Sustainable Development Assessment

Lumina Residential Development

1 Clarke Street, Southport, QLD 4215

Prepared For:
Urbis Pty Ltd

Prepared By:
Building Services Engineers

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Queensland Government

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Executive Summary

ESD Targets and Certification

The purpose of this document is to detail the environmentally sustainable design principals that have been incorporated and committed-to, for the Lumina Residential Development at 1 Clarke St Southport QLD 4215.

Located in the Economic Development Queensland (EDQ) Parklands priority development area (PDA). Lumina of 1 Clarke Street, Southport forms part of *Lumina* – the Gold Coast Health and Knowledge Precinct, situated in the City of Gold Coast Council region.

The project's sustainability strategy integrates local environmental plans and policies, particularly: -

- 5 Star Green Star Certification (Buildings V1)
- 5-star NABERS Apartments rating National Australian Built Environment Rating System.
- 7.5 Star NatHERs Star Rating (Residentials components)
- Section J Compliance (Amenities and common areas)

Further to the above certifications, the proposed development has been carefully designed to align with and incorporate the following guidelines and schemes:

a) Parklands Priority Development Area Development Scheme
b) PDA Guideline No. 2: Accessible housing
c) PDA Guideline No. 8 – Medium and High Ruise Buildings
d) QDesign (Queensland Government)

Preliminary Planning and ESD Strategy

Overall, the primary goals of the projects ESD (Environmental Sustainable Design) strategy is to create a sustainable environment where residents can connect, grow, and belong.

This objective has been integral to the overarching establishment, ultimately enabling the proposed development to achieve the targets and adhere to the guidelines outlined above, as detailed through this report.

Parametric Modelling and Design Enhancements

As part of the conceptual design process, BSE completed high-level energy models to guide the wider project team on the expected thermal performance requirements for the apartments.

This was done to ensure that the overarching Environmental Sustainable Design (ESD) targets could be achieved based on the current proposed layout, orientation and geometry of the building.

BSE also conducted parametric studies on different shading and passive design options for the various buildings across different orientations. The findings indicate that the current design is promising for achieving Green Star and other environmental targets. The exact façade and design details will be further developed and refined in future stages.

Occupant Amenity and Comfort

Regarding amenity and comfort, a strong emphasis on outdoor spaces has been incorporated into the project. Since parklands and community spaces are often lacking in the residential sector, this became an innovative focus for the project. With current amenity and landscaping spaces significantly exceed the requirements of Green Star.

Figure 1: Landscaping Concept Plan 1 Clarke Street - Site View (Lat Studios, July 2024)

Future Steps

Looking ahead, we recognise that a significant portion of the ESD work will be undertaken during the design phase. We are keenly focused on finalising Green Star portal calculations and submitting our consolidated reports to the Green Building Council of Australia (GBCA) for design review.

In the coming design phases, computational ESD modelling will serve as an ongoing tool, providing empirical data that informs the design, construction, and operation of Lumina. Although we have been able to review and confirm key configuration and aspects such as the use of EV's, Significant Solar PV, rainwater harvesting, vertical farming, significant amenities and low carbon emissions.

Figure 2: Building 2 - North Elevation Architectural Render (Rothelowman, July 2024)

Figure 3: Architectural Render – Ground Plan (Rothelowman, July 2024)

Figure 5: Level 02 Plan Podium - Architectural Renders (Rothelowman, July 2024)

Figure 4: Level 02 Plan Podium - Architectural Renders (Rothelowman, July 2024)

1. Introduction

BSE has been engaged by the applicant to assess and report on Sustainable Development Principles required for the proposed new residential development of Lumina, 1 Clarke St Southport QLD 4215.

This report summarises the key ESD provisions which demonstrate a commitment to a 5 Star Green Star Certification.

The sustainability targets for the development will be achieved in an integrated and staged approach through minimising the need for energy consumption (via passive measures) and then consumption optimisation (energy efficiency) and use of renewable resources where required (currently aprox. 200kW+ system).

Green Star is the primary method to describe and benchmark this development.

As such, the general principles described in this report are to be adopted in the project's subsequent stages, applicable to the new and associated areas that form part of the proposed development. Further development, reporting and Green Star As-Built certification is to be achieved at subsequent stages.

1.1. Project ESD Targets

The following environmental targets have been set for this project:

	Target
Green Star Buildings Version 1	5 Stars
NABERS Apartment Buildings	5 Stars
NatHERs (Nationwide House Energy Rating Scheme)	7.5 Stars

Table 1: Lumina – 1 Clarke Street - Environmental Certification Targets and Ratings

1.2. Site Description and Design Intent

1.2.1. Site Description:

The proposed new residential development is located at 1 Clarke St, Southport, QLD 4215. This site is part of the Lumina Precinct, an innovative area dedicated to creating vibrant community spaces and sustainable living environments. The development at 1 Clarke Street is specifically proposed as a Build to Rent project by the applicant, aimed at providing high-quality rental housing options within this precinct.

1.2.2. Proposed Building:

The proposed project for the Lumina development is envisioned as a state-of-the-art facility. Key features include:

- Two levels of basement carparking
- Four buildings
- Retail and office spaces on the ground floor of Building 1

All occupants will have access to common areas and amenities throughout the site. This includes over 1,855m² of internal communal space and 3,622m² of exterior areas, making a combined total of over 5,477.8m² of communal open space. Key areas include:

- Ground-level recreation area
- Gym
- 2,242m² podium recreation area and pool on podium level 02
- 880m² gym and lounge space on the ground floor of Building 1
- 248m² indoor resident active use space
- 160m² residential lounge on the ground floor of Building 2
- 260m² of games room and lounge amenity space on the ground floor and podium 2 of Building 3
- Significant residential bike storage rooms

The development will feature extensive landscaping, providing ample outdoor spaces for community gatherings and recreational use. The landscaping will incorporate native plants to enhance local biodiversity and promote an eco-friendly environment.

1.2.3. Design Intent:

Rothelowmans architectural design of the development focuses on aesthetics, functionality, and sustainability, with multiple stories accommodating collaborative spaces.

Emphasis is placed on interactive environments, spacious interiors, and natural lighting.

The design prioritises sustainability, targeting 5 Star Green Star certification with features like solar panels, rainwater harvesting, and energy-efficient engineering and control systems.

Accessibility is also a key consideration, ensuring full compliance with disability access requirements. Overall, the design of Lumina – 1 Clarke Street, aims to create more than just a building; it seeks to establish a hub for learning, development, and community engagement in the area.

1.3. Information Used

Please note that, BSE actively collaborated with the wider design team, including the applicant, Architect, Mechanical, Hydraulic, Electrical, Fire, Landscape, and Civil services.

This report, along with the comments and assessment, reflects the Lumina design as represented within the current service disciplines. This active engagement and coordination with the team have been crucial and occurred from the early concept stage to DA submission, and will continue in future stages to achieve the targeted ESD certifications and initiatives.

Detailed assessment and preliminary Green Star calculations presented within this report are based on an assessment completed to the architectural drawings prepared by Rothelowman (Table 2).

Table 2. Drawing List.

Name	Date modified	Type	Size
cleanup	22/07/2024 2:36 PM	File folder	
TP01.01_DWG-Basement 02 Plan(P11).dwg	22/07/2024 9:23 AM	DWG File	304 KB
TP01.01-Basement 02 Plan(P11).pdf	22/07/2024 9:23 AM	PDF Document	229 KB
TP01.02_DWG-Basement 01 Plan(P10).dwg	22/07/2024 9:23 AM	DWG File	373 KB
TP01.02-Basement 01 Plan(P10).pdf	22/07/2024 9:23 AM	PDF Document	240 KB
TP01.03_DWG-Ground Plan(P12).dwg	22/07/2024 9:23 AM	DWG File	4,888 KB
TP01.03-Ground Plan(P12).pdf	22/07/2024 9:23 AM	PDF Document	1,182 KB
TP01.04_DWG-Level 02 Plan - Podium(P10).dwg	22/07/2024 9:23 AM	DWG File	10,062 KB
TP01.04-Level 02 Plan - Podium(P10).pdf	22/07/2024 9:23 AM	PDF Document	1,807 KB
TP01.06_DWG-Level 04 (03-09 Typical) Plan(P11).dwg	22/07/2024 9:23 AM	DWG File	5,706 KB
TP01.06-Level 04 (03-09 Typical) Plan(P11).pdf	22/07/2024 9:23 AM	PDF Document	907 KB
TP01.12_DWG-Level 10 Plan(P10).dwg	22/07/2024 9:23 AM	DWG File	4,995 KB
TP01.12-Level 10 Plan(P10).pdf	22/07/2024 9:23 AM	PDF Document	800 KB
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TP03.01-Section A and B(P4).pdf	22/07/2024 9:24 AM	PDF Document	293 KB
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TP03.03-Section E and F(P4).pdf	22/07/2024 9:24 AM	PDF Document	168 KB
TP03.04_DWG-Section G and H(P4).dwg	22/07/2024 9:24 AM	DWG File	210 KB
TP03.04-Section G and H(P4).pdf	22/07/2024 9:24 AM	PDF Document	166 KB

2. Preliminary Parametric Modelling and Design Review

As part of the conceptual design process, BSE were engaged to undertake a comprehensive analysis to review and support the wider project team by completing parametric studies of the proposed residential development as well as completing preliminary NatHERs simulations.

Using a range of computer simulation tools, we were able to gain insight into how the proposed residential building performs. With these techniques, we explored the effects that alterations made during concept design would have on the building's behaviour. Being at conceptual stage, the parametric models took a simplified geometric shape of a typical apartment. With specific emphasis on worse-case rooms (unshaded by a balcony).

We experimented with the building envelope design reviewing varying configurations to review how the building can minimise ongoing energy consumption and heat load / cooling load reduction as well as enhance occupant comfort.

Using a representative model consisting of four storeys with varying configurations based on the current layout, location and orientation we analysed variable changes such as the impact of shading, glazing performance, and glass-to-wall ratios on heat load reduction and occupant thermal comfort. The simulation setup included:

Table 3: Lumina - Concept Design - Parametric Model Variable Testing

Project Specific Key Items/Initiatives	Project Specific Implementation Response
Top Storey (L5):	Horizontal shading with increasing extensions (Low SHGC).
Middle Storey Upper (L4):	Different glazing specifications, varying SHGC values starting from 0.25 ending in 0.70.
Middle Storey (L3):	Different glass-to-wall ratios, starting from 15% -ending at 60%.
Middle Storey Lower (L2):	Vertical fins with increasing usage/frequency.
Bottom Storey (L1):	Horizontal and vertical shading (High SHGC)
Top Storey (L5):	Implement smart, demand-response control of equipment.

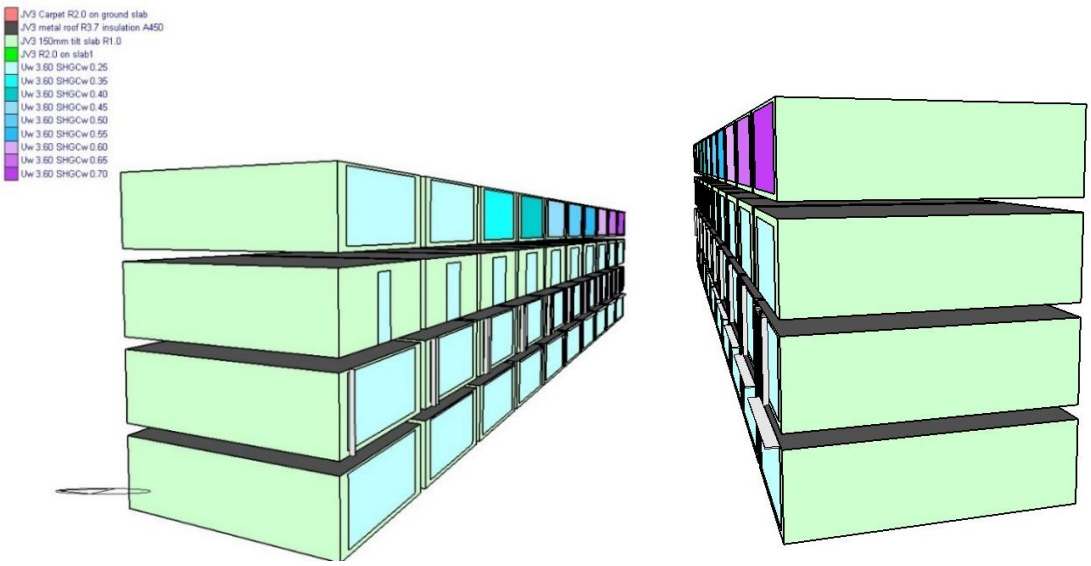

Figure 6: Parametric Model - 1 Clarke Street, Southport

Our findings reveal that while the introduction of vertical shades provides significant benefits for east and west-facing orientations, and horizontal hoods or slab extensions of ideally 475mm are effective, having higher-performing thermally resistant and appropriately selected glazing and wall constructions suited to the local climate and environment is more important for thermal comfort, temperature maintenance, and heat load reduction than the application of shading devices.

Through this review, we confirm which options or combination of options would be required for a well-designed façade to achieve good levels of internal environmental quality, as well as reduce running costs, plant capital costs, and plantroom spatial requirements. In reviewing the current apartment performance, we confirmed that the current design facilitates passive design elements and achieves suitable NatHERS star ratings. These ratings are expected to improve in the future as the design further develops, given that current models make conservative assumptions. Therefore, BSE expects the 7.5 Star average NatHERS target to be achieved.

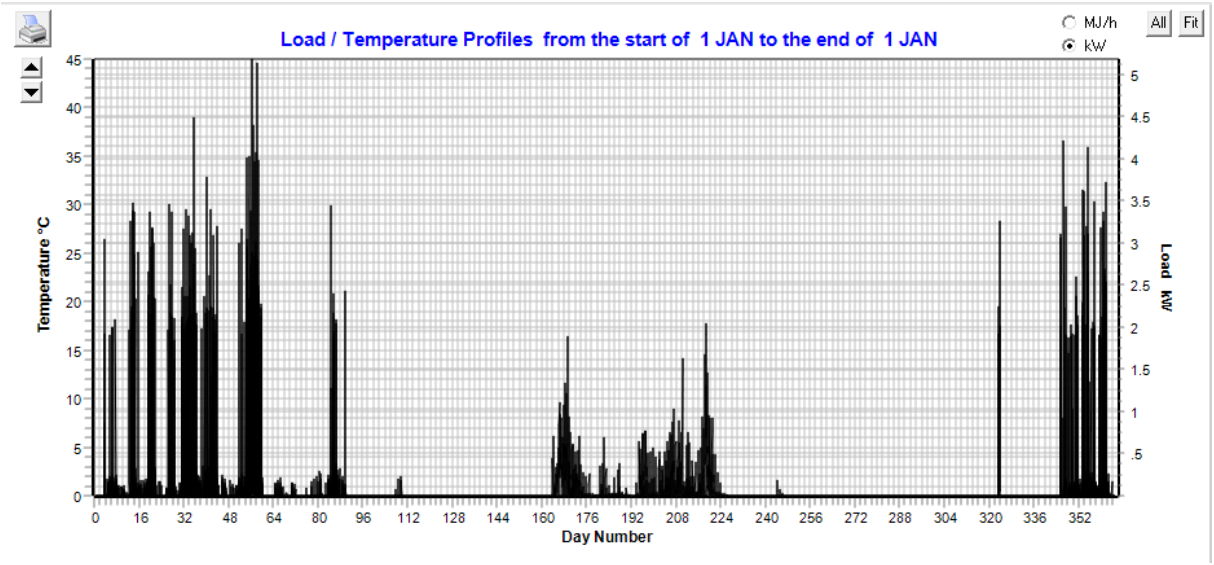

Figure 7: Typical Heating/Cooling Load and Temperature Profile of the development - 1 Clarke Street, Southport

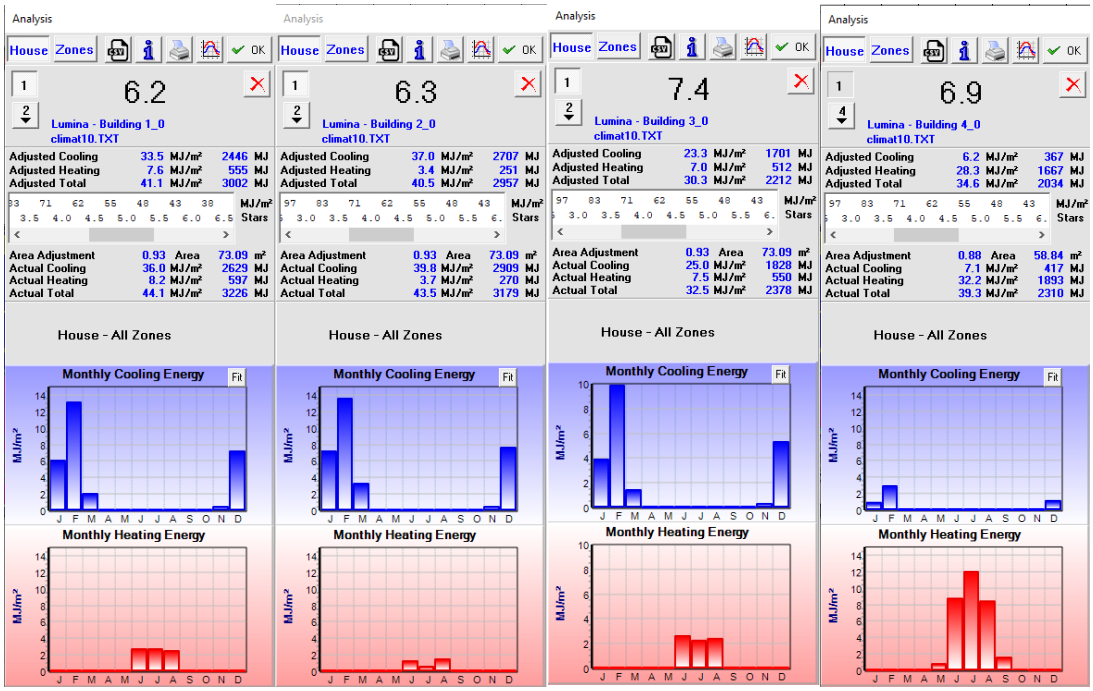

Figure 8: NatHERs Star Rating - Building Performance

This was then assessed in detail via NatHERs compliance requirements, using simulation enhanced with Chenath engine to incorporates the inclusion of air flow modelling to account for natural ventilation and review how this impacts the buildings occupational performance. Specifically, the Chenath engine automatically switches the building operation between mechanical air conditioning and natural ventilation operation whenever natural ventilation satisfies occupant thermal comfort. The Chenath engine calculates hourly heating and cooling energy requirement over a period of one year or multiple years. To evaluate if the apartment is passively designed.

This assessment involved grouping several units within each building and reviewing their general thermal performance. The results confirmed that the overall design of the buildings achieves a high Star Rating, as detailed below. It should be noted that this assessment is based on the current early stages of the project, and it is anticipated that the ratings will improve as further details, design refinements, and optimal glazing selections are incorporated in future stages.

3. Third Party Certification

In accordance with he Economic Development Queensland PRE2024/799 Parklands PDA of 1 Clarke Street, Southport. Condition 5 of the PA the project is to shall ensure the design , construction and operation of sustainable buildings is achieved through best-practice by achieving:-

a) A minimum 6 leaf EnviroDevelopment Certification
b) A minimum 5 Star Green Star; Design and as Building certification (Buildings V1)
c) An equivalent rating under an alternative rating system.

As such this development will achieve a 5 Star Green Star Certification.

3.1. 5 Star Green Star

1 Clarke Street, Southport - Lumina will achieve a 5 Star Green Star rating, which is recognised as an example of 'Australian Excellence' by being a high environmental performer and addressing relevant social issues through design and construction.

Ultimately promoting sustainability, reduces operating costs, improves occupant health and well-being, and increase in the market value of the surrounding community.

It is considered one of the highest standards in design, construction, and operation. A testament to the applicants continued commitment to reducing its environmental impact and improving the health and well-being of its occupants.

Green Star Framework

The Green Star rating system offers a framework to evaluate a building's ability to lessen its impact on the environment while meeting the economic and social needs of its occupants and neighbouring communities.

The Green Star rating system evaluates buildings based on eight categories, namely Responsible, Healthy, Resilient, Positive, Places, People, Nature and Leadership.

The system awards points based on the building project's ability to obtain credits in each category, with each credit targeting the environmental impact of a specific design feature.

The project's rating is determined based on the total number of points earned, as illustrated in Figure 4.

Figure 9: Available Green Star Certification ratings

3.2. 5 Star NABERS Apartments Rating

The proposed development for the Lumina Precinct is committed to achieving a minimum 5-Star NABERS Apartments rating for all four buildings (Building 1, Building 2, Building 3, and Building 4).

The NABERS Apartments rating is a performance-based tool developed by the National Australian Built Environment Rating System (NABERS). It measures the environmental performance of apartment buildings in terms of energy, water, indoor environment, and sustainability. The NABERS rating system is designed to provide a reliable and transparent measure of a building's environmental impact and performance, ensuring that it meets high standards of sustainability.

Figure 10: NABERS Apartments rating scale

3.2.1. Achieving the 5-Star NABERS Apartments Rating target

In review of opportunities and the design intent with the design team. 1 Clarke Street, Southport has incorporated the following design elements to support the 5 Star NABERS rating:

Energy Efficiency: The buildings shared services such as car parks, lobbies and gyms are designed with high-performance energy systems, including energy-efficient lighting, HVAC systems, and significant renewable energy sources (200kW+ Solar system).

Water Management: Practical and effective water management initiatives have been nominated to the shared water use Including: low-flow fixtures, rainwater capture, and efficient irrigation practices.

Indoor Environment: The design takes advantage of natural ventilation, daylight, and materials to improve indoor air quality. This focus helps create a healthy and comfortable living environment for residents which in turn sees reduced HVAC / energy consumption for both the base building and for individual units.

Sustainability Measures: The project will incorporate sustainable building practices and materials, such as low-impact construction techniques and eco-friendly materials. Landscaping with native plants will further contribute to the development's environmental goals.

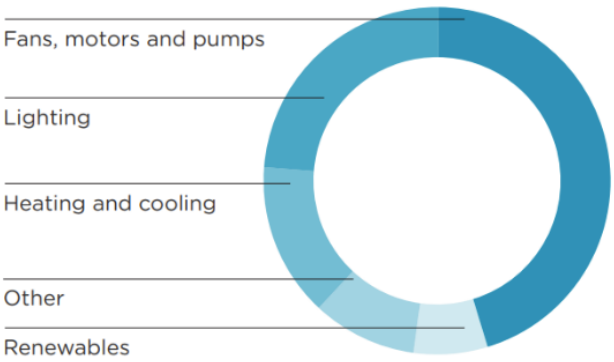

Figure 11: Opportunities for energy savings in shared services of apartment buildings

3.3. Compliance with Development Guidelines for Lumina Residential Development

BSE evaluated how the proposed Lumina Residential Development meets the requirements and guidelines outlined for the Parklands Priority Development Area (PDA), specifically focusing on accessibility, building design, and overall planning standards.

Through this process, BSE confirmed that the proposed development adheres to the guidelines, a key summary of outcomes is detailed below with some further information in Appendix B.

Compliance Summary

Guideline/Requirement	Requirement	Compliance in Lumina Residential Development
Parklands Priority Development Area Development Scheme	Ensures development aligns with long-term planning objectives, promotes sustainable growth, and integrates with surrounding areas.	The Lumina Residential Development adheres to the Parklands Scheme by incorporating sustainable design principles, ensuring connectivity with existing infrastructure, and enhancing community amenities. The development supports the area's vision for balanced growth and environmental stewardship.
PDA Guideline No. 2: Accessible Housing	Requires a proportion of residential units to be designed for accessibility, ensuring inclusivity for people with disabilities.	Lumina Residential Development includes 10% of its residential units designed to meet the accessibility standards outlined in PDA Guideline No. 2. Features such as wider doorways, ramps, and adaptable living spaces are integrated to accommodate residents with varying needs.
PDA Guideline No. 8: Medium and High Rise Buildings	Mandates design considerations for medium and high-rise buildings including setbacks, height limits, and architectural aesthetics.	The development complies with Guideline No. 8 by adhering to prescribed height limits and incorporating appropriate setbacks. The building's design also meets aesthetic criteria, featuring modern architectural elements that complement the surrounding urban landscape.
QDesign (Queensland Government)	Focuses on high-quality design standards that enhance the public realm, sustainability, and liveability of residential developments.	Lumina Residential Development aligns with QDesign principles by incorporating green building practices, creating engaging public spaces, and ensuring high standards of liveability. The design includes energy-efficient systems, high-quality materials, and community-focused amenities.

4. Discussion and Closing Comments

From the onset of the project, rigorous computational modeling and adherence to stringent sustainability standards have been a priority. This approach has positioned the Lumina development to achieve a commendable 5-Star Green Star rating, a 5-Star NABERS Apartment rating, and a 7.5 Star NatHERS rating. These ratings reflect the integration of sophisticated energy-efficient strategies in the design, including:

- Significant use of vegetation and landscaping to reduce the heat island effect.
- Extensive amenity spaces to facilitate community gatherings.
- Appropriate passive design to minimise unwanted heat gain during hot summer months and to maximise natural ventilation through operable windows and ceiling fans.
- Solar photovoltaic (PV) systems to reduce greenhouse gas emissions.
- Sustainable transport options, supported by EV charging stations and bike parks, to promote active modes of transport with low emissions.
- Double glazing for enhanced acoustic and energy efficiency.
- Rainwater harvesting and community gardens to further sustainability efforts.

Given these factors, we confidently assert that 1 Clarke Street – Lumina is on track to not only meet but surpass several key sustainability benchmarks. Our commitment to this project remains strong, with ongoing dedication to further development in the upcoming design stages and meticulous construction management.

We look forward to advancing through the next phases of design and construction to realise this vision fully.

Appendix A: 5 Star Green Star Scorecard

The Lumina Residential Development is committed to secure a 5 Star Green Star accreditation, a hallmark of "Australian Excellence in Sustainability." This certification underlines the project's commitment to ecological excellence and sustainable design concepts.

The current building design forms the basis for the Green Star credit assessment for this development. An in-depth analysis of Green Star credits affirms that the existing building design has the potential to secure a 5 Star Green Star rating. However, liaison and confirmation is required with the GBCA regarding some credits based on limitations from the existing school buildings – out of current project scope.

Additionally, it's worth mentioning that certain credits may undergo changes as the design plans evolve.

The included table (Appendix A) consolidates the points currently targeted as part of the project's development. This is a continuous process that will undergo revisions as the design is further refined, with the goal of identifying the perfect blend of initiatives to reach the thirty-five (35) point target required for a 5-star result.

By striving for a 5 Star Green Star certification, the project not only highlights its dedication to sustainable development but also serves as a beacon for future industry projects. It is a testament to the project's leadership and commitment to establishing a sustainable legacy beneficial to both the immediate school community and the broader environment.

Climate Positive Pathway

Registering from / certified	2023 onwards	**Desired Green Star rating**	5 Star

Scoring

Minimum expectations met	Yes	**Total points targeted**	50
Core points targeted	46	**Green Star rating targeted**	5 Star
Leadership points targeted	4	**Climate Positive Pathway met**	~~No~~

LEGEND
Closed Out
Targeted - Low Risk
Targeted - Medium Risk
Targeted - Medium / High Risk

MBSR: Multiple Buildings Single Rating Approach

Building Specific: Each building to demonstrate compliance seperatey

~~The Climate Positive Pathway is required for the targeted rating~~

Achievement of a climate positive pathway is required

AMENDED IN RED

By: Nicole Tobias

Date: 10 September 2024

Queensland Government

#	Credit	Minimum Expectation	Credit Achievement	Exceptional Performance	Total points available	Targeted performance level	Total points targeted	High Level Requirement
	Responsible				**17**		**6**	
1	Industry Development		1		**1**	Credit Achievement	**1**	The building owner or developer appoints a Green Star Accredited Professional, discloses the cost of sustainable building practices to the GBCA, and markets the building's sustainability achievements.
2a	Responsible Construction	•			**Min Expectation**	Minimum Expectation	•	The builder or head contractor has an environmental management system in place to manage its environmental impacts on site; ~~SS by Credit achievement: The builder diverts at least 80% of construction and demolition waste from landfill; The head contractor provides training on the sustainability targets of the building.~~
2b	Responsible Construction		1		**1**	Credit Achievement	**1**	90% of construction and demolition waste is diverted from landfill, and waste contractors and facilities comply with the Green Star Construction and Demolition Waste Reporting Criteria.
3a	Verification and Handover	•			**Min Expectation**	Minimum Expectation	•	~Energy & water sub-metering for all common uses, major uses and major sources, connected to a BMS automatic monitoring system. ~Metering and monitoring strategy to be developed in design. ~Commissioning & Tuning: Prior to construction - set environmental performance targets, undertake Services & Maintainability Review, design for air tightness. ~During construction and PC - commission the building, engage building tuning provider, test for air tightness. ~After PC - Tune the building for 12 months. ~Building Information: Provide O&M information for nominated systems. Develop a ~Building Log Book as per CIBSE TM31: Building Log Book Toolkit. Provide Building User Information at PC.
3b	Verification and Handover		1		**1**	Credit Achievement	TBC	Path 1: Soft landings approach involving FM team. Path 2: Engage ICA during commissioning & tuning process. For buildings with a total building services value over $20m, both requirements must be met.
4	Responsible Resource Management (Operational Waste)	•			**Min Expectation**	Minimum Expectation	•	The building must be designed to allow for effective management of operational waste by: • Separating waste streams [General waste, Recycling Streams, + 1 additional e.g. e-waste, batteries, etc] • Providing a dedicated and adequately sized waste storage area; and • Ensuring easy and safe access to waste storage areas for both occupants and waste collection contractors.
6a	Responsible Structure		3		**3**	Credit Achievement	**3**	50% of all structural components (by cost) meet a Responsible Products Value score of at least 10. For responsible products credits: https://new.gbca.org.au/rate/rating-system/responsible-products-framework/
9a	Responsible Finishes		1		**1**	Credit Achievement	**1**	60% of all internal building finishes (by area) meet a Responsible Products Value score of at least 7. For responsible products credits: https://new.gbca.org.au/rate/rating-system/responsible-products-framework/
	Healthy				**14**		**9**	
10a	Clean Air	•			**Min Expectation**	Minimum Expectation	•	Building ventilation systems to comply with minimum separation distances between pollution sources and outdoor air intakes, and all ductwork to be cleaned prior to occupation. Exhaust or elimination of pollutants from printing & photocopying equipment, cooking and vehicles.
11a	Light Quality	•			**Min Expectation**	Minimum Expectation	•	The building provides adequate levels of daylight and good lighting levels suitable for the typical tasks in each space. - Flicker free lighting with CRI R1-R8 > 85, CRI R9 > 50. Best practice illuminances levels & uniformity as per AS 1680. All light sources to have minimum 3 MacAdams Ellipse. - Limit glare from light sources through fitted baffles, diffusers etc, or AS 1680.1 compliant UGR - Daylight access exceeds typical federal, state or local regulations through provision of a narrative and simple daylight calculations. No modelling required to achieve this, qualitative description of considerations of access to daylight acceptable.

#	Credit	Minimum Expectation	Credit Achievement	Exceptional Performance	Total points available	Targeted performance level	Total points targeted	High Level Requirement
11b	Light Quality		2		**2**	Credit Achievement	**2**	The building provides either best practice Artificial Lighting or best practice access to daylight (40% coverage). One of the below must be addressed: (1) Artificial Lighting. Lighting to address quality of light, provide highlights & contrasts and avoid excessive lighting or overly uniform solutions. AS/NZS 1680 applies for task lighting. (2) Daylight. At least 40% of area (minimum 20% per floor / tenancy) to have high levels of daylight. High levels of daylight = 160 lux during 80% of hours or through manual calculations.
12a	Acoustic Comfort	•			**Min Expectation**	Minimum Expectation	•	An Acoustic Comfort Strategy is prepared to describe how the building and acoustic design aims to deliver acoustic comfort to the building occupants.
12b	Acoustic Comfort		2		**2**	Credit Achievement	**2**	The building is designed and tested to achieve minimum acoustic performance requirements aligned with the Acoustic Comfort Strategy. The project must comply 2 of the following criteria: internal noise levels, acoustic separation and impact noise transfer through floors.
13a	Exposure to Toxins	•			**Min Expectation**	Minimum Expectation	•	The building's paints adhesives, sealants, carpets, and engineered wood products are low or non-toxic. Occupants are not exposed to banned or highly toxic materials in the building.
13b	Exposure to Toxins		2		**2**	Credit Achievement	**2**	On-site tests verify the building has low Volatile Organic Compounds (VOC) and formaldehyde levels. Sample testing required to verify TVOC < 0.27ppm and formaldehyde < 0.02 ppm. Sample area depends on building size / no. of floors. Testing when all finishes & furniture have been installed.
14	Amenity and Comfort		2		**2**	Credit Achievement	**2**	The building has dedicated one or several amenity rooms to act as parent room, a relaxation room, or an exercise room, dedicated for staff or regular building occupants. 1m2 for every 10 occupants / staff. Rooms must be no smaller than 10m2. 24.06.21: Buildings 1,2 and 4 Combined requirements = 150m2; currently 860m2 achieved (via Gyms buildings 1 and 4) - assumed accessible to building 2 occupants? Building 3 requirement = 30m2; currently 160m2 from the Active Use - assumed to be used as gym space.
15a	Connection to Nature		1		**1**	Credit Achievement	**1**	The building provides views; and At least 4287 m2 must be planted area (either vertical or horizontal). The allocated area must be accessible and have the necessary infrastructure to allow the acivity to occur (for example taps for irrigation)
	Resilient				**8**		**3**	
16a	Climate Change Resilience	•			**Min Expectation**	Minimum Expectation	•	The project team completes the climate change pre-screening checklist. The project team communicates the building's exposure to climate change risks to the applicant.
16b	Climate Change Resilience		1		**1**	Credit Achievement	**1**	The project team develops a project-specific climate change risk and adaptation assessment for the building. Extreme and high risks are addressed.
18	Community Resilience		1		**1**	Credit Achievement	**1**	The project team undertakes a needs analysis of the community, identifies shocks and stresses that impact the building's ability to service the community, and develops responses to manage these.
19	Heat Resilience		1		**1**	Credit Achievement	**1**	At least 75% of the whole site area comprises of one or a combination of strategies that reduce the heat island effect. This credit can be targeted through a combination of solar PVs, light coloured roofing, landscaping and water bodies.
	Positive				**30**		**16**	
21a	Upfront Carbon Emissions	•			**Min Expectation**	Minimum Expectation	•	The building's upfront carbon emissions are at least 10% less than those of a reference building.
21b	Upfront Carbon Emissions		3		**3**	Credit Achievement	**3**	The building's upfront carbon emissions are at least 20% less than those of a reference building. Demolition works must be offset.
22a	Energy Use	•			**Min Expectation**	Minimum Expectation	•	Residential Pathway: Pools must have a pool cover; Whole of House performance is 10% better than NCC 2022 requirements. PV Does not contribute. Hotel: Building performs 10% better than NCC 2022 requirements. PV Does not contribute.

#	Credit	Minimum Expectation	Credit Achievement	Exceptional Performance	Total points available	Targeted performance level	Total points targeted	High Level Requirement
22b	Energy Use		3		**3**	Credit Achievement	**3**	BTR - Efficient Heating/cooling; exact details pending HVAC selection (see p149 of Guidelines) - Ceiling fans installed in all bedrooms and living rooms - Lifts to achieve energy efficiency class A or B in accordance with ISO 25745-2; AND idle and standby energy performance level is 1 in accordance with ISO 25745-2; AND The minimum escalator energy performance is class A+ to A+++ in accordance with ISO 25745-3. - HW is electric heat pump with COP 3.0 OTHER options to replace above - 300kw Solar system; showers 7.5L/min and hw pipes R2 outside units R0.5 inside units. - Lift lobbies and corridors are naturally ventilated / supply air (no AC or tempered systems) Hotel: The building's energy use is at least 20% less than a reference building. PV can contribute.
23a	Energy Source	•			**Min Expectation**	Minimum Expectation	•	The building provides a Zero Carbon Action Plan.
23b	Energy Source		3		**3**	Credit Achievement	**3**	100% of the building's electricity comes from renewable electricity. Both on-site and off-site renewables are acceptable. For off-site renewables, 5 year renewable energy contract is required.
23c	Energy Source			3	**3**	Exceptional Performance	**3**	100% of the building's energy comes from renewables i.e. 100% GreenPower for an all electric building.
24a	Other Carbon Emissions		2		**2**	Credit Achievement	**2**	The building owner eliminates or offsets emissions from refrigerants through carbon credits. Refrigerants with GWP less than 10 don't require offsets.
24b	Other Carbon Emissions			2	**2**	Exceptional Performance	**2**	All other emissions not captured in the Positive category are eliminated or offset.
25a	Water Use	•			**Min Expectation**	Minimum Expectation	•	The building installs efficient water fixtures as follows:- Taps - Kitchen - 4 star WELS (7.5L/min) - see GS credit 22a Taps - hand wash basins - 5 star WELS Urinals - 5 Star WELS Toilets - 4 Star WELS Showers - 3 Star WELS (9L max flow rate) Clothes washing machines - 4 Star WELS Dishwashers - 5 Star WELS
	Places				**7**		**3**	
27a	Movement and Place	•			**Min Expectation**	Minimum Expectation	•	Building 3 will have 1 unisex shower and 1 locker for every 8 staff members. It will also include accessible and inclusive changing facilities in a safe and protected space.
27b	Movement and Place		3		**3**	Credit Achievement	**3**	The building's design and location prioritises walking, cycling, and allows 5% EV ready to all carparks. Allowance to 25% of all carparking spaces mix of EV chargers 7kW-22kW): As-Built: 15 EV carparks (Buildings 1-2) As-Built: 20 EV carparks (Buildings 3-4)
	People				**9**		**5**	
31a	Inclusive Construction Practices	•			**Min Expectation**	Minimum Expectation	•	During the building's construction, the head contractor provides gender inclusive facilities and protective equipment. The head contractor also installs policies on- site to increase awareness and reduces instances of discrimination, racism and bullying.
31b	Inclusive Construction Practices		1		**1**	Credit Achievement	**1**	The head contractor provides high quality staff support on-site to reduce at least five key physical and mental health impacts relevant to construction workers. They must also evaluate the effectiveness of their interventions.
32	Indigenous Inclusion		2		**2**	Credit Achievement	**2**	The building's design and construction celebrates Aboriginal and Torres Strait Islander people, culture and heritage by undertaking one or both of the following: • Playing an active role in the organisational Reconciliation Action Plan; and • Incorporating design elements using the Indigenous Design and Planning principle
33a	Procurement and Workforce Inclusion		2		**2**	Credit Achievement	**2**	Through the implementation of a social procurement strategy, at least 2% of the building's total contract value has been directed to generate employment opportunities for disadvantaged and under-represented groups.
	Nature				**14**		**4**	
35a	Impacts to Nature	•			**Min Expectation**	Minimum Expectation	•	The building was not built on, or significantly impacted, a site with a high ecological value.
36a	Biodiversity Enhancement		2		**2**	Credit Achievement	**2**	• The building's site includes atleast 2600 m2 of landscape area; • The landscaping includes a diversity of species and prioritises the use of climate- resilient and indigenous plants; and • The project team develops a site-specific Biodiversity Management Plan and provides it to the building owner or building owner representative.
37	Nature Connectivity		2		**2**	Credit Achievement	**2**	The site must be built to encourage species connectivity through the site, and to adjacent sites. If the project sits within a blue or green grid strategy it must contribute to the goals of the strategy.
	Leadership				**21**		**4**	
41	Leadership Challenges		1		**16**		**4**	Leadership Challenges: - Residential Performance = 1 point - Circular Economy = 2 points (Credit Achievement) - Fossil Fuel Free Construction Site - 1 point (Credit Achievement)

Appendix B: Parklands Priority Area Development Scheme and Development Guidelines Compliance – High Level Commentary

EDQ Key Concepts	Project Specific Key Items/Initiatives	1 Clarke Street - Project Specific Implementation Response
Net zero emissions	- Passive building design	Utilise the parametric modelling and studies completed to date of the site, to review and make decisions to select and incorporate passive design materials to minimise energy use.
	- Electrification and no use of gas	Natural and liquid petroleum gas will not to be part of the proposed site works.
	- Highly energy-efficient appliances	Install highly energy-efficient electrical appliances.
	- Onsite renewable energy	Install 300kW photovoltaic systems for onsite renewable energy generation.
	- Batteries or provision for future installation	Include batteries or allocate space for future installation.
	- Smart demand response control	Implement smart, demand-response control of equipment.
Independent measurement and verification	- Verification of sustainability performance	Continue to undertake verification to ensure sustainability targets and requirements are met.
	- Green Star certification	The project will achieve a 5 Star Green Star certification.
Climate change adaptation	- Identification of natural and urban hazards	Identify hazards affecting the site and develop strategies for resilient development.
	- Climate change risk assessments	A risk assessment has been completed and medium and long-term risks have been addressed.
	- Workshop with design team and staff	Workshops have been help and discussed items will be discussed as necessary throughout the project with develop a climate change adaptation plan issued during later stages.
Key areas for engagement	- Technical stakeholder group	Meetings have been had with key stakeholders including meeting with the current school principal to discuss how we can actually implement some of the ESD initiatives idealised; such as encourage active modes of transport within the development and wider Lumina Precinct / EDQ transport plan. We will continue to engage with relevant stakeholders.
Supporting sustainability	- Consideration of environmental factors	Consider ecological significance, bushfire and flood-prone areas, solar access, and ground contamination. As well as consider flora use for natural habitats and fauna movements to and from adjacent sites and nearby surrounding parklands.

EDQ Key Concepts	Project Specific Key Items/Initiatives	1 Clarke Street - Project Specific Implementation Response
	- Consideration of heritage factors	Respond to and enhance positive qualities of the site's heritage.
	- Engagement of Sustainability Consultant	BSE will act as the GSAP, Sustainability Consultant to advise on sustainability targets and assist with Green Star certification throughout the design and later construction stages.
Schematic and detailed design	- Passive design principles	Incorporate best practice passive design principles into building orientation and massing.
	- Thermal performance improvements	Improve glazing, insulation, and thermal bridge abatement for better energy efficiency.
	- Indoor environmental quality	Prioritise daylight, views, ventilation, and thermal comfort for staff and students.
	- Design responses to climate change risks	Develop design solutions for identified climate change risks.
	- Green spaces and biophilic design	Create green spaces, retain vegetation, and incorporate biophilic design principles.
	- Energy and water conservation measures	Implementation of energy-efficient lighting, water conservation methods, and water-sensitive urban design.
Delivery, commissioning, and handover	- Monitoring and review of sustainability initiatives	Monitor construction activities and minimise negative impacts.
	- Assisting in commissioning and tuning	ICA will provide support during the commissioning and tuning stages of equipment when contractors completing ITP's.
	- Handover plan and defect identification	A commissioning and handover plan will be developed to ensure facility readiness and identify any defects for a soft landings approach.
Whole-of-life planning	- Balancing whole-of-life costs	Discussions and advise to date, have been in premise of whole-of-life costs, reducing resource impact, and achieve sustainability objectives.

EDQ Key Concepts	Project Specific Key Items/Initiatives	1 Clarke Street - Project Specific Implementation Response
Integrated design	- Cross-disciplinary approach	The project team has fostered an integrated design approach involving all stakeholders and optimise services over the life of the asset.
Student wellbeing and educational outcomes	- Improved indoor and outdoor environments	Significant allowance for operable windows and natural ventilation. The proposed site also provides for significant high-quality outdoor spaces, and promotes occupant wellbeing.
Future directions for sustainability	- Increasing sustainability targets	The 5 Star Green Star targets are excessive of the overarching requirements and supports the PDA Scheme