Victorian Health Building Authority

Embedding sustainability in health facility carparks

Health Technical Advice HTA 2024-004

Purpose

This Health Technical Advice (HTA) provides general guidance on sustainability requirements and opportunities for public health facility carpark design and construction.

This HTA is to be read in conjunction with the Guidelines for sustainability in health care capital works <https://www.vhba.vic.gov.au/sites/default/files/2021-10/Sustainability-guidelines-for-capital-works-VHBA-Revised-October-2021.pdf> ('the Guidelines').

Context

Health facilities typically include carparking in some form to cater for fleet vehicles, staff, or the public. Depending on carpark typology (basement, on-grade, or multi-storey), there are a range of opportunities to improve sustainability outcomes.

The Guidelines include several business-as-usual (BAU) requirements relevant to health facility carparks that are to be included in the project base budget. Additional opportunities identified in this HTA may be funded by the 2.5% sustainability budget if deemed appropriate for the project and agreed with the project team, VHBA, and the relevant health agency.

Sustainability requirements

The following section outlines the minimum requirements for car parks at public health facilities as per the National Construction Code (NCC) 2022 Section J and the Guidelines. These requirements must be included in the project base budget.

This is general advice only and project teams are not to rely on this HTA to meet Section J requirements.

NCC 2022 Section J

The National Construction Code (NCC) 2022 Section J Part J1P4 'Renewable energy and electrical vehicle charging' performance requirement states that "a building must have features that facilitate the future installation of on-site renewable energy generation and storage and electric vehicle charging equipment".

Section J9D4 'Facilities for electric vehicle charging equipment' sets out the provisions to meet the J1P4 performance requirement. For health buildings, which are typically Class 9, this requires electrical infrastructure to allow 20% of car parking spaces to be installed with EV charging points. It also stipulates that charging is to be available during the daytime, and a load management system for peak load control is allowed for. Section J9D4 does not require EV charging points to be installed from day one – just the enabling infrastructure.

Business as usual requirements

The Guidelines include the following BAU requirement that are relevant to carparks as listed in Table 1.

Table 1: BAU requirements

Requirement	Responsible Consultant
Energy Efficiency	
All below-ground carparks to have carbon monoxide monitoring and variable speed drive (VSD) fan controls.	Mechanical
Lighting	
External lighting to use LED lighting with lower activity dimming and day light sensors (dusk to dawn).	Electrical
Metering	
Provide separate energy metering to carparks with at least 20 car spaces.*	Electrical
Water management	
Include water sensitive urban design, such as swales and biofiltration to manage stormwater run-off.	Architect Civil Landscape
Materials specification and selection	
Minimise use of paint or finishes on exterior surfaces.	Architect
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 and footpaths • non-structural concrete, including kerbing and footpaths, with concrete aggregates to contain a minimum 15% recycled or substitute materials – fly ash, crushed recycled aggregate • car park wheel-stops, landscaping elements, decking, bollards, and fixed outdoor furniture	Architect Structural Civil Landscape
Transport	
Provide 25% of total parking spaces designed and labelled for small cars or motorcycles and mopeds (or both), hybrids, electric cars, and carpool vehicles in preferential locations with adequate signage or markings.	Architect Traffic
Future-proof carpark infrastructure to enable electric vehicle charging stations to be installed in line with health agency EV roll out strategy.	Electrical Traffic

** Refer Implementing effective energy and water metering systems guide*

Sustainability opportunities

The following section includes a range of sustainability themes for health facility carparks, with further discussion on business-as-usual requirements and opportunities to exceed these requirements. If agreed with the project team, VHBA, and the relevant health agency, these opportunities may be funded by the project 2.5% sustainability budget.

Electric vehicles

Transition to electric vehicles (EVs) is a key component of the Victorian Governments Zero Emissions Vehicle Roadmap and 2045 net zero emissions commitment.

The focus of the Guidelines business-as-usual requirement is health agency EV fleet roll.

Health facility carpark designers should consider key design implications of EVs such as:

- Number and type of fleet vehicles and charging requirements to align with the health agency fleet vehicle roll our strategy
- Available electrical capacity for day one and future EV charging stations
- Grouping of fleet vehicle parking in proximity to electrical infrastructure whilst balancing access and security requirements
- Fire safety implications of EV charging stations, which require a fire engineered solution and approval by relevant authorities, and also the Fire Risk Management Unit (FRMU)
- Spatial allowance for future charging stations including safe access and impact protection bollards
- Accessible routes for power and data infrastructure – future charging station installation should not require abortive works

The Australasian Health Infrastructure Alliance (AHIA) has released a guide and factsheet on electric vehicle fleet charging[1] for existing and new facilities to assist health agencies and project teams plan and deliver EV infrastructure.

The project sustainability budget may be used to fund infrastructure to futureproof for EV charging station installation over and above NCC and business as usual requirements (i.e. more than 20% of car park spaces). The sustainability budget may be also used to fund installation of EV charging stations for health service fleet vehicles, however, it may not currently be used to fund staff or visitor EV charging stations.

Refer Appendix 1 for full details of EV infrastructure scope and funding.

Water sensitive urban design

Carparks often feature large impervious areas of concrete or asphalt that stop rainfall absorbing into the ground. This results in stormwater runoff, which can negatively impact downstream systems such as rivers and creeks due to increased water flow and pollutants levels.

Water sensitive urban design (WSUD) aims to reduce this negative impact and improve site resilience against rainfall events through introducing systems that reduce stormwater runoff flow and pollutants levels.

The use of integrated landscaping elements such as permeable car park surfaces, raingardens, swales, and wetlands to naturally treat stormwater runoff from carparks is preferred as these can provide co-benefits such as improved amenity, biodiversity, and heat resilience. Mechanical stormwater treatment

[1] AusHFG Electric Vehicle Infrastructure Guide <https://aushfg-prod-com-au.s3.amazonaws.com/Electric%20vehicle%20infrastructure%20guide.pdf>

systems should only be considered if there are spatial, technical, or operational constraints that preclude the use of nature-based solutions.

As noted in the Guidelines business-as-usual requirements, WSUD features should be included in the project base budget, as should any authority mandated requirements relating to stormwater detention, retention, or treatment. The project sustainability budget may be used to fund WSUD initiative that exceed business as usual requirements if deemed appropriate for the project. This may include a reducing stormwater flow rate and pollutant levels below authority requirements by aligning with industry sustainability benchmarks such as Greenstar.

Reduced impact materials

The construction material supply chain is depleting finite natural deposits, impacting ecosystems, and generating significant carbon emissions.

Carparks are built using materials with high environmental impact such as concrete, steel, and asphalt.

There are numerous opportunities to utilise reduced embodied carbon materials and recycled content in car park design and construction in addition to the Guidelines business-as-usual requirements, including:

- asphalt with recycled high content
- reduced carbon concrete and steel
- recycled subbase (e.g. crushed concrete)

Refer to the VHBA *HTA 2024-002 Recycled materials in health care design and construction* for further details on this topic.

Reduced impact of heatwaves

Climate change projections for Victoria predict an increase in heatwaves that will negatively impact communities.

The urban heat island effect (UHIE) results in urbanised areas experiencing higher temperatures than outlying areas due the use of heat absorbing materials such concrete and asphalt – both commonly used in carparks. Heat absorbed by these materials increases their surface temperature which increases the temperature of the local environment. UHIE can be a particular problem during heatwaves, exacerbating extreme heat conditions. Reducing UHIE is a major focus for climate change resilience.

Effective strategies for reducing the impact of heatwaves in carparks include:

Reduction in asphalt area

Asphalt absorbs high amounts solar energy due to its dark colour, therefore a reduction in asphalt area can reduce UHIE. Increasing proportion of green spaces and porous surfaces achieves this whilst improving amenity, biodiversity, and site permeability.

Heat reflective asphalt sealant

Where exposed asphalt is required, heat reflective sealants may be applied that are designed to achieve lower surface temperatures. This may be considered within the project sustainability budget.

Shading

Shading carparks from direct sun reduces UHIE and protects vehicles and people from the effects of extreme heat. This is particularly important in health setting for people with compromised health that may be sensitive to heat exposure. Shading can be achieved with shading structures or trees.

Shading structures alone may not be considered within the project sustainability budget unless they include integrated renewable energy as described in the following section.

When using trees for shading it is important to select species that have non-disruptive root forms, and do not drop branches, sap, and high-maintenance leaves. Tree species selection should also consider projected climate conditions relating to these factors.

Heat resilient facades

Multistorey carparks may consider façade designs that shade concrete elements from direct sun on the north and western facades. Green / living facades can also achieve this outcome but must consider increased long-term maintenance requirements. If deemed suitable for the project, green / living façade treatments may be considered within the sustainability budget due to the biophilic and biodiversity co-benefits.

Renewable energy

Integration of solar panels into carpark shading structures is a significant trend in carpark design. As well as providing the solar shading benefits mentioned above, this strategy maximises the value of the carpark to generate renewable energy onsite. Carpark shading with integrated solar panels may be funded by the sustainability budget.

When considering this approach, there needs to be suitable demand that can connect to the system so that generated renewable energy can be used onsite to reduce energy bills. Solar systems that feed into the grid will not be supported. For example, some hospitals have on-grade parking that is separated from the hospital by a public road, meaning cables cannot be connected back to the hospital demand.

Figure 1 below is from Ararat Hospital, where a 176 kilowatt-peak capacity solar PV shade structure was installed at the on-grade hospital carpark and connected to the hospital facility.

Figure 1. Carpark shading with integrated solar panels at Ararat Hospital

Adaptability

Car parks are built for current vehicle use demands, however over the life of a health facility this demand may reduce due to advancements in public transport infrastructure and autonomous vehicles.

Basement and multi-storey carparks may consider designs with a height clearance suitable for future conversion to a habitable building use. Multi-storey carparks may investigate steel rather than concrete structure that can be deconstructed and repurposed elsewhere if, and when, carparking demand reduces.

Accessibility and safety

Providing accessible and safe health facility carparks is a key social sustainability outcome. The strategies described below are considered good design practice and may not be funded by the sustainability budget.

- Access must be safe, with consideration given to avoiding steep gradients, appropriate surface grip levels, and visibility around corners
- Pedestrians should be protected from vehicles through physical separation where possible
- Clear signage should be provided in carparks directing users to the health facility entrances and other relevant destinations

Crime prevention through environmental design

Crime prevention through environmental design (CPTED) applies three basic strategies in the design of a space: natural access control, natural surveillance, and territorial reinforcement.

Examples of CPTED in carpark design include:

- Enhanced passive surveillance ensuring visibility is not obscured by architectural or landscaping features
- Highly visible CCTV system with full carpark coverage
- Additional artificial lighting at night
- Refuge area with access to an emergency phone connecting back to reception

A safety-in-design or access consultant may be engaged to assist with CPTED early in the carpark design process.

Appendix 1

Table 2: EV infrastructure scope and funding definitions

Scope	Project Base Budget	2.5% Sustainability Budget	Not currently funded by VHBA
Distribution boards designed for future connection of 20% of parking spaces to EV chargers as per NCC 2022 J9D4 for car parks associated with Class 9 Buildings, or health agency fleet requirements based current and committed to fleet EV's (whichever is greater).	✓		
Cable pathways (e.g., inground conduits or suspended cable trays) designed to connect future EV chargers for the car park spaces as nominated above. No abortive works should be required to facilitate future installation of these EV chargers.	✓		
Additional car park spatial requirements for future EV chargers, protective bollards, safe access, etc. Note that if car park spaces abut a landscaped or hardscape area, future charger locations and safe access may not require an increase in car park size. Future charger locations should be identified on site layout drawings.	✓		
Supply and installation of EV chargers for health agency fleet vehicles only.		✓	
Additional future connection capacity and cable pathways over and above the base budget allowance. This may be considered if, for example, health agency fleet vehicles account for all the 20% NCC requirement and future flexibility for EV fleet expansion, or staff and/or visitor paid EV charging is desirable.		✓	
Supply and installation of EV chargers for staff and/or visitor paid EV charging.			✓
Coordination of EV solution with relevant authorities and fire engineer.	✓		

Resources

Guidelines for sustainability in health care capital works <https://www.vhba.vic.gov.au/sites/default/files/2021-10/Sustainability-guidelines-for-capital-works-VHBA-Revised-October-2021.pdf>

Australian Building Codes Board, Electric vehicles in buildings <https://www.abcb.gov.au/sites/default/files/resources/2023/ABCB%20EV%20Guidance%20Document%20June%202023.pdf>

AHIA AusHFG electric vehicle fleet charging guide and fact sheet <https://healthfacilityguidelines.com.au/content/sustainability-0>

Contact

For any queries, please email sustainability@health.vic.gov.au