Metro North Health

Sustainable Design Guidelines

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Sustainable Design Guidelines

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Introduction

Metro North Hospital and Health Service (MNHHS) are developing transformational projects to deliver world class healthcare campuses. A comprehensive sustainability vision and strategy is considered to be a key enabler for achieving MNHHS's sustainability targets and supporting the transition to achieving Queensland Government carbon emission targets and strategic outlook to a sustainable future.

Purpose and Vision

As the largest health service in Australia, Metro North Hospital and Health Service (MNHHS) are dedicated to reducing their environmental footprint, promoting public and environmental health and ensuring their service is resilient to climate change.

The MNHHS Green Metro North - Sustainability Strategy 2021-2026 identifies the Sustainable Design Guidelines as a catalyst for transforming and activating future projects and developments within their portfolio to achieve state government carbon emissions targets as well as providing enhanced wellness and user experiences for patients, visitors and staff. The Sustainable Design Guidelines seek to deliver sustainable development practices by embedding sustainability initiatives into the planning, design, construction, operations and maintenance of MNHHS projects.

The Sustainable Design Guidelines will support MNHHS's aspiration to be carbon neutral ready (in accordance with the Queensland Health pathway) and will provide comfortable and biodiverse spaces to create high amenity places for patients and staff. The guidelines are future focused, incorporating strategies for adaptive and resilient infrastructure, to support Queensland's circular economy.

The MNHHS Green Strategy is a long term, multi-decade strategy. A key challenge for the sustainability strategy will be the need to enable the delivery of high performing developments, whilst also being able to evolve as regulatory and market demands for sustainable design and operation continues to transform. To allow for this evolution, the sustainability guidelines accommodate forecast and emerging trends in sustainable design and operation. However it is recommended the strategy is reviewed and updated (where necessary) every 5 years to ensure it remains future focused and relevant.

These guidelines should be used in conjunction with other guidelines relevant to construction delivery and operations. Any statutory or legislative requirements (including codes, regulations or standards) take precedence over any of the outcomes or initiatives within this document.

Key Sustainability Themes

The Sustainable Design Guidelines will support in the delivery of future MNHHS healthcare projects enabling cohesion, engagement and innovation throughout project teams.

The Guidelines will identify a range of sustainability initiatives and outcomes that drive quality and functionality, as well as delivering resilient infrastructure that is future proofed to enable future change and expansion.

The guidelines apply to the whole asset lifecycle and include compulsory requirements which address the following project lifecycle stages of feasibility, design, construction, operations, maintenance and disposal.

The Sustainable Design Guidelines will play a large part in ensuring that a sustainability strategy and vision is maintained through the development process, and that design voices and key stakeholder drivers are synthesised into a common goal.

The guidelines are aimed primarily at planning, design, construction, operations and maintenance professionals involved in projects being delivered by MNHHS.

The sustainability initiatives referenced in this strategy have been grouped into 9 key themes. It is noted that some targets and themes significantly overlap.

These key themes have been used to integrate MNHHS's sustainable design approach across the various disciplines and stakeholders.

Alignment with Sustainability Governance and Policies

SUPPORTING GREEN METRO NORTH SUSTAINABILITY STRATEGY 2021-2026

The Green Metro North - Sustainability Strategy represents MNHHS's commitment to take action towards environmental sustainability and deliver high quality health services for the community and future generations.

The Sustainability Strategy spans the five strategic elements of:

1. Green Facilities
2. Green Monitoring
3. Green Initiatives
4. Green Partnerships
5. Green Workforce

The six focus areas of the Sustainability Strategy are:

1. Waste
2. Energy
3. Water
4. Food
5. Transport
6. Procurement

Relevant requirements of the Sustainability Strategy have been incorporated into the Sustainable Design Guidelines. Refer to Appendix F for the Green Metro North - Sustainability Strategy 2021-2026.

QUEENSLAND HEALTH CAPITAL INFRASTRUCTURE REQUIREMENTS (CIR)

The Capital Infrastructure Requirements (CIR) provide a consistent and standardised approach to health capital infrastructure planning and design in Queensland Health, which directly links MNHHS requirements to the built solution and promotes the application of contemporary and evidenced-based standards.

The MNHHS Sustainability Guidelines do not replace the requirements within the CIR but seek to complement and improve on certain sustainability parameters that have been set as minimum thresholds.

SUPPORTING QUEENSLAND'S STRATEGIC OUTLOOK TOWARDS A SUSTAINABLE FUTURE

The Queensland Government has a number of strategies and legislations in place to deliver climate action:

- Queensland Climate Transition Strategy (QCTS)
  - 30% emission reduction against 2005 baseline by 2030;
  - 50% renewable energy by 2030; and
  - Zero net emission by 2050.
- Queensland Climate Adaptation Strategy (QCAS)
- Climate Action Plan (2020 – 2030)
- Queensland Waste Management and Resource Recovery Strategy
  - 2030 Interim target
    - 85% Waste diversion from landfill
    - 60% Recycling of total waste
  - 2050 target
    - 90% of waste is recovered and does not go to landfill
    - 75% or recycling rates across all waste types
- Queensland Resource Recovery Industries 10-year Roadmap and Action Plan

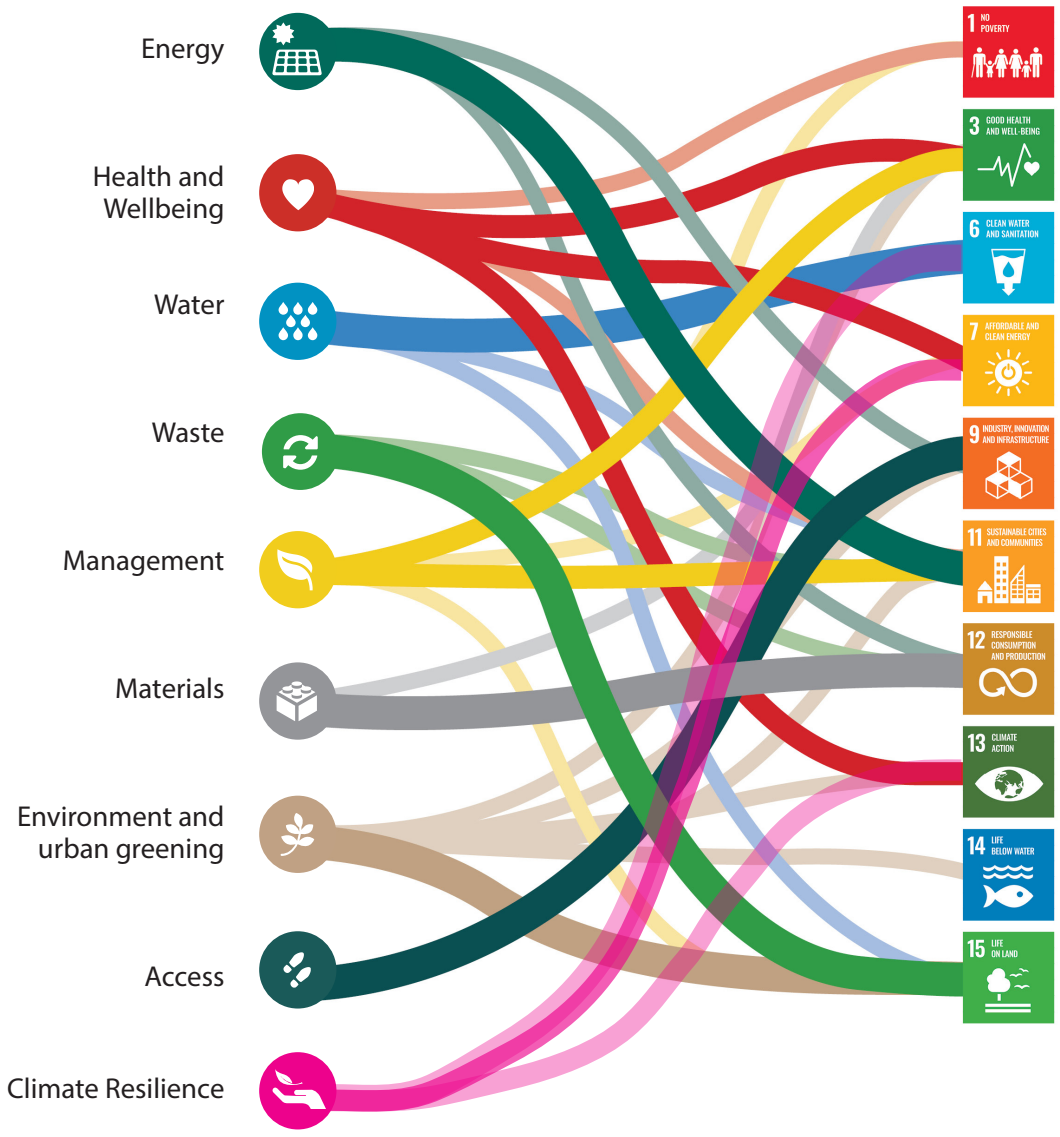
Queensland Health's operations through its built environment is the biggest contributor towards the government's total carbon emissions and is expected to rise year on year. Corporate Social Responsibility (CSR) is becoming increasingly important in its decision making regarding operational costs, environmental aspects, and the impacts, and for reporting and legal requirements.

The MNHHS Sustainability Strategy will ensure the future developments align with, and enables, these targets to be achieved.

The sustainable design guidelines can demonstrate government leadership in delivering consistent, holistic best practice sustainability outcomes at various scales. It also presents a unique opportunity to take the leading practices and achievements from both government and the private sector and adapt them on various scales to deliver a benchmark demonstration project that aligns with the government's sustainability ambitions.

UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

In 2015, during the United Nations (UN) summit, heads of state and governments established the Agenda 2030. The Agenda consists of 17 Sustainable Development Goals (SDGs) with 169 targets. The SDGs focus on stimulating action for people, planet, prosperity, peace and partnerships. All of these components have an integrated and interlinked nature that is of vital importance to ensure the purpose of the Agenda. For this reason, an integrated implementation of the SDGs that captures the interactions between the different SDGs and MNHHS's key themes has been undertaken.

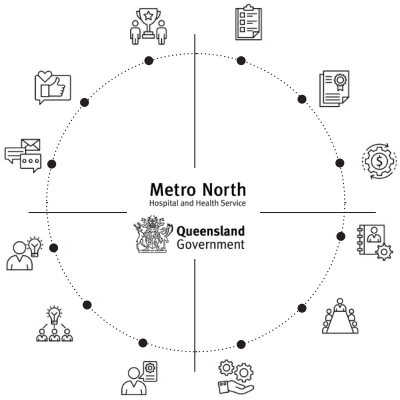


Evolution of the guidelines

The sustainable design guidelines have evolved through a 7-step performance-based approach which applies a set of interrelated design initiatives to enable specific design outcomes to be achieved with engagement from MNHHS's stakeholders.

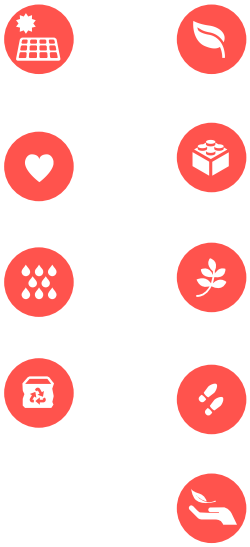
1

MNHHS Stakeholders Engagement



2

Sustainability Themes



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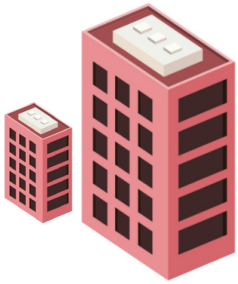
MNHHS Sustainable Design Guidelines & Sustainability Tracker

7

MNHHS Developments

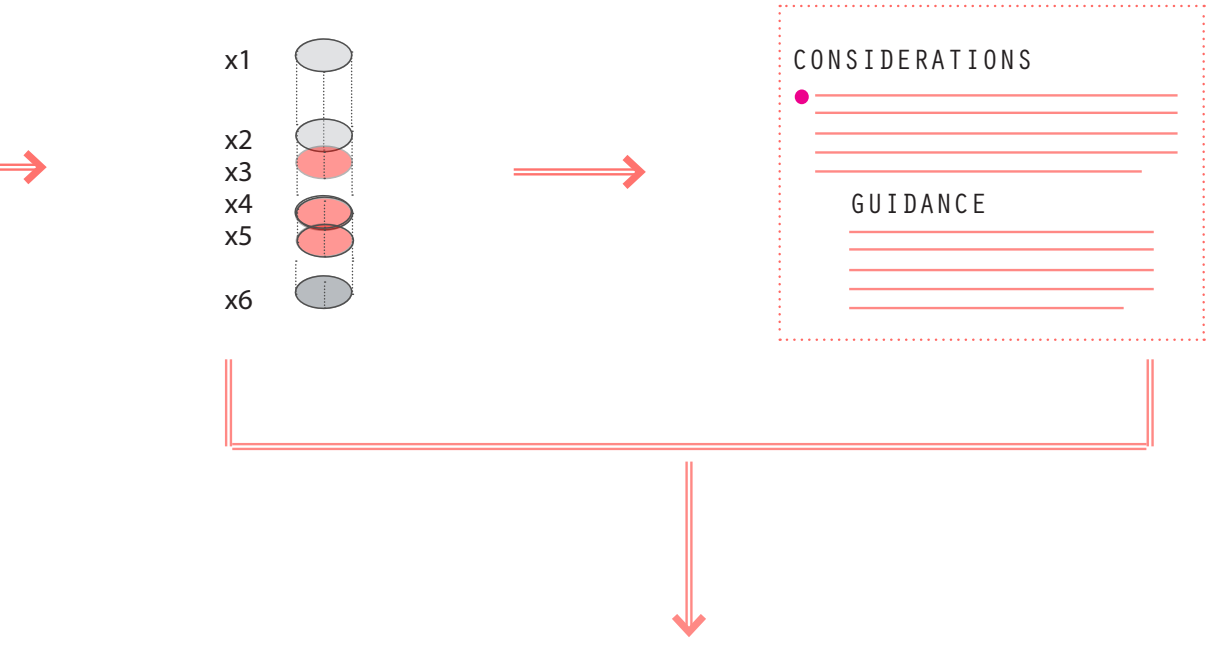


3

Review of Comparison Design Frameworks

4

Consideration & Guidance



Sustainable Design

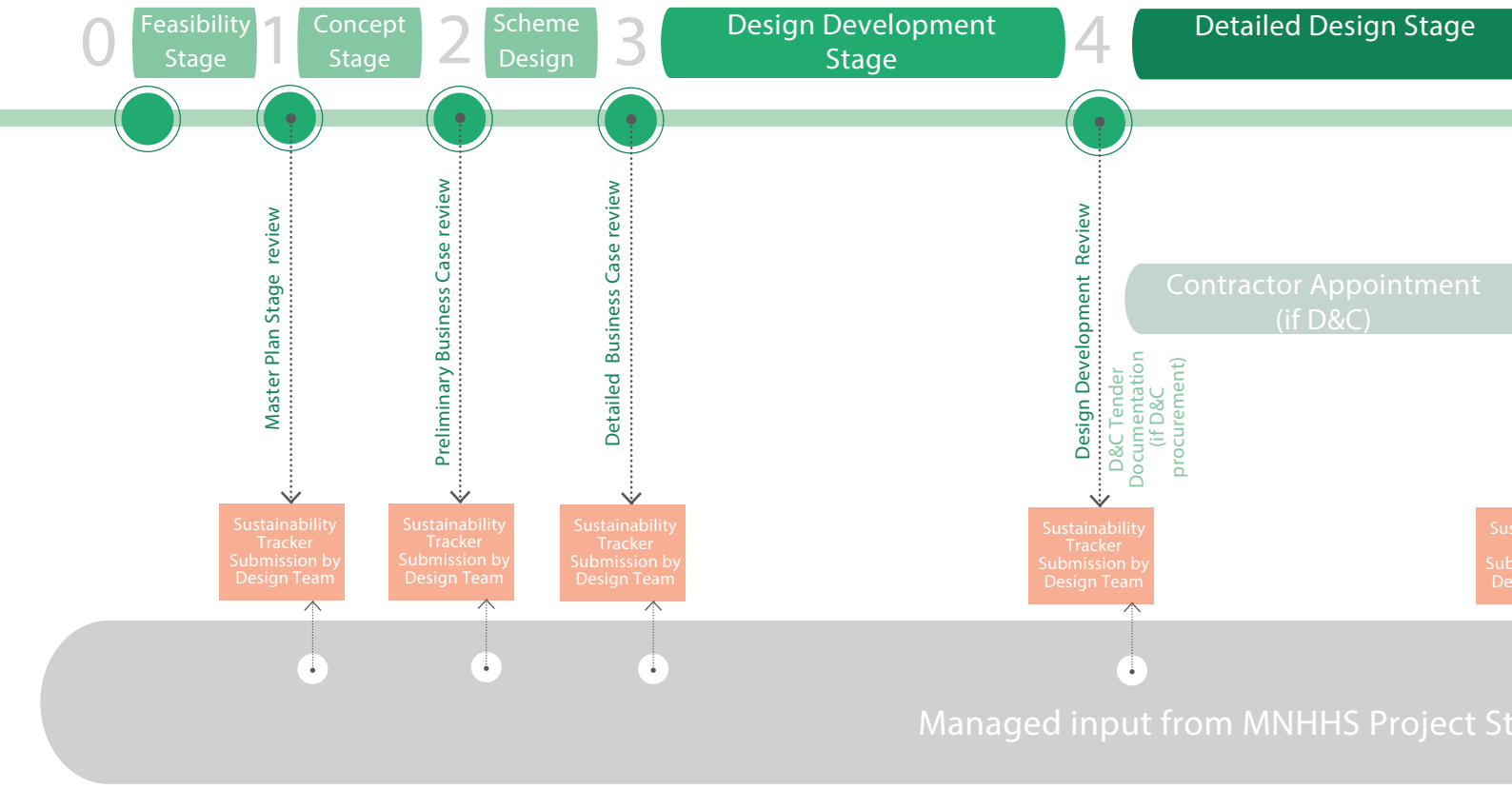
5

Implementation of Sustainability Tracker for Design & Construction Stages

Metro North Health will use a bespoke sustainability tracker to verify the design and ongoing performance of their projects as they evolve and expand whilst guiding and governing its delivery. The implementation process for the various initiatives contained in the MNHHS Sustainable Design Guidelines is critical to enable the targeted outcomes to be achieved.

The MNHHS Project Sustainability Tracker contains a summary list of all design considerations and targets outlined in this design guide. The project design team will complete the tracker spreadsheet at each design milestone and submit for review by the relevant MNHHS stakeholders.

The Project Sustainability Tracker will be provided by MNHHS to the project teams and adjusted to suit project scale, stage and procurement.

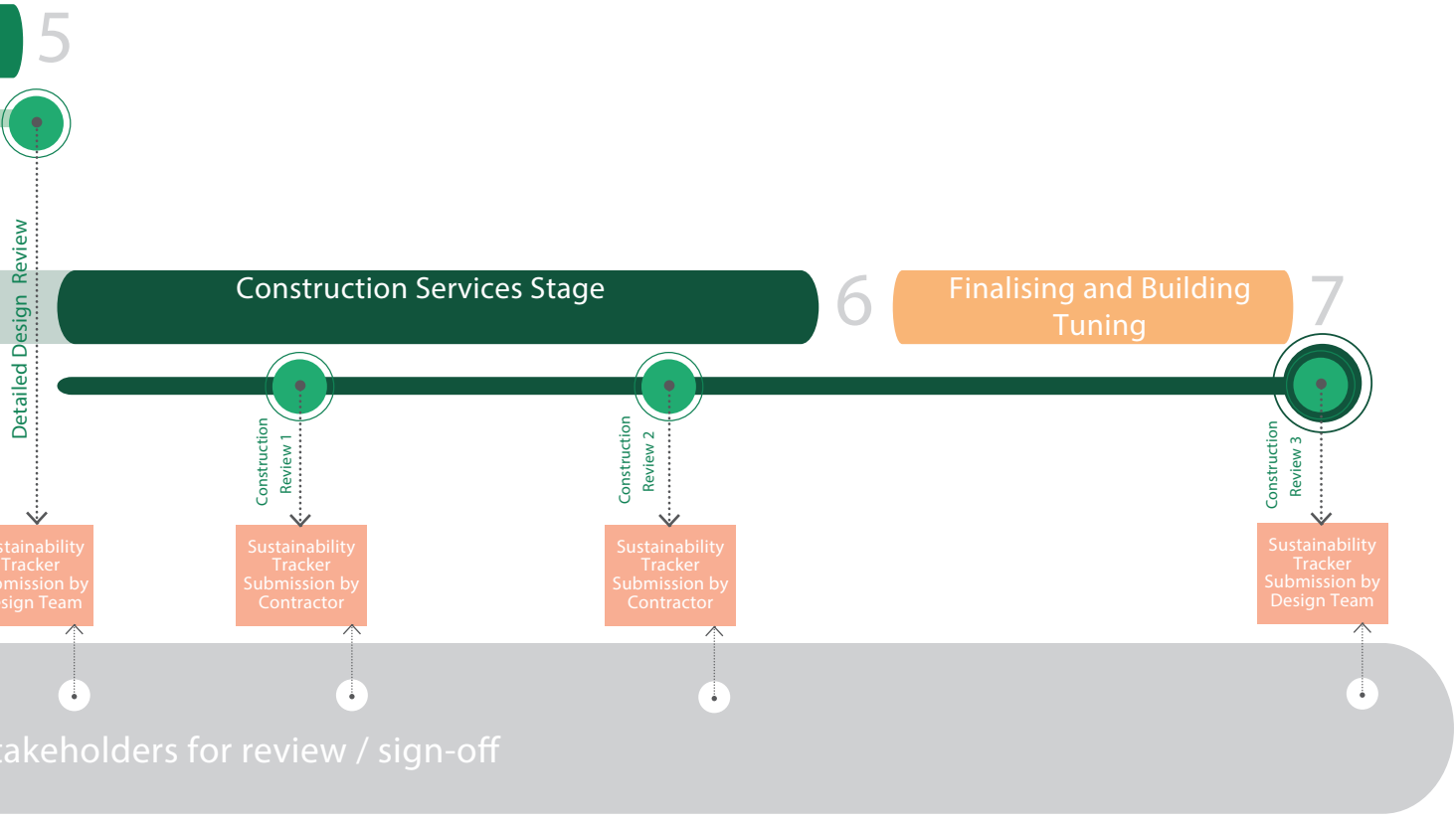


Clarity
A clear understanding and agreement between all parties of the sustainability roles, responsibilities, project needs and goals in order to achieve sustainable outcomes that meet MNHHS expectations.

Communication Tool
Remaining open and transparent throughout all phases of the project. Constant access to a reactive team, ensuring all stakeholder inputs are collected, understood, and utilised effectively.

Technical Excellence
A commitment to technical excellence and an understanding of industry best practice. Drawing on lessons learnt, a technical peer review team, and constant engagement with senior staff.

Total design
A true collaborative partnership between the Project team. Achieving a better sustainable outcomes through the collaboration of an integrated tool and framework, ensuring awareness and understanding across disciplines.



The MNHHS sustainability objectives will be governed and delivered through a combination of design briefs, performance standards and partnerships.

These guidelines are to be used by the project team at each project deliverable stage e.g. – feasibility/concept design, design development etc. The application of the guidelines is a collaborative process requiring multidisciplinary discussion within a project team when identifying the initiatives that are applicable to a project. The Green Metro North Team are able to assist with project team workshops on the guidelines and provide specialist support, however the process must be led by the technical and project managers and embedded into the project methodology.

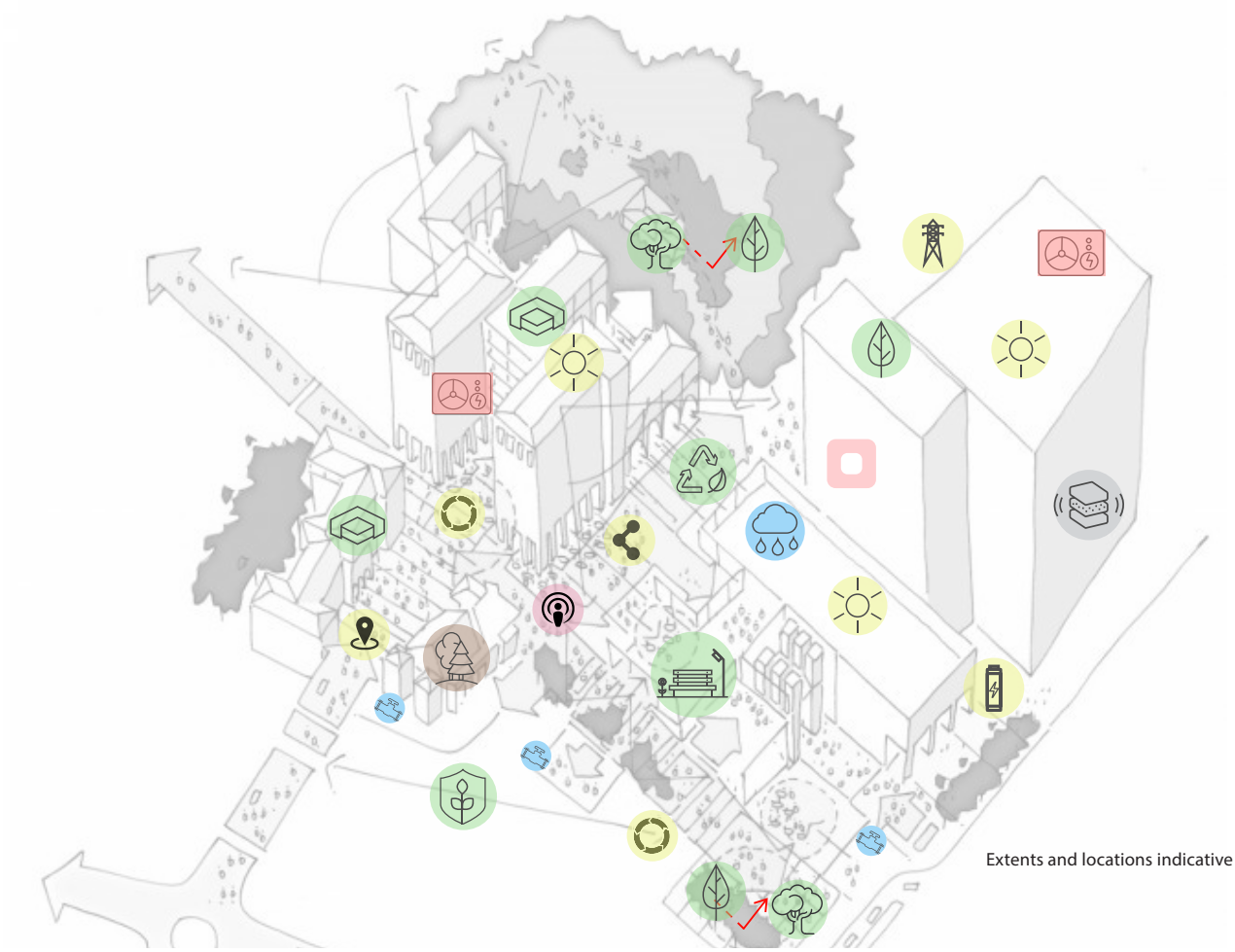
This section lists specific targets for project teams to achieve, as well as sustainability strategies to be considered as part of the design, construction and operation of the project.

The initiatives set within these guidelines are there to complement and enhance those minimum design expectations set within Queensland Health CIR documentation. Unless otherwise stated, these targets and strategies are intended for all new buildings and major refurbishments. Where design criteria is either:

- Not applicable or,
- Not achievable due to the technical requirements to support specific health equipment/spaces,

Then these shall be raised with MNHHS and outlined in the Project Sustainability Tracker.

Sustainable Design Brief



Extents and locations indicative

Public Realm Features

Waste Management Design
Reduce waste to landfill. Development Specific Targets for reduction in operational waste.

Integrated urban ecology + landscaping
Strong Biophilic Design for the public areas. Street furniture and hoardings with plants to clean air.

Amenity and comfort
Users are at the heart of the design for interior and exterior spaces, enhancing physical and mental health and wellbeing.

Site-wide water management
Provision for drinking water outlets/devices throughout the development. Reduce water run-off and improve water quality by filtering the pollutants.

Welcoming and Inclusive
Inclusive, engaging and enabling infrastructure in both the physical fabric and ongoing operations.

Access & Integrated Mobility
Movement of people and goods within the hospital precinct and to/from the surrounding areas is healthy, efficient and sustainable.

Urban Form Features

Renewable energy
Solar PV arrays to be maximised on available roof areas.

Whole of life considerations
Future proofing of building spaces - flexible and adaptable. Review opportunities where structure and slab can be retained, reducing the upfront impacts of new construction.

Smart rainwater
Water Storage for rainwater re-use and condensate re-capture from cooling coils. The collected water will be used for irrigation and cooling tower water make-up.

Upfront carbon emissions
Use of low embodied carbon materials (façade, structure, systems, finishes).

Occupant health and wellbeing
Explore opportunities for natural ventilation / mixed mode operation for staff and patient areas (non-clinical). Enhanced acoustic quality of patient areas. Good light quality for occupants. Healthy material specification - reducing exposure to toxins.

All electric + net zero
Prioritise all-electric solutions to support journey to net zero carbon. Energy strategy that focuses on passive design with a focus on high performing building envelope, airtight and thermal-bridge free design in order to minimise the energy demand of the building and maximise the value of selected low-carbon and on-site renewable technologies.

Site Wide Features

Public parks, integrated ecology + light surfaces
Increasing biodiversity + reducing urban heat island.

Bespoke MNH frameworks/certification
Climate adaptation plan to the Queensland Health Climate Change Adaptation Planning Guidance, using the spreadsheet templates. MNHHS Sustainability Tracker. Bespoke Health & Wellbeing Strategies - Occupational / Behavioural Psychology Strategies Post Occupancy Evaluation & Building Performance Analysis's (Building User Surveys).

Material passports + design for disassembly
Material data embedded in digital twin and construction optimised for flexibility. Design for disassembly / deconstruction / disposal of the physical asset after the end of its useful life.

Energy retailer
Potential for energy partner to provide and operate site wide microgrid and PV infrastructure.

Potential for increased onsite renewable energy
To be explored with extended solar PV and battery storage.

Smart Hospital Precinct / Campus
Enhancing social and environmental performance through emerging digital technology.

Energy
Sustainable Design Brief

The proposed Energy design measures accommodate a range of sustainable design features to help ensure that new developments are aligned with national, state and local carbon targets.

Items	Proposed Criteria
Operational Energy	– NABERS Energy performance rating will be relevant to the Queensland Health Peer Group Classification and will be agreed with MNHHS for each project. – A minimum Energy Rating of 5 Stars is sought for all new and major refurbished buildings with minimum 10% buffer in design. (MNHHS to define project specific energy targets). – For new buildings, project teams to investigate costed options for 5.5 Star NABERS Energy
Peak Demand	– Investigate opportunities to reduce peak demand with storage and management devices.

Building Fabric	– Passive design principles are a priority to reduce loads and resulting cooling energy, to minimise the life cycle costs of air conditioning systems. Emphasis must be placed on appropriate orientation and massing, window to wall ratio, envelope thermal performance, and use of external sun control shades.
	– Projects teams to achieve at least 10% improvement on NCC Section J, with consideration for the following targets, except where they adversely impact energy use or life-cycle cost:
	  – Roof/ceiling insulation - 10% increase on the minimum required total R-values in NCC 2019 Part J1.3
	  – Wall-glazing construction with area-weighted total system U-value at least 10% less than the maximum allowable in NCC 2019 Part J1.5
	  – Wall-glazing construction with at least 10% less solar admittance than the maximum allowable in NCC 2019 Part J1.5
	  – Where the wall component is 80% or more of the wall-glazing construction, at least a 20% increase on the minimum total wall R-value in NCC 2019 Part J1.5
	– Internal blinds must not be used as a substitute for external shade devices to control solar admittance.
	– Consider Passivhaus principles, with a focus on high performing building envelope, airtight and thermal-bridge free design. Design teams also encouraged to use Passivhaus PHPP to self-assess development and identify opportunities to upgrade performance.

Air Permeability	– For new buildings and refurbishments with major façades upgrade, conditioned areas shall target a maximum 5m3/(h.m2) at 50Pa (Method 1 of AS/NZS ISO 9972) by a suitably qualified practitioner (ATTMA or AIVAA). Practitioner to review construction documentation and inspect construction works.
Demand Control Ventilation (DCV)	– Incorporate DCV (where appropriate) for increased outside air rates to maintain CO_2 levels of 800ppm in the occupied spaces. Project teams to consider lower targets where health benefits and energy implications can be balanced.

Items	Proposed Criteria
HVAC Equipment	– Projects teams to achieve at least 10% improvement on NCC Section J, with consideration for the following targets, except where they adversely impact life-cycle cost: – For each fan, at least 15% reduction on the NCC 2019 DTS fan motor power per unit flow rate (Part J5.4 b, c, d and e) – For each pump, at least 10% reduction on the NCC 2019 DTS pump motor input power per unit of flow rate (Part J5.7 b, c and d) – The minimum energy efficiency ratio (EER) (cooling) for all unitary air conditioning equipment is at least 5% higher than NCC 2019 DTS (Part J5.11) – The minimum energy efficiency ratio (EER) (cooling) and integrated part-load efficiency (IPLV) for all refrigerant chillers are at least 15% higher than NCC 2019 DTS (Part J5.10a/b) – Investigation into heat recovery from plant and equipment (e.g. DHW plant).
Natural / Mixed Mode Ventilation	– The feasibility of incorporating natural ventilation or mixed mode ventilation to all non-clinical areas or partial areas must be investigated. – Automatic AC shut-off to areas that are openable – e.g. reed switches to windows and sliding doors.
HVAC Control	– For non-critical areas, consider motion control to switch off air conditioning or widen temperature bands when not in use. – For mixed-mode/nat vent spaces, use of the adaptive thermal comfort criteria should be used. – For conditioned (non-clinical) areas, review options to widen indoor air temperature set bands/points.
Hot Water	– Where applicable to building typology, prioritise heat pump or high efficiency electrical equivalent. – Heat pumps to have minimum COP of 3.5.
All Electric	– Prioritise all-electric solutions to support journey to net zero carbon. – Where fossil fuels are to be used on site, a transition plan must be developed. The transition plan must show how the building will transition away from the use of fossil fuels on site and allow MNHHS to be carbon neutral ready, in line with their organisational carbon reduction timeline. Take into account design considerations to accommodate replacement of equipment (e.g. spatial allowances, electrical infrastructure, logistics of replacements, interruption of services to building operations).

Energy (continued)
Sustainable Design Brief

The proposed Energy design measures accommodate a range of sustainable design features to help ensure that new developments are aligned with national, state and local carbon targets.

Items	Proposed Criteria

Lighting	– Power density NCC compliant without applying adjustment factors.
	– Minimum efficiency of 100lm/W.
	– Lighting controls – daylight/occupancy sensors, manual on/off/dimming switches, and/or time-clocks – should be implemented on life cycle cost basis, for example as a minimum consider:
	  – Time-clock with out of hours dimming for circulation areas.
	  – Presence detection in ensuites.
	  – Absence detection in back of house (utility, stores, plant)
	  – Daylight dimming in regularly occupied perimeter areas (e.g. ward rooms, office).
	  – Manual dimming in ward rooms for supplementary (bed light).
	  – All external lighting circuits are to be controlled via a photoelectric (PE) Cell and time-clock

Appliances	– Appliances must have an energy star rating of at least one star below the highest available of the type and comparable capacity (refer to Energy Rating website - https://www.energyrating.gov.au).
Power Quality	– Combined Power Factor Correction / Active Harmonic Filter. Modular/Scalable to allow for changes in site usage. – Harmonic current elimination (2nd ~ 51st harmonics selectable); – Power factor (lag or lead) improvement, capable of minimum 0.98; – Load imbalance correction (Negative and Zero sequence compensation).

Items	Proposed Criteria
Metering	– In line with CIBSE metering framework – Metering to connect with wider precinct/campus network (where applicable) – Meters to be connected to BMS - centralised automatic monitoring system to collect data from all meters, that can be accessed locally and remotely, produce alerts for failures or when energy/water uses increases above certain parameters, produce consumption graphs, and quarterly reports. Data output at least every 15mins, with ability to be viewed graphically - hourly, daily, weekly and monthly trends to be viewed to identify problems and excessive energy use. – Meter individual items that exceed 5% of the total energy use for the building, or 100kW. – Flow meters and temperature sensors must be provided to enable CHW and DHW energy consumption to be monitored and reported. – Meters must be commissioned and validated per the most current 'Validating Non-Utility Meters for NABERS Ratings' protocol, or National Measurement Institute (NMI) standards.
Solar PV	– Solar PV arrays to be maximised, up to the building/precinct base load to avoid export to the grid. Consideration should be given to maximising roof area for solar unless shadowing from existing adjacent buildings and trees results in poor life cycle costing. Roof design to minimise shading from trees, HVAC systems and other. – Building integrated PV (BiPV) feasibility to be considered and appraised against fire engineering compliance/sign off. – Future proofing (where applicable) - Allowance within circuit breakers, space in the main switch board to enable retrofit of solar photovoltaics without requiring upgrade. Design access/harness points for working at heights to allow expansions for future use for solar panels. – Anticipate combination of roof mounted and building integrated photo-voltaic (PV) technology to be used across shade structures, bus stops, park features, canopies etc.
Stairs	– New buildings should incorporate open, prominent and inviting stairways, with access to all floors and placement to maximise visibility, encouraging stair use instead of lifts. – Signage placed around lifts and stair entrances advocating use of stairs

Health and Wellbeing

Sustainable Design Brief

The health and wellbeing elements of the design are highlighted below and are proposed to be included within the Development Briefs and Contractor Specifications for all project work.

Items	Proposed Criteria
Indoor Pollutants	– Interior paints to have TVOC content of 5g/L or less. – VOC and formaldehyde contents for adhesives, sealants, carpets and engineered wood products in line with Green Star Buildings credit Exposure to Toxins – tested limits (see Appendix A) or certified under a recognised Product Certification Scheme (see GBCA website). – For existing buildings, a hazardous materials survey must be carried out in accordance with the relevant Environmental and Work Health and Safety (WHS) legislation, with relevant rectifications to best practice guidelines. – Printers compliant with emissions standards, in accordance with ECMA-328, RAL-UA 171, or GGPS.003.
Lighting Comfort	– Lighting minimum colour rendering index (CRI) greater than 90. – Local control for light zones up to 100m^2. – Lighting glare - Either; fit bare lamps with baffles - translucent diffusers, comply with clause 8.3.4 (AS/NZS 1680.1-2006) OR not exceed maximum UGR (Table 8.2 AS/NZS 1680.1-2006) – Circadian lighting in patient bedrooms to be considered and agreed with MNHHS.

Daylight	– Achieve Daylight Autonomy of at least 160 lux (daylight) for 80% of the hours between 8am and 6pm. Minimum area percentages:
	  – 60% of clinical areas
	  – 20% of interventional suite clinical areas
	  – 30% of clinical support services areas
	  – 60% of other support service areas such as staff lounges/breakout
	  – 40% of general front of house

Daylight Glare	– All windows to regularly occupied spaces to have manually operated blinds with VLT < 5% for glare control, unless the combination of external shading and/or glazing treatments negates glare sufficiently throughout the day.

Items	Proposed Criteria
Views	– Direct line of sight to the outdoors or well lit atrium as per the Green Star Views method for the following percentage of areas as a minimum: - 60% of clinical areas - 20% of interventional suite clinical areas - 30% of clinical support services areas - 60% of other support service areas such as staff lounges/breakout - 40% of general front of house
Wind	– Consider adjacent sites and wind tunnels from the venturi effect.
Desks	– At least 50% of staff workstations are to be height adjustable (sit-stand).
Thermal Comfort	– For Natural Ventilated/Mixed Mode spaces, the internal temperatures are to be within 80% of acceptability limit 1 of ASHRAE Standard 55. – For A/C patient and staff areas, PMV -1 to +1 for 98% of the time.
Patient food services	– Consideration of patient food services, including nutrition, food waste and short order food preparation models, in close coordination with the MNHHS Patient Food Services department.

Health and Wellbeing (continued)
Sustainable Design Brief

The health and wellbeing elements of the design are highlighted below and are proposed to be included within the Development Briefs and Contractor Specifications for all project work.

Items	Proposed Criteria
Acoustics	– Internal noise levels – Design of the noise environment must consider both the level and the character of noise sources. Additional noise control is required for sources that can be a cause of discomfort to patients/staff e.g. beeping machines. – In addition to the maximum acceptable background noise levels from the AAAC Guideline for Healthcare Facilities v2.0 referenced in the CIRs, minimum acceptable background noise levels shall be no more than 5 dB below the recommended values from AS2107. – Where sufficient background noise cannot be achieved by building services design, or where acoustic privacy is critical, the use of an electronic sound masking system shall be considered and adopted if practical and reasonable. – Sound insulation – For critical spaces requiring acoustic privacy (including all consultation, interview and mental health treatment rooms) an assessment of acoustic privacy using the Speech Privacy Class metric as defined in ASTM E2638-10 2017 shall be conducted. Allowance for raised source levels in telehealth or mental health spaces shall be made when determining appropriate levels of privacy.

Items	Proposed Criteria
	– Room acoustics – Room acoustic design for healthcare spaces should consider the location of treatment with respect to dominant noise transfer paths (e.g. treating prominent ceiling or wall reflections) in preference to achieving numerical reverberation time targets. As an alternate to meeting the RT-based targets from AS2107 or blanket provision of an acoustic tile ceiling as recommended in the AAAC Guideline, the approach based on privacy distance and distraction distance from ISO 3382.3 may be adopted. – Additional acoustic finishes should be included for early and late reflection control in spaces used for telehealth and the location of these finishes coordinated based on reflection patterns from loudspeakers and microphone locations. Finishes on wall surfaces will typically be required. – Localised sound absorbing finishes should be considered for noise control in the vicinity of noisy areas (e.g. nurses stations), or in the vicinity of quiet areas. Where practicable, finishes should be placed on walls at or close to head/ear height in preference to located on ceiling. – The use of alternate sound absorbing products that can be cleaned/sterilised (e.g. microperforated or membrane type absorbers) should be considered for healthcare applications to allow acoustic finishes on wall surfaces. – A higher level of acoustic control is recommended for mental health care settings. Additional room acoustic treatment should be incorporated to provide a more controlled, subdued acoustic environment.

Water
Sustainable Design Brief

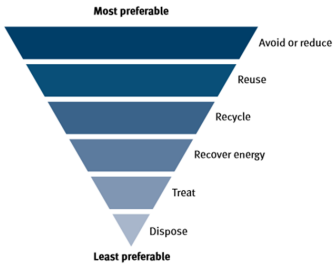
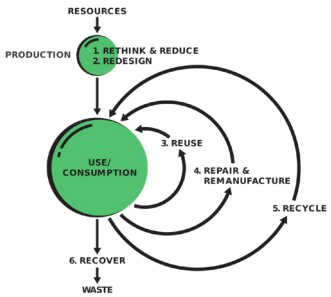
The water elements of the design are highlighted below and are proposed to be included within the Development Briefs and Contractor Specifications for all project work.

Items	Proposed Criteria
Operational Water Target	– 4 star NABERS water with minimum 10% buffer in design. Costed option for 4.5 stars to be provided to MNHHS for review.
Fixtures and Fittings	– Fixtures are to achieve the following WELS ratings as a minimum (and flow rates as a maximum): – Taps - 6 Star, less than 3 L/min (laminar flow only, no aerosols) – Toilets - 4 stars, investigate vacuum – Urinals - 6 stars - 0.8L/flush or less, consider waterless – Showers - 3 star (6 to 7.5 L/min) – Clothes Washing Machines & Dishwashers - Appliances must have an WELS star rating of at least one star below the highest available of the type and comparable capacity
Recycled Water	– Recycled water (rain, grey and others listed below) to be used for cooling towers with treatment, and irrigation if necessary. No indoor use. Water balance to demonstrate potable water savings and effective tank sizing. – Rainwater to be captured and used. Design teams to justify not collecting rainwater from any exposed building surfaces. – Opportunities for greywater and other recycled water are to be investigated, such as renal RO, CSSD, condensate capture, and recycled water infrastructure provided by utility (or future-proof infrastructure for potential connections where planned – coordinate with authorities). – Investigate potential to reuse cooling tower reject water (mixed with other water for <1000 TDS).
Landscape Irrigation	– Design water efficient landscaping with drought tolerant native species, ideally with no irrigation needed. – Where irrigation is installed, it is to be automatic sub-soil drip system with moisture sensor override.

Items	Proposed Criteria
Fire System Testing	– For fire protection systems, capture and reuse at least 80% of test water. Divert to grey water tank.
Wash-down	– Wash-down hoses to be controlled by commercial high-pressure water efficient trigger nozzles.
Water Metering	– Sub-meter at each major branch (per floor level) of the HW system. – Sub-meter any common water use that consumes more than 10% of the building's water. – Meters to be connected to BMS - centralised automatic monitoring system to collect data from all meters, that can be accessed locally and remotely, produce alerts for failures or when energy/water uses increases above certain parameters, produce consumption graphs, and quarterly reports. Data output at least every 15mins, with ability to be viewed graphically - hourly, daily, weekly and monthly trends to be viewed to identify problems and excessive energy use. – Water meters to meet NABERS protocols. – Meters to be capable of producing alerts if any inaccuracies in the meter network are found. The Monitoring system is to be continual (15mins to 1hr interval readings) and meter accuracy reconciled to appropriate standards. – Monitoring strategy developed in accordance with recognised standard.
Stormwater	– Consider stormwater systems with low impact, green infrastructure (e.g. bio-retention swales) to reduce runoff volume and improve water quality by replicating the natural hydrology and water balance of the site, based on historical conditions and undeveloped ecosystems in the region. – Prioritise permeable surfaces and planted areas instead of hardscape, in order to maximise site water absorption.

Waste
Sustainable Design Brief

The waste and recycling operations elements of the design are highlighted below and are proposed to be included within the Development Briefs and Contractor Specifications for all project work.

Items	Proposed Criteria
Principles of Design	– The underpinning principle of design for waste management is the circular economy and waste hierarchy, aligning with the Queensland Waste and Resource Recovery Strategy. – The waste management design will be in accordance to Australian Standards, state legislation and best practise design guidelines. – The waste and resource management hierarchy is a framework that guides the order of preference for managing waste. Waste should be avoided as a first priority, after which options for reuse and recycling should be explored. The options of fuel production, energy production or disposal should be reserved for residual waste that is unsuitable for higher order options.   – The circular economy aims to decouple growth from finite resource consumption whilst increasing natural capital, human wellbeing and promotion of distributed economic activity.
Construction and Demolition Targets	– At least 90% landfill diversion for Construction and Demolition waste – Contractors and facilities comply with the Green Star Construction and Demolition Waste Reporting Criteria as per minimum Greenstar Building Submission Requirements (version 1 Revision A).

Operational Targets	– Facilities that are enabled to achieve the following targets
	  – At least 90% of recyclable material is recovered and diverted from landfill
	  – 10% reduction in waste per patient per annum
	– Development Specific Targets
	  – NABERS 5 Star rating
	  – Green Star (Design and As Built v1.3) Operational Waste Credit - 8A Performance Pathway: Specialist Plan

Items	Proposed Criteria
Master Planning Waste Strategy	– Waste Strategy prepared by a waste specialist during master planning phase in close coordination with the MN Environment and Waste department is required. At a minimum the waste strategy must include: – Confirmation of materials to be source separated – High level waste estimates – Approximate size and location of the central waste storage area/areas – Proposed waste collection point and collection vehicle access requirements – Proposed methods/ equipment for transfer, consolidation, and on-site treatment (as required)
Functional Brief Requirements	– The waste management Functional Brief requirements must be prepared in close coordination with the MNHHS Environment and Waste department. – The MNHHS Environment and Waste department must review and endorse the waste related Functional Brief items. – The Functional Brief must include a complete list of materials to be source separated and a completed material flow matrix as shown in Table 3. Refer to Table 1 for details. – The Schedule of Accommodation within the Functional Brief for each department/main function of the development and the loading dock must include: – The number of dirty utilities and minimum size (m^2) to accommodate proposed bin sizes and collection frequency defined in the Material Flow Matrix – The number of disposal rooms and minimum size (m^2) to accommodate proposed bin sizes and collection frequency – The number and minimum size (m^2) of other interim recycling storage locations defined in the Material Flow Matrix – Minimum size (m^2) of the clinical and related waste (full and empty bins) central storage area located adjacent to the loading dock – Minimum size (m^2) of the general waste and recycling central storage area (full and empty bins) adjacent to the loading dock based on the Material Flow Matrix defined in the Material Flow Matrix – Minimum size (m^2) of any additional equipment or storage areas required within the loading dock – Minimum size (m^2) of designated bin wash area – Minimum room sizes based on the required bin sizes and collection frequency

Waste (continued)
Sustainable Design Brief

The waste and recycling operations elements of the design are highlighted below and are proposed to be included within the Development Briefs and Contractor Specifications for all project work.

Items	Proposed Criteria

Concept Design – Operational Waste Management Plan	– An operational waste management plan (OWMP) prepared by a waste specialist during the early phases of concept design is required. The OWMP must be prepared in close coordination with the MN Environment and Waste department.
	– At a minimum the OWMP must adhere to the Green Star (Design and As Built v1.3) Operational Waste Credit - 8A Performance Pathway: Specialist Plan and include:
	  – Refinement of waste generation estimates
	  – Material streams to be source separated
	  – Bin sizes
	  – Horizonal and vertical transfer methodology
	  – Disposal room, interim storage and central storage requirements
	  – Waste collection and access requirements
	  – Equipment requirements
	  – Monitoring and data collection requirements
	  – Public realm waste management
	– The OWMP must adhere to and document all requirements as specified in the relevant Australian standards, state legislation and best practise guidance in Table 2 of the Appendicies.
	– The OWMP must adhere to and document all requirements listed in the Operational Requirements (Table 1) and Waste Room Design (Table 2).

Detailed Design – Update Operational Waste Management Plan	– The OWMP must be updated to reflect the latest design and innovations in technology.

Management
Sustainable Design Brief

The construction and design management elements of the design are highlighted below and are proposed to be included within the Development Briefs and Contractor Specifications for all project work.

Items	Proposed Criteria
Universal Design	– Dedicated parent facilities must be provided in public buildings and workplaces over 1000m^2. – Elevators shall be sized to at least allow for cyclist to transport bicycles up levels (where appropriate). – Provision shall be allowed in each main lobby for the parking and charging of 3 mobility aids (note these do not include escooters and ebikes which are not permitted within buildings).
Space Use	– Capital Management Plans based on rational space planning, which seeks to minimise the construction of new facilities to those which are absolutely necessary for the Hospital's expansion and development.
Remote Working	– Review design opportunities to support the hybrid/blended work model that encourages productivity, engagement, and seamless collaboration between MNHHS staff working from different locations
Education	– Green education materials to promote sustainability initiatives in the project. At a minimum this should include a static display in the main/entry foyer.
Contractor Requirements	– Project specific Environmental Management Plans are required to be developed and implemented during construction works, in line with the NSW Guideline for the preparation of environmental management plans or similar. – Contractor to have Environmental Management System certified to ISO14001
Commissioning	– Design team to produce O&M Manuals to CIBSE Standard – Implementation of BSRIA Soft Landings Framework - to be developed in consultation with MNHHS on a project-by-project basis.

Items	Proposed Criteria

Building Guide	– Design team to produce building user guide including energy and environmental strategy, performance targets, summary of systems, BMS, sustainable features and operational requirements.
	– Produce digital twin (upon request from MNHHS) – a 3D model as an extension of the BMS system with system information, energy, water, indoor environment and waste data, and material data, to support facility management with replacement/refurbishment of elements (potentially including predictive maintenance).
	  – All projects to provide as-built material data for material database for projects.
	  – Incorporation of sensors (where applicable) to monitor air quality – Ozone, PMs, Ozone, Carbon Monoxide (and reporting).
	  – Central database of on-site hazardous materials and access made available.
	  – Access to operational energy, water and indoor / outdoor environment data.

Procurement	– Ensure project procurement processes respond to cultural considerations of local Aboriginal and Torres Strait Islander communities

Materials
Sustainable Design Brief

The materials elements of the design are highlighted below and are proposed to be included within the Development Briefs and Contractor Specifications for all project work.

Items	Proposed Criteria
Building Reuse	– Where possible, retain and retrofit existing buildings instead of demolishing and building new.
Space Efficiency	– Provide building space efficiencies (e.g. UFA to GFA) for MNHHS review and comment.
Future Flexibility	– Building interior and structure to be designed for future flexibility, allowing change in building use, considering the following: – Regular column grid. – Load bearing walls shall be minimised and restricted to areas such as the building core for stairwells and lift shafts. All other internal walls and partitions shall be non-load bearing and able to be readily removed and altered at minimum cost. – Design for disassembly / deconstruction (e.g. bolted connections instead of permanent). – Consider modular construction techniques, to contribute to better build quality, reducing construction phase time and waste, and ease of replacement with standard component sizes. – Car parks – minimum 3m floor to floor height, level floors, and external ramps that can be removed (no internal ramps). Design team to provide section diagram to demonstrate future proofing for flexible space use.
Life Cycle Assessment	– Where directed by MNHHS, undertake an upfront carbon assessment or whole-of-life material LCA. If undertaken, achieve a minimum 15% reduction in up-front carbon as per calculation methodology from Green Star Buildings credit 'Upfront Carbon Emissions'.
Low Impact Structure	– Timber structure or hybrid timber-steel/concrete structure must be presented as a design option due to its significant reduction in embodied carbon. Early contractor involvement recommended to learn lessons directly from previous timber developments and develop partnerships with industry. – All concrete must have at least 30% reduction in Portland Cement, replaced with low impact or recycled material such as fly ash (or equivalent low/zero carbon concrete product). Concrete suppliers to be engaged during design phase to determine project potential targets.

Items	Proposed Criteria

Material Selection	– Choose low embodied carbon materials and products for major building systems (structure, cladding, foundations etc).
	– Procure low carbon products, local source, and meeting the intentions of the 3 R's (Reduce, Reuse and Recycle).
	– Local, indigenous, and sustainable materials and products should be prioritised. At least 80% of structural components, 60% of building envelope components, 20% of active building systems, and 60% of internal building finishes, by cost (or area for finishes), must meet at least one of the following:
	  – Reused or recycled
	  – Product specific Environmental Product Declaration (EPD)
	  – Climate Active Carbon Neutral
	  – Third-party product certification schemes, as listed on the GBCA website
	– Products with materials, chemical and elements on the Living Building Challenges (LBC) Red List should be avoided where practicable.
	– Above provisions to be developed in consultation with MNHHS on a project-by-project basis.

Furniture	– Minimum 30% by cost of loose furniture to be 3rd party certified by environmental certification scheme (GECA, Green Rate, Eco-specifier, SMaRT 4.0, Green Tick or equivalent).
Timber	– All timber used in the project must be reused, recycled or certified (FSC, AFCS, PEFC or recognised equivalent).
Insulation	– All insulation must have zero ozone depletion potential.
PVC	– The use of PVC should be avoided or minimised where practicable. Where PVC is used, it must meet the GBCA's Best Practice Guidelines for PVC (note this is currently being updated).

Environment and Urban Greening

Sustainable Design Brief

The environment and urban greening elements of the design are highlighted below and are proposed to be included within the Development Briefs and Contractor Specifications for all project work.

Items	Proposed Criteria
Ecology	– At least 30% of site area to be soft landscaping, regenerating local natural habitat with connection from indoor spaces. Establish a biophilic environment that provides regular immersion in and contact with nature and natural systems. – Project site must not include old growth forest, prime agricultural land, wetland of high national importance, or impact matters or national significance. – At least 75% of the building site must be previously developed. – Consider design with connection to Country, collaborating with local Aboriginal community and services. – Create public spaces that utilise cultural stories and locally native ecologies. – Maximise site vegetation and canopy coverage. Continuous canopy coverage along pedestrian and bicycle routes where applicable/possible. – Use plant species native to the Plant Community Type which improves chances of attracting local wildlife to help with the local ecosystem – Incorporate locally-sensitive drought tolerant plant species which require little irrigation and maintenance
Safety in Design	– For applicable projects of scale and context, undertake a Crime Prevention through Environmental Design (CPTED) review at concept & schematic stage with consultation of suitably qualified professional. Recommendations to be published in report and risks mitigated where appropriate. Report to be shared to enable adjacent sites and future developments to build upon strategy.
Refrigerants	– Refrigerants must have 0 ozone depletion potential (ODP). – For equipment over 100 kWr, refrigerants with GWP less than 10 must be used. – For equipment under 100 kWr, low GWP refrigerants must be investigated, prioritising GWP less than 10 when available.

Items	Proposed Criteria
Light Pollution	– Limit light pollution to night sky with one of the following: – Upward Light Output Ratio (ULOR) - no external light has a ULOR that exceeds 5%. – Direct illuminance - external lights produce a maximum initial point illuminance value no greater than 0.5 lux to the site boundary, and 0.1 lux to 4.5metres into the night sky. – External lighting (excluding emergency lighting) with colour temperature no more than 3000K.
Construction Emissions	– Minimise on-site construction energy use (e.g. with solar PV on site or early project installation) and minimise on-site emissions (prioritise electric over diesel, all fossil-fuelled construction equipment to be fitted with particular filters).
Site	– Subtropical design for a subtropical climate. Review design opportunities for openness, permeability and a strong connection with the natural environment. Reference should be made to the key design principles within the New World City Guide: Buildings that Breathe Design Guide. – Generous footpath widths to support mobility aids – Activated streetscape and podiums (not institutional) – Review opportunities for community hub space - space available for community groups, collaboration and gathering – Multiple diverse clear entrance and exit paths – Effective cross-block links and wayfinding. Unobstructed lines of sight and visual connection. – Extensive accessible street furniture – Engaging and creative public lighting to enforce safety, orientation and accessibility

Access and Integrated Mobility

Sustainable Design Brief

The access and integrated mobility elements of the design are highlighted below and are proposed to be included within the Development Briefs and Contractor Specifications for all project work.

Items	Proposed Criteria

Site Selection	– Sites should be well connected with surrounding amenities and access to public transport. Consider the following targets:
	  – Walkscore of at least 70, or at least 10 amenities (stores, parks, community centres, etc.) within 400m walking distance as per Green Star.
	  – At least 8 public transport routes within 400m walking distance (current, or future potential services with engagement of public services providers).
	– Consideration for car-free pedestrianised public domain.
	– Integration of ride share / pick-up / drop-off bays.

Transport Plan	– Sustainable Transport Plan to be developed (MNHHS to define projects) to explore and implement strategies to reduce emissions with reduced private vehicle use and trip lengths, and increased use of public transport and active commuting. – Where applicable and confirmed by MNHHS, project teams to engage with local authorities and public transport providers to synchronise services with shift times of MNHHS staff and discuss provision of infrastructure (stops, signage, etc.).

End of Trip Facilities	– Where no facility numbers are advised by a project Transport Plan, the Green Star Buildings requirements are to be used:
	  – Secure bicycle parks for 7.5% of staff.
	  – Secure visitor bicycle parks - one per 30 beds (as per CIR).
	  – 1 shower per 50 staff for the first 200 staff, plus one additional shower for every 200 occupants above 200 (i.e. 4 showers for 200 staff, 7 showers for 800 staff, and so on).
	  – 1 locker per eight staff.
	– Safe and convenient bicycle and pedestrian access, separated from cars where practical, and connected with surrounding routes. Roads within site boundary to be low speed (10km/hr).

Items	Proposed Criteria
Car Parking	- Dedicate 20% of car park spots for low emission vehicles (small, electric, hybrid, motorcycles and scooters), with signage or ground markings.
Electric Vehicles	– At least 5% EV charging stations for non-fleet / public car parks - provisions to be developed in consultation with MNHHS on a project-by-project basis. – 100% of fleet car parks to be provided with either EV chargers or electrical infrastructure to allow for future installation – MNHHS to confirm on project-by-project basis.
Wayfinding	– Legible wayfinding and signage to and from nearby public transport and cycle ways. – All building entrances accessible by pedestrian routes and bicycle paths.
Video Conferencing	– ICT and network capability, etc. to support remote working and tele-health – provisions to be developed in consultation with MNHHS on a project-by-project basis.
Procurement and Logistics Processes	– Loading dock entry that does interrupt valuable pedestrianised public domain – Development of procurement and logistics processes must demonstrate consideration of the following: – Measures to minimise the level of transport (vehicle km's) associated with supplying and servicing the facility. – Measures to minimise the amount of packaging (particularly non-recyclable packaging) associated with supplying and servicing the facility. – Measures to prioritise, where possible, the use of reusable or recyclable goods over disposable or consumable items, and measures to ensure the reverse logistics of these goods are incorporated into facility planning.
Asset Management Processes	– Development of asset management processes must demonstrate consideration of the following: – Measures to consider sustainability aspects of procurement of biomedical and other equipment. – Measures to reduce equipment turnover, loss and replacement through effective maintenance and replenishment processes.

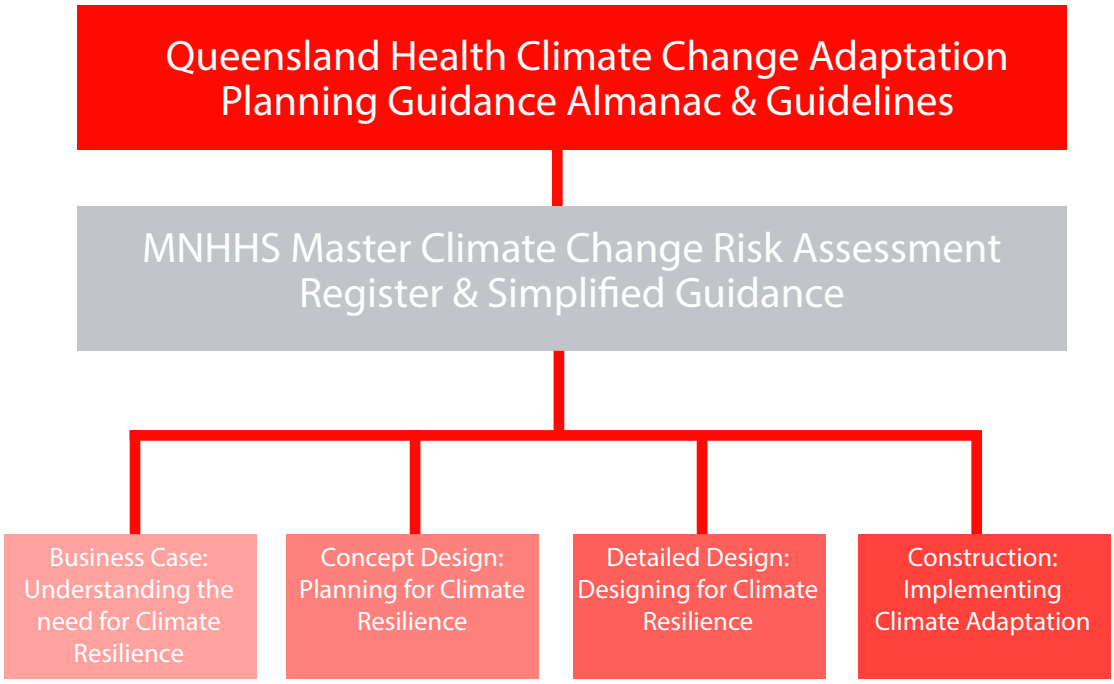
Climate Resilience

Sustainable Design Brief

In accordance with the Queensland Health Climate Change Adaptation Planning Guidance almanac and guidelines, MNHHS has developed a Master Climate Change Risk Assessment Register (CCRA) to document climate-related impacts on all asset systems for new builds, retrofits, and upgrades.

The master CCRA and complementary guidance document should be used by contractors/design team to inform climate adaptation planning at the Business Case, Concept Design, Detailed Design, and Construction phases. This will ensure the following objectives are met for each project:

- Climate risks are assessed, and adaptation measures are confirmed during Concept Design to ensure that the costs associated with these are captured in Detailed Design.
- Climate change risks and adaptation measures are appropriately monitored and implemented during Construction.



Items	Proposed Criteria
Business Case: Understanding the need for Climate Resilience	– Review MNHHS Master Climate Change Risk Register (CCRA) to understand process of Climate Resilience and breadth of potential climate-related risks. – Identify project and site wide historical climate impacts and future climate risks using screening tool in the Master CCRA. – Accommodate critical risks into business case assessment.
Concept Design: Planning for Climate Resilience	– Review the Master CCRA to identify climate changes risks (direct and indirect) that are relevant to the project based on site and project specific climate impacts, asset components, and design life. – Analyse (describe the likelihood, consequence, and vulnerability) and evaluate (assign a risk rating) to the identified risks using the provided criteria matrices. – Determine priority climate-related risks for the project based on risk ratings (high, extreme). – Outline initial adaptation measures for all priority risks to incorporate into the design.
Detailed Design: Designing for Climate Resilience	– Undertake a multi-disciplinary climate change risk assessment workshop to validate the risks and initial risk ratings contained in the project specific CCRA. – With input from the workshop participants, facilitate the confirmation of existing risk treatments and identification of additional adaptation measures that could potentially be implemented to further treat the risk where further treatment is required. – Develop a detailed climate adaptation plan, outlining how climate change risks have been addressed by design adaptation measures on the project for all high and extreme risks. – Outline recommendation for operational controls to treat priority risks.
Construction: Implementing Climate Adaptation	– Implement adaptation actions outlined in detailed design. – Document performance of interventions. – Hand over risk register formally to MNHHS – including recommendations for operational controls.

Appendices

Appendix A

Waste

Table 1 - Operational Requirements

Table 1 below defines specific requirements for the key elements of a waste management system that must be incorporated into the Functional Brief and corresponding waste management design.

Items	Proposed Criteria
Source separation of materials	– The OWMP needs to consider the technical and logistical viability of the source separation of materials. As a minimum the materials in the Material Matrix (Table 2) and their corresponding estimated storage and equipment requirements must be considered. – Additional specialist streams (e.g radioactive waste) may be required based on the functionality of the development. – Consideration of appropriate donation and reuse programmes is required.
Disposal rooms[3]	– A minimum of one disposal room will be provided for each department. – Disposal rooms must be sized to accommodate storage for applicable waste streams and allocated bin sizes as shown in the Material Matrix (Table 3) and required equipment as determined by the OWMP. – Sizing and number of receptacles will be provided in the Material Matrix and confirmed in the OWMP. – All receptacles and equipment needs to be accessible and accommodate manoeuvring – Disposal rooms must be utilised for waste and dirty linen storage only. – Disposal rooms must be located in close proximity to the goods/ service lifts and located close to or inside the ward or near the service entry. – In a facility where waste and linen volumes are expected to be significant, a dedicated "dirty" service lift should be considered. – The OWMP prepared during concept design will be required to demonstrate the adequacy of the number and size of the disposal rooms servicing each department.
Dirty Utilities[4]	– Dirty utility rooms must be sized to accommodate storage for applicable waste streams as shown in the Material Matrix (Table 3) and required equipment as determined by the OWMP. – All waste receptacles and equipment need to be accessible and accommodate manoeuvring. – The OWMP prepared in detailed design will be required to demonstrate the adequacy of the number and size of the dirty utilities servicing each department.

[3] Storage of bins / receptacles within each floor or department of a refurbished or new building

[4] Australian Health Facility Guidelines (AusHFG) generic room requirement for a hospital. Typical function of a dirty utility room based on the AusHFG typically includes dirty linen trolleys, cleaner's equipment, handwashing sinks, general waste, clinical waste and cytotoxic waste. Dirty utilities may not be required for a small healthcare development.

Items	Proposed Criteria
Other Interim Storage	– Bin bays provided within administration and staff areas to accommodate general waste, co-mingled recycling and at least one other recyclable stream. – Provision of cabinetry within all staff kitchenettes to accommodate the segregation of general waste, co-mingled recycling and organic waste with appropriate sizes. – Space allocated for 240L secure waste bins within all administration, office and printing areas. – Space allocation for 240L paper bins adjacent to printers. – Cardboard and confidential receptacles provided within storerooms. – Pantries, catering kitchens or other designed to accommodate the segregation of organic (food) waste (maximum bin size 120L). – No provision for individual under desk bins and centralised bin stations.
Vertical Transport	– Automated waste collection systems, chutes and carousel systems for dirty linen and non-medical waste streams should be considered. – At a minimum a dedicated goods/service lift should be provided. – Best practise is to allocate a dedicated service lift specifically for the separate transfer of dirty linen and waste.
Horizontal Transport	– To assist in managing infection control requirements, optimised separation of all clean (patients, goods, catering etc.) and dirty material streams (waste and dirty linen) should be embedded within the spatial solution. – Back of house corridors should be utilised for the transfer of waste where possible. – Excessive distances (>100m) for manual handling of bins (240L or larger) should be avoided. – Electric trolleys, bin tugs or automated guided vehicles (AGVs) for the transfer of multiple bins should be considered. – Design of corridors needs to allow for two-way movement and the utilisation of bin tugs or AGVs (if required) including consideration of manoeuvring electric handling equipment and bin trains around corners. – Transfer pathways will be free of stairs – Gradient of ramps not steeper than 1:10

Appendix A

Waste

Table 1 - Operational Requirements (continued)

Table 1 below defines specific requirements for the key elements of a waste management system that must be incorporated into the Functional Brief and corresponding waste management design.

Items	Proposed Criteria
Central Storage	General requirements – Central storage rooms/areas must be sized sufficiently to store all waste, recycling, empty bins/receptacles, and equipment. The OWMP must validate (or justify where alternative requirements are proposed) the Functional Brief waste storage requirements. – All rooms and storage areas must be sized to hold at least one day's waste generation (or a weekend if appropriate), although contingency for an extra day storage should be considered. – All rooms and storage areas must and have adequate manoeuvring space. The OWMP prepared during concept design will be required to demonstrate the adequacy of the number and size of the waste storage areas. – A central storage room or allocated area for empty, clean medical waste bins must be provided. – "A central storage room or allocated area for empty, clean recycling (all streams) and general waste bins must be provided. – Clinical and related wastes must be stored in a secure area. – There should be bin washing facilities including a bin wash with bin tipper sized to accommodate at least one 1100L bin. Bin wash required to be equipped with a hot water connection and drained to sewer. Refer to Table 2 for additional detail. – Provision of waste transfer equipment storage and charging area or storeroom (if applicable) – Refrigeration of organic waste if they are to be stored longer than 48 hours. – It is best practise is to refrigerate clinical waste. If clinical waste is to be stored longer than 48 hours, refrigeration must be provided. Additional infrastructure / storage areas – Bin weighing area and scales to accommodate at least 1100L bin. – An area for reverse logistics of packaging such as boxes and wooden pallets (if applicable). – A de-boxing area for source segregation of packaging for incoming goods. – Segregation of waste management equipment and storage within the loading dock to support infection control requirements.
Access	– Collection points for waste must be designed to accommodate a Medium Rigid Vehicle and swept paths must be provided to demonstrate appropriate access has been provided – For developments utilising roll on roll off (RORO) compactor/s must have an appropriate minimum clear height (free of services) to allow the collection of the compactors. – All waste receptacles and equipment should be accessible with consideration of manoeuvring space.
Collection	– The OWMP must detail the collection frequency of each stream based on waste generation estimates. – The OWMP must define vehicle size and spatial requirements including operating height for collection. – The OWMP must define the bin / receptacle replacement provision proposed for each material stream.

Items	Proposed Criteria
Equipment requirements	– Roll on roll off (RORO) compactors with bin tipper for general waste and either co-mingled recycling or cardboard. – Consideration of on-site organic waste treatment (requires power and sewer connection). – Consideration of electric bin tugs or automated guided vehicles (AGVs) to reduce manual handling risk (require storage and charging points). – Consideration of bin tippers to reduce manual handling risk.
Future Proofing	– The design must consider likely future changes to waste streams and volumes and the impact on waste management. – The central waste storage spaces must consider flexibility to allow for expansion, changes in waste streams and changes in waste volumes. – Signage and colour schemes for waste recycling and storage should be adaptable and flexible to allow for future changes.
Monitoring and data collection	– A system for bin tracking such as barcodes or RFID tags must be implemented to enable tracking and billing of waste for multiple tenants . – Equipment and space for bin weighing must be provided to support NABERS requirements. – Equipment for monitoring contamination should be considered. – A suitable waste auditing programme should be implemented to track and monitor contamination and to identify opportunities for additional resource recovery.
Operational Management Requirements	– Clear and consistent signage is required as per the Queensland Department of Environment and Science (DPIE) Clinical and Related Waste Guideline (ESR/2015/1571). Specific guidance for recycling signage in health facilities can be found in the Waste Minimisation in Healthcare User Guide by Health Victoria. – Compulsory education and training of all staff is required. – Clear allocation of roles and responsibilities for operational waste management tasks is required. – A dedicated waste manager should be allocated to manage waste contracts, oversee waste management operations, identify and implement additional resource recovery opportunities, facilitate education of staff in waste management practices and interface with facilities management and other relevant stakeholders.

Appendix A

Waste

Table 1 - Operational Requirements (continued)

Table 1 below defines specific requirements for the key elements of a waste management system that must be incorporated into the Functional Brief and corresponding waste management design.

Items	Proposed Criteria

Retail and Commercial Areas	– Retail and commercial areas must allow for the source separation of the following streams as a minimum:
	  – General waste
	  – Co-mingled recycling
	  – Paper and card
	  – Organics (if applicable)
	– Waste prevention and reduction measures such as ban of single use plastics and a food waste reduction plan should be considered.
	– A system for tracking, weighing and billing of waste and recycling for individual tenants should be implemented.

Public Realm	– Self compacting smart bins in public realm areas should be considered. – Public realm bins must include general waste and co-mingled recycling at a minimum. – General waste and co-mingled recycling bins must be located next to each other and there will be no single general waste bins within the public realm areas. – Bin placement should target high-traffic areas and high waste generation Areas. – Bins should be placed as close as possible to where waste is generated, such as high pedestrian traffic areas and at entrances and exits to spaces. – Bins should be sited an appropriate distance from food-consumption locations. – Bins should be clearly visible, but sensitive to the surroundings. The placements of bins should consider sight lines to make sure that they are visible from seating areas or common approaches.

Appendix B

Waste

Table 2 - Waste Room Design Requirements

Table 2 provides an overview of key design requirements for waste storage rooms.

Items	Proposed Criteria
General	All waste management facilities will be compliant with the Building Code of Australia (BCA) and all relevant Australian Standards. The waste management system and storage areas will not be visible from the exterior of the building. Space for chemical cupboards, staff facilities, sharps brackets.
Surfaces	The floors of the waste storage rooms will be constructed of concrete of at least 75mm thickness and graded and drained to the sewerage system. The floors will be finished to a smooth, even surface, and covered at their intersection with walls and plinths. A ramp to the doorway will be provided if necessary.
Structure	The walls, ceilings and floors of the storage rooms will be finished with a light colour. The walls of the waste storage rooms will be constructed of approved solid impervious material and will be cement rendered internally to a smooth even surface coved at all intersections. The storage area will be constructed and finished to prevent absorption of liquids and odours, and will be easily cleanable.
Doors	A close-fitting and self-closing door or gate operable from within the room must be fitted to all waste and recycling storage areas (rooms or binbays). Doors/gates to the waste storage rooms must provide a minimum clearance of 1,200mm. At least one door or gate to the waste and recycling storage area must have sufficient dimensions to allow the entry and exit of waste containers of a capacity nominated for the development. Lightweight roller shutter-type doors or grilles should be considered for access to waste and recycling storage areas, as these do not impact on the available storage space. If these types of doors or grilles are used, the requirement for a close-fitting and self-closing door remains, so that waste collectors can access the waste storage area other than through the roller door or grille.
Water	All waste and recycling rooms and communal bin areas must be provided with an adequate supply of cold water (excluding the waste service compartments located on residential floors of residential flat buildings). A floor waste basket trap connected to the sewer shall be provided within the bin room area. Storm water shall not be permitted to enter this floor waste trap.

Items	Proposed Criteria
Drainage	The storage room and bin cleaning area will be sealed and bunded internally, with all water draining to the sewage system. Waste should be stored: Such that spills and wash waters from storage and loading are not allowed to reach storm water drains or waterways. On rigid impervious flooring with appropriate drainage that will contain any spillage. The base service of storage areas for biohazardous waste should be an impervious surface such as concrete surrounded by an appropriate bund to contain any spills. No liquid waste, washdown waters or stormwater contaminated with biohazardous waste are to be disposed of via the stormwater drainage system. The bunded area must drain to a sump or sewer to collect spills and wash waters. Cut-off drains which drain to a sump should be used instead of bunds if approved by the relevant authority.
Cleaning	Cleaning should include mechanical cleaning with a suitable detergent or as otherwise assessed and described in Australian Guidelines for the Prevention and Control of Infection in healthcare where transmission-based precautions are indicated.
Lighting	Adequate lighting will be provided for all rooms, controllable from a switch located both outside and inside the room. Lighting will ensure safe access to the area at night. Automatic light sensors may be installed for ease of manual handling during transfer of bins.
Pest Control	The potential for vermin must be minimised. To achieve this, all waste and recycling awaiting collection is to be stored in a Council approved container (such as a bin or bulk bin).
Ventilation	The waste storage rooms will be supplied with an approved system of mechanical exhaust ventilation, exhausting at a rate of 5L/s.m2 floor area, with a minimum rate of 100L/s minimum or permanent, unobstructed natural ventilation openings direct to the external air, not less than one-twentieth (1/20th) of the floor area. Mechanical exhaust systems shall comply with AS1668 and not cause any inconvenience, noise or odour problem.
Safety	Smoke detectors will be fitted in accordance with AS1670 Automatic Fire Detection and Alarm Systems and connected to the fire prevention system of the building. All equipment will be protected from theft and vandalism.

Appendix B

Waste

Table 2 - Waste Room Design Requirements (continued)

Table 2 provides an overview of key design requirements for waste storage rooms.

Items	Proposed Criteria
Signage	Signs will be provided to demonstrate how to use the waste management system (including segregation of wastes for recycling), as well as appropriate safety signage. The different recycling and waste bins will be stored in their streams and will clearly identified and signed appropriately. Standard signage on how to use the waste management system and what materials are acceptable in the recycling system will be posted in all waste and recycling rooms, waste service compartments and communal bin areas, after the Occupation Certificate is issued but before the first users occupy the building.
Refrigeration	Where a waste room is refrigerated the temperature must be maintained at or below 5°C with all refrigeration equipment installed with sufficient space for cleaning.
Secure Access	Central waste storage rooms should be secure with access available only to relevant staff.

Appendix C

Waste

Table 3 - Example Material Flow Matrix

A completed materials flow matrix must be provided within the Functional Brief. Bin/receptacle sizes should be defined for disposal rooms, dirty utility rooms, other internal storage areas and central waste storage rooms for each stream. The material matrix should be used as a guide and an indicative reference point for operational waste management design. Responsibilities for waste transfer and clean bin replacement must be considered and detailed in the matrix. If the design deviates from the Functional Brief material flow matrix a completed material matrix with justification of the changes must be provided as part of the OWMP.

Waste Stream	Initial Disposal Receptacle (IDR)	Consolidated Disposal Receptacle (CDR)	Other internal storage (OS)
General waste	1 x 240L	1 x 660L	Bin bay in admin/office area Cabinetry in staff kitchenette Bin allocated in catering/retail kitchens
Co-mingled recycling	1 x 240L	1 x 660L	Bin bay in admin/office area Cabinetry in staff kitchenette Bin allocated in catering/retail kitchens
Organic waste	-	-	1 x 120L in pantries 1 x 120L within catering kitchens Cabinetry in staff kitchenette
Green waste	-	-	-
Paper	-	1 x 240L	Bin allocated in printing and office areas
Cardboard	-	1 x 660L	Bin allocated in storerooms Bin allocated in catering kitchen
Confidential paper	-	-	1 x 240L in all admin and office areas
Clinical waste	1 x 240L	1 x 660L	Within wards as required
Clinical sharps	Shelving for empty and full sharps containers	Shelving for empty and full sharps containers	Within wards as required
Anatomical	-	-	Within wards as required
Cytotoxic	1 x 240L (in required wards)	-	Within wards as required

Central waste storage room (CS)	Loading Dock Storage	Equipment requirements	Collection Frequency	Key responsibilities for Waste Transfer
General waste and recycling storage room (empty and full bins)	RORO compactor with bin lift		Daily	IDR to CDR: Cleaners DR to CS: FM staff
General waste and recycling storage room (empty and full bins)	RORO compactor with bin lift		Maximum 3 x a week	IDR to CDR: Cleaners DR to CS: FM staff
Refrigerated organic waste storage room	-	Organic waste dehydrator or in vessel Composting	Outputs from on-site treatment collected 1 x a week	FM staff
-	-		As required	Landscaping Contractor
General waste and recycling storage room (empty and full bins)	-	-	-	OS to CDR: Cleaners CDR to CS: FM staff
General waste and recycling storage room (empty and full bins)	De-boxing area within loading dock	-	2 x a week	OS to CDR: Cleaners CDR to CS: FM staff
Secure storage room	-	-	1 x a week	OS to CS: FM Staff
Clinical and related waste secure storage room	-	-	Daily	IDR to CDR: Cleaners CDR to CS: FM staff
Clinical and related waste secure storage room			Daily	IDR to CDR: Cleaners CDR to CS: FM staff
Clinical and related waste secure storage room	-	-	As required	IDR to CDR: Cleaners CDR to CS: FM staff
Clinical and related waste secure storage room	-	-	Weekly	IDR to CDR: Cleaners CDR to CS: FM staff

Appendix C

Waste

Table 3 - Example Material Flow Matrix (continued)

Waste Stream	Initial Disposal Receptacle (IDR)	Consolidated Disposal Receptacle (CDR)	Other internal storage (OS)
Pharmaceutical	-	-	1 x 240L within Pharmacy
Radioactive	1 x 240L (in required wards)	-	Within wards as required
E-waste	-	1x 160L tub (per floor)	-
Batteries	-	-	Small Tubs within admin/office areas
Printer/toner cartridges	-	-	Tub adjacent to printers and copy rooms
Mobile phones	-	-	Small Tubs within admin/office areas
PVC	-	1 x 240L	1 x 60L bin, all wards and theatre
Single use metal instruments	-	1 x 240L	Bench space, all wards and theatre
Soft plastic	-	1 x 240L	1 x 240L within wards, pharmacy and theatre as required
Polystyrene	-	-	1 x 600L within Pharmacy and Pathology
Polyester	-	1 x 240L	1 x 240L within Plaster room
Aluminium foil	-	1 x 240L	1 x 60L, theatre only
Textiles	-	1 x 240L	1x 240L within wards as required
Sterile wrap	-	1 x 240L	1x 240L bin within wards and theatres as required 1 x 600L within CSSD
Metals	-	-	1 x 240L bin within Engineering

Central waste storage room (CS)	Loading Dock Storage	Equipment requirements	Collection Frequency	Key responsibilities for Waste Transfer
Locked cage within secure clinical and related waste storage room	-	-	As required	OS to CS: Pharmacy staff
Radioactive waste storage room	-	-	As required	OS to CS: trained FM staff
Collection area within loading dock	Skip for recycling	-	As required	CDR to CS: FM staff
Secure waste storage room	-	-	As required	OS to CS: FM staff
Secure waste storage room	-	-	As required	OS to CS: FM staff
Secure waste storage room	-	-	As required	OS to CS: FM staff
Recycling storage room	-	-	Monthly	OS to IDR: Clinical staff IDR to CDR: Cleaners CDR to CS: FM staff
Recycling storage room	-	-	Monthly	
Recycling storage room	-	-	Weekly	
Recycling storage room	-	-	Weekly	OS to CS: FM staff
Recycling storage room	-	-	As required	OS to CDR: Ward support staff CDR to CS: FM staff
Recycling storage room	-	-	As required	OS to CDR: Ward support staff CDR to CS: FM staff
Recycling storage room	-	-	As required	OS to CDR: Ward support staff CDR to CS: FM staff
Recycling storage room	-	-	Weekly	OS to CDR: Ward support staff CDR to CS: FM staff
-	Skip(s) within loading dock	-	As required	OS to CS: Engineering staff

Appendix C

Waste

Table 3 - Example Material Flow Matrix (continued)

Waste Stream	Initial Disposal Receptacle (IDR)	Consolidated Disposal Receptacle (CDR)	Other internal storage (OS)
Hard/bulky waste	-	-	-
Office furniture/ equipment	-	-	-
Medical equipment	-	-	-
Chemicals and other hazardous wastes	-	-	Within wards as required
Cooking oil	-	-	Within commercial kitchens
Donations or reuse streams	-	-	Within wards as required
Container Deposit Scheme	-	-	1 x 120L bin, admin/office areas and lobby/wait areas (1x per floor)
Pallets	-	-	-

Central waste storage room (CS)	Loading Dock Storage	Equipment requirements	Collection Frequency	Key responsibilities for Waste Transfer
Allocation of area for identification for reuse, repair, donation or disposal	Skip (s) if required	-	As required	Engineering Staff
-	Skip (s) if required	-	As required	Engineering Staff
-	Skip (s) if required	-	As required	Engineering Staff
Hazardous waste storage area	-	-	As required	FM Staff
General waste storage room	-	-	Weekly	OS to CS: kitchen staff
Recycling storage room	-	-	As required	OS to CS: FM Staff
Recycling storage room	-	-	As required	OS to CDR: Cleaners CDR to CS: Cleaners
-	Pallet storage	-	As required	FM Staff

Appendix D

Materials

Table 4 - Material VOC/Formaldehyde Limits

Internally applied paints, adhesives, sealants, and carpets must meet the maximum Total Volatile Organic Compounds (TVOC) limits in accordance with Green Star, demonstrated by one of the following two methods:

- The product(s) are certified under a recognised Product Certification Scheme accepted by the GBCA (for Green Star Buildings); or
- The product(s) are tested in a laboratory

Total VOC Limits for paints, adhesives and sealants:

Product Category	Max Total Volatile Organic Compounds (TVOC) content in grams per litre (g/L) of ready to use product
General purpose adhesives and sealants	50
Interior wall and ceiling paint, all sheen levels	16
Trim, varnishes and wood stains	75
Primers, sealers and prep coats	65
One and two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membranes	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

Total VOC Limits for carpets:

Compliance Option	Test Protocol	Limit
ASTM D5116	ASTM D5116 - Total VOC limit	0.5mg/m2 per hour
	ASTM D5116 - 4-PC (4-Phenylcyclohexene)	0.05mg/m2 per hour
ISO 16000 / EN 13419	ISO 16000 / EN 13419 – TVOC at three days	0.5 mg/m2 per hour
ISO 10580 / ISO/TC 219 (Document N238)	ISO 10580 / ISO/TC 219 (Document N238) - TVOC at 24 hours	0.5 mg/m2 per hour

All engineered wood products are to meet the maximum formaldehyde emission limits, demonstrated by one of the following two methods:

- The product(s) are certified under a recognised Product Certification Scheme accepted by the GBCA (for Green Star Buildings); or
- The product(s) are tested in a laboratory

Formaldehyde limits for Engineered Wood Products:

Test Protocol	Emission Limit
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1mg/L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1mg/L
AS/NZS 4357.4 - Laminated Veneer Lumber (LVL)	≤1mg/L
Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL	≤1mg/L
JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤1mg/L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤1mg/L
JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates)	≤0.1 mg/m2 hr*
ASTM D5116 (applicable to high pressure laminates and compact laminates)	≤0.1 mg/m2 hr
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m2 hr (at 3 days)
ASTM D6007	≤0.12mg/m3
ASTM E1333	≤0.12mg/m3
EN 717-1 (also known as DIN EN 717-1)	≤0.12mg/m
EN 717-2 (also known as DIN EN 717-2)	≤3.5mg/m2 hr

Appendix E

Green Metro North - Sustainability Strategy 2021-2026

GREEN METRO NORTH SUSTAINAB

Message from the Board Chair and Chief Executive

Metro North Health is a recognised leader in the provision and delivery of world class healthcare. Our role as a leader in healthcare extends beyond caring for the community in the present, to future generations to come.

As the largest health service in Australia, we are dedicated to reducing our environmental footprint, promoting public and environmental health, and ensuring our service is resilient to climate change.

Green Metro North presents our commitment to environmental sustainability spanning over five strategic elements. This strategy represents an important step on our sustainability journey and reflects the passion of our staff to make a positive impact.

We encourage all staff to take this opportunity to imagine a brighter future and join us in taking action to create a healthier and more sustainable tomorrow.

Jim McGowan AM
Chair
Metro North Hospital and Health Board

Shaun Drummond
Chief Executive
Metro North Hospital and Health Service

Queensland Government targets

Metro North actions will reflect Queensland Health's **Climate Change Adaptation Planning Guidance** and progressively align with Queensland Government targets of:

- 50 per cent renewable energy by 2030
- An interim emissions reduction target of at least 30 per cent below 2005 levels by 2030
- Zero net emissions by 2050.

Our commitment

To take action towards environmenta

Strategic elements

Metro North will deliver on our comm

Green Monitorin

Measure, monitor and repor sustainability metrics to track p identify opportunities for imp

- Implement Sustainability Reportin major sources of waste and er
- Establish sustainability baselines alignment with Queensland Gover

Green Facilities

Build and maintain all facilities, plant and infrastructure to integrate environmental sustainability and resilience.

- Adopt a whole of lifecycle approach to our assets, incorporating design, construction, maintenance and redevelopment
- Cross-reference Green Building rating systems to find the right fit
- Create culturally appropriate places for people, with a focus on precinct master planning, walkability, and improving patient outcomes

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Our next step will be to prep

To join the Green Team a

Metro North is proud to recognise the cultural diversity of our workforce. We recognise and pay respect to the Turrbal, Jagera/Yuggera/ Ugarapul, Gubbi Gubbi/Kabi Kabi and Jinibara/Jiniburi people on whose lands Metro North Health walk, work, talk and live.

BILITY STRATEGY 2021–2026

l sustainability and deliver high quality health services for our community and future generations.

itment by focusing on five strategic elements.

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rovement.

ng to quantify
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and targets in
nment targets

Green Partnerships

Collaborate with other organisations to improve sustainability performance and innovation within the healthcare sector.

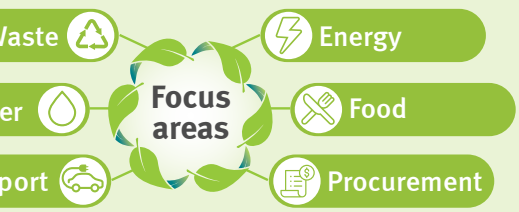
- Promote organisational collaboration as a source of research and knowledge sharing
- Foster partnerships with a wide range of partners, including government, healthcare providers, private sector, universities and peak bodies

Green Initiatives

tion for sustainable change, including
ncing energy efficiency and minimising
waste output.

nsolidate, showcase, scale and support existing Green Initiatives

- Identify, investigate and implement new Green Initiatives



Green Workforce

Prioritise staff engagement to champion environmental sustainability across all organisational locations.

- Grow a sustainability culture where everyone has a role to play
- Provide staff with opportunities to become more engaged and provide input through Green Teams
- Embed environmental sustainability into Metro North's governance structure to provide ongoing sustainability leadership

are organisation-wide waste and energy implementation plans.

t your facility, contact **greenmetronorth@health.qld.gov.au**

Metro North Health | Queensland Government

Shaping a
better world

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