دائـــرة الـصـحـــة
DEPARTMENT OF HEALTH

DOH Health Facility Guidelines 2026

Part B – Health Facility Briefing & Design

125 Secure Underground Emergency Overflow Facilities



Executive Summary

This Functional Planning Unit (FPU) covers the Secure Underground Emergency Overflow Facilities (SUEOF). The purpose of this Unit is to ensure the continuity of essential healthcare services during emergencies, crises, disasters, and other major disruptive events which affect the functionality and safety of a hospital.

All new hospital developments that meet at least two (2) of the following criteria are required to incorporate SUEOF, providing protected healthcare capacity during such emergencies:

- The hospital is planned to provide critical acute or tertiary-level services (RDL 5 or 6)
- The hospital has a planned inpatient capacity of 150 beds or more (RDL 3 to 6)
- The hospital is intended to provide essential acute healthcare coverage within a regional or rural area where no comparable acute care hospital providing an equivalent level of service is available within approximately 100 kilometres (RDL 3 to 6)

The SUEOF can either be underground below the main hospital, underground outside the main hospital or a repurposed basement carpark (under the main hospital or outside). SUEOF must be connected to the hospital through an internal secure link. This may be direct, through the hospital lifts and stairs or via an underground corridor or both.

At least 50% of the bed capacity of the hospital should be accommodated in SUEOF. The provisions of SUEOF according to this FPU may vary from those in the full Department of Health (DoH) Health Facility Guidelines. In such cases the provisions of SUEOF will prevail as a somewhat lower standard of clinical support, space planning and comfort is expected and deemed acceptable within SUEOF.

This FPU applies to the new facilities and major facility expansions where the application for design approval is received after 1st January 2027 or as determined on a case-by-case basis by the Department of Health.

Users who wish to propose minor deviations from these guidelines should use the **Non-Compliance Report** (**Appendix 4 in Part A**) to briefly describe and record their reasoning based on models of care and unique circumstances.

The facility must ensure compliance with the regulations, standards, and policies approved or published by the DoH. Moreover, the guidelines do not supersede the regulations and standards of the DoH but are considered complementary to them.

If the circumstances of a facility vary considerably from those anticipated in this FPU, the guidance of the DoH should be requested and followed.

The details of this FPU follow overleaf.

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1. Secure Underground Emergency Overflow Facilities

1.1 Introduction

The function of the Secure Underground Emergency Overflow Facility (SUEOF) is to provide underground protected capacity to ensure the continuity of essential healthcare at a hospital during emergencies, crises, disasters and other major disruptive events.

This capacity shall be designed to:

- Maintain continuity of critical and essential healthcare services during emergencies and crises.
- Provide a protected environment for patients who cannot be safely or rapidly evacuated including critically ill, intensive care and ventilated patients.
- Provide additional protected surge capacity for the continued admission, assessment, stabilization and treatment of patients during major emergency events.

The facility shall operate in coordination with:

- The DoH Policy for Health Emergency Management
- The DoH Emergency Management Standard for Hospitals
- Applicable enterprise risk management and business continuity requirements
- Relevant emergency medical services, patient-transfer and critical-care transport requirements
- Abu Dhabi emergency, crisis and disaster management arrangements
- Applicable federal and local laws, building codes, civil-defence requirements and security directives

1.1.1 Criteria for Facilities Required to Provide the Unit

All new hospital developments at RDL 3 and above that meet at least two (2) of the following criteria are required to incorporate underground protected healthcare capacity to enhance hospital resilience and support the continued delivery of essential clinical services during emergencies.

- The hospital is planned to provide critical acute or tertiary-level services, including, but not limited to:
  - Level I or Level II trauma services
  - Neurosurgery
  - Cardiovascular services
  - Reconstructive, trauma- supportive, or other comparable high-acuity surgical services
- The hospital has a planned inpatient capacity of 150 beds or more at RDL 3 to 6
- The hospital is intended to provide essential acute healthcare coverage within a regional or rural area where no comparable acute care hospital providing an equivalent level of service is available within approximately 100 kilometres, in accordance with applicable DoH criteria for determining rural areas and healthcare accessibility

Existing healthcare facilities that are specifically designated by DoH to establish, maintain or operate protected underground capacity must also provide SUEOF in accordance with these guidelines unless directed otherwise by the DoH.

1.1.2 Licensing of the Unit

Applicants whose proposed hospitals are subject to this FPU should plan for SUEOF from the earliest stages of site selection, architectural and engineering and construction. SUEOF should not be an after-thought or a compromise.

Where the requirements of SUEOF apply, the DoH will require evidence of compliance at relevant stages of the hospital licensing applications, planning submissions and construction inspections.

Applicants should not rely on subsequent modification of an approved hospital design as an alternative to incorporating this requirement during initial planning.

No hospital or other entity shall describe, advertise, commission or operate an underground facility as a DoH-designated Secure Underground Emergency Overflow Facility (SUEOF) without written approval from DoH.

1.1.3 Transitional Arrangements

The provision of SUEOF according to this FPU applies to new hospital applications submitted to the DOH on or after 1st of January 2027.

The provisions of SUEOF may also apply to applications for major expansions of existing hospitals with an increase in the area of more than 50% of the current area.

For hospital projects already under development or within the licensing process as of 1st January 2027, applicability shall be determined by DoH on a case-by-case basis, taking into consideration the project's stage of design, approval, and construction.

1.1.4 Suspension, restriction or withdrawal of designation

DoH may restrict, suspend, vary or withdraw the hospital's designation or approved capability where:

- The hospital no longer meets the applicable approval or readiness requirements
- A material infrastructure, workforce, equipment or safety deficiency is identified
- The operator makes an unauthorized change to the hospital or its use
- The hospital is unable to activate within the expected and approved timeframe
- The operator provides services outside the approved Clinical Capability Profile; or
- Continued designation presents an unacceptable risk to patients, personnel or healthcare-system continuity

1.2 Functional & Planning Considerations

1.2.1 Models of Care

Based on the hospital's clinical profile, location, capacity and intended emergency role, and as determined by DoH, the area shall be capable of one or both of the following functions:

- Continuity and protection of the hospital's existing operations including:
  - Continued care of existing patients
  - Relocation of patients from unsafe, inaccessible or non-operational areas
  - Maintenance of defined essential services
  - Accommodation of additional surge capacity during emergencies; and/or
- Emergency admission and treatment capacity:
  - Receive patients directly affected by an emergency or crisis event
  - Emergency triage and assessment
  - Stabilisation and treatment
  - Holding patients pending transfer, discharge, admission or escalation

A facility may be required or approved by the DoH to perform both functions where its infrastructure, workforce, equipment and supporting systems are capable of safely supporting the combined function.

During the periods where no emergency or crisis event is experienced, the Hospital may not utilise the SUEOF for the provision of its normal clinical licensed services. For example, if the facility has reached capacity, it cannot use the SUEOF to add further patient capacity.

1.2.2 Capacity and Clinical Capability Profile

The capacity of the Unit shall be sufficient to maintain the hospital's defined **minimum essential clinical services** during a major emergency and to support the required level of patient surge. The required capacity and level of protection will be determined based on factors including:

- Hospital size and licensed bed capacity
- Clinical services and acuity
- Expected emergency and trauma role
- Geographic location and accessibility
- Availability of alternative healthcare capacity within the surrounding area
- Relevant national and Emirate-level emergency preparedness and resilience requirements

It is expected that at least 50% of the bed capacity of the current facility be provided within the SUEOF.

As part of the application process, the hospital must submit a Clinical Capability Profile for DoH approval. This should include:

- The clinical services that may be provided
- The patient populations and levels of acuity that may be managed
- Any excluded patient populations, services or procedures
- The maximum approved bed and occupancy capacity
- The configuration of continuity and surge capacity
- The minimum workforce required for each activation level
- Required clinical equipment, medicines and supplies
- Required diagnostic, pharmacy and support services
- Critical infrastructure and utility dependencies
- Patient-transfer, escalation and evacuation arrangements
- The required timeframe for partial and full activation
- The approved duration and conditions of sustained operation

The underground facility should not be used to provide services, admit patients or operate at a capacity beyond its approved Clinical Capability Profile. The SUEOF may provide emergency, critical-care, inpatient, observation and other clinical or support functions only where these are included in the DoH-approved Clinical Capability Profile.

The SUEOF may not admit or retain a patient whose needs exceed the available infrastructure, equipment, workforce or clinical capability.

DoH will consider and approve the Clinical Capability Profile for each facility. Meeting the applicability criteria shall not, by itself, determine the required number of protected beds or the configuration of the protected area.

1.2.3 Policy Principles

The need for SUEOF is established in accordance with the following DoH Policy principles:

- Protection of life, patient safety and staff safety shall remain the primary consideration.
- The hospital must supplement or temporarily replace existing healthcare capacity through the

use of SUEOF and may not operate as an unlicensed routine healthcare facility.

- The hospital shall only provide services included within its DoH-approved Clinical Capability Profile.
- Designation and investment decisions shall require DoH authorisation and shall be based on health-system need, geographical coverage, population risk, critical-service continuity and system-wide resilience.
- Hospital readiness shall be measurable, regularly tested and independently verifiable.
- Activation and operation shall be integrated with Abu Dhabi's health emergency-management and incident-command arrangements.
- Information relating to facility vulnerabilities, protected systems, access arrangements and security capabilities

1.2.4 Operational Models

The range of options for a SUEOF may include:

- A purpose-built Unit underground, below the main hospital
- A purpose-built Unit underground, outside but adjacent to the main hospital
- A repurposed basement carpark under the main hospital
- A repurposed basement carpark outside the main hospital

If SUEOF is outside the footprint of the main hospital, it must be linked to the hospital via a secure underground tunnel. If the SUEOF is under the main hospital it should be linked via the lift cores and stairs of the hospital or separate, secure internal connections.

Use During Normal Operations

Subject to DoH approval and applicable building, civil defence, safety, and healthcare facility requirements, SUEOF may be used for appropriate non-clinical purposes during normal operations, including parking or other compatible functions. Any such dual-use arrangement must be designed so that the protected area can be safely and rapidly converted to its designated emergency clinical function within the required activation timeframe.

Normal operational use must not compromise the area's:

- Structural protection
- Accessibility
- Emergency utilities and infrastructure
- Infection prevention and control requirements
- Medical gas and ventilation capability, where applicable
- Emergency communications
- Patient movement and evacuation arrangements
- Readiness for timely activation

1.2.5 Readiness Plan

The operator shall maintain a DoH-approved readiness and activation plan covering infrastructure assessment, area designation, equipment and logistics, workforce mobilisation, training, exercises, activation procedures and sustained operations.

1.2.6 Workforce and Clinical Governance

The operator shall maintain trained response teams and role-based staffing arrangements for each activation level. Healthcare facility Incident Command shall lead facility activation and coordination.

Medical and nursing leadership shall provide clinical oversight; engineering teams shall maintain infrastructure integrity; and quality and patient-safety functions shall monitor operations.

1.2.7 Training and exercises

Relevant personnel shall receive orientation and role-specific training and shall participate in tabletop exercises and functional drills at a frequency determined by DoH and the facility risk assessment. Exercise findings shall be documented, assigned to accountable owners, tracked to closure and reflected in revised plans and procedures.

1.2.8 Declaration of readiness

The operator shall not declare the facility ready for deployment until the designated area, infrastructure, workforce, equipment, logistics, communications and activation procedures have been validated and all material deficiencies have been resolved or formally risk-accepted by the authorised authority.

1.2.9 Activation

Activation Triggers

This Policy may be activated only after DoH receives a formal determination, declaration, notification, or direction from a Competent Authority that an Emergency, Crisis or disaster (ECD) Event exists. An activation trigger may be any one of the following:

- A formal declaration of an emergency, crisis or disaster by a Competent Authority
- A formal notification from a Competent Authority that an ECD event is imminent and shall affect health services in the Emirate of Abu Dhabi
- A direction from a Competent Authority requiring DoH to mobilise the SUEOF

Activation Authority

The Activation Authority shall be the DoH. During an ECD event the Unified Medical Operations Centre (UMOC) is authorised to act on behalf of the DoH as its representative to activate this Policy through an ECD Activation Notice when one or more of the Activation Triggers are met. The UMOC shall simultaneously inform the Activation Authority of any activation.

ECD Activation Notice

The Activation Authority, or UMOC acting on its behalf, shall activate this Policy through an ECD Activation Notice. The Notice shall record:

- The legal and factual trigger
- Issuing authority and the written delegation where applicable,
- Effective time
- Geographic and service scope
- Accountable DoH function
- Coordination requirements, and
- The review date

ECD Circular

Following activation, DoH shall issue and maintain an ECD Circular identifying:

- Eligible facilities or service categories
- Geographic scope
- Reporting and review arrangements
- Expiry conditions for protected underground capacity

DoH may amend the ECD Circular during an active ECD Event to expand, narrow, suspend, or otherwise modify protective measures in response to changing healthcare needs, workforce availability, health-system capacity, risks, or operational requirements arising from the ECD Event.

Hospital Activation Records and Incident Commander

The hospital shall record the activation authority, time, reason, scope, initial capacity and responsible incident commander. The hospital shall inform the name and contact details of responsible incident commander to DoH for ongoing communication and coordination.

Activation Timeframe

If the SUEOF is a dual-use facility it shall be capable of progressing from its normal operation to its initial emergency operational capability within one hour of the activation decision and to full operational capability within 12 hours.

Staff should be notified of activation within minutes of receiving the command decision to activate. Initial operating capability shall include entrance opening, power and air running, triage and decontamination ready and core staff in place.

All areas and support services of the facility shall be running and patients relocated from the hospital within 12 hours.

1.2.10 Patient Movement, Transfer and Evacuation

Patient movement decisions should minimize clinical risk while maximizing speed and safety, using a phased, priority-based approach rather than diagnosis alone.

Patients at greatest immediate environmental risk and those most difficult to relocate later must be prioritized.

The most important link to SUEOF will be via an underground connection to the Hospital. However, evacuations and transfers from SUEOF to other facilities and entry of external patients to the facility should also be anticipated. Therefore, in addition to the link to the hospital, SUEOF should also have provision for connections to the outside via fire protected stairs or ramps and at least one vehicular ramp. The normal stair and ramp provisions of a typical basement carpark may be re-purposed to comply with these requirements. However, care should be taken to ensure that any stairs used comply with the standards expected in hospitals including patient transfers via the stairs.

The movement of patients should be based on the greatest urgency and threat. Move first any patients located in areas of direct or imminent danger, irrespective of acuity or mobility:

- Patients in zones affected by fire, smoke, structural instability, flooding, hazardous materials or active threat
- Patients on compromised floors or units (e.g. above fire zones, damaged infrastructure)

Once immediate danger areas are cleared, ambulatory patients who require minimal assistance should be moved into the SUEOF including:

- Stable inpatients able to walk independently or with minimal support
- Day-case patients and stable observers
- Patients with low oxygen or monitoring needs

Next, relocate wheelchair bound or bed bound patients who are clinically stable:

- Patients requiring basic nursing care
- Patients on low flow oxygen
- Post operative patients without invasive monitoring

ICU, HDU, NICU, and ventilated patients should be moved once protected capacity and staffing are fully ready.

The below groups should have pre planned, parallel movement pathways, not ad hoc decisions:

- Psychiatric patients requiring supervision
- Isolation patients with infectious risk
- Paediatric patients requiring family accompaniment
- Palliative patients (movement guided by clinical judgement and dignity considerations)

1.2.11 Deactivation and Recovery

The use of protected capacity on the earliest of the effective time of an ECD Deactivation Notice, expiry or revocation of the relevant Facility Authorization, or another ending condition specified by DoH.

- Before deactivation, the operator shall ensure:
- Safe transfer, relocation or discharge of all patients;
- Continuity of ongoing clinical care;
- Reconciliation of patient and clinical records;
- Reconciliation of medicines, controlled substances, supplies and equipment;
- Management of clinical, hazardous and general waste;
- Cleaning and decontamination;
- Inspection of infrastructure and safety systems;
- Identification of repairs and replenishment requirements; and
- Communication of the change in operational status.

Following deactivation, the operator shall:

- Conduct a structured debrief
- Submit an after-action report to DoH within the specified period
- Provide appropriate staff welfare and psychological support
- Restore equipment, stocks and systems; and
- Return any dual use SUEOF to its originally intended use

1.3 Functional Relationships

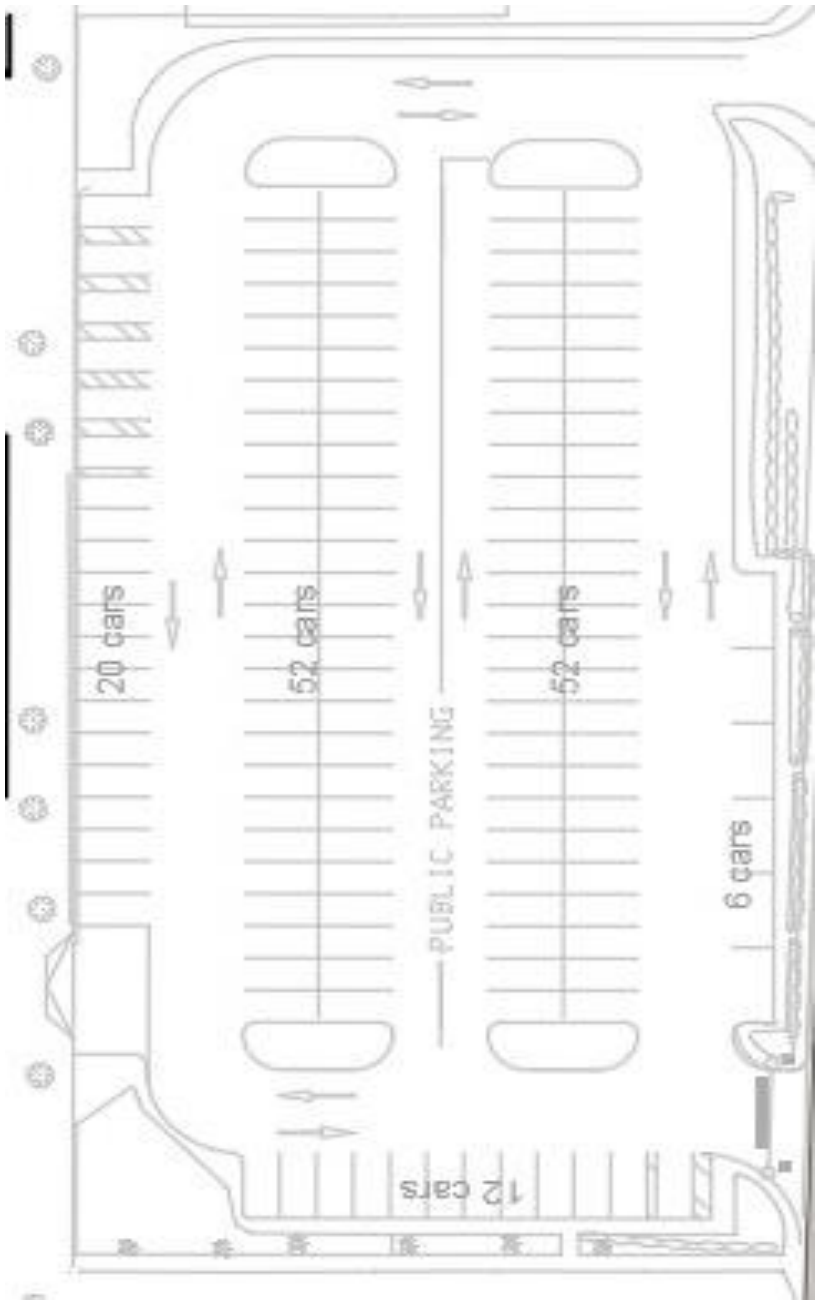
A Functional Relationship can be defined as the correlation between various areas of activity which work together closely to promote the delivery of services that are efficient in terms of management, cost and human resources. Correct Functional Relationships are identified below.

1.3.1 Functional Relationship Diagrams

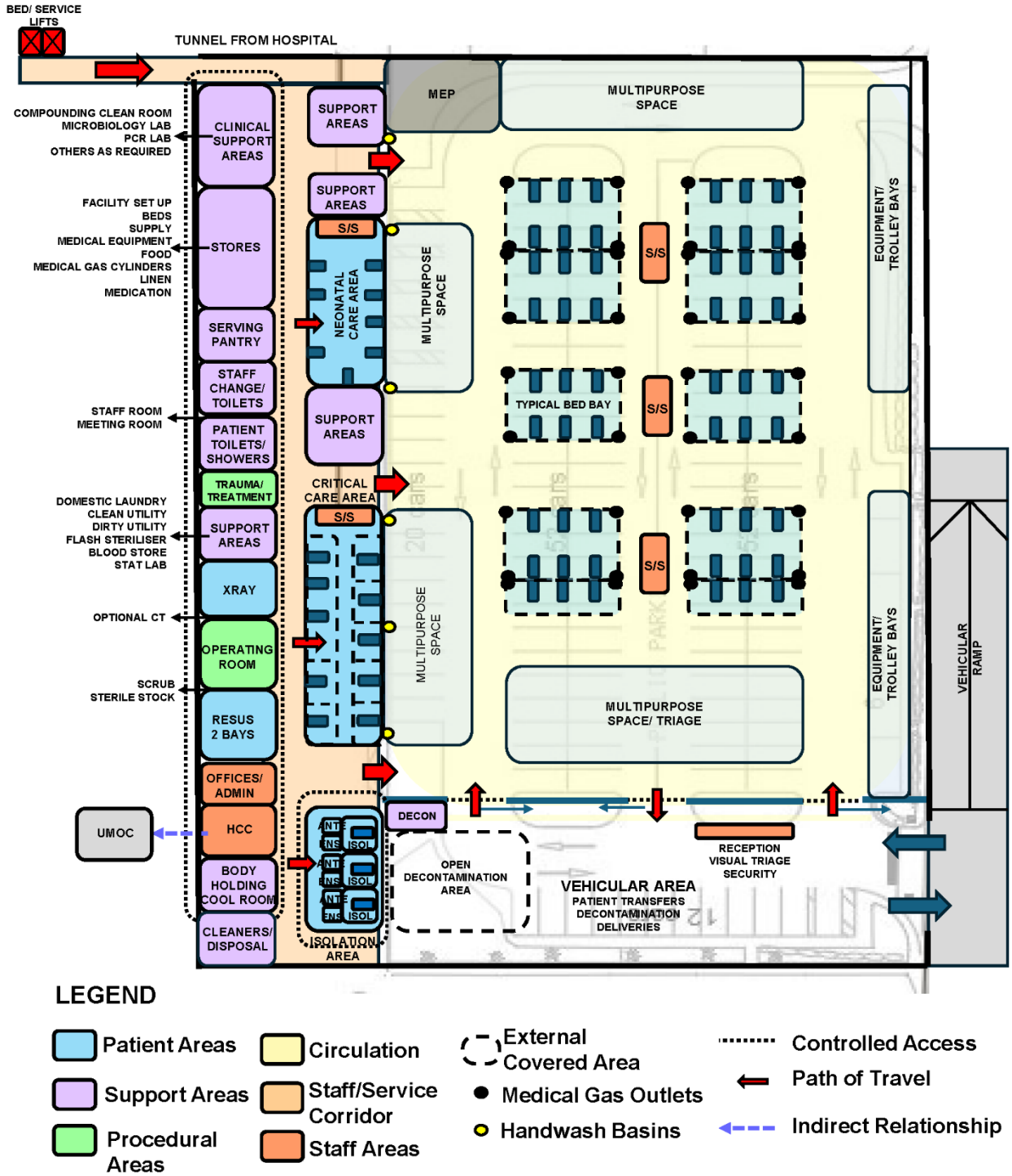
Demonstrated below the functional relationship of an example facility. The example provided is for SUEOF within a basement car park within a 150-bed hospital. Other models need to have similar relationships but implemented in different ways as appropriate to the circumstances of the hospital and choice of space.

Normal Operations – Assumed to be a Basement Car Park

This basement carpark may be below the main hospital building or separate from the hospital building but linked via a secure underground corridor/ tunnel. For the conversion of this typical carpark to SUEOF see the diagram overleaf.



Activated Facility



1.3.2 External Relationships

The SUEOF requires close and efficient access to the following units:

- UMOC- open communication between the Unit and the Unified Medical Operations Command Centre, to ensure patients requiring emergency care are correctly matched to healthcare system resources
- The DoH- for the permitted services and directions
- Abu Dhabi Civil Defence- for the assessment of fire risk and assistance in evacuations
- Other government agencies as required including Police, Military, Ambulance Service etc.

1.3.3 Internal Relationships

Within the Unit, key functional relationships include the following:

- The design should allow for rapid access to every space with a minimum of cross traffic
- Most of the patient care areas of the SUEOF should be open plan for easy access to all areas and observation of multiple patients from almost every point
- The unit should have provision for vehicle access directly to the floor
- There must be close proximity between the Resuscitation, Operating Room and Critical Care Areas
- Scrub up shall be adjacent to the Operating Room and a sterile stock room shall be in close proximity
- Sterilisation shall be in close proximity to the Operating Room
- There must be close proximity between Ambulance Bays, Resuscitation Bays and Operating Room
- The Reception/ Visual Triage/ Security Desk shall be located at the Patient Entry of the Unit with view of ambulant patients coming down the ramp into SUEOF
- Direct link from Ambulance and the Patient Transfer area to Decontamination, Ambulance Triage and Resuscitation areas
- Multipurpose Triage Area shall be located upon entry into the Open Area
- Access from Patient Areas to the Resuscitation area
- Staff Station/s located centrally within the Open Area, with direct oversight of the Bed Bays
- Access from all Patient Treatment and Bed Bays to the X-Ray Room. The X-Ray Room shall have close proximity to the Critical Care areas
- Support areas and Stores for the Underground facility shall be located adjacent to the zones for ready access
- Hospital Command Centre (HCC) located in close proximity to the Ambulance Entry. It shall be responsible for communicating with the UMOC
- Body Holding Room shall be located away from high traffic areas and close to the Ambulance Bays

1.4 Unit Planning Models

The Unit should be located underground with efficient connectivity to the hospital building as well as ambulance and other emergency vehicle access.

Planning of the Unit should consider providing maximum flexibility of patient spaces to allow adaption and multipurpose usage to accommodate patients of different ages presenting with different care needs.

1.4.1 Dual Use example

In the example provided in this FPU, a basement carpark is re-purposed as SUEOF in less than one hour. The carpark area will have the following provisions built-in ready for activation as SUEOF:

- In a large open plan area of the carpark, privacy curtain tracks are permanently installed.
- Privacy curtains are stored in an adjacent area ready to be used to subdivide each carparking grid into 3 patient bays. Typically, the column grid is approximately 8m x 8m. With parking bays approximately 2.5 m wide, three bed bays can fit within one grid span, so one bed can be placed in each bay. This allows beds to be set out within the carpark in a predictable pattern. To note that critical care patients will not be treated in this space.
- In a separate enclosed store collapsible beds are to be stored so that they can be used as patient beds in situations where the transfer of patient beds from the inpatient units is deemed impractical.
- Each column within the open plan area will have a lockable Stainless Steel box incorporating Oxygen, Suction, Power and Data outlets on each side facing the bed bays.
- Mobile staff stations are to be stored and rolled out into the appropriate aisles of the carpark to monitor the patients and activities.
- The carpark floor, columns and ceilings must be finished with resilient gloss paint in a light colour. The finish must suit the movement of vehicles but must also be capable of cleaning as a clinical space.
- On the perimeter of the carpark, where cars are against the walls, there may be multi-use zones set aside for ad-hoc support activities. A variety of collapsible furniture such as tables, folding chairs, privacy screens, trolleys, mobile lockers etc should be stored in a separate enclosed room. The staff may bring out such furniture and place them in the multi-use zones to create space for ambulant patient waiting, additional triage and immediate minor treatment.
- In a separate area on the perimeter of the carpark, an emergency clinical zone needs to be planned, mostly without the potential for dual use. This area will house minor versions of many clinical and support areas, fully finished, stocked and ready for use. These clinical spaces will be of lower facility standard than the normal hospital requirements and are mostly multi-use for different patient types, ages and conditions.
- The use of the spaces will be dynamically decided by the clinical and management staff according to the conditions experienced.
- At one end of the dual use carpark, by the use of carefully located walls and sliding doors, a section is segregated at the bottom of the ramp to act as a logistics area and interface between the inside and outside. In this area, the staff will use the provisions from the furniture store to set up temporary reception and visual triage areas for communication with those entering from the outside. The same area will be used for patient transfers via an ambulance, collection of waste and re-stocking of the SUEOF.
- The segregated area of the basement carpark will also be used as a method of managing certain MEP services during the emergencies where the main services may be compromised. For example, the air via the carpark ramp is filtered, tempered and pumped into the main hall (converted carpark).
- The basement carpark may also house the emergency generator serving the SUEOF as well as water storage and filtration facilities dedicated to SUEOF.
- Oxygen is expected to be provided via emergency bottles and supplemented by an oxygen concentrator on emergency power.

1.4.2 Functional Zones

As a minimum, the Unit shall include the following Functional Zones:

Entrance Ramp/ Outer Open Area

- An entry/ exit ramp
- An open area at the bottom of the entry/ exit ramp to lead to:
  - At least two (2) Ambulance/ Patient Transfer Bays that also function as Triage Assessment Bays for ambulance patients
  - Decontamination showers in an enclosed room for at least 2 persons and a mass casualty decontamination area
  - Reception/ Visual Triage desk that functions as triage assessment for ambulant patients
  - Security desk, which may be combined with the reception desk
  - A space for deliveries

Patient Resuscitation/ Treatment Areas

- Resuscitation Bays ; At least two (2)
- Operating Theatre; At least one (1)
- Trauma/ Treatment Room; At least one (1)
- Room dedicated to Critical Care beds
- Room dedicated to NICU beds, if the facility provides this service
- An internal airconditioned open area that contains:
  - Triage area
  - Curtained bed bays that can be utilised as Inpatient beds, Sub Acute, Non-Acute, Observation beds etc. These can be grouped into different patient zones as the case mix changes
  - Multipurpose zones that can be utilised as required including additional triage, non-clinical workspaces etc.
- Isolation Area for infected patients

Diagnostic Areas

- At least one X-Ray Room
- Stat Lab
- Equipment Bays for other mobile diagnostic equipment such as ultrasounds

Support Areas

- Bays for Handwashing basins
- Blood Store
- Body Holding Cool Room
- Clean and Dirty Utility Rooms
- Disposal and Cleaner's room
- Equipment Bays for resuscitation trolleys and mobile equipment
- Flash Sterilisation
- Patient Toilets/ Showers
- Serving Pantry
- Store - Beds
- Store - Facility Setup
- Store - Food
- Store - Linen
- Store - Medical Equipment
- Store - Medical Gas Cylinders

- Store - Medication
- Store – Supply
- Other required areas as assessed by the facility including compounding pharmacy for IV preparation, PCR or microbiology lab etc

Staff Areas

- Hospital Command Centre (HCC)
- Offices; at least two (2)
- Staff Stations
- Staff Change Rooms
- Staff Rest Room

Within the Unit, each patient zone shall have multiple functions, determined by management decision and based on patient numbers or conditions encountered. The facility can have the option, if it is large enough, to separate the patient types, initially determined by the triage category, into their own zones or pods which can be better managed by specialised staff.

There should be a provision of temporary signs which may be hung from ceilings to suit the emergency operations of SUEOF according to the configuration of the space decided by the staff. For example, labels for various zones or services or clear passageways for fire evacuation etc.

Any additional space requirements shall be determined by the type and level of hospital facility the SUEOF is associated to and the minimum essential clinical services identified that need to be maintained during activation of the SUEOF. Similarly, supporting services shall vary depending on the size and type of clinical service to be provided.

The above zones are briefly described here:

Entrance Ramp

The Unit should be accessible by an entry/ exit ramp for ambulance and private cars to bring in patients and for delivery access. There should also be a pavement for ambulant patients to be able to walk down the ramp to access the Unit. The width of the ramp should take into consideration a two-way ramp system allowing two ambulances to pass each other and sufficient outer edge pavement on at least one side.

Outer Vehicular Open Area

The ramp shall lead to an open area that will include ambulance patient transfer bays with ambulance triage. Sufficient space should be provided to allow discharge of patients from vehicles and ambulances and to prevent bottlenecks. A limited number of temporary vehicle drop-off bays should be provided close to the entrance for private cars bringing in patients and for delivery vehicles.

Upon discharge of patients from the ambulance, those on stretchers shall move to an ambulance triage area prior to proceeding to their next destination.

Upon entry of ambulant patients, they shall be screened at a Reception/ Visual Triage desk prior to progressing through the Unit. This desk should have a clear vision of the ambulant entry point and should have direct communication with the internal Staff Stations.

Decontamination

This space shall also include two decontamination areas: one for mass casualty decontamination and one for individual decontamination. This may be integrated with the Ambulance bays or directly accessible from the ambulance bays without entering any other part of the Unit.

The mass casualty decontamination area shall be external with a deluge shower incorporated into the ceiling of the bay area.

Additional requirements include:

- A drop-down retractable plastic screen should be provided to contain the water flow in the open area used for vehicle access to act as a mass decontamination area when required.
- A dedicated storage for Personal Protective Equipment (PPE) and dedicated CBRN kits should be provided directly adjacent to this area.
- Privacy during clothing removal should be provided with the ability to segregate males from females.

The individual decontamination area shall be a dedicated enclosed room with pass-through access.

All decontamination areas shall have a flexible water hose, floor drain and contaminated water trap with all water flowing out to be treated as contaminated water and treated accordingly.

Patients arriving from outside shall not enter the internal clean area of the facility until they are screened and decontaminated where required. Clinical judgement should be exercised to manage patients effectively, with infection prevention and control considered at each stage of care. In life threatening circumstances immediate treatment may take precedence, with infection control measures applied as far as practicable.

Internal Open Area

The Open Area should lead to an internal enclosed area with tempered air. Fixed walls should separate these two distinct areas and be fitted with sliding doors that can be operated only when the Unit is activated. At other times the sliding doors will be in the open position.

Upon entry to this area there should be another desk located where staff can observe and control access to treatment areas and entrances. This area shall function as a triage and triage waiting area for rapid screening and sorting of patients by triage level. It shall be large enough to cope with a mass influx of patients when required. Stackable chairs, mobile tables and mobile screens can be used to adapt the space to operational needs. The setup of this area should encourage a one-way flow of patients from entry to clinical and treatment areas and then exit. It should consider mass casualty events where crowding can inhibit care. In this scenario a funnel-shaped triage space can prevent over-crowding at the assessment area and will encourage a controlled and orderly flow allowing patients to be assessed.

This open area will have tempered air upon activation and furnished with mobile beds. Bed bays shall ideally be grouped into clusters of three (3) beds within the structural grid of the building and separated by privacy curtains. Each cluster shall be serviced by two sets of medical gas and emergency power, with each set consisting of (1 x oxygen, 1 x suction and 3 x emergency power outlets). These shall be pre-piped to appropriate locations on the structural columns and placed within lockable boxes. Waste bins and sharp containers shall be provided. The allocation of bays as non-acute, acute treatment bays or inpatient beds shall be determined based on the daily patient volume and acuity. This allows clinical capacity to be optimised for real-time reassignment to match shifting operational demands and patient needs.

Mobile Staff Stations shall be distributed evenly to provide appropriate visibility of and supervision over all bed bays.

The open area shall include equipment bays for essential equipment and supplies used at the bedside including mobile equipment, supply trolleys and resuscitation trolleys. These bays shall have emergency power outlets spaced at intervals of no more than one meter for charging of equipment. Mobile storage units may be placed appropriately to distribute supplies where they are needed.

Spaces can also be designated as multipurpose zones that can be used for non-clinical workspace, where foldable tables and chairs can be set up. These zones may also be used for triage, visitor or patient waiting, staff rest areas or clinical workspaces for minor injuries.

The ambulatory inpatients with non-critical or minor injuries who are relocated to the SUEOF may need to be accommodated in a temporary seating area since the number of inpatient beds will be a fraction of those in the above ground facility.

The percentage of patients per triage category will vary depending on the type of casualty event that has occurred, therefore providing flexible spaces within the open area that can adapt to the changing operational requirements of the facility is crucial.

Handwash basins shall be distributed evenly, so that staff and patients can use them when required. These can be installed on one side or both sides of the open area.

Patient Resuscitation/ Treatment Areas

Dedicated rooms shall be provided for several functions.

Resuscitation Area

At least two Resuscitation Bays shall be provided for the resuscitation and treatment of critically ill or injured patients. The Resuscitation Room/ Bay requires:

- Space to fit a specialised resuscitation bed
- Space to ensure 360-degree access to all parts of the patient for uninterrupted procedures
- Circulation space to allow movement of staff and equipment around the work area
- Maximum possible visual and auditory privacy for the occupants of the room and other patients
- Easy access from the ambulance entrance and separate from patient circulation areas
- Easy access to the Bed Bays
- A full range of physiological monitoring and resuscitation equipment
- Workbenches and storage cupboards
- Access to dirty utility and disposal facilities
- Solid partitions between this and other areas are recommended

Each Resuscitation Bay should be equipped with:

- Service panel, service pendants or pods to maximise access to patients
- Physiological monitor with facility for ECG, printing, NIBP, SpO_2, temperature probe, invasive pressure, CO_2 monitor
- A procedure light similar to a small, single arm operating light
- Equipment to hang IV fluids and attach infusion pumps
- Resuscitation patient trolley suitable for adults, paediatrics and neonates
- Wall mounted diagnostic set (ophthalmoscope/ auroscope)
- Clinical scrub basin with paper towel and soap fittings
- Imaging facilities should include:
    - One Overhead X-ray
    - At least one mobile X-ray
    - X-ray screening (lead lining) of walls and partitions between beds
    - Lead lined mobile screens
    - Patient resuscitation bed/ trolley with X-ray capacity

Isolation Area

- The Isolation Area shall be provided to segregate infectious patients from those in open spaces to prevent the spread of infection. It shall be as close as possible to the Ambulance bays to avoid infectious patients accessing the inner parts of the facility. It shall be an enclosed area containing the appropriate number of isolation rooms. Each Isolation Room shall have an anteroom to the

isolation room and an ensuite bathroom with access from the Isolation room.

Operating Room

At least one operating room shall be provided to conduct surgical procedures in a sterile environment. It shall be located close to the resuscitation bays and accessible from the ambulance bays.

The DoH may require the number of emergency operating theatres within SUEOF to be increased. In such circumstances, the provision of supporting spaces should also be increased.

It shall have fixed surgical lighting, anaesthesia equipment, patient monitoring devices and sterile instrument storage. A sterile stock room shall be close by and a scrub up shall be provided. Post operative patients shall recover within the Critical Care Area, which shall be located in close proximity to the Operating Room.

Trauma/ Treatment Room

This room shall be a multipurpose treatment room. This room can also be used for a variety of purposes including:

- Emergency trauma
- Patient treatment in the privacy of an enclosed room
- Emergency baby deliveries
- Minor procedures

Critical Care Area

The Critical Care Area shall be an enclosed room composed of critical care bed bays. Each bed bay shall have privacy curtains. As a minimum, these bays shall be designed as high dependency patient bays. There shall be a staff station and a handwash basin within the room. A resuscitation trolley should be kept in this space. Each bay shall have a ventilator, critical care patient monitor and infusion pumps.

Neonatal Intensive Care Area

Similar to the critical care area, this room shall be composed of neonatal care bed bays. The bays shall be designed as Special Care Neonatal Bays. There shall be a staff station and a handwash basin within the room. A resuscitation trolley dedicated to neonates should be kept in this space. There shall be sufficient storage for formula and other neonatal supplies within the Unit.

Support Areas

Support areas include Clean and Dirty utilities, Disposal room, handwashing, mobile equipment and resuscitation trolley and Store Rooms to comply with Standard Components as identified in the Schedule of Accommodation. Other rooms can also be provided, such as an IV compounding area to support with production of IVs. The facility can also choose to provide a Chemotherapy Prep area if this function is part of their service plan. Other services that can be provided include a PCR lab, microbiology lab and others.

Patient Toilets/ Showers

The Patient Toilet facilities shall be shared and shall be as close as practicable to patient areas minimising travel distance. At least ten patient toilets (five male, five female) along with at least six showers (three male and three female) in a communal area. Separate facilities should be provided for patients with accessibility needs, with provision for six toilets (three male and three female) to be wheelchair accessible.

Stat Lab

A designated area for performing laboratory investigations shall be provided. Capabilities shall include, but not be limited to, point of care testing for rapid test results, haematology, basic chemistry and basic microbiology. Referral arrangements for specialist testing must be established.

Patient blood samples shall be taken at bedside or within a screened off area within the internal open area.

An appropriate level of waste management shall be conducted depending on the samples and testing to be conducted.

Blood Store

Where surgery shall be taking place, blood storage in refrigerators with temperature monitoring is required. Blood grouping and crossmatching capability must be provided with basic screening of donated blood for infections such as hepatitis and HIV. Blood donation shall take place in a screened zone within the internal open area.

Diagnostic Imaging

As a minimum, an X-Ray Room shall be provided. Mobile ultrasounds, echocardiography machines and additional mobile X-Ray shall be provided. Depending on the level service a mobile C-arm may be provided within the operating room. The X-Ray room shall be located close to the operating room and critical care areas.

Medication Room

A Medication Room is required for the storage of medications used within Unit. Entry should be secure with a self-closing door. The area should be accessible to all clinical areas and have sufficient space to house a drug refrigerator for the storage of heat sensitive drugs. The drug refrigerator should be temperature monitored and alarmed. Controlled or dangerous drugs must be kept in a secure cabinet within the medication room. Access shall be restricted to authorised staff. Medication store shall be sized to be sufficient for 14 days without external replenishment.

Body Holding Cool Room

The body holding room shall be a cool room or a room with body refrigerators to hold deceased patients. This room shall be adjacent to the open area for ease of transfer of the deceased. The capacity of the room shall be able to hold 10 bodies. It is assumed that as soon as possible the bodies will be removed outside the facility.

Flash Sterilisation

The sterilisation area shall provide a one-way flow from dirty to clean. The dirty utility room with hatch access to the sterilisation room can be utilised as the dirty side. Items shall be manually cleaned, inspected then packed for sterilisation. Benchtop steam sterilisers or low temperature sterilisers shall be provided. Where items are heat sensitive, high level chemical disinfection may be used. Sterilised items shall be stored appropriately within cupboards in the same room.

Serving Pantry and Food Store

Food stock sufficient for patients, staff and caregivers allowed to stay shall be provided within a food store. The store shall maintain a minimum of 14 days' supply taking into consideration that each person requires 3 meals each. Infant nutrition and enteral feeds for critical care patients shall also be provided. Refrigerator and freezers with temperature monitoring and on emergency power supply shall be provided. The food store should primarily stock non-perishable food with minimal or no cooking or refrigeration requirements to reduce dependence on water and power during extended operations.

A separate serving pantry shall be adjacent to the food stock room. It shall have handwashing and heating facilities. The surfaces shall be easy to sanitise.

Allowance for limited cooking facilities shall be considered for long-lasting dry ingredients such as rice, dry legumes, boiling water or heating canned food.

Cleaners Room

The Cleaners Room shall be large enough to store the required cleaning and disinfection supplies and hygiene materials and supplies.

Stores

Equipment, medicines, consumables, infection-prevention materials and logistics arrangements required for the approved capacity shall be identified, available, maintained and capable of deployment within the approved activation timeframe. Large backup supplies should be arranged due to the risk of shortages.

Several stores shall be provided including a facility setup store sized to include all the furniture and equipment required to setup the unit upon activation. This shall include but not be limited to foldable chairs and tables, disposable or washable curtains, bedside lockers, overbed tables, stationary, power tools, ladders, power extension cords, portable chargers, mobile computers on wheels, spare air conditioning units, batteries, light bulbs, spare parts etc.

A separate bed store and medical equipment store shall be provided. The Unit shall maintain medical equipment appropriate to the level of service it shall provide with spares for critical equipment. These can include emergency and resuscitation equipment and kits, monitoring and diagnostic equipment such a mobile patient monitors, thermometers glucometers, ECG machines, portable ultrasound, respiratory equipment including ventilators, nebulisers, flowmeters, regulators, anaesthesia machines, C-arms, mobile X-Rays, electrosurgical units, mobile procedure lights, instrument sets, infusion and syringe pumps, IV poles, hypothermia devices, haemodialysis machines, obstetric equipment, neonatal equipment where this service is provided including incubators, warmers, phototherapy etc. This list is not exhaustive, and the facility should pre plan the required equipment that will be needed.

The bed store shall include all the beds required in the facility including critical care beds, cots and inpatient beds. Inpatient beds shall be foldable or collapsible with manually adjustable backrest. Critical care beds shall preferably be electrical and have the required features for a critical care bed. Maternity delivery bed, mattresses and stretchers shall also be included in this store.

A separate store for consumables and supplies shall be included. A clean linen store shall also be provided, and the facility shall include a laundry room with at least four washing machines or as required by the Unit's operational policy plan.

Staff Areas

Hospital Command Centre (HCC)

A command centre that communicates with the UMOC shall be located in close proximity to the External open area and ambulance bays. Coordination with the Healthcare Facility Incident Command, DoH, UMOC and other applicable emergency command structures shall be conducted from this room. Sufficient workstations shall be provided to serve this function.

The facility should establish and provide a Healthcare Provider Liaison Officer (HLO), either in person or electronically, to the Unified Medical Operations Command Centre (UMOC). UMOC is the operations centre that monitors, facilitates and optimizes healthcare emergencies.

The HLO will be responsible for facilitating communication, maintain visibility of healthcare facility resources, capacity, and real time status, and assist the UMOC and the ambulance call centre in ensuring patients requiring emergency care are correctly matched to healthcare system resources.

Staff Station/s

The Staff Station/s should have an uninterrupted vision of the patients as far as possible. They should be distributed evenly and centrally located within the open area. There should be a dedicated staff station within the Neonatal Care Area and Critical Care Area.

Staff Change Rooms

Male and Female separated staff change room shall be provided. The size shall be appropriate to serve the number of staff anticipated to run the Unit.

Staff Room

At least one dedicated Staff Room shall be provided where staff can rest and recover between shifts. This room shall be quiet and separated from patient areas and equipped with seating and rest furniture, lockers and refreshment facilities.

1.5 Design Considerations

Refer to **Part C for ergonomic** issues, **Part D for Infection Control**, and **Part E for Engineering** Requirements. However as described above a somewhat lower standard of provisions within the SUEOF is expected and will be utilised temporarily until the main hospital is back to full function.

Wherever possible and practical the SUEOF should aim to maintain the key principles of the Guidelines Parts C, D and E, even if the quantitative provisions are less than the normal hospital conditions within the dual-use open plan areas.

Within the separate clinical area of SUEOF (not the dual-purpose area), within each room, the full requirements of the Guidelines will apply without compromise.

1.5.1 General

The protected facility shall be located in a pre-assessed underground area, taking geological risks into consideration. It shall be designed, commissioned, maintained and tested for the approved Clinical Capability Profile.

Car Parking

There should be sufficient space for a small number of cars to drop off patients. However, use of space for car parking should be limited, and should be dedicated, as much as possible, to treatment and patient care. The parking areas available should be for urgent call-in staff.

If an underground carpark is re-purposed as a SUEOF, the use of the space should be instantly changed to become a disaster management area. Each column grid will be able to be converted to a makeshift 6 bed ward by hanging curtains. The columns shall have provision for gases and power.

Ambulance bays

Adequate ambulance bays should be provided. This is based on the approved capacity of the facility and the types of services it shall provide. A minimum of two bays should be provided for a 150-bed hospital.

1.5.2 Patient Treatment Areas

Treatment bed spaces should be designed as acuity adaptable - to suit any patient acuity in order to provide maximum flexibility for patient placement within the Unit.

1.5.3 Environmental Considerations

Acoustics

The provisions of **Part G – Acoustics** of these Guidelines are waved for the SUEOF due to the special circumstances of the unit and the dual use of space.

Privacy

Each cluster of beds within the open area space shall be provided with bed screens to ensure reasonable privacy and dignity of patients.

Where practicable, patient privacy and confidentiality shall be maintained throughout the facility, while taking into consideration the constraints of the open area configuration, rapid implementation and limited space of the facility.

Where practicable separate screened bed areas shall be designated for male, female and paediatric patients. For paediatric patients, where practicable, provision should be made for a parent or guardian accompanying them and staying in the same bed bay.

1.5.4 Space Standards and Components

Bed Spacing

In open areas, provide a minimum of 700mm clear space on both sides and foot of each bed. The minimum centre to centre bed bays in an open area should be 2400mm. In enclosed areas, the minimum clearance around the bed will be 900mm to privacy curtain and 1200mm to solid walls.

1.5.5 Accessibility

Design should provide ease of access for wheelchair bound patients. Open plan flexible areas used for patient waiting should include spaces for wheelchairs and suitable seating for patients with disabilities or mobility aids.

1.5.6 Doors and Corridors

Doors used for bed transfer to Operating Room, Trauma Room, Medical Imaging Rooms and Critical Care Areas, must be appropriately positioned and sized as recommended in the Standard Components.

Corridor width used for patient movement should be a minimum of 2500mm to allow the passage of two hospital beds without difficulty. Corridors should not be used for storage of equipment within the 2500mm clearance. If necessary wider corridors or bays should be provided for storage. Non-patient corridors should be a minimum of 1200mm wide.

All external entry and exit doors and gates of the SUEOF, including those at the entry ramp, shall be blast-resistant and sealable against blast pressure, airborne contaminants, radiation and flooding, subject to a risk assessment and DoH requirements.

Note: Refer to **Part C - Access, Mobility and OH&S** in these Guidelines - Space Standards & Dimensions for further information on corridor standards. These requirements apply to the dedicated clinical areas of SUEOF.

1.5.7 Size of the Unit

The capacity and functional configuration of the protected area shall be proportionate to the hospital's licensed services, bed capacity, anticipated emergency role and risk profile. At least 50% of the bed capacity of the current facility be provided within the SUEOF.

Schedules of Accommodation have been provided for a typical 150 bed general hospital, to provide approximately 75 beds within the SUEOF.

1.5.8 Safety and Security

An exclusion zone should be established around the facility to protect the site from any nearby explosions. Keeping other structures out of this zone decreases the likelihood that the site will be targeted or damaged by an explosion. The size of the exclusion zone shall be determined by the threat assessment and any UAE or Civil Defence requirements.

The Unit shall provide a safe and secure environment for patients, staff and visitors during the emergency scenario.

The facility shall maintain safe, clearly identified and illuminated emergency access and exit routes suitable for patients, staff, emergency responders, equipment and supplies. The signage for this purpose may be temporary and installed at the set-up time within a dual use SUEOF.

The Unit shall comply with applicable Fire and Life safety requirements appropriate to the use of the space. For example, in a dual-use space, the facility must comply with the fire services of a carpark but at the time of use for SUEOF, it must also comply with the requirements of a healthcare treatment space.

The Unit shall receive a large number of patients and their visitors, many of whom may be distressed. The hospital has a duty of care to provide for the safety and security of employees, patients and visitors. Both policies and structures should be in place to minimise injury, psychological trauma and damage or loss of property. The precise details of security features should be designed in conjunction with a security risk assessment for the specific site.

The location of an office or desk for security personnel near the entrance should be considered. This room should be positioned so that it allows Security Staff a clear view of Entry and Ramp. Immediate access to these areas is essential.

1.5.9 Drug Storage

Controlled and dangerous drugs must be kept in a secure cabinet within the Medication Store Room. with alarm according to operational and drug storage policies. The room should be secured with staff only access and may include CCTV surveillance.

A lockable refrigerator or a refrigerator located within a lockable room is required to store restricted substances.

The drug storage provision should be sufficient for 2 weeks of use for the patient capacity of SUEOF.

1.5.10 Finishes

Finishes including fabrics, floor, wall and ceiling finishes, should be appropriate to the nature of this unit including the following considerations:

- Ease of cleaning
- Infection control
- Acoustic properties
- Light colour
- Durability
- Fire safety
- Movement of equipment and impact resistance.

However, if this is a facility that is being converted to an SUEOF upon activation and not purpose built, such as an underground car park, the standard finishes of such an area are expected and acceptable in such Emergency situations. For example, a washable epoxy paint finish to the floor, columns, walls and ceiling rather than vinyl.

In purpose-built clinical areas such as the enclosed treatment rooms and patient care areas, floor finishes shall have a non-slip surface and be impermeable to water and body fluids. They should be durable, easy to clean with acoustic properties that reduce sound transmission and shock absorption to optimise staff comfort while facilitating bed movement. Lighting and colour selected must not impede the accurate assessment of skin tones. Walls shall be painted with lead free paint. Carpet should be avoided to maintain the ease of cleanability.

In short, in the purpose-built clinical areas the full provisions of Parts C and D of the Guidelines will apply.

1.5.11 Curtains

Privacy bed screens must be washable, fireproof and cleanly maintained at all times. Disposable bed screens may also be considered.

1.5.12 Clocks

Accurate tracking of time within the Unit is critical. Wall clocks shall be provided and clearly visible in all clinical and open areas. Clocks in clinical areas shall be large digital clocks displaying time in a 24-hour format. All clocks shall be battery operated or battery backed. Additionally, clocks in resuscitation areas shall be capable of displaying elapsed time.

1.5.13 Grab Rail/ Handrails

In corridors accessed by patients, a grab rail/ handrail is required on both sides of the corridor. Refer to **Part C - Access, Mobility, OH&S** for further information.

1.5.14 Infection Control

Handbasins

Handbasins for handwashing shall be distributed evenly, so that staff and patients can use them when required. These can be installed on one side or both sides of the open area.

These shall also be included within each enclosed bay or treatment room. Handbasins in clinical areas should be the surgical type with hands-free activation (Type A). In the enclosed clinical areas, the ratio shall be one per four bed bays or part thereof. Within the open bed bay area, handbasins shall be Type B with a ratio of one per ten beds or part thereof. Handwash basins required within the Isolation Rooms and Anterooms are in addition to those mentioned above. Dispensers for non-sterile latex gloves should be available in the vicinity of each handbasin and each treatment area.

Personal Protective Equipment (PPE)

Each handwash station should have storage and disposal facilities for PPEs.

Antiseptic Hand Sanitisers

Antiseptic hand sanitisers should be located so they are readily available for use at points of care, on walls and columns and in high traffic areas.

The placement of antiseptic hand sanitisers should be consistent and reliable throughout facilities.

Antiseptic Hand Sanitisers, although very useful and welcome, cannot fully replace Hand Wash Bays. Both are required.

Isolation Rooms

Isolation Rooms should be provided at the following ratios:

- 1 negative pressure isolation room per every 30 beds or part thereof

The need for any additional negative pressure isolation rooms can be determined by risk assessment and the service plan of the facility.

All Isolation Rooms require an Anteroom and an Ensuite Bathroom, both under negative pressure.

The corridor off the Isolation rooms should be separated from the interior of the Unit via double doors and be kept under negative pressure.

Refer also to **Part D - Infection Prevention and Control** in these Guidelines.

1.6 Building Service Requirements

This section identifies the minimum engineering requirements for a SUEOF. The planning and operational requirements of a 75-bed SUEOF located within a basement-level structure, to be activated and operated during war, civil emergency, mass casualty event, pandemic or natural disaster, is used as an example to provide more clarity. This section must be read in conjunction with **Part E - Engineering Services** for the detailed parameters and standards applicable, unless noted otherwise below.

The facility shall operate as a self-sufficient "island" site, with its own dedicated utility resources, for a minimum of 14 days (336 hours) without any external supply of electricity, water, fuel, medical gases, sewerage or communications. Self-sufficiency shall be achieved through dedicated on-site systems, including but not limited to:

- **Emergency Diesel Generators:** Heavy-duty backup diesel generator systems configured with $N + 1$ redundant electrical distribution to continuously power all critical clinical, mechanical, ventilation, and life-safety loads.
- **Generator Fuel Storage:** Bulk fuel storage tanks sized to maintain continuous 100% essential load operation for up to 14 days (336 hours) independently, complete with blast-protected fuel transfer pumps, redundant containment, and fuel polishing systems.
- **Potable & Utility Water Storage:** Underground bulk water storage reservoirs and automated pressurized booster pumping stations sized to supply domestic potable water, clinical handwashing, patient showers, drinking water compatible filtration system, and sanitation needs for the full 14-day operational duration.
- **Sewerage & Effluent Management:** Dedicated sewage holding/ septic tanks with 72 hours storage capacity, macerator pumps, and pressurized effluent lift stations capable of isolating and storing wastewater within the protected underground perimeter or safely discharging off-site without backflow risk during flood or structural collapse.
- **HVAC & Airborne Contamination Protection:** Independent Heating, Ventilation, and Air Conditioning (HVAC) systems equipped with specialized CBRN (Chemical, Biological, Radiological, and Nuclear) filtration, HEPA units, positive-pressure isolation zoning, and 100% direct outdoor exhaust for aerosol-generating/decontamination zones. Refer to Part E – Engineering Services for compliance requirements. Requirements for the outer vehicular open area, open decontamination and internal open area, as well as specific SUEOF requirements are specified in this section.
- **Medical Gas Systems:** Autonomous medical gas supply networks featuring high-capacity cylinder manifold banks (for oxygen, medical air, and vacuum) supplemented by dedicated on-site emergency oxygen concentrator plants and backup cylinder stores to ensure continuous supply to resuscitation, ICU, NICU, and procedure spaces.
- **Independent Communication Systems:** High-reliability communications infrastructure operating independently from public networks, featuring hardened satellite voice/data terminals, localized server node storage for Electronic Health Records, emergency VHF/UHF (Very High Frequency/ Ultra High Frequency) tactical radio links, and encrypted connectivity to the Unified Medical Operations Command (UMOC) and Department of Health (DoH) command centres.

This standard applies to both:

- Brownfield conversions – adaptation of an existing underground area
- Greenfield basement - new basements designed from the outset with pre-installed provisions

1.6.1 Facility profile example – design basis

Parameter	Design Basis
Bed capacity	75 beds (indicative split, to be confirmed by the clinical brief): ICU, NICU, Isolation, surgical and general ward beds
Clinical functions	Triage & casualty reception, CBRN decontamination, resuscitation, operating theatres (OT), ICU/NICU, isolation rooms, stat laboratory, imaging (X-ray/ultrasound), pharmacy, blood storage, sterile services, body holding
Occupancy (peak, for utility sizing)	75 patients + staff + caregivers. Assume ≈ 2.5–3.0 persons per bed on site at peak (≈ 188–225 persons) unless the operational model states otherwise
Autonomy	14 days for all utilities and consumables (Section 1.6.2)
Lockdown (sealed) period	12–24 hours minimum with all external air intakes, exhausts and heat-rejection paths closed
Activation time	Initial operating capability – within one hour. Full activation target 12 hours from activation order to first patient (to be confirmed by the Operator)
Operating modes	Dormant/Dual use → Activation → Emergency operation → Lockdown → Recovery (Section 1.6.3)

1.6.2 Design Criteria an Autonomy Targets

Resilience principles

Every system shall be designed applying the three resilience principles: robustness (able to withstand the design hazards and threats), redundancy (continued operation on loss of a component) and reconfigurability (able to be re-routed or isolated around damage).

Single points of failure shall be eliminated. Where a single point cannot be avoided, it shall be located within a protected space and identified in the risk register.

Duplicated systems (duty and standby) shall be physically separated (different routes, fire compartments and plant rooms) so that a single event cannot disable both.

A site-specific hazard, threat and risk assessment shall be completed at concept stage and shall set the blast, ballistic, CBRN, flood and seismic design loads for the facility.

Autonomy and redundancy summary

The following table is the consolidated performance target for all dedicated utility resources. Section references show where the detailed requirement is given.

Utility / Resource	Autonomy	Redundancy	Notes
Electrical - Standby Generation	14 days fuel at full essential load	N+1 (min.)	Section 1.6.5. Fuel quantity by calculation
Electrical - Battery Energy Storage System (BESS)	≥ lockdown period for life-safety & critical loads	Modular N+1	Bridges generators start and lockdown

Utility / Resource	Autonomy	Redundancy	Notes
UPS / Medical IT Locations	≥ 1 h at full critical load (indicative)	2N for OT/ICU/NICU	Critical areas such as Operating Theatres, ICUs, NICUs, Pharmacy Compounding etc
Cooling - Chilled Water	Continuous	N+2 critical / N+1 general	Section 1.6.7
Domestic / Potable Water	14 days	2 compartments min.	Section 0
Fire-Fighting Water	Per code (minimum 60–120 min)	Dedicated, separate	Section 1.6.10
Medical Oxygen	14 days at design flow	Primary + secondary + reserve	Section 1.6.12
Medical Air / Vacuum	Continuous	Duplex/triplex, N+1	Section 1.6.12
Sewage Holding	≥ 72 h (14 days preferred)	Duplex pumps	Section 1.6.9
Communications	Continuous	Diverse paths (wired, radio, satellite)	Section 1.6.13

1.6.3 Operating Modes

All systems shall be designed, controlled and tested for each of the operating modes below. Change of mode shall be initiated from the Facility Control Room and shall be possible both automatically via Building Management System (BMS) and by manual override.

Mode	Description	Key System States
Dormant / Dual use	Normal use; SUEOF infrastructure pre-installed and maintained in standby	Plant exercised periodically; Water turned over; Generators tested on load; Medical gas pipework sealed and pressurised; Stocks rotated.
Activation	Area cleared, fit-out completed, plant brought on line	Fire separations closed; Ventilation switched to healthcare mode; Water Systems flushed and sampled; Commissioning checklist completed.
Emergency operation	Facility operating with surface connections available	Mains/grid and generators available; Filtered fresh air; Normal heat rejection; External deliveries possible.

Mode	Description	Key System States
Lockdown (sealed)	Surface under attack or CBRN threat; all external openings closed	Blast valves closed; Air recirculated through CBRN filters with overpressure; cooling from TES; Power from BESS (and protected generators if fitted with protected air paths); CO_2 and O_2 monitored.
Recovery	Threat passed; facility returns to M2 or is decommissioned	Purge ventilation; Filters changed; Tanks and fuel replenished; Systems inspected; Lessons learned recorded.

1.6.4 Site Selection Constraints

Site and Threat Assessment

Site selection shall consider flood risk (fluvial, surface water, groundwater and sewer surcharge). It should be noted that basements beneath tall buildings experience greater effects from flood, fire or confined explosion. A structural and blast assessment of the host building is therefore mandatory before a basement is designated as a SUEOF.

Specific Constraints (Brownfield)

Constraint	Requirement
Clear height	Typical clear height of an existing basement (≈ 2.1–2.6 m) is below that needed for clinical rooms plus services. A height survey shall confirm a minimum clear height of 2.7 m in clinical areas (3.0 m preferred in OT/ICU) plus service zone; Otherwise, services shall run in exposed, accessible routes or the function relocated. 4m clear height is recommended.
Floor loading	Areas for OT, imaging, plant, water tanks, batteries and stores shall be checked and strengthened where required.
Slab falls & drainage	Clinical areas shall be levelled (screed/raised floor) and any gullies sealed or converted.
Ramps & access	Ramps shall be assessed for ambulance access (gradient, headroom, turning). At least two independent protected access/egress routes are required.
Waterproofing	Existing tanking/waterproofing shall be surveyed; Active leaks shall be remedied before clinical use.

Pre-installed Provisions (Greenfield and Dual-Use)

Greenfield basements designated for future SUEOF use shall incorporate, at construction stage:

- Structural floor loading, clear height and blast resistance for the clinical layout;
- Protected plant rooms, water/fuel tank spaces and service risers;
- Sleeves, blast-valve housings and penetrations through the protective envelope;
- Pre-installed main medical-gas, water, drainage and power backbones with capped connection

points;

- Quick-connection points for mobile generators, chillers, water tankers and fuel bowsers;
- Markings and documentation showing the conversion layout.

1.6.5 Electrical Power Supply and Distribution

Supply Strategy

The underground facility shall be served by a fully redundant $N + N$ power supply configuration to eliminate single points of failure and ensure uncompromised clinical continuity during major disruptive events or external infrastructure collapse. The redundancy shall extend from the incoming supply through to the final distribution boards serving critical areas (resuscitation, OT, ICU, NICU, HCC and ICT rooms), with critical areas fed from two independent sources via automatic changeover at the final distribution level.

Where practical, two utility feeds from separate substations shall be provided. The utility supplier shall register the facility as a priority user.

Distribution shall use ring or dual-radial topology with interconnectors to allow bypass of damaged sections. Spare capacity of not less than 20% shall be provided in switchboards.

Load Classification

Category	Typical loads	Max. changeover	Source
Category A - Critical life support	OT luminaires, life-support equipment, ICU/NICU bedheads	≤ 0.5 s	UPS + IPS, backed by BESS & Generators
Category B - Life safety	Emergency lighting, fire alarm, smoke control, fire pumps, PA/VA, blast-valve controls, CBRN filtration fans	≤ 15 s	BESS / Generators
Category C - Clinical	Medical gas plant, ventilation to clinical zones, chillers for critical zones, sewage & water pumps, ICT	≤ 15 s	BESS / Generators
Category D - Support	General lighting, serving pantry, lifts	> 15 s (sequenced)	Generators
Category E - Non-Essential	Comfort loads, non-critical equipment	Shed in M3	Shed automatically

Resilience of Power Sources

- Primary Source: Main primary supply grid and substation infrastructure.
- Secondary Source: Battery Energy Storage System (BESS) providing immediate, seamless power transfer without interruption to critical clinical loads.
- Tertiary Source: Dedicated emergency backup diesel generator system equipped with bulk fuel storage sized to support independent, off-grid operation at 100% load for a minimum duration of 14 consecutive days.
- Uninterrupted Power Supply: The UPS for critical & life safety systems shall be sized to support 60 min operations.

- Blast & Structural Hardening: All electrical distribution equipment, switchboards, cabling pathways, and emergency power systems shall be designed with enhanced protective measures, structural hardening, and shock/vibration isolation to maintain complete operational integrity in the event of external site unrest or severe structural impacts.
- Fire Survival Cabling: All life safety electrical feeders, sub-feeders, emergency circuits, and essential control wiring shall utilize fire survival cables (180min circuit integrity rated) across all clinical and critical loads to preserve electrical supply during internal or external fire emergencies.

Standby Generation

Standby generators shall be continuous/ prime-rated (not limited-hours standby rated) in **N+1** configuration as a minimum, sized for the full essential load with the largest set out of service.

Location: Standby generators should preferably be at surface; where underground, they shall be designed in such a way to avoid associated risks such as flooding. Generators shall therefore be either (a) at surface in a hardened, blast-protected enclosure with protected cable routes, or (b) in a dedicated underground plant room with flood protection above the design flood level, dedicated blast-protected combustion-air intake and exhaust paths, and fire separation.

Lockdown: Since generators need combustion air and exhaust, their operation during Lockdown Mode shall be confirmed by design. Where combustion air cannot be safely provided during lockdown, the BESS shall carry critical and life-safety loads for the full lockdown period.

An external mobile generator connection point (with interlocked changeover) shall be provided at a protected location.

Generators shall be tested monthly on load and annually at full load for not less than 4 hours (load bank permitted), plus a periodic black-start test of the whole facility.

Fuel Storage

Fuel storage shall provide **14 days of continuous operation at the full essential load**. Fuel quantity shall be calculated as:

> **V (litres) = P (kW average essential load) × 24 h × 14 days × SFC (≈ 0.27 L/kWh) × 1.10 (unusable/margin)**
>
> Example (indicative): 1,500 kW average essential load → 1,500 × 336 × 0.27 × 1.10 ≈ **150,000 litres**

Bulk fuel shall be stored in at least two separated tanks, not aggregated in the same space as the generators or transformers; with day tanks in generator rooms.

A protected fuel-fill point for bowser delivery, fuel polishing system, leak detection, bunding and tank-level telemetry to the BMS shall be provided. Fuel shall be sampled and turned over periodically during dormant mode.

Battery Energy Storage System (BESS)

BESS shall be sized to:

- Bridge generator starting
- Carry life-safety and critical loads for the full lockdown period where generators cannot run
- Support load levelling

Battery chemistry shall be selected for underground use with low thermal-runaway risk (e.g. LFP). BESS rooms shall be fire-rated enclosure, off-gas detection, dedicated ventilation/exhaust, suppression and spill containment.

Socket outlets

Adequate power outlets shall be provided throughout the SUEOF, ensuring power availability of appropriate purpose (normal/essential/UPS). Universal type socket outlets are not recommended due to safety and fire risk and only. Refer to Part E – Engineering Services for general requirements for power socket outlets.

Retractable Ceiling-mount power outlets/extensions

Throughout the facility, adequate ceiling-mounted outlet connections shall be provided for mobile staff stations (Refer to figure XX below as a reference). The ampere rating of such outlets must be able to cater the demand load of the station in coordination with the equipment list from the planner.

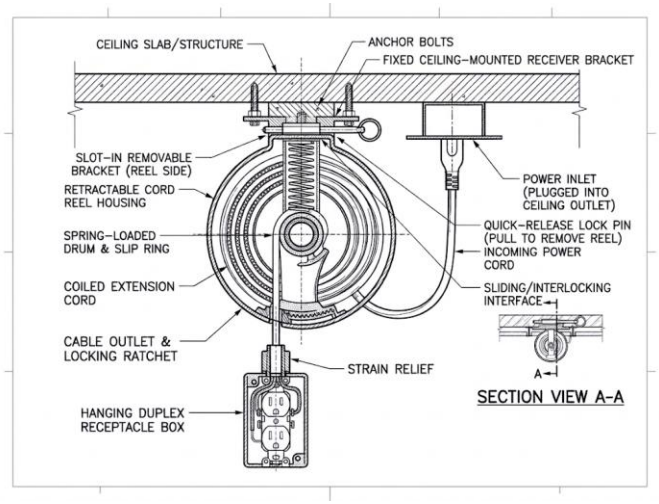


Figure 1 Retractable power outlet reference

UPS and medical IT

Critical medical locations (OT, ICU, NICU, Resuscitation etc) shall be served by Medical IT (IPS) systems with insulation monitoring and remote alarm panels.

UPS systems serving critical areas shall be **2N** (or N+1 modular with dual-path distribution) with not less than 60 minutes autonomy at full critical load.

Where the project risk assessment identifies a likely or highly likely loss of standby generator availability due to external surface hazards, the UPS shall provide sufficient autonomy ensuring the operation and safe closure of ongoing critical clinical procedures and continued life support functions until the backup power supply is available, restored or the procedures can be safely concluded, as defined in the early-stage risk mitigation strategy.

All business-continuity loads identified by the Facility Operator as essential to the continued safe operation of the facility, including but not limited to data centre and communications systems, building management systems, security and fire safety systems, and critical IT infrastructure shall be evaluated in the risk assessment with the end-user at early stage of the design.

Earthing, Lightning and Surge Protection

A combined earthing system with equipotential bonding in all medical locations shall be provided. Surge protection devices shall be installed at all incoming services. Where the risk assessment identifies electromagnetic pulse (EMP) threat, critical ICT and controls shall be shielded and protected with filtered penetrations.

1.6.6 Lighting and Emergency Lighting

All lighting shall be LED. Lighting levels for the internal clinical enclosed spaces shall follow DoH Health Facility Guidelines Part E Engineering requirements.

Since this is a surge/ activation-capable facility the areas within the lighting within the internal and vehicular open areas shall be capable of dual-mode operation. During the Dormant operational mode, lighting requirements shall match the requirements of the space's normal use. For example, if the space is a car park, it shall function at car park lighting levels and requirements. In Activation Mode, the facility should be able to switch to colour corrected lighting and a lux level appropriate to an inpatient bedroom. Where higher lighting levels are needed in open area spaces, a mobile procedure light can be used.

The performance requirements above may be achieved through a number of design strategies. Two preferable approaches are described below for guidance only. They are not mandatory, and the lighting designer may adopt these, a combination of them, or an alternative solution, subject to demonstrating compliance with the required illuminance, colour rendering, control and emergency design requirements.

- Dual-system fixtures. Standard car-park luminaires stay on in normal mode. Separate high-CRI (Ra 80+) examination luminaires are installed in the ceiling or on rails and switched on only in activation mode.
- Tunable or dimmable high-CRI luminaires. One fixture set runs at about 30 lux in normal mode and boosts to 300+ lux at Ra 80 on activation, through a lighting scene controller. It has a cleaner ceiling, but the cost is higher and the high-CRI luminaires run in a car-park environment.

Dedicated emergency lighting systems (in compliance with DoH or other responsible authority) shall be provided across all zones, backed by internal batteries or central battery units providing a minimum battery autonomy of 3 hours. Where the designer decides to have emergency lighting fixtures with integral battery, it must be ensured that the light fixture is monitored (at central BMS as well as the Fire Command Centre). The monitored feature shall include but not be limited to:

- Functional tests (ensuring switching circuits are operational)
- Duration tests
- Fault diagnostics (e.g. battery / led lamp / charging circuit failure)

Explosion-Proof Luminaires - Emergency light fittings installed in the critical areas and on the means of egress shall be explosion-proof heavy-duty rated, and shock-resistant to withstand extreme overpressure and volatile operational environments

Escape Route Signage - Escape route and exit signs shall be fed from the same source as of Emergency lighting.

Standby lighting at 100% shall be provided in OT, ICU, NICU, Resuscitation, Triage, Decontamination, plant rooms and the control room.

Clinical areas shall have lighting served from two separate circuits, so a single failure does not leave a room dark.

Tunable (circadian) lighting is recommended in wards and staff rest areas to support patient recovery and staff alertness in the windowless environment.

Photoluminescent way-guidance shall be provided along all escape routes

1.6.7 HVAC (Heating, Ventilation and Air Conditioning)

Cooling Plant and Chiller Strategy

The facility shall use a centralised air-cooled chiller or Direct Expansion (DX) condensing unit housed in an underground plant room, with **N+2** redundancy for critical areas (OT, ICU, NICU) and **N+1** for general zones.

As a secondary layer of resilience, critical life-support zones shall have provisions for independent, Direct Expansion (DX) split units to provide localised cooling if the central chilled water loop is compromised.

Chilled water distribution shall be dual path (or ring) with isolation valves so that damaged sections can be isolated without loss of supply to critical zones.

Condenser Heat Rejection and Surface Protection

Heat rejection equipment shall be placed in a space provided with openings for fresh air intake and exhaust connected to ground level with ballistic louvers, ducts, supports and heavy-duty blast dampers, to effectively reject the system heat to the ambient. The strategy here is to have multiple ducted openings for this purpose so to make sure if a duct is having any hindrance for intake/exhaust due to debris and rubble others are available to suffice the minimum requirements.

Blast and CBRN Protection

Fast-acting blast valves and overpressure protection dampers shall be installed on all fresh air intakes and exhaust ducts/louvers.

AHUs and FAHUs shall include multi-stage filtration with HEPA and CBRN activated-carbon filtration, capable of switching between: (a) full outside air (M2), (b) filtered air with overpressure (CBRN protection), and (c) closed-loop recirculation (M3).

CBRN-protected zones shall be held at an overpressure relative to outside of not less than 50 Pa (or as required by the national civil-defence code), with airlocks at entries.

Air intakes shall be located away from vehicle ramps, car-park exhausts, generator exhausts, loading bays and drainage vents, and placed out of easy reach.

For greenfield projects the designer must provide fresh air and exhaust air provision for possible clinical spaces in future along with the traditional design of building components

Indoor Air Quality During Lockdown

The duration of fully closed recirculation shall be limited by CO_2 build-up. Design shall either (a) supply CBRN-filtered fresh air in overpressure mode, or (b) provide CO_2 scrubbing and oxygen make-up for sealed operation.

Continuous monitoring shall be provided for CO_2, O_2, CO and NO_2 in all occupied zones and plant rooms, with targets of $CO_2 \leq 1{,}000$ ppm (normal) and alarm before 5,000 ppm; O_2 alarm below 19.5% and above 23.5%; CO alarm at 25/50 ppm (low/high).

Humidity control (dehumidification) shall be provided since underground spaces are prone to high humidity, condensation and mould.

Pressure Regimes and Air Changes

Strict differential pressure zoning shall be maintained: **positive pressure** for clean zones (OT, ICU, NICU, protective environment) and **negative pressure** for isolation (airborne infection) rooms, triage and decontamination zones, in accordance with Part E - Engineering.

Exhaust from isolation rooms, decontamination and laboratories shall be HEPA-filtered before discharge and discharged away from any intake.

Pressure differentials shall be continuously monitored with local displays and BMS alarms at room entrances.

Indicative design parameters:

Space	Pressure	Min. OA (ACH)	Min. total (ACH)	Temp. (°C)	RH (%)
Vehicular Open Area	Negative	2	12	21–24	≤ 60
Open Decontamination (1.6.17)	Negative	2	12 (100% exhaust)	—	—
Open Patient Area	—	2	4	21–24	≤ 60

Smoke Control Interface

Smoke extraction and pressurisation systems shall be independent of normal HVAC, or where shared, shall have fire-mode override with priority over all other modes, including lockdown, as agreed with the DoH or other responsible authority.

1.6.8 Water Supply Systems

Autonomous Storage

The facility shall have dedicated underground domestic/ potable water storage sized for an independent supply of minimum 14 days at full operational capacity (75 beds plus staff and escorts).

Storage shall be divided into at least two compartments/tanks so one can be cleaned or repaired while the other remains in service.

Storage volume shall be calculated by a water demand study. An indicative basis is:

Demand item	Rate (indicative)	Quantity	Daily (m^3)
In-patients (full service)	300 L/bed/day	75 beds	22.5
Staff and escorts	50 L/person/day	150 persons	7.5
Operating theatres / procedures	100 L/intervention	30/day	3.0
Sub-total domestic			33 m^3
14-day storage (+10% margin)			510 m^3

Water Quality and Legionella Control

Water systems shall comply with IHFG. Hot water shall be stored at ≥ 60 °C and circulated to return at ≥ 55 °C, cold water shall be kept below 20 °C.

Dormant mode**:** to prevent stagnation, stored water shall be turned over regularly and outlets flushed on a scheduled programme, a water safety plan shall be in force from handover.

Disinfection by chlorination with UV as secondary barrier, residual chlorine monitoring on the BMS.

Supply sources and connections

Primary filling from the mains; a **second source** (separate mains or emergency borehole with treatment) shall be investigated.

A protected tanker/bowser connection shall be provided at surface with a filtered fill line to the tanks.

A stock of bottled drinking water shall be held for the first 72 hours as a contingency.

Distribution and Boosting

A duplex (duty/standby) booster pump set with variable speed drives, automatic pressure maintenance and emergency power shall serve all fixtures, clinical hand-wash basins, showers and equipment wash-down areas.

The BMS shall allow automatic isolation of non-essential outlets to enforce rationing, with water metering per zone and leak detection.

Emergency Water Heating

Independent, localised water heaters (electric, with multi-source back-up) shall be distributed across functional zones to ensure uninterrupted hot water for clinical and sanitation purposes without relying on surface boiler plant.

Thermostatic mixing valves (TMV3) shall be fitted at patient outlets.

1.6.9 Drainage Systems

Subsurface Drainage and Pumping

As the facility is underground, gravity drainage cannot be relied upon. A dedicated sewage and grey water lift station with duplex (duty/standby) submersible sewage pumps, automatic alternation and high-level alarms shall be provided.

Lift pumps and controls shall be on emergency power (BESS and generators).

Sewage holding/Septic tank - Where the public sewer may fail or the discharge must be closed in M3, a sewage holding tank of not less than 72 hours capacity (14 days preferred) shall be provided, with connection for tanker extraction.

Separate stormwater / groundwater sumps shall collect ramp run-off, seepage and fire-fighting water, with duplex pumps sized for the design storm.

Blast and Backflow Protection

All drainage penetrations and discharge lines leaving the protective envelope shall be fitted with blast-resistant motorised backwater valves and check valves to prevent backflow or blast overpressure entry.

Drainage vent stacks penetrating the envelope shall have blast protection and shall not discharge near air intakes.

Hazardous and Decontamination Drainage

Drainage from decontamination showers, laboratories and isolation areas shall be routed to a dedicated containment/ holding tank with treatment or neutralisation before discharge to the main network.

Car-park oil interceptors shall remain isolated from healthcare drainage.

Drainage drawings shall be colour-coded (foul red, surface blue) and kept in the control room.

Trap seals shall be protected against evaporation (especially in dormant mode) by scheduled top-up or trap-primer valves.

1.6.10 Fire-Fighting Systems

Suppression networks

A complete suppression network including automatic sprinklers (wet or pre-action as appropriate), standpipes/risers, fire hose reels and landing valves shall cover all internal areas, designed to UAE Fire Codes.

Clean-agent or water-mist systems shall protect data rooms, electrical switch rooms, BESS rooms and the control room. Pantry hoods shall have wet-chemical suppression.

Any car-park area remaining in vehicle use shall retain its own sprinkler protection at the higher hazard classification.

Pump Set and Water Reserves

Dedicated fire pumps (electric primary and diesel standby, plus jockey pump) per UAE Fire Codes with an independent dedicated fire water tank sized for the greater of the sprinkler and hose demand for the code duration shall be housed in a blast-protected, fire-rated enclosure.

Fire service inlet connections shall be at protected, accessible surface locations.

Portable Extinguishers

Portable extinguishers (CO_2, dry powder, water/foam and wet chemical as appropriate) shall be positioned throughout the facility in accordance with UAE Fire Codes. Non-magnetic extinguishers shall be provided where MRI is installed.

1.6.11 Fire and Life Safety (FLS)

Fire and access readiness

The operator shall maintain documented evidence that the designated area has been assessed and complies with applicable fire and life-safety requirements.

The facility shall maintain safe, clearly identified and illuminated emergency access and exit routes suitable for patients, staff, emergency responders, equipment and supplies. Access routes shall remain usable during the credible hazards identified in the facility hazard and vulnerability assessment, subject to direction from competent authorities.

Normally a carpark is subject to different (and lower) fire egress and fire protection standards. In a space such as a basement carpark which acts as dual use space for SUEOF, the provisions of fire services must be deliberately increased to the same level expected of a healthcare treatment area.

Evacuation Strategy

The facility shall be designed for progressive horizontal evacuation / defend-in-place so that patients can be moved to an adjacent fire/smoke compartment on the same level without leaving the protected envelope.

Each compartment shall be able to receive the patients of the adjacent compartment. Refuge areas shall be provided at each protected stair/ramp.

Compartmentation and Structural Integrity

The facility shall be divided into fire and smoke compartments to prevent the spread of fire, smoke or toxic gases. Internal compartment walls, floors and doors shall have a minimum fire-resistance rating of 1 hour. Externally exposed elements, including the roof slab, external walls and blast doors shall be blast resistance and shall have a fire resistance rating of 3 to 4 hours.

Fire-stopping shall be provided at all service penetrations. Blast valves shall be compatible with fire dampers.

Detection, Alarm and Voice Evacuation

An addressable fire detection and alarm system with voice evacuation, staged alarm for healthcare and interfaces to HVAC, smoke control, access control, lifts and medical gas alarm panels shall be provided.

Aspirating smoke detection is recommended in plant rooms, BESS and data rooms.

Smoke Management and Pressurisation

Dedicated smoke extraction and stair/ramp pressurisation shall maintain smoke-free egress routes during a fire or external structural breach. Smoke exhaust discharge and make-up air paths shall be blast-protected and must operate in Lockdown Mode if a fire occurs during lockdown.

Emergency Egress and Signage

Photoluminescent and battery-backed exit signage shall guide occupants along protected routes to surface safe zones.

Escape routes and entry/exit ramps shall be structurally hardened against local collapse. A minimum of two independent escape routes from each compartment is required.

1.6.12 Medical Gas Systems

Medical gases shall be installed and readily available in the enclosed clinical areas such as the critical care areas, neonatal care areas, operating and trauma rooms, resuscitation bays and isolation rooms and shall be according to the quantities noted in the Standard Components Room Data Sheets.

Bed bays within the open area shall ideally be grouped into clusters of three (3) beds and separated by privacy curtains. Each cluster shall be serviced by two sets of medical gas and emergency power, with each set consisting of (1 x oxygen, 1 x suction and 3 x emergency power outlets). These shall be pre-piped to appropriate locations.

Centralised Supply and Source Redundancy

A centralised medical gas pipeline system shall provide oxygen, medical air, surgical air, medical vacuum and anaesthetic gas scavenging system (AGSS). Medical air and surgical air shall be supplied from a combined plant. Nitrous oxide/Entonox shall be provided for operating theatres and resuscitation bays.

Source equipment (manifolds, vacuum pumps, medical air compressors) shall be dedicated and installed in secure, blast-protected underground plant rooms, with emergency connection ports for replenishment or mobile tank connection or link to the main hospital facilities if they are still functional.

Oxygen Supply Strategy

Oxygen supply shall comprise three sources:

- Primary - On-site Pressure Swing Adsorption (PSA) oxygen generator plant (N+1) and/or Liquid Oxygen Vacuum-Insulated Evaporator LOX VIE
- Secondary - Automatic cylinder manifold
- Emergency Reserve - Cylinder manifold with automatic changeover, plus emergency inlet point

Bulk LOX (VIE) tanks shall not be located underground. Where used, they shall be at surface in a protected compound with blast walls, with the pipeline entering the envelope via a protected route.

Total oxygen stock (generation and storage) shall meet 14 days at design flow, calculated from outlet diversity per Part E Engineering with allowance for ventilated ICU patients (high-flow therapy may require up to 60 L/min per patient).

Medical air compressor intakes shall draw CBRN/HEPA-filtered air and must not draw from carpark or plant-room air.

Oxygen Enrichment and Gas Safety

Oxygen-enrichment and depletion monitoring (alarm at > 23.5% and < 19.5%) shall be installed in oxygen plant rooms, cylinder stores and high-use clinical areas, linked to ventilation boost and the BMS.

Vacuum and AGSS exhausts shall discharge outside via filtered, blast-protected routes, away from intakes.

Pipeline Protection and Routing

Pipelines shall run in protected service corridors with fire-resistant sleeves and flexible seismic/blast joints at structural movement joints.

Dual feeds (ring main) shall supply critical areas (OT, ICU, NICU etc.) so that a single damaged section does not isolate them.

Zone Valve Control and Alarms

Zone Valve Boxes (ZVBs) with pressure sensors and digital alarms shall be located at the entrance of each clinical zone for rapid isolation.

Area alarm panels at each nurse station and a master alarm in the control room shall be provided, with BMS interface.

1.6.13 ICT, Communications and Security

Data and IT

The same electronic Emergency Unit Information System installed in the existing facility shall support clinical management, patient tracking and departmental administration.

A dedicated data room (Tier III equivalent, N+1 cooling and dual power) within the protective envelope shall host clinical systems (EMR, PACS, laboratory, pharmacy) able to run stand-alone without external connectivity, with local back-up and synchronisation when links are restored. This system should have a backup facility for existing patient medical records and diagnostic results.

Structured cabling with redundant backbones on diverse routes and Wi-Fi coverage throughout for clinical devices.

Cyber-security controls (segmentation of BMS/medical device networks, access management, off-line back-ups) shall be in place.

Communications

- Diverse External Links - At least two of fibre (diverse routes), microwave/radio and satellite communication/IP Over Satellite licensed BGAN/VSAT or equivalent satellite link, provided by a licensed Service provider by the national telecom regulator and using equipment type-approved by that regulator, in line with Civil Defence, DoH or other local regulatory body requirements. The BGAN/VSAT links shall preferably be paired as primary and backup systems. The system must be configured and tested in collaboration with the responsible authorities.
- In-Building Radio - Distributed antenna system (DAS) for emergency-services radio (e.g. TETRA) and mobile networks, plus dedicated two-way radios for staff.
- Telephony - IP telephony with fall-back analogue/hard-wired telephones to control room, OT, ICU and refuges.
- Public Address System/ Voice Alarm - An intercom or public-address system that can reach all areas of the Unit should be considered. This should be linked to at least one of the staff stations and accessible from the HCC and shall be on essential power.
- Nurse Call
    - Within the enclosed clinical areas, a standard wired nurse call system shall be provided. For the enclosed clinical area, emergency call, staff call and patient call should be provided within each bed bay and connected to the staff station within the clinical area itself.

  - Within the open plan bed bay area, a wireless nurse call system shall be deployed upon activation. The appropriate setup for this system shall be provided during the planning and construction phase. The mobile nurse call devices may be given to the patients who may require it. These are usually worn around the neck and battery operated. As part of this system, wireless Wi-Fi handsets for the staff should be provided.
- Telemedicine may be built into every space and data system, where applicable. Furthermore, Telemedicine may be a mobile station, allowing it to move around to any space or patient. If a dedicated room is provided, it should be of suitable size to allow simultaneous viewing by members of multiple service teams. It shall link to supporting surface/ remote hospitals.
- Communication systems shall support coordination with the Healthcare Facility Incident Command, DoH, UMOC and other applicable emergency command structures.

Security

Integrated security management system comprising access control (card/PIN/biometric), CCTV (high-definition, low-light, recorded locally), intruder detection on unused doors, intercoms at all entries and a lockdown function.

Screening/search space shall be provided at the entrance, outside the protected space, sized for queues.

1.6.14 Building Management, Control and Monitoring

A Facility Control Room within the protective envelope shall house the BMS, EPMS, fire alarm, security, medical gas master alarm and communications consoles, with a secondary (back-up) control position in a separate compartment.

The BMS shall control and monitor all systems and shall implement the operating-mode changes (M0–M4) as pre-programmed sequences with manual override.

Monitoring shall include as a minimum:

- Room pressures
- CO_2, O_2, CO, NO_2
- Temperature/humidity
- Water/fuel/oxygen tank levels and autonomy remaining (hours)
- Leak and flood detection
- Detection and measurement of contamination levels in facilities where there is a CBRN risk
- Blast-valve status
- Filter differential pressure
- Generator
- BESS and UPS status
- Sewage pit levels

Controls shall be capable of stand-alone operation. Failure of the BMS shall leave the plant in a safe running state. All controllers shall be on UPS.

Up-to-date plans, schematics and operating procedures shall be held in paper and electronic form in the control room for emergency services.

1.6.15 Vertical Transport, Access and Patient Flow

A combination of lifts, stairs, corridors, tunnels and/or ramps shall provide access to the underground facility from the hospital and from open surface areas. Access to the SUEOF may differ based on its relative location. Stair lifts and stair climbers may also be used to help patients with limited mobility in the absence of lifts.

A separate access route is to be provided for patients arriving (for example down the car parking ramp) from the outside with crowd control measures taken into consideration arriving at the visual triage area with a path to decontamination, the internal triage zone and the isolation area.

Signage and ground markings should be used to support patient wayfinding within the SUEOF.

A minimum of two bed/stretcher lifts serving the surface and all SEUOF levels, in separate shafts. Lift cars shall accommodate a bed with attendants and equipment. The use of the lifts shall be under the control of the command centre.

An ambulance-accessible ramp or protected drop-off with direct route to triage/decontamination shall be provided. The ramp gradient, headroom and turning shall suit the ambulance fleet.

1.6.16 Structural, Blast and Flood Protection

Structural and Blast

The facility shall provide a level of structural protection appropriate to its approved function, hazard profile, risk assessment and intended emergency role. The facility shall be capable of maintaining safe operations during the emergency scenarios identified through the facility hazard and vulnerability assessment. Where required by DoH, the facility shall incorporate enhanced protective measures, which may include structural hardening, blast-resistant design features, protected utility systems, redundant critical infrastructure or other measures necessary to support continuity of operations during high-consequence events. The required level of structural protection shall be approved by DoH.

As a minimum, the structural design shall follow the blast-resistance principles of framed reinforced-concrete construction with robustness. The structure and façade should be designed to absorb and dissipate blast energy since shockwaves can cause considerable deformations. The slab above the underground facility shall be 450mm thick reinforced concrete and designed to withstand the loss of a supporting column. Slabs shall be tied down to resist upward load reversal from a blast. Finished shall be non-fragmenting. Care should also be taken to shock isolate critical equipment to prevent damage from blasts.

The host carpark or basement structure shall be assessed for progressive collapse and for debris loading from the building above.

Equipment, pipework, ducts and ceilings shall be seismically and shock-restrained, so they do not fall or rupture.

Flood Protection

A site-specific Flood Risk Assessment (FRA) covering surface water, groundwater, sewer surcharge and fire-fighting water shall be carried out.

Flood resistance measures include waterproofing and sealing against groundwater ingress and flooding and shall include raised thresholds and demountable flood barriers at ramps and entrances; non-return valves; waterproof tanking and sealed penetrations.

Flood resilience measures shall include critical plant (switchgear, generators, BESS, UPS, medical gas plant, pumps) on plinths above the design flood level or in separately protected rooms and water-level alarms in all low points.

Seismic Bracing & Restraint

Electrical equipment, containment and distribution shall be seismically restrained in accordance with the applicable seismic code for the site. The site-specific seismic hazard level shall be confirmed by the structural engineer and stated in the design basis, in coordination with the structural, MEP and BESS designers.

The facility shall be classified as an essential/post-disaster facility. The highest component importance factor (or equivalent) shall apply to all electrical and ELV equipment, so that it remains functional, not just stable, after the design seismic event.

Equipment to be Anchored & Braced - The following minimum shall be anchored and braced:

- Transformers, LV/MV switchgear, switchboards, distribution boards and busbar trunking
- Generators, day tanks, bulk fuel tanks and associated piping
- BESS cabinets, battery racks and inverters/PCS
- UPS, central battery systems and ICT/server racks
- Floor-mounted and wall-mounted control panels, including the fire alarm and HCC equipment

Distribution & Containment - Cable trays, ladders, conduits and busduct shall be braced laterally and longitudinally, with spacing and loads determined by calculation or a recognised prescriptive standard. Flexible connections and seismic loops or slack shall be provided where services cross building joints, enter equipment on isolators, or pass between structures that can move relative to each other. Fire-stopping at seismic joints and penetrations shall accommodate movement while maintaining its fire rating.

Luminaires & Ceiling Mounted Items - Luminaires, emergency lights and ceiling-mounted devices shall be independently supported from the structure and shall not rely on suspended ceiling grids alone.

Interaction with Shock Isolation - Where equipment is shock-mounted, restraints shall not short-circuit the isolation under normal operation but shall limit displacement under seismic or blast loading (restrained isolators). A combined shock and seismic design basis shall be documented, and the more onerous case shall govern each element.

Post-Event Operation - The design shall address failure of non-structural elements that could damage critical equipment, including falling items, sprinkler discharge, and rupture of fuel or water pipes. Fuel tanks and lines shall have flexible connections and automatic isolation where appropriate.

Maintenance & Inspection - Seismic restraints shall be documented on as-built drawings, inspected at commissioning, and included in the planned maintenance schedule.

1.6.17 CBRN Decontamination and Casualty Reception

Enclosed decontamination areas shall be negative pressure with 100% exhaust through HEPA/carbon filters, tempered water showers, and drainage to a containment tank (Section 1.6.8).

For open CBRN decontamination areas they shall maintain an overall negative air pressure relative to adjacent zones with high volume 100% direct exhaust through HEPA and active carbon filtration, supplemented by local capture hoods where required, along with tempered water showers and dedicated containment drainage (Section 1.6.8).

Equipment shall be installed to detect and measure contamination levels wherever there is a CBRN risk.

1.6.18 Testing, Commissioning and Readiness

Critical infrastructure and utility systems shall be subject to planned preventive maintenance, functional testing and documented defect management. Any failure that may materially affect safe activation or sustained operation shall be reported to DoH in accordance with the applicable reporting requirements and shall result in an appropriate limitation or suspension of readiness status until resolved.

Commissioning

Full commissioning of every system shall be carried out, witnessed and documented, including an integrated systems test (IST) simulating loss of all external utilities for not less than 24 hours with the facility in M3.

Ventilation pressure regimes, CBRN overpressure, room airtightness, blast-valve operation, and medical gas purity/identity shall be verified.

Readiness Programme (Dormant Mode)

Activity	Frequency	Purpose
Generator Test on Load	Monthly	Prove start, changeover and load acceptance
Generator Full-Load Test (≥ 4 h)	Annually	Prove continuous rating and cooling
BESS / UPS Discharge Test	Quarterly / annually	Prove autonomy
Water Turnover & Outlet Flushing	Weekly	Legionella control
Water Sampling	Monthly	Microbiological quality
Fuel Sampling & Polishing	6-monthly	Prevent fuel degradation
Blast Valves & CBRN Fans / Filters	Quarterly / per manufacturer	Operation and filter life
Medical Gas Pressure Decay Check	Quarterly	Pipeline integrity
Fire Pumps	Weekly (churn) / annual (flow)	As per UAE Fire Code
Stock Rotation (Drugs, Consumables, Food)	Per shelf life	Prevent expiry
Full Activation Exercise	Annually	Prove activation within target time

1.6.19 Emergency Plans for Engineering Services

An engineering emergency plan shall be prepared, tested and kept up to date with the Accountable Emergency Officer, covering loss of each utility, fire, flood, CBRN incident and structural damage.

Emergency Operating Procedures (EOPs) shall be written for each system and each mode change, in simple step-by-step form usable by staff of varying experience.

Spares - Critical spare parts (pumps, fans, filters, valves, controllers, batteries) shall be stocked on site for 14 days of independent operation.

Competent staffing - Authorised/Competent Persons for High Voltage / Low Voltage (HV/LV), medical gases, water and ventilation shall be available on-site during operation.

Formal working relationships shall be established with utility, fuel, oxygen and waste suppliers, including priority-user status.

1.6.20 Radiation Shielding

The imaging rooms and areas where mobile imaging is used require radiation shielding. A certified physicist or qualified expert is to assess the plans and specifications for radiation protection as required by FANR. A radiation protection assessment specifies the type, location and amount of radiation protection required for an area according to the final equipment selections, the layout of the space and the relationship between the space and other occupied areas.

Radiation protection requirements must be incorporated into the final specifications and building plans. Consideration should be given to the provision of floor and ceiling shielding when rooms immediately above and below are occupied.

In relation to radiation or nuclear risks, it is crucial to protect the facility from airborne contamination, as well as groundwater contamination, should a risk assessment or the DoH deem necessary. The facility shall be constructed of monolithic-steel reinforced concrete that provides the required structural strength and durability. The concrete thickness shall be calculated by a radiation protection specialist to provide the necessary radiation protection. Penetrations shall also be designed to maintain this protection.

1.7 Standard Components of the Unit

Standard Components are typical rooms within a health facility, each represented by a Room Data Sheet (RDS) and a Room Layout Sheet (RLS).

The Room Data Sheets are written descriptions representing the minimum briefing requirements of each room type, described under various categories:

- Room Primary Information; includes Briefed Area, Occupancy, Room Description and relationships, and special room requirements)
- Building Fabric and Finishes; identifies the fabric and finish required for the room ceiling, floor, walls, doors, and glazing requirements
- Furniture and Fittings; lists all the fittings and furniture typically located in the room; Furniture and Fittings are identified with a group number indicating who is responsible for providing the item according to a widely accepted description as follows:

Group	Description
1	Provided and installed by the builder
2	Provided by the Client and installed by the builder
3	Provided and installed by the Client

- Fixtures and Equipment; includes all the serviced equipment typically located in the room along with the services required such as power, data and hydraulics; Fixtures and Equipment are also identified with a group number as above indicating who is responsible for provision
- Building Services; indicates the requirement for communications, power, Heating, Ventilation and Air conditioning (HVAC), medical gases, nurse/ emergency call and lighting along with quantities and types where appropriate. Provision of all services items listed is mandatory

The Room Layout Sheets (RLS's) are indicative plan layouts and elevations illustrating an example of good design. The RLS indicated are deemed to satisfy these Guidelines. Alternative layouts and innovative planning shall be deemed to comply with these Guidelines provided that the following criteria are met:

- Compliance with the text of these Guidelines
- Minimum floor areas as shown in the schedule of accommodation
- Clearances and accessibility around various objects shown or implied

- Inclusion of all mandatory items identified in the RDS

The Unit consists of Standard Components to comply with details described in these Guidelines. Refer also to Standard Components Room Data Sheets (RDS) and Room Layout Sheets (RLS) separately provided.

1.7.1 Non-Standard Rooms

Non-standard rooms are rooms are those which have not yet been standardised within these guidelines. As such there are very few Non-standard rooms. These are identified in the Schedules of Accommodation as NS and are separately covered below.

Multipurpose Area

The multipurpose area are zones within the internal open bed bay area that can be used as non-clinical workspace or clinical workspace. Foldable tables and chairs can be set up. These zones may also be used for triage, visitor or patient waiting, staff rest areas or clinical workspaces for minor injuries. Mobile privacy screens can be set up to provide privacy and to physically segregate the area. An appropriate number of power outlets shall be provided so that this area can be used for any possible anticipated service. A handwash basin shall be accessible close by.

1.8 Schedule of Accommodation

The Schedule of Accommodation (SOA) provided below represents generic requirements for this Unit. It identifies the rooms required along with the room quantities and the recommended room areas. The sum of the room areas is shown as the Sub Total as the Net Area. The Total area is the Sub Total plus the circulation percentage. The circulation percentage represents the minimum recommended target area for corridors within the Unit in an efficient and appropriate design.

Within the SOA, room sizes are indicated for typical units and are organised into the functional zones. Not all rooms identified are mandatory therefore, optional rooms are indicated in the Remarks. These guidelines do not dictate the size of the facilities, therefore, the SOA provided represents a limited sample based on assumed unit sizes. The actual size of the facilities is determined by Service Planning or Feasibility Studies. Quantities of rooms need to be proportionally adjusted to suit the desired unit size and service needs.

The Schedule of Accommodation are developed for particular levels of services known as Role Delineation Level (RDL) and numbered from 1 to 6. Refer to the full **Role Delineation Framework** (**Part A - Appendix 6**) in these guidelines for a full description of RDL's.

The table below shows an SOA for a 150-bed general hospital, where the SUEOF contains 75 beds, of which 54 are within the open plan bed area, 3 are Isolation Rooms, 10 are critical care beds and 8 are dedicated to neonates.

Any proposed deviations from the mandatory requirements, justified by innovative and alternative operational models may be proposed and record in the **Non-Compliance Report** (refer to **Part A - Appendix 4**) with any departure from the Guidelines for consideration by the DOH for approval.

1.8.1 Secure Underground Emergency Overflow Facility for a 150 Bed General Hospital

ROOM/ SPACE	Standard Component	RDL 3-6			Remarks
	Room Codes	Qty x m^2			
Unit is based on a 150-bed hospital		75 beds			
Entry/ Outer Open Area					
Entry/ Exit Ramp	NS	1	x	0	External
Ambulance Parking/ Transfer	NS	2	x	40	2 bays
Ambulance Triage	ambtr-d	1	x	12	2 bays
Decontamination	shdec-d	1	x	8	external with ambulance bays
Reception/ Visual Triage/ Security	rec-e-d similar	1	x	6	
Bay - Wheelchair Park	bwc-d similar	1	x	2	
Parking - Deliveries	NS	1	x	60	
Parking - Temporary Cars	NS	3	x	10	
Resuscitation/ Treatment Areas					
Patient Bay - Resuscitation	pbtr-r-d similar	1	x	35	35m² room has 2 bays, includes handbasin within
General X-ray Room	genxr-d	1	x	30	
Trauma/ Treatment Room	pbtr-tr-18-i	1	x	18	Multi-use
Operating Theatre	or-gn-d	1	x	42	
Scrub Bay	scrb-4-d	1	x	4	
Store - Sterile Stock	stss-12-d	1	x	12	
Open Bed Bay Areas			**54 beds**		
Patient Bay - Treatment	pbtr-a12-d	54	x	12	Arranged in clusters of 3 beds
Multipurpose/ Triage Area	NS	1	x	100	provide power outlets
Multipurpose Area	NS	3	x	60	provide power outlets
Bay - Handwashing, Type A	bhws-a-d	6	x	1	1 per 10 bays
Staff Station	sstn-14-d similar	3	x	14	In the Open bed bay Area

ROOM/ SPACE	Standard Component	RDL 3-6			Remarks
	Room Codes	Qty x m^2			
Unit is based on a 150-bed hospital		**75 beds**			
Critical Care Area			**10 beds**		
Patient Bay - Intensive Care	pb-hdu-16-d	10	x	16	Can be used as CCU / HDU
Bay - Handwashing, Type A	bhws-a-d	3	x	1	1 per 4 bays
Staff Station	sstn-10-d	1	x	10	
Bay - Resuscitation Trolley	bres-d	1	x	1.5	Adult and paediatric trolleys
Neonatal Care Area			**8 beds**		**Provide if this service is provided in the hospital**
Patient Bay - NICU	nbsc-d similar	8	x	9	Can be used as SCN
Bay - Handwashing, Type A	bhws-a-d	2	x	1	1 per 4 bays
Staff Station	sstn-10-d	1	x	10	
Bay - Resuscitation Trolley	bres-d	1	x	1.5	Neonatal trolley
Isolation Area			**3 beds**		
Patient Bay - Enclosed, Isolation - Negative Pressure	pbhe-12-d	3	x	12	includes hand basin within; Qty according to service plan
Anteroom	anrm-d	3	x	6	For isolation room (s)
Ensuite - Standard	ens-st-d	3	x	5	For Isolation room (s)
Support Areas					
Bay - Mobile Equipment	bmeq-10-d	2	x	10	
Bay - Resuscitation Trolley	bres-d	3	x	1.5	Adult and paediatric trolleys
Blood Store	blst-d similar	1	x	3	
Clean Utility	clur-8-d	1	x	8	
Cleaner's Room	clrm-6-d	1	x	6	
Dirty Utility	dtur-s-d	1	x	8	
Disposal Room	disp-8-d	1	x	8	
Flash Steriliser	fst-2-d similar	1	x	6	
Holding Room - Bodies	body-h-d	1	x	12	

ROOM/ SPACE	Standard Component	RDL 3-6			Remarks
	Room Codes	Qty x m^2			
Unit is based on a 150-bed hospital		75 beds			
Laundry	laun-ho-d	1	x	14	
Medication Room	medr-10-d similar	1	x	8	
Pantry	pntry-d	1	x	15	
Stat Lab	bpath-3-d similar	1	x	20	
Store - Beds	stgn-30-d	1	x	30	
Store - Food	stgn-30-d	1	x	30	
Store - Facility Setup	stgn-30-d	1	x	30	
Store - General	stgn-14-d	1	x	14	
Store - Linen	lho-cl-d	1	x	15	
Store - Medical Equipment	steq-40-d	1	x	30	
Store - Medical Gas Cylinders	stgb-f-d	1	x	15	
Store - Supply	stgn-30-d	1	x	30	
Toilet - Accessible	wcac-d	6	x	6	Male/ Female separated
Toilet/ Shower - Patient	wcpt-d similar	2	x	32	Male/ Female separated; Located within one or more communal areas
Staff Areas					
Change - Staff	chst-20-d	2	x	30	includes toilets
Hospital Command Centre (HCC)	comc-30-d similar	1	x	20	
Office- Single Person	off-s9-d	2	x	9	
Property Bay- Staff	prop-3-d	2	x	3	
Staff Room	srm-15-d	1	x	15	
Sub Total				**2189.5**	
Circulation %				**25**	
Area Total				**2737**	

Please note the following:

- Areas noted in Schedules of Accommodation take precedence over all other areas noted in the Standard Components
- Rooms indicated in the schedule reflect the typical arrangement according to the sample treatment spaces
- All the areas shown in the SOA follow the No-Gap system described elsewhere in these Guidelines
- Exact requirements for room quantities and sizes shall reflect Key Planning Units (KPU) identified in the Clinical Service Plan and the Operational Policies of the Unit
- Room sizes indicated should be viewed as a minimum requirement; variations are acceptable to reflect the needs of individual Unit
- Offices are to be provided according to the number of approved full-time positions within the Unit

1.9 Further Reading

In addition to Sections referenced in this FPU, i.e. **Part C- Access, Mobility, OH&S**, **Part D - Infection Prevention and Control**, and **Part E - Engineering Services**, **Part G-Acoustics** readers may find the following helpful:

- World Health Organization, Classification and Minimum Standards for Emergency Medical Teams, refer to website: https://www.who.int/publications/i/item/9789240029330
- World Health Organization, European Region, Underground shelters and services in hospitals, 2025
- DoH Policy for Health Emergency Management in Abu Dhabi
- DoH Emergency Management Standard for Hospitals
- DoH Policy on Risk Management and Business Continuity for Healthcare Facilities
- DoH Healthcare Regulator Manual
- Applicable DoH healthcare facility design standards
- Applicable Abu Dhabi building, fire and life-safety requirements
- Applicable Abu Dhabi emergency, crisis and disaster-management requirements
- Applicable UAE and Abu Dhabi information-security, privacy and cybersecurity requirements
- AE/SCNS/NCEMA 7000, National Standard for Business Continuity Management Systems, as amended
- ISO 22301, Security and resilience — Business continuity management systems.
- ISO 22320, Security and resilience — Emergency management — Guidelines for incident management
- ISO 31000, Risk management — Guidelines