Appendix 6:
New Multi-level Carpark Design Report

ST JOHN OF GOD MURDOCH HEALTH

10TH FEBRUARY 2023

New Multi-Level Car Park

Design Report Annexure

PREPARED BY:

PARKD

FOR:

ST JOHN OF GOD
Health Care

Revision History

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Contents

REVISION HISTORY 3

1. GLOSSARY OF TERMS 5

2. EXECUTIVE SUMMARY 7

3. PROJECT BACKGROUND 9

3.1. Purpose 9

3.2. Site Overview 9

4. PROJECT EXPANSION OUTCOMES 11

4.1. Concept Architectural Overview 11

4.2. Parking Arrangement 11

4.3. Vertical Landscaping 11

4.4. Operational Access Control 13

5. SUSTAINABLE OUTCOMES 15

5.1. Construction 15

5.1.1. Sustainable Targets 15

5.1.2. Achieving the Sustainable Construction Targets 16

5.2. Operational 17

5.2.1. Solar Cells 17

5.2.2. Electric Vehicle Charging 17

5.2.3. Landscaping 17

5.2.4. LED Lighting 17

5.2.5. Other Sustainable Items 17

APPENDIX 20

1. GLOSSARY OF TERMS

Term/Abbreviation	Definition
AS	Australian Standard
BCA	Building Code of Australia
BT	Built
CVB	Continuously Voided Beam
DA	Development Approval
DRC	Design Review Panel
DFES	Department Fire and Emergency Services
EV	Electric Vehicle
GFA	Gross Floor Area
JSA	Job Safety Analysis
NCC	National Construction Code (Includes BCA)
QS	Quantity Surveyor
SJGMH	St John of God Murdoch Health
SDRP	State Development Review Panel
SWMS	Safe Work Method Statement

Executive **SUMMARY**

2. EXECUTIVE SUMMARY

This report provides additional information regarding the development of the MSCP following the receipt of SDRP commentary. The SDRP response primarily requests more information regarding a campus style approach to the application through several clarifications that are addressed in this report.

The current project delivers 837 car bays in total and incorporates consideration for future flexibility in the design and engineering to expand the MSCP towards the hospital and ring road. The expanded capacity has the potential to accommodate future parking demand as the precinct is developed resulting.

The project retains a high impact in sustainability through the consideration of ultra low carbon construction methods that minimise embedded carbon in construction materials and waste from all steps in the design, construction and labour.

PROJECT **BACKGROUND**

3. PROJECT BACKGROUND

St John of God Murdoch Health (SJGMH) is investigating the development of a multi-level car park (MLCP) for staff parking at its Murdoch Campus and has completed a number of reports to determine the best outcomes for the hospital. The need for additional parking capacity has been independently determined by SJGMH and is understood to address the upcoming development of the new Mental Health Unit and three further expansions of the campus. The expansion works are planned on existing at grade car parks and will result in a loss of approximately 700 existing bays.

3.1. Purpose

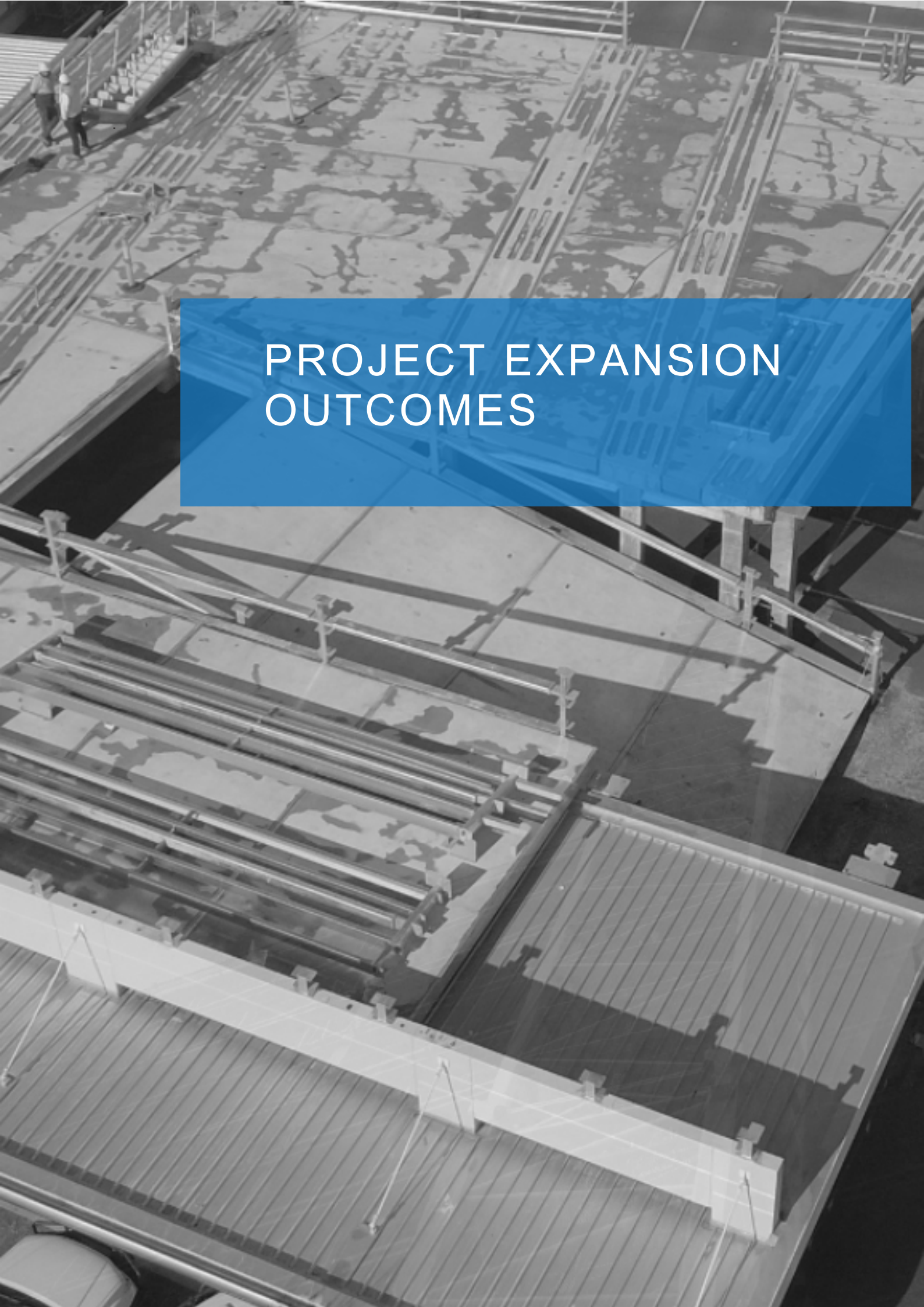
This report contains specific advice from PARKD and their consultants to provide SDRP with supporting information on the delivery of additional parking in the Murdoch Precinct. The revised plan provides future expansion options and campus planning strategies to assist St John of God in assessing an 837 staff MLCP ground plus 6 level structure close to the western boundary of the Murdoch campus and as shown in Figure 1.

Figure 1: Site Map

3.2. Site Overview

The site is located on the western boundary of the health precinct, with a Water Corporation easement adjacent and natural wetlands beyond. The 3,000m^2 site is currently an operating at-grade staff and visitor parking facility. The site sits in an ideal location to provide staff parking to the main hospital, WA Cardiology, and the health precinct.

The existing car park slopes from the north-east down to the south-west corner, dropping 3.5m, with existing stormwater flowing to the southwest to stormwater swales within the site.



PROJECT EXPANSION OUTCOMES

4. PROJECT EXPANSION OUTCOMES

4.1. Concept Architectural Overview

Expansion of the car park allows the planned health precinct growth to be managed appropriately, with a precinct wide approach. We have prepared an initial concept indicating a simple expansion process with increased parking and access amenity as the car park facility grows, Appendix B attached shows the future expansion scenario.

The parking expansion shows two additional aisles of multi-level parking with an additional vehicle entry point which connects the parking facility to the internal ring road.

The expansion can be delivered in a staged approach as the precinct demands increase. Additional pedestrian and vehicle access have been indicated, these will be refined as the project develops.

The vertical landscaping has been updated with planters on every second level to improve the greening affect of the façade. See section 4.3.

The legibility of the car park from a vehicle and pedestrian perspective has been updated to allow pedestrians, cyclists and vehicles to easily locate the entry locations.

4.2.Parking Arrangement

The expanded arrangement maintains a high parking yield potential of 23.52 m^2/bay, 7m^2 per bay below the industry standard and integrates seamlessly with the initial design.

The expanded car park shows four aisles of additional long term parking bays with vehicle access from the ring road in two locations and the vehicle flow will be considered during the design development stage.

The MSCP was designed as a staff only facility and therefore 2.4m wide(long term) parking. If the facility was used for staff and public parking, bay dimensions would need to be increased along with vehicle access control measures (ie boom gate, ticket parking etc). This would have a negative impact on parking yield or increase the size of the structure to accommodate the slightly larger bays. Bays would need to increase to 2.5m for visitor bays, an increase in gross floor area of approximately 4%. The expansion only could be reserved for visitors and staff and maintain the rear section for staff only. These are items that will need to be resolved in the design stage.

The ramps throughout the structure comply with industry standards, providing a less steep gradient than AS2890 code and provide easy, safe passage whilst accessing and circulating the car park.

4.3.Vertical Landscaping

The vertical landscaping to the south eastern façade has been updated to include planters on every second level to provide a more enhanced lush outcome. The elevated planters will be located on level 2B, 4B and 6B providing 500mm deep soil on each level. It is proposed that mature climbing plants will be planted in each planters and trained on the external mesh/lattice work.

The planters will be reticulated using rainwater collected from roof structures and mains water. Planters will have wicking bed technology to help plants withstand the harsh climate with overflows from each planter.

Figure 1 shows a typical wicking planter, dimensions would be 500mm high, 400mm wide and 7,000mm long. The overflow would be connected to the planter below.

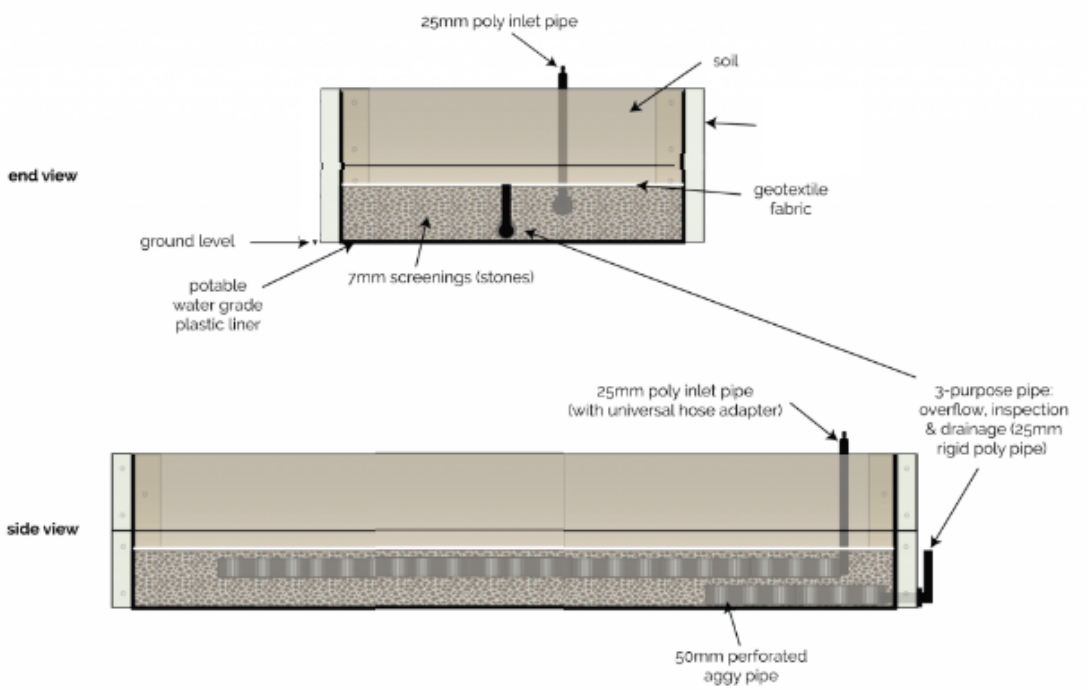


Figure 1

There are several evergreen planting options for the raised planters that include;

- Star Jasmine is a fast-growing woody vine that can grow up to 7 meters. Star jasmine likes full sun location and requires little maintenance. Star Jasmine has the added bonus of frequent flowering and gorgeous smelling fragrance. See Figure 2
- **Hibbertia Scandens** or Snake Vine is a vigorous climber with large yellow flowers. Hibbertia are full sunny loving plants with low maintenance and is drought tolerant. Hibbertia grows to 6 meters and up to 5 meters across. See Figure 3

Figure 2

Figure 3

4.4. Operational Access Control

If the car park is expanded to visitors and staff, access control and in particularly vehicle queuing on entry and exit will be a key consideration. We have shown an additional entry from the ring road which would allow for queuing at the entry exit barrier. It is possible that other vehicle control systems could provide a more enhanced visitor experience, such as vehicle plate recognition and phone parking application access control.

These technologies are considered more user friendly and typical for new parking developments. These options would allow entry and exit hands free and allow rapid entry and exit offerings. Parking applications offer additional options that SJGMH may want to consider.

SUSTAINABILITY **OUTCOMES**

5. Sustainable Outcomes

The sustainability of the project is split into two major areas, construction and sustainable operational outcomes.

5.1. Construction

We have proposed the PARKD System as the preferrable solution for several reasons, from cost and flexibility through to its increased sustainable benefits. The system incorporates high performing materials, manufactured offsite to provide a superior environmental outcome. The system provides the additional option of flexibility in the future, if considered in design phase, to allow the structure to easily be dismantled and repurposed or relocated in a new location, the ultimate sustainable outcome.

We have attached the Park System Innovation and Sustainability Report as Appendix B.

The PARKD System utilises modern prefabricated techniques to provide a high-performance structural solution. The structure can be designed to incorporate the ability to relocate the structure in the future in the same configuration or a new layout. The structure can be designed with predetermined cut joints in the concrete deck, so the three key elements can be disassembled and re assembled if or when required. A relocatable structure would still meet all the structural requirements outlined in Appendix B and be a permanent solution.

Critical construction sustainable outcomes that will be a focus of the project team are as follows;

- **Efficiency approach,** Prefabricated modular approach improves project efficiency, reducing waste, reducing inground works, energy and time
- **Raw materials processing;** Less water, energy, labour, concrete and aggregate. Use of low carbon green concrete reduces environmental Impact
- **Manufacturing;** Controlled manufacturing systems in Western Australia reduce wasteage, improve labour efficiency and reduce onsite works
- **Logistics;** Less logistics required, reducing road impact aswell as emissions for truck and subcontractors.
- **Construction;** controlled measured construction increases site efficiency
- **Decking System Comparison**
- **Recycle and reuse and end of life,** flexibility of the PARKD system along with reduced impact of removal costs over traditional methods.

5.1.1. Sustainable Targets

Critical construction sustainable outcomes that we will be targeting on this project are as follows based on traditional construction techniques;

- 50% reduction in components
- 50% Reduction structural weight
- 50% less footings
- 50% reduction in site labour
- 50% reduction in truck movements

- 50% reduction in site wasteage
- 60% reduction of embedded energy
- 100% reuse of the structure

5.1.2.Achieving the Sustainable Construction Targets

The project team will prepare a construction management methodology that will include the above targets. The project team, including sustainable consultant will undertake assessments and analysis during design and construction phases to meet and surpass the sustainable targets.

- Reduction components; The PARKD system uses 65% less concrete and steel reinforcement
- Reduction weight, The PARKD system uses 60% less concrete, therefore our structures are greatly reduced in weight, reducing building loads
- Reduction in site labour through prefabrication techniques. Utilising a repetitious design and modulation, onsite labour and scope is vastly reduced
- Reduction in truck movements, prefabrication reduces raw materials coming to site and more components rather than materials, resulting in a fast track construction approach
- Reduction of embedded carbon through use of low carbon products and modern methods of construction
- Reuse of the structure through the PARKD systems ability to be disassembled and reused at a new location.

The PARKD system utilises 65% less materials than traditional construction methodologies and therefore our construction carbon footprint is greatly reduced. The lean construction practices incorporated also reduce other factors and provide a superior outcome. Table 5 outlines the project environmental benchmarking of various construction methodologies including the PARKD system.

Primary Span	*Area(m^2)*	*Worst Practices (TJ)*	*Best Practices (TJ)*	*Reduction in Embodied Energy*
Precast Concrete	12,300	16.0	10.5	34%
Cellulare Steel	13,300	30.8	12.7	59%
Post Tensioned	29,100	42.3	24.7	42%
Mass Timber	19,900	32.85	19.28	41%
PARKD System	13,300	34.5	14.6	68%

Table 5.

The PARKD system surpasses industry benchmarks providing a high performing, low carbon outcome.

5.2.Operational

Several sustainable initiatives can be incorporated into the development to reduce the project carbon footprint of the project.

5.2.1.Solar Cells

The Installation of Solar PV cells to the roof level could greatly reduce the energy consumption of the project. It is anticipated that the power generation from the photo voltaic cells mounted on roof shade structures would greatly reduce the energy consumption of the car park.

The sizing of the PV system will be considered in the whole life costing process, to ensure optimal use and value. The PV cells would be incorporated into shade structure or a lightweight roof. The expansion of the car park will allow the expansion of the solar cells and shade structures, therefore offset additional power costs.

5.2.2.Electric Vehicle Charging

We have proposed 12 EV charging locations on the ground level, using long term 22KW chargers. The MSCP is a long-term parking structure and therefore low KW chargers are best suited for this use. We would designate a specific area for EV charging and provide infrastructure for expansion of up to 15% parking bays to have charging capacity.

Fast charging stations are available in the market, but we consider that this is not appropriate for this project considering the operational use of the car park.

5.2.3.Landscaping

The Murdoch Health Precinct is nestled in a landscaped precinct adjoining the Quenda Wetland Reserve. The MSCP would provide an opportunity through vertical and additional at grade planting opportunities.

We anticipate the increased landscaping will;

- Reduce the heat island effect in the precinct,
- Increase Biodiversity in the precinct
- Encourage native wildlife in the area
- Reduce noise pollution

We have considered several landscaping options to green the façade and soften the feel, reduce noise impact from vehicles and remove pollutants from the air. All greening options will require reticulated watering and require regular maintenance.

5.2.4.LED Lighting

We would propose the use of highly efficient LED lighting with motion detection and daylight sensors for each fitting, significantly reducing operational lighting demand.

5.2.5.Other Sustainable Items

The infrastructure Sustainability Council of Australia provide a framework for infrastructure projects to be assessed against set criteria regarding there green credentials.

The project could be evaluated against relevant sustainability rating tools to provide a framework to benchmark the sustainability performance of the project. ‘IS Essential’ is a key benchmark for sustainability projects up to $100m and would include:

- Undertaking a self-assessment using the identified rating tool to determine targeted rating and priority objectives.

- Undertaking a weightings assessment (if applicable).
- Determining a pathway to achieving the targeted rating including identifying realistic and achievable sustainability outcomes.
- Identification of sustainability risks and costs associated with identified initiatives.

APPENDIX

APPENDIX

Appendix A Revised Architectural

Appendix A Concept Design

[Planning Solutions: Refer Appendix 2 of Development Application Report for plans]