Victorian Health Building Authority

VICTORIA State Government

Guidelines for sustainability in health care capital works

Contents

Foreword

Climate change represents a fundamental threat to public health. Victoria is already experiencing significant impacts from events which are becoming more frequent and intense as a result of climate change, including excessive deaths from extreme heat, an increase in the prevalence of diseases such as the Ross River Virus and exposure to smoke from bushfires. As a result, it is critical that the health sector plays a central role in driving action on climate change, seeking solutions and supporting the community to adapt to its impacts.

The health sector contributes 4.4 per cent of carbon emissions globally and, if the sector were a country, it would be the fifth largest emitter on the planet. In Australia, it is estimated that the sector contributes 5.1 per cent of the nation's emissions and 1.29 tonnes of carbon per capita. Australia's per capita emissions from health are second only to the United States.

In 2019-20 Victoria's public hospitals and health services emitted just over to 0.8 mega-tonnes of carbon emissions from energy, nitrous oxide, emergency transport, metropolitan vehicle fleets and waste. Carbon emissions from energy use comprised 91 per cent of total emissions and energy costs were $146 million.

The health sector has a material role in contributing to reductions in Victoria's government emissions. Equally, the sector has important assets that have growing vulnerability to the effects of climate and which must incorporate increased climate resilience.

Victoria is taking decisive action to address the significant risks posed by climate change through the Climate Change Act 2017 and Climate Change Strategy. The health sector must play its role by taking action to mitigate emissions and adapt to climate change.

These guidelines for capital works provide advice and guidance to all stakeholders involved in the design, construction and refurbishment of healthcare facilities on how to build sustainable, healthy and resilient buildings. Sustainable and resilient healthcare buildings offer many benefits including lower environmental impacts, greater resilience at times when they are most needed, lower operating costs and a healthier healing and working environment for patients, visitors and staff.

Robert Fiske

Chief Executive Officer

Introduction

The Victorian Government acknowledges the effects of climate change and has legislated commitments, through the Climate Change Act, 2017 to achieve net zero carbon by 2050 and adapt to the effects of climate change.

The Victorian Health Building Authority's (VHBA) Environmental sustainability strategy 2018-19 to 2022-23[1] acknowledges the role that climate change plays in the health and wellbeing of the community and further recognises the contribution of hospital carbon emissions to the Victorian government's carbon footprint.

In addition, the Department of Health's adaptation action plan 2019-21[2] provides information and direction for Victoria's response to climate adaptation. The plan assists the sector to embed climate change considerations into policies, planning, guidelines and operations, and respond to the risks posed to public health and wellbeing. Climate change adaptation will ensure that our health and human services continue to provide a high standard of service to Victorians and preserve the community's health, wellbeing and safety.

These sustainability guidelines are applicable to all healthcare capital works delivered by the Victorian Health Building Authority – new builds, retrofits and refurbishments.

Capital projects delivered by public hospitals and health services, regardless of the funding source, must meet the business as usual requirements. Public hospitals and health services that fund and deliver projects directly are encouraged to apply the 2.5 per cent sustainability budget for above business as usual items.

The guidelines have been developed specifically for Victorian public healthcare capital works but may be applicable to other public and private healthcare capital works across Australia.

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[1] Available on Health.vic's Sustainability in healthcare page <https://www2.health.vic.gov.au/hospitals-and-health-services/planning-infrastructure/sustainability>

[2] Available on the DHHS website's Environmental sustainability strategy page (under 'Climate change strategy') <https://www.dhhs.vic.gov.au/publications/environmental-sustainability-strategy-department-health-and-human-services>

Integrating universal design in capital works

The Convention of the Rights of Persons with Disability 2008 (CRPD) legislates the rights of people to an inclusive environment. The Disability Discrimination Act 1992 and the supplementary standards suggest that universal design principles be applied to health project settings and to allow full access and participation of all.

The Charter of Human Rights has encouraged public authorities to develop fairer policies that better respect human rights. A human rights-based approach helps identify potential human rights concerns – before the implementation of any proposed projects or policies. This approach requires public authorities to give equal consideration to what a particular policy intends to do and how it will do it.

Human ability is enabled, supported and encouraged by a universally designed environment that provides everyone with the opportunity to participate unassisted or with minimal support. Independence is best and can be extended with universal design. VHBA has adopted the universal design process to enable and empower Victoria's diverse population through improving human performance, health and wellness, and social participation.

The universal design approach seeks to create environments, objects, and systems that can be used by as many people as possible. To this end, universal design is the process of embedding choice for all people in the things we design:

- Choice involves flexibility and multiple alternative means of use or interface.
- People include the full range of people regardless of age, ability, sex, or economic status.
- Things include spaces, products, information systems and any other things that humans manipulate or create.

Universal design is a user-centred process that evolves as designers and users broaden their own understanding, perspectives and experience by working with the range of users. It is an approach to the design of all products and environments to be as usable as possible by as many people as possible regardless of age, ability or situation.

The Absolutely Everyone: State disability plan 2017–2020 embeds universal design principles across the state to make more infrastructure, services and places accessible to people of all abilities. This is enabling and empowering a diverse population by improving social participation, health and wellness.

All healthcare capital projects are to have universal design as an underlying design requirement that seeks to go over and above access to premises compliance levels. This ensures that projects plan to create smart, equitable, safe and comfortable environments for all occupants, regardless of their capability levels.

Designs are to demonstrate the following principles:

- Equitable use (Fair) – the design does not disadvantage or stigmatise any group of users
- Flexibility in use (Included) – the design accommodates a wide range of individual presences and abilities
- Simple and intuitive use (Smart) – use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level
- Perceptible Information (Independent) – the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities
- Tolerance for error (Safe) – the design minimises hazards and the adverse consequences to do accidental or unintended actions
- Low physical effort (Active) – The design can be used efficiently and comfortably, and with a minimum of fatigue

- Size and space for approach and use (Comfortable) – appropriate size and space is provided for approach, reach or manipulation, and use, regardless of the user's body size, posture or mobility.

More information on universal design is available on VHBA website's Universal design page <https://www.vhba.vic.gov.au/universal-design>.

Universal design is to be delivered as part of the project's base build and is not to use the 2.5 per cent sustainability budget.

Sustainability principles for capital works

Delivering sustainable and resilient buildings promotes better patient outcomes, higher employee satisfaction and productivity, lowers operating costs and emissions, and ensures the building is operational at all times to ensure fair and timely access to healthcare.

Healthcare capital works are to focus on the following sustainability principles.

Hospitals are healing environments

Hospitals are built to make sick people well and are not to make well people sicker. Hospital design is to focus on indoor environment quality, a connection with nature and an active lifestyle. They are to:

- enhance working environments for staff, increase productivity, engagement and wellbeing
- enhance patients experience to support faster recovery through providing healthier healing environments
- encourage more active use of the building and surrounds, including active transport choices.

Passive design is paramount

Passive design can dramatically reduce the requirement for space heating and cooling, whilst also creating excellent indoor air quality and comfort levels. Space heating and cooling in a hospital can account for up to 47 per cent of energy use and 65 per cent of carbon emissions. The design and delivery of healthcare buildings are to focus on:

- insulated fabric and windows
- low air leakage
- use of solar and internal heat gains for heating
- quality assured process and components.

Air tightness is to be considered holistically for the whole building design fabric. Air tightness risk is to be clearly communicated to the operator to ensure it is protected from penetrations during post construction works, such as the installation of services.

Resource use is minimised

Designing and building efficient and sustainable healthcare buildings will reduce the consumption of finite resources and the level of emissions to land, water and air associated with delivering healthcare. Reduced resource use will also minimise the growth in utility costs over time.

Reducing reliance on natural gas, reducing waste to landfill and promoting active transport will reduce any future carbon liabilities associated with meeting net zero carbon by 2050.

Hospitals are resilient to climate change

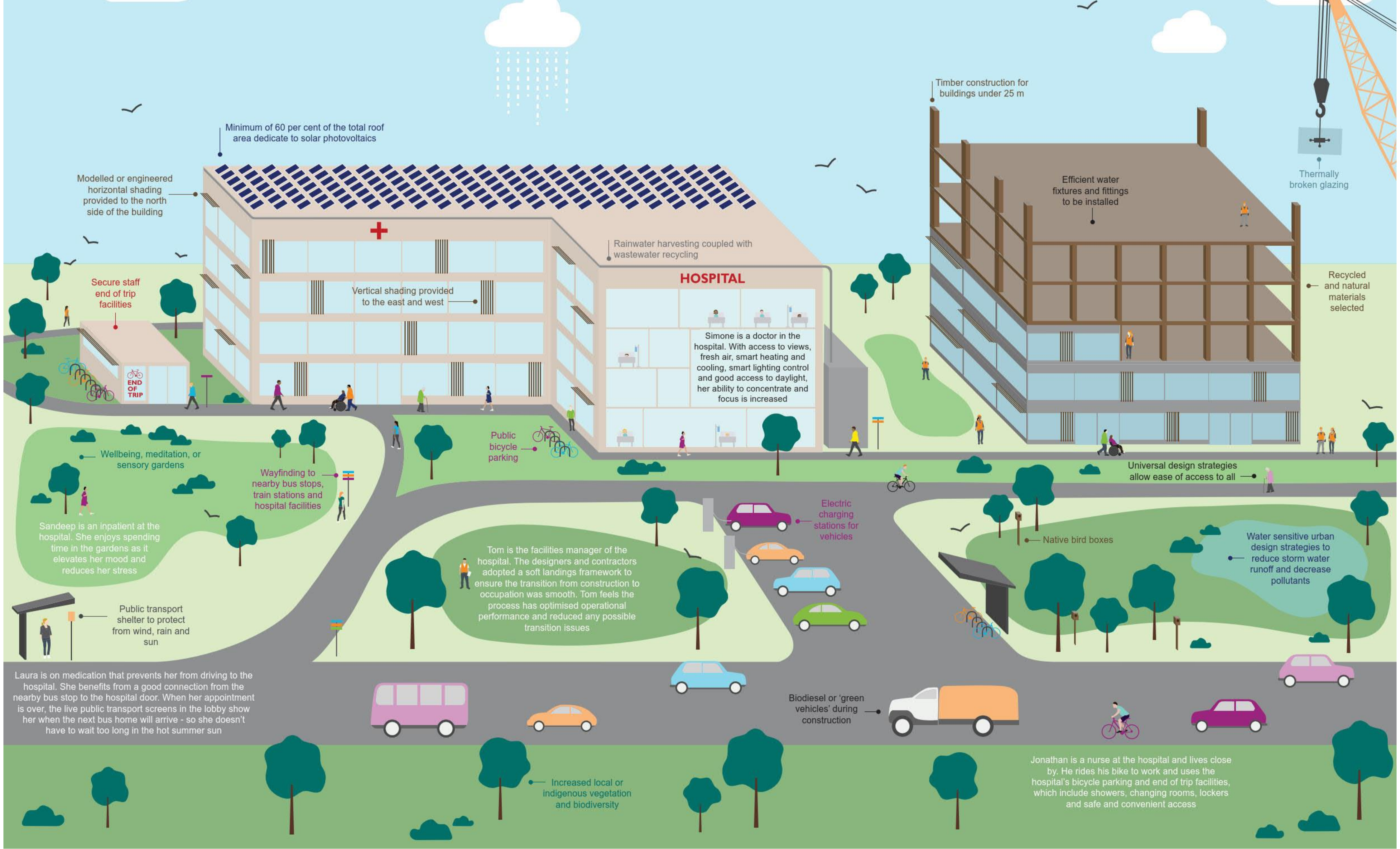
Climate change is a significant and emerging threat to human health and wellbeing. Climate change has direct health and wellbeing impacts such as injury, trauma or death from extreme weather events such as bushfires, floods, heatwaves and dust storms. Indirect impacts include impacts on the social determinants of health and wellbeing, like degradation of the urban environment, access to water, economic costs, unemployment, and food security.

In addition to its patients, staff and tenants, climate change also presents significant risks to the function and operation of the health and human services system, including assets, services, workforce, programs, and policy outcomes.

Climate change risks to infrastructure include inundation due to sea level rise, riverine and inland flooding, soil contraction shifting foundations, extreme windstorms, bushfire and smoke damage, hot days and heatwaves, legionella growth and amplification of other pathogens and microbes. These can result in loss of assets to flooding, or reduced operability of air conditioning units, chillers and emergency generators in extreme heat. If these are not addressed when locating, designing, building and maintaining assets, climate change will reduce asset life and increase operational costs over their lifecycle.

More information on the implications of climate change for healthcare buildings and design responses are provided in Appendix 1. During the design and delivery of healthcare buildings, these implications are to be assessed and appropriate responses integrated within the building.

What does a sustainable healthcare facility look like?



Delivering sustainable healthcare buildings

Business as usual requirements

The most up to date version of the National Construction Code – Building Code of Australia is to be used. Projects moving through feasibility and schematic design are to actively plan for the introduction of revised codes and look to adopt them as soon as practically possible.

The list of business as usual requirements is provided in Appendix 2. These requirements are to be implemented on all public healthcare capital projects in Victoria as part of the base budget.

The project is required to identify which of the business-as-usual requirements are not being included in the project, with supporting explanation for their exclusion. Examples of non-inclusion of a business-as-usual measures are:

- it is not applicable, such as the requirements for below ground carparks where below ground carparks are not part of the project, or
- it is not technically or economically viable to retrofit the initiative into an existing building. Where this reasoning is used, a summary of the analysis undertaken to reach this conclusion must be included.

Design targets

Buildings eligible for NABERS ratings

Healthcare buildings with occupied (in-patient) bed-days, or residential aged care bed-days and separations are to use NABERS for Hospitals reverse calculator1 to estimate the building performance based on the modelled energy and water use. All new buildings are to achieve a 5-Star or higher NABERS rating.

As the calculator requires estimated energy use apportionment of the total building load, a predictive energy model for the whole building will need to be built.

Buildings ineligible for NABERS ratings

Healthcare buildings without in-patient (occupied) bed-days, or residential aged care bed-days are ineligible for NABERS for Hospitals ratings. Whereas there are no set design targets, it is expected these buildings would outperform buildings built to the minimum current National Construction Code – Building Code of Australia. This includes extensions and/or refurbishments of existing buildings.

Performance is to be measured as a percentage improvement of the building, extension or refurbishment based on the Deemed to Satisfy method, against the minimum standards of the current version of the National Construction Code – Building Code of Australia. Predictive energy models are not necessary for these building types but can be included where it would provide value to the project.

Sustainability budget

The cost plan is to allocate 2.5 per cent of the total construction cost for delivering sustainability initiatives above standard practice. This budget is not to be rolled up into the overall project budget.

Where the sustainability budget is used to exceed a standard practice requirement or replace a material with a more sustainable option, the budget only covers the cost above that of implementing the standard option. For example, if the project was targeting wall insulation with an improvement of 10 per cent above the building code, the budget could only be used to deliver the cost difference of delivering an additional R0.25 (that is, the difference between R2.5 and R2.75).

The sustainability budget cannot be removed or reallocated without first implementing one of the following initiatives:

- installation of solar

- exceeding the NCC Section requirements by 10 to 20 per cent
- other suggestions listed in Appendix 3.

In renovation projects where the built form is not significantly affected, the sustainability budget can be used for improving the sustainability of site-wide infrastructure, such as more efficient HVAC (heating, ventilation and air conditioning) systems, improved BMS (building management system) or the installation of solar. A greater focus on fittings, furniture and equipment and total volatile organic compounds can also be targeted to improve the indoor environment quality.

The sustainability budget can be used to support the adoption of new and innovative technologies. Examples of innovation include the use of on-site generation technology beyond the conventional solar panel, such as thin film technologies on glazing that can also reduce solar gain and glare.

The sustainability report is to clearly detail the value of the sustainability budget and the initiatives it is supporting. The report is to include the following key information for each initiative the cost, estimated reduction in energy / water / carbon / waste, financial savings, and simple payback. Similar information is to be provided for the sustainability budget in aggregate. Where financial savings are attributed to benefits such as improved staff productivity and/or patient well-being, the methodology for calculating is to be included.

Installing solar

Business as usual requires 60 per cent of the roof space to be designed for solar, such as orientation, areas of continuous space and lack of shading. The sustainability budget can be used to install solar and arrays are to be sized to meet base load.

The VHBA's Environmental Sustainability Strategy 2018-19 to 2022-23 has a target of delivering 5 per cent of the public health system's electricity use from behind the meter solar. It is recognised that metropolitan hospitals with a large base load and low availability of roof space may struggle to meet this, whereas rural and regional buildings with lower electrical demand and more roof space may be able to exceed 5 per cent.

Healthcare capital works should endeavour to source 5 per cent of electricity from on-site solar but it is not a design target – the VHBA measures performance against the target at the system level.

All solar arrays are to be configured for automatic export of generation data to the department's environmental data management system (EDMS). More detail on the requirements is in Appendix 4.

Installing batteries

It is not recommended that batteries are integrated with solar as it is unlikely that any solar array installed on a hospital would have sufficient export to charge a battery. As the price of batteries reduce, they could potentially provide value in the following scenarios:

- where there is significant differential between the peak and off-peak rates, batteries may lower peak demand and associated costs
- providing energy security of supply to discrete areas of a hospital or pieces of equipment.

As both of these scenarios do not directly or materially reduce carbon emissions, batteries installed for these purposes are not eligible for the sustainability budget. Where modelling indicates that a solar array integrated with a battery could reduce carbon emissions, it should be discussed with the VHBA sustainability unit.

Transitioning to all-electric buildings

By 2025 Victoria's public hospitals and health services will be powered by 100 per cent carbon neutral renewable electricity. Moving to all-electric buildings will therefore support the 2050 net zero carbon target by reducing the use of gas. It is acknowledged that it may not always be viable to deliver an all-electric building on sites that already have gas reticulation and services.

For buildings <10,000 square meters

In general terms thermal loads can be effectively and economically provided by electricity for buildings up to 10,000 square meters. It is therefore expected that all buildings below 10,000 square meters are all-electric.

Where natural gas is used to provide thermal energy, the sustainability report is to provide reasoning why the building cannot be all-electric and detail the technical and financial analysis underpinning this decision. Where this is the case, it is to be discussed with VHBA's Sustainability Unit prior to submission of the sustainability report for review. The approach for transitioning to an all-electric building is to be outlined in the sustainability report.

For buildings >10,000 square meters

It is not mandatory for buildings >10,000 square meters to be all-electric. However, opportunities to use more electric plant and equipment to minimise the use of natural gas is to be investigated during schematic design and documented in the sustainability report. Viable opportunities are to be adopted into the design.

Where natural gas is used, the design needs to allow for the transition to an all-electric building when the gas-fired plant reaches end of life and needs to be replaced. The approach for transitioning to an all-electric building is to be outlined in the sustainability report.

Building performance

Buildings eligible for NABERS ratings

Healthcare buildings with occupied (in-patient) bed-days, or residential aged care bed-days and separations are to use the NABERS for Hospitals reverse calculator to estimate the building's performance based on the modelled energy and water use. All new buildings are to achieve a 5-Star or higher NABERS rating.

A completed screen shot of the NABERS for Hospitals reverse calculator[3] is to be included in the ESD report alongside the modelled results for the proposed building.

As the calculator requires estimated energy use apportionment of the total building load, the sustainability consultant will need to build a predictive energy model for the whole building. The latest advice on the energy break-up of a hospital is on the department's website[4]. The model does not have to detail the plug-in loads and base building use, but the sustainability report is to include any assumptions. The completion of the predictive model is to be delivered within the sustainability consultant scope of services. Where the modelled results fall below the requirements to achieve a 5-Star NABERS rating, these are to be discussed with VHBA's Sustainability Unit before submission of the sustainability report for review.

Buildings ineligible for NABERS ratings

Healthcare buildings without in-patient (occupied) bed-days, or residential aged care bed-days are ineligible for a NABERS for Hospitals rating. Whereas there are no set design targets, it is expected these buildings would outperform buildings built to the minimum National Construction Code – Building Code of Australia. This includes extensions and/or refurbishments of existing buildings.

The sustainability report is to identify the percentage improvement of the building, extension, or refurbishment, based on the Deemed to Satisfy method, against the minimum standards of the current version of the National Construction Code – Building Code of Australia. Predictive energy models are not necessary for these building types but can be included where it would provide value to the project.

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[3] The most up-to-date NABERS for Hospitals reverse calculator is available at https://www.nabers.gov.au/reverse-calculators. If using a local version, it is recommended the version history is checked to ensure the most up-to-date calculator is being used.

[4] See https://www2.health.vic.gov.au/hospitals-and-health-services/planning-infrastructure/sustainability/energy/energy-break-up.

Waste management

The sustainability consultant is to work with the health service to map waste flows (generation, movement to dirty utility and/or loading dock and disposal) for the building. For some buildings this may need to be completed for discrete areas, for example theatre, emergency, ICU, wards, dialysis, supply, and administrative areas, while for smaller buildings it could be done for the whole building.

The mapping exercise will assist in identifying the necessary waste and recycling streams and the required space for infrastructure, including bins, at the point of generation, handling points (for example dirty utility rooms) and disposal though the loading dock. An example waste mapping flowchart for an ICU ward is at Appendix 5.

Delivering climate resilient facilities

The project is to identify and assess climate risks to the building over its design life and detail the design responses included in the building to mitigate and/or adapt to these risks. Climate risks that may eventuate during the asset's planned life but cannot be addressed through the design of the building, are to be identified in the report, as well as details of impacts to the building or its operation and suggested mitigation or adaptation responses.

For sites and/or buildings with a significant climate risk, a draft Climate Adaptation Plan in line with the requirements of Green Star Communities Credit 04: Adaptation and Resilience is to be prepared. Scenarios should reference the latest Victorian Climate Projections, which at the time of publication was 2019. The draft plan is to demonstrate how the responses will minimise risk or add value to the project in a tangible way.

Engaging sustainability consultants

Dedicated sustainability consultants are to be engaged for all projects with a total estimated investment (TEI) of greater than $10 million. Sustainability consultants can be engaged under the principal consultant. The role of the sustainability consultant is to:

- provide specialist technical sustainability advice on integrating sustainability across the project through the application of these guidelines
- provide advice on sustainability initiatives that will deliver best value from the sustainability budget
- report to the VHBA project manager and Project Control Group on the compliance or otherwise of these guidelines.

For projects with a TEI of less than $10 million, the role of the sustainability consultant as described above can be delivered by the principal, architect or services engineer. In this instance, the successful provider must be able to demonstrate the requisite skills and experience within their team in all sustainability topics including waste, indoor environment quality, materials and sustainable transport.

Sustainability consultants can be from the same firm delivering other services to the project where there is a clear separation of personnel and lines of reporting, such as separate staff and project director.

Section J compliance

Section J compliance can be met using the Deemed to Satisfy (DTS) method for all components except building sealing. For building sealing (J3), the JV4 method is to be used. All DTS methods are to be delivered as part of the base budget. The completion of JV4 testing can be funded through the 2.5 per cent sustainability budget, where it cannot be covered within the fee for the sustainability consultant.

At least 10 per cent of the building, by floor area, is to undergo JV4 air tightness testing and the builder is not to be informed which areas are to undergo testing. Where performance is above the minimum 5 m3/hr.m2 at 50 Pa, or a higher specified performance standard, leaks will need to be patched and retested. In addition, a further 10 per cent of the building will require testing to confirm building sealing requirements are being met. If building sealing standards are not met in the second test, leaks will require patching and retesting, with consideration given to further testing, or testing the whole envelope.

The architect is responsible for Section J compliance for the building fabric (J1), glazing (J2) and building sealing (J3). The services engineer is responsible for Section J compliance for parts J5, J6 and J8.

The role of the sustainability consultant in Section J compliance is to provide specialist advice and input to the architect and services engineers on the energy performance of the building. The sustainability consultant may complete documentation as necessary but cannot sign-off on Section J compliance documents.

Where the design components fail to achieve the requirements of Section J, the sustainability consultant is to undertake appropriate performance-based assessment processes and provide advice and detail on how the minimum standards can be achieved. The sustainability consultant is to review all Section J compliance documentation prior to formal sign-off by the architect and services engineers.

Sustainability workshops

Sustainability workshops are a useful way to bring the design team and key stakeholders together to agree on the sustainability priorities for a project. Workshops are to be facilitated by the sustainability consultant and include representatives from:

- health service facilities management or engineering department, capital department and sustainability officer or, if not appointed, the primary sustainability contact[5]
- design team including architect, services engineer and project manager
- VHBA project manager
- VHBA sustainability unit, where appropriate.

Sustainability initiatives are to be prioritised based on delivering best value over the life of the project against the following criteria in no order of importance:

- reduced carbon emissions
- improved patient and staff wellbeing
- improved environmental outcomes
- reduced operating costs.

Application of the guidelines on existing projects

Projects that were in schematic, or detailed design prior to 1 July 2020 should endeavour to meet the guidelines as much as the budget and design allows.

Projects that were in masterplan or feasibility from 1 July 2020 must meet the guidelines.

Engaging the VHBA sustainability unit

The VHBA sustainability unit will review the list of funded projects at the start of each year to identify where it can provide best value. Where input is provided, it may include:

- input to design of, and attendance at, sustainability workshops
- review of sustainability and other reports as required
- meeting with the design team to challenge proposed sustainability concepts
- spot checks to ensure projects are complying with these guidelines.

Input on other projects will be provided as resources allow. Design teams are to liaise with the nominated VHBA project manager to organise input from the VHBA sustainability unit.

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[5] The VHBA sustainability unit administers a list of primary sustainability contacts for all health services. Contact details can be requested via email at **sustainability@health.vic.gov.au**.

Quality assurance

The VHBA sustainability unit will audit a representative sample of capital projects annually. These will be focussed on projects delivered by VHBA but could include projects delivered directly by health services. The audit will include projects at a variety of stages from masterplan to delivery.

The audit will include reviewing the business as usual requirements and initiatives delivered through the sustainability budget against the sustainability guidelines. Where appropriate, the VHBA sustainability unit will undertake site visits to verify the delivery of initiatives.

Audit results will be used to:

- report on the implementation of the guidelines and delivery of sustainable healthcare buildings to the VHBA executive
- inform updates of the sustainability guidelines.

The following control points are embedded within VHBA's Project Management Framework:

- endorsement of schematic design sustainability report by the sustainability unit,
- endorsement of detailed design sustainability report by the sustainability unit,
- provision of data enabling addition of building to VHBA's environmental data management system, and
- automatic upload of nett generation data from any installed on-site generation, such as solar, delivered as part of the project to VHBA's environmental data management system.

These control points cannot be passed without endorsement of appropriate materials by VHBA's sustainability unit.

Appendix 1: Climate resilience in capital works

Event	Asset implications	Resilience responses
Rising temperatures and extreme heat	Increased thermal discomfort and the risk of heat stress, resulting in decreased productivity of workers and impacting the health of vulnerable communities Increased demand for air-conditioning, placing demand on energy networks and raising energy demand and associated utility costs Increased peak loads and associated utility costs Increased heat in urban environments, creating heat island effects and impacting the comfort of the users Impacts on building structures and materials, increasing risks of movement, cracking and failure of building envelopes Decreased levels of soil moisture, impacting building foundations (such as movement) and surrounding landscape External building materials becoming too hot to touch (such as handrails, seats)	Orientate building for passive design Provide for natural shade through landscape design Use light colour materials and heat reflective coatings Select roof, wall and floors materials for increased durability and water resistance Improve building insulation and design out thermal bridging Include high performance glazing Increase passive or natural ventilation where possible Include fixed external shading and internal blinds External materials designed to be touched have low conductivity such as wood or recycled plastic (such that they are not extremely hot after prolonged sun exposure) Increase efficiency or capacity of HVAC systems, demand control ventilation per AS1668.2 Include strategies to reduce operational energy
Bushfires	Increased severity and number of bushfires causing smoke, fire and water damage to property and assets Increased risk to the health and safety of people and higher demand on emergency services and healthcare facilities	Avoid proximity to bushfire prone areas Build to, or exceed, appropriate bushfire standards
Extreme rainfall, storm, hail and high wind events	Localised flooding leading to property damage and potential sewerage and stormwater system overflow, limiting access and egress Falling trees and branches, impacting buildings, people, transport and access Wind, hail and rain damage to building fixtures and structure	Secure signage and fixtures to resist extreme storm events Ensure built land surfaces are permeable Select appropriate landscaping to mitigate. Include for a tree maintenance plan. Design for future flood levels, rainfall intensity
Sea level rise and storm surge	Intensified rates of coastal erosion, resulting in property loss and land	Incorporate water sensitive urban design Design for future flood levels, rainfall intensity

Event	Asset implications	Resilience responses
	damage and reduced access to open space Increased risk of localised flooding limiting access and business continuity, increasing damage and insurance premiums Increased salt spray and seawater intrusion resulting in increased corrosion and impacts on structural integrity of infrastructure and assets	Avoid proximity to a floodplain, waterway or coast. If unavoidable, design for future flood levels, rainfall intensity (raise building FFL, essential services) Select materials resilient to local environment
Reduced rainfall rates	Impacts on building structures and materials, increasing risks of movement, cracking and failure of building envelopes Decreased levels of soil moisture, impacting building foundations (such as movement) Reduction in harvestable rainwater Increased irrigation requirements, reduced plant selections	Select drought and heat tolerant indigenous plants and grasses Select plants to provide shade where appropriate Increase water efficiency of fittings, fixtures and services Ensure reliable potable water supply and collect recycled water for additional resilience
Other	Increased risk of loss of road access in extreme weather events impacting ability of staff, patients, visitors, emergency response and suppliers to access healthcare facilities Increased risk of loss of grid connectivity in extreme weather events	Include climate risk in business continuity and emergency management plans, including procedures for staff, patients, visitors and logistics to access the site when access to roads are impacted Link to or support of local health and wellbeing plans Ensure continuity of essential engineering services

Appendix 2: Business as usual requirements

Systems, processes and guidance

The managing contractor (builder) is to have an environmental management system developed in line with ISO 14001 and an environmental management plan in line with the NSW Guideline for the preparation of environmental management plans[6] or similar.

The building is to be commissioned in compliance with the Chartered Institute of Building Services Engineers (CIBSE) commissioning code M.

A building user guide is to be provided to the operator detailing:

- energy and environmental strategy for the building
- modelled performance targets
- building monitoring system
- details of sustainable features and any operational requirements.

Provide VHBA, via email to **edms@health.vic.gov.au,** the environmental data management system (EDMS) requirements template (see Appendix 6).

Post-occupancy evaluations of energy and water targets and waste measures against actual building performance within six months of practical completion. Actions required to address any identified discrepancies and addressed through defects and liability.

Indoor environment quality

Design and internal layout to provide daylight for occupied functional areas (all areas likely to be occupied for at least one continuous hour per day).

Internal layout to reduce excessive solar heat gain for patient areas.

Treat doorways and other external openings to manage prevailing winds and draughts.

Inclusion of internal stairs to promote internal staff and patient movement, noting requirements for universal design.

Use of electrolysed water systems or equivalent for surface cleaning in commercial kitchens.

Locate outside air intakes away from major roads, loading docks and waste collection to reduce contaminants from entering the building.

Design for a potential wider and more variable internal temperature band (such as 19 to 26° Celsius) adjusted for seasonal variation, unless contraindicated for clinical or operational reasons.

All paints, adhesives, sealants, wall and ceiling coverings to meet the following total volatile organic compounds (TVOC) in g/L of ready to use products:

- Interior wall and ceiling paint – 5g/L
- General purpose adhesives and sealants, trims, varnishes, wood stains, primers, sealers and prep coats – 75g/L
- One and two pack performance coating for floors, acoustic sealants, architectural sealant, waterproofing membrane and sealant, fire retardant sealants and adhesives, structural glazing adhesive, wood flooring and laminate adhesives and sealants – 250g/L
- Carpets: 0.5mg/m2/hour under ASTM D5116 test protocol for Total VOC; 0.05mg/m2/hour under ASTM D5116 test protocol for 4-PC
- All plywood, particleboard, MDF and LVL to meet formaldehyde limits of no more than 1mg/L

[6] See Planning NSW's Guideline for the preparation of environmental management plans (.PDF) <https://www.planning.nsw.gov.au/~/media/Files/DPE/Guidelines/guideline-for-the-preparation-of-environmental-management-plans-2004.ashx?la=en>

- All high pressure and compact laminates to meet formaldehyde limits of no more than 0.1 mg/m²hr

Acoustic treatment to meet best practice guidelines for noise levels, reverberation and acoustic separation as per current AS/NZS 2107:2016 standard.

A minimum of 30 per cent by cost of loose furniture to be third party-certified by a recognised environmental certification scheme, such as GECA, Green Rate, Eco specifier, SMaRT 4.0, Green Tick or equivalent.

Glare control for all occupied spaces unless it can be demonstrated that glare is eliminated by external shading features or glazing treatments. If blinds are installed, they are to be able to be controlled by affected occupants and have a visual light transmittance (VLT) of less than 5 per cent.

Energy efficiency

Orient and design the building, within site constraints, so that as close as possible to 100 per cent of the north façade is shaded at the noon solstice and there is minimal glazing (with shading) on the west façade.

Maximise shading of northern and western façades from existing trees and neighbouring buildings.

Maximise use of directly accessible stairs through location and design.

All window systems to be double glazed and thermally broken with light-coloured window frames.

Design of skylights to harvest daylight in single storey buildings and top floors of multi-storey buildings within transit routes and stairs must include appropriate insulation properties to minimise thermal heat gain and or heat loss.

Provide operable windows for natural ventilation in sub-acute patient and administration areas, where feasible.

Design out inefficient thermal bridging across floor plates, walls and roofing. Examples of thermal bridging include cantilevered structures with no thermal break (such as balconies and wing walls), steel framed walls and roofs with no thermal break.

For non-24-hour theatres, implement a set-back mode for when the operating theatres are not in use. In set-back mode the operating suite will:

- set to minimum outside air
- widen temperature dead band to 14 to 30° Celsius
- always maintain full humidity control within the limits set in Engineering guidelines for healthcare facilities: Volume 4 – mechanical engineering.

Design outside air cooling options to server, communication rooms and data centres with supplementary computer room air conditioning unit (CRAC) air treatment for support and higher temperature operating days.

All below-ground car parks to have carbon monoxide monitoring and variable speed drive (VSD) fan controls.

Install minimum 0.95 power factor correction systems for building services.

Use of heat pump or high efficiency equivalent technology to provide domestic hot water for sites below 10,000 sqm.

Investigate viability of commercial scale heat pumps for domestic hot water for sites greater than 10,000 sqm.

All boiling water units to have operational timer controls installed and set to Monday to Friday 7 am to 7 pm, unless otherwise required, and not require supplier or specialist service engineer expertise to change time settings.

Air conditioners (single phase, non-ducted), clothes washers, clothes dryers, dishwashers, televisions, refrigerators, freezers, computer monitors and pool pumps to have a minimum 5-star energy rating.

Over door air heaters or curtains to be designed out.

Lighting

Design and take advantage of natural light in new buildings to minimise the use artificial lighting during daytime working hours.

Internal artificial light sources to have a minimum colour rendering index (CRI) of 80.

External and internal artificial lighting to employ occupancy sensors, lux level sensors, lux/occupancy combined sensor or BMS transition dimming and shutdown as appropriate to building type and work area use. Include local control for light zones of up to 75 sqm.

Artificial lighting efficiency benchmark must not exceed the NCC-BCA minimum requirements per square meter averaged across the building net floor area (at maximum wattage).

Glare from lamps to be managed, for example, by:

- fitting bare lamps with baffles, translucent diffusers
- complying with clause 8.3.4 of AS/NZS 1680.1-2006, or
- not exceeding the maximum Unified Glare Rating (UGR) values listed in Table 8.2 of AS/NZS 1680.1-2006, calculated in line with Clause 8.3.3.

LED technology to be used for all lighting, unless clinical practices dictate specialist lighting solutions.

External lighting, including architectural, public areas and carparking to use LED lighting with lower activity dimming and day light sensors (dusk to dawn). Architectural lighting not required for wayfinding or public safety is not to operate between the hours of 12.00 am and 6.00 am.

Metering

A metering and monitoring strategy to be provided, describing the water and energy sub-metering strategy for the project, including instruction for data collection and analysis and an integration control strategy between building services disciplines. Metering to form part of handover materials to the operator.

Metering to be designed in line with 'Good practice' in Appendix A of DHHS' Guidance note on implementing effective energy and water metering systems[7].

All metering connections (sub-metering) to be installed and commissioned to report to the building management system, or dedicated monitoring platform in the engineering or facilities management office (or both). Metering to be able to provide real-time notifications to engineering or facilities management staff (or both) of use outside abnormal parameters.

Heating and cooling

Reverse cycle split system air-conditioning units to be within one star of highest available for output (kW).

Building ventilation and heat rejection vents to be located near or next to hot water and heating heat pump systems to improve air-on conditions to heat rejection plant.

On-site renewable generation

At least 60 per cent of the roof space is to be designed for the installation of solar, including:

- continuous roof areas of greater than 20 square meters
- roof top systems to be designed to minimise shading from trees, HVAC units, vents, pipes, ventilation systems, skylights, mobile phone masts, parapets or other architectural design features

[7] Available on Health.vic's Guidelines and guidance notes on sustainability page <https://www2.health.vic.gov.au/hospitals-and-health-services/planning-infrastructure/sustainability/resources/guidelines-on-sustainability>

- north, east and west facing including any azimuth angles in between (with plus or minus 10-degree tolerance)
- roof pitch angles of 25 degree or less are preferred for rooftop systems installations
- preference for tin roof finishes rather than roof tiles
- installation of solar preference for lower storey buildings (easier access for install and maintenance) where they will not be overshadowed by future development.

Allowance within the design of the electrical infrastructure, including circuit breakers or space in the main switch board (or both) to enable retrofit of solar photovoltaics without requiring upgrade to electrical infrastructure.

Adequate weather protected wall space suitable for the location and installation of inverters.

Where safe access and/or harness points for working at heights are being installed for other plant, the design is to allow expansion for future use for the solar panels.

Solar photovoltaic arrays are to be sized to match the hospitals base load and avoid export to the grid due to diminishing returns from over-sized arrays.

All solar arrays are to be configured for automatic export of generation data to the department's environmental data management system (EDMS) as detailed in Appendix 3.

Water management

Install tapware with maximum flow rate equivalent to 6-Star WELS rating or above in all bathrooms, en-suites and general amenity areas.

Install dual flush toilets with flush rates equivalent to 4-Star WELS rating or above.

Install showers with maximum flow rate equivalent to 3-Star WELS rating or above.

Urinals for staff and visitors to be fitted with demand driven or smart demand operation and have flush rates equivalent to 5-Star WELS rating or above. No cyclic flushing urinals to be installed.

Patient amenities taps to include flow rates equivalent to 6-Star WELS rating or above.

Drinking water fountains to be installed in internal and external public areas to minimise use of bottled water.

Water using appliances, such as dish washers and washing machines to be equivalent to 4.5-Star WELS rating or above.

Preference cooling of equipment such as CSSD or compressors with chilled water and heat exchangers or non-potable water where services are in close proximity. Use of non-potable water to be in line with Guidelines for water reuse and recycling in Victorian healthcare facilities: Non-drinking applications.[8]

Include water-sensitive urban design, such as swales and biofiltration to manage stormwater run-off.

Design landscaping to be water efficient, including use of mulching, plant selection and water-efficient irrigation system, comprising subsoil drip systems and automatic timers with rainwater or soil moisture sensor over-ride.

Provide rainwater tanks to collect water from roof tops, reverse osmosis (dialysis) and other areas where flows justify. Collected water to be treated and used for landscape irrigation and toilet flushing in staff and public areas. Use of non-potable water to be in line with the Guidelines for water reuse and recycling in Victorian healthcare facilities: Non-drinking applications.[9]

Wash-down hoses to be controlled by commercial high-pressure water efficient trigger nozzles and connected to rain, or reclaimed water tanks.

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[8] Available on Health.vic's Managing health and environmental risks of water supply page <https://www2.health.vic.gov.au/hospitals-and-health-services/planning-infrastructure/sustainability/water/managing-water-supply>

[9] See footnote 6

Materials specification and selection

Re-usable fittings compliant to current performance requirements, furniture and workstations from vacated and/or demolished premises to be re-used or donated to third party uses.

Design for re-use of existing structures or facilities on-site, where feasible.

Adopt and promote the use of standard material sizes and components in design and fit-out.

Minimise use of paint or finishes on exterior surfaces.

Use of post-consumer waste or post-industrial waste, such as recycled aggregate, fly ash and silica fume for concrete and post-consumer recycled content or re-used steel. A proportion of recycled content to be used in the following:

- tarmacked areas, including on-site access roads, at-grade carparks and footpaths
- non-structural concrete, including kerbing and footpaths, with concrete aggregates to contain a minimum 15 per cent recycled or substitute materials fly ash, crushed recycled aggregate
- car park wheel-stops, landscaping elements, decking, bollards and fixed outdoor furniture.

Maximise use of locally produced building materials, construction workers and facilities.

Cross laminated timber (CLT) structure options to be considered during design.

All timber (structural and architectural) to be Forest Stewardship Council (FSC) certified or recognised equivalent.

Preference carpet squares with a recycled content for ease of replacement.

Preference stainless steel, concrete or bamboo bench tops in food preparation areas. Stone or composite stone products are to be avoided.

Preference for recycled content for plumbing and drainage reticulation pipework.

Waste and resource recovery

95 per cent by weight target for demolition and construction materials (excluding hazardous waste) to be re-used or recycled (or both).

Provide a baler in the loading dock and space provision of 6 square meters.

Provide an additional 10 square meters in the loading dock for storage and management of recycling bins.

Provide an additional 10 square meters in the loading dock for a compactor in buildings greater than 10,000 square meters.

Space provision of an additional 20 square meters per 1,000 square meters of building space for installation of recycling bins at the point of generation for recovery of the following resources.

Clinical areas	Staff and admin	Public areas	Kitchen areas
Commingled	Commingled	Commingled	Commingled
Paper and cardboard	Paper and cardboard	Organics	Organics
Confidential paper	Confidential paper	E-waste (see note)	
PVC	E-waste (see note)		
Kimguard			
E-waste (see note)			

Note: In Victoria it is illegal to send e-waste to landfill. E-waste to be collected in these areas generally relates to batteries, pagers and mobile phones. Space for larger e-waste items, such as medical equipment and computers, is to be allowed for in the loading dock or facilities department.

Space budget is to be distributed across the points of generation including dirty utility rooms, supply, facilities management/engineering and kitchens. Even if collection services are not available for these resources, space is to be provided so they can be collected when services become available.

Ecology and landscaping

Avoid building on land that is:

- prime agricultural value
- below the 100-year flood operations location
- subject to erosion, bushfire or landslides
- land of recognised heritage or conservation value.

Maximise retention of existing ecological resources, contiguous ecosystems networks and native vegetation during construction for project delivery.

Maintain balance of topsoil and fill on site, such that minimal topsoil is removed from site. Topsoil is not to be sent to landfill.

Deliver a net biodiversity increase to the site from landscaping, using locally indigenous flora and planting for habitat and enhancing local wildlife, including invertebrates.

Provide habitat corridor links where the site is close to conservation areas and natural habitats.

Maximise use of sensory and well-being gardens for interaction with staff, visitors and patients/residents.

Maximise use of outdoor spaces and activities for patient rehabilitation.

Transport

Incorporate connectivity to transport nodes within the site, adjacent to it and surrounding (bike paths, bike storage, car parks, public transport nodes, pedestrian networks) following universal design principles.

Health service to develop an integrated transport plan (ITP) for greenfield projects over 10,000 square meters consolidating all behavioural and infrastructural transport measures implemented on site and recommendations for future improvements.

Provide tele- and video-conferencing facilities for corporate office use. Encourage adoption of tele-medicine where budget allows.

Provide wayfinding to direct staff, patients and visitors to bike and pedestrian networks and public transport, following universal design principles. Work with local council to provide wayfinding from public transport nodes to the healthcare facility.

Provide secure and conveniently located on-site bicycle parking for staff and visitors and ‘after-trip’ facilities for staff in line with provisions in clause 52.34 of the Victorian Planning Provisions (VPP), including where exemptions exist. Buildings are to meet the requirements for ‘Hospitals’ or ‘Medical Centres’, whichever is the most appropriate. Healthcare facilities located in Melbourne and regional centres are to exceed VPP clause 52.34 requirements by at least 20 per cent.

Provide internal charging points with appropriate berth for motorised mobility devices and investigate viability of charging points for e-bikes and scooters.

Provide 25 per cent of total parking spaces designed and labelled for small cars or motorcycles and mopeds (or both), hybrids, electric cars and alternative-fuel vehicles and carpool vehicles in preferential locations with adequate signage or markings.

Future-proof carpark infrastructure to enable charging stations to be installed in line with DHHS' fleet management guide, Planning for electric vehicles in the health sector.[10]

Emissions to land, water and air

Install noise attenuation on engineering plant and other noise sources to meet required noise emission standards. Location of engineering plant to be considerate of local noise sensitive receptors, including residential housing and other community facilities.

Avoid ozone-depleting chemicals by sourcing recognised alternatives with low ozone-depleting potential (ODP), for example, hydrocarbon gases in air conditioning and thermal insulants.

No lighting to be directed beyond site boundaries or upwards without falling directly onto a surface for illumination, being mindful of safety and 'ambience' requirements.

Non-blown insulation (thermal, pipe, fire, acoustic) to have a global warming potential (GWP) of less than or equal to 5. Blown insulation to preference low GWP products.

Where refrigerant systems have a charge of over 3 kilograms or refrigerant with a GWP over 5 (or both), leak protection and leak detection systems are to be installed.

[10] Available on Health.vic's Transport page <https://www2.health.vic.gov.au/hospitals-and-health-services/planning-infrastructure/sustainability/transport>

Appendix 3: Guidance for using the sustainability budget

Install embedded generation solar panel that is sized to the base load of the building.

Exceed the minimum NCC BCA 2019 Section J requirements by 10 or 20 per cent, as provided in the following table:

Part	Minimum standard	10 per cent improvement	20 per cent improvement
Insulation (total system values)	Roof: R3.2 Walls: R2.5 Floor: R2.0	Roof: R3.5 Walls: R2.75 Floor: R2.2	Roof: R3.85 Walls: R3.0 Floor: R2.4
Glazing (total system values)	U-Value 4.5 SHGC 0.45	U-Value 3.0 SHGC 0.40	U-Value 2.6 SHGC 0.40
Building sealing	Airtightness testing required to 5 m3/hr.m2 at 50 Pa, tested in line with Method 1 of AS/NZS ISO 9972	Airtightness testing required to 4.5 m3/hr.m2 at 50 Pa	Airtightness testing required to 4.0 m3/hr.m2 at 50 Pa
HVAC	VAV Air Cooled System Energy efficiency ratio (EER) 3 for refrigerant chillers at full operation	Power factor 0.95 EER for full load operation 4.71	Power factor 0.98 EER ratio for full load operation 5.13
Lighting	3.5 W/m2	3.0 W/m2	2.7 W/m2
DHW	J7 – Thermal efficiency 86% Central gas system	Thermal efficiency of 90% central gas system Or Electric heat pump	Thermal efficiency of 95% central gas system Or Electric heat pump
Monitoring	Standard BMS to meet NCC Section J8 requirements	BMS and 10 additional sub-meters and connections	BMS and 20 additional sub-meters and connections

Provide real-time public transport travel time display in the public foyer.

Install reed switches on openable windows in rooms with individual thermal controls to manage heating and cooling.

Incorporate pre-conditioning technology for air source heat pumps and energy recovery systems on flues and exhausts.

Introduce ground source heat pumps for pre-air/water conditioning

Incorporate extended external building design to extend and improve building summer shading.

Provide a ‘soft landings’ approach for a period of 12 months.

Install super-efficient equipment with an energy rating of 7 to 10 stars.

Exceed any of the business as usual requirements.

Appendix 4: Environmental data management system requirements

The following key information is to be provided to set-up a new facility, add an asset to an existing facility, or update existing facility details in the department's environmental data management system.

Facility details

Facility or asset details	Guidance	New facility or asset details
Building name	*Free text*	
Is this a new facility?	*Yes or No*	
Is this a new asset adding to an existing facility	*Yes or No*	
If Yes, what facility	*Free text*	

Contact details

Facility or asset details	Guidance	New facility or asset details
Health service contact	*Type name here*	Type email address here
Sustainability consultant	*Type name here*	Type email address here
VHBA project manager Date power connected	*Type name and date here*	Type email address here

Building details

Lists of preselected answers are shown on the following page.

Facility or asset details	Guidance	New facility or asset details
What peer group does the building belong	*Select from 'Peer group' list*	
Building area in sqm – New / refurbished	*Amount of sqm*	
Land area (New site only)	*Amount of sqm*	
Facility type	*Select from 'Facility type' list*	
Health service (Operator)	*Health service name*	
Output Code	*Select from 'Output code and label' list*	
Output label	*Select from 'Output code and label' list*	
Building type	*Select from 'Building type' list*	
Address details	*Full postal address*	
Town or Suburb	*Full postal address*	
Postcode	*Full postal address*	
Asset configuration	*Please select 1, 2–3, 4–9 storeys*	

Facility or asset details	Guidance	New facility or asset details
Total levels	*How many levels, including basements*	

Measurement devices

Type of measurement device	Guidance	Measurement device details
NMI	*Not account number*	
Electricity supplier	*Name if known*	
MIRN	*Not account number*	
Gas supplier	*Name if known*	
Water account	*Account number*	
Water supplier	*Name*	

Installation of solar arrays and water tanks

Initiative	Metric	Size	Name of building installed at
Solar array	*kWp*		
Water tank	*Litres*		

Lists of pre-selected answers

Peer group

Select the dominate activity type for building:

- Accommodation
- Acute
- Aged care
- Ambulatory
- Community Health
- Metro Local
- Metro Regional
- Office
- Regional
- Rural
- Specialist
- Sub-Acute
- Tertiary

Facility type

- Specialist Hospital
- Public Hospital-Acute
- Public Hospital-Subacute
- Residential Aged Care
- Ambulance Station

Output code and label

- 11000 Acute health
- 12000 Ambulance
- 13000 Aged & home care
- 15000 Mental health
- 16000 Public health
- 27000 Dental health
- 28000 Community health
- 34000 Drug services

Building type

- Hospital
- Aged care
- Administration or Office
- Community, Allied or Primary health
- Mental health
- Dialysis
- Accommodation
- Car park
- Kitchen
- Laundry
- Plant room
- Ambulance

Appendix 5: Example waste mapping for an ICU ward

Ward: ICU

***Required bins on the ward floor**:*

Clinical waste

- *10 bins*
- *P22 in each room, on wheels, always in room.*

General waste

- *10 bins*
- *1 small bin in each room, grey bin, black lining*
- *60 litre bin at desk*

Sharps bin

- *3 bins*
- *P22, on wheels, moved between rooms*

Recycling

- *1 120 litre bin for PVC*
- *Receptacle at nurses station for e-waste*

Comment:

- *Allow wall space beside bins for educational materials including posters*

Behaviour:

Nurses dispose of most if the waste

Doctor rarely disposes of waste

Technician does not dispose of waste. Empties bins

Dirty utility

Required bins:

Clinical waste

- *2 bins (240 litre)*

General waste

- *2 bins (240 litre)*

Commingled recycling

- *1 bin (240 litre)*

Paper recycling

- *2 bins (240 litre)*

Pharmaceutical

- *2 pharmaceutical bins (1 with absorption capacity)*
- *1 pharmaceutical sharps bin*

Single use metal instrument

- *One collection tray*
- *Collected by CSSD technician*

Loading Dock

Number & type of compactor: *TBC*

Comment: *Allow 6 sqm for a baler, 10 sqm for recycling bins and 10 sqm for a compactor.*

Technician moves waste from ward to dirty utility after treating each patient.

Cleaner moves waste from dirty utility to loading dock 2x per day morning and afternoon

Waste contractors pick up waste

Nurse calls environmental services when PVC and e-waste bin needs collecting

Appendix 6: Data acquisition from embedded solar PV

This document specifies the required data feed to be provisioned for all embedded solar PV installations in the Victorian public health portfolio.

Aim

The aim is to provide a periodic structured solar data production record, readable by automated computer systems (interface), that can be automatically uploaded into the health environmental data management system (EDMS) to track hospital solar PV electricity production data.

Transmission methodology

The system is to provide information to the interface via email containing an attached file in Excel CSV format (\r\n for new line) containing records in the following structure:

‘supplier name’,’measurement device’,’start datetime’,’stop datetime’,’measured quantity’,’measurement unit’,’activity name’\r\n

Term	Definition
Suppler name	The producer of the measurement. For a health service owned solar installation, this is the health service name (such as Eastern Health).
Measurement device	A unique identifier for the solar PV system (or part of a system) from which the data is being supplied. For a measurement device that reports solar production from the entire solar PV system (such as taken from the Class one LGC meter, a single inverter or for reporting an aggregate of multiple inverters), the naming convention follows the format: **FACILITY NAME_SOLAR_kWp** (system capacity). For example, for a 7 kWp array at Healesville Hospital, the measurement device would be named: **HEALESVILLE_SOLAR_7**. Where Solar PV data is being measured from multiple measurement points within the overall solar PV installation (such as emails generated from individual inverter outputs where there is more than one inverter), the naming convention follows the format: **FACILITY NAME_SOLAR_kWp_Inverter (or other device) number**. For example, for a 200 kWp array at Bendigo Hospital with separate measurement devices, the measurement devices would be named: **BENDIGO_SOLAR_200_01**, **BENDIGO_SOLAR_200_02** and so on.
Start datetime	The time of the measurement period start in SQL format datetime **YYYY-MM-DD HH:MM**. For example, 9 **September 2017 at 11.30 pm is recorded as 2017-09-10 23:30.**
Stop datetime	The time of the measurement period end in SQL format datetime **YYYY-MM-DD HH:MM**. For example, 11.44 pm on 10 September 2017 is recorded as **2017-09-10 23:44**
Measured quantity	The amount of the measurand. For example, the measured amount on 200kWh is 200.
Measurement unit	The unit of the measurand. For solar this is kWh.

Term	Definition
Activity name	The EDMS-approved name for the activity type. For solar it is Solar Power (with capitalisation as shown).

Example seven-day extract

Eastern Health,HEALESVILLE_SOLAR_7,2017-09-10 00:00,2017-09-10 23:59,0.060,kWh,Solar Power

Eastern Health, HEALESVILLE_SOLAR_7,2017-09-11 00:00,2017-09-11 23:59,0.170,kWh,Solar Power

Eastern Health, HEALESVILLE_SOLAR_7,2017-09-12 00:00,2017-09-12 23:59,0.200,kWh,Solar Power

Eastern Health, HEALESVILLE_SOLAR_7,2017-09-13 00:00,2017-09-13 23:59,0.370,kWh,Solar Power

Eastern Health, HEALESVILLE_SOLAR_7,2017-09-14 00:00,2017-09-14 23:59,0.550,kWh,Solar Power

Eastern Health, HEALESVILLE_SOLAR_7,2017-09-15 00:00,2017-09-15 23:59,0.680,kWh,Solar Power

Eastern Health, HEALESVILLE_SOLAR_7,2017-09-16 00:00,2017-09-16 23:59,0.800,kWh,Solar Power

Note: CSV files must:

- **not** contain header rows
- **not** contain blank rows

E-mailing

E-mails are to be sent to **direct-data@edensuite.com.au**.

E-mails must contain only a single attachment file – if multiple files are generated at the same time by a batch process, they must be emailed separately.

Frequency of e-mailing from each measurement device can be set appropriate to the solution provided but should not be less frequently than monthly.

Solutions that require manual action by health services or third parties to process e-mails will not be accepted.

Notification of measurement device names

When setting up a new data supply, notify the department via email to edms@health.vic.gov.au of the measurement device unique identifier, the solar PV system it is associated with and the frequency of e-mailing.

Any queries on the collection of solar data, or naming measurement devices can be sent to edms@health.vic.gov.au.

Appendix 7: Image descriptions

Illustration on page 11

The illustration shows a hospital building and its surrounds, including bicycle parking, electric charging stations and a new building being constructed.

The hospital building

Minimum of 60 per cent of the total roof area dedicated to solar photovoltaics.

Rainwater harvesting coupled with wastewater recycling.

Modelled or engineered horizontal shading provided to the north side of the building.

Vertical shading for the east and west.

Simone is a doctor in the hospital. With access to views, fresh air, smart heating and cooling, smart lighting control and good access to daylight, her ability to concentrate and focus is increased.

Construction

Timber construction for buildings under 25 metres.

Efficient water fixtures and fittings to be installed.

Thermally broken glazing.

Recycled and natural materials selected.

Biodiesel or ‘green vehicles’ during construction.

Tom is the facilities manager of the hospital. The designers and contractors adopted a soft landings framework to ensure the transition from construction to occupation was smooth. Tom feels the process has optimised operational performance and reduced any possible transition issues.

Outside the buildings

Wellbeing, meditation or sensory gardens.

Native bird boxes.

Waster sensitive urban design strategies to reduce storm water runoff and decrease pollutants

Increased local or indigenous vegetation and biodiversity.

Sandeep is an inpatient at the hospital. She enjoys spending time in the gardens as it elevates her mood and reduces her stress.

Access and transport

Universal design strategies allow ease of access to all.

Electric charging stations for vehicles.

Public transport shelter to protect from wind, rain and sun.

Laura is on medication that prevents her from driving to the hospital. She benefits from a good connection from the nearby bus stop to the hospital door. When her appointment is over, the live public transport screens in the lobby show her when the next bus home will arrive – so she doesn’t have to wait too long in the hot summer sun.

Public bicycle parking.

Secure staff end of trip facilities.

Jonathan is a nurse at the hospital and lives close by. He rides his bike to work and uses the hospital's bicycle parking and end of trip facilities, which include showers, changing rooms, lockers and safe and convenient access.

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Victorian Health Building Authority

VICTORIA State Government