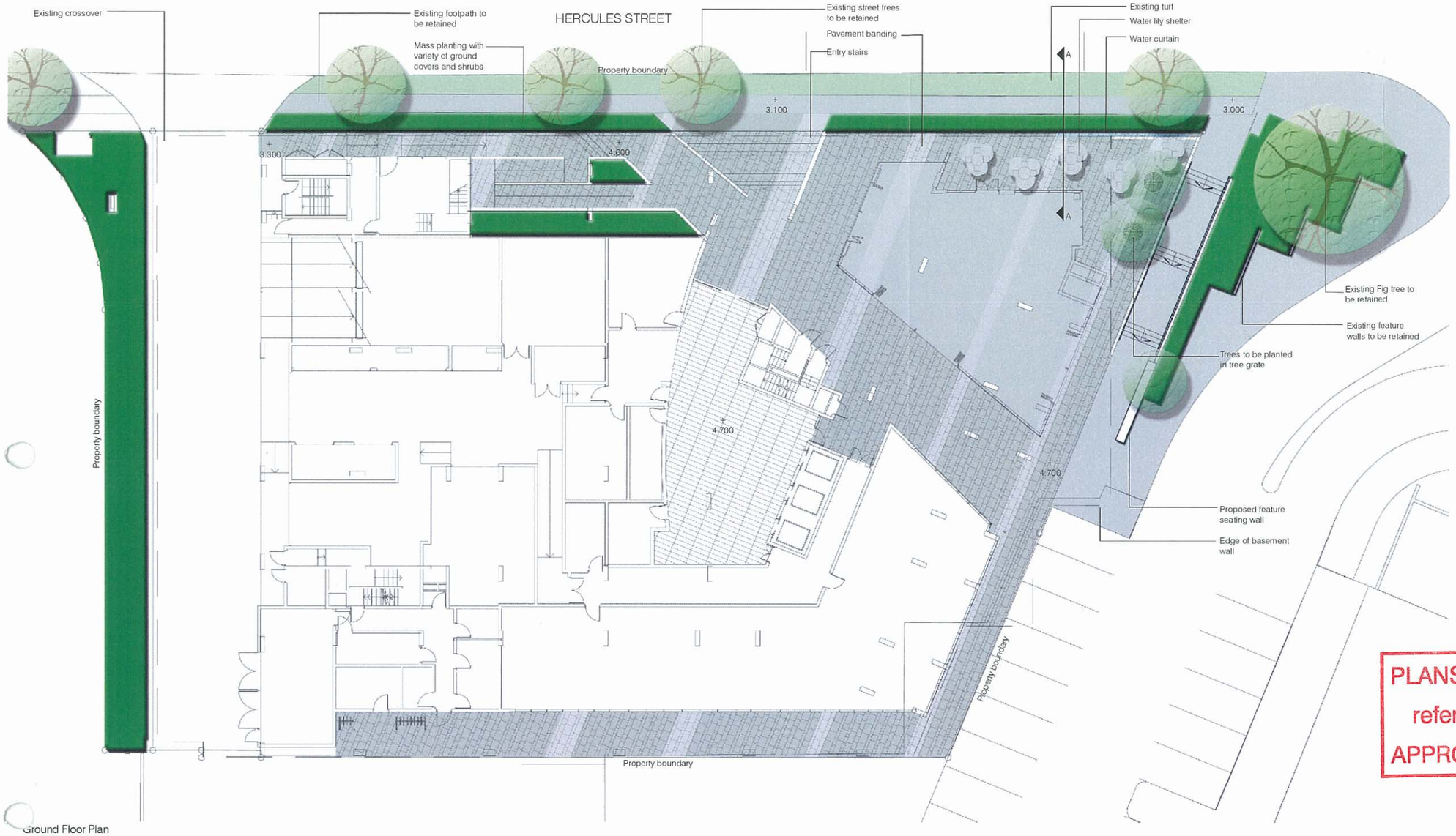
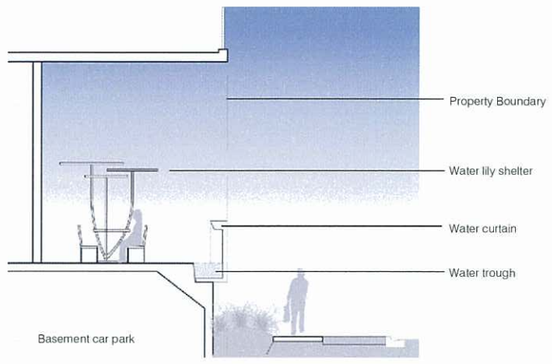


Ground Floor Plan
Scale 1:100 @A0



Section A-A
Scale 1:50 @A0

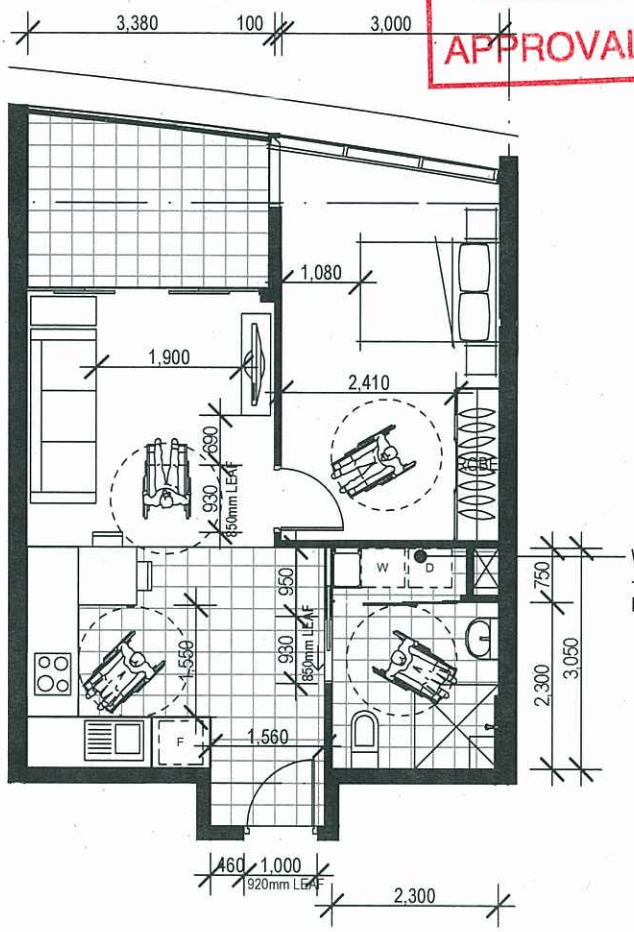
SPECIFICATION NOTES

1. SERVICES: The locations of services on these drawings are indicative only as they are designed locations for general information or council approval and may not reflect site conditions.
2. SITE SET-OUT AND AS BUILT SURVEY: A licensed Surveyor shall be responsible for the set-out of landscape.
3. PLANTING AREAS
3.1. Non Podium: Prepare as noted, place 300mm deep of imported topsoil (to AS4419) and place 100mm deep of max 25mm grade hoop pine mulch.
3.2. Podium areas: Allow for an average soil depth of 900mm and 100mm deep of max 25mm grade hoop pine mulch for all planting areas shown over podium. Provide 100mm thick Hydrocell Hard Foam slab over A12 Bidum on Ausdrain drainage tiles. Waterproofing of podium planters to future detail and specification.
4. FERTILISING DURING ESTABLISHMENT: Symptoms of nutrient deficiencies such as 'Nitrogen Draw Down' are unacceptable. Plants and turf shall exhibit signs of growth and good health. The contractor is responsible for fertilising to achieve optimal plant health. The contractor shall allow for further AS4419 testing to assess soil nutrition as required.
5. TOPSOIL: Topsoil quality and sample testing to comply with AS4419 Soils for Landscaping and Garden Use. All topsoil shall be blended with Hydrocell flake 15% by volume (example - Hydrocell supplier: Centenary Landscapes ph 3373 4900).
6. GRAVEL MULCH: Unless otherwise noted, gravel mulch shall be 50-70mm grade Nambucca Heads smooth washed river gravel, place 150mm deep on A12 bidum fabric.
7. PEDESTRIAN PAVEMENTS:
7.1. Type 1: Broom Finished Colour Concrete to match existing Portside colour scheme.
7.2. Type 2: 20mm Granite Tiles to match existing Portside colour scheme.
7.3. Tactile Ground Surface Indicators - system type to be SS pathfinder type, locations as per AS1428.
7.4. Stair tread indicators: Provide SS cast in place stair nosing strips to all stairs.
8. SERVICE PIT INFILL LIDS: Unless otherwise specified all service pits shall have pavement infill lids. Pavement shall match adjacent type (colour and finish).
9. WALLS:
9.1. Masonry Planter Walls: Core filled steel reinforced 190 series Boral block wall to Engineers detail. Generally all planter walls shall have a smooth cement based render min 10mm thick, painted with min 2 coats of external grade Dulux paint to all visible surfaces, colours TBA.
9.2. Seating walls: 50x50mm HW dressed Jarrah timber battens at 10mm spacing with SS frame and fixings. Timber finished with 3 coats of Tanalith E 3:1 with Penetrol.
10. Balustrade - Semi-frameless glass balustrade with SS fixings and posts to meet Australian standards.
11. HANDRAILS: All handrails shall be 50mm dia grade 316 stainless steel with polished finish. SS fixings.
12. VEHICULAR PAVEMENTS: Refer Engineers drawings for all vehicular pavements.
13. LIGHTING: Refer to Electrical Engineers drawings.
14. IRRIGATION: All ground floor and roof garden areas are to be irrigated using rainwater stored in on-site rainwater tanks.
15. WATER CURTAIN: Proprietary water curtain fitting with stainless steel heel guard grate over stainless steel trough. High volume water pump and self chlorinator.
16. WATER RILL & OVERFLOW PONDS: 300 x 300 mm stainless steel trough, fixed to 200 series block work wall, 600mm high. Overflow ponds to be 300mm deep stainless steel pond to sizes as shown on plan. Provide high flow reticulation pumps within each overflow pond. All water to be treated through soft chlorinators and commercial grade pool filters.
17. ROOF GARDEN SHELTERS: Steel construction, with timber soffits and SS cabling.

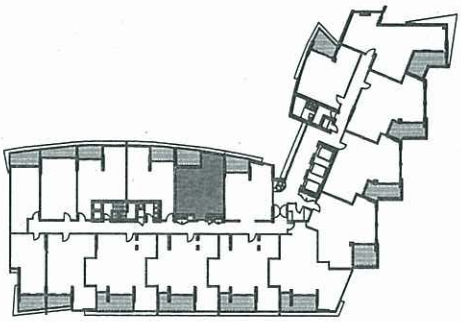
BUILDING 6 PORTSIDE
SCHEMATIC DESIGN

BR005719000-SD 01
2010-06-17 ISSUE B
LANDPARTNERS

PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 12/10/10



1 / - UNIT PLAN - B3 UNIVERAL ACCESS
SCALE @ A4 1:100



N

0 1 2 3 4 5 metres

Schematic

BUILDING 6 PORTSIDE HAMILTON

CITIMARK

Issue	Revision	Date	In.
C	REVISED LAYOUT	09/10/2010	LM
B	REVISED LAYOUT	07/10/2010	SO
A	FOR CLIENT REVIEW	02/10/2010	SO

Amendments

Client: CITIMARK	Scale: As Shown	Date: MAY 2010	Job no.: 09004025
Project Name and Location: BUILDING 6 PORTSIDE HAMILTON, HERCULES ST, HAMILTON	Drawn: LM	Checked: ND	Approved: ND
Drawing Title: UNIT PLAN: B3 UNIVERAL ACCESS	Drawing no.: SD 10004	Issue: C	

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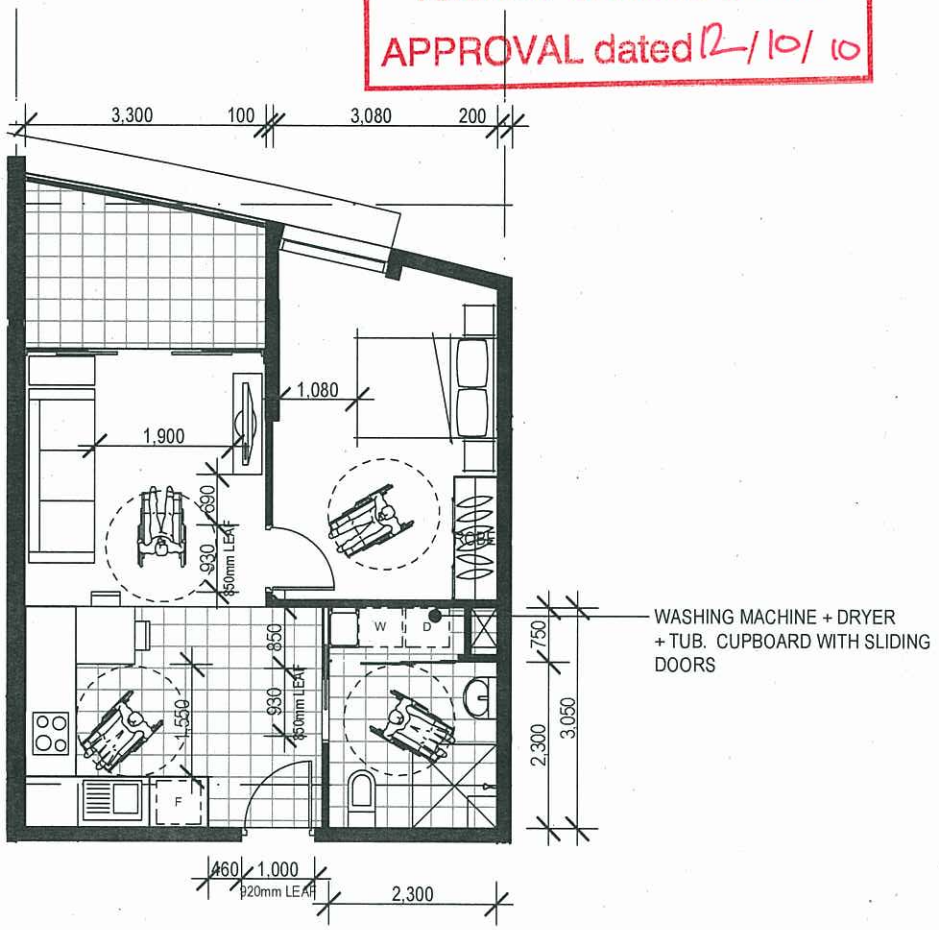
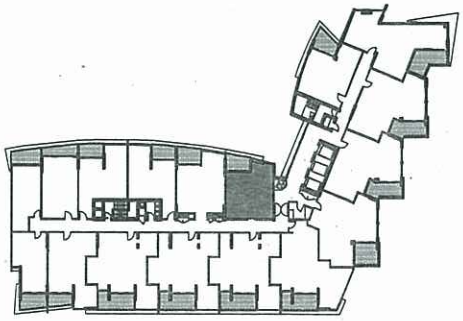
COTTEE PARKER

PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 12/10/10



1 - UNIT PLAN - B4 UNIVERAL ACCESS
SCALE @ A4 1:100



0 1 2 3 4 5 metres

Schematic

BUILDING 6 PORTSIDE HAMILTON

CITIMARK

Issue	Revision	Date	In.
C	REVISED LAYOUT	09/10/2010	LM
B	REVISED LAYOUT	07/10/2010	SO
A	FOR CLIENT REVIEW	02/10/2010	SO

Amendments

Client: CITIMARK	Scale: As Shown	Date: MAY 2010	Job no.: 09004025
Project Name and Location: BUILDING 6 PORTSIDE HAMILTON, HERCULES ST, HAMILTON	Drawn: LM	Checked: ND	Approved: ND
Drawing Title: UNIT PLAN: B4 UNIVERAL ACCESS	Drawing no.: SD 10005		Issue: C

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Affordable Component

Level	Type	Bed	Total m2
1	A2	1	51
2	A2	1	51
1	A3	1	51
2	A3	1	51
3	A	1	51
3	D2.1	1	44
3	D2.2	1	46
4	A	1	51
4	D2.1	1	44
4	D2.2	1	46
5	A	1	51
5	D2.1	1	44
5	D2.2	1	46
6	A	1	51
7	A	1	51
Total		**15**	**728**

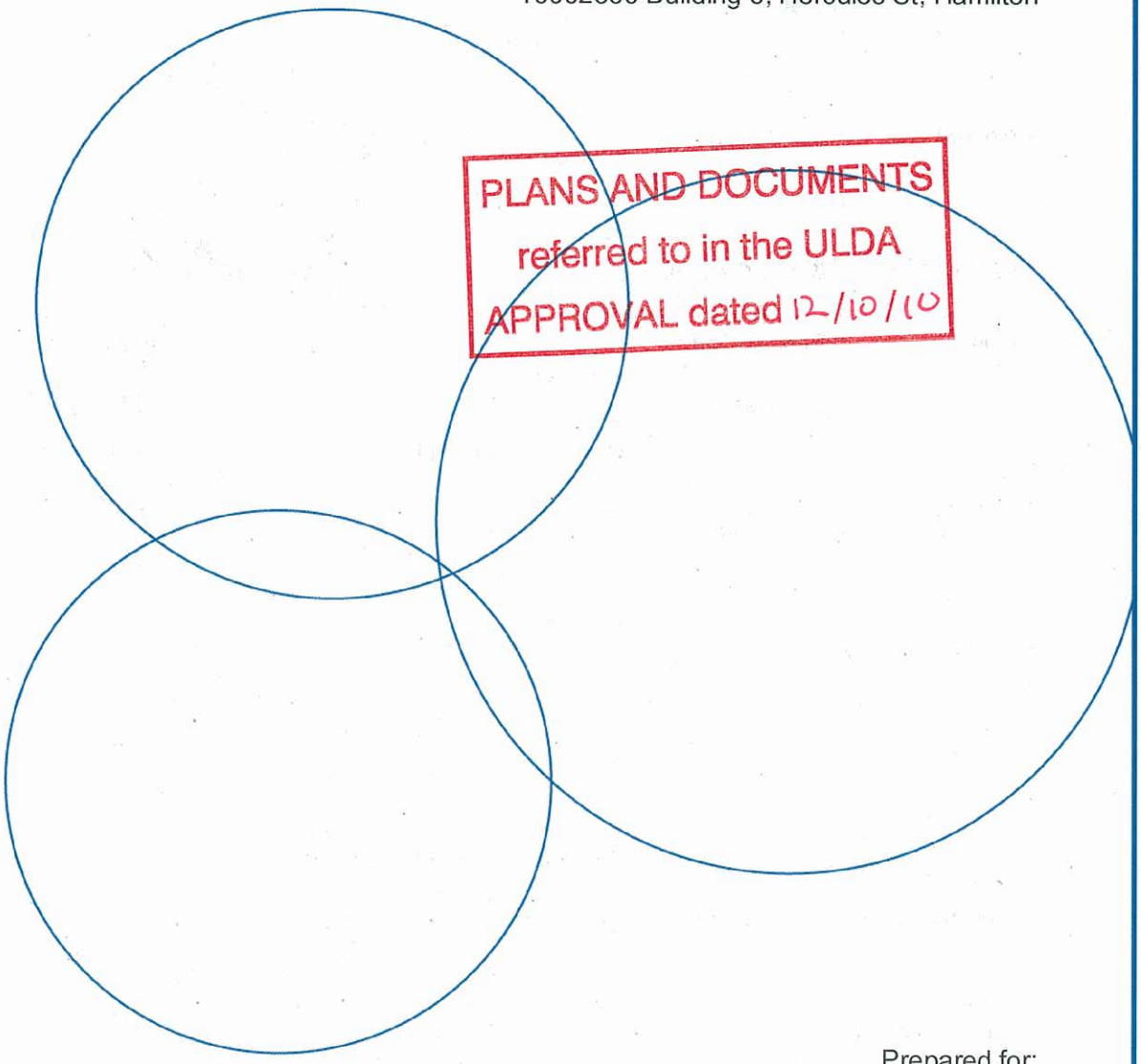
received 10th September 2010

PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 12/10/10

CUNDALL

ULDA Development Application : Sustainability

10002360 Building 6, Hercules St, Hamilton



Prepared for:

Citimark

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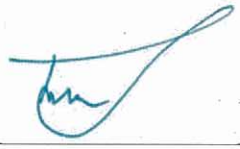
Please contact: Brett Beeson

Author:	Brett Beeson	
Checked by:	Tim Davies	
Approved by:	Ben O'Callaghan	

Revision	**Description**	**Date**
A	Initial Issue	6/8/2010
B	Feedback from involved parties included	10/8/2010
C	Revised with feedback from ULDA	9/9/2010

The success and realisation of the proposed initiatives will be dependent upon the commitment of the design team, the development of the initiatives through the life of the design and also the implementation into the operation of the building. Without this undertaking the proposed targets may not be achieved.

Contents

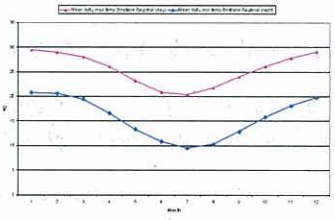
Executive Summary

This report presents the ESD (ecologically sustainable design) initiatives for a proposed development on Hercules St. Hamilton. Building 6 will provide the area with an affordable mix of residential and retail space that allows residents to enjoy low impact living through integrated design and planning. Urban Land Development Authority (ULDA) has been engaged throughout this process to ensure the proposal meets the needs of the land, the people and the planning for the region.

The report describes how the climate and sustainability initiatives have been incorporated into the design. This is presented in three parts;

Basis: The development addresses key outcomes within the *Urban Land Development Authority Act 2007*.

Climate Response – Solar passive design balances heat and cooling by tailoring shading and window performance for the sub-tropical climate.



Sustainability Criteria

A strategy guide of 15 principles of sustainability is used in the report to provide a guide to how this building has incorporated many key aspects developed by the Brisbane City Council has been incorporated into the design

Some of the key features that have been incorporated into the design are:

- No swimming pool
- Central services – air-cooled chillers providing air-conditioning; central hot water
- Evacuated tube solar hot water with gas boost
- Naturally ventilated podium car-parks and corner units
- Good solar orientation and shading design
- Recycling and general waste chutes

1 Introduction

This report summarises the environmentally sustainable design (ESD) aspects of the proposed Building 6, Portside, Hercules St. Hamilton development. Its intended audience is twofold: firstly the design team and secondly the Urban Land Development Authority (ULDA). The design team has contributed discipline-specific information, which is summarised and supplemented by the ESD consultant - this report's author.

The report is composed of three parts:

- Basis: Referencing appropriate acts and setting sustainability criteria
- Climate and Response: Summary of design opportunities based on climate
- Sustainability Criteria: Summary of design responses and how they address the sustainability criteria

1.1 Relevant Acts, Authorities and Plans

The relevant authority for the development is the ULDA; the relevant legislation is the *Urban Land Development Authority Act 2007*. A core function of the Act, which this report addresses is that:

> "Planning principles that give effect to ecological sustainability ..."

The Act further defines ecological sustainability as a balance between "protection of ecological process and natural systems...", economic development and "... cultural, economic, physical and social wellbeing...".

The practical result of multiple functions and such a definition is that developments should aim to use most cost-effective ESD initiatives and the most long-term, people-focused initiatives. Such an approach meets the stated desire for 'balance'.

The ULDA also have a draft *Sustainability Policy*. This document's visions, principles, goals and strategies are referenced and address.

1.2 Scope of Report

This report addresses *environmental* sustainability. The *Sustainability Policy* document addresses this and other forms of sustainability, such as financial and cultural sustainability. Hence the relevant aspects of this policy, in line with the Act's environmental sustainability requirements are addressed. Where necessary the scope is widened: for example to address reducing transportation energy via promoting cycling.

1.3 Environmental Sustainability Criteria

The Sustainability Policy provides for development of sustainability criteria. The Brisbane City Council's *15 principles for Sustainable Design* is a climate specific, well-used set of criteria. These 15 Principles are used to assess this development. To ensure the ULDA's environmental objectives are met, a matrix is given below, cross-referencing the 15 Principles to relevant parts of the Development Scheme and Sustainability Policy.

Table 1 – Sustainablity Criteria Cross-Referencing

Principle	ULDA Sustainability Policy Vision	ULDA Principles
1 – Establish agreed sustainable design values	Protecting ecological values and optimising resource use	Climate impact, water, energy, materials, habitats and pollution
2 – Apply an integrated and collaborative design and construction process		
3 – Design for our subtropical place	Protecting ecological values and optimising resource use	Climate impact, water, energy, materials
4 – Protect and restore the natural ecosystems	To facilitative the creation of sustainable urban communities	Protecting ecological values and optimising resource value
5 – Utilise land appropriately	Providing economic benefit	
6 – Apply integrated water management	Protecting ecological values and optimising resource use	Water
7 – Manage energy use	Providing economic benefit	Lifecycle costs
	Protecting ecological values and optimising resource use	Climate impact, energy & transport
8 – Select appropriate building materials	Providing economic benefit	Lifecycle costs
9 – Manage waste	Protecting ecological values and optimising resource use	Pollution, Materials and Waste
10 – Consider cost efficiency	Providing economic benefit	
11 – Create healthy indoor environments		
12 – Support green transport	Promoting and maintaining liveable communities	
13 – Develop adaptable buildings and spaces		
14 – Build a safe and diverse community	To facilitative the creation of sustainable urban communities	
15 – Inform the end owner and user	Providing economic benefit	Sustainability Champion

2 Climate and Design Responses

2.1 Temperature and Humidity

Temperatures

To understand the opportunity for natural ventilation an ambient temperature frequency analysis was carried out for the Test Reference Year from 8am to 5pm from Monday to Friday.

Comments: Average maximum temperatures vary between 18°C – 24°C 58.7% of the year.

Recommendation: This suggests natural ventilation could be used on its own to provide comfortable conditions for almost 60% of the year.

Temperature °C	Jan (hrs)	Feb (hrs)	Mar (hrs)	Apr (hrs)	May (hrs)	Jun (hrs)	Jul (hrs)	Aug (hrs)	Sep (hrs)	Oct (hrs)	Nov (hrs)	Dec (hrs)	Year (hrs)	Total (hrs)
<= 2	0	0	0	0	0	0	0	0	0	0	0	0	0	
2 to 4	0	0	0	0	0	0	0	0	0	0	0	0	0	
4 to 6	0	0	0	0	0	0	0	0	0	0	0	0	0	
6 to 8	0	0	0	0	0	0	0	0	0	0	0	0	0	
8 to 10	0	0	0	0	0	0	0	0	0	0	0	0	0	
10 to 12	0	0	0	0	0	3	5	0	0	0	0	0	8	
12 to 14	0	0	0	0	0	11	12	10	0	0	0	0	33	
14 to 16	0	0	0	0	1	20	26	30	0	0	1	0	84	
16 to 18	0	0	0	0	9	27	43	51	2	0	7	0	145	270
18 to 20	4	0	0	1	38	40	41	57	17	4	17	0	219	
20 to 22	3	0	2	13	47	46	45	51	49	36	29	2	323	
22 to 24	10	0	24	36	72	33	18	8	71	66	52	32	422	
24 to 26	27	26	53	74	35	2	2	0	28	61	53	44	416	1380
26 to 28	87	55	76	50	4	1	0	0	13	24	28	49	367	
28 to 30	57	67	30	15	0	0	0	0	0	16	8	41	234	
30 to 32	32	27	3	0	0	0	0	0	0	0	3	20	85	
32 to 34	6	5	0	0	0	0	0	0	0	0	0	1	12	
34 to 36	1	0	0	0	0	0	0	0	0	0	0	0	1	
36 to 38	0	0	0	0	0	0	0	0	0	0	0	0	0	
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	699
Total	207	180	198	189	207	189	198	207	180	207	198	189		2349

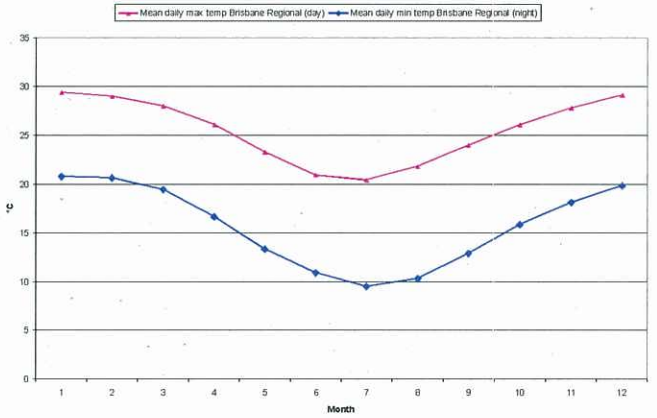
Legend		
	11.5%	Heating may be required
	58.7%	Natural ventilation suitable
	29.8%	Cooling may be required

Diurnal swing

The following diagram shows the difference between daily minimum and maximum temperatures (diurnal range) at Brisbane Airport.

Comments: The difference in temperature between day and night is markedly different, at 9°C on average.

Recommendation: This suggests that night time cooling can be an effective way to help maintain comfortable conditions indoors.



Thermal comfort (see explanation Appendix A)

The following diagram shows the distribution of cold, comfortable and warm hours through the year (assumed Monday – Sunday, 24hours).

Comments: This slide demonstrates that winter needs as much passive heating as available whilst summer requires complete shading. Further, the slide additionally emphasises the significant potential for mixed mode ventilation to be successful

Temperature °C	Jan (hrs)	Feb (hrs)	Mar (hrs)	Apr (hrs)	May (hrs)	Jun (hrs)	Jul (hrs)	Aug (hrs)	Sep (hrs)	Oct (hrs)	Nov (hrs)	Dec (hrs)	Year (hrs)	Total (hrs)
< -3.0	0	0	0	0	0	13	3	0	0	0	0	0	19	
-3.0 to -2.5	0	0	0	0	0	27	17	33	4	0	0	0	110	
-2.5 to -2.0	0	0	0	0	7	45	30	82	11	0	0	0	205	
-2.0 to -1.5	0	0	0	0	23	103	117	148	67	12	0	0	458	
-1.5 to -1.0	0	0	0	0	71	155	164	172	105	28	20	7	734	
-1.0 to -0.5	0	2	5	38	128	173	161	171	137	89	94	40	1034	2530
-0.5 to 0.0	164	117	247	331	393	155	181	148	301	378	339	200	2954	
0.0 to 0.5	373	344	394	284	122	39	19	8	100	203	230	345	2461	5415
0.5 to 1.0	102	89	70	30	2	0	0	0	5	24	24	77	423	
1.0 to 1.5	59	85	25	8	0	0	0	0	0	2	10	42	232	
1.5 to 2.0	36	27	3	0	0	0	0	0	0	0	2	27	97	
2.0 to 2.5	13	7	0	0	0	0	0	0	0	0	1	6	27	
2.5 to 3.0	6	1	0	0	0	0	0	0	0	0	0	0	6	
> 3.0		0	0	0	0	0	0	0	0	0	0	0	0	
													0	
													0	
													0	
													0	
													0	
													0	785
Total	744	672	744	720	744	720	744	744	720	744	720	744		8760

Legend		
29.2%	Below -0.5	
61.8%	Between 0.5 and 0.5	
9.0%	Above 0.5	

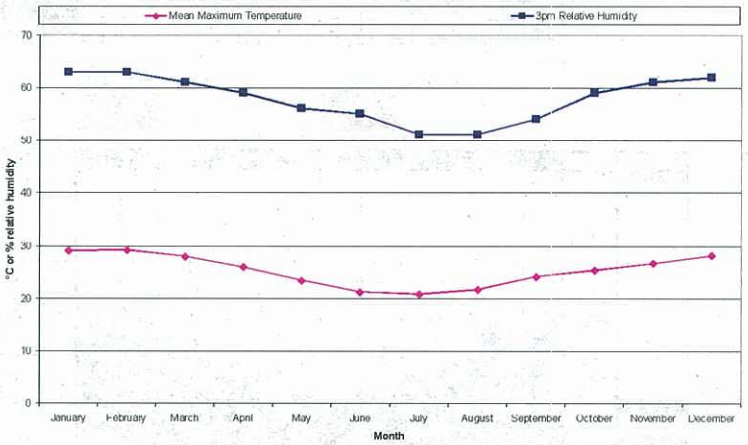
29.2%	0%	0%	1%	5%	31%	73%	76%	79%	44%	18%	16%	6%
61.8%	71%	69%	86%	90%	69%	27%	24%	21%	56%	78%	79%	73%
9.0%	29%	31%	13%	5%	0%	0%	0%	0%	1%	3%	5%	20%

Humidity

The following graph depicts how humidity varies with temperature.

Comments: Being a subtropical location, this variation is small. However, it should be noted that the humidity levels are not extremely high.

Recommendation: As humans are not very sensitive for humidity levels below 70-80%, there is no need to address humidity for thermal comfort. Especially in natural ventilation mode, these levels are fine. In cooling mode, there is a condensation risk that needs to be addressed, e.g. with a dryer section and humidity sensors.



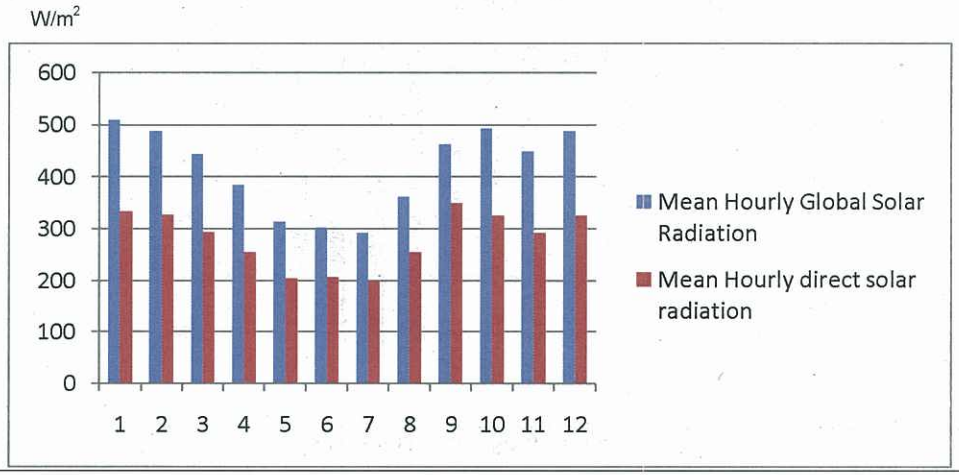
2.2 Solar Exposure

Solar radiation (TRY)

The following figures show the global solar radiation and the direct solar radiation on the site in W/m^2.

Comments: For 61.2% of the year there is high to medium direct solar radiation (above 400 W/m^2) and for 38.8% of the year the direct solar radiation is low (under 400 W/m^2.)

Recommendation: Shading of windows is a critical consideration in passive design. As such this requires appropriate shading strategies and light colours on roof and walls.



Direct Radiation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
<50	0	0	0	5	22	22	22	11	0	0	0	0	83	
to 100	0	0	4	11	0	3	4	10	2	3	4	0	55	
to 150	2	1	3	8	14	12	11	9	18	11	6	2	98	
to 200	4	2	8	2	25	28	24	16	0	7	7	2	126	
to 250	8	8	13	9	15	9	13	11	0	7	14	9	116	
to 300	12	9	8	14	19	15	15	20	8	15	15	9	152	
to 350	17	5	8	12	16	12	13	17	12	15	13	10	150	
to 400	8	8	15	7	10	23	21	8	9	10	14	8	131	911
to 450	7	8	15	13	20	22	19	8	9	13	10	4	148	
to 500	9	9	8	12	16	12	21	16	8	10	11	13	147	
to 550	11	9	9	25	13	10	11	13	13	10	4	14	142	
to 600	9	10	12	21	14	8	15	14	17	10	9	6	145	
to 650	14	17	19	13	4	8	8	17	16	13	10	7	146	
to 700	15	14	25	16	7	0	5	10	24	13	6	12	150	
to 750	11	27	20	6	0	0	1	10	16	15	11	14	141	
to 800	25	8	14	10	0	0	0	2	15	15	6	7	106	
to 850	11	10	11	1	0	0	0	3	10	10	15	22	100	1235
to 900	17	5	5	4	0	0	0	1	5	5	9	12	68	
to 950	9	12	3	0	0	0	0	0	5	9	12	11	61	
> 950	17	9	2	0	0	0	0	0	0	7	18	23	76	205
Total	207	180	198	189	207	189	198	207	189	207	198	189		2349

Legend		
	38.8%	Low Direct Solar Radiation
	52.5%	Medium Direct Solar Radiation
	8.7%	High Direct Solar Radiation

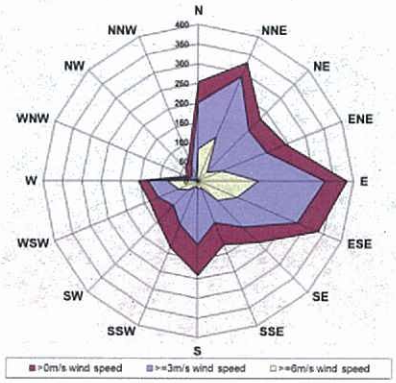
2.3 Wind

Wind direction (TRY)

To determine the potential for natural ventilation, wind direction and speed were also analysed using data from the *Test Reference Year.*

Comments: Most of the wind during the day comes from the east with some wind from north and south.

Recommendation: From this it can be concluded that east oriented windows are ideal for daytime natural ventilation. South facing windows are good for daytime ventilation too, especially if windows are also open in the north façade to stimulate cross ventilation.

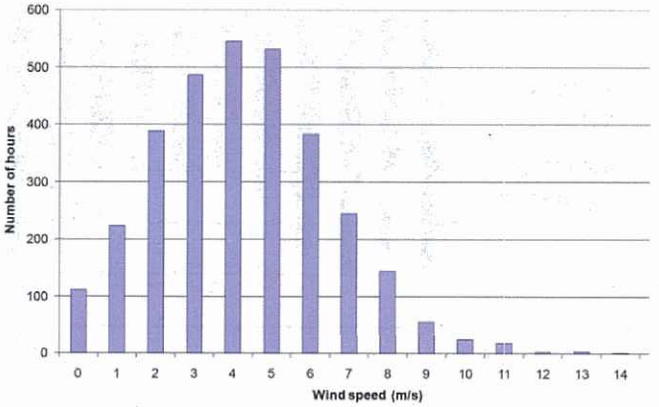


Wind rose from 8am to 5pm

Wind speed frequency

Comments: High wind speeds (greater than 5m/s) are not frequent.

Recommendation: Window openings need to be carefully designed to ensure the building can be ventilated on windy days without disturbing the occupants. High level openings can ensure this; including both a high and low level opening can encourage air circulation within the room even on stiller days.

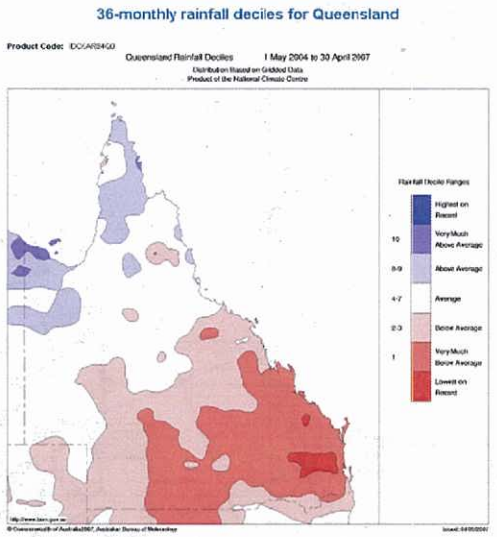


2.4 Rainfall

Monthly Rainfall Deciles (BOM)

Comments: Historically, Brisbane has received around 1135 mm rainfall annually between 1840 and 1994. However, in the past years, rainfall in this part of Queensland has been recorded significantly below average and is currently classified as "serious deficiency", (i.e. in the lowest 10% of historical records). Therefore, it is essential that water conservation measures are adopted in this project.

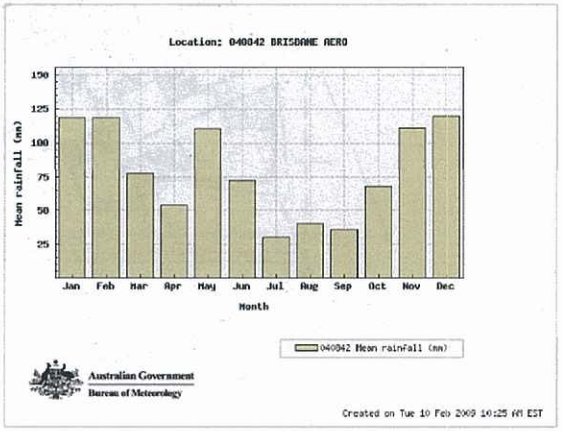
Recommendation: These measures may include initiatives such as rainwater collection (around and re-use and grey water re-use, particularly from vehicle wash-down. In addition, any landscaping will need to use drought resistant / low maintenance plants. Further information regarding the site layout and use is required to identify other possible water saving initiatives.



Monthly average rainfall (BOM)

Comments: The following graph from the BOM website shows that the rainfall is highly seasonal, with the majority of the year's rain falling between November and February.

Recommendation: This means that any rainwater collection system will need to be sized in order to make the most effective use of the available rain.

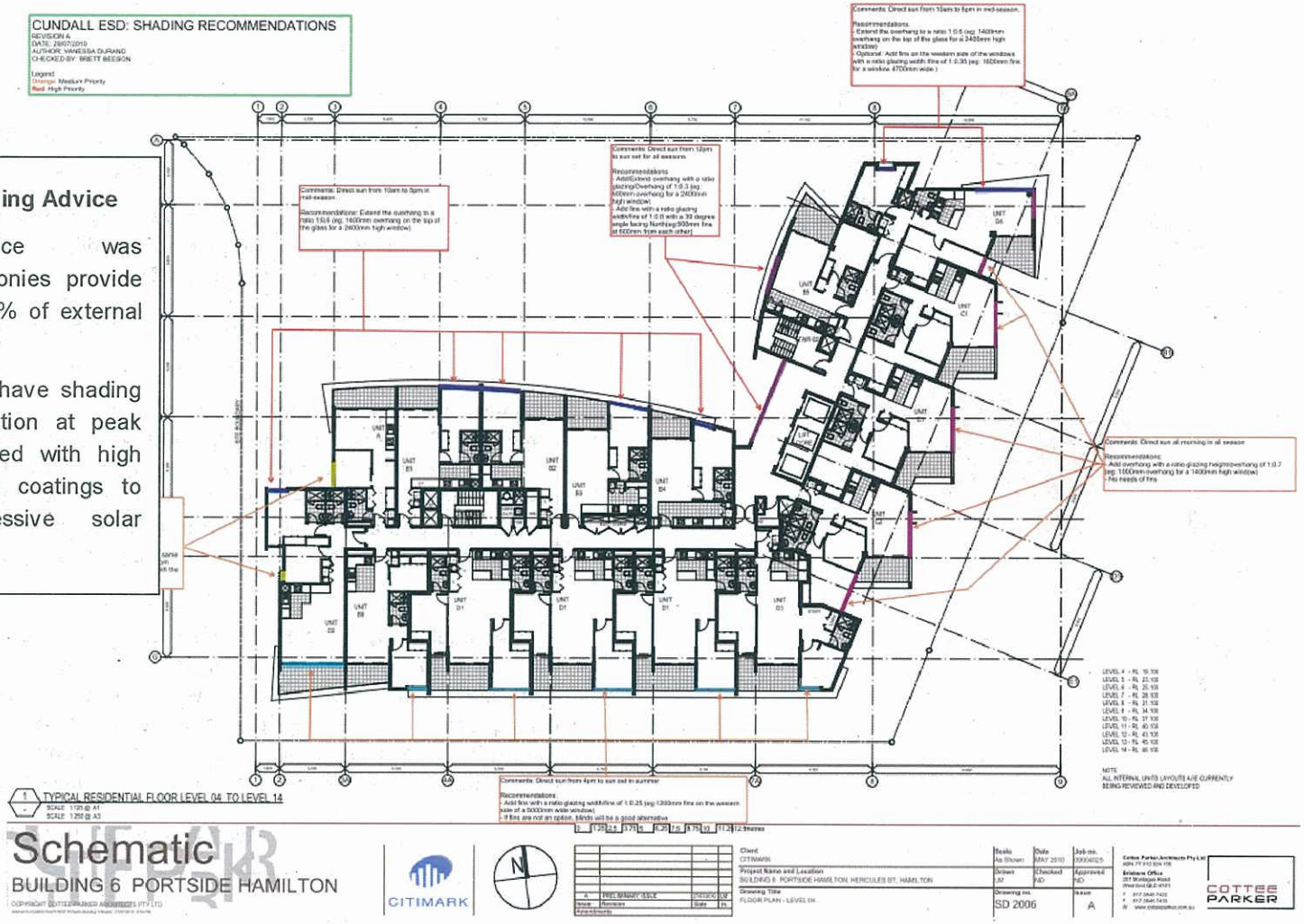


2.5 Shading analysis

Outcomes of Shading Advice

Shading advice was implemented. Balconies provide total shade to ~75% of external windows.

~25% of windows have shading that reduces radiation at peak times and are fitted with high performance low-e coatings to deal with excessive solar radiation.



3 Sustainability Criteria

3.1 P1: Establish agreed sustainable design values

The proposed development does not aim to achieve a Superior Design outcome, but rather meet an appropriate balance of sustainable principles and cost-effectiveness.

This document outlines the agreed sustainable design values, summarised as:

- Focus on good passive design : orient building well, analysis shading
- Then focus on energy efficiency and longevity: use central plant for A/C
- Minimum base-building energy consumption : omit pools, minimise carpark ventilation
- Minimise water use: rainwater capture and reuse, water-efficient fittings
- Make good choices easy: provide for bicycles, walking and outdoor activity

In addition to reducing base-building energy consumption, an average NatHERS rating of five stars will be achieved.

3.2 P2: Apply an integrated, collaborative design and construction process

The ESD consultant was engaged prior to the development approval to provide advice on shading and climate analysis as shown in section 2.

The proposed building design was developed during design meetings involving all parties. This provides an integrative approach where ideas and sustainability concepts can be easily discussed during the design phase. This helps to build a project that each party is satisfied that they contributed to and have achieved their desired goals.

Collaborative decisions were taken on design areas that overlap within the disciplines, such as glazing selection, shading, window placement and area. In this example, ESD, mechanical and architectural consultants collaboratively explored glazing and shading options.

3.3 P3: Design for subtropical place

Refer to Section 2 for an analysis for climate-sensitive design opportunities.

3.3.1 Built Environment

Building Orientation

The main building form is oriented east-west to minimise the problematic western facade, and increase the preferred north and south facades.

The relatively narrow footprint of the building allows for significant outside connection, daylight opportunities and private balconies.

Facade Design

As addressed in Section 2, the facade is vital to a well-performing building. The facade features:

- Overhangs and other shading where appropriate to reduce peak solar gain
- High Visible Light Transmittance Glass (VLT) – greater than 50%
- High performance glazing – low-e coat – reduces solar radiation and improves U-value.

Natural Ventilation

- Large openable areas for natural ventilation
- Plan layout is relatively open, allowing for reasonably efficient single-sided ventilation
- Cross-ventilation will be provided for corner apartments.
- Trickle ventilation will be used for other apartments, via automated control of bathroom / laundry exhaust fan, and openable windows.
- Ceiling fans will be incorporated in apartments, to achieve the required NatHERS rating.

Insulation

Much of the facade is glazed, and most walls are internal. Hence insulation is not a key component of energy efficiency. Insulation will either meet DTS requirements, or the apartment will be NatHERS overall performance requirements.

3.4 P4: Protect and restore natural ecosystems

3.4.1 Protecting Ecological Processes

During construction, best practice construction methods will be used to reduce the impact on the surrounding environment. Sediment runoff control is a key component.

A comprehensive Erosion and Sediment Control Plan including a construction process will be prepared for this development during the detailed design phase. The ESCP designs will be in accordance with the Institution of Engineers reference material and Brisbane City Council's Guidelines.

These designs will provide a basis for the managing contractor to use during the construction of the development and minimise any adverse impacts to the surrounding development.

3.4.2 Biodiversity and Landscape Design

A mixture of native and suitable introduced plants with a variety of ecological functions will be incorporated into the design. This planting will also serve to reduce the heat island effect in the area. This development constitutes at least 30% landscaped area and contains areas for recreation.

Landscape irrigation water is provided by collected rainwater from the roof, stored in tanks located in the basement.

Water Sensitive Urban Design will be an integrated feature of the landscape design. Refer to P6 - Integrated Water Management for further details.

3.4.3 Scenic Amenity

The rejuvenation of the water front will greatly improve scenic amenity for the area.

3.5 P5: Utilise land appropriately

The site fits within the Northshore Hamilton Urban Development Area. The proposed development is appropriate for the purpose according to the regulatory map. The proposed development satisfies an established economic need in conjunction with providing 196 new dwelling units. The site due for revitalisation is situated in an urban infill location that has excellent access to public transport and existing infrastructure, including a substantial network of public recreation areas.

Due to the nature of the site, the podium footprint covers 100% of the site boundary, while the tower plate above covers 47% of the site. Surrounding the building on the podium the bulk of the area is landscaped.

Overall, it is considered that the proposal provides an appropriate development and design outcome for the site that will address a significant demand for residential accommodation within the SEQ region.

3.5.1 Land use transport integration

The land was chosen due its potential to integrate into existing public transport routes, revitalise river frontage and increase urban density in a key strategic area with high growth and employment.

Key features that will make this development accessible to the public;

- Six kilometres to the CBD, an easy cycling, public transport or taxi distance

- The UDA contains a retail areas and employment, reducing the need for travel
- The high density of housing reduces the demand for far distant, Greenfield sites.

3.6 P6: Apply integrated water management

Rainwater

The runoff from the relatively small roof area will be filtered and stored for later reuse in commercial premises' toilets flushing, water features, bin washing, car washing and irrigation. A storage tank of approximately 100kL will be installed, fed from the roof via a symphonic downpipe system. A preliminary rainwater analysis has been undertaken, as show below. This size tank and roof will supply 72% of these usages. Due to the small roof area, analysis shows a tank *larger* than 100kL will not provide additional benefit.

Table 2 - Simulation Setup

Item	Value	Unit
Roof Area	1200	m^2
Tank Capacity	100	kL
Collection Factor	0.8	
Rainfall Threshold	3	mm
Usage	829	kL/ann
Weather Station	Brisbane 040690	

Table 3 – Estimated Usage

Name	Value	Volume Unit	Time Unit	Notes
Toilets	120	L	/Per Day	5 toilets
Irrigation	2000	L	/Per Day	2mm/m^2/day
Bin, Car Wash	100	L	/Per Day	
Water Features	50	L	/Per Day	

Table 4 – Rainwater Results

Metric	Value	Meaning
Rainwater Fraction	72%	How much of consumption is met via rainwater?
Potable Fraction	28%	How much of consumption is met via potable?
Overflow Fraction	25%	How much of inflow water overflows?
Collection Fraction	0.96	What is the TotalInflow:TotalComsumption ratio?

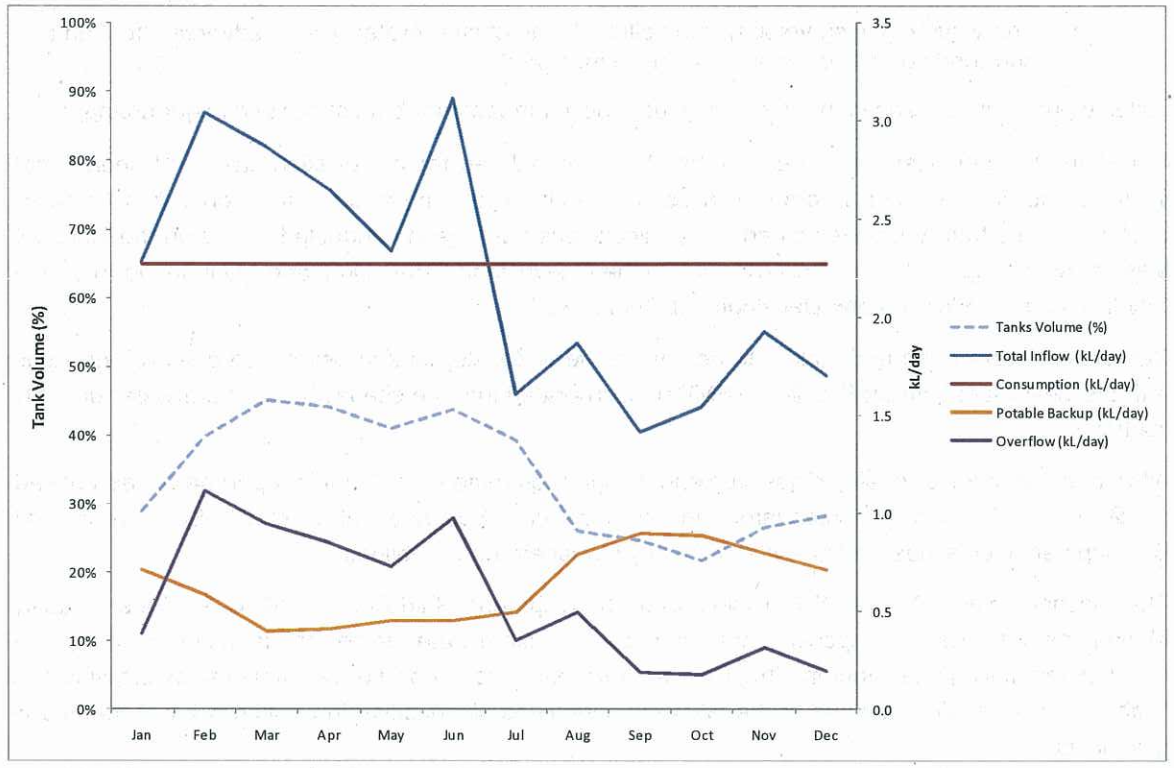


Figure 1 - Simulation Tank Levels

Rainwater and Commercial Section

The Queensland Development Code applies to the commercial section of the development. Each pedestal requires 1500L of rainwater storage. This will be incorporated as part of the rainwater collection system.

Integrated water management strategy

The integration of stormwater, rainwater, irrigation, waterways, and demand reduction management on this site satisfies the intent of this principle.

The overall target is to reduce potable water consumption. A number of strategies have been used to achieve this are;

1. Water efficient appliances throughout
2. Integrated WSUD
3. Using air cooled chillers
4. Deleting provision for a swimming pool

Stormwater

Under the Brisbane City Council Land Use Development Guidelines (2000), several design elements were identified in relation to stormwater management issues. Brisbane City Council must be satisfied that:

- The proposed development can be drained;
- The stormwater management system can follow the features and functions of the natural drainage system;

- The volume, timing velocity and pollutant load of stormwater has no adverse effect on any surrounding properties or receiving waters; and

Suitable provision is made in the design layout to accommodate for both minor and major drainage.

Modelling of stormwater runoff quantity has been considered for the existing case and operational phase of the development. In order to assess the existing and predicted future (operational phase) discharge rates from the development site, calculations have been conducted based on the Rational Method, according to the methods specified in the Queensland Urban Drainage Manual and Brisbane City Council's Subdivision and Development Guidelines.

Calculations have been undertaken to determine the undeveloped and developed peak run-off rates with the Best Management Practices (BMPs) incorporated into the site layout for stormwater quantity control.

All references to water quality objectives and design requirements within this report have been based on Brisbane City Council Standards and in particular Brisbane City Council Subdivision and Development Guidelines Part C – Water Quality Management Guidelines.

The Brisbane City Council Subdivision and Development Guidelines, Part C – Water Quality Management Guidelines, specifies that the level of stormwater treatment is determined by the development falling into either the 'high' or 'low' risk categories. For a development to be classified as 'high risk' it must fall within one of the following categories as specified in Section 3.1.1 of the above guidelines:

- Development located in a waterway corridor, Brisbane River corridor, or wetland area;
- Multi-unit dwellings or commercial uses with an impermeable surface area (not including roof area) in excess of 2500m^2;
- Subdivision where greater than 6 lots are involved
- Industrial activities that are not impact assessable (under Council's City Plan) and have at least 1000m^2 in uncovered storage / working space;
- Industrial activities that are impact assessable (under Council's City Plan);
- Uncovered car parks with at least 100 spaces;
- Developments which discharge stormwater or wastewater to an area deemed by Council to have significant environmental value.

From a review of these categories, we believe that the development can be classified as 'low risk' for Water Quality as the site is not located in a waterway corridor, Brisbane River corridor or wetland area. Also, the majority of the site is roof areas, hence the uncovered impervious areas within the site will be less than the 2500m^2 trigger for 'high risk' developments. As the development has been classified as 'low risk' Best Management Practices will be applied.

The proposed development is such that the majority of the site is covered with roof area. It is hence expected that the generation of pollutants would be low. Best management practices will be applied to mitigate the pollutant discharge from the site.

It is proposed to install a GPT in the basement area for treatment of stormwater prior to discharge. We expect that this would be of the Ecosol RSF4000 range which allows trapping of oils and grease. The location of this is to be determined by the Hydraulic Engineer during the detailed design phase.

Irrigation

A water management strategy for irrigation will involve ensuring gardens are well mulched and are drip irrigated in the afternoon to avoid evaporation. A dense canopy on a variety of levels produces

shade that lowers temperatures & evaporation. Overall, it will make the area cooler, reduce glare and be more enjoyable.

Demand Reduction

All fixtures will exceed the minimum WELS rating required by the Queensland Development Code. Appliances provided will be a minimum 4 Star WELS rated.

A simple building user's guide will be provided alerting occupants to the relative impact of their behaviour on water consumption.

3.7 P7: Manage energy use

Appliances

An energy and water efficient clothes dryer and dishwasher will be provided with each unit to reduce hot water and electrical consumption.

Hot water system location

A centralised evacuated tube solar hot water system will be installed on the roof. These higher efficiency tubes are particularly effective on cold sunny days in winter. In times when the sun is not able to meet the needs, a natural gas booster will supply the remaining energy.

Passive design

The building's facade has been designed to make use of the sun, breezes, views and climate to provide a balance of heating, cooling, lighting and ventilation.

Unwanted solar gains are controlled with external shading and balcony projections. The main glazed facades exist on the north and south. By doing this, the main heat load remains outside, while maintaining excellent daylight. The western facade has a limited exposure area to reduce excessive summer afternoon heat load.

All units will have access to natural ventilation through the use of windows and doors to the exterior. Further, the shallow plans of the units allow reasonably effective single sided ventilation.

The podium car park is above ground and is naturally ventilated.

The main living room and bedrooms will have consistent natural light due to the well shaded but open glazed areas. Because these areas are shaded well, inhabitants are less likely to draw the curtains, reducing the need for internal lighting.

Heating and cooling

The air-conditioning system exceeds the current government energy efficiency requirements (MEPS).

Cooling is provided via a centralised chilled water system. The plant will use chillers that are staged to provide efficient part-load service, as well as a low-load chiller. The chillers are air-cooled which eliminates the water use of cooling towers.

The AC will be zoned for each room with the apartment to ensure no energy is wasted through over-cooling or over-heating.

Common areas, such as the lobbies and corridors, will be naturally ventilated and exhaust at the corridor ends to maintain air quality. Intake will be via the lobby wall.

Thermal performance rating

Energy modelling with BERS will be conducted soon after DA to confirm the apartments will meet their NatBERS requirements.

Energy efficient lighting

Fluorescent and/or metal halide lighting with timers and/or light sensors will be used for all common areas, car parks and external lighting. Compact fluorescents will be used a majority of internal lighting.

Day lighting

All units have well shaded clear glazing to at least one facade on the living room providing ample daylight. The bedrooms also have openable windows, bringing daylight to these spaces.

Monitoring

Visible electricity monitors will be installed for each dwelling to help occupants understand the effect their behaviour has on energy consumption.

Comprehensive commissioning will be undertaken in, with tuning during the twelve month defects period and a final re-commission to ensure all systems operate as intended throughout a typical year.

Commercial Section

The commercial areas at ground level will require full-height glazing for retail purposes. This glazing will be well shaded by the structural overhangs to the north, south and east. The difficult west orientation is a service area, to reduce excessive solar gain. These overhangs also provide weather protection.

Air-conditioning will be supplied by the centralised chiller water system. This is more efficient than the traditional method of Room Air Conditioners running off condenser water. Hot water is also supplied by the centralised system.

No kitchen exhaust will be installed initially, as this may be be required. Provision for future high-level discard will be made.

3.8 P8: Select appropriate building materials

Manufacturing process

Standardised, pre-fabricated joinery components will be used for bathrooms and kitchens to help reduce waste during the fabrication process. The majority of the components of the building will be suitable for recycling at the end of their life.

PVC minimisation

Wet areas will be tiled to avoid the use of PVC flooring. Window frames will be aluminium; facade cladding will also avoid PVC.

Sustainable timber

There will be minimal use of timber within the development. Moreover, timber that is used will come from a certified Australian Forestry Standard (AFS) source.

Design for disassembly

The design development process will consider the embodied energy equation for the building and will assess the design for disassembly for major elements such as the roofing and the facade system.

3.9 P9: Manage waste

Waste management plan

A waste management plan will be prepared prior to the commencement of construction.

Construction waste

Suppliers will be encouraged to use minimal packaging and return unused materials and packaging where appropriate.

The building contractor will be required to maintain a materials recycling program during construction.

Residential Provisions

Separate general waste and recycling waste bins are to be provided in the ground floor. Each apartment floor will also be provided with a recycle waste bin located within the refuse chute room, for residents' use.

A simple building user's guide will be provided alerting occupants to various waste minimisation strategies and the facilities available to them.

Commitment to P9

1. A target of 80% waste recycling during construction will be established for the project
2. A strategy for collection and suitable disposal of recycled waste will be adopted

3.10 P10: Consider cost efficiency

Cost efficiency as been considered by:

- Using central air-conditioning plant which considerably lowers lifetime costs – it has a longer useable life, can have individual components replaced and has lower operation costs.
- Using standard floor plates to improve construction efficiency
- The ongoing costs to occupants and owners have been reduced through good passive design, efficient services, durable materials, and convenient access to public transport and local businesses.
- Utilising natural ventilation to the podium level car parking results in lower capital, ongoing and lifecycle costs for the occupants and owners.

3.11 P11: Create healthy indoor environments

There has been a focus on creating a good quality indoor and outdoor environment quality, which has been achieved through;

- the use of natural lighting
- common sheltered areas outside
- Operable facades that will allow a large percentage of the year to operate without air conditioning and its associated health problems
- Balconies off the main living spaces, sized for a cosy living ambience that is suited to the price-point and affordable unit mix
- Material selection- low VOC carpets, paints and finishes will be used throughout

3.12 P12: Support green transport

The development site is situated close to recreational areas and transport routes. There are a number of travel options other than private vehicles that are available to users of the site. The development is close to Brett's Wharf Ferry terminal, and there are also a number of scheduled bus routes that pass the site and there is a bus stop located along Kingsford Smith Drive.

Further, the proposal will provide retail areas for the residents of the surrounding area, thus reducing the need for local residents to leave the area to do their shopping.

To further encourage green transport, the development proposal will significantly improve the streetscape environment through significant landscape works and will enhance pedestrian connectivity and safety through reinforcing the pedestrian movement networks. The site is located within a high pedestrian traffic zone and the proposal responds to this existing environment through the creation of a pedestrian friendly environment incorporating paved spaces and hard and soft landscaping treatments.

Secure, undercover and convenient bicycle facilities are provided for the use of residents, visitors, retail employees and patrons. The facilities are all in accordance with AS2890.3.

Walking paths along the river front provide a public asset that will bring surrounding communities to enjoy the regenerated river frontage. Covered areas are provided along the walkway for resting and shelter against the sun and rain.

3.13 P13: Develop adaptable buildings and spaces

The proposed building has been designed to allow flexibility with respect to the changing technologies of sustainability over time.

The lower level recreation, retail and commercial spaces are designed as adaptable spaces and will provide opportunity for changes in various retail and commercial uses over time. These are designed with lighting and open viewable areas providing ambient security.

The ground floor retail plaza is designed as a meeting place for the local community and provides sufficient space for a variety of passive recreational activities. The podium level, communal space also provides flexibility with respect to the types of activities that can occur. A combination of BBQ facilities and undercover areas as well as soft and hard landscaping, facilitates an adaptable recreation space for residents.

Internally, design features ensure that spaces are able to be used by people with a multitude of abilities, family sizes and needs. The focus is on small family units, which matches the demographic trend of Australia. Most units are an open plan arrangement with the kitchen positioned at one end.

3.14 P14: Build a safe and diverse community

Crime prevention through environmental design (CPTED) features are integral to developments such as mixed use retail and residential areas with public parks and access. Creating spaces that have excellent visual security through social presence is a key strategy that has been implemented in this development. Parks and retail areas are lit at night and aim to provide a usable space at any time during the week.

Key CPTED strategies include:

1. Provide clear border definition of space

2. Provide clearly marked transitions from public to private space
3. Place gathering areas in locations with natural surveillance and access control
4. Place safe activities in unsafe areas
5. Place safe activities in safe areas
6. Provide natural barriers to conflicting activities
7. Improve scheduling of space to allow for 'critical intensity'
8. Increase the perception of natural surveillance
9. Overcome distance and isolation through improved communications and design efficiencies

3.15 P15: Inform the end owner and user

A simple building users' guide will be prepared that incorporates information on each of the key features of the building to help owners and tenants understand how to make the most of their building. All equipment manuals and as-installed drawings and details will also be provided. Information on public transport routes and simple diagrams on how to be more sustainable will be provided.

Electrical energy monitors show immediate usage to invoke a greater sense of responsibility and awareness. This is provided on the basis that if people are aware of their immediate impact or cost of operation, they are likely to perform that activity more prudently.

ENVIRONMENTAL AMENITY IMPACT ASSESSMENT

BUILDING 6 DEVELOPMENT APPLICATION

PORTSIDE WHARF DEVELOPMENT

HAMILTON

Prepared for:
Citimark Properties

Prepared by:
MWA Environmental

16 August 2010

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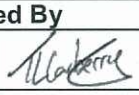
1 Building 6 DA Report	16.08.10	TLC		PAK	
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CONTENTS **PAGE**

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

1.1 Study Brief

This report is prepared in support of an application for a Development Approval for Building 6 of the Portside Wharf development at Hamilton. The report has been prepared for submission to the Urban Land Development Authority.

The Portside Wharf site is located at Hercules Street and Harbour Road, Hamilton. Building 6 is located on the northern portion of the Portside Wharf site at 35A Hercules Street.

The Portside Wharf development is anchored by the Brisbane Cruise Ship Terminal and incorporates a range of uses including residential, retail and commercial uses as part of the overall Masterplan.

Building 6 is a proposed mixed use development, incorporating retail and residential uses in a multi storey building.

This report considers the impact of noise from surrounding land uses upon the residential components of the Building 6 development and also considers the potential reverse amenity impacts of the development upon existing surrounding land uses.

The report also considers the impact of lighting, in particular headlight glare from proposed on-site car parking, from the Building 6 development upon surrounding residential facades. Air Quality impacts upon proposed residential uses are also considered.

Previous reporting has been prepared by MWA Environmental (formerly Max Winders & Associates) for the Portside Wharf development at the Masterplan Stage and for development applications to UDLA for various buildings on the site. This report utilises the significant work undertaken for the current approval as a basis for assessment of the Building 6 development approval.

The report has been prepared from detailed field surveys and data acquisition from Brisbane City Council, DERM and surrounding land occupiers including P&O Ports.

This report has been prepared in accordance with the requirements of applicable Australian Standards and with the requirements of the Brisbane City Council (BCC) *Brisbane City Plan 2000*, *Noise Impact Assessment Planning Scheme Policy* (NIAPSP).

1.2 Site Description

The subject site is described as:

Street Address	35A Hercules Street
Suburb	Hamilton
Real Property Description	Lots 901 & 907 on SP169072
Site Area	3,099 m^2
Land Owner	Multiplex Portside Wharf
Regional Plan Designation	Urban Footprint
Zoning	Mixed Use Centre Zone
Precinct	Northshore Urban Village Precinct and Sub-precinct 3(c)

The site location is shown on **Figure 1**.

1.3 Surrounding Land Uses

A detailed review of surrounding land uses has been previously undertaken to identify any environmental and amenity issues that may conflict with the Portside Wharf development. Study methodologies adopted have been visual surveys of land uses, requests to the Brisbane City Council and the Environmental Protection Agency (EPA) to obtain factual data on Environmental Licences and approvals including Flammable and Combustible and Dangerous Goods Licensing, investigation of complaints registers of Brisbane City Council and DERM to understand any complaints made regarding existing industrial and commercial uses and discussions and meetings with surrounding land users to identify their operations and constraints imposed on the subject development.

From the detailed surrounding land use studies, the following were identified as potential noise impacts upon the Portside Wharf development:

- Aircraft noise;
- Traffic noise;
- Cruise Terminal operation;
- Port activities noise; and,
- Surrounding land use noise (i.e. plant and equipment, car parking, etc).

These potential noise impacts will each be investigated as impacting upon the proposed Building 6 development.

1.4 Proposed Development

The proposal is to develop Building 6 as a new mixed use development.

The Building 6 development proposal provides for the following:

- Basement car parking;
- Ground level retail uses;
- 2 podium car parking levels including 2 residential units per podium level facing Hercules Street; and,
- 12 residential apartment levels above.

Indicative design drawings are included as ***Attachment 1***.

2.0 EXISTING ENVIRONMENT

2.1 Existing Noise Environment

2.1.1 Existing Noise Sources

The site is located in an inner urban area adjacent to industrial land uses with proximity to a number of significant noise sources. The prominent noise sources at the site are aircraft noise, vehicular traffic noise and noise from port activities and other surrounding land uses.

2.1.2 Existing Noise Levels

To enable an assessment of the existing noise exposure of the subject site detailed short-term and long-term noise measurements have been undertaken. The noise data utilised in this assessment is that from the 2003 report for Portside Wharf. Short term measurements have been undertaken in 2006 which demonstrate that the noise data from 2003 was still relevant for assessment of noise amenity aspects of the development. Previous data recorded is still considered relevant for the Building 6 assessment.

The short-term statistical noise levels recorded by sound level meter are listed below in **Table 2.1** with monitoring locations shown on **Figure 2**. Noted peak noise levels from discrete noise sources are provided in ***Attachment 2*** and summarised in the appropriate sections of this report for each noise source.

The recorded noise levels are presented as statistical components, which are described as:

L_1: Noise level exceeded for 1 percent of the measurement period, referred to as the adjusted maximum sound pressure level.

L_{10}: Noise level exceeded for 10 percent of the measurement period, referred to as the averaged maximum sound pressure level.

L_{90}: Noise level exceeded for 90 percent of the measurement period. AS1055.1–1997[1] notes that the L_{90} is described as the background sound pressure level.

L_{eq}: An "average" measurement, and as per AS1055.1–1997 defined as the value of the sound pressure level of a continuous steady sound state, that within a measurement period, has the same mean square sound pressure as a sound under consideration whose level varies with time.

[1] Australian Standard *AS 1055.1-1997 Acoustics – Description and measurement of environmental noise, Part 1: General procedures*

Table 2.1: **Recorded Short-Term Statistical Noise Levels - dB(A)**

#	LOCATION	DATE	TIME	RECORDED STATISTICAL NOISE LEVEL - dB(A)					COMMENTS
				L_1	L_{10}	L_{50}	L_{90}	L_{eq}	
1	Centre of Eastern Boundary	10-04-03	1225 - 1235	62.9	60.2	58.7	57.7	59.1	Generator on 'Alblasgracht' at Hamilton 1, Unloading fertiliser on 'Vega Eternity' by crane to trucks at Hamilton 2, Trucks on surrounding roadways, planes
		10-04-03	1535 - 1545	67.6	57.0	54.3	53.0	56.7	Alblasgracht' gone, Unloading fertiliser on 'Vega Eternity' by crane to trucks at Hamilton 2, Trucks on surrounding roadways
2	South-eastern Corner of Site	10-04-03	1238 - 1248	67.5	61.6	59.2	58.1	60.5	Generator on 'Alblasgracht' at Hamilton 1, Unloading fertiliser on 'Vega Eternity' by crane to trucks at Hamilton 2, Trucks on surrounding roadways, planes
		14-04-03	1035 - 1045	64.5	60.1	56.9	53.6	57.8	Parkgrascht' berthing at Hamilton 1 under tug power, forklift, beeper, truck and loading noise at P&O store building
		14-04-03	1105 - 1115	60.0	55.6	51.8	49.4	53.2	Parkgrascht' berthed at Hamilton 1 generator running, forklift, beeper, truck and loading noise at P&O store building, trucks on surrounding roadways
3	Centre of Southern Boundary	10-04-03	1255 - 1305	65.0	64.2	54.6	51.2	58.6	Generator on 'Alblasgracht' at Hamilton 1, Unloading fertiliser on 'Vega Eternity' by crane to trucks at Hamilton 2, Trucks on surrounding roadways, planes
4	South-western Corner of Site	10-04-03	1307 - 1317	60.6	56.2	53.9	52.6	54.4	
5	Centre of Western Boundary	10-04-03	1320 - 1330	67.2	58.6	51.9	49.4	56.2	
		14-04-03	1130 - 1140	70.2	63.6	53.4	49.4	60.2	Parkgrascht' berthed at Hamilton 1 generator running, forklift, beeper, truck and loading noise at P&O store building, trucks on surrounding roadways
		02-08-06	1425 - 1435	81.3	70.9	60.0	56.7	68.9	Traffic noise on Hercules St, Distant traffic noise on Kingsford Smith Drv, Many trucks and commercial vehicles, forklift and parking noise, distant construction noise from site building 1 to south
6	Centre of Site	10-04-03	1332 - 1342	57.4	56.0	54.1	52.8	54.4	Generator on 'Alblasgracht' at Hamilton 1, Unloading fertiliser on 'Vega Eternity' by crane to trucks at Hamilton 2, Trucks on surrounding roadways, planes
7	Northern Boundary of Site	10-04-03	1350 - 1400	72.0	64.0	59.0	54.5	61.5	
		02-08-06	1410 – 1420	80.4	68.7	59.6	56.2	66.8	Traffic noise on Hercules St, Distant traffic noise on Kingsford Smith Drv and Remora Rd, Many trucks and commercial vehicles
		02-08-06	1440 - 1450	85.0	69.1	58.9	56.1	69.8	
8	North-eastern Corner of Site	10-04-03	1405 - 1415	73.1	62.5	56.6	54.0	61.1	Generator on 'Alblasgracht' at Hamilton 1, Unloading fertiliser on 'Vega Eternity' by crane to trucks at Hamilton 2, Trucks on surrounding roadways, planes
		14-04-03	1120 - 1130	70.4	62.1	56.4	52.4	59.9	Parkgrascht' berthed at Hamilton 1 generator running, forklift, beeper, truck and loading noise at P&O store building, trucks on surrounding roadways

The noise levels experienced throughout the site due to specific noise sources are discussed in the relevant sections of the report.

The short-term noise monitoring was undertaken with a Rion NL-21 Precision Sound Level Meter, internally pre-calibrated to 94 dB at 1kHz. There was no deviation from this level at post-calibration.

To provide further data on the diurnal variation of noise in the locality, detailed noise datalogger measurements were conducted by Max Winders & Associates over a continuous seven day period from 7 to 14 April 2003 at locations as shown on **Figure 2**. The logging was undertaken to assess the current noise environment at the vicinity of the site. The datalogger recorded noise levels are included as graphical traces of noise level versus time in ***Attachment* 3**. The noise dataloggers used were Acoustic Research Laboratories noise dataloggers, model EL-215, programmed to provide statistical analysis results based on 15-minute sampling periods. The dataloggers were pre-calibrated to 94 dB at 1kHz using a Rion Sound Level Calibrator, model NC-73, and displayed a deviation of less than ±0.5 dB from this level at post-calibration.

The results of the noise datalogger measurements are summarised in **Tables 2.2** to **2.5** below.

Table 2.2: **Range of Recorded Noise Levels - dB(A)**
Location 1 – Hercules Street
7 to 14 April, 2003

PARAMETER	PERIOD	RECORDED NOISE LEVELS - dB(A)		
		MINIMUM	MAXIMUM	AVERAGE
L_{max}	Daytime (7am-6pm)	62.5	90.5	75.7
	Evening (6pm-10pm)	54.5	89.5	68.8
	Nighttime (10pm-7am)	51.5	84.5	68.5
L_1	Daytime (7am-6pm)	58.5	80.0	69.6
	Evening (6pm-10pm)	51.0	72.0	62.3
	Nighttime (10pm-7am)	46.5	79.5	61.7
L_{10}	Daytime (7am-6pm)	50.5	70.0	61.8
	Evening (6pm-10pm)	48.0	64.5	54.7
	Nighttime (10pm-7am)	43.5	68.5	53.0
L_{90}	Daytime (7am-6pm)	41.0	59.0	49.7
	Evening (6pm-10pm)	41.5	55.5	46.9
	Nighttime (10pm-7am)	38.0	61.5	44.5
L_{eq}	Daytime (7am-6pm)	48.0	67.0	58.7
	Evening (6pm-10pm)	45.5	61.5	52.6
	Nighttime (10pm-7am)	41.0	65.5	51.3

Table 2.3: **Recorded Noise Level Statistics - dB(A)**
Location 1 – Hercules Street
7 to 14 April, 2003

DATE	STATISTICAL NOISE LEVEL - dB(A)	
	L_{10}(18hr)	L_{eq}(24hr)
07/04/03	-	-
08/04/03	61.0	55.8
09/04/03	60.8	56.6
10/04/03	61.0	56.8
11/04/03	60.9	55.9
12/04/03	55.4	54.3
13/04/03	53.6	49.7
14/04/03	-	-

Table 2.4: **Range of Recorded Noise Levels - dB(A)**
Location 2 – Centre of Site
7 to 13 April, 2003

PARAMETER	PERIOD	RECORDED NOISE LEVELS - dB(A)		
		MINIMUM	MAXIMUM	AVERAGE
L_{max}	Daytime (7am-6pm)	55.5	82.5	68.7
	Evening (6pm-10pm)	50.5	79.5	62.9
	Nighttime (10pm-7am)	46.0	85.0	61.0
L_1	Daytime (7am-6pm)	48.5	77.5	60.7
	Evening (6pm-10pm)	48.0	79.0	57.5
	Nighttime (10pm-7am)	43.5	71.5	54.2
L_{10}	Daytime (7am-6pm)	44.0	75.5	53.8
	Evening (6pm-10pm)	46.0	78.0	51.4
	Nighttime (10pm-7am)	40.5	68.5	50.1
L_{90}	Daytime (7am-6pm)	37.5	55.0	47.5
	Evening (6pm-10pm)	41.5	52.5	46.8
	Nighttime (10pm-7am)	38.0	55.5	45.7
L_{eq}	Daytime (7am-6pm)	42.0	70.0	52.1
	Evening (6pm-10pm)	44.0	74.5	50.1
	Nighttime (10pm-7am)	39.5	62.5	48.4

Table 2.5: **Recorded Noise Level Statistics - dB(A)**
Location 2 – Centre of Site
7 to 13 April, 2003

DATE	STATISTICAL NOISE LEVEL - dB(A)	
	L_{10}(18hr)	L_{eq}(24hr)
07/04/03	-	-
08/04/03	52.5	49.3
09/04/03	54.6	51.4
10/04/03	55.9	54.2
11/04/03	53.0	50.9
12/04/03	50.5	49.0
13/04/03	-	-

The noise measurements indicate that the site is influenced by noise from aircraft, vehicular traffic and trucks on surrounding roadways and various noise sources associated with the ports and other surrounding land uses.

3.0 ASSESSMENT OF NOISE IMPACTS ON DEVELOPMENT

3.1 Aircraft Noise Impact Assessment

3.1.1 Aircraft Noise Criteria

The western portion of the Portside Wharf site is located adjacent the ANEF 20 contour for the proposed future parallel runway at the Brisbane Airport. As such, it is considered that an aircraft noise assessment is warranted.

The applicable standard with respect to development suitability within aircraft noise affected areas is *AS 2021-2000 Acoustics - Aircraft noise intrusion - Building siting and construction*. The effect of an ANEF on land use planning may be summarised in the **Table 3.1,** (Table 2.1 from *AS2021-2000*):

Table 3.1: Building Site Acceptability Based on ANEF Zones (to be used in conjunction with Table 3.3 from AS2021-2000)

Building Type	ANEF zone of site		
	Acceptable	Conditional	Unacceptable
House, home unit, flat, caravan park	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF
Hotel, motel, hostel	Less than 25 ANEF	25 to 30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF (Note 1)	20 to 25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF (Note 1)	20 to 30 ANEF	Greater than 30 ANEF
Commercial building	Less than 25 ANEF	25 to 35 ANEF	Greater than 35 ANEF
Light industrial	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF
Other industrial	Acceptable in all ANEF zones		

NOTES:(from *AS2021-2000*)

1. The actual location of the 20 ANEF contour is difficult to define accurately, mainly because of variation in aircraft flight paths. Because of this, the procedure of Clause 2.3.2 may be followed for building sites outside but near to the 20 ANEF contour.

2. Within 20 ANEF to 25 ANEF, some people may find that the land is not compatible with residential or educational uses. Land use authorities may consider that the incorporation of noise control features in the construction of residences or schools is appropriate (see also Figure A1 of Appendix A).

3. There will be cases where a building of a particular type will contain spaces used for activities which would generally be found in a different type of building (e.g. an office in an industrial building). In these cases Table 2.1 should be used to determine site acceptability, but internal design noise levels within the specific spaces should be determined by Table 3.3.

The Standard then requires the following actions:

1 **Acceptable**
If from Table 2.1, the building site is classified as "acceptable", there is usually no need for the building construction to provide protection specifically against aircraft noise.

2 **Conditional**
If from Table 2.1, the building site is classified as "conditional", the maximum aircraft noise levels for the relevant aircraft and the required noise reduction should be determined from the procedure of Clauses 3.1 and 3.2, and the aircraft noise attenuation to be expected from the proposed construction should be determined in accordance with Clause 3.3.

3 **Unacceptable**
If, from Table 2.1, the building site is classified as "unacceptable", construction of the proposed building should not normally be considered.

NOTE: In certain circumstances it may be proposed to construct or upgrade buildings on sites that could be classified as unacceptable, e.g. a hotel in the immediate vicinity of an aerodrome. In these cases, refer to Note 2 of Clause 1.1. This does not apply to sites to be used for residential purposes.

For the assessment of internal aircraft noise levels within the proposed residential units and commercial premises, Table 3.3 of AS2021-2000 provides design indoor sound levels for aircraft noise reduction assessment. It provides for:

Houses, home units, flats, caravan parks

Sleeping areas, dedicated lounges	*50 dB(A) indoor design sound level*
Other habitable spaces	*55 dB(A) indoor design sound level*
Bathrooms, toilets, laundries	*60 dB(A) indoor design sound level*

Commercial buildings, offices and shops

Private offices, conference rooms	*55 dB(A) indoor design sound level*
Drafting, open offices	*65 dB(A) indoor design sound level*
Typing, data processing	*70 dB(A) indoor design sound level*
Shops, supermarkets, showrooms	*75 dB(A) indoor design sound level*

The potential for aircraft noise to cause sleep disturbance at the proposed residences is assessed as per the ***FICAN (Sleep Awakenings due to Aircraft)*** methodology of the Brisbane City Council NIAPSP Guidelines. This criterion requires a maximum internal aircraft noise level of L_{AE} 65 dB(A) to be achieved within sleeping areas.

3.1.2 Existing Aircraft Noise Levels

Maximum noise levels of aircraft were recorded at the site during the short-term noise monitoring (**Table 2.1**). The recorded aircraft noise levels varied significantly dependant upon the aircraft flight path. The loudest peak aircraft noise levels were associated with planes approaching from the west and banking above the site before aligning with the runway for landing. Recorded peak aircraft noise levels ranged 54.6 to 71.8 dB(A).

The noise measurements conducted demonstrated that aircraft noise currently impacts on the subject site. However, the issue of future aircraft noise at the site relates to air traffic using a future proposed parallel runway at the Brisbane Airport for which the site is adjacent the ANEF 20 contour. As such, future aircraft noise levels for assessment purposes will be determined by calculation, not by measurement.

3.1.3 Predicted Future Aircraft Noise Levels at Development

The eastern portion of the site is adjacent the ANEF 20 contour for a proposed future parallel runway at the Brisbane Airport. Thus, the site is potentially affected by aircraft noise and should incorporate appropriate noise control measures (i.e. building construction) to provide suitable internal acoustic amenity as per Table 3.3 of *AS 2021-2000*. These standards requires that internal aircraft noise levels, calculated as per AS 2021-2000, are a maximum of the levels detailed in ***Section 3.1.1*** above for various internal areas.

The site location with respect to the proposed future parallel runway flight path was defined in terms of DS, DL and DT as per *Clause 3.4* of *AS 2021-2000* as follows: