06-01, BS 7671 and BS EN 62305.

Call systems

Healthcare buildings generally

8.177 Addressable call systems should be designed in accordance with HTM 08-03 – 'Bedhead services'. Outlet quantities identified should form the starting point for discussions with the users and should be included in the project's room data sheets.

Mortuary and post-mortem facilities

8.178 Staff call points should be provided in all spaces accessible to the public. This call system will provide a level of security for staff who need to call for help with bereaved visitors who are either agressive or distraught.

8.179 Each call unit should include a push-button or pull cord, reassurance lamp and reset unit.

8.180 A visual and audible indication of operation of each call point should be provided

to reassure the visitor and report an unambiguous location of the source to a reception area or staff base.

8.181 A repeater unit should be provided within the staff rest room or technologist office, or any other area that staff who are able to provide support, regularly occupy.

Security

Healthcare buildings generally

8.182 CCTV must be provided for general safety and security, which should include surveillance of restricted areas to monitor any unauthorised access. The location, capacity and requirements of the system should be agreed with the Trust's security committee.

8.183 The CCTV system should comply with relevant legislation, codes of practice, national and local policies and procedures. Notices should be provided in areas covered by CCTV surveillance (see 'Data protection and your business: using CCTV', www.gov.uk). Patient privacy and the confidential nature of footage should be taken into consideration when positioning cameras and managing the data obtained.

Mortuary and post-mortem facilities

8.184 Any parts of the facility that are only used during the day should be protected out of hours by an intruder alarm system, to either BS 4737 or BS EN 50518 as appropriate.

8.185 Points of ingress and egress from the facility, including body storage and receiving areas, even if temporary, should all be monitored by high-definition CCTVs. These should be equipped with a pan and tilt facility and be capable of producing high-quality images in low levels of light. Positioning of cameras should be determined with care, selecting optimum positioning for maximum field of coverage. Monitors should be sited at a location that is permanently manned whilst the facility is in use. Use of CCTV everywhere is the accepted policy: even post-mortem rooms may have a camera focusing on the fridge doors but not the dissecting benches or post-mortem tables. It is essential to have CCTV where you can see people coming in and out of the space and where you can see bodies coming in and out of fridges.

8.186 Entrances, work areas and other sensitive spaces should be protected wherever possible by passive security, plus one of the variety of electronic access control systems available.

8.187 Visitors and funeral directors will only gain access to the mortuary after operating an audio/video intercom at the appropriate entrance.

8.188 CCTV provided in mortuary facilities will need to be capable of being isolated if required.

8.189 Consideration should be given to wall-mounted panic alarms in publicly-accessed spaces, and to personnel attack alarms being available to staff. Preference should be given to a type capable of identifying the location of a member of staff in difficulty.

Information and communications technology

Healthcare buildings generally

8.190 Designers should consult with the healthcare provider's ICT lead to identify specifications and requirements for the facility.

8.191 The ICT provision, such as connection to existing infrastructure, server rooms, cabling, data outlets and Wi-Fi hubs, should be agreed with relevant stakeholders.

8.192 The Institution of Engineering and Technology's (IET) 'Code of Practice: building infrastructures for healthcare ICT' (2020) provides guidance and best practice advice in this area.

Mortuary and post-mortem facilities

8.193 Planners should ensure that the data network in any mortuary should be sufficient to meet the needs of that mortuary provision; for instance, if a CT scan is required, the correct bandwidth should be used.

8.194 Provision for dedicated disaster mortuaries should be agreed with local partners.

8.195 The provision of an effective communications and IT system or systems is necessary for the efficient management of a mortuary and post-mortem room facility. These requirements can be identified in five main categories:

- **telephones:** to be provided as per local policy for communication internally and/or externally; ideally VOIP, all with direct line etc, but at a minimum, direct lines for one phone and one fax. (Despite its decline in use and NHS policy, "fax" communication is occasionally required for funeral directors, criminal forensic services or in an emergency.) Robust cordless phone handsets, with excellent sound quality and range and with a ≥8 hr battery life, are required for visitor and staff use. Hands-free/loudspeaker and wall-mounted options are required, including in the post-mortem, body store and observation areas. Options for hearing and sight impairment will also be needed
- **staff call:** there is a need for visitors and funeral directors to alert staff to their arrival at the mortuary. An audiovisual intercom should be provided at all appropriate entrances. Staff audiovisual intercoms should be able to be answered from the technicians' office
- **intercom:** the majority of communication needs within the mortuary and post-mortem facility, and between it and the pathology laboratory, should normally be satisfied by the specified telephone system. Consideration might also be given to audiovisual communication between the body handling area and viewing room, post-mortem room and teaching rooms, such as CCTV and monitors
- **dictation:** a custom-built dictation system, suitable for the conditions within the post-mortem room, may be provided. The field of voice recognition, voice command and audiovisual technology is continually improving, and the latest advances should be considered in any new or refurbishment projects. This may include electronic transmission of dictation files or voice recognition software displaying notes on a screen within the post-mortem room
- **computer:** intranet and internet access, email and server access are required in all areas.

Lifts installations

8.196 HTM 08-02 – 'Lifts' covers all types of lifts, including new lifts installed in healthcare buildings, and can also be used as guidance for the upgrading of the safety and performance of existing lifts.

Fire safety

Healthcare buildings generally

8.197 Health Technical Memorandum 05-02 – 'Firecode: Fire safety in the design of healthcare premises' provides recommendations and guidance on the design of fire safety in healthcare premises.

8.198 A fire risk assessment and evacuation strategy should be developed at the design stage and should include wide consultation with stakeholders including the users, the Fire Safety Group and the local fire and rescue service.

8.199 Addressable fire alarm systems should be designed in accordance with BS 5839. The

functions performed by the fire alarm panel, typically presented as cause-and-effect diagrams, should be agreed with the stakeholders.

Mortuary and post-mortem facilities

8.200 Consideration should be given to the fire safety strategy during the design stage. The architect and engineer should verify the proposals with the relevant fire authority. The project team and all other planning staff should be fully acquainted with the fire safety strategy. This will include operational aspects, for instance staff responsibilities, evacuation protocols, equipment provision, and building and engineering layouts.

Body storage in mortuary and post-mortem facilities

8.201 Storage of the deceased should always be safe and carried out with due dignity. Body storage must be in a secure, cool and appropriate space, where the duration and temperature can be monitored.

8.202 Refrigeration should be provided at an optimum 4–6ºC; and freezer storage at an optimum –20ºC for stays of over 30 days. The resilience of any building services related to body storage is an essential requirement.

8.203 Alarm systems must be tested regularly (normally once a month, with at least one "no notice" test each year) to ensure they are functioning as expected and will alert staff to a failure of storage units both in and out of hours.

Public health services

Drainage and waste systems

Healthcare buildings generally

8.204 The internal drainage system should use the minimum of pipework and remain water- and air-tight at all joints and connections. The system should be sufficiently vented to retain the integrity of water seals.

8.205 Provision for inspection, rodding and maintenance should ensure "full bore" access and be located to minimise disruption or possible contamination. Manholes should not be located within the unit.

Mortuary and post-mortem facilities

8.206 Mortuary waste systems should be made of heat-sealed polypropylene. High silicone iron alloy (14.5%) should be used below ground.

8.207 Mortuary facilities should be provided with an acid-resistant waste and vent system connected, after dilution, to the foul sewer outside the building perimeter. Space should be available for a neutralisation tank, since this is likely to be required in the future.

8.208 Sink traps and piping to floor drops should be made of acid-resistant materials. Below ground, acid-resistant pipes will not be damaged by minor quantities of acids and solvents. Vents should be routed through the roof and not connected to sanitary vent piping.

8.209 Drainage systems from pathology laboratories may contain pathogens. To prevent any risk of cross-infection, the system should be routed to avoid other hospital accommodation such as critical care areas, operating theatres and catering departments.

8.210 Drainage may also contain chemicals and should be designed for maximum dilution. Frequently-used large-volume appliances should be located upstream.

8.211 The internal drainage system should be connected to the main drainage system as far downstream as possible to ensure maximum dilution. The designer should liaise with the statutory authority on volumes and the agreed method of connection to main services.

8.212 The drainage system should allow easy access for inspection and maintenance. Access should be above the appliance flood/rim level so that spillage of contaminated effluent can be minimised. Access for cleaning should cause minimal disturbance to facility staff.

8.213 The briefing documents should identify the types of discharge produced by specialist equipment and the effect that the mixing of various chemical discharges may have upon the drainage system.

8.214 If radioactive effluent is to be discharged into the drainage system, the requirements for catch-pot recovery, dilution and maintenance should be discussed and agreed with the Radiological Protection Advisor.

8.215 Autoclaves (except those used for decontamination of infected material), glassware washing machines and refrigerators should not be connected directly to the drainage system. They should have an air gap appropriate to local water regulations. Consult with the water regulator for further information.

8.216 The sterilizer for discarded material should be connected to the drain via a vented break tank and trap. The break tank should be vented outside the building. The vent termination should be above roof level and at least 2 m clear of any ventilation inlet or window. The trap should be positioned between the break tank and the connection to the drainage system.

8.217 Stainless steel floor gullies should be located between tables to ensure that waste water/spillages can be easily and safely removed. The floor between the post-mortem tables should be graded and should drain into suitable gullies.

Drainage effluent

8.218 Whilst most discharges from mortuary processes are acceptable for discharge to the foul sewer, care should be taken to ensure that the Trust has the appropriate Trade Effluence Licences and permission from the local water board, as each will have a different policy.

8.219 Discharge from any washer-disinfectors used must be below 43ºC upon entry to the main drain; appropriate pipework should be manufactured to take account of such elevated discharge temperatures.

8.220 Special attention must be given to the need to comply with the requirements of the National Guidance for Healthcare Waste Water Discharges (2014) document, by www.water.org.uk and the requirements set out by the Environment Agency. Designers in home nations should refer to their local regulators, such as SEPA in Scotland, for information on local obligations.

8.221 Where discharge effluent contains pH-neutral enzymatic detergents, hydrogen peroxide, biocides, corrosion inhibitors, scale inhibitors, antifoams, bio-dispersants, formaldehyde, phenol, methanol or glycerine, the owner is responsible for contacting the sewerage provider to discuss whether discharge consent is required.

8.222 The discharge is acceptable provided that levels of formaldehyde do not exceed 100 mg/L or 10 mg/L phenol at the discharge point to the public foul drain system.

Part 3: Estates considerations for emergency spaces

9.0 Emergency preparedness, resilience and response

9.1 As set out in Chapter 6, it is expected that those planning and designing a mortuary and body store will factor in allowances for excess death periods which occur regularly/ seasonally.

9.2 There will occasionally be periods of excess deaths which are exceptional and unforeseen, for which including additional permanent body storage facilities will not be economically feasible. It is expected that designs for mortuaries will consider the potential for such eventualities and provide space which could be used to accommodate temporary body stores. This space could be in the mortuary facility or in close proximity externally to the mortuary.

9.3 A variety of capacity mitigation measures should be planned, and will include:

- negotiation with a local network of mortuaries (both public and private)
- negotiation with funeral directors, crematoria etc to increase throughput
- the purchase or rental of “flat-pack” temporary fridges, installed in a suitable internal space, preferably within or adjacent to the mortuary
- the provision of a cold room with thermal curtain and storage racks, which may be used as a normal store room when not in use for bodies
- the installation of a temporary, free-standing refrigerated store, for example a Portakabin, which is secure, suitably screened, has discreet access and is adjacent to the mortuary.

Events outside health service operational responsibility

9.4 Mass fatality events and mass casualty events have also highlighted in recent years the importance of local civil contingency plans and the need for sufficient mortuary provision in localities to address unforeseen but immediate requirements.

9.5 In mass fatality events there is specific guidance, issued primarily by the Cabinet Office, around the provision of temporary body stores and post-mortem facilities. These are referred to as Dedicated Disaster Mortuaries within this document.

9.6 Home Office guidance states that: “Hospital mortuary facilities may be considered but should not be relied on when considering the designated mortuary for a mass fatality incident.”

9.7 When investing in new hospitals, planners should have detailed discussions with local system partners and civil contingency planners to assess the requirements of local

systems for dedicated disaster mortuaries and temporary body stores.

9.8 If a hospital is deemed to be a realistic option to bolster local contingency plans, planners are recommended to read the following documents when considering the scope of emergency response provision required in a new facility:

- *Regional Local Resilience Forum Mortuary Plans* (it should be noted that many of these plans will be classified as Official Sensitive documents and may not be openly available, therefore liaison with local civil contingency planners is essential)
- Cabinet Office, *Lexicon of UK civil protection terminology*, version 2.1.1, 2013
- *Managing the deceased during a pandemic, guidance for planners in England*, 2020
- *Pandemic Influenza Excess Deaths: Good practice guide for the collection and storage of the deceased*, 2009
- Cabinet Office, *Guidance on dealing with fatalities in emergencies*, joint publication, 2006
- National College of Policing, *Disaster Victim Identification Authorised Professional Practice*
- Cabinet Office, *Human Aspects in Emergency Management. Guidance on supporting individuals affected by emergencies*, 2016
- Disaster Action, *Guidance for Responders*
- *'The patronising disposition of unaccountable power'. A report to ensure the pain and suffering of the Hillsborough families is not repeated*, 2017
- The Kerslake Review into the Manchester Bombings, 2017
- *Thames Safety Inquiry, Final Report by Lord Justice Clarke*, 2000
- Cabinet Office, *Data protection and sharing guidance for emergency planners and responders*, 2007.

Dedicated disaster mortuaries

9.9 The establishment of a dedicated disaster mortuary during a mass fatality event is co-ordinated by the Coroner, alongside the police, local authority and other public agencies active in that area. As such when planning a mortuary within a hospital due regard should be given to the potential loss of control of some or all of the facilities in the mortuary.

9.10 The spatial requirements of a dedicated disaster mortuary should not be underestimated, and sufficient external space and infrastructure should be provided. Hospitals should therefore only be considered as a realistic option if this space can be provided without significant detriment to existing healthcare provision and operational integrity.

9.11 It is feasible for the permanent body store to be retained for use by the hospital through a mass fatality response, whilst surrendering control of the post-mortem room and support facilities to the coroner. If liaison with local civil contingency planners identifies the hospital as a realistic and beneficial addition to the Regional Local Resilience Forum Mortuary Plans, planners and designers should consider:

- the effect on the model of care and operational policies of the hospital mortuary during times of emergency response. This should include how bodies not part of the emergency response will be transferred to funeral directors, and alternative locations and transportation arrangements for post-mortem examinations

- how to provide internal zonal separation between the retained hospital body store and emergency response zones
- access, egress and transportation between the sequestered facilities and the temporary facilities provided in external spaces on site.

9.12 A number of factors will influence the decision-making over the location and functional content of a dedicated disaster mortuary, including type of incident, types of ongoing threat and condition of the bodies.

9.13 Dedicated disaster mortuaries will include a large range of facilities which need to be coordinated into an operationally efficient facility. These facilities must be secured, and adequate access arrangements for large numbers of people and vehicles must be provided to support the emergency response without affecting the operational integrity of the hospital hosting the facility. The facility may include some or all of the following spaces:

- a mobile CT scanner, including necessary access to power, water, drainage and data infrastructure
- an emergency generator
- a body reception area
- body storage facilities
- decontamination facilities
- staff rest and welfare facilities
- catering and canteen arrangements
- administration facilities
- wash down and drying facilities
- car parking or bus access points for staff
- storage units for equipment and consumables
- personal effects and evidence storage units
- a waste disposal area.

9.14 When planning the site, some situations may require space for radiological diagnostic equipment, especially for odontology. A radiology exclusion zone should be provided in such situations.

9.15 All spaces provided must be secured with temporary fencing and will require privacy coverings for the access routes and facilities included above, for example tented structures.

9.16 Dedicated disaster mortuaries are licensed by the HTA and are required to be constructed to the same requirements as a permanent mortuary.

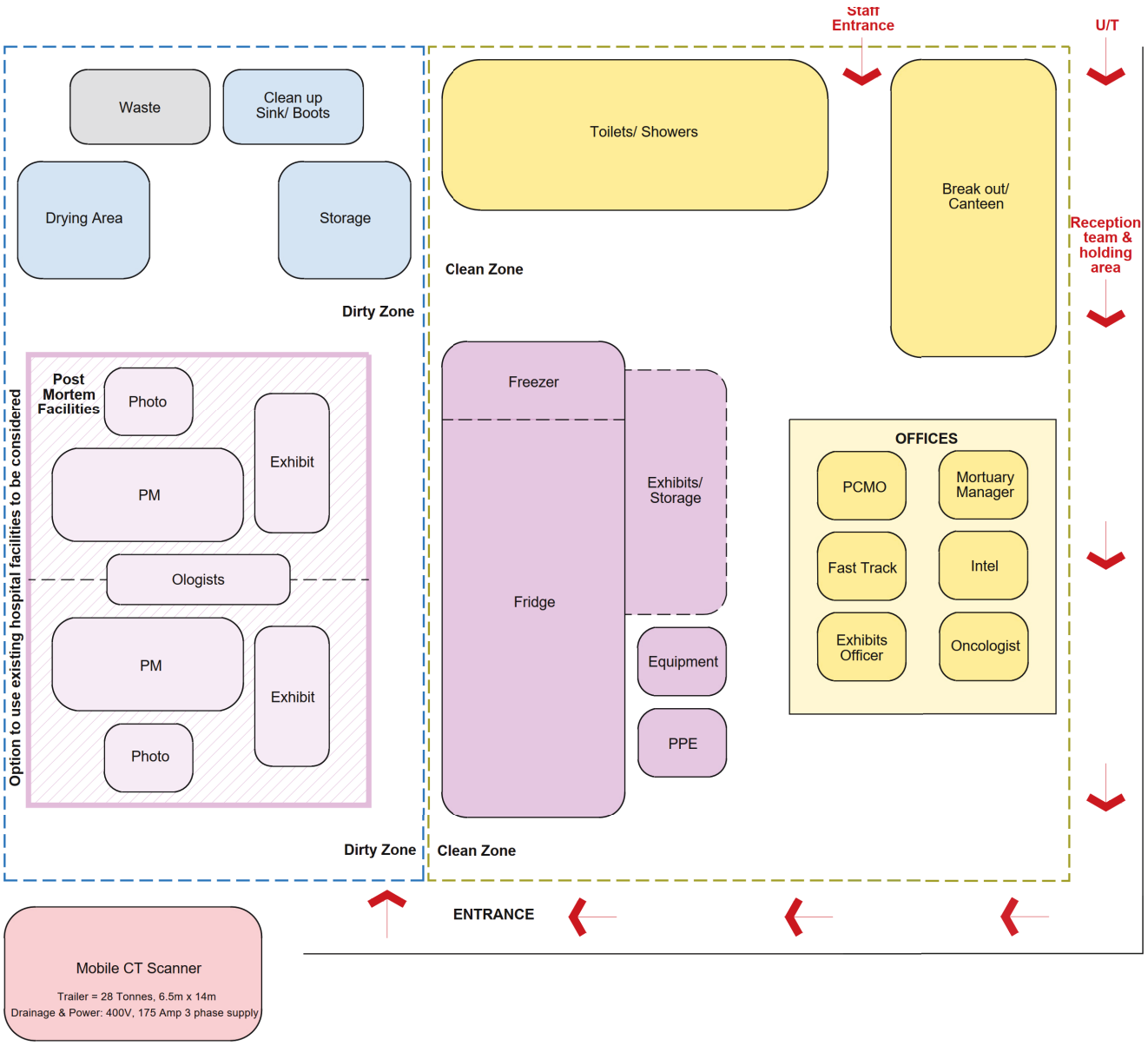
9.17 Body viewing and bereaved visitor spaces are likely to be undertaken away from the dedicated disaster mortuary.

9.18 The number of people accessing the site will be considerable – it is estimated that a moderate sized event will require accommodation for approximately 70 staff per shift, with potentially three shifts per day. This is in addition to transient staff visiting, delivering and securing the site.

9.19 Mass fatality events will attract significant attention from members of the press and members of the public, including distressed relatives seeking information about missing loved ones. It is essential that any plans considering dedicated disaster mortuary status consider how and where to host press attendance and information zones safely and without affecting the operational integrity of the hospital.

9.20 Consideration should be given to operational facilities management issues, such as ensuring that deliveries are maintained and that waste management contracts can be flexed in order to accommodate the significant amounts of waste produced by a dedicated disaster mortuary.

Figure 11 Example of a dedicated disaster mortuary layout



Engineering considerations

9.21 If a proposed facility is considered suitable to accommodate an emergency provision of any type, designers should liaise with local system partners to determine the scale and type of engineering service support required in external areas to address the potential site setup. Consideration should be given to:

- electrical distribution points
  - additional requirements for mobile CT scanners, for instance 400V, 175 amp supplies and plug-in points for generator support
- water distribution points
- drainage points
- data and communication connectivity, including reliable Wi-Fi connectivity across the whole of the proposed area and high-speed ISDN lines for secure transmission of high-resolution images and information. Such networks must be designed to comply with the requirements of the appropriate security rating, for instance secure connection to

Figure 12 Example of a previous dedicated disaster mortuary

the Police National Network must be facilitated within any system provided

- appropriate ventilation if the proposed facility is within an existing structure.

Appendix A – Mortuary-specific room designs

Body store spaces

Appendix A1 – General body store

Appendix A2 – Bariatric storage, including walk-in fridge

Post-mortem facilities

Appendix A3 – Post-mortem room with three tables

Appendix A4 – Isolation post-mortem room

Appendix A5 – Post-mortem dirty utility

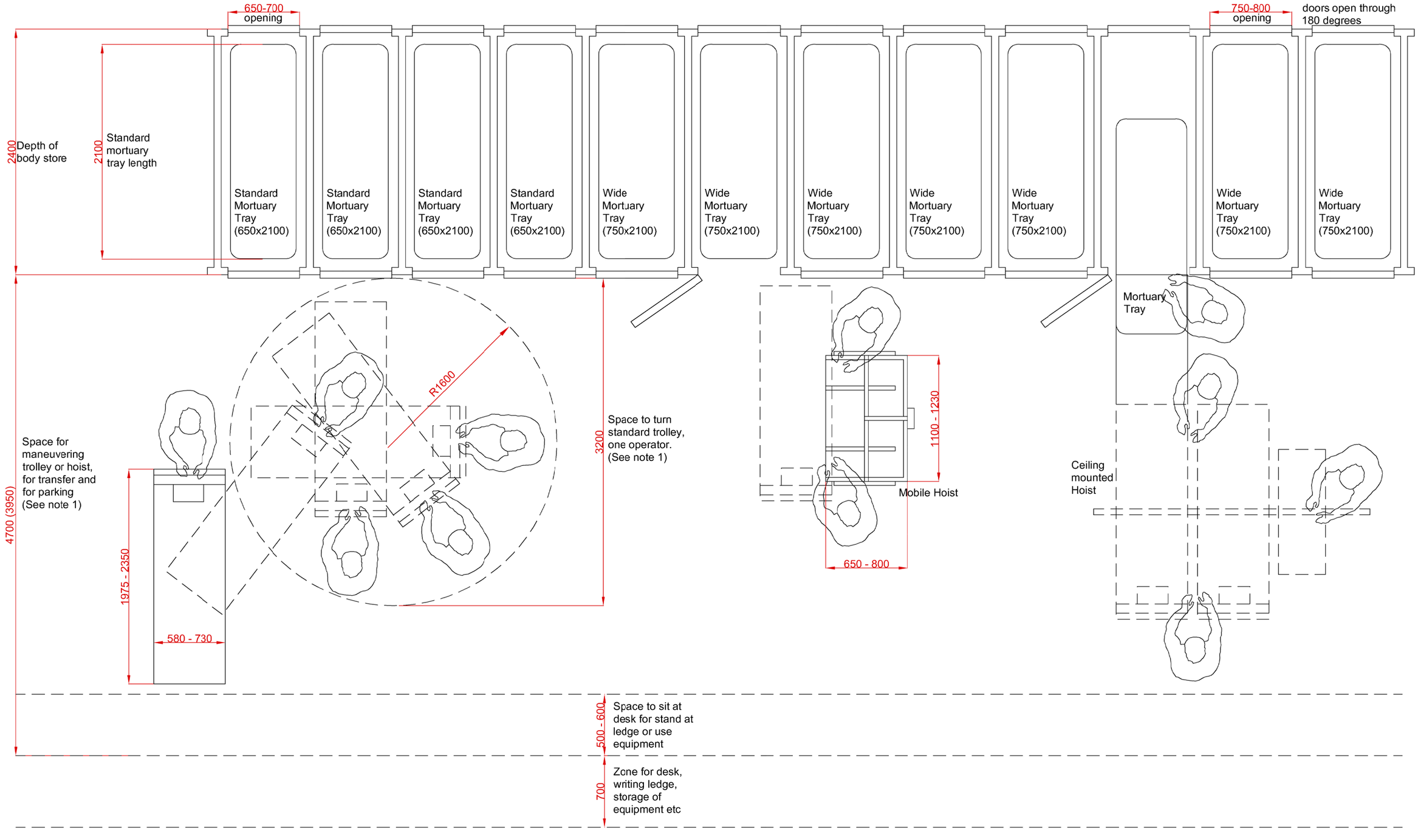
Appendix A6 – Post-mortem transit lobby

Appendix A7 – Raised platform post-mortem observation room

Viewing and bier rooms

Appendix A8 – Viewing room and bier room and combined viewing room

Appendix A1 – General body store



Appendix A1 – General body store (contd)

Drawing Notes

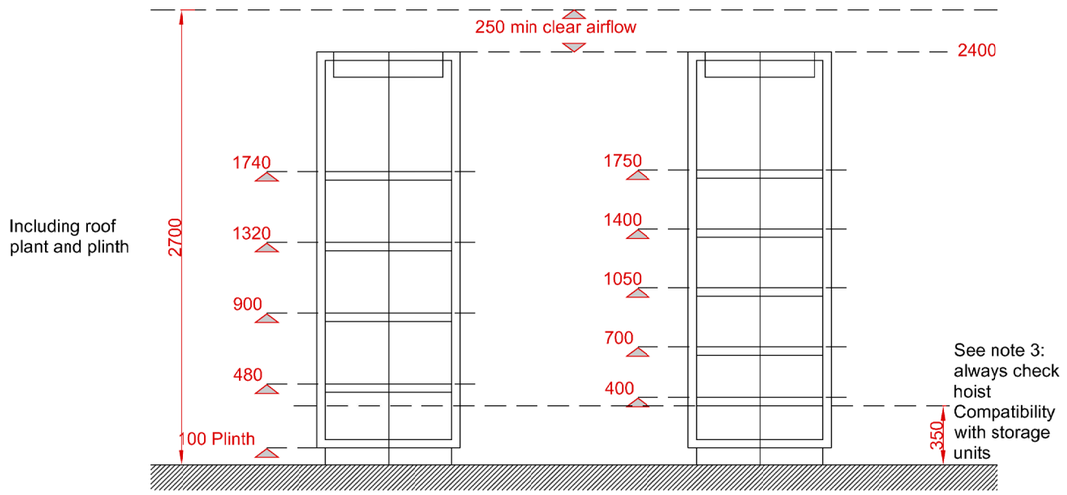
preferred minimum (restricted minimum)

restricted minimum not recommended for general use

1. These dimensions are based on the longest mortuary trolley for general use. Also refer to 'Body transfer area and Body Store layout for Bariatric/ Bariatric Plus use'.
A minimum space of double the length of the chosen trolley must be allowed for maneuvering the trolley.

2. Different methods of transferring the body may be practiced, but must comply with local manual handling policy.
a). The mortuary tray may be transferred to the mortuary trolley by one person.
b). The body may be transferred from one trolley to another, side by side, a min. of two up to eight people.
c). A mobile hoist may be used which has slings, straps or scoops requiring one or two people.
d). A ceiling mounted hoist may be used required one or two people.

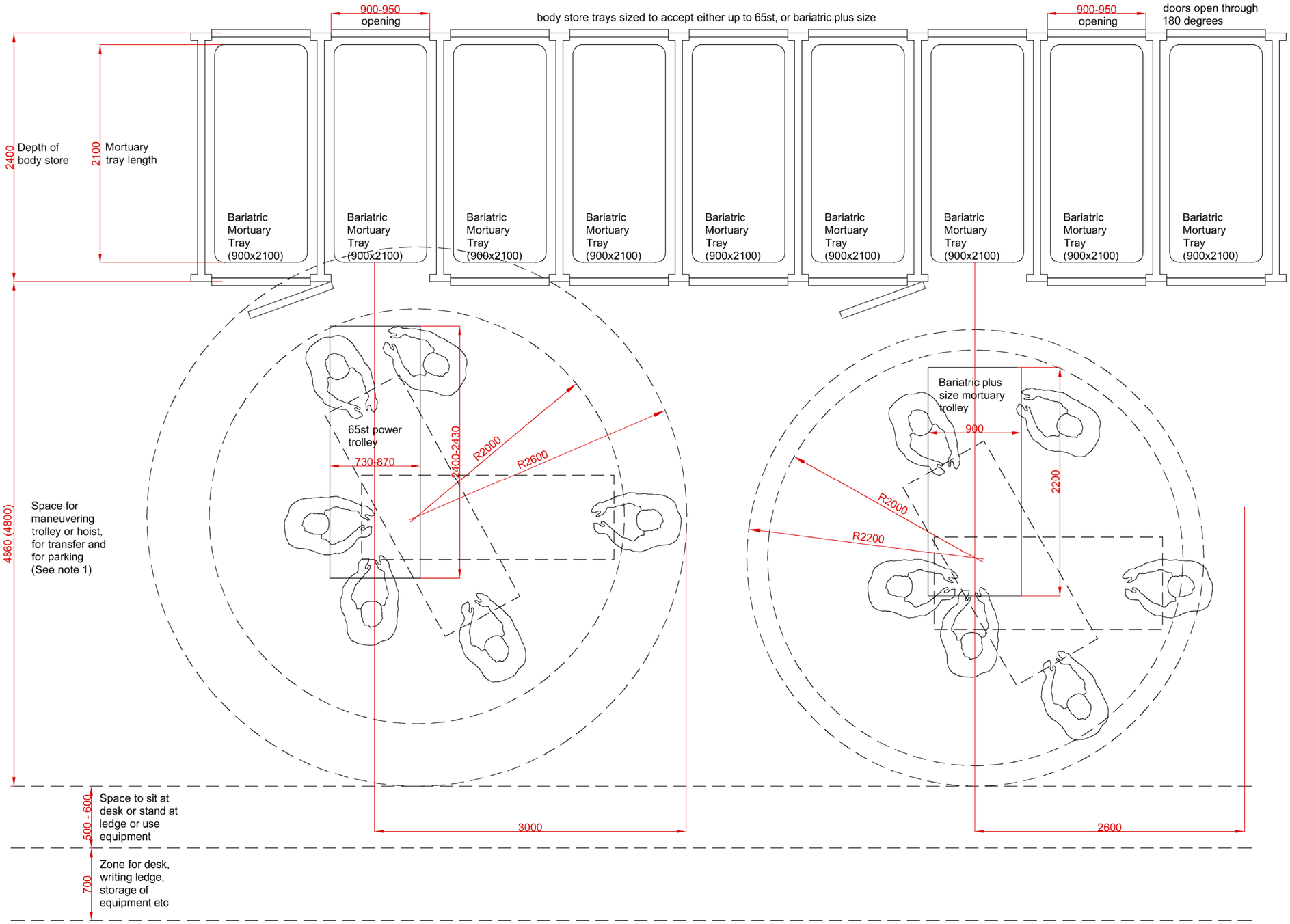
3. Standard size body stores may typically have four to five tiers of trays within one bay. For flexibility, manufactures recommend adjustable/ removable full length rollers as opposed to stubb rollers.
The minimum height of roller for saftey crouching and pulling out/pushing in a loaded tray 350mm and most hoists will not operate below this height.
The maximum height for safety reaching in to the store, past the raised mortuary trolley and pulling out/pushing in a loaded tray is 1750mm for general use (confirm with local Manual Handling policy).



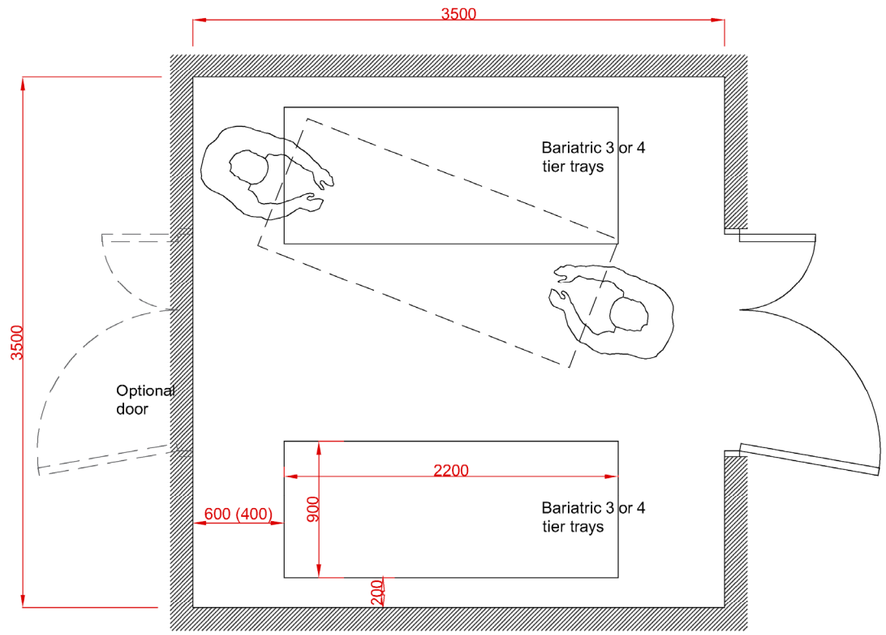
Typical standard 4
tier arrangement:
(420mm between tiers)

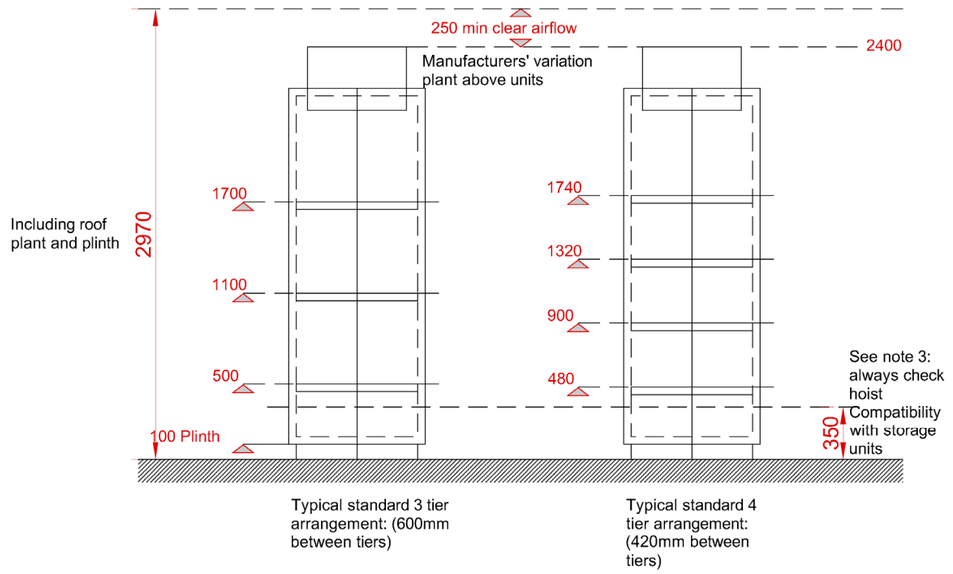
Typical standard 5
tier arrangement:
(300-350mm between tiers)

Appendix A2 – Bariatric storage, including walk-in fridge



Appendix A2 – Bariatric storage, including walk-in fridge (contd)





Refrigerated 'Cold' Store (Bariatric Plus) - 12m2

Drawing Notes

preferred minimum (restricted minimum)

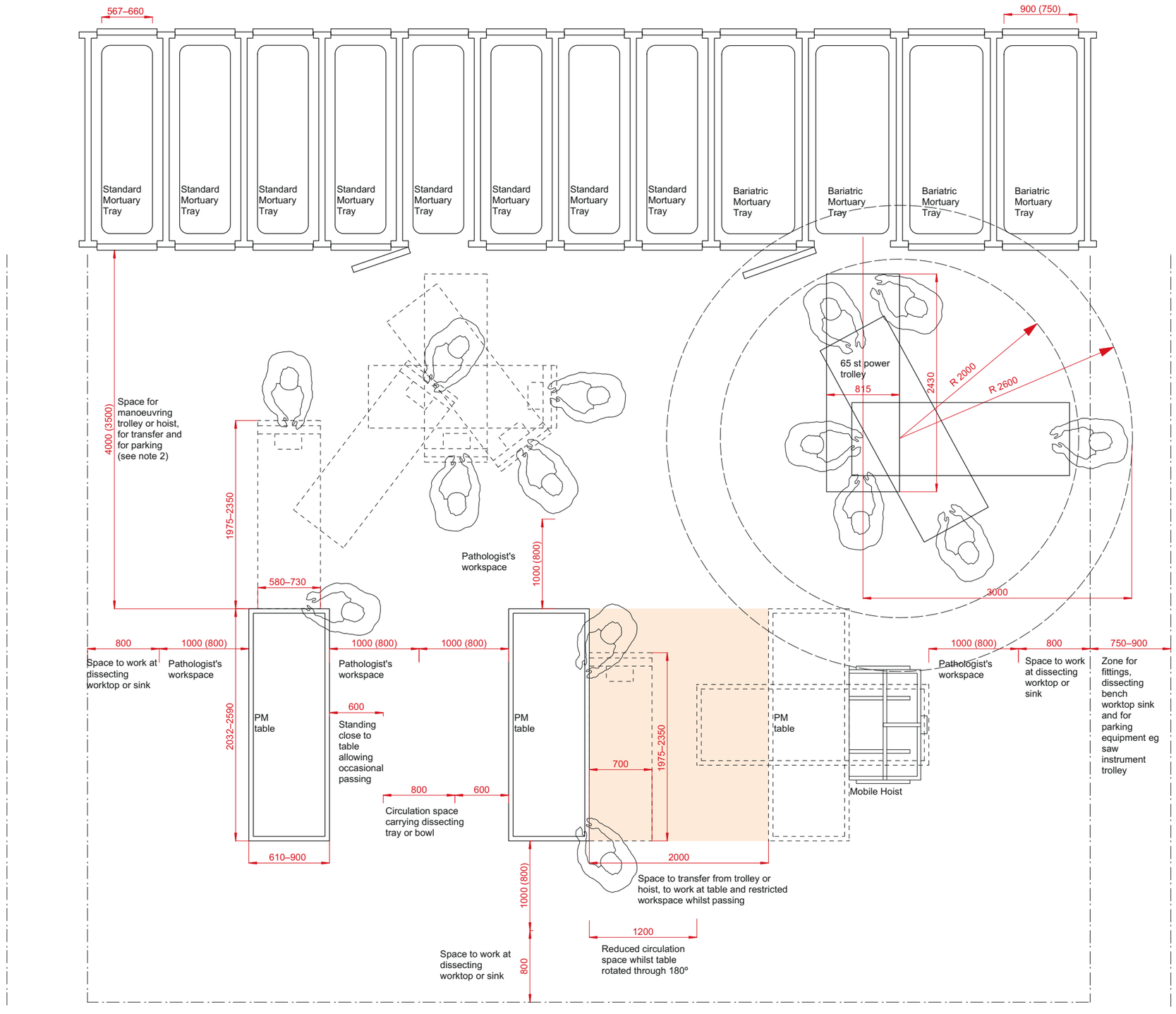
restricted minimum not recommended for general use

1. These dimensions are based on the longest mortuary trolley for general use. A minimum space of double the length of the chosen trolley must be allowed for maneuvering the trolley.

2. Different methods of transferring the body may be practiced, but must comply with local manual handling policy.
a). The mortuary tray may be transferred to the mortuary trolley by one person.
b). The body may be transferred from one trolley to another, side by side, a min. of two up to eight people.
c). A mobile hoist may be used which has slings, straps or scoops requiring one or two people.
d). A ceiling mounted hoist may be used required one or two people.

3. Bariatric body stores may typically have three to four tiers of trays within one bay. For flexibility, manufactures recommend adjustable/ removable full length rollers as opposed to stubb rollers.
The minimum height of roller for saftey crouching and pulling out/pushing in a loaded tray 350mm and most hoists will not operate below this height.
The maximum height for safety reaching in to the store, past the raised mortuary trolley and pulling out/pushing in a loaded tray is 1750mm for general use (confirm with local Manual Handling policy).

Appendix A3 – Post-mortem room with three tables



Appendix A3 – Post-mortem room with three tables (contd)

Drawing Notes

preferred minimum (restricted minimum)

restricted minimum not recommended for general use

1. A minimum of two tables is recommended for all post-mortem services.

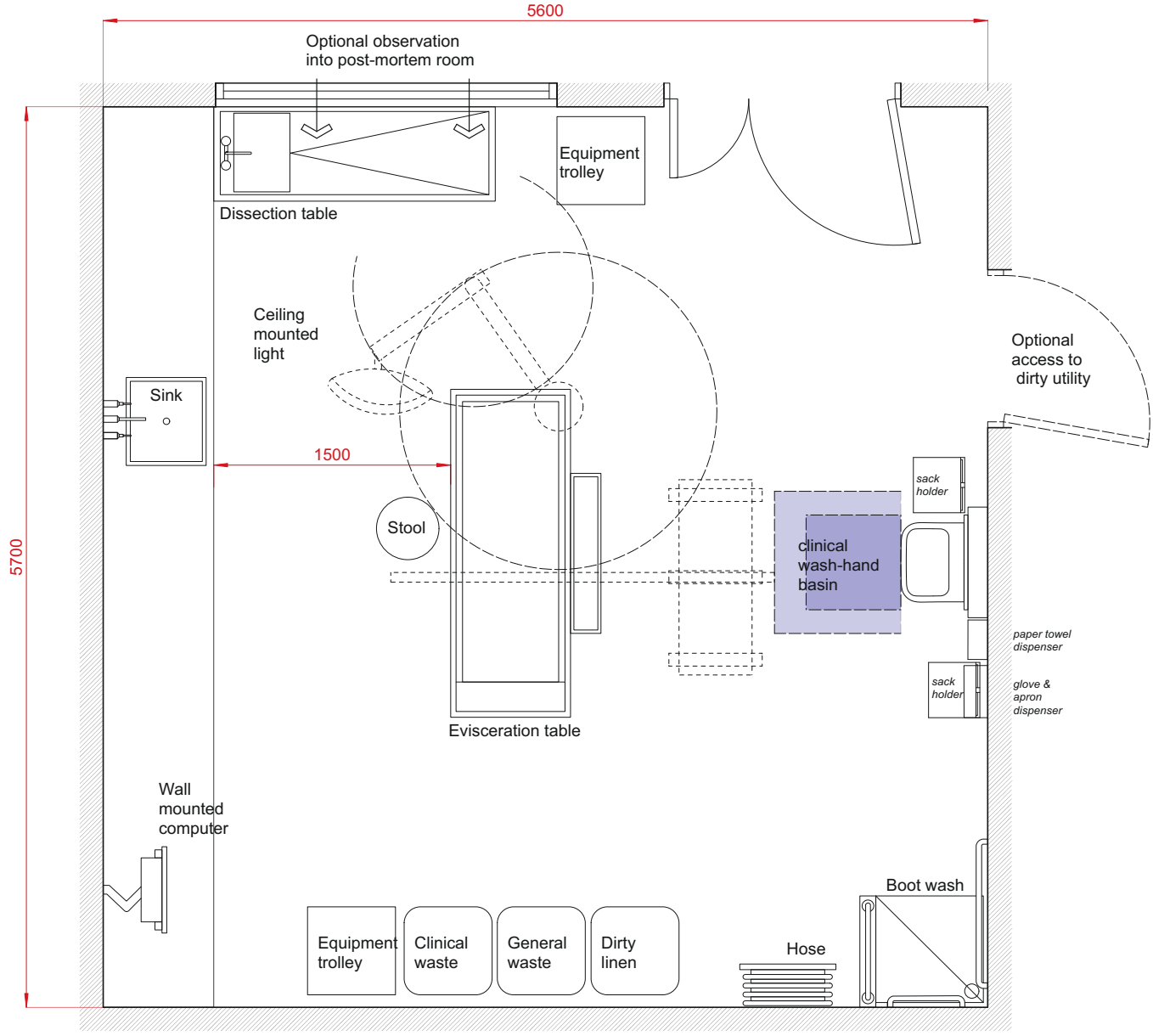
2. The dimensions are based on the longest standard size mortuary trolley. Note: bariatric trolleys will impact on minimum dimensions. If a smaller trolley is used and/or trolley or hoist is parked alongside post-mortem table for transfer, dimensions can be reduced.

3. Some tables incorporate sinks or adjoin dissection benches, therefore these will not need to be provided separately unless there is a requirement to dispose of aqueous radioactive substances.
If small tables are installed, room dimensions can be reduced, but adequate space to transfer, to work at the table and to pass is still to be allowed.

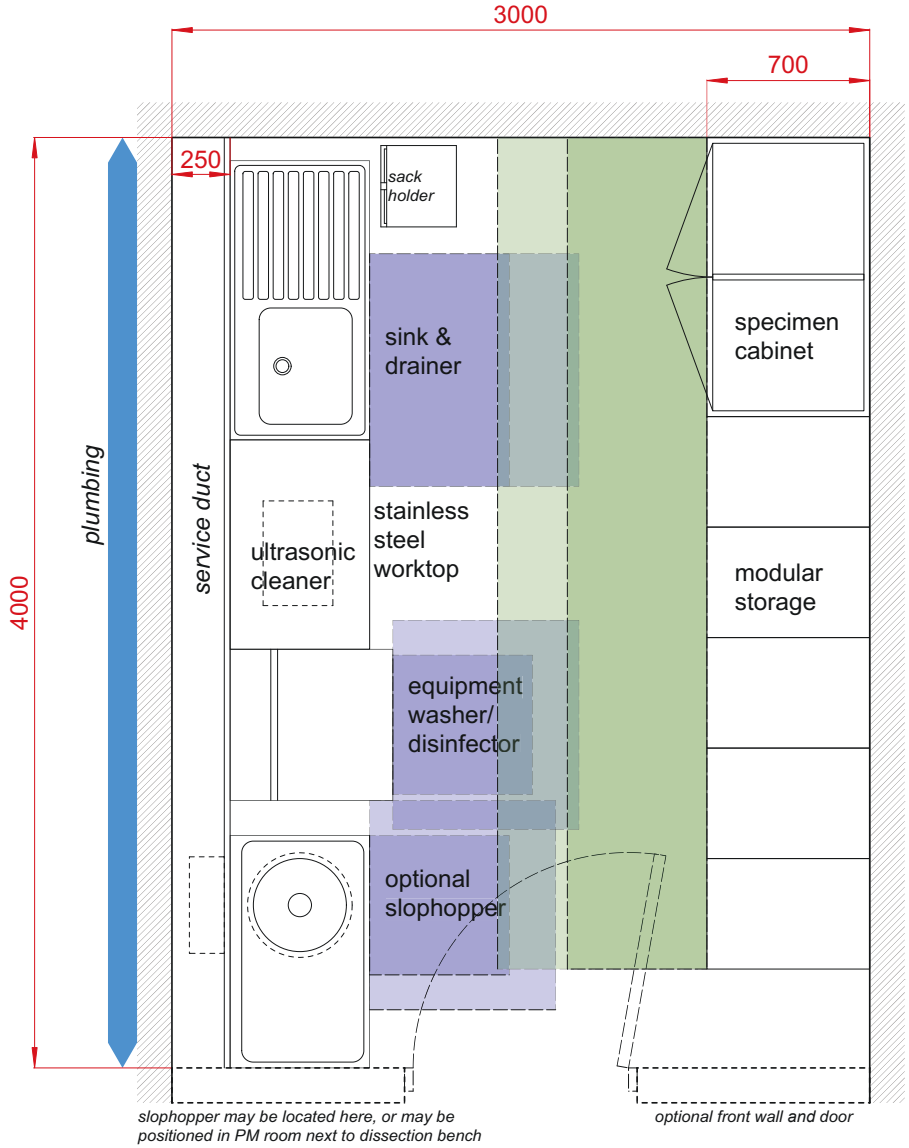
4. Tables may be installed offset or rotated in relation to each other.
2000 mm is still to be allowed between the long sides of two tables.

5. Consider location of bariatric body store bays in relation to post-mortem tables. There may be more flexibility at the perimeter of the room where zones for other activities can be shared.

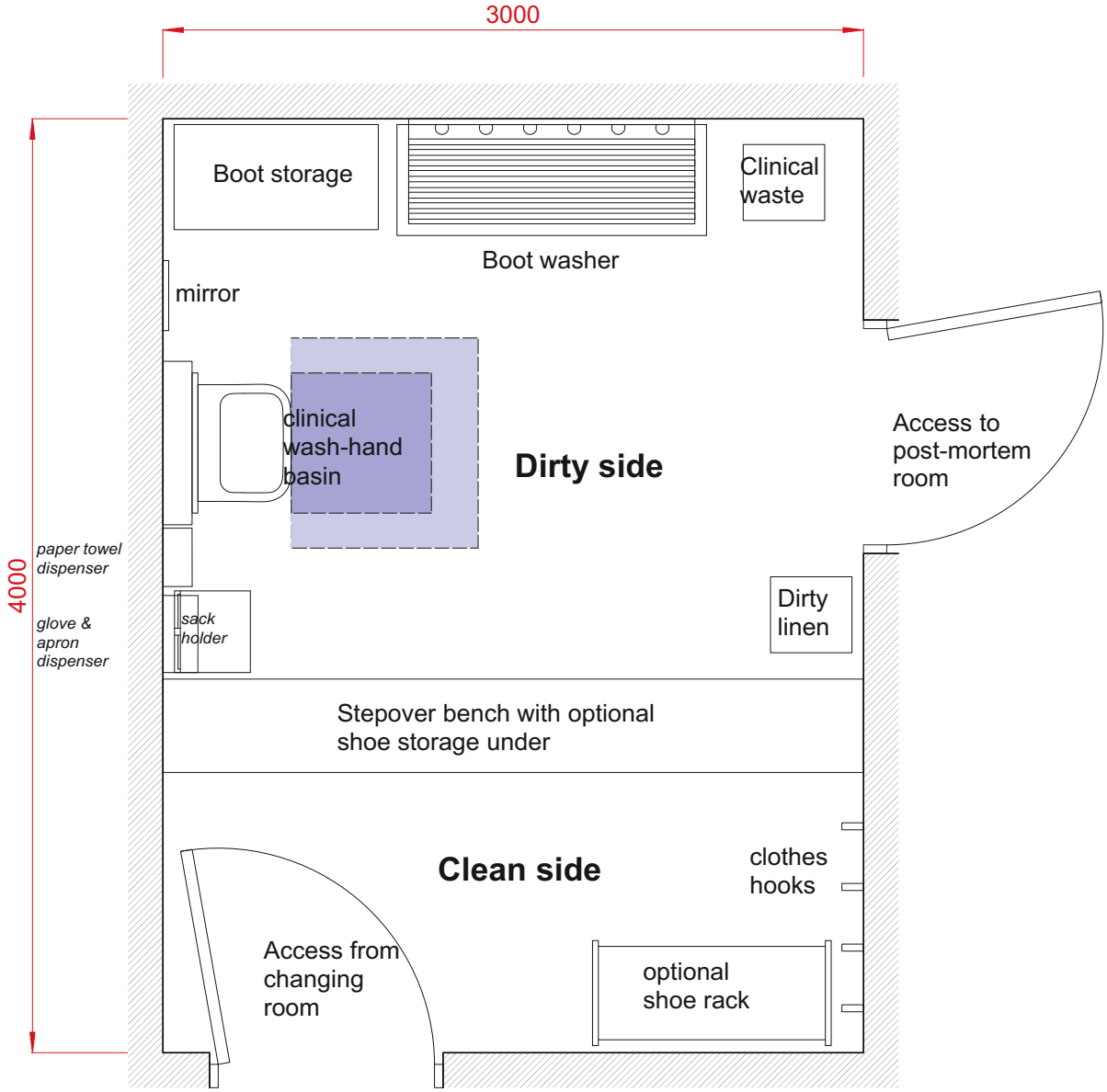
Appendix A4 – Isolation post-mortem room – 32 m²



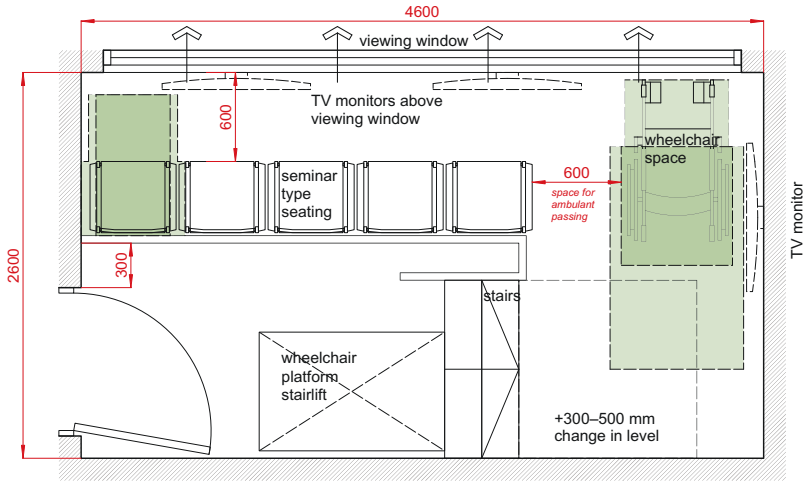
Appendix A5 – Post-mortem dirty utility – 12 m²



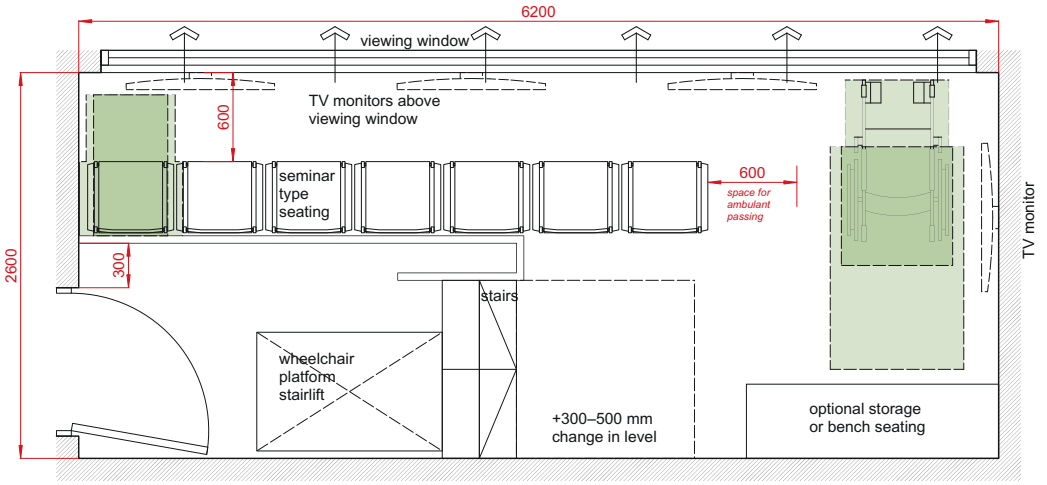
Appendix A6 – Post-mortem transit lobby



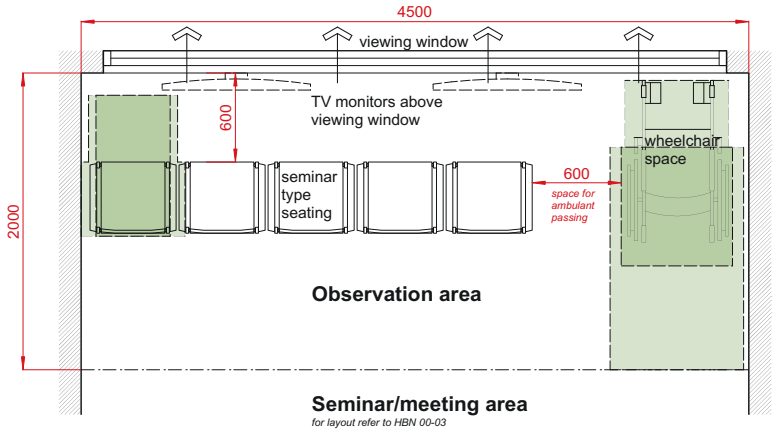
Appendix A7 – Raised platform post-mortem observation room



Forensic Observation Room – 12 m²

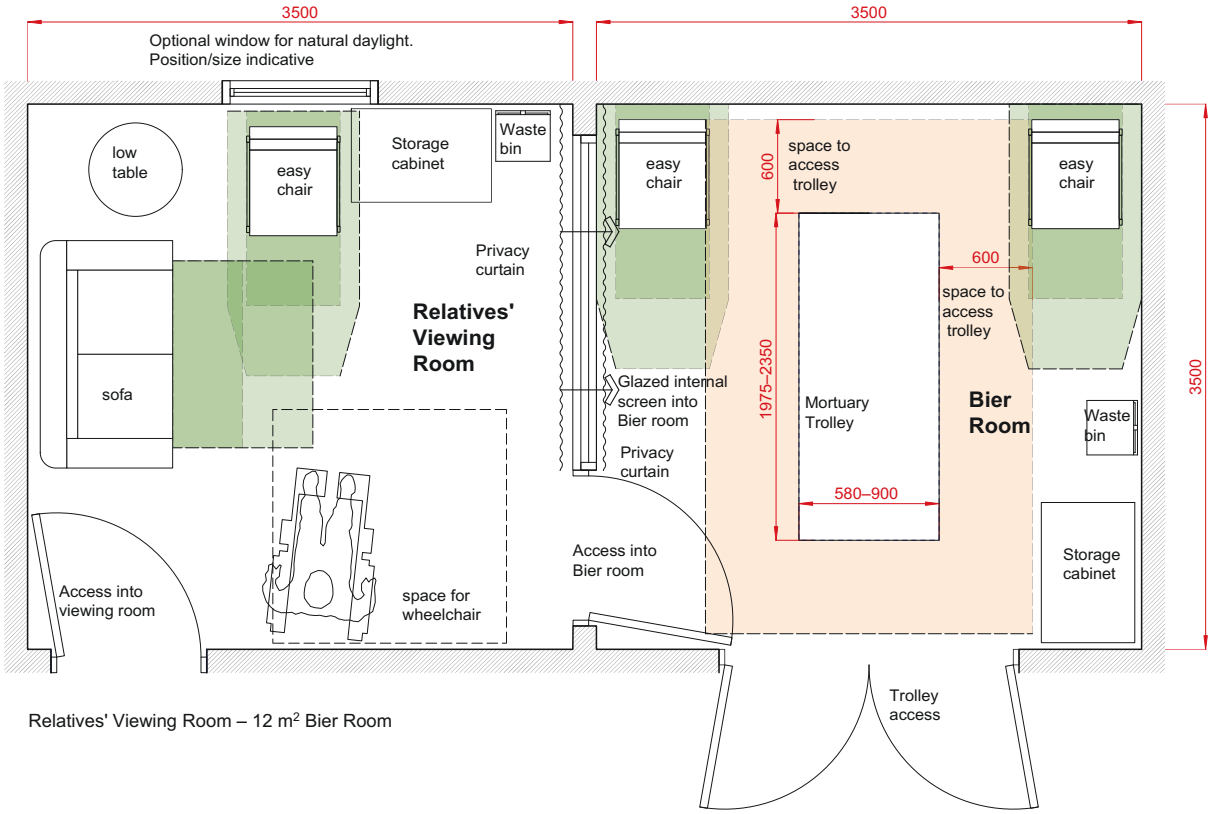


Forensic Observation Room – 16 m²

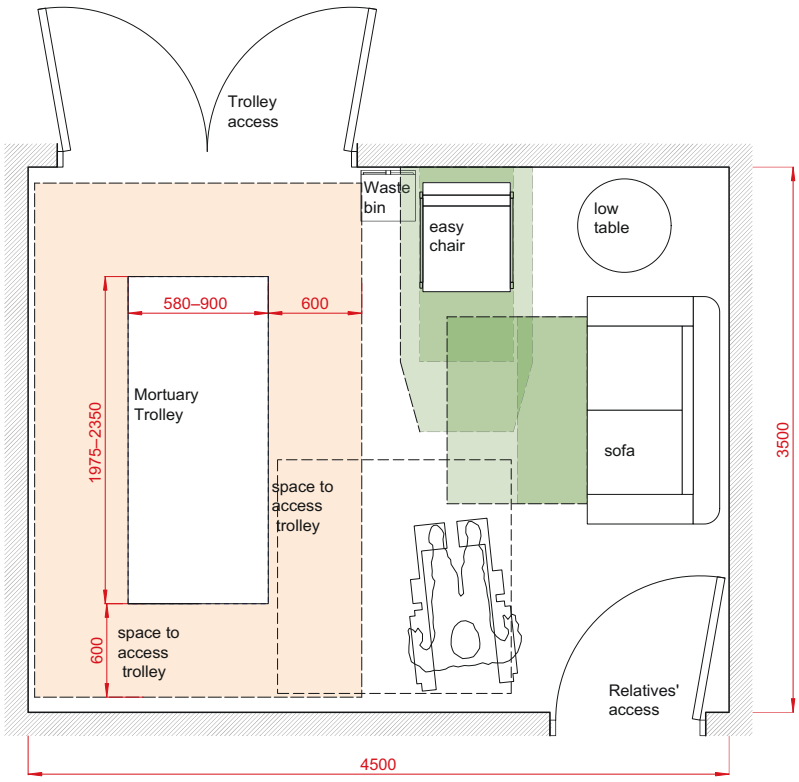


Forensic Observation Room (attached to seminar/meeting room) – 9 m²

Appendix A8 – Viewing room and bier room and combined viewing room

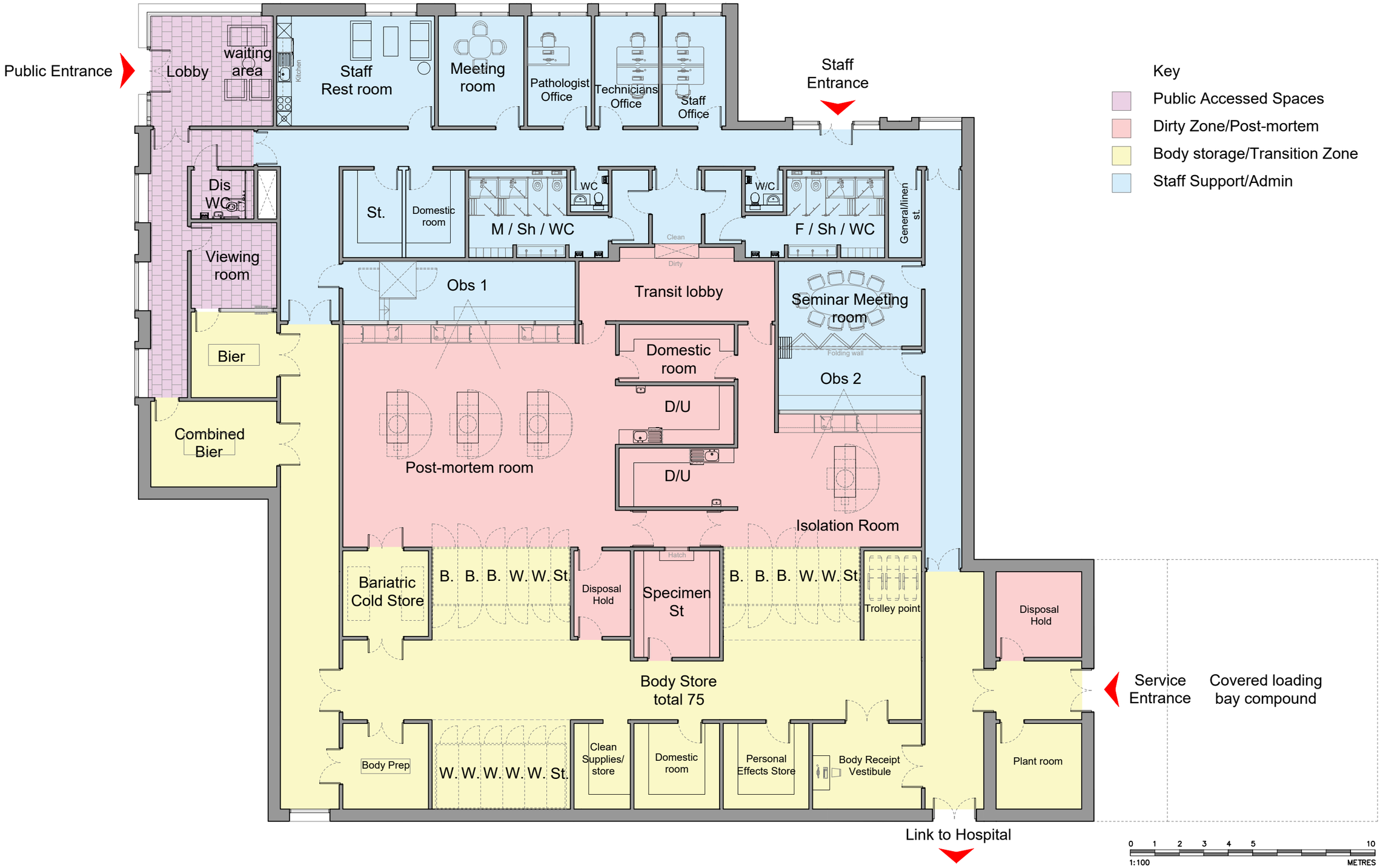


Relatives' Viewing Room – 12 m^2 Bier Room



Combined viewing and Bier room – 16 m^2

Appendix B – Generic layout


Public Entrance
Lobby
waiting area
Kitchen
Staff Rest room
Meeting room
Pathologist Office
Technicians Office
Staff Office
Staff Entrance
Dis WC
Viewing room
St.
Domestic room
WC
M / Sh / WC
W/C
F / Sh / WC
General/linen st.
Clean
Dirty
Obs 1
Transit lobby
Seminar Meeting room
Folding wall
Bier
Domestic room
Obs 2
D/U
Combined Bier
Post-mortem room
D/U
Isolation Room
Hatch
Bariatric Cold Store
B. B. B. W. W. St.
Disposal Hold
Specimen St
B. B. B. W. W. St.
Trolley point
Disposal Hold
Body Store total 75
Service Entrance
Covered loading bay compound
Body Prep
W. W. W. W. W. St.
Clean Supplies/ store
Domestic room
Personal Effects Store
Body Receipt Vestibule
Plant room
Link to Hospital
Key
Public Accessed Spaces
Dirty Zone/Post-mortem
Body storage/Transition Zone
Staff Support/Admin
0 1 2 3 4 5 10
1:100
METRES

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NHS England
Wellington House
133–155 Waterloo Road
London
SE1 8UG

Contact enquiries@england.nhs.uk

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