

If a building becomes architecture, then it is art. Clearly, if a building is not functionally and technically in order, then it isn't architecture either – it's just a building.
Arne Jacobsen

Mechanical Engineering
Lighting Design
Sustainable Design
Electrical Engineering

Copenhagen
London
Sydney
Hong Kong
New York

Level 8, 9 Castlereagh Street
Sydney, NSW, 2000, Australia
ABN 50 001 189 037
t : +61 / 02 9967 2200
e : info@steensenvarming.com

SUSTAINABLE DESIGN

STEENSEN VARMING



Liverpool Hospital Multi Storey Car Park ESD SEAR's Report



If a building becomes architecture, then it is art. Clearly, if a building is not functionally and technically in order, then it isn't architecture either – it's just a building.
Arne Jacobsen

Mechanical Engineering
Lighting Design
Sustainable Design
Electrical Engineering

Copenhagen
London
Sydney
Hong Kong
New York

Level 8, 9 Castlereagh Street
Sydney, NSW, 2000, Australia
ABN 50 001 189 037
t : +61 / 02 9967 2200
e : info@steensenvarming.com

STEENSEN VARMING

Document Revision and Status

Date	Rev	Issue	Notes	Checked	Approved
31-01-2020	0	DRAFT	For comment	GL	
14-02-2020	01	FINAL		BJ	GL
10-03-2020	02	FINAL	Co-ordination update	GL	GL

Sydney March 10th, 2020
Ref. No. 197139 S02 MSCP

Garry Luu
Sustainability Consultant

garry.luu@steensenvarming.com
+61 2 9967 2200

Disclaimers and Caveats:

Copyright ©2020, by Steensen Varming Pty Ltd.

All rights reserved. No part of this report may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of Steensen Varming Pty Ltd.

This document is confidential and contains privileged information regarding existing and proposed services for the Building. The information contained in the documents is not to be given to or discussed with anyone other than those persons who are privileged to view the information. Privacy protection control systems designed to ensure the highest security standards and confidentiality are to be implemented. You should only re-transmit, distribute or commercialise the material if you are authorised to do so.

If a building becomes architecture, then it is art. Clearly, if a building is not functionally and technically in order, then it isn't architecture either – it's just a building.
Arne Jacobsen

Mechanical Engineering
Lighting Design
Sustainable Design
Electrical Engineering

Copenhagen
London
Sydney
Hong Kong
New York

Level 8, 9 Castlereagh Street
Sydney, NSW, 2000, Australia
ABN 50 001 189 037
t : +61 / 02 9967 2200
e : info@steensenvarming.com

STEENSEN VARMING

Table of contents

1.0	Introduction	4
1.1	Secretary's Environmental Assessment Requirements (SEARs) for State Significant Developments (SSD's)	5
2.0	Sustainability Aspirations and Requirements	6
2.1	Hospital Car Park Design Guidelines	6
2.2	Health Infrastructure Engineering Services Guidelines (ESG)	6
2.3	NCC Section J 2019	7
2.4	Liverpool Development Control Plan 2008 Part 1 - General Controls for all development	7
3.0	Sustainable Design Approach	10
3.1	Energy Conservation	10
3.1.1	Passive Design Measures	11
3.1.2	Active Strategies	11
3.2	Stormwater Management (WSUD) Water-sensitive urban design	12
3.3	Water Conservation	12
3.4	Emissions Reduction	12
3.5	Materials	13
3.6	Waste Management	13
3.7	Construction Management	13

1.0 Introduction

This report has been prepared by Steensen Varming for the Liverpool Hospital Multi Storey Car Park. Liverpool Hospital is located within the Liverpool Central Business District (CBD), on the corner of Elizabeth Street and Goulburn Streets, Liverpool. The Hospital includes land east and west of the Main Southern Railway, which forms an eastern and western campus. The proposed works are located in the northern portion of the western campus which is currently occupied by an existing 4 storey car park and at-grade car parking. The site is legally described as Lot 501 in DP1165217.

The application seeks consent for the construction of a multi-storey car park, connections to the existing road work and associated landscaping. A detailed project description is provided by Ethos Urban within the EIS.

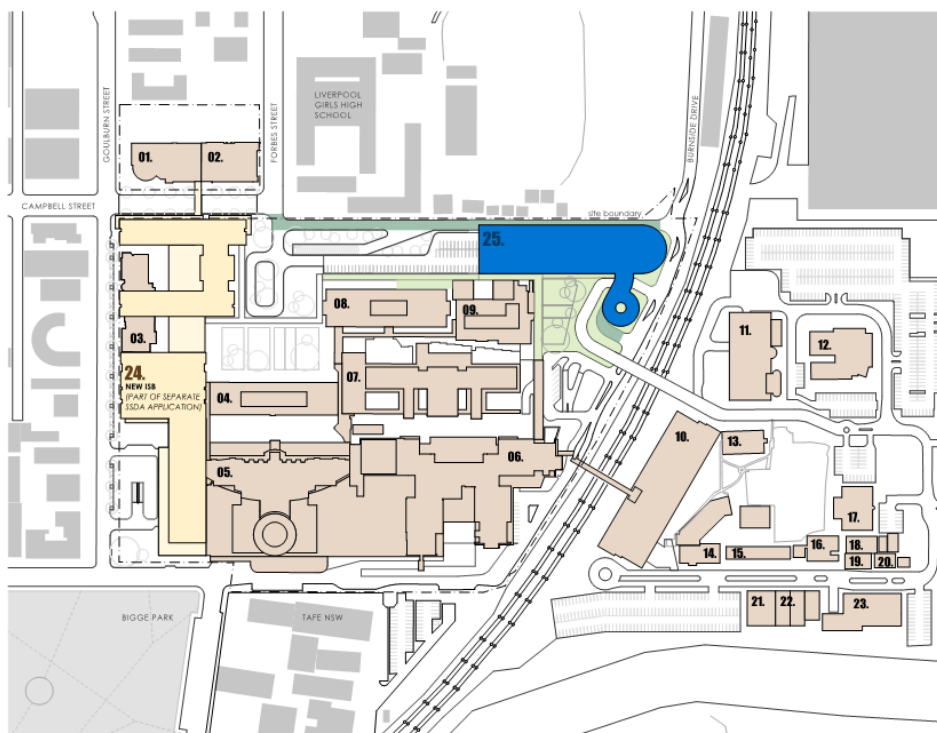


Figure 1: Blue – Liverpool Hospital Multi Storey Car Park

1.1 Secretary's Environmental Assessment Requirements (SEARs) for State Significant Developments (SSD's)

The Department of Planning, Industry and Environment (DPIE) issued the SEARs for the Liverpool Hospital Multi Storey Car Park SSD on 27 November 2019.

Table 1 - Secretary's Environmental Assessment Requirements		
Item	SEARs	Project Response
1	Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Regulation) will be incorporated in the design and ongoing operation phases of the development.	<p>The ESD initiatives proposed for the car park aim to reduce the environmental impacts typically associated with the construction and ongoing operation of the car park.</p> <p>The ESD initiatives include passive and active design measures to reduce ongoing energy use. This approach aligns with the ecological sustainable development principles of Clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000.</p> <p>Refer to section 3.0 for the proposed ESD initiatives.</p>
2	Include preliminary consideration of building performance and mitigation of climate change, including consideration of Green Star Performance.	<p>Due to the nature of the project (car park), it is not considered relevant to assess the project against a green rating system. Furthermore, car parking is typically excluded from green rating systems.</p> <p>ESD strategies have been included in the project to address issues associated with energy efficiency, water conservation and emissions reductions. Refer to section 3.0 for the proposed ESD initiatives.</p>
3	Include an assessment against an accredited ESD rating system or an equivalent program of ESD performance. This should include a minimum rating scheme target level.	<p>Due to the nature of the project (car park), it is not considered relevant to assess the project against a green rating system. Furthermore, car parking is typically excluded from green rating systems.</p> <p>Refer to section 3.0 for the proposed ESD initiatives.</p>
4	Include details in relation to energy efficiency, including practical opportunities to minimise energy consumption from non-renewable sources.	Refer to section 3.0 for the proposed ESD initiatives.
5	<p>Include details in relation to water conservation, including practical opportunities to implement water sensitive urban design principles.</p> <p>Relevant Policies and Guidelines:</p> <ul style="list-style-type: none"> • NSW and ACT Government Regional Climate Modelling (NARClIM) climate change projections. 	<p>Refer to sections 3.3 and 3.4 for Sustainable Design Initiatives related to Water Sensitive Urban Design (WSUD) and Water conservation.</p> <p>For further details relating to WSUD, refer to Civil and Stormwater system design.</p>

2.0 Sustainability Aspirations and Requirements

ESD requirements from the following policy documents have been considered where relevant to the Liverpool Hospital Multi Storey Car Park (MSCP) design. These include:

- Health Infrastructure's Engineering Services Guidelines (ESG) (August 2016). See Section 2.2 within.
- National Construction Code (NCC) of Australia 2019 – Section J requirements. See Section 2.3 within.
- Liverpool Development Control Plan 2008 Part 1 - General Controls for all development. See Section 2.4 within.

The following sections provide an overview of each policy document and whether the requirements have been considered/addressed as part of the current car park design.

2.1 Hospital Car Park Design Guidelines

Health Infrastructure (HI) provides guidance for hospital car park design, including general arrangement, elemental design requirements, signage and wayfinding, and equipment. The following guidance has been taken from HI guideline as they loosely relate to ESD.

- Light spill and noise to neighbouring properties – Light spill from external lighting has been designed to reduce the impact on local fauna;
- Onsite stormwater detention is to be designed in accordance with the council's requirements; and
- Naturally ventilated car parks – The façade must maintain a minimum 50% open area. The car park façade will be naturally ventilated and will meet or exceed the 50% open area.

2.2 Health Infrastructure Engineering Services Guidelines (ESG)

Health Infrastructure's Engineering Services Guidelines (ESG) (August 2016) is a performance-based guide used for design and development of health care facilities. 'Section 2.5.8 Sustainability and Energy Targets' with the ESG provides an overview of the sustainability targets, which include:

- Aspirational 4-star Green Star equivalency rating;
- Energy Targets;
- Water;
- Materials;

- Maintenance and Logistics; and
- Emerging Technology;

The Liverpool Hospital MSCP has included sustainable design initiatives addressing energy conservation and material reduction. Refer to Section 3.0 for further details.

Furthermore, due to the nature of the project (car park), it is not considered relevant to assess the project against an equivalent green star rating. Furthermore, car parking is typically excluded from green star ratings.

2.3 NCC Section J 2019

The specific requirements for Building Fabric under the NCC Section J are a Parts J1 Building Fabric, J2 Glazing and J3 Building Sealing. Parts J1 to J3 are applicable to 'conditioned' spaces. Any conditioned spaces will and services applicable to the NCC Section J must comply.

Parts J4 to J8 relate to Section J requirements for building services components. Refer to the relevant consultant's documentation for further applicability and compliance details.

2.4 Liverpool Development Control Plan 2008 Part 1 - General Controls for all development

The Liverpool Council Development Control Plan 2008 provides an overview of its Strategy for the Liverpool LGA. It also provides a framework for the objectives of this plan.

The relevant sections of the DCP in relation to Sustainability have been extracted and included below. It is important to note that not all requirements are applicable to the project, however, have been included for completeness.

Section 22 – Water Conservation

- *WELs rated fixtures and appliances;*
- *Development of a comprehensive Water Management Plan relating:*
 - *Stormwater runoff control, capture and reuse, including water quality management in accordance with Council guidelines.*
 - *Select water efficient plants and/or, indigenous vegetation for landscape in accordance with Council's recommendations.*
 - *Use non-potable water for watering gardens and landscape features*
 - *For development of more than \$1 million construction cost, consideration of separate pipe-work for the utilisation of recycled stormwater for non-potable purposes should be considered.*

- Any development that contains a rainwater tank is to satisfy the following criteria:
 - Rainwater is to be sourced only from roof structures via a tank storage system.
 - The tank capacity, or combined tank capacity, is to be at least 5,000L (10,000L preferred).
 - Tanks may be connected to toilets and garden/outdoor taps (the common tanks in residential flat buildings are to be connected to common outdoor taps only).
 - Tanks may be connected to laundry taps with suitable filters.
 - The system is to be fitted with an effective first flush device for removing roof surface contamination.
 - The system is to contain a facility for periodic de-sludging.
 - Tanks are to be connected to main water to top them up during times of low rainfall with supplemental inflow not taking places until the tank is 80% empty.

Section 23 - Energy Conservation

- All Class 5 to 9 non-residential developments are to comply with the Building Code of Australia energy efficiency provisions;
- Improve the control of mechanical space heating and cooling by designing heating/ cooling systems to target only those spaces which require heating or cooling, not the whole building.
- Encourage passive solar designed dwellings.
- Improve the efficiency of hot water systems by:
 - Insulating hot water systems.
 - Installing water saving devices, such as flow regulators, 3 stars rated shower heads, dual flush toilets and tap aerators.
- Maximise natural light to reduce reliance on artificial lighting and utilise energy efficient lamps, reflectors and fittings to reduce requirements for artificial lighting.
- For all commercial office development over \$5 million - Provide an Energy Efficiency Report from a suitably qualified consultant to accompany any development application for new commercial office development. The report is to demonstrate that the building can achieve no less than 4 stars under the National Australian Built Environment Rating System (NABERS).

Section 24 - Landfill

- All fill applied should be Virgin Excavated Natural Material (VENM), as defined by the NSW Department of Environment and Climate Change. Any fill involving material other than VENM is subject to referral to the State Government as potential Integrated Development or contaminated land assessment.
- All filling in the vicinity of native vegetation must be local material (in order to minimise the spread of weeds).
- Any excavation within the zone of influence of any other building will require a Dilapidation Report.
- Refer to the section on Salinity if cutting greater 500mm is to be undertaken.
- No retaining wall structures will be permitted within any easements such as drainage easements. Retaining walls located on the boundary of two allotments

If a building becomes architecture, then it is art. Clearly, if a building is not functionally and technically in order, then it isn't architecture either – it's just a building.
Arne Jacobsen

Mechanical Engineering
Lighting Design
Sustainable Design
Electrical Engineering

Copenhagen
London
Sydney
Hong Kong
New York

Level 8, 9 Castlereagh Street
Sydney, NSW, 2000, Australia
ABN 50 001 189 037
t : +61 / 02 9967 2200
e : info@steensenvarming.com

STEENSEN VARMING

*or boundary to a public street or public reserve shall be of masonry construction.
Other types of retaining wall structure may be permitted if the structure is
located wholly within the property.*

3.0 Sustainable Design Approach

Sustainable building design involves a holistic and integrated design approach, which builds on an increased awareness of site opportunities, form and function, to encompass and target a broad range of sustainable design initiatives.

For the Liverpool Hospital Multi Storey Car Park (MSCP), the key sustainability objectives are related to the scope of resources consumed, they are:

- Energy conservation;
- Emissions reduction; and
- Material consumption and selection.

The following sections outline the sustainable design strategies recommended for the Liverpool Hospital MSCP, and have been categorised as follows:

- 3.1 Energy Conservation
- 3.2 Renewable Energy Opportunities
- 3.3 Stormwater Management (WSUD) Water-sensitive Urban Design
- 3.3 Material Selection
- 3.4 Water Conservation
- 3.5 Emission Reduction
- 3.6 Materials
- 3.7 Waste Management
- 3.8 Construction Management

Unlike habitable buildings, car parking buildings are used temporarily for short periods of time. Hence issues such as occupant comfort are considered of lesser concern.

3.1 Energy Conservation

The main energy use in car parks is from artificial lighting, lifts, comms/security and sensors. The following initiatives seek to reduce the energy consumption associated with these services through passive measures and efficient systems.

The following energy hierarchy approach has been applied to the car park design in seeking to firstly reduce energy through passive design measures, and further improving energy efficiency using efficient systems.

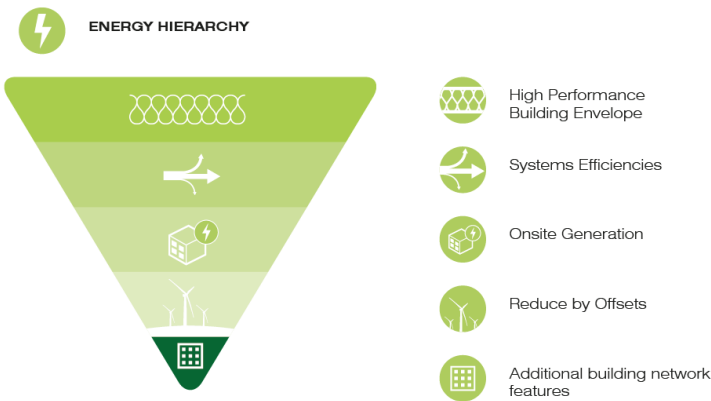


Figure 2 – Energy Hierarchy

3.1.1 Passive Design Measures

The following passive design measures are being proposed to reduce energy consumption.

- The car park has no mechanical cooling/ventilation, other than a small air-conditioning unit to condition the COMMS rooms and switch room. The car park is naturally ventilated via the façade. High strength tensile mesh allows air movement through the carpark.
- Daylight penetration in carpark spaces is primarily used for highlighting to aid in circulation and orientation of users. Daylight will also be used to assist with energy associated with artificial lighting through means of maximised natural daylight.
- Lighter internal finishes to increase light bounce/reflectance for deeper daylight penetration.
- Promotion of stair use through design (reduce lift usage). Include bright colours and natural daylight to stairs to encourage the use of stairs as opposed to lifts.

3.1.2 Active Strategies

The following active design strategies have been recommended to reduce energy consumption.

- Energy efficient Air Conditioning for the COMMS room, compliant with the Australian Government's Energy Rating Label;
- The air-conditioning unit for the lift shaft will be of air-cooled ducted system which is not applicable to the Energy Rating Label. However, economy cycle/free cooling is incorporated in the system design;
- Energy Efficient Lighting - LED lighting throughout;
- Occupancy sensors will be incorporated to turn lights on only when there are occupants. Lighting design will be designed to ensure compliance with regards to minimum illumination levels;

- Metering and data gathering to evaluate energy usage of systems and facilitate further energy usage optimisation and reduction; and
- Regenerative breaks to car park lifts and standby modes/operation.

3.2 Stormwater Management (WSUD) Water-sensitive urban design

Water Sensitive Urban Design (WSUD) provides opportunities to control flows, filter stormwater to remove pollutants and integrate water cycle management from stormwater harvesting to treatment. The aim of WSUD is to minimise negative impacts on the natural water cycle. Car parks can have a large impact on the stormwater networks due to their large area of impervious material.

This project is considering the following strategies for stormwater retention and natural filtration.

- Surface stormwater will be directed into garden beds where practical, to provide passive irrigation, reduced stormwater outflow and moisture retention in the soil;
- Consideration of rainwater capture / harvesting tanks; and
- Oil interceptors, to filter oils from vehicles entering the stormwater system.

3.3 Water Conservation

The Liverpool Hospital MSCP will have minimal water consumption. The car park will have taps for irrigation, cleaning and maintenance, and toilets and hand basins. The following measures have been proposed to reduce potable water consumption.

- Plant species selection is primarily endemic and native, selected for low maintenance and low watering requirements;
- Consideration of low flow fixtures and fittings such as toilets and taps; and
- Consideration of rainwater capture / harvesting tanks.

The incorporation of low flow water fixtures and fittings are typically considered for habitable buildings. Low flow fixtures and fittings could be considered for wash-down taps, however due to the minimal use, and higher water volume/pressure required for cleaning, it would not be beneficial to incorporate low flow taps for this use.

3.4 Emissions Reduction

Reducing emissions from the carpark is also being targeted, with the following initiatives considered. Improved way finding will also reduce emissions from vehicles by reducing travel time.

- Electric car charging stations or future proofing for electric car charging;
- Consideration of parking spaces indicator at the entrance to indicate how many car spaces are available on each level (reduce travel time/emissions);
- Consideration of designated car parking spaces closer to the entry exit for low-emissions vehicles; and
- Designate car parking spaces closer to the entry exit for car/ride sharing (more than 2 passengers);
- Signage to discourage vehicle idling; and
- Reducing light spill and pollution.

3.5 Materials

Carpark constructions utilise vast quantities of concrete and steel, which consists of high embodied energy. The following material initiatives have been considered;

- Concrete
 - Portland Cement Reduction;
 - Water Reduction; and
 - Aggregates Reduction.
- Steel Use
 - Reduced Use of Steel Reinforcement;
 - Reinforcing bar and mesh is produced using energy-reducing processed in its manufacture; and
 - Consideration of recycled steel use in the tensile metal mesh and façade elements.
- PVC reduction, alternatives and/or best practice PVC in permanent formwork, pipes and cables where appropriate.
- Select materials and products such as paints, adhesives, waterproofing material, anti-slip with high durability and low toxic properties i.e. Low VOC properties.

3.6 Waste Management

Car parks also generate operational waste from car park users. The car park design will include following strategies:

- Labelled and colour coded bins placed in ordered positions, including paper bins, recycling bins and garbage bins. Labelling will be incorporate to encourage visitors to throw their rubbish in a correct manner.

3.7 Construction Management

The following measures are developed to improve the environmental conditions during the construction phase of Liverpool MSCP.

If a building becomes architecture, then it is art. Clearly, if a building is not functionally and technically in order, then it isn't architecture either – it's just a building.
Arne Jacobsen

Mechanical Engineering
Lighting Design
Sustainable Design
Electrical Engineering

Copenhagen
London
Sydney
Hong Kong
New York

Level 8, 9 Castlereagh Street
Sydney, NSW, 2000, Australia
ABN 50 001 189 037
t : +61 / 02 9967 2200
e : info@steensenvarming.com

STEENSEN VARMING

- Environmental Management Plan (EMP) – The EMP can be developed and implemented for the construction stage, including demolition and excavation, to address environmental, worker health and safety and community risks. The EMP is a project specific plan and developed using State and Federal Guidelines and standards. The main contractor will implement an Environmental Management System certified to the ISO 14001 standard to ensure the objectives of the EMP are met.
 - Noise and Vibration Controls – Machinery should not be operated if maintenance would affect its noise characteristic. All activities should comply with the EPA noise control guideline 12. Demolition works time is to be controlled.
 - Dust Control – Contaminated water does not enter the storm water system from the land. Temporary fencing is covered with shade cloth where it is utilised. Disposal of contaminated site material must comply with the requirements of the Environment Protection Authority and the Environment Protection Act 1970.
- Site waste management plan. During the demolition and construction phases, a project-specific site waste management plan (WMP) can be developed and implemented while complying with the Waste Avoidance and Recovery Act 2001. This may include recycling areas, bins, plans of protection measures, disposal procedures and emergency plans and contingency plans.