the rear of 33 Shepherd Street, Liverpool (Appendix 1). No indigenous species occur within or at the rear of the site (Appendix 1).

Figure 13 - Site location at 33 Shepherd Street, Liverpool, an operational factory establishment with no vegetation occurring within the site except for a small patch of Kikuyu. The eastern boundary of the site demarcating vegetation along a section of the western embankment of the Georges River.

3.7 Mill Park, Shepherd Street, Liverpool

The site at the section of Mill Park adjoining the southern boundaries of 31 & 33, Shepherd Street, Liverpool, is an artificially raised plateau landform comprising exotic grassland and a sloping vegetated hillslope containing a tall scrubland (Figure 14) (Appendix 1).

Exotic species

The area of exotic grassland adjoining 31 Shepherd Street is comprised of a managed and maintained lawn grass of Kikuyu containing patches of Common Clover (Appendix 1).

The unmanaged scrubland section of Mill Park adjoining 33 Shepherd Street contains shrubs and small trees to 6m tall to a Crown Canopy Density Projection (%CCPD) of up to 70% with

the remaining area to 2-3m tall shrubland (Figure 14). Exotic woody weed and herbaceous species include Large and Small-leaved Privet, Blackberry, Lantana, African Love Grass and Fennel (Appendix 1).

Indigenous species

Indigenous remnant species from former Alluvial Woodland assemblages include Parramatta Green Wattle, Prickly Beard Heath, Blackthorn, Swamp Oak, Black Sheoak (possibly planted), Sweet Pittosporum and Bleeding Heart (Appendix 1).

Figure 14 - Site location of section of Mill Park adjoining 31 & 33 Shepherd Street, Liverpool.

4. Indigenous, exotic and ornamental flora species

Appendix 1 lists the total numbers of species comprising the mainly weed-infested vegetation that is established across the sites, particularly at the rear of the subject areas. Table 1 lists the numbers of indigenous, exotic environmental weed species and noxious species as well as ornamental and locally-occurring endemic and non-locally occurring endemic species that have been used in landscaped plantings.

Indigenous species	Exotic environmental weeds	Noxious weeds	Landscaped exotic ornamentals	Landscaped locally-endemic species	Landscaped non-locally occurring species
14	42	7	10	16	2

Table 1 - lists the numbers of indigenous, exotic environmental weeds and noxious species as well as ornamental and locally-occurring endemic and non-locally occurring endemic species that have been used in landscaped plantings

A total of 14 indigenous flora species were recorded across the subject sites at Shepherd Street Liverpool, 6 of these occurring at Mill Park.

A total of 49 exotic plant species, including 7 noxious weed species, were recorded across the sites (Table 1).

Exotic woody weeds include trees such as Camphor Laurel, Mulberry and Privet and also shrubs such as Lantana, Blackberry, African Boxthorn, Green Cestrum and Golden Wreath Wattle.

Exotic plant species include 7 species of noxious woody weeds including Green Cestrum, Large-leaf Privet, Small-leaf Privet, Blackberry, African Boxthorn and Lantana (Appendix 1).

5. Fauna species

Bird species recorded either on site, on adjacent land, or over flying the area included the Noisy Miner (*Manorina melanocephala*), Australian Magpie (*Cracticus tibicen*), Australian Raven (*Corvus coronoides*) Laughing Kookaburra (*Dacelo novaeguineae*), Black-faced Cuckoo Shrike (*Coracina novaehollandiae*), Masked Lapwing (*Vanellus miles*) and Superb Fairy-wren *(Malurus cyaneus)*. All of the above species are common to urban landscapes and none are listed as threatened. No mammalian species were recorded however species likely to occur would include the Common Brushtail Possum (*Trichosurus vulpecula*) and Common Ringtail Possum (*Pseudocheirus peregrinus*) as well as the introduced Black Rat (*Rattus rattus*) and House Mouse (*Mus musculus*).The weedy grassland areas provide very poor habitat for most terrestrial fauna and the only species recorded was the Dark-flecked Garden Sunskink (*Lampropholis delicata*) within areas of Kikuyu.

6. Threatened flora species

A total of 7 threatened flora species have been recorded by the OEH Atlas of NSW Wildlife within a 5km radius of the subject site in the past 25 years (Table 2).

However, no threatened species have been recorded within 1 sq km of the site, the vegetation of the subject sites being comprised largely of exotic shrubland with isolated woody small tree-form weeds smothered with exotic vine growth and grassland with exotic herbaceous weeds.

Targeted searches for the mostly large-life form threatened species recorded within a 5km radius of the site did not locate any of these threatened species, or any other threatened flora species, and nor were any of these threatened species expected to occur at the subject site as current habitat is unsuitable for their occurrence, the subject site being greatly disturbed and natural habitat not occurring over the range of the subject sites.

Family	Common name	Scientific name	NSW status	Comm. status	No. of records
Apocynaceae	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	*Marsdenia viridiflora* subsp. *viridiflora*	E2		3
Ericaceae	Woronora Beard-heath	*Leucopogon exolasius*	V	V	1
Fabaceae (Faboideae)	Matted Bush-pea	*Pultenaea pedunculata*	E1		8
Fabaceae (Mimosoideae)	Downy Wattle	*Acacia pubescens*	V	V	85
Proteaceae	Small-flower Grevillea	*Grevillea parviflora* subsp. *parviflora*	V	V	2
	Nodding Geebung	*Persoonia nutans*	E1	E	3
Thymelaeaceae	Spiked Rice-flower	*Pimelea spicata*	E1	E	8

Table 2 - Records for 7 threatened flora species recorded within the last 25 years within a 5km radius of the subject site.

7. Ecological Plant Community

The composition of the subject vegetation is comprised largely of exotic species and has been mapped as such along its eastern boundary as 'Weeds and Exotics' (OEH 2013) (Figure 15). The vegetation includes a cover of about 10-15% of noxious weed composition and has no biodiversity significance.

Figure 15 - Vegetation contiguous with the western edge embankment of the Georges River is mapped and confirmed by ground-truthing to mostly consist of Weeds and Exotics (OEH 2013).

8. Threatened fauna species

A total of 19 threatened fauna species have been recorded by the OEH Atlas of NSW Wildlife within a 5km radius of the subject site in the past 25 years (Table 3).
Of these, only two were recorded within 1km of the site. In 1996 an individual of Swift Parrot was sighted approximately 850m to the south on the eastern side of the Georges River and in 2014 an individual of Little Lorikeet was sighted 500m to the south on the eastern side of the Georges River. No habitat exists within the subject land that would potentially attract either of these species.

Other threatened terrestrial fauna species listed by the Commonwealth DoE were reviewed in relation to the distribution, habitat and likelihood of occurrence. The current study concluded the site contained no nesting or foraging habitat for any of the species listed in Table 3 and as such development of the site would be unlikely to cause impact to any threatened species.

Family	Common name	Scientific name	NSW status	Comm. status	No. of records
Hylidae	Green and Golden Bell Frog	Litoria aurea	E1	V	1
	Little Eagle	Hieraaetus morphnoides	V		5
Falconidae	Black Falcon	Falco subniger	V		1
Cacatuidae	Gang-gang Cockatoo	Callocephalon fimbriatum	V		2
Psittacidae	Little Lorikeet	Glossopsitta pusilla	V		10
	Swift Parrot	Lathamus discolor	E1	E	4
Strigidae	Powerful Owl	Ninox strenua	V		3
Meliphagidae	Regent Honeyeater	Anthochaera phrygia	E4A	E	1
	Black-chinned Honeyeater	Melithreptus gularis gularis	V		2
Neosittidae	Varied Sittella	Daphoenositta chrysoptera	V		9
Phascolarctidae	Koala	Phascolarctos cinereus	V	V	4
Petauridae	Squirrel Glider	Petaurus norfolcensis	V		1
Pteropodidae	Grey-headed Flying-fox	Pteropus poliocephalus	V	V	46
Molossidae	Eastern Freetail-bat	Mormopterus norfolkensis	V		10
Vespertilionidae	Eastern False Pipistrelle	Falsistrellus tasmaniensis	V		1
	Eastern Bentwing-bat	Miniopterus schreibersii oceanensis	V		6
	Southern Myotis	Myotis macropus	V		4
	Greater Broad-nosed Bat	Scoteanax rueppellii	V		6
Camaenidae	Cumberland Plain Land Snail	Meridolum corneovirens	E1		81

V = Vulnerable; E = Endangered

Table 3- Records for 19 threatened fauna species recorded within the last 25 years within a 5km radius of the subject site.

9. Migratory fauna species subject to international agreements

The OEH Atlas of NSW Wildlife database 2015 listed seven (7) migratory species of avifauna covered by bi-lateral bird agreements, and recorded within a 5 km radius of the site (Table 4).

However none of the migratory species listed has potential to occur on the site and would not be impacted by the proposed development.

	Common name	Scientific name	NSW status	Comm. status	No. of records
Apodidae	White-throated Needletail	*Hirundapus caudacutus*	P	C,J,K	1
Ardeidae	Cattle Egret	*Ardea ibis*	P	C,J	5
Threskiornithidae	Glossy Ibis	*Plegadis falcinellus*	P	C	1
Accipitridae	White-bellied Sea-Eagle	*Haliaeetus leucogaster*	P	C	8
Scolopacidae	Common Greenshank	*Tringa nebularia*	P	C,J,K	1
Laridae	Caspian Tern	*Hydroprogne caspia*	P	C,J	1
Meropidae	Rainbow Bee-eater	*Merops ornatus*	P	J	1

P - Protected species in NSW.
J - Japan and Australia Migratory Bird Agreement, C - China and Australia Migratory Bird Agreement, K - Republic of Korea Migratory Bird Agreement.

Table 4 - Records for 7 migratory fauna species recorded within the last 25 years within a 5km radius of the subject site.

PART B: RIPARIAN ISSUES, ASSESSMENT AND MANAGEMENT AT 20, 28, 31, 32-34 and 33 SHEPHERD STREET and MILL PARK, LIVERPOOL

1. Location and description

The sites occur along a section of the western perimeter of the Georges River (Figures 1 & 2) and have been developed for industrial purposes since well before 1943. Currently, embankment riparian setbacks to the rear of the subject properties are comprised of tall weed-infested scrub with emergent woody weed trees to 12m tall (Figures 4, 5 & 6).

2. General riparian setbacks and management of riparian corridors according to NSW Office of Water Guidelines (2012)

According to the NSW Office of Water (2012) the Riparian Zone or Corridor is defined as:

A transitional zone between the land, also known as the terrestrial environment, and the river or watercourse or aquatic environment. Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 metres of the highest bank of the river, lake or estuary.

The riparian corridor consists of:

- the channel which comprises the bed and banks of the watercourse (to the highest bank), and
- the vegetated riparian zone (VRZ) adjoining the channel.

Riparian corridors may perform a range of important environmental functions such as:

- providing bed and bank stability and reducing bank and channel erosion
- protecting water quality by trapping sediment, nutrients and other contaminants
- providing diversity of habitat for terrestrial, riparian and aquatic plants (flora) and animals (fauna)
- providing connectivity between wildlife habitats
- conveying flood flows and controlling the direction of flood flows
- providing an interface or buffer between developments and waterways
- providing passive recreational uses.

Controlled activities carried out in, on or under waterfront land are regulated by the *Water Management Act 2000* (WM Act). The NSW Office of Water administers the WM Act and is

required to assess the impact of any proposed controlled activity to ensure that no more than minimal harm will be done to waterfront land as a consequence of carrying out the controlled activity.

As such, a controlled activity approval must be obtained from the NSW Office of Water before commencing the development activity.

Changes to Controlled Activities within Riparian Corridors

On 1 July 2012 new rules commenced regarding controlled activities within riparian corridors. The new rules amend the riparian corridor widths that apply to watercourses, providing more flexibility in how riparian corridors can be used and making it easier for applicants to determine the Office of Water controlled activity approval requirements. Key aspects of the changes include:

- Provision of greater flexibility in the allowable uses and works permitted within riparian corridors.
- The core riparian zone and vegetated buffer have been combined into a single vegetated riparian zone (VRZ).
- The width of the VRZ within the riparian corridor has been pre-determined and standardised for first, second, third and fourth order and greater watercourses.
- Where suitable, applicants may undertake non-riparian corridor works or development within the outer 50 per cent of a VRZ, as long as they offset this activity by connecting an equivalent area to the RC within the development site.
- A new 'riparian corridors matrix' enables applicants to determine what activities can be considered in riparian corridors.

These changes will simplify the controlled activities application and assessment process, provide greater flexibility, help make more land available for housing, support floodplain, stormwater and bush fire management, and allow riparian corridors to be used for public amenity whilst continuing to deliver environmental outcomes required under the WM Act (NSW Office of Water 2012).

Objectives for Riparian Corridor Management

The overarching objective of the controlled activities provisions of the WM Act is to establish and preserve the integrity of riparian corridors.

Ideally the environmental functions of riparian corridors should be maintained or rehabilitated by applying the following principles:

- If a watercourse is present, define the RC/VRZ on a map.
- Seek to maintain or rehabilitate a RC/VRZ with fully structured native vegetation.

- Seek to minimise disturbance and harm to the recommended RC/VRZ.
- Minimise the number of creek crossings and provide perimeter road separating development from the RC/VRZ.
- Locate services and infrastructure outside of the RC/VRZ. Within the RC/VRZ provide multiple service easements and/or utilise road crossings where possible.
- Treat stormwater run-off before discharging into the RC/VRZ.

The Office of Water however, does allow for a range of works and activities on waterfront land and in riparian corridors to better meet the needs of the community, so long as they cause minimal harm.

The section of the Georges River that forms the eastern boundary of the Shepherd Street Precinct, is a 4th Order watercourse as defined by the Strahler system for classifying the various watercourse systems (NSW Office of Water 2012).

As such a riparian setback of 40m from the riverbank is taken as a guideline to the distance incorporating a vegetated buffer zone or Vegetated Riparian Zone (VRZ) to development (NSW Office of Water 2012).

3. Environmentally Significant Land (from Liverpool LEP 2008)

Figure 16 indicates the riparian environmentally significant land setback along the Georges River, parallel to Shepherd Street, Liverpool (Environmentally Significant Land Map (LLEP 2008, Sheet ESL-012). The objective of this setback is to ensure that development in the foreshore area will not impact on natural foreshore processes or affect the significance and amenity of the area (LLEP 2008, Part 7, Division 2, Clause 7.9 (1)).

The 40m setback recommended by the guidelines issued by the NSW Office of Water (2012) for the section of the Georges River at Shepherd Street, Liverpool, approximates that indicated by the mapping of Environmentally Significant Land shown in Figure 16.

Figure 16 - Environmentally Significant Land (shown in Sheet ESL-012 of the Liverpool LEP 2008) indicated by the olive green shading

4. Proposed development - Precinct Plan

The layout of the proposed development plan for the subject site (from Aspect Studios - Woods Bagot 2015) is shown in Figure 1 and expanded in Figure 17 below.

Figure 17 - Precinct Plan for Shepherd Street, Liverpool indicating nominal riparian setback beyond the council building line (dashed line).

5. Proposed development - Riparian zones at subject development sites at 20, 28, 31, 32-34 and 33 Shepherd Street and Mill Park, Liverpool

5.1 20 Shepherd Street

The proposed development plan for the subject site at 20 Shepherd Street, Liverpool (from Aspect Studios - Woods Bagot 2015) is shown in Figure 18.

Figure 18 - The development plan for the subject site at 20 Shepherd Street, Liverpool (from Woods Bagot - Aspect Studios 2015) showing a 30m riparian setback (VRZ) (red font) with the demarcation of the inner and outer 50% of the VRZ indicated by the broken red line. Note that the proposed building construction does not encroach beyond the outer 50% of the VRZ.

5.2 26 Shepherd Street

The proposed development plan for the subject site at 26 Shepherd Street, Liverpool (from Woods Bagot 2016) is shown in Figure 19.

Figure 19 - The development plan for the subject site at 26 Shepherd Street, Liverpool (from SJB 2016) showing the foreshore building line and indicative 40m riparian setback (VRZ) recommended by the NSW Office of Water. Note that the proposed building construction does not encroach into the inner 50% of the VRZ.

5.3 28 Shepherd Street

The proposed development plan for the subject site at 28 Shepherd Street, Liverpool (from Woods Bagot 2015) is shown in Figure 20.

Figure 20 - The development plan for the subject site at 28 Shepherd Street, Liverpool (from Woods Bagot - Aspect Studios 2015) showing the indicative 40m riparian setback (VRZ) recommended by the NSW Office of Water (blue font). Note that the proposed building construction does not encroach into the inner 50% of the VRZ or beyond the council foreshore building line.

5.4 32-34 Shepherd Street

The layout of the proposed development plan for the subject site at 32-34 Shepherd Street Liverpool (from SJB 2016) is shown in Figure 21.

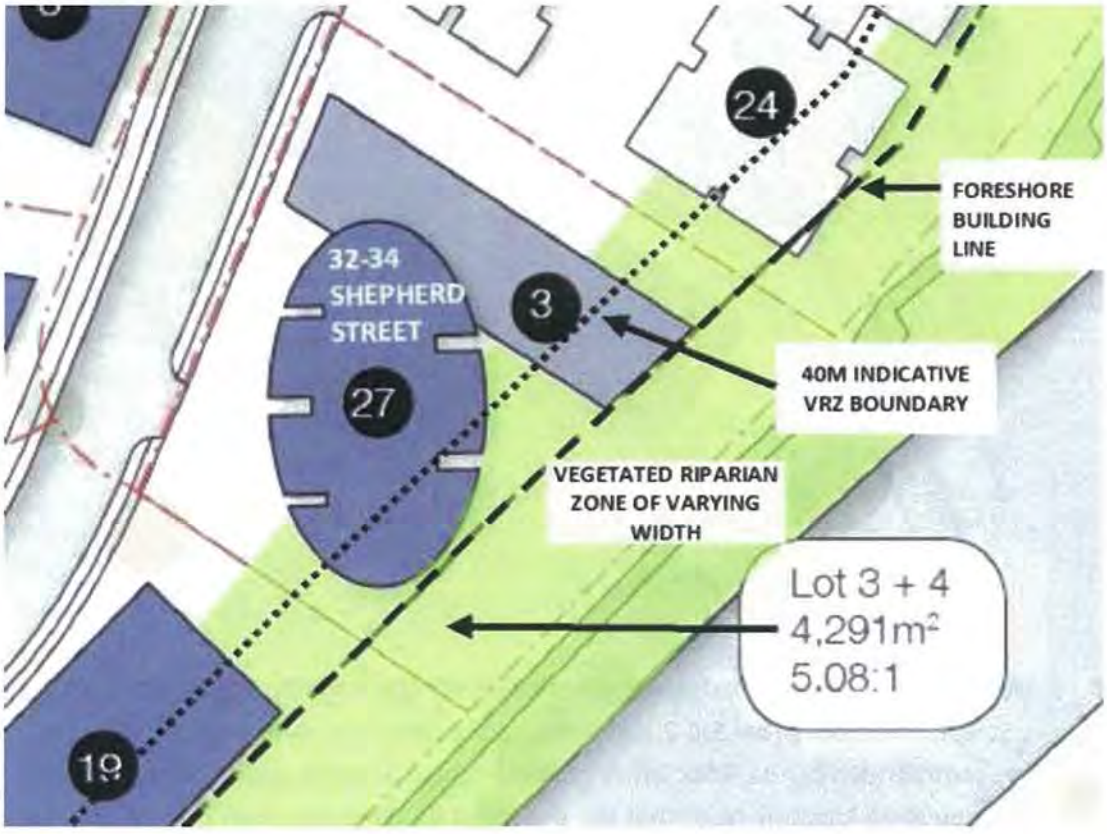

Figure 21 - The proposed development plan for the subject site at 32-34 Shepherd Street, Liverpool (from SJB 2016) showing the indicative 40m riparian setback recommended by the NSW Office of Water and a variable width VRZ to compensate for the building location. Note that the proposed building construction does not encroach into the inner 50% of the VRZ or beyond the council foreshore building line.

5.5 31 & 33 Shepherd Street

The layout of the proposed development plan for the subject site at 33 Shepherd Street (and including current 31 Shepherd Street), Liverpool (from SJB 2016) is shown in Figure 22.

Figure 22 - The proposed development plan for the subject site at 31 and 33 Shepherd Street, Liverpool (from SJB 2016) showing the indicative 40m riparian setback recommended by the NSW Office of Water and a variable width VRZ to compensate for the building location. Note that the proposed building construction does not encroach into the inner 50% of the VRZ or beyond the council foreshore building line.

5.4 Mill Park, Shepherd Street

The proposed development plan for Mill Park, Shepherd Street, Liverpool (from SJB 2016) is shown in Figure 23.

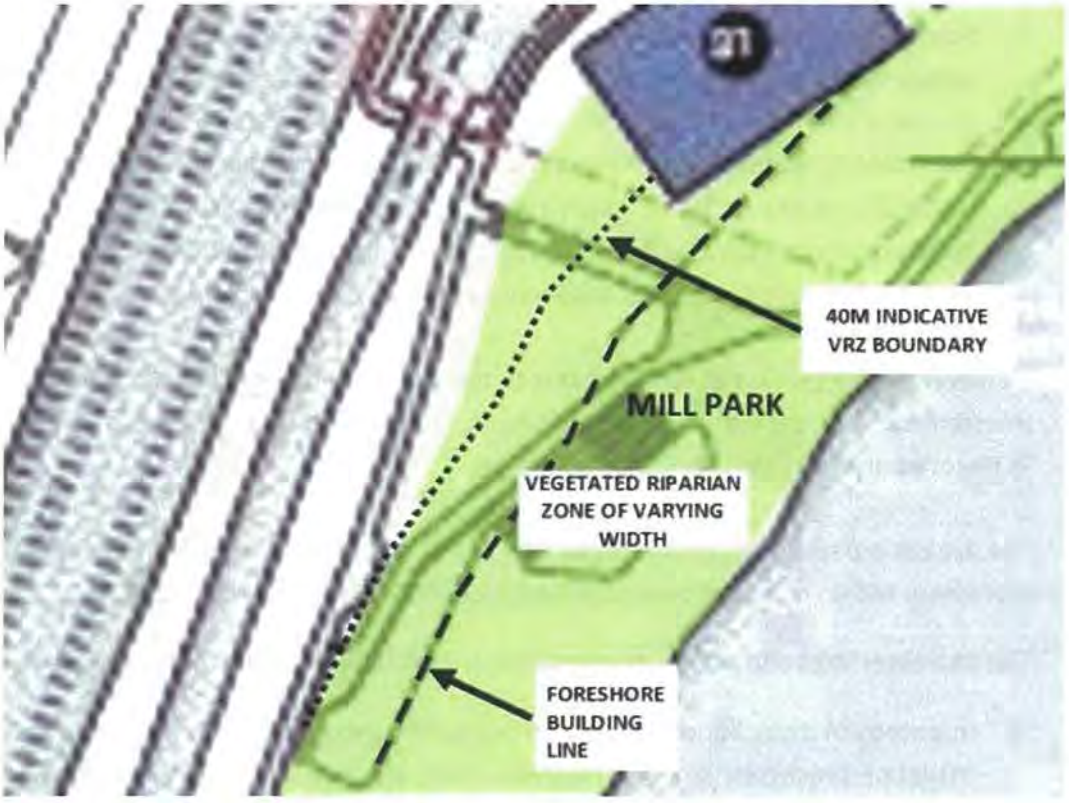

Figure 23 - The proposed development plan for the subject site at Mill Park, Shepherd Street, Liverpool (from SJB 2016) showing the indicative 40m riparian setback recommended by the NSW Office of Water and a variable width VRZ greater than 40m.

6. Permissible activities within the riparian zone (VRZ)

According to the guidelines given by the NSW Office of Water, certain controlled activities are allowable within particularly the outer 50% of the VRZ (from 20 - 40m from the edge of the river embankment), with consideration given to offsetting an equal area of land within the development that has been given to a prescribed use within the riparian zone (NSW Office of Water 2012).

According to the guidelines given by the NSW Office of Water, allowable development within, particularly the outer 50% of the VRZ, may include the following:

- **Cycleways and paths:** Cycleways or paths no wider than four metres total disturbance footprint can be built in the outer 50 per cent of the VRZ;
- **Detention basins:** Detention basins can be built in the outer 50 per cent of the VRZ. Refer to the Office of Water's *Controlled activities. Guidelines for outlet structures* and *Controlled activities. Guidelines for in-stream works*.
- **Stormwater outlet structures and essential services:** Stormwater outlets or essential services are allowed in the RC. Works for essential services on a fourth order or greater stream are to be undertaken by directional drilling or tied to existing crossings. Refer to the Office of Water's *Controlled activities. Guidelines for laying pipes and cables in watercourses* and *Controlled activities. Guidelines for outlet structures.*
- **Road crossings:** Indicates permitted road crossing methods. Refer to the Office of Water's *Controlled activities. Guidelines for watercourse crossings.*

However, as the section of the river associated with the subject sites is heavily weed-infested and requires extensive rehabilitation, a merit-based development may be proposed in negotiation with the NSW Office of Water.

The area encroached within the outer 50% of the VRZ may be required to be offset elsewhere within the developmental land area (NSW Office of Water 2012).

The characteristics and merits of maintaining, with modifications to the VRZ, are as follows:

- In a study of disturbance patterns in vegetation associated with the Georges River estuarine processes, Kirchner (in SMEC 2010) mapped similarly weed-infested riparian vegetation occurring along the river banks downstream of the subject sites as 'Very High Intensity Disturbance Pattern - generally >70% affected'.
- DEC (2002) has not mapped the Conservation Significance Assessment of the current weed-infested riparian vegetation along the edges of the Georges River at Shepherd Street, Liverpool, as containing any significant vegetation indicating its extensive disturbance history and current lack of integrity as a naturally sustainable ecological community.
- The currently weed-infested VRZ vegetated sections of the river bank land at Shepherd Street, Liverpool, should be rehabilitated by best-practice bush regeneration to a weed-free vegetated River-flat Forest 'alluvial woodland' zone to provide an effective integrated and floristically and structurally restored vegetation community in the locality.
- The extent of areas encroached by building and other structures into the outer 10m width of the nominal 40m wide VRZ should be amply offset elsewhere within the development.

Applications for controlled activities approvals should be informed by the riparian corridor matrix shown in Table 2 of the Guidelines (Office of Water 2012) and prepared using the *Application for a Controlled Activity Approval for works on waterfront land* form and the *Guideline for completing an application for a Controlled Activity Approval.*

Other controlled activity guidelines are available on the Office of Water website and outline relevant considerations for applicants when proposing activities and works on waterfront lands.

The current vegetation of the riparian component of the river bank is heavily weed-infested, and it is recommended that this vegetation undergo best-practice bush regeneration and rehabilitation for the health of the ecosystem and surrounding vegetated areas. It is recommended that for any development this zone is reconstructed to remove all weeds and that the vegetation within the VRZ be reconstructed with species comprising riparian forest or alluvial woodland assemblages.

7. Riparian width and justification of encroachment into outer riparian area

The NSW DPI Water have classified the Georges River on the basis of the Strahler system as a Stream Order 4+ requiring a 40 metre average riparian setback (DPI Water 2012).

Notwithstanding the importance of maintaining riparian areas for the biological and physical health of waterways, the application of a 40 metre wide riparian can be difficult to apply in some cases. Such is the case at the Shepherd Street Precinct, Liverpool, where urbanisation has resulted in lot sizes too narrow to accommodate viable new development together with a wide riparian setback.

The proposed development at Shepherd Street will encroach some 10 metres into the outer portion of the theoretical riparian area but not beyond the Liverpool Council delineated 'foreshore building line' which demarcates the foreshore area as outlined in section B3 on page 21 of this report. The objectives of Councils foreshore building line and DPI's vegetated riparian zone are similar however in that their intent is to ensure that development in the foreshore area will not impact on natural foreshore processes or affect the significance and amenity of the area (LLEP 2008, Part 7, Division 2, Clause 7.9 (1)). For the proposed development all basement structures will be located outside the council defined foreshore area, allowing for deep plantings as part of riparian rehabilitation.

Scope also exists for constructed landscape areas on other parts of the precinct to be included as a 'riparian setback' (DPI Water 2012).

Currently the width of the highly disturbed and weed infested strip of riverside vegetation is about 15 metres. A rehabilitated riparian zone of 30-40 metres, financed by redevelopment of the site, would be considered a progressive outcome.

8. Proposed strategy to rehabilitate riparian areas within western section of Georges River at Liverpool

Vegetation Management Plans will provide for the provision and reconstruction of a riparian zone commensurate with vegetation that would have occurred along this section of the river-edge before degradation. The objectives of such plans will be related to ensuring that biodiversity values on the site are improved and ensuring that the development enhances the character of the riparian vegetation at this location.

Objectives will include the following:

- To undertake rehabilitation works in degraded areas of native vegetation including sequential removal of smothering noxious and environmental woody weeds and climbers whilst maintaining the current environmental status and condition of the Georges River waterway;
- To reconstruct and restore native vegetation along the riparian corridor, including areas currently encumbered with noxious woody weeds and exotic environmental weed climbers, as well as sections of land occurring beneath a concreted slab of a former industrial development to a level that reflects the cover, diversity and density of former assemblages of indigenous vegetation; and
- To provide educational material to promote responsible management of reconstructed native vegetation in riparian setback areas.

Species suitable in a reconstructed, landscaped VRZ setting for 20, 26, 28, 31, 32-34, 33 and Mill Park, Shepherd Street, Liverpool and surrounds, could include the following (taken from compositions indicative of River-flat Paperbark Swamp Forest and Cumberland River-flat Forest assemblages known to occur along stretches of the embankments of the Georges River (OEH 2013).

Trees	Small trees	Shrubs	Ground cover plants
Rough-barked Apple (*Angophora floribuna*)	*Acacia decurrens*	*Ozothamnus diosmifolius*	*Dianella longifolia*
Broad-leaved Apple (*Angophora subvelutina*)	*Acacia parramattensis*	*Hibbertia diffusa*	*Brunoniella australis*
Cabbage Gum (*Eucalyptus amplifolia*)	*Exocarpus cupressiformis*	*Acacia longifolia*	*Pratia purpurascens*
Blue Box (*Eucalyptus baueriana*)	*Melaleuca decora*	*Callistemon citrinus*	*Microlaena stipoides*
Forest Red Gum (*Eucalyptus tereticornis*)	*Melaleuca styphelioides*	*Kunzea ambigua*	*Dichondra repens*
Blue Gum (*Eucalyptus saligna*)	*Melaleuca linariifolia*	*Bursaria spinosa*	*Oplismenus aemulus*
Swamp Mahogany (*Eucalyptus robusta*)			*Pteridium esculentum*
Grey Box (*Eucalyptus moluccana*)			*Viola hederacea*
			Einadia hastata
			Cheilanthes sieberi
			Clematis glycinoides

Table 5 - Species suitable for planting in a reconstructed riparian forest/woodland landscaped VRZ setting for 20, 26, 28, 32-34 and 33 Shepherd Street and Mill Park, Liverpool and surrounds.

9. Compliance with Greater Metropolitan Regional Environmental Plan No. 2 - Georges River Catchment (2008)

This SREP must be addressed and complied with whenever a consent authority determines a development application, or a public authority or another person proposes to carry out development or an activity which does not require development consent but which has the potential to adversely affect the water quality, river flows, flood regime or ecosystems within the Georges River Catchment.

As such, the cumulative impact of the proposed development or activity on the Georges River or its tributaries must be considered and mitigated in such a way that there will be no overall detrimental impact of wastewater or stormwater entering the river at Shepherd Street, Liverpool.

The development should effectively utilise any relevant plans of management including any River and Water Management Plans approved by the Minister for Environment and the Minister for Land and Water Conservation and best practice guidelines approved by the Department of Urban Affairs and Planning (all of which are available from the respective offices of those Departments), the *Georges River Catchment Regional Planning Strategy* (prepared by, and available from the offices of, the Department of Urban Affairs and Planning), and all relevant State Government policies, manuals and guidelines of which the council, consent authority, public authority or person has notice (SREP No. 2 - 2008).

The following specific issues must be addressed and complied with in regard to SREP No. 2 (2008):

Bank disturbance

Specifically, the development requires that all stormwater and water flowing from hard surfaces be retained in appropriate on-site stormwater detention basins, excess flows regulated in such a way that disturbance of the bank or foreshore along the Georges River and its tributaries is to be avoided and those areas and any adjoining open space or vegetated buffer areas must be protected from degradation (SREP No. 2).

Urban/stormwater runoff

The impacts of stormwater runoff, including sewage contaminated runoff into or near streams within the Catchment, is to be minimised and mitigation measures that address urban stormwater runoff are to be implemented in accordance with local council requirements and the Managing Urban Stormwater series of documents. Development is also to be in accordance with the *NSW State Rivers and Estuaries Policy* available from offices of the Department of Urban Affairs and Planning. Stormwater management must be integrated so that quality, quantity and land use aspects are all encompassed.

Urban development areas

The environment within or in the vicinity of the Catchment is to be protected by ensuring that new or expanding urban development areas are developed in accordance with the Urban Development Program and the Metropolitan Strategy and that the requirements of the *NSW Floodplain Development Policy and Manual* (prepared by and available from the Department of Land and Water Conservation) are also satisfied. It is important to ensure that the level of nutrients entering the waterways and creeks is not increased by the development.

Vegetated buffer areas

Appropriate vegetated buffer widths (as proposed and recommended in Sections 2, 3 & 4 of Part B of this report) must be retained as a means of improving surface runoff entering into the Georges River or its tributaries.

Land degradation

Land degradation processes, such as:

(a) erosion,
(b) sedimentation,
(c) deterioration of soil structure,
(d) significant loss of native vegetation,
(e) pollution of ground or surface water,
(f) soil salinity and acidity, and
(g) adverse effects on habitats and sensitive natural environments (aquatic and terrestrial), within the Catchment, must be avoided where possible, and minimised where avoidance is not possible (SREP No. 2)

Catchment water quality

Water quality within the Catchment is to be maintained or improved through the implementation of environmental objectives for water quality agreed between the Minister for Environment and the Minister for Land and Water Conservation and by the application of consistent decisions affecting the use and management of land (SREP No. 2).

Specific matters for consideration for the section of the Georges River at Shepherd Street, Liverpool (SREP NO. 2)

The following considerations must be taken into account and addressed by appropriate expert personnel in the case of the current development, at a suitable stage in the assessment process:

- The likely impact of the proposal on the water table.
- The likely impact of the proposal on natural flows in the Georges River and its tributaries.
- The likely impact of the proposal on other downstream water users in the Catchment.
- Whether the proposal will contribute to enhancing both the recreational and environmental amenity within the Catchment.
- If the proposal is part of rehabilitation works, whether the proposal is in keeping with an approved rehabilitation plan.
- Whether the proposal is likely to result in a propagation zone for noxious aquatic weeds.

- The likelihood of the development resulting in the formation of algal blooms and the documentation of measures proposed to control that.

10. Compliance with Fisheries Management Act 1994 (FM Act)

Fisheries NSW is responsible for ensuring that fish stocks are conserved and that there is no net loss of key fish habitats upon which they depend. To achieve this, Fisheries NSW ensures that developments comply with the requirements of the Fisheries Management Act 1994 (FM Act) (namely the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the Act, respectively), and the associated Policy and Guidelines for Fish Habitat Conservation and Management (2013). As such, the following conditions would be satisfied:

- It is considered that a minimum 30m riparian VRZ setback (Vegetated Riparian Zone) having a similar width to that indicated on the Environmentally Significant Land map as indicted in Liverpool LEP (2008) (Figure 16) would be commensurate with foreshore buffer guidelines as recommended by Fisheries NSW for a merit-based proposed development along this weed-infested bank of the Georges River that occurs above the tidal downstream weir.

- River bank regrading works are not proposed for the development and the river banks will be left intact (Northrop 2015, Woods Bagot 2015).

- The location of the proposed bioswales occur outside the riparian zone and all surface flows grade to this point for treatment prior to discharge to the Georges River. Roof water is directed to a vault containing Stormwater360 treatment cartridges prior to discharge into the Georges River (Northrop 2015).

- It is considered that the riparian buffer zones proposed provides generous provision of native vegetation and habitat on the Georges River. Provision for connectivity in both upstream and downstream directions is made. Deep rooted areas are provided for native tree species such as recommended for landscaping as indicated in Table 5.

11. References and literature reviewed

ACS Environmental P/L (2015) Riparian issues, assessment and management at No. 20 Shepherd Street, Liverpool, (prepared for Coronation Property P/L)

ACS Environmental P/L (2015) Flora and fauna survey and biodiversity assessment at No. 28 Shepherd Street, Liverpool, (prepared for Coronation Property P/L)

ACS Environmental P/L (2015) Riparian issues, assessment and management at No. 28 Shepherd Street, Liverpool, (prepared for Coronation Property P/L)

Aspect Studios (2015) Proposed Development Plan at Shepherd Street, Liverpool

Kirchner, E. (in SMEC) 2010 - Georges River Estuarine Process Study

Liverpool City Council DCP (2008)

Liverpool City Council LEP (2008)

Northrop (2015) Water and Consulting Engineers

NSW Office of Water (2012) Guidelines for Riparian Corridors on Waterfront Land

NSW Scientific Committee. Final Determinations (1996 – 2015) Determinations relating to listings of threatened species, populations, ecological communities and key threatening processes in the Schedules of the *Threatened Species Conservation Act 1995.*

OEH Atlas of NSW Wildlife (2015). NPWS Geographic Information Systems Division, Hurstville NSW, 2220

OEH (2013) 'The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area'.

Appendix 1: Floristic species assemblages recorded at various addresses at the subject sites at Shepherd Street, Liverpool

KEY

Status

* - Exotic species

*pl - planted exotic or ornamental

C3, C4 - Noxious weeds as listed on the *NSW Noxious Weeds Act (1993)*

Vegetation

Weeds and Exotics (OEH 2013)

Relative ranked frequency of occurrence

u rare to uncommon

o occasional

c common to very common

STATUS	SCIENTIFIC NAME	COMMON NAME	REAR OF PROPERTIES (WESTERN BANK	NO. 20 SHEPHERD STREET	NO. 26 SHEPHERD STREET	NO. 28 SHEPHERD STREET	NO. 31 SHEPHERD STREET	NO. 32-34 SHEPHERD STREET	NO. 33 SHEPHERD STREET	MILL PARK, SHEPHERD STREET
	FILICOPSIDA									
	Dennstaedtiaceae									
	Pteridium esculentum	Bracken	o							
	GYMNOSPERMAE: CONIFERALES									
	Araucariaceae									
*pl	*Araucaria heterophylla*	Norfolk Island Pine					1 tree to 3m tall			
	Cupressaceae									
*pl	*Juniperus communis*	Juniper					c (low shrub)			

STATUS	SCIENTIFIC NAME	COMMON NAME	REAR OF PROPERTIES (WESTERN BANK)	NO. 20 SHEPHERD STREET	NO. 26 SHEPHERD STREET	NO. 28 SHEPHERD STREET	NO. 31 SHEPHERD STREET	NO. 32-34 SHEPHERD STREET	NO. 33 SHEPHERD STREET	MILL PARK, SHEPHERD STREET
	MAGNOLIOPSIDA: MAGNOLIDAE									
	Anacardiaceae									
*pl	*Schinus areira*	Pepper Tree		1 tree				2 trees		
	Apiaceae									
*	*Foeniculum vulgare*	Fennel	o			c				o
	Asclepiadaceae									
*	*Araujia sericifera*	Moth Plant				o				
	Asteraceae									
*	*Ageratina adenophora*	Crofton Weed				o				
*	*Bidens pilosa*	Cobblers Pegs	c		o	c	o			u
*	*Cirsium vulgare*	Common Thistle	o			o				
*	*Conyza sumatrensis*	Tall Fleabane		c	o	o				
*	*Galinsoga parviflora*	Potato Weed	o							
*	*Hypochaeris radicata*	Cats Ears				o				
pl	*Ozothamnus diosmifolius*	White Dogwood					u			
*	*Sonchus asper* subsp. *glaucescens*	Prickly Sowthistle	u							
*	*Sonchus oleraceous*	Common Sowthistle	o	o		o				
	Basellaceae									
*	*Anredera cordifolia*	Madeira Vine	o							
	Bignoniaceae									
*pl	*Jacaranda mimosaefolia*	Jacaranda	o					1 tree		
	Brassicaceae									
*	*Brassica juncea*	Indian Mustard		o						

STATUS	SCIENTIFIC NAME	COMMON NAME	REAR OF PROPERTIES (WESTERN BANK)	NO. 20 SHEPHERD STREET	NO. 26 SHEPHERD STREET	NO. 28 SHEPHERD STREET	NO. 31 SHEPHERD STREET	NO. 32-34 SHEPHERD STREET	NO. 33 SHEPHERD STREET	MILL PARK, SHEPHERD STREET
	Caprifoliaceae									
*	*Lonicera japonica*	Japanese Honeysuckle	o							
	Casuarinaceae									
pl (?)	*Allocasuarina littoralis*	Black Sheoak								u
	Casuarina glauca	Swamp Oak								u
	Chenopodiaceae									
	Einadia nutans subsp. *nutans*					c				
	Convolvulaceae									
*	*Ipomoea indica*	Common Morning Glory	c			c				
	Ericaceae									
	Leucopogon juniperinus	Prickly Beard-heath								o
	Euphorbiaceae									
	Homalanthus populifolius	Bleeding Heart								u
C4	*Ricinus communis*	Castor Oil Plant	**c**	o (dead)						
	Fabaceae: Faboideae									
*	*Erythrina crista-galli*	Cockspur Coral Tree	o							
pl	*Hardenbergia violacea*	False Sarsaparilla					o			
pl	*Indigofera australis*	Native Indiga					u			
*	*Medicago polymorpha*	Burr Medic			o	o				
*	*Trifolium pratense*	Red Clover	o							
*	*Trifolium repens*	White Clover			o	o				
	Fumariaceae									
*	*Fumaria muralis*	Wall Fumitory	o							

STATUS	SCIENTIFIC NAME	COMMON NAME	REAR OF PROPERTIES (WESTERN BANK)	NO. 20 SHEPHERD STREET	NO. 26 SHEPHERD STREET	NO. 28 SHEPHERD STREET	NO. 31 SHEPHERD STREET	NO. 32-34 SHEPHERD STREET	NO. 33 SHEPHERD STREET	MILL PARK, SHEPHERD STREET
	Goodeniaceae									
pl	*Goodenia ovata*	Hop Goodenia					o			
	Lauraceae									
*	*Cinnamomum camphora*	Camphor Laurel	o			c (to 11m tall)				
	Malaceae									
*pl	*Cotoneaster glaucophyllous*	Cotoneaster					u			
	Malvaceae									
*	*Malva parviflora*			o	o					
*	*Modiola caroliniana*	Red-flowering Mallow	o	o	o	c				
*	*Sida rhombifolia*	Paddys Lucerne			o	o				
	Mimosaceae									
pl	*Acacia falcata*	Sickle Wattle					u			
pl	*Acacia longifolia* ssp *longifolia*	Sydney Golden Wattle					o			
	Acacia parramattensis	Parramatta Green Wattle								c
*	*Acacia saligna*	Golden Wreath Wattle				c (to 5m tall)				
	Moraceae									
*	*Morus alba*	White Mulberry	o			c (<12m)				
*pl	*Ficus microcarpa*		1 tree							
	Myrtaceae									
pl	*Callistemon viminalis*	Willow-leaved Bottlebrush					o			
*pl	*Eucalyptus scoparia*						1 tree			
pl	*Eucalyptus saligna*							1 tree		
pl	*Eucalyptus saligna x botriodes*		o					2 trees		
pl	*Kunzea ambigua*	Tick Bush					o			

STATUS	SCIENTIFIC NAME	COMMON NAME	REAR OF PROPERTIES (WESTERN BANK)	NO. 20 SHEPHERD STREET	NO. 26 SHEPHERD STREET	NO. 28 SHEPHERD STREET	NO. 31 SHEPHERD STREET	NO. 32-34 SHEPHERD STREET	NO. 33 SHEPHERD STREET	MILL PARK, SHEPHERD STREET
	Myrtaceae cont.									
*pl	*Leptospermum petersonii*	Yellow-scented Teatree					o	o		
pl	*Lophostemon confertus*	Brush Box						o		
	Melaleuca linariifolia	Snow-in-Summer	1 mature tree							
pl	*Melaleuca nodosa*	Ball Honey-myrtle					o			
	Oleaceae									
C4	*Ligustrum lucidum*	Large-leaved Privet	o			o	u			o
C4	*Ligustrum sinense*	Small-leaved Privet	o			o				o
	Phyllanthaceae									
	Glochidion ferdinandi	Cheese Tree	u							
	Phytolaccaceae									
*	*Phytolacca octandra*	Inkweed	u	o						
	Pittosporaceae									
	Bursaria spinosa	Blackthorn					o			o
	Pittosporum undulatum	Sweet Pittosporum	u							o
	Plantaginaceae									
*	*Plantago lanceolata*	Plantain				c				
*	*Acetosa sagittata*	Turkey Rhubarb				o				
	Portulacaceae									
*	*Portulaca oleracea*	Pigweed			c					
	Proteaceae									
pl	*Hakea sericea*						o			

STATUS	SCIENTIFIC NAME	COMMON NAME	REAR OF PROPERTIES (WESTERN BANK)	NO. 20 SHEPHERD STREET	NO. 26 SHEPHERD STREET	NO. 28 SHEPHERD STREET	NO. 31 SHEPHERD STREET	NO. 32-34 SHEPHERD STREET	NO. 33 SHEPHERD STREET	MILL PARK, SHEPHERD STREET
	Rosaceae									
*	*Eriobotrya japonica*	Loquat	u							
*pl	*Photinia sp.*						u			
C4	*Rubus ulmifolius*	Blackberry	o			o				o
	Rubiaceae									
*	*Galium aparine*		o							
	Rutaceae									
*pl	*Murraya paniculata*	Orange Jessamine						1 shrub		
	Sapindaceae									
*	*Cardiospermum grandiflorum*	Balloon Vine	c			c				
pl	*Dodonaea multijuga*						o			
pl	*Dodonaea viscosa* ssp *cuneata*	Wedge-leaf Hop Bush					o			
	Solanaceae									
C3	*Cestrum parqui*	Green Poisonberry	c			o				
*	*Datura stamonium*	Jimson Weed			o	c				
C 4	*Lycium ferocissimum*	African Box-thorn				o				
*	*Solanum mauritianum*	Tobacco Bush		u			u			
*	*Solanum nigrum*	Black Nightshade	o	o	o	o				
	Verbenaceae									
C4	*Lantana camara*	Lantana	c			o				c
*	*Verbena litoralis*	Purpletop				c				
	MAGNOLOPSIDA: LILIDAE									
	Arecaceae									
*pl	*Syagrus romanzoffiana*	Queen Palm					3 trees to 8m			

STATUS	SCIENTIFIC NAME	COMMON NAME	REAR OF PROPERTIES (WESTERN BANK)	NO. 20 SHEPHERD STREET	NO. 26 SHEPHERD STREET	NO. 28 SHEPHERD STREET	NO. 31 SHEPHERD STREET	NO. 32-34 SHEPHERD STREET	NO. 33 SHEPHERD STREET	MILL PARK, SHEPHERD STREET
	Phormiaceae									
pl	*Dianella revoluta*	Blue Flax Lily					o			
	Poaceae									
*	*Chloris gayana*	Rhodes Grass				c				
*	*Cynodon dactylon*	Couch		o		o				
*	*Eragrostis curvula*	African Lovegrass			o			o		c
	Imperata cylindrica	Blady Grass					o			
	Lachnagrostis filiformis	Blown Grass	u							
*	*Paspalum dilatatum*	Paspalum				c				
*	*Pennisetum clandestinum*	Kikuyu		c		c		c (managed lawn)	c (managed lawn)	
	Phragmites australis	Common Reed	o							
*	*Setaria parviflora*	Slender Pidgeon Grass						o		
	Themeda australis	Kangaroo Grass					o			o (vic)

LEGEND TO APPENDIX 1 - NOXIOUS WEEDS IN THE LIVERPOOL COUNCIL LGA

C3 - A noxious weed the presence of which must be fully and continuously suppressed and destroyed

C4 - A noxious weed the growth and spread of which must be controlled according to the measures specified in a management plan published by the local control authority

mecone

8 August 2016

The Chief Executive Officer
Liverpool City Council
Level 2, 33 Moore St
Liverpool NSW 2170

Attn: Toni Averay

Dear Toni,

Re: Amended letter of offer regarding Planning Proposal for 20-33 Shepherd Street

I refer to Council's resolution dated 29 June 2016 and our ongoing discussions regarding the Planning Proposal for 20-33 Shepherd Street Liverpool. In particular, I note:

- Council's requirement that Voluntary Planning Agreement (VPA) and public benefit negotiations be finalised by the A/CEO in order to support the subject planning proposal; and
- The minutes from the meeting attended between Council and Coronation on 11 July 2016 where it was agreed that an updated letter of offer be prepared in order to submit the Planning Proposal to the Dept. of Planning and Environment for gateway determination.

This 'letter of offer' is accompanied by a detailed 'VPA Schedule of Works' outlined in **Appendix 1** to this report.

In line with our correspondence dated 10 June 2016, the amended Concept Plan, prepared by SJB Urban results in a net increase of approximately 284 units on Coronation land (or 415 units within the overall precinct) above the existing FSR of 2.5:1 permitted for the precinct. Coronation is willing to provide a VPA contribution of $15,000 per unit, in accordance with Council's draft VPA Policy. This equates to a contribution of $6,210,000.00 across the precinct, of which Coronation is responsible for 284 additional units or 69% of the total value.

In addition, Coronation is also proposing to undertake a number of works-in-kind in lieu of Section 94 contributions where the proposed works are specifically identified within Council's Contributions Plan for the Liverpool City Centre. Completing these works in kind, rather than as a contribution, has been proposed in order to ensure the relevant works are completed in time for the first residents moving into the precinct.

The overall offer is based on a number of key factors:

- Works have been summarised on a precinct basis (ie associated with the entire uplift on the eastern side properties);
- The costs of the works are shown as base material plus required contingency (builder's margin, unmeasurable works, GST etc). This is in accordance with Coronation's Quantity Surveyor advice.

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- VPA works have been proportionally split between the two landowners (Coronation @ 69%; and 31-33 Shepherd St @ 31% based on additional number of units in concept design) as clearly these result from the overall uplift, not just Coronation's land.

Section 94 works

Coronation proposes to undertake some of the works such as open space upgrades and riverbank works in lieu of Section 94 contributions as these works are specifically referred to in the S94 plan for the City Centre.

Although, we note that the boardwalk is also identified within the S94 Plan, Coronation proposes to retain this as a VPA item as it has been continually discussed as a VPA item. The works proposed to be undertaken in lieu of Section 94 contributions are as follows:

- Upgrades to Mill Park including play space – playground area directly to the south of the precinct will form a standard upgrade to play facilities typically associated with S94 works;
- Riparian zone bank stabilisation – includes work to ensure no further bank erosion and will provide the platform for the boardwalk to be properly implemented; and
- External works and services – includes lighting in the park/along the pathways, stormwater and required services in the open space areas.

VPA works

In addition, Coronation is also proposing the following VPA works totalling $4,561,269.00, of which Coronation will contribute $3,128,987.00 towards the following works:

- A riverfront boardwalk along the precinct following bank stabilisation;
- Public domain upgrade works including upgrades to Shepherd Street, planting on Atkinson Street and new lanes to riverfront;
- A new pedestrian/cycle access to boardwalk that will connect boardwalk to path. The boardwalk will be at lower level than street/development and accessible ramping plus stairs will be required to provide suitable access at either end of the precinct;
- An interim shuttle bus - depending on discussion regarding extending Council's existing route;
- A new bus shelter to be constructed and delivered as a Council asset;
- New bike share pods – three in total at the precinct, Casula and Liverpool; and
- Contribution towards the Woodbrook Road underpass reopening. It is noted that a recent meeting with TfNSW revealed that they will not support the opening of the underpass for vehicles. Opening the underpass for pedestrians and cyclists may be possible.

The remainder of the VPA contribution ($1,648,731.00) will go towards intersection upgrades. Although the total cost of these upgrades will be determined by GTA's network study, the remaining funds should enable the upgrade of approximately 3 intersections.

It is proposed to allows the development of 800 units within the precinct (what is currently permissible under existing controls) prior to requiring the traffic and transport works to occur as has been discussed with Council at a meeting with Coronation on 11 July. The following works are proposed to be undertaken only after the 800th unit is delivered:

- Shuttle bus
- Bus shelter
- Bike share pods
- Woodbrook Road underpass reopening
- Intersection upgrades yet to be determined by Council/GTA network model

I trust this information addresses Council's key outstanding matters and will enable Council to submit the Shepherd Street Planning Proposal to the Dept. of Planning and Environment for Gateway determination. If you have any queries in the meantime, please do not hesitate to contact me on 8667 8668 or at kbartlett@mecone.com.au.

Yours sincerely,

Kate Bartlett

Appendix 1 – VPA Works Schedule

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VPA WORKS	Qty	Unit	Cost	CPC share (69%)	31-33 share (31%)
Riverfront boardwalk	1244	m2	$ 581,521	$ 398,918	$ 182,603
Upgraded Shepherd Street	3153	m2	$ 524,159	$ 359,568	$ 164,591
New Tree planting Atkinson St	1862	m2	$ 335,210	$ 229,951	$ 105,259
New lanes to riverfront	1955	m2	$ 423,070	$ 290,222	$ 132,848
Pedestrian/cycle access to boardwalk	1157	m2	$ 229,937	$ 157,735	$ 72,203
Pedestrian/cycle boardwalk	1333	m2	$ 1,469,497	$ 1,008,061	$ 461,436
Connect new boardwalk to existing path	535	m2	$ 93,013	$ 63,806	$ 29,207
Shuttle bus (3 years)	-	-	$ 298,500	$ 204,768	$ 93,732
Bus shelter	5	m2	$ 53,577	$ 36,753	$ 16,824
Bike share pods (Site, Liverpool, Casula)	3	m2	$ 173,895	$ 119,290	$ 54,605
Woodbrook Road underpass reopening	197	m2	$ 378,890	$ 259,915	$ 118,975
Intersection upgrades (TBC by network study)	TBC		$ 1,648,731	$ 1,137,624	$ 511,107
TOTAL VPA WORKS			$ 6,210,000	$ 4,266,611	$ 1,943,389

NB: Costs based on preliminary QS advice from Napier and Blakely and include builder's margin, contingency, GST etc

SJB Architects

Shepherd Street Precinct Masterplan, Liverpool

19-33 Shepherd Street, Liverpool, 2170

July 2016 | Version 06

SJB Architects

Project
Shepherd Street Precinct Masterplan
19-33 Shepherd Street.
Liverpool, 2170

Ref: 5143
Date issued: July 2016
Version: 06
Prepared by: RC, SS
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Executive Summary

SJB have been appointed by Coronation Property Co. to prepare an urban design study and masterplan for the properties located at Shepherd Street, south of Atkinson Street, Liverpool. The purpose of the study is to test the development capacity of the properties within the Shepherd Street precinct in a comprehensive manner, taking into consideration the consolidated impact and ability to achieve the requirements of SEPP65 and the Apartment Design Guide (ADG).

The precinct masterplan is based on analysis of the site, its immediate and broader urban contexts, focusing specifically on the site's integration with the surrounding movement network, open spaces and landscape, and built form character. Key site features including the railway corridor, Georges River and existing heritage item have all been identified and used to inform the concept design.

Design principles have been prepared that distil the findings of the analysis, key planning objectives, and our knowledge from working on similar projects in Western Sydney and throughout the Sydney Metropolitan Area. These principles provide the basis of the options design and testing, and have directly influenced the structure and scale of the development.

A concept for the precinct has been prepared to investigate the appropriate level in development yield and density, and to determine the appropriate up-lift in building heights and floor space ratio for the site. The concept has been tested in regards to built form, scale, orientation, overshadowing and amenity, all to determine an appropriate response to the precinct. The ultimate goal of this study is to inform amendments to the Liverpool LEP 2008, and specifically the height and FSR controls.

1

Introduction

Overview of the regional, urban and local context to provide an initial understanding of the site.

1.1 Introduction

Liverpool, located within 40km of the Sydney CBD, has been identified as a Key Strategic Centre (A Plan for Growing Sydney) with a major focus on increased employment and housing within its city centre. Key objectives for the centre include:

- Increasing housing opportunities in the Liverpool CBD;
- Provide capacity for additional jobs;
- Improve connectivity between the CBD and the surrounding residential areas.

The analysis and options in this report are undertaken in the context of the current planning controls and strategies, which include:

- Liverpool LEP 2008
- Liverpool DCP 2008
- A Plan for Growing Sydney

This analysis includes a review and commentary on the current controls and testing of a base case and a preferred concept. The objective of delivering a better built form outcome within the Liverpool City Centre is supported by the bonus Floor Space Ratios, which in terms of the Shepherd Street precinct increases FSR from 1.5:1 to 2.2:1 or 2.5:1.

Key

- Arterial Route
- Liverpool
- Town Centres

1.2 Urban Context

The site is positioned at the south of the Liverpool City Centre and is located within Liverpool's urban renewal precinct, which is made up of industrial properties zoned for high-density residential uses.

It is located within a 10-15 minute walk from the Liverpool train station and the Macquarie Street retail area, and is in close proximity to regional facilities such as Liverpool Hospital, Liverpool TAFE and the Casula Powerhouse Arts Centre.

The precinct's broader urban context features a number of public parks, including Mill Park, Haigh Park, and various green spaces along the Georges River foreshore, which also connect the site to Lighthorse Park.

Key

- Site Boundary
- City Centre Precinct
- Local Amenity
- Train Station
- Motorway
- Primary Route
- Local Route
- Railway Corridor

1.3 Site Context

The precinct is located in an urban renewal area made up of industrial properties zoned for high density residential.

To the west of the precinct is a railway corridor that serves the T2 Inner West & South, T3 Bankstown and T5 Cumberland Lines. Vegetation along the foreshore of the Georges River defines the eastern boundary of the precinct and extends to the southern boundary and beyond to the Casula Powerhouse. Immediately to the north of the site is a medium density residential precinct, and single light-industrial property.

The existing residential development to the north of the precinct predominantly consists of 3-storey walk-up apartment buildings, and 1-2 storey detached houses and terraces to the west of the railway line.

The existing road and footpath infrastructure requires extensive maintenance and realignment. Access to the Casula Powerhouse Arts Centre, between Shepherd Street and Powerhouse Road is poorly defined.

The precinct currently features a range of 1 and 2 storey buildings and varying land uses, including light industrial, manufacturing and logistics. A single heritage building (LLEP2008 item 104), referred to as the Paper Mill, is located at the north-eastern boundary of the precinct, and serves as a visually prominent characteristic. A number of large mature trees are positioned along the edge of the street reserves and property boundaries.

Key

— — Site Boundary

1.3 Site Features

Atkinson Street and Shepherd Street intersection

Casula Powerhouse Arts Centre

Powerhouse Road looking towards Shepherd Street

Pedestrian link and cycleway adjacent to Powerhouse Road

Paper Mill heritage building positioned along Atkinson Street

Street character of Shepherd Street

Neighbouring housing typologies located north of the site

Residential apartment buildings to the north of Atkinson Street

Existing industrial buildings along Shepherd Street

View looking south towards the Georges River

Existing industrial buildings along Shepherd Street

Paper Mill heritage building along Shepherd Street frontage

1.4 Liverpool LEP 2008

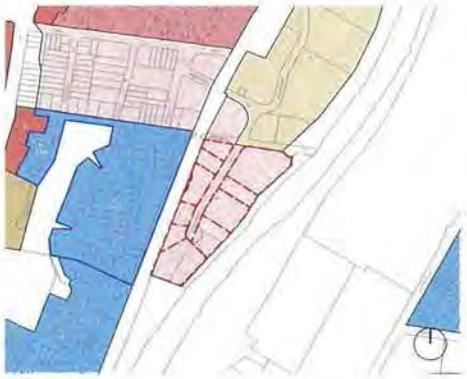
01 Height of Buildings Map

The precinct features a 24m height control, as outlined in the Liverpool LEP 2008. Areas to the east are designated at 8.5m in height, whilst the properties to the north have an allowable height limit of 18m.

Key

- I 8.5
- M 12
- O 15
- P 18
- R 21
- S 24
- T 28
- U 30
- V 35
- X 45
- AB 80
- AC 100

Source: Liverpool Local Environmental Plan 2008 - Height of Buildings Map - Sheet HOB - 012



02 Floor Space Ratio Map

The LEP 2008 applies an FSR control of 1:1.5 across the precinct. Properties to the north have an FSR of 1:1, whereas lots to the east have an FSR of 0.5:1. The precinct is however eligible for an increase in the allowable FSR due to large lot sizes. This permits sites to have an FSR of 2.2:1 - 2.5:1 instead of the permissible 1.5:1 as stipulated on the LEP maps.

Key

- A1 0.01
- A2 0.1
- A3 0.15
- A4 0.25
- D 0.5
- F 0.6
- G 0.65
- I 0.75
- N 1.0
- P 1.2
- S1 1.5 → 2.2:1 - 2.5:1
- S2 1.7
- T 2.0
- U 2.5
- V 3.0
- X 4.0
- Z 5.0

Source: Liverpool Local Environmental Plan 2008 - Floor Space Ratio Map - Sheet FSR - 012

03 Heritage Map

The lot positioned at the north-eastern boundary of the site is dedicated as Heritage 'General' as specified by the LEP 2008 (Item 104).

Key

- Item - General

Source: Liverpool Local Environmental Plan 2008 - Heritage Map - Sheet HER - 012

04 Land Zoning Map

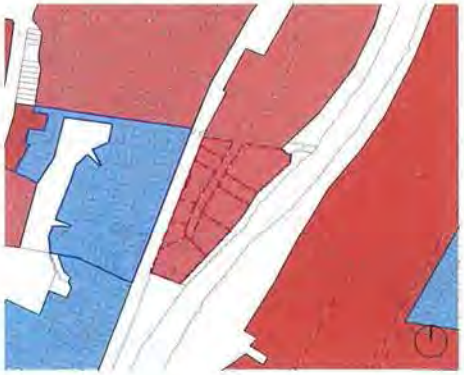
The LEP 2008 applies a High Density Residential (R4) zoning across the precinct. Areas to the north are also zoned R4, whilst the lots to west are zoned R3 Medium Density Residential, to the south RE1 Public Recreation, and IN1 General Industrial to the east of the W1 Natural Waterways.

Key

- B1 Neighbourhood Centre
- B2 Local Centre
- B3 Commercial Core
- B4 Mixed Use
- B5 Business Development
- B6 Enterprise Corridor
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- IN1 General Industrial
- IN2 Light Industrial
- IN3 Heavy Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R4 High Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU1 Primary Production
- RU2 Rural Landscape
- RU4 Rural Small Holdings
- SP1 Special Activities
- SP2 Infrastructure
- W1 Natural Waterways
- WSP SEPP Western Sydney Parklands

Source: Liverpool Local Environmental Plan 2008 - Land Zoning Map - Sheet LZN - 012

1.4 Liverpool LEP 2008



05 Lot Size Map

The LEP 2008 applies a minimum lot size control of 1,000m² on the lots within the precinct, which this is consistent with lots to the north. The medium density residential area to the west of the precinct has a minimum 300m² lot size, where as those located across the Georges River to the east have a minimum 2,000m² lot size.

Key

- D 300
- F 400
- G 450
- M 600
- O 700
- U 1000
- V 2000
- W 4000
- Y 10000
- Z 2ha
- AB1 10ha
- AB2 40ha
- AD 120ha

Source: Liverpool Local Environmental Plan 2008 - Lot Size Map - Sheet LSZ - 012

06 Flood Planning Map

Lots along the eastern boundary of the subject site are identified as being flood prone land (as are areas to the north, south and east of the site) within the LEP 2008.

Key

- Flood planning area
- Flood prone land

Source: Liverpool Local Environmental Plan 2008 - Flood Planning Map - Sheet FLD - 012

07 Environmentally Significant Land Map

The eastern boundary of the site is designated Environmentally Significant Land within the LEP 2008, as it fronts onto the Georges River Riparian Corridor.

Key

- Environmentally Significant Land

Source: Liverpool Local Environmental Plan 2008 - Environmentally Significant Land Map - Sheet ESL - 012

08 Foreshore Building Line Map

The LEP 2008 states that the eastern boundary of the precinct, along the Georges River, must take into account the Environmentally Significant Land restrictions in the form of a Foreshore Building Line setback.

Key

- Land below foreshore building line
- Foreshore building line

Source: Liverpool Local Environmental Plan 2008 - Foreshore Building Line Map - Sheet FBL - 012

1.5 Liverpool DCP 2008

01 Street Setbacks

The Liverpool DCP 2008 indicates that lots within the precinct must have a street building setback of 4 - 4.5m from Shepherd Street, and along the eastern side of Atkinson Street. Balconies may project up to 1.2m into front building setbacks, with the cumulative length of all balconies at a particular level to account for no more than 50% of the building facade. Shading devices, entry awnings and cornices are permissible.

Key

- City Centre Precinct
- Site Boundary
- 2 - 2.5m Setback
- 4 - 4.5m Setback

Source: Part 4 Liverpool City Centre LDCP 2008 - Building to Street Alignment and Street Setbacks, pg 13 - 14

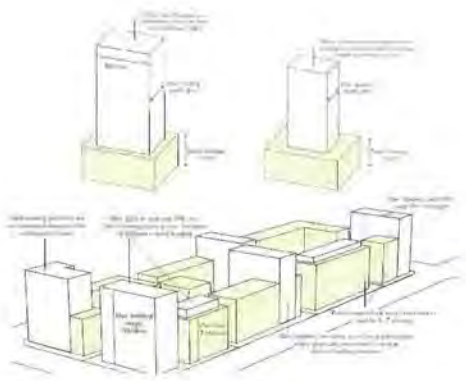
02 Street Frontage

A street frontage of 15 - 20m is applied to lots facing Shepherd Street and Atkinson Street as indicated above. The two lots positioned in the north-western corner of the precinct are located opposite a lot designated as a heritage item and must be scaled appropriately. 'Fake' building street walls (frames with the building line recessed behind) will not be permitted up to street frontage height level.

Key

- City Centre Precinct
- Site Boundary
- 15 - 20m Frontage
- 15 - 25m Frontage
- 12 - 20m Frontage
- 16 - 26m Frontage

Source: Part 4 Liverpool City Centre LDCP 2008 - Street Frontage Heights, pg 15 - 17.

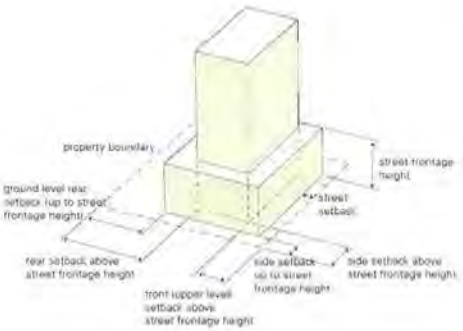


03 Building Depth and Bulk

The Liverpool DCP 2008 states that buildings should promote the design and development of sustainable buildings by minimising the need for artificial heating, cooling and lighting whilst maintaining good internal amenity. Bulk and scale of buildings may be articulated via separation, modulation and facade detail. The maximum floor plate of a residential development above 25m in height is 500m² (GFA) and a maximum building depth of 18m.

Residential Condition Above 25m in height:	Maximum GFA per Floor	Maximum Building Depth
The GFA permitted above this height is 20% of the total gross floor area of the development, up to the maximum permissible height shown on the Height of Buildings map in the Liverpool LEP 2008.	500m²	18m

Source: Part 4 Liverpool City Centre LDCP 2008 - Building Depth and Bulk, pg 17 - 18.



04 Building Setbacks

Lots within the subject site must comply with the table below. Lots fronting the railway corridor must have a building setback of 12m, and lots facing the Georges River must comply with the Foreshore Building Line map boundary as indicated by the Liverpool LEP 2008.

High Density Residential	Front (Upper Level) Setback	Side Setback	Rear Setback
All uses up to 12m height: · Non-habitable · Habitable	 Street setback Street setback	 3m 6m	 6m 6m
All uses up to 12-25m height: · Non-habitable · Habitable	 N/A N/A	 4.5m 9m	 6m 9m
All uses up to 25-35m height: · Non-habitable · Habitable	Max. 20% of total site GFA up to max. floorplate of 500sqm	 6m 12m	 6m 12m
All uses up to 35-45m height: · Non-habitable · Habitable	Max. 20% of total site GFA up to max. floorplate of 500sqm	 6m 14m	 9m 14m

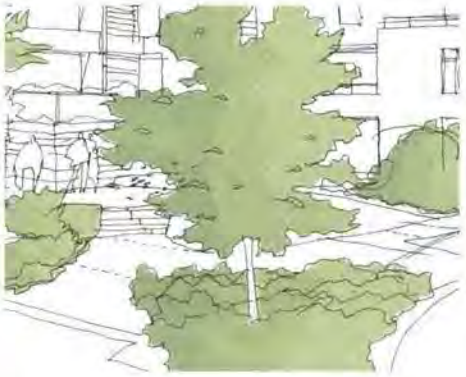
Source: Part 4 Liverpool City Centre LDCP 2008 - Building Setbacks, pg 18 - 21.

1.5 Liverpool DCP 2008

05 Site Cover and Deep Soil Zones

The 12m railway corridor setback applying to lots on the western boundary of the precinct allows deep soil planting to occur within this area to improve the amenity of the developments, allowing for good daylight access, ventilation, improve visual privacy and create areas of passive and active recreation. Structures, works or excavations that may restrict vegetation growth are not permitted within this zone (car parking, hard paving, patios, decks, drying areas etc.).

Source: Part 4 Liverpool City Centre LDCP 2008 - Site Cover and Deep Soil Zones, pg 23 - 24.



06 Landscape Design

The Liverpool DCP 2008 states that all landscaped areas must be irrigated with recycled water, and species must be selected from Council's schedule of Preferred Landscape Species. All commercial and retail developments must incorporate planting into accessible outdoor spaces and remnant vegetation must be maintained throughout the site wherever practical. A long-term concept plan must be provided for all landscaped areas, in particular that of deep soil zones, and any new public spaces are to be designed so that at least 50% of the open space provided has 3 hours minimum of sunlight (between 10am and 3pm on 21st June - Winter Solstice).

Source: Part 4 Liverpool City Centre LDCP 2008 - Landscape Design, pg 25 - 26.

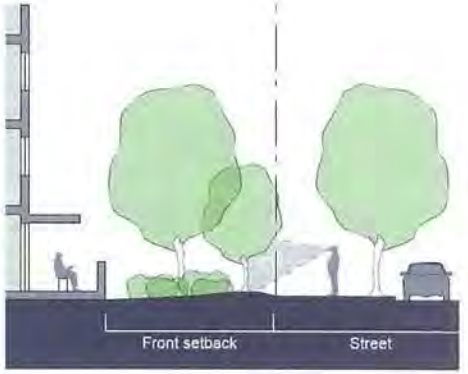
07 Pedestrian Permeability

The Liverpool DCP 2008 encourages active street fronts and the enhancement of existing and proposed through site links, both vehicular and pedestrian. Where possible, existing dead end lanes are to be extended through to the next street as redevelopment occurs (i.e, Shepherd Street onto Powerhouse Road). Through block connections (Shepherd Street to Georges River foreshore) must be 5m clear of all obstructions, clear and direct for pedestrians using signage, and 'safer-by-design' principles.

Key

- Site Boundary
- Arterial Route
- Pedestrian links
- Riverfront walk
- Residential Area
- Open Space
- Riverfront

Source: Part 4 Liverpool City Centre LDCP 2008 - Pedestrian Permeability, pg 28 - 29.

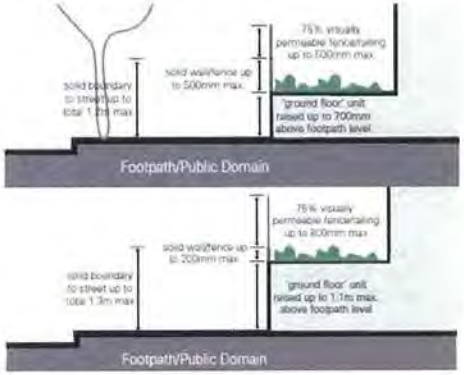


08 Active Street Frontages and Address

Proposed residential development must contribute positively to the street by providing a clear street address, direct access from the primary street front and allow residents to overlook all surrounding streets. Active ground floor uses are to be at the same general level as the footpath and accessible directly from the street.

Source: Part 4 Liverpool City Centre LDCP 2008 - Active Street Frontages and Address, pg 31 - 33.

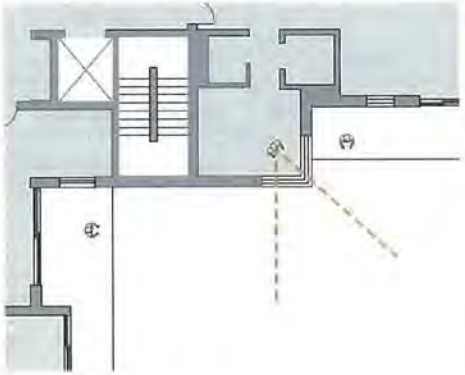
1.5 Liverpool DCP 2008



09 Front Fences

Fences to primary and secondary frontages, and side boundaries, must use varied materials, not be 1.3m above the footpath/public domain, allow for passive surveillance and clearly define the interface between the private and public domain.

Source: Part 4 Liverpool City Centre LDCP 2008 - Front Fences, pg 33 - 34.



10 Safety and Security

The Liverpool DCP 2008 states that 'Safer-by-Design' principles must be implemented within the design so as to allow for passive surveillance of public and communal spaces, access ways, entries and driveways. The number of identifiable 'front door' entries at ground level must be maximised, as is the amount of lighting in all pedestrian access ways, parking areas and building entries. Boundaries must be clearly defined using physical or symbolic features with particular consideration given to the avoidance of blind spots.

Source: Part 4 Liverpool City Centre LDCP 2008 - Safety and Security, pg 34 - 35

11 Awnings

Buildings with an interface to the public domain (lots positioned along streets identified in diagram above) must provide shelter where most pedestrian activity occurs, whilst providing a consistent street frontage as identified within the DCP 2008. Awnings must be horizontal in form, 2.4m in depth, considerate of growth pattern of mature trees and have a clearance of 2.8m. They must match building facades, and at corner sites, the awnings must be wrapped around the corner for a minimum of 6m.

Key

Site Boundary

Awnings

Source: Part 4 Liverpool City Centre LDCP 2008 - Awnings, pg 35 - 36

12 Building Exteriors

According to the Liverpool DCP 2008, facades should be articulated in order to address the street and add visual interest, thus blank walls and single materials in both the public and private realm are discouraged. Balconies and terraces should be provided to overlook public spaces. All roof top structures, such as air conditioning, lift motor rooms etc. should be incorporated into the architectural design of the building. Special consideration should be given to adjoining buildings (in particular heritage buildings) in regards to; appropriate alignment and street frontage heights, setbacks above frontages, appropriate materials and finishes selection, facade proportions and the provision of enclosed corners at street intersections.

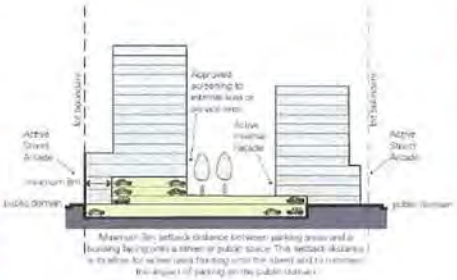
Source: Part 4 Liverpool City Centre LDCP 2008 - Building Exteriors, pg 40 - 41

1.5 Liverpool DCP 2008

13 Corner Treatments

New buildings opposite or adjacent to Heritage Items are to respond in terms of height, scale and proportion. New buildings opposite or adjacent to public open space are to comply with the sun access controls.

Source: Part 4 Liverpool City Centre LDCP 2008 - Corner Treatments, pg 41 - 43.



14 Traffic & Access

The Liverpool DCP 2008 states that parking and servicing provisions be contained within development sites to an amount and rate adequate for the economic and sustainable growth of the city centre. All new developments must provide for safe and secure access, minimise impacts on city amenity, and ensure that access is provided for the disabled and mobility impaired.

Residential Development	Car Spaces Required
Car Parking: · Studio Apartment · · One Bedroom · Two Bedroom · Three Bedroom	 0.5 or 1 Space per 2 dwellings 1 1 1.5
Car Parking Visitor:	1 per 10 dwellings
Accessible:	Min. 1 per dwelling or 2%
Service Vehicles:	1 per 40 dwellings
Motorcycle:	1 per 20 car spaces
Bicycle:	1 per 200sqm GFA

Source: Part 4 Liverpool City Centre LDCP 2008 - Traffic and Access, pg 45 - 51.

15 Noise

The Liverpool DCP 2008 identifies that all lots affected by Noise Sources (see diagram above), must produce an acoustic report outlining the appropriate noise attenuation and barrier planning strategy. Lots fronting the railway corridor (Noise Source 3) must have a 12m setback.

Key

- Site Boundary
- Noise Source 1 (Major Roads)
- Lots affected by Noise Source 1
- Noise Source 3 (Railway Corridor)
- Lots affected by Noise Source 3

Source: Part 4 Liverpool City Centre LDCP 2008 - Noise, pg 56 - 57.

16 Heritage

Buildings identified as 'Heritage Items' must comply with the conservation criteria as set out by the Liverpool DCP 2008, in regards to bulk and scale, siting of new buildings, architectural form and detailing, materials and finishes, original fabric and the aging process. All new developments within the vicinity of a heritage item must provide an impact assessment.

Source: Part 4 Liverpool City Centre LDCP 2008 - Heritage, pg 67 - 71.

1.6 FSR Bonus Identified in the Liverpool City Centre LEP 2008

Large lot sizes within the R4 High Density Residential zoned land, such as those within the Shepherd Street Precinct, are eligible for additional built form. This is achieved by an increase in the allowable Floor Space Ratio, permitting such sites to have an FSR of 2.2:1 - 2.5:1 instead of the permissible 1.5:1 stipulated on the LEP maps.

	Zone R4 High Density Residential	Site Area greater than 1,000 sqm less than 2,500 sqm	Site Area equal to or greater than 2,500 sqm
LEP Height	18 m	(1 + X):1	2:1
	24 m	(1.5 + X):1	2.5:1
	35 m	(2 + X):1	3:1
	45 m	(2 + 1.5X):1	3.5:1

X= the number of square metres of the site area

2

Site Analysis

Exploring the existing urban conditions and contexts, to assist in developing an appropriate urban response

2.1 Local Open Space

The City of Liverpool features a variety of open space and recreational areas, consisting of:

Local Park:

1 Ireland Park
2 Tepper Park
3 Alamein Park
4 Collimore Park
5 Apex Park
6 Wadel Park
7 Liverpool Pioneer Memorial Park
8 Bigge Park
9 Haigh Park
10 Lighthorse Park
11 Bill Morrison Park
12 Moorebank Reserve
14 Barbara Long Park
15 Pearce Park
16 Paciullo Park
17 Raine Park
18 Everett Park
19 Discovery Park
20 College Park
21 Hazel Bradshaw Park
22 Mill Park
23 Clinches Pond Reserve

Private Recreation:

13 Whitlam Leisure Centre

Key

- Site Boundary
- City Centre Precinct
- Motorway
- Railway Corridor
- Open Space

2.2 Local Amenity & Services

A number of commercial, community, transport and educational destinations are located within a 2 km radius of the site, with the major arterial and primary routes providing connection to the following services and amenities:

- Liverpool Hospital
- Sydney Southwest Private Hospital
- Liverpool TAFE
- Westfield Liverpool
- Whitlam Leisure Centre
- Liverpool Train Station

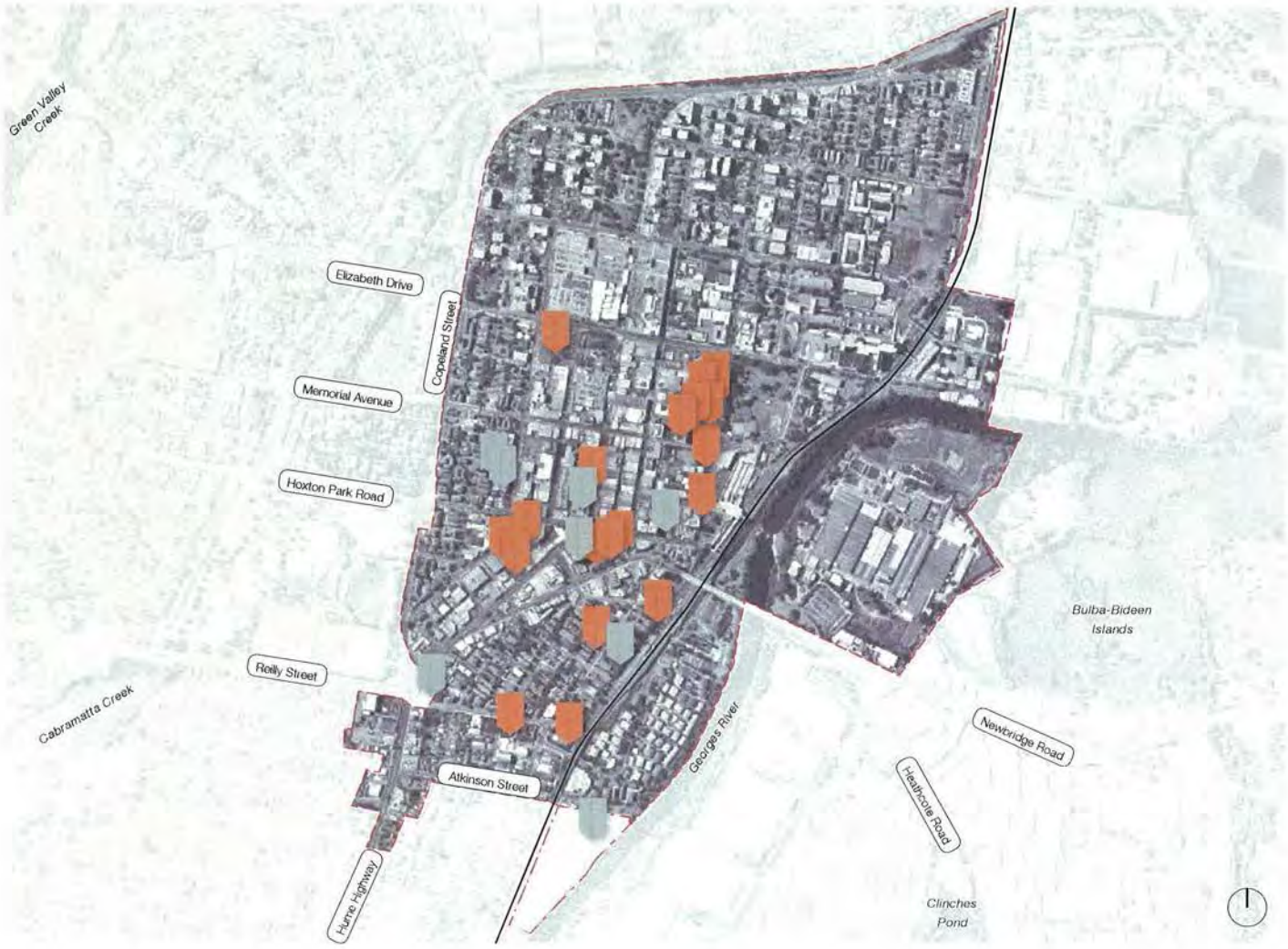
Community facilities including the Liverpool Community Centre and Liverpool Library are accessible via the Hume Highway. Areas of sport and recreation are located in close proximity to bodies of water, such as Cabramatta Creek and the Georges River.

Key

- Site Boundary
- City Centre Precinct
- Motorway
- Railway Corridor
- Retail Amenity
- Community Amenity
- Schools & Education Amenity
- Sport & Recreation Amenity
- Medical Amenity

2.3 Local Proposed Development

A number of future development sites within the City Centre precinct include both development approvals and Council-owned sites that are the subject of design proposals (at varying stages of approval). These are located in areas zoned as R4 High Density Residential and B4 Mixed Use, and align with the future growth of the locality where higher density dwelling types are needed to sustain the retail and employment centre.



2.4 Local Movement

Liverpool features a number of major arterial corridors providing key regional transport connections, including the M5 South Western Motorway and Hume Highway, which access the Sydney CBD, Western Sydney and Campbelltown.

The town centre is well serviced by Sydney Buses, with express routes in operation connecting residents to the greater Sydney area. Liverpool Train Station is located approximately 1.5 km from the site and provides a connection to other local centres along the T2 Inner West & South, T3 Bankstown and T5 Cumberland Lines.

Key

- Site Boundary
- City Centre Precinct
- Train Station
- Motorway
- Primary Route
- Secondary Route
- Railway Corridor
- Bicycle Path

2.5 Site Movement

Vehicular movement into the precinct is gained via Speed Street into Shepherd Street. This is the only vehicular access from the north, and the primary road connection to the Casula Powerhouse Arts Centre.

Currently, pedestrian access along the Georges River from Lighthorse Park ends at Atkinson Street and begins again along Powerhouse Road.

The nearest train station is Liverpool train station and is located approximately 1.5km away from the subject site, with the closest bus stops located along the Hume Highway.

Key

- City Centre Precinct
- Site Boundary
- Local Street
- Railway Corridor
- Foreshore Walk
- Site Access
- Pedestrian + Vehicular Access

2.6 Site Landform

The eastern portion of the precinct is currently affected by flooding during peak events, and has been designated as 'Flood Prone'. Flood planning regulations apply to these designated areas, with specific controls defining building setbacks to the Georges River and on site flood storage if necessary.

Existing landscape features in the precinct are limited to the mature trees (eucalypts) along Shepherd Street, with the eucalypts along the Foreshore considered as not worthy for retention.

The precinct's topography falls approximately from RL15.30 at the south-western corner of the site, to RL 9.5 at the north-eastern corner of the site, before dropping steeply to the river.

Key

- City Centre Precinct
- Site Boundary
- Railway Corridor
- Flood Prone Area
- Flood Planning Area
- Environmentally Significant Land
- Foreshore Building Line Setback
- Existing Trees
- Site Contours

2.7 Constraints

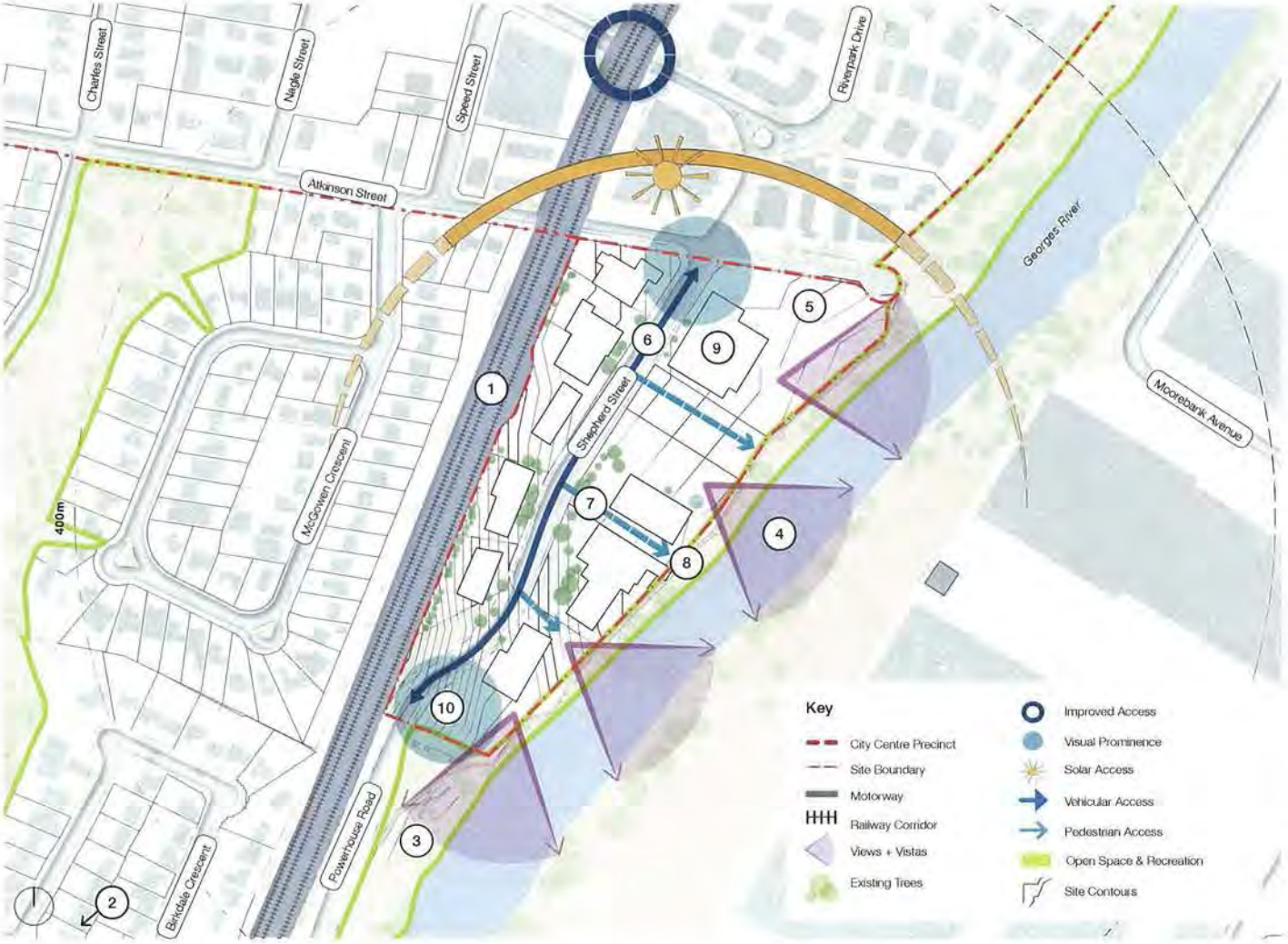
Following the urban and context analysis there are several key constraints that have been identified, which will inform the preparation of the urban design response. These include:

1. **Setbacks:** There are two setbacks that apply to the subject site, the first being the 12m Railway Corridor setback to the west of the site and the second being the Foreshore Building setback to the east, which runs parallel to the Georges River and limits the extent of development;
2. **Amenity:** Development within the precinct adjacent to the railway corridor is likely to be sensitive due to conflicts between orientating buildings in order to achieve adequate solar access, and mitigating the impact from the noise generated by passing trains. Visual and acoustic treatments to the facade need to be considered;
3. **Flooding:** Lots situated within the floor prone area, adjacent to the Georges River, are the subject of specific flood planning and management controls, which need to be considered when designing ground floors, basements and site access;
4. **Solar Access:** Height of development on the west of Shepherd Street may potentially overshadow development on the east of the precinct, as well as existing development west of the railway corridor;
5. **Noise:** The railway corridor located on the western boundary of the site is identified in the Liverpool LEP 2008 as a key noise source and as a result, certain design and environmental considerations must be put in place (i.e, building orientation, 12m setback);
6. **Privacy:** Privacy of residential units adjacent to the railway corridor is compromised by frequent train services and potential for screening devices to manage noise impacts;
7. **Heritage:** The heritage item located at the junction of Atkinson Street, Shepherd Street and the Georges River, places several restrictions on the built form of proposed buildings;

2.8 Opportunities

Furthering the site analysis, several key opportunities have been identified and will also inform the urban design response. These include:

1. **Railway Corridor:** Liverpool Station is located approximately 1.5 km to the north of the precinct, providing access to the T2 Inner West & South, T3 Bankstown and T5 Cumberland Lines;
2. **Arterial Connections:** The M5 South Western Motorway and Hume Highway provide access from Liverpool to south-western Sydney and the Sydney CBD;
3. **Open Space & Recreation:** Mill Park is located along the southern edge of the precinct, with vehicular and pedestrian access along Powerhouse Road. The Georges River and foreshore provides opportunities for future recreational use and landscaping;
4. **Key Views:** The subject site offers views of the Georges River and also key district views in a northern, eastern and southern direction;
5. **Site Gradient:** The topography allows for differentiation between the public and private realm, without compromising pedestrian circulation in and around the precinct;
6. **Access Roads:** Shepherd Street is proposed to be realigned at its southern extent, where it connects with Powerhouse Road, to improve site lines, accessibility and improve the streetscape;
7. **Site Permeability:** Due to lot configuration and imposed setbacks between buildings there are a number of opportunities for improved pedestrian permeability between Shepherd Street and the Georges River foreshore;
8. **Landscape Setbacks:** A 12m deep-soil setback is required along the western boundary of the site to the railway line. Along the eastern boundary to the river foreshore a 30m deep soil setback s required. This combination will deliver two contiguous bands of landscaping;
9. **Character + Heritage:** The area around The Paper Mill and the Georges River present an opportunity to create a unique character for the precinct based around the former Collingwood Paper Mill founded in 1865;
10. **Urban Markers:** The site is visible from the M5 Motorway and Railway Corridor and can be used as a key marker to help define and establish the gateway for the Liverpool CBD.



3

Urban Design Principles

Design principles, and responses that respond to the site's unique characteristics and opportunities.

3.1 Urban Design Principles

Movement + Access

Movement within the Shepherd Street Precinct should be easy to navigate with pleasant and attractive streetscapes. Pedestrian access is a key priority, particularly to open space areas on the eastern and southern boundaries of the site (i.e. Georges River and Mill Park). An inviting foreshore walk that links Lighthorse Park to Mill Park and enhances the character of the George River, should be addressed by active residential frontages.

Vehicular access along Shepherd Street should also be considered to maintain an ease of access, which does not disrupt pedestrian activity and traffic moving in/out of the individual sites.

Sustainability

The redevelopment of the precinct will embody sustainability, not only in financial terms, but also through connections to public transport, open spaces, the CBD, and provision of housing types.

It is important that the precinct becomes part of Liverpool's 'walkable suburbs', where attractive public open spaces and streetscapes along Shepherd Street, Atkinson Street and Powerhouse Road encourage pedestrian movement.

In addition, the use of public and active transport should be facilitated through the provision of bicycle parking, cycle lanes, and safe and comfortable routes to the station.

Density

The density of development within the Shepherd Street Precinct is an important contributor to activating the local parks and spaces, maximising access to the station and CBD services, and bringing life into a degraded foreshore area.

The housing choice offered by this scale of development, within such close proximity to the CBD, compliments the low-density to the west, and mid-rise to the north.

While a higher density brings positive outcomes, it is also important that the proposal responds to its context in terms of traffic, access and overshadowing.

Amenity

A key component of any successful residential precinct is active, quality and accessible public open spaces, where residents can build relationships with neighbours. This is even more important in higher-density communities, where private spaces are limited.

Views towards the Georges River and upgrades to Mill Park are essential. The orientation of buildings should carefully consider passive surveillance, over-shadowing of spaces and the solar access and natural ventilation to individual dwellings.

3.1.1 Urban Design Principles

Built Form

It's important to consider the scale and bulk of the built form in relation to pedestrians. Areas of open space should not feel intimidating or closed-off by the heights of adjacent buildings.

The built form should consider its orientation to the primary frontages to create a permeable street wall. Streetscapes should feel welcoming in order to allow for social interaction between residents.

Separation of buildings can be used to break up the bulk of the built form and create opportunities for gathering spaces. The buildings proposed on each of the lots should pursue design excellence.

Diversity

The variation in lot sizes, ownership and the influences of varying urban conditions throughout the precinct should be embraced, as they will ensure a variation in built form, scale and housing typologies. Common urban design principles should not manifest into common architecture. A range of materials, design approaches and styles should be encouraged to create interest in the streetscape and character.

Design responses to particular urban conditions, including the Paper Mill, foreshore edge, and railway line should be encouraged, and allowed to manifest in unique design outcomes.

Character

Development will make a positive contribution to the character of Liverpool and the Georges River corridor, building on and enhancing the local sense of identity. New development within the vicinity of the heritage item should be respectful of the setting and significance of the Paper Mill. All proposed buildings will help to define a new character for a modern Liverpool CBD, responding to the need for density within a future growth centre.

The Georges River ecosystem should be rehabilitated and celebrated with the opportunity to create a linear boardwalk and park along the foreshore.

Safety

'Safer-by-Design' principles will be implemented into the design of the built form, and within both the public and private realms of the development.

Setback of built form, adequate lighting, elimination of blind spots, ground level entries and passive surveillance are strategies that will be taken into consideration throughout the design process.

3.2 Urban Design Response

Movement + Access

Shepherd Street is the primary and sole vehicular access route through the precinct, which links to Powerhouse Road leading down to the Casula Powerhouse Arts Centre. The proposed realignment of Shepherd Street will improve this important north/south movement spine.

There is an opportunity to create a continuous foreshore boardwalk along the eastern edge of the precinct to the Georges River. Pedestrian permeability from Shepherd Street down to the boardwalk will be addressed by residential frontages. Ease of access and respect between vehicular and pedestrian movement can be achieved through upgrading existing streetscapes and landscaping within the precinct.

Key

- Site Boundary
- Vehicular
- Pedestrian links
- Riverfront walk

Frontages

In order to create a vibrant and cohesive precinct it is important for the primary frontage of all development to face Shepherd Street.

Development east of Shepherd Street, should also have a frontage along the Georges River, which encourages an active pedestrian boardwalk connection.

Secondary frontages along the east-west axis should also be considered to provide visual interest to neighbouring buildings.

Key

- Site Boundary
- Primary frontage
- Secondary frontage
- Riverfront frontage

3.2.1 Urban Design Response

Heights

Height of built form across the precinct steps up along a north-south axis to create a transition of height from the lower scale development to the north and west. Height will also be concentrated towards the east of Shepherd Street as it will have minimal overshadowing impact on proposed development, streetscape and context.

Taller built forms at the northern and southern ends of the precinct will create an urban marker visible from the M5 and railway corridor. The result will be an undulating skyline, with variations in visual prominence and also dwelling forms.

Key

- Site Boundary
- Height Transition
- Height Pattern
- Urban Marker
- Western Marker

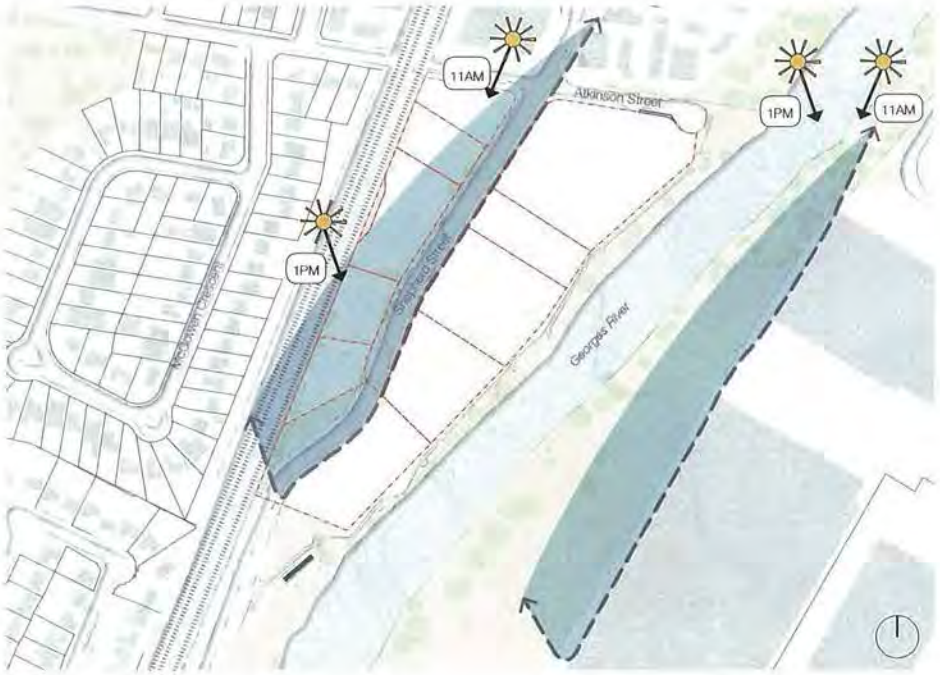
Orientation + Separation

As a result of the 12m Railway Corridor setback and also the Foreshore Building setback, the orientation and separation of buildings on individual plots are heavily constrained. Further restrictions are placed on buildings fronting onto Shepherd Street with a 3m setback, whilst side setbacks between buildings are in accordance with the requirements set out in the Apartment Design Guide, which vary from 6-12m setbacks from side boundaries.

Key

- Site Boundary
- 3m Setback from Atkinson and Shepherd Streets
- 6 - 12m Side Setback
- 6 - 9m Rear Setback
- No Build Zone

3.2.2 Urban Design Response

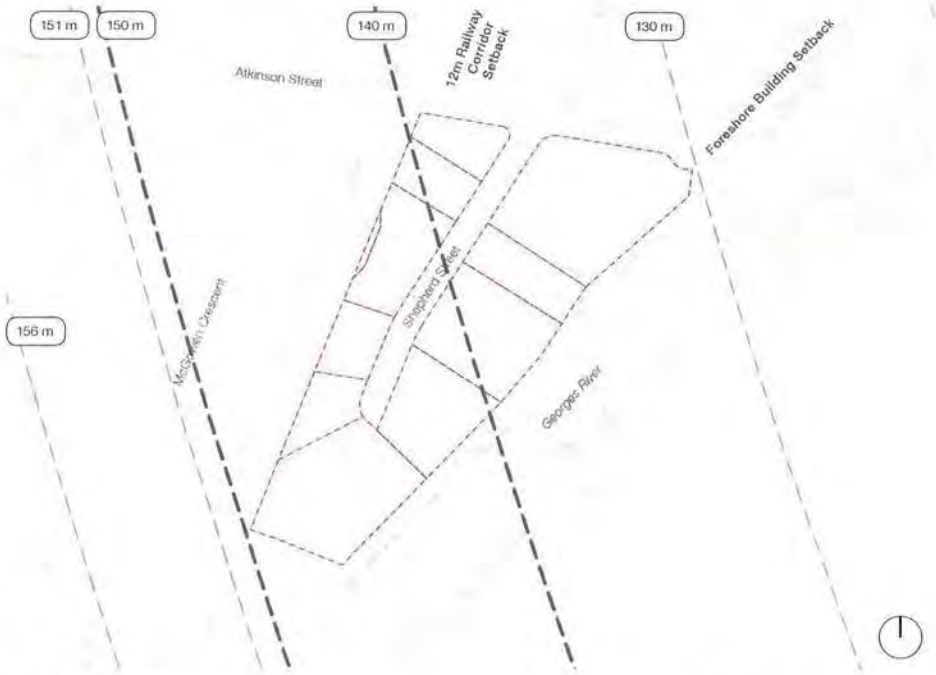


Shadows

Due to the orientation of the precinct and the Georges River the optimal time for buildings to receive continuous solar access, required in the Apartment Design Guide (ADG) is between 11am and 1pm. Solar access should be maintained at this time to allow buildings to achieve the solar access requirements and address the Shepherd Street.

Key

- Site Boundary
- Overshadowing
- Sun Path



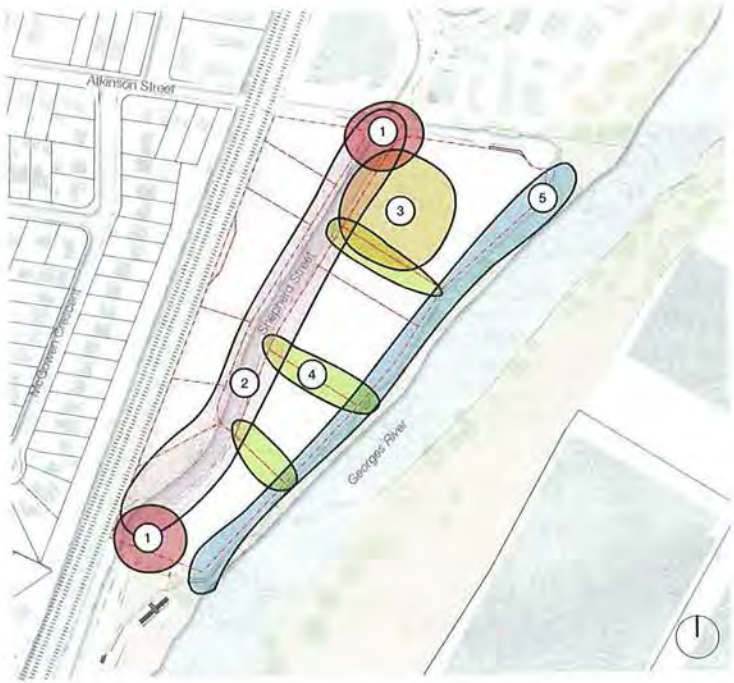
Obstacle Limitation Surface

The Obstacle Limitation Surface (OLS) is used to limit the height of buildings in the surrounding area of airports (Bankstown). The site has two height planes of 140 and 150 AHD, which limit the maximum development on site. This height limit also requires that cranes during construction do not exceed the height limit.

Key

- Site Boundary
- OLS

3.2.3 Urban Design Response



Built Form Character

1. **Urban Marker:** Shepherd Street, Atkinson Street and Powerhouse Road intersections
2. **Active Frontage:** Amenity, interaction and circulation along Shepherd Street
3. **Heritage:** Enhancement and adaptive re-use of the Paper Mill
4. **Through Site Link:** Access and engagement along through-site links between Shepherd Street and Georges River
5. **Foreshore:** Open space used for recreation and circulation

Key

- Site Boundary
- Urban Marker
- Active Frontage
- Heritage
- Through Site Link
- Foreshore

Urban Marker

Precedent: O'Dea Avenue, SJB Architects

Active Frontage

Precedent: St Margarets, SJB Architects

Heritage

Precedent: Willoughby Incinerator, SJB Architects

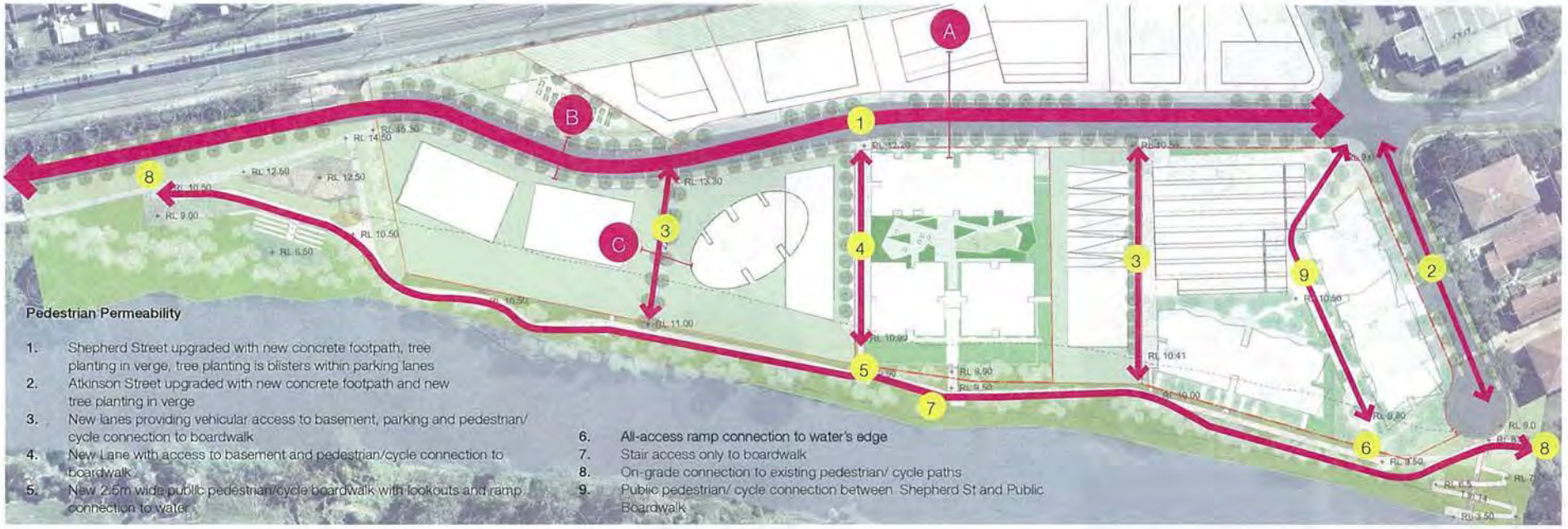
Through Site Link

Precedent: Casba, SJB Architects

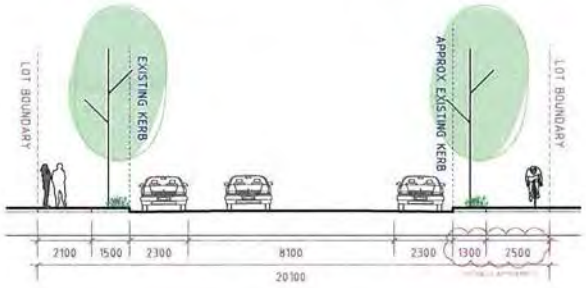
Foreshore

Precedent: Glebe Harbour, SJB Architects

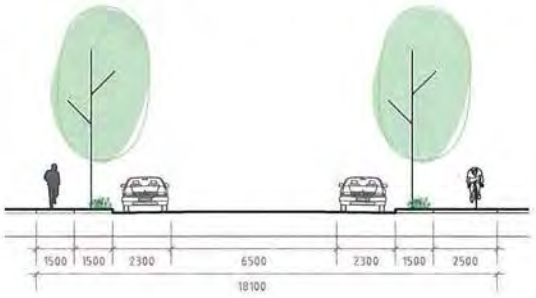
3.3 Urban Design Response



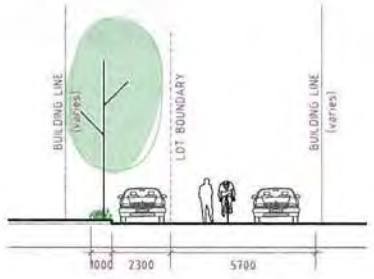
Section A Shepherd Street within Existing Kerb



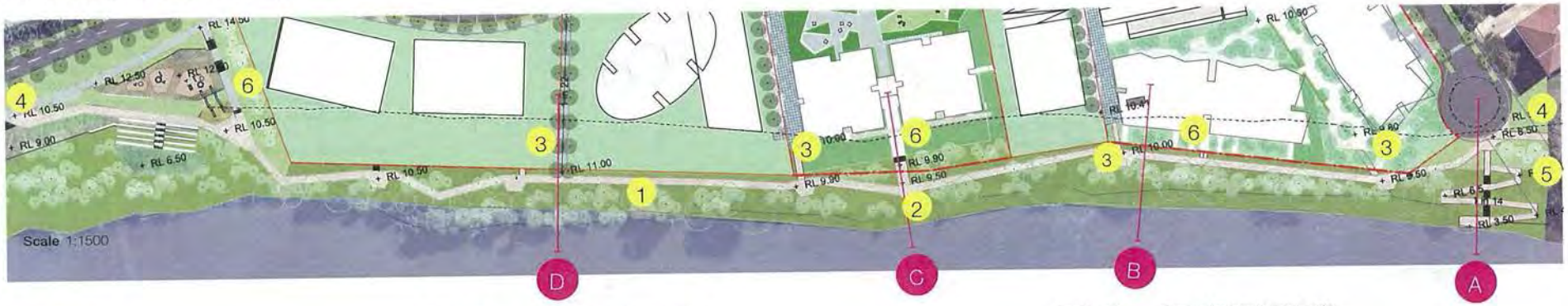
Section B Shepherd Street between Existing Bulb and Powerhouse Road



Section C Proposed Shared Access Lanes



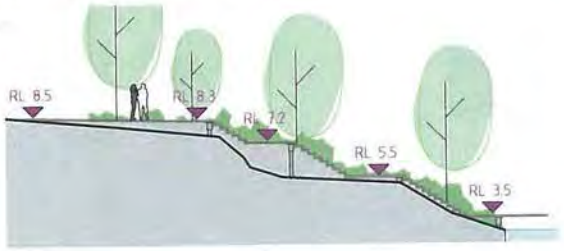
3.4 Pedestrian Boardwalk Strategy



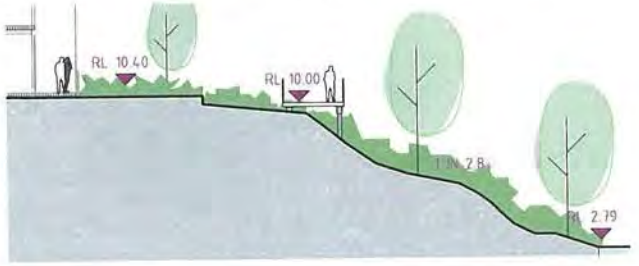
Public Boardwalk

1. 2.5m wide shared public pedestrian/ cycle boardwalk located near top of bank at RL9.0- RL 10.5
2. Lookouts/ seating areas located at key positions along the boardwalk
3. On-grade access points to boardwalk
4. On-grade connection from boardwalk to existing park paths
5. All-access ramp connection to water's edge
6. Stair only access to boardwalk

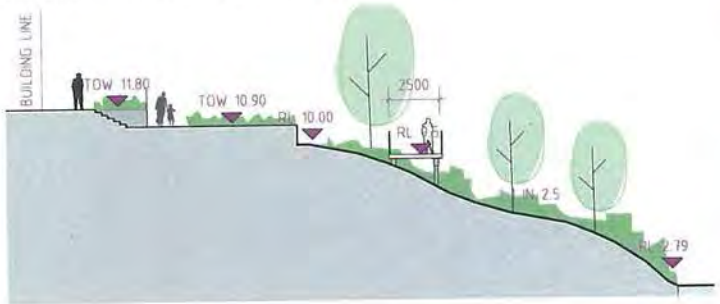
Section A All-Access to Georges River



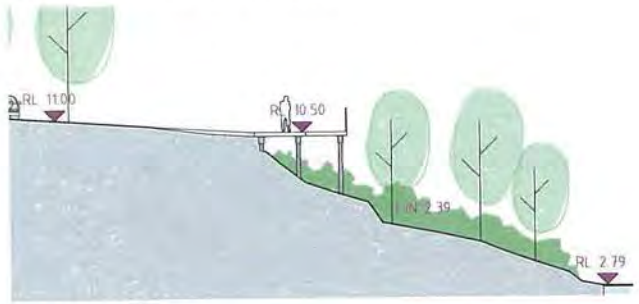
Section B Private / Public Interface (20)



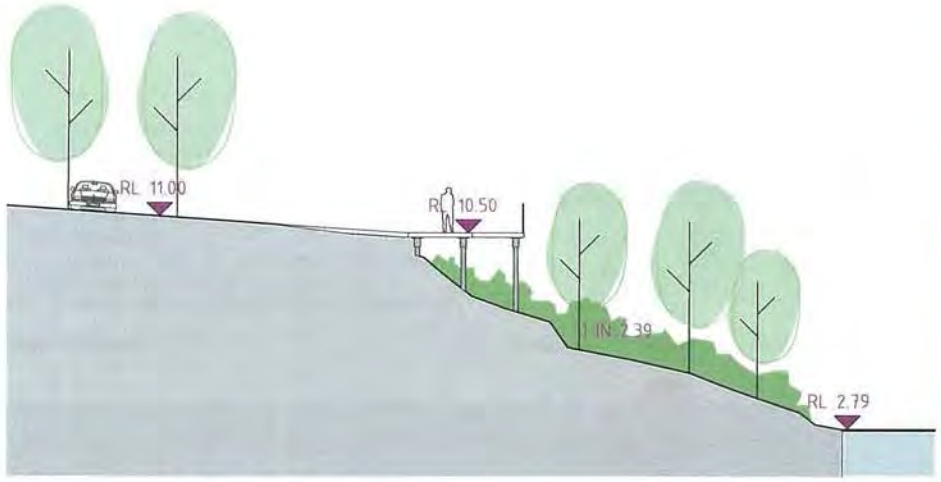
Section C Private / Public Interface (28)



Section D Public Lane + Georges River

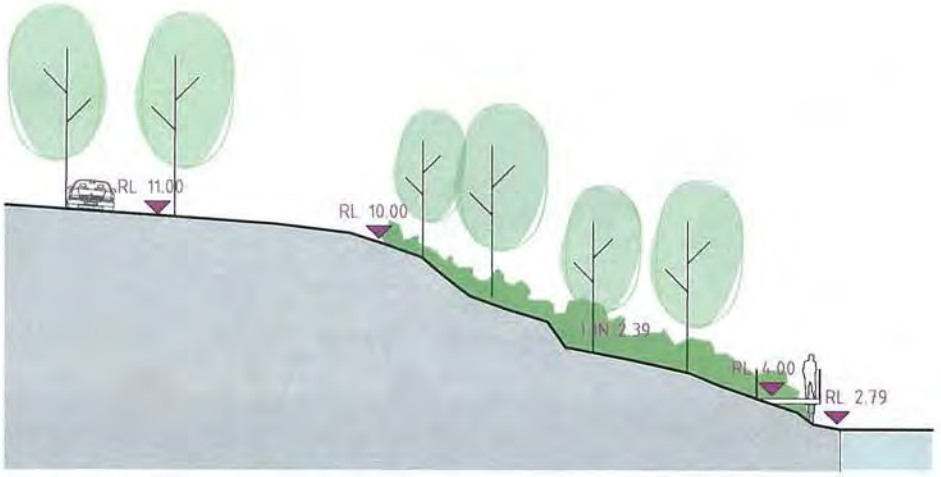


3.4.1 Pedestrian Boardwalk Strategy



Public Boardwalk - Top of Bank (RL 9-10.5)

- Good visual connection and surveillance to other external spaces
- Achieves all-access connection to public lanes and links
- Ease of connection to existing paths at northern and southern ends of precinct
- Limited opportunity for access to water's edge, particularly for all-access



Public Boardwalk - Bottom of Bank (RL 3-4.5)

- Poor visual connection to other external spaces and low surveillance makes this location undesirable
- Limited opportunity to join public lanes on-grade; would require extensive ramping/ stairs
- Flooding issues

3.5 Urban Design Response

Avenue tree and verge planting

Lophostemon confertus

Tristaniopsis laurina

Public-private interfaces

Cumberland Riverflat Forest

Cumberland Riverflat Forest Revegetation

Street tree planting and mass planted understorey to create a bold avenue entry to the precinct

Botanic Name	Common Name
Shepherd Street	
Lophostemon confertus	Brisbane Box
Anigozanthos 'Gold Velvet'	Kangaroo Paw
Callistemon 'Little John'	Bottebrush
Dianella caerulea	Blue Flax Lily
Hardenbergia violacea	False Sarsparilla
Lomandra longifolia 'Tanika'	Spiny Headed Mat Rush

Small-scaled, tree-lined streets and paved roadways make these attractive pedestrian links throughout the precinct

Botanic Name	Common Name
East-West Connection Lanes	
Tristaniopsis laurina	Water Gum
Dianella caerulea	Blue Flax Lily
Ficinia nodosa	Knotted Clubrush
Hardenbergia violacea	False Sarsparilla
Hibertia scandens	Snake Vine
Lomandra longifolia 'Tanika'	Spiny Headed Mat Rush
Leucophyta brownii	Cushion Bush
Myoporum parvifolium	Creeping Myoporum

Riparian planting of endemic vegetation to reinstate Cumberland Forest and stabilise the river front bank

Botanic Name	Common Name
Riparian zone - Cumberland Riverflat Forest	
Acacia floribunda	White Sally
Angohora floribunda	Rough Barked Apple
Backhousia myrtifolia	Grey Myrtle
Bursaria spinosa	Blackthorn
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus elata	River Peppermint
Casurina glauca	Swamp Oak
Juncus usitatus	Common Rush

3.2 Planting Strategy and Indicative Plant list

Street tree planting and mass planted understory to create a bold avenue entry to the precinct

Botanic Name	Common Name
Lophostemon confertus	Brush Box
Anigozanthos 'Gold Velvet'	Kangaroo Paw
Callistemon 'Little John'	Bottebrush
Dianella caerulea	Blue Flax Lily
Hardenbergia violacea	False Sarsparilla
Lomandra longifolia 'Tanika'	Spiny Headed Mat Rush

Small-scaled, tree-lined, paved laneways make these attractive pedestrian links

Botanic Name	Common Name
Tristaniopsis laurina	Water Gum
Dianella caerulea	Blue Flax Lily
Ficinia nodosa	Knotted Clubrush
Hardenbergia violacea	False Sarsparilla
Hibertia scandens	Snake Vine
Lomandra longifolia 'Tanika'	Spiny Headed Mat Rush
Leucophyta brownii	Cushion Bush
Myoporum parvifolium	Creeping Myoporum

Screen and Riparian planting of endemic vegetation to reinstate Cumberland Forest in the precinct

Botanic Name	Common Name
Acacia floribunda	White Sally
Angohora floribunda	Rough Barked Apple
Backhousia myrtifolia	Grey Myrtle
Bursaria spinosa	Blackthorn
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus elata	River Peppermint
Casurina glauca	Swamp Oak
Juncus usitatus	Common Rush

4

Design Concept

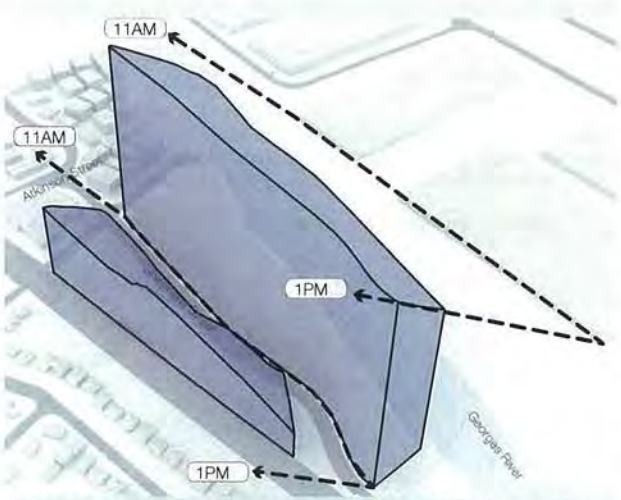
Concept masterplan for the site that respond to the design principles.

3.3 Urban Design Concept

From the principles and urban design responses above, the key ideas of the scheme are described in the adjacent concept sketch as follows:-

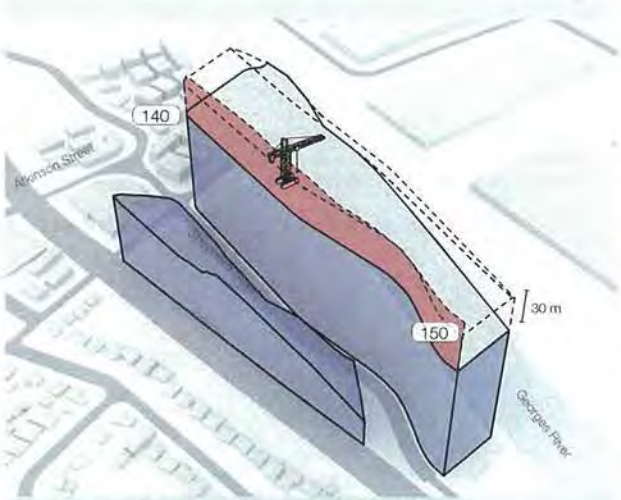
1. **Heights:** Height is focused on the eastern side of Shepherd Street with taller elements located towards the northern and southern edge of the precinct.
2. **Orientation + Separation:** Buildings orientated as best as possible on a north-south axis optimising solar access. A 12m Railway Corridor setback, 30m Foreshore Building Setback, as well as side and rear setbacks in line with the ADG define building locations.
3. **Active Frontage:** Each development should address its primary frontage to Shepherd Street, with residential frontages also fronting the Georges River Foreshore and any through-site links.
4. **Movement + Access:** Shepherd Street serves as the primary vehicular and pedestrian corridor, and should be enhanced as part of all proposals. Vehicular entrances off Shepherd Street should be rationalised where possible.
5. **Site Permeability:** Pedestrian permeability down to the boardwalk along the Georges River is important to create.
6. **Built Form Character:** Enhance the revitalisation of the precinct and introduce a fine grain character which responds to the scale of the Paper Mill. Variation in built forms and architectural styles is also encouraged.
7. **Planting Strategy:** Deep soil planting should be implemented in the 12m Railway Setback zone, which also creates a visual and acoustic barrier to the rail line. Streetscapes along Shepherd Street and along the rear boundaries fronting the Georges River can be enhanced through landscaping.

4.1 Preferred Concept Approach



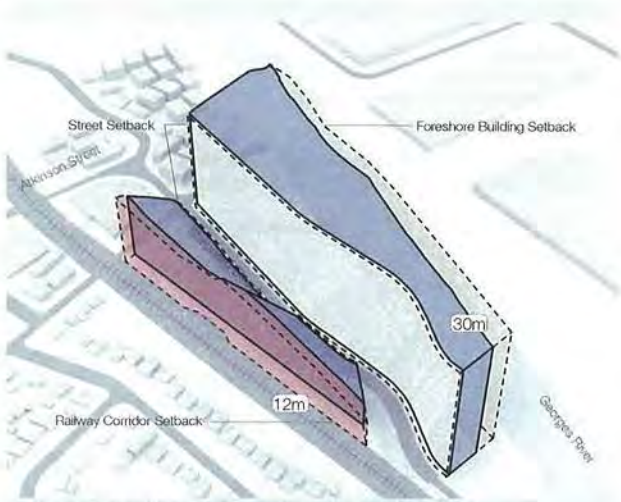
01 Establish maximum envelope volume base on solar clipping plane

Establish the maximum volume based on solar clipping planes determined by 11am-1pm on the winter solstice to residential areas on the eastern side of Shepherd Street and along the western site boundary across the river. This will ensure that any future residential development can achieve 2 hours of continuous solar access. The envelopes defined by the solar clipping planes identify that there is substantial opportunity for height along the eastern side of Shepherd Street.



02 Reduce maximum volume to OLS height plane

Reduce height of the building envelope to allow for the OLS height restrictions, with a additional reduction to accommodate cranes during construction - we've assumed a maximum 30m height for cranes, however, this can be reduced.



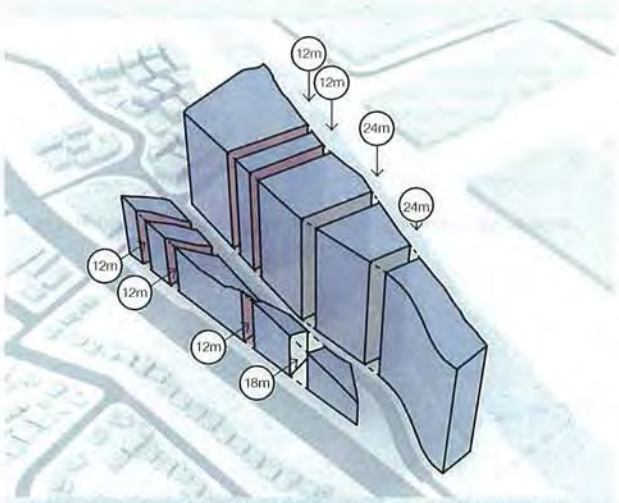
03 Setback development from the river and the rail line

Setback envelopes 12m from the railway line to the west of the precinct, and 30m for the foreshore building line to the east. The envelope will also be setback 3-4.5m from Shepherd Street, in response to Council's DCP and the heritage building

The design approach outlined in the diagrams above and on the following page has been used to establish an appropriate built form envelope that responds to the key urban considerations identified in Section 3 of this report.

Each urban consideration has been used to define an appropriate built form outcome and quantum of development that responds to the constraints of overshadowing, amenity, OLS height limits, setbacks, separation and height variation.

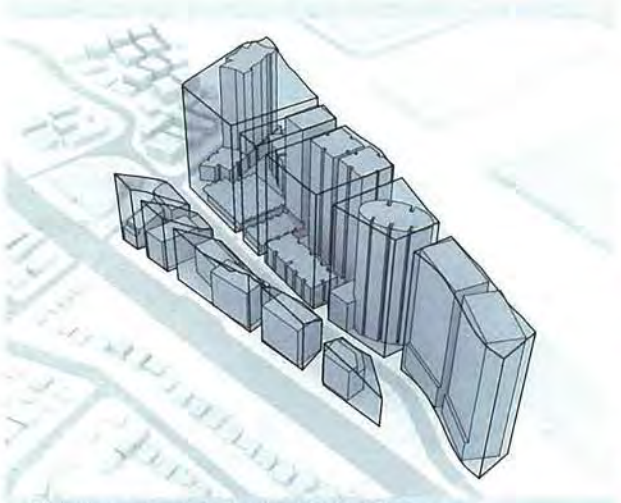
4.2 Preferred Concept Massing - Concepts



04 Apply side separations to conform with the ADG and existing DAs

Side setbacks will be applied at each lot boundary to ensure ADG separations are achieved between proposed buildings and approved DA's. On narrow sites that have limited development opportunity, minimum separation distances have been assumed.

Publicly accessible through-site links will be provided between the proposed building separations to provide a connection from Shepherd Street to the Foreshore Walk.



05 Maximise development within the solar envelope

Fill the resulting envelope with built form to maximise development across the precinct. Development within this envelope will not have any solar impact on surrounding developments and will achieve the required separation distances outlined in the ADG.

06 Defining the skyline and streestscape

The proposed envelope has been agreed upon in consultation with Liverpool Council and sits within the solar envelope which has been derived from the existing site constraints.

The proposed massing has been reduced along the edge of Shepherd Street to define the street wall and steps in height to respond to the Paper Mill. The proposed tower heights have been varied in order to create visual interest.

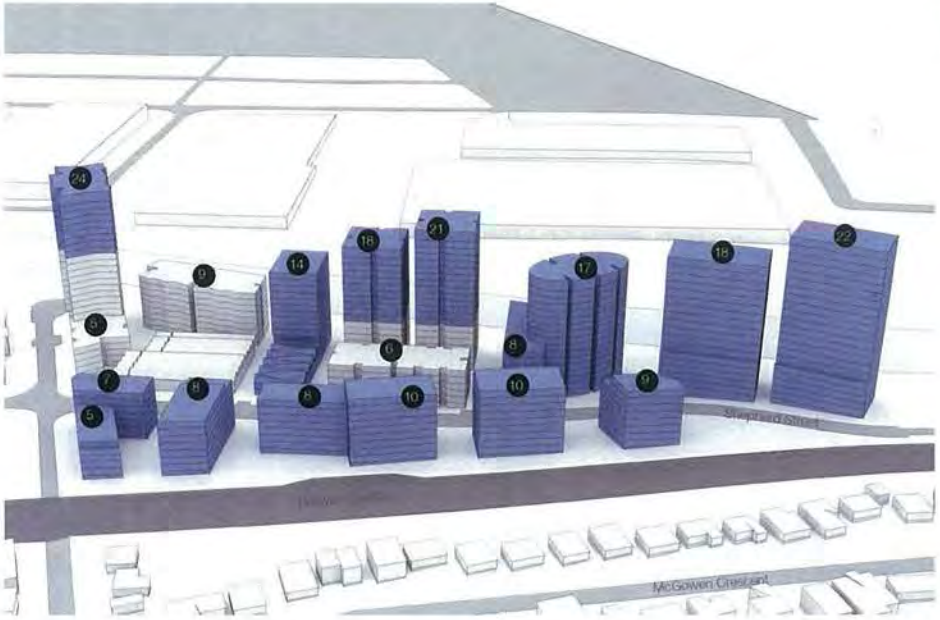
4.3 Preferred Concept - Plan

Lot	Storey	GFA	FSR	Dwellings	Height
Paper Mill	24	31,783m²	3.22	309	75.8m
22-23	6-20	31,870m²	3.67:1	375	67.3m
3+4	17	16,050m²	3.53:1	178	55.7m
5+6	18-22	28,820m²	3.44:1	339	76.9m
7	9	3,299m²	1.63	37	28.4m
8	10	5,497m²	2.72	61	31.9m
11	8-10	9,141m²	2.37	102	31m
SP-30264	8	4,447m²	2.2	49	25.5m
SP-70274	5-7	4,472m²	2.2	50	22.4m

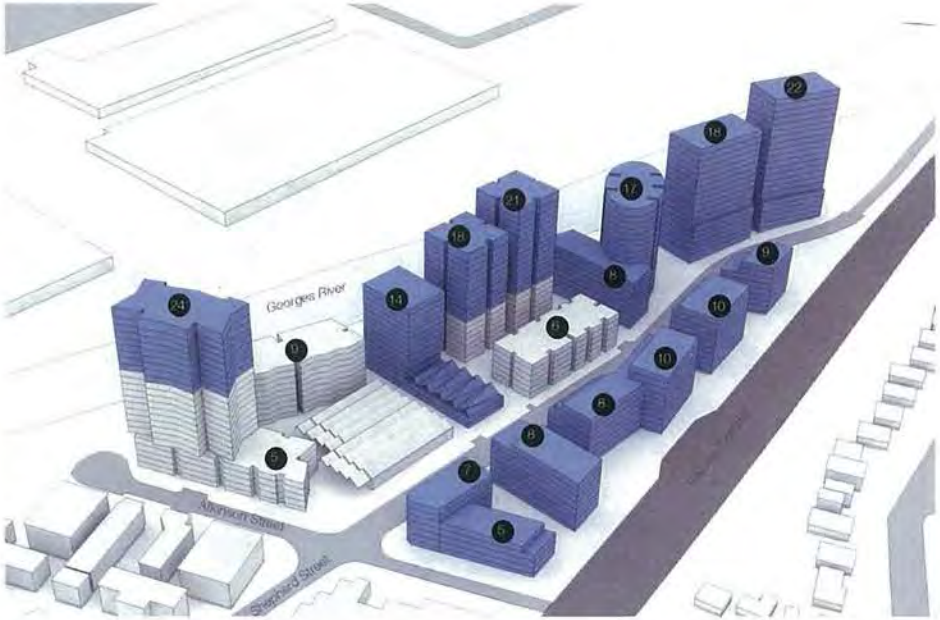
Key

- Site Boundary
- Proposed
- Open Space
- Approved

4.4 Preferred Concept Massing



View 01



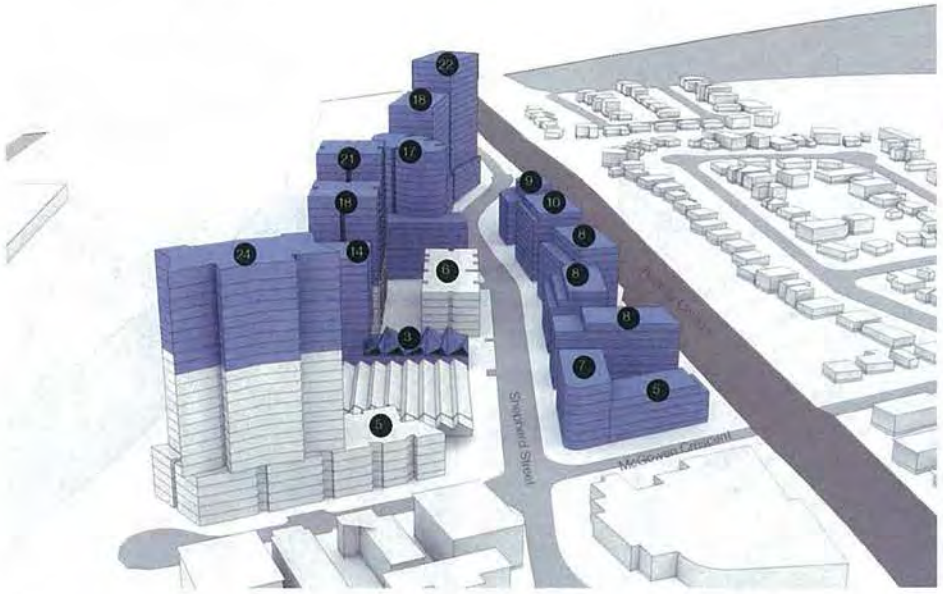
View 02

- Height is located at the north and south ends of Shepherd Street in order to create urban markers at either end of the precinct.
- Height of buildings directly adjacent to the Paper Mill have been reduced in order to respond to the height and scale of the heritage item.
- 3 storey terrace typology is proposed to the south of the Paper Mill along the through-site link leading to the Foreshore Walk.
- A consistent 6-8 storey street wall is proposed along Shepherd Street.

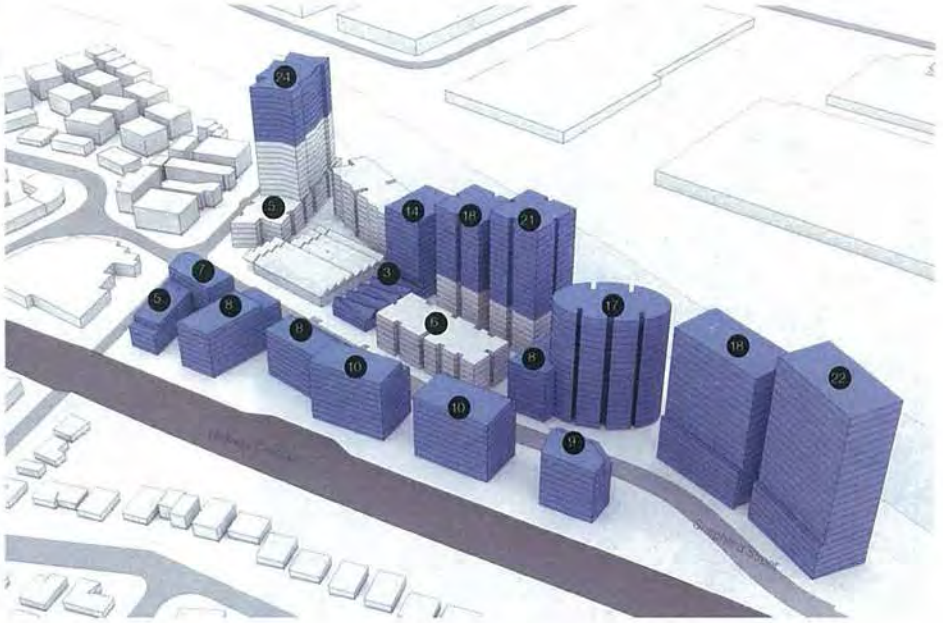
Key

- Site Boundary
- Proposed Allowable
- Approved

4.5 Preferred Concept Massing



View 01



View 02

Key

Site Boundary

Proposed Allowable

Approved

4.6 Visualisation

Ground floor terrace typology to interface with the Paper Mill site

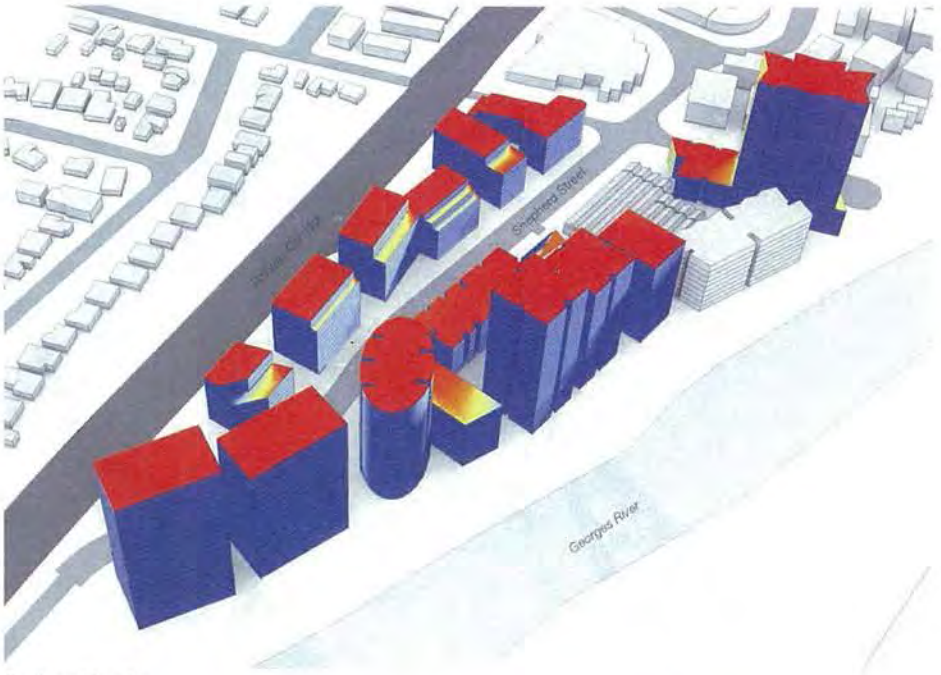
Residential development interface with public domain

The Bindery (Lot 22-23) from across the Georges River

The Paper Mill from across the Georges River

4.7 Preferred Concept Solar Access

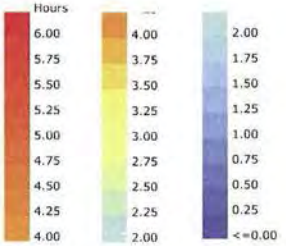
North-west facades



South-east facades

- The solar access diagram above show that the north-west facades are achieving the solar requirements of the Apartment Design Guide
- On the eastern facade only 25, 27, 29 and 32 Shepherd Street will achieve a minimum of 2 hours of solar access.

Key



4.8 Shadow Study - 21st of December

21st December - 9am

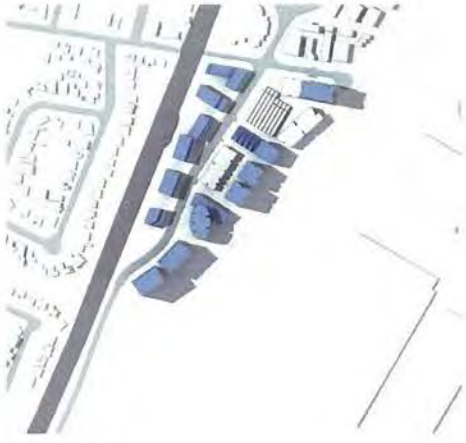
21st December - 10am

21st December - 11am

21st December - 12pm

21st December - 1pm

21st December - 2pm



21st December - 3pm

4.9 Shadow Study - 20th of March

20th of March - 9am

20th of March - 10am

20th of March - 11am

20th of March - 12pm

20th of March - 1pm

20th of March - 2pm

20th of March - 3pm

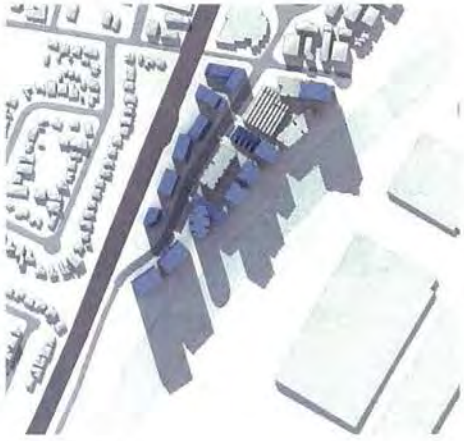
4.10 Shadow Study - 21st of June

21st of June - 9am

21st of June - 10am

21st of June - 11am

21st of June - 12pm



21st of June - 1pm

21st of June - 2pm

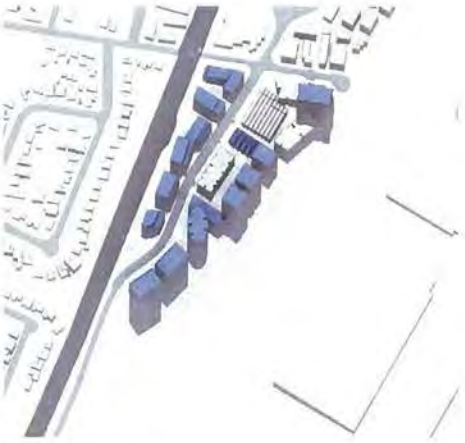
21st of June - 3pm

4.11 Shadow Study - 20th of September

20th of September - 9am

20th of September - 10am

20th of September - 11am



20th of September - 12pm

20th of September - 1pm

20th of September - 2pm

20th of September - 3pm

4.12 Preferred Concept Assessment

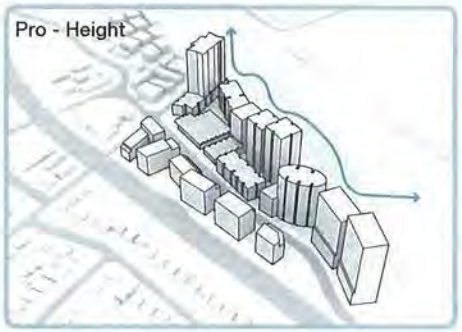
The following Pros and Cons have been identified for the base option.

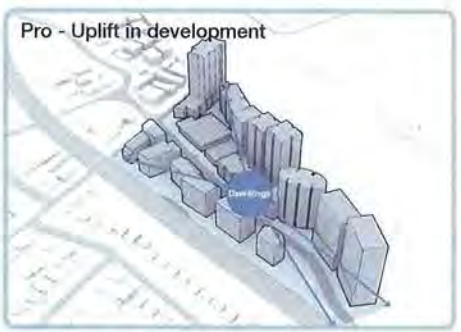
Pros

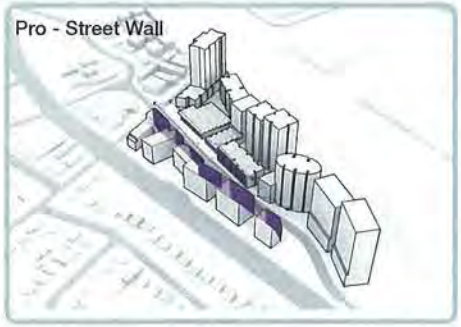
- Improved permeability and accessibility to the Georges River;
- Clearly defined street wall along Shepherd Street;
- Buildings envelopes ensure solar access is achieved to surrounding development, as well as within the precinct;
- Variation in height along the eastern edge of the site allows for greater separation between the taller buildings and creates visual interest to the skyline;
- Tall towers on 20-24 Shepherd Street and 31-33 Shepherd Street creates an urban marker visible from the CBD and the M5;
- The separation in the skyline between 20-24 Shepherd Street and 26 Shepherd Street acts as a marker to the Paper Mill, whilst the low scale buildings that address the through site links provides a human-scale connection to the river and has a good relationship to the Paper Mill heritage item;
- Orientation of buildings along the through site link, Shephard Street and through the foreshore walk will allow for passive surveillance of these spaces;
- The proposed built form and density responds to key urban considerations, whilst delivering a uplift in development that supports;
- Uplift in development provides opportunity for substantial improvements to the surrounding public domain including a new connection to the Casula Powerhouse Arts centre and the public foreshore walk.
- The proposed building envelopes be made to achieve the required 2 hour solar access to 70% of each building and no greater than 15% with no solar access (Objective 4-A1 of the ADG) This can be achieved through layout of apartments on each floor.

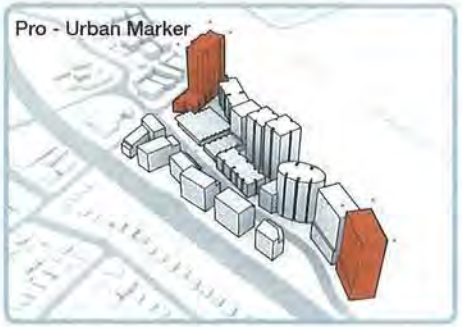
Cons

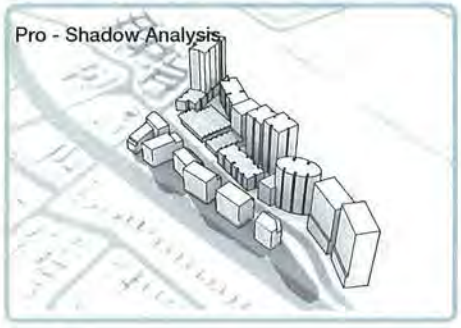
- Orientation of development to the west of Shepherd Street creates a tension between gaining solar access and screening for noise and visual privacy along the railway corridor.
- The site can only be accessed from the north of Shepherd Stree. Traffic management solutions are being nvestigated as part of this planning proposal.

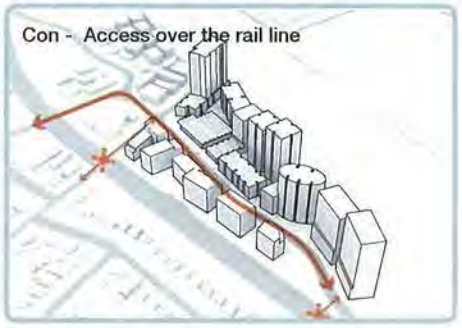












5 Recommendations

5.1 Recommendations

The Urban Design Study for the Shepherd Street Precinct, Liverpool outlines the site's capacity to accommodate additional residential development to a scale that reflects the strategic role of Liverpool CBD whilst retaining and enhancing the site's unique characteristics and features.

The proposed concept enables the rehabilitation of the Georges River, increasing public access to the foreshore and providing creating greater connectivity to the surrounding area.

As demonstrated in the preferred concept, the precinct as a whole has the capacity to increase in height and density whilst delivering built form outcomes that can achieve good amenity.

Sites along the western edge of the precinct are heavily constrained by the size of lots, setback to the rail line, orientation of the urban block, and its potential to overshadow the properties to the east of Shepherd Street. As a result site are only able to achieve within a range of 1.6 to 2.7, which is similar to the existing FSR of the site.

Sites along the eastern edge are larger in size and are able to deliver taller tower forms with greater building separations. FSR range from 3.22:1 to 3.67:1 along this edge of the precinct.

Recommendations:

- Sites along the western edge of the precinct to increase allowable height limit to 32m, to allow sites to achieve FSR in a built form that is appropriate to all the site constraints. Solar impact of proposed built forms along the eastern edge of the precinct will need to be taken into consideration during the DA Stage.
- Due to the size of sites along the eastern edge of the precinct, Height (up to 77m) and FSR (as per diagram above) should be increased to allow for an uplift of density across the precinct, as this site will has less impact on surrounding development and has the ability to achieve greater building separations.

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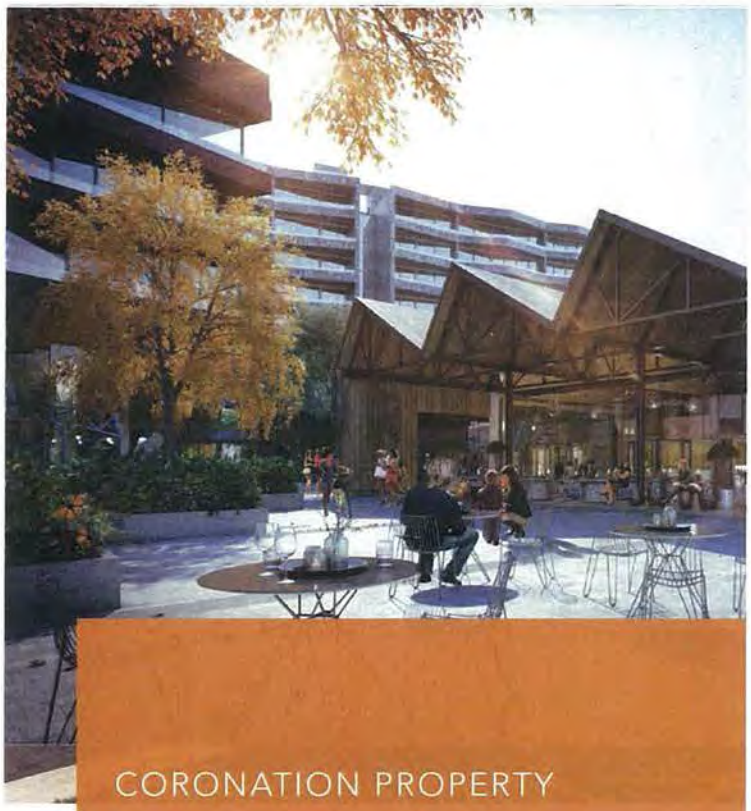
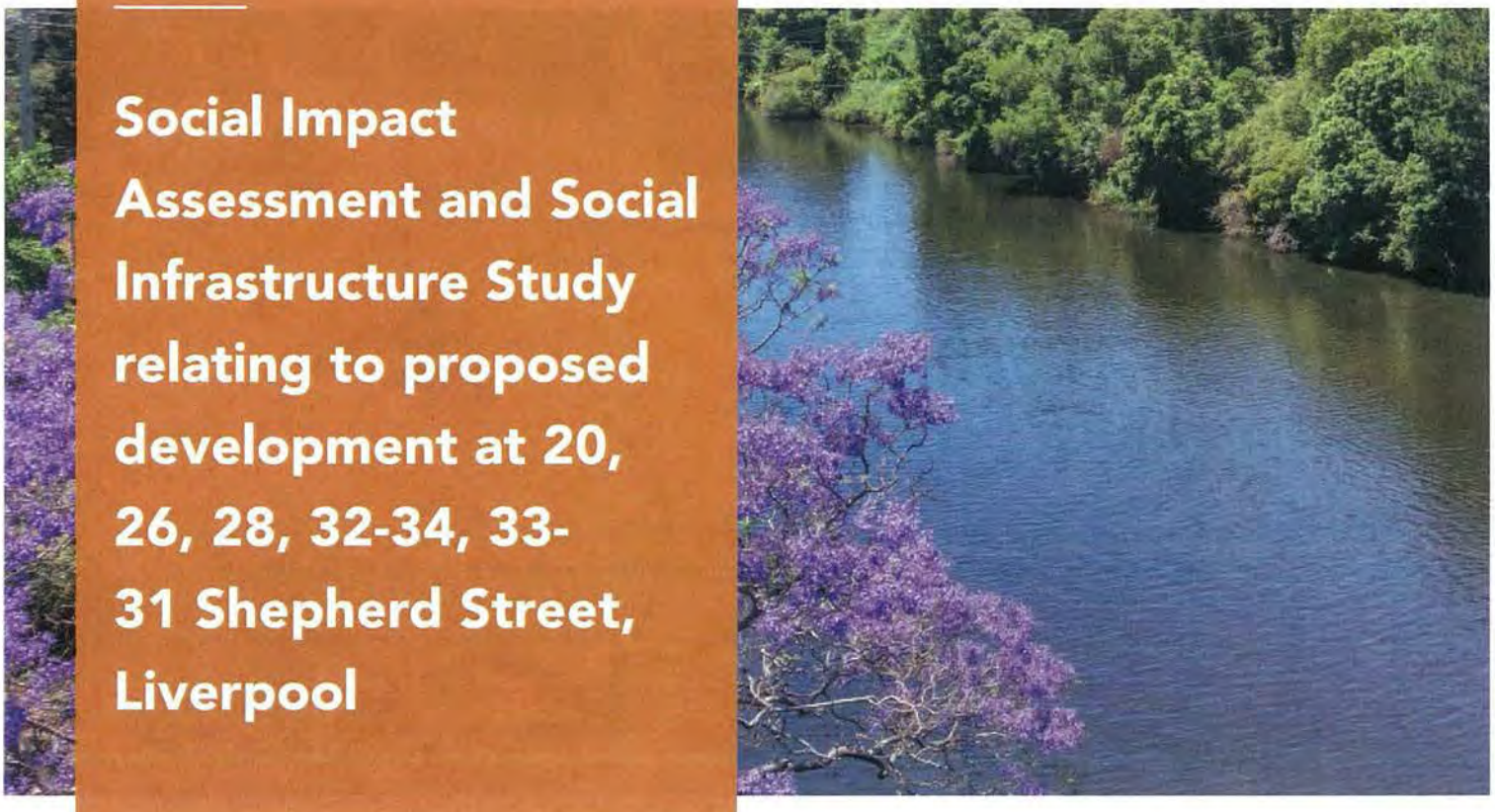


CORONATION PROPERTY

Social Impact Assessment and Social Infrastructure Study relating to proposed development at 20, 26, 28, 32-34, 33-31 Shepherd Street, Liverpool



July 2016

Creating and building community

Report Title: Social Impact Assessment and Social Infrastructure Study relating to proposed development at 20, 26, 28, 32-34, 33-31 Shepherd Street, Liverpool

Client: Coronation Property

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Date: 18 July 2016

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Executive summary

Cred Consulting is an independent social planning consultancy based in Sydney. Cred was engaged by Coronation Property to prepare a comprehensive Social Impact Assessment (SIA) looking at the potential social impacts of a proposed development at 20, 26, 28, 32-34, 33-31 Shepherd Street, Liverpool (the site). The proposal is for a residential development of 1,201 high density dwellings on a 30,963m2 site, as part of the 1,500 dwelling, 42,916m2 Shepherd Street Precinct.

As the development is over 100 dwellings, Liverpool City Council's adopted Social Impact Assessment Policy (Chapter 27, Part 1 DCP) requires a Comprehensive Social Impact Assessment. This SIA has been completed in accordance with requirements of the Environmental Planning and Assessment Act 1979 Sec 79C (1), and Liverpool City Council's adopted Social Impact Assessment Policy.

Diverse and increasing residential population

In 2011, the population of the suburb of Liverpool was 24,005. The proposed development will result in between an additional 2,702 to 3,303 residents or a 9% increase. The total Shepherd Street Precinct when complete will result in an additional 3,375 to 4,125 residents. Currently, the Liverpool suburb is a highly culturally diverse area (around 61% non English speaking background) with high proportions of working age households, and families with children. The area has a higher proportion of houses in rental and mortgage housing stress than the Liverpool LGA and Greater Sydney and comparatively higher proportions of low-income households and unemployment.

Increased population density

Population density is calculated based on Statistical Areas defined by the Australian Bureau of Statistics. Statistical Area 1152563, where the site is located currently has a population density of 36 persons per hectare, with the redevelopment of 20, 26, 28, 32-34, 33-31 Shepherd Street the density will increase to between 215 to 254 persons per hectare, and resulting from the redevelopment of the entire Shepherd Street Precinct it will be between 259 to 309 persons per hectare. By way of comparison, by 2031, the Green Square renewal area in the City of Sydney will have a population density of around 211 persons per ha, and the high-density area of Rhodes West will have a population density of around 209.

Connectivity and accessibility

The site is currently disconnected from the Liverpool City Centre and Liverpool Station. The applicant proposes a pedestrian/cyclist boardwalk providing an improved recreational connection. The current pedestrian access to the site is 800 metres (around a 12-minute walk) to the City Centre, which is considered walkable. However, a more direct route may be required to encourage active transport to work and activation of the City Centre (Strategic Integrated Transport Assessment for Shepherd Street Precinct, Smyth Consulting, 8 June 2016).

Traffic and transport

An additional 2,702 to 3,303 residents will increase local traffic, particularly at peak hours, and impact on traffic in the Liverpool City Centre (Traffic Report, InRoads Group, June 2016).

Community facilities

There are 11 community facilities within 800 metres of the subject site including child care centres, and a community hall, all of which currently have capacity for increased use. There are no public high schools or primary schools within 800 metres of the site. The site is located within walking distance to the Liverpool

City Centre, Liverpool Station and Liverpool Hospital (which is currently at capacity), however improved pedestrian/cycle access is required to these services/facilities. The following public benefits are proposed through this development:

- Shared footpath/cycleway along the Georges River
- Bike share pods one site and at Liverpool and Casula stations
- Shuttle bus in peak hours to Casula stations and possible other destinations
- Village shops at the Paper Mill building, and
- Potential for community space within the Paper Mill building.

Open space

Within 800 metres of the site there is a high supply of public open space including a playing field and a district park (Lighthorse Park). Open space benchmarking[1] indicates that the proposed development would require between 24,345m2 and 29,754m2 of new open space to meet benchmarks for the new population. The entire Shepherd St Precinct when completed would require between 30,375m2 and 37,162m2. The applicant proposes to provide an additional approximately 11,000m2 of communal (semi-private) open space within the subject site, including communal rooftop open space. Across the entire Shepherd Street Precinct, the applicant proposes to provide approximately 14,000m2 of semi-private communal open space and 16,000m2 of public open space including an embellished Mill Park. The open space provision meets benchmarks for the lower forecast population of the total Shepherd St Precinct, but not for the higher forecast. However, residents will also have access to a significant amount of existing district open space within 800 metres of the site, including an upgraded Lighthorse Park.

Social impacts and mitigation measures

Detailed social impacts and mitigation measures are provided at Section 6. The table below provides a high level summary of the key impacts and mitigation measures:

Identified social impact	Type	Mitigation measure
Increased population of Liverpool suburb by 2,702 to 3,303[2] residents (proposed development of the subject site), and a total of 3,375 to 4,125 residents (Shepherd Street Precinct). In particular: • Increased children and young people needing access to primary and secondary schools that are currently not within 800 metres of the site • Increased demand for health services including services at	Negative	Increased and improved access to social infrastructure and services within the Liverpool suburb specifically: • There is no primary school within 800metres and the local Liverpool Girls High School is near capacity. The need for additional public school places as impacted by the entire Shepherd Street Precinct should be monitored, along with the other development happening in the Moorebank/Liverpool area. Department of Education to develop a plan (consistent with the staging of the development), to accommodate additional primary and

[1] World Health Organisation sets a benchmark of 9m2 per person

[2] Based on a range of 2.25 to 2.75 persons per household

Identified social impact	**Type**	**Mitigation measure**
Liverpool hospital		secondary school places. • Identify opportunities to provide medical facilities on site to service Shepherd Street Precinct • Monitor impact of access to health services and beds at Liverpool Hospital which is currently at capacity. Department of Health to develop a plan (consistent with the staging of the development), to accommodate additional demand for hospital services.
Increased residential population will improve economic, social and cultural activation of the Liverpool City Centre and the area	Positive	To encourage use of the City Centre, implement improved pedestrian/cycleways from the site, and Shuttle Bus (outside of peak hours). New active transport infrastructure should be accessible and safe (well-lit and with active frontages and clear sightlines).
Increased population density from 36 persons per hectare (SA1152563) to around 259 to 309 post development of the entire Shepherd Street Precinct will require opportunities for new and existing residents to connect with each other and place activation during the day and night to ensure a safe, cohesive place. Proposed development will result in the transformation of the area from industrial/suburban to an urban place.	Negative	Deliver community building and community engagement activities from the early stages of development to connect new and existing residents with each other. Develop a place-making strategy that supports community connections and the transition from an industrial/suburban place to an urban place with identity drawing on past and future uses and people. Integrate quality, place specific public art as part of the place-making strategy. Provide a public community space in the Paper Mill building at the early stages of the development for community meetings, birthday parties, and social, cultural, and recreational activities. Consider a small library hub (unstaffed). Provide communal meeting and socializing spaces attached to rooftop open space areas for community gathering and collective activities. Activate the place in the evening through the adaptive reuse of the Paper Mill building, through the inclusion of restaurants and cafes and a public domain that supports walking and sitting and socializing/people watching. Explore pop-up (temporary) community and retails spaces as the development stages progress to minimized unused

Identified social impact	**Type**	**Mitigation measure**
		spaces.
Disconnection between site and the Liverpool City Centre and Liverpool Station	Negative	▪ Pedestrian/cycle boardwalk connection along the Georges River between the site and the Liverpool City Centre. ▪ Investigate the re-opening of Woodbrook Road underpass to south of precinct using high quality design, lighting and public art. ▪ Improved lighting and landscaping of Lighthorse Park to make this a safer pedestrian/cycle route to the Liverpool City Centre and Liverpool Station. Design to include equipment to encourage diverse uses by diverse people.
Increased traffic on local and major roads from significantly increased residential population particularly at peak hours	Negative	Implement recommendations of the Strategic Integrated Active Transport Report including: ▪ Bike share pods ▪ Shuttle bus in peak hours to Casula Station and to other destinations (eg. Westfield) outside of peak hours ▪ Car share spaces ▪ Improved landscaping and lighting at Lighthorse Park ▪ Pedestrian/cycle boardwalk along riverfront ▪ Upgrades to path from Atkinson Street to Newbridge Road to enable faster cycling
Increased access to quality, accessible, and safer local parks in an area with a high proportion of large underutilised open space areas without community amenity	Positive	Deliver a neighbourhood public park (Mill Park) at the early stages of the development, include equipment for families with children and seating for small groups. Deliver improvements to Lighthorse Park including improved pedestrian/cycle connectivity, play equipment, landcape upgrades, and lighting. Design the park to address the needs of a range of age groups (including children and young people) and the social and recreational interests of a culturally diverse population including Arabic, Hindi and Vietnamese speaking residents (eg. for family gatherings, for tai chi, and for dance/exercise space). Design the park to host local gatherings and events. Space will need to be designed to prevent conflict between users in a highly dense area in particular

Identified social impact	Type	Mitigation measure
		to ensure that children and young people are able to play outdoors. Provide rooftop communal open spaces that reflect diverse uses eg. dog walking, bbqs, community gardens, children's play (natural and modern). Contribute to improvements to existing district open space areas through a contribution toward two additional tennis/multipurpose courts and one cricket wicket to meet benchmarks for recreation facilities for Liverpool suburb.
Increased rental housing stock, however potentially no increase in affordable rental housing stock in an area experiencing high levels of housing stress.	Positive Negative	While targets in other jurisdictions range from 3-8% of new developments, Liverpool Council does not currently have an affordable housing target to apply. Affordable rental housing is a public benefit that should be considered on the site and will support connections between existing and new residents.
Increased employment opportunities during and post construction in an area with comparatively high unemployment	Positive	Identify opportunities to employ local young people and other residents in construction and ongoing maintenance/service delivery.

Conclusion

The proposed development is for 1,201 dwellings as part of the 1,744 dwelling Shepherd Street Precinct, and is forecast to have between 2,702 and 3,303 new residents at its completion. With this increase in population and density, the proposed development will have moderate negative social impacts on existing social infrastructure, services and sustainability within the suburb of Liverpool, most of which have capacity. There is significant supply of open space within 800 metres of the subject site, although much of this is not high quality. However, given the significantly higher density of the proposed development and the Shepherd Street Precinct, there will be a need to support social sustainability for future residents of the development through the delivery of social infrastructure, such as the neighbourhood park (Mill Park) and indoor community meeting places, at the development's early stages that will provide opportunities for community connection and engagement between new and existing residents. To support community activation and sustainability a new community space should be made available, through an adaptive reuse of the Paper Mill building. The population increase from the proposed development and the Shepherd Street Precinct indicates there will be increased demand for primary school and secondary school places and medical facilities, including an increase in health facilities at the already at capacity Liverpool Hospital, as well as demand for two additional tennis courts and one cricket wicket.

The site is currently disconnected from the Liverpool City Centre and Liverpool Station, and this could result in resident isolation, and increased reliance on car transport having negative environmental and health impacts and significantly increased traffic. While the current pedestrian trip is around 12 minutes,

the proposed mitigation measures of a pedestrian/cycle boardwalk, lighting and landscaping improvements in Lighthorse Park, bike share pods, a shuttle bus service, and upgrades to the shared pathway from Atkinson Street to Newbridge Road will address these impacts.

The proposed public benefits of approximately 16,000m2 of quality public open space/14,000m2 of communal open space (11,000m2 in the proposed development), increased housing stock and employment opportunities through increased retail, activation of the Liverpool City Centre, and services in the Paper Mill facility outweigh the negative impacts of increased density and population. To ensure that residents do not become socially disconnected, or have to leave the area to access services, there are opportunities to enhance the positive impacts by: providing a multipurpose space that can service the wider neighbourhood and that is connected to outdoor space to use for family/local community gatherings; delivery of community building and community engagement activities from the early stages of development; and, that the public domain is universally designed, well-lit and safe and provided at the early stages of development. The relocation of the Liverpool Men's Shed should be supported. With very high levels of housing stress in the Liverpool suburb, opportunities to contribute to an increased supply of affordable rental housing for key service workers in the Liverpool suburb should be considered.

1. Introduction

1.1. Background

Cred Consulting is an independent social planning consultancy. Cred was engaged by Coronation Property to prepare a Comprehensive Social Impact Assessment (SIA) and Social Infrastructure Study looking at the potential social impacts of proposed residential development of 1,201 high density dwellings at 20, 26, 28, 32-34, 33-31 Shepherd Street, Liverpool, in the Liverpool City Council Local Government Area (LGA). This Comprehensive SIA has been completed in accordance with Liverpool City Council's Social Impact Assessment Policy.

The proposed development at 20, 26, 28, 32-34, 33-31 Shepherd Street (the subject site) is part of plans for a new residential neighbourhood, the "Shepherd Street Precinct", which will have a total of 1,500 dwellings when complete.

This report provides an assessment of the likely social impacts of the proposed development and makes recommendations on how the proposed development can achieve social sustainability, create its own sense of place, and respect the existing character of the site and surrounding area.

Social sustainability can be broadly defined as being the maintenance and improvement of well-being for both current and future generations. It aims to balance social diversity, inclusion, stability, interaction, pride, and safety in the context of urban development. It refers to finding ways to make places that are inclusive and cohesive, and adaptable in the face of changing circumstances.

1.2. What is Social Impact Assessment?

Social Impact Assessment (SIA) is a method for predicting and assessing the consequences of a proposed action or initiative before a decision is made. SIA refers to the assessment of the social consequences of a proposal or the impacts, on affected groups of people and on their way of life, life chances, health, culture, and capacity to sustain these.[3]

This Comprehensive SIA has been completed in accordance with requirements of the Environmental Planning and Assessment Act 1979 Sec 79C(1), the Planning Institute of Australia's Social Impact Position Statement, and Liverpool City Council's adopted Social Impact Assessment Policy (Chapter 2, Part 1 DCP). According to the Council's Policy, a Comprehensive Social Impact Assessment is required and is defined as:

A CSIA is an in-depth assessment of the potential social impacts of a development proposal. This type of assessment is required when a development is of large enough scale or potential level of impact that it requires detailed consideration of social impacts. It involves a detailed analysis of the issues identified in the SIC and must be completed by a qualified and experienced professional.

This SIA assesses the positive and negative impacts, and where negative, the mitigation measures to be provided.

[3] Planning Institute of NSW, SIA National Position Statement, June 2009

1.3. Methodology

The study has been undertaken using the following methodology:

- Review of planning and policy context and implications
- Pre and post development demographic analysis of the small area and suburb and comparison with Liverpool LGA
- Audit, mapping and capacity and utilisation assessment (where possible), of social infrastructure and services within 800 metres of the site and within the suburb of Liverpool
- Audit and mapping of open space within 800 metres of the site and in the suburb of Liverpool
- Benchmarking social infrastructure demand for target groups
- Consultation with Council and local service providers/NGOs
- Analysis of social impacts in accordance with PIA Policy Statement and Liverpool SIA Policy,
- Recommendation of mitigation measures to address identified impacts and
- Peer review by a senior social planner with experience in high-density development, Social Investment Group.

2. Proposed development

2.1. The Site

The subject site is 20, 26, 28, 32-34, 33-31 Shepherd Street Liverpool. This site is part of a larger Masterplan - the "Shepherd Street Precinct".

The subject site is located in the suburb of Liverpool in the Liverpool City Council Local Government Area (LGA). Liverpool City Council is located in Sydney's south-western suburbs, around 25 kilometres from the Sydney CBD. The site is located within walking distance of bus services to Liverpool, Campbelltown and other suburbs (Bringelly, West Hoxton, Prestons) and approximately 978 metres (approximately 15 minute walking distance) from Liverpool station and Liverpool City Centre. The site has an area of 30,963m2.

The site is located in the Georges River Corridor which comprises a parkland corridor along the western bank of the Georges River, from Lighthorse Park to Casula Powerhouse Regional Arts Centre.

Figure 1 Location of proposed development site at 20, 26, 28, 32-34, 33-31 Shepherd Street Liverpool

2.1.1. Current site uses: Proposed development

Current uses are:

- 20 Shepherd St has no current uses. The Paper Mill building is a heritage building on site
- 26 Shepherd St is currently occupied by a car towing company
- 28 Shepherd St is currently vacant and has no current uses
- 32-34 Shepherd St is currently occupied by Liverpool Smash Repairs
- 33-31 Shepherd St is currently occupied by the Liverpool Men's Shed. The Liverpool Men's Shed will be relocated by Council to an alternate location at the end of the lease.

2.1.2. Neighbouring sites

The site is currently bordered by:

- Residential area to the North (7-9 Atkinson St)
- The Georges River to the East, Mill Park to the South, and
- Light industrial buildings across Shepherd St to the West, including car wreckers.

The site is in close proximity (within 100m) to the passenger and freight rail line.

2.2. Proposed dwellings

The proposed dwelling mix and total dwellings count is shown in Table 1. The proposal is for residential towers between 6 and 24 storeys, 1,201 high-density dwellings in total. The proposed dwelling mix is for a majority of two-bedroom dwellings (65%-80%).

Table 1 Proposed Residential Towers

Lot	Dwellings	Height (# Storeys)
20 Shepherd St (Paper Mill)	309	24
26-28 Shepherd St (Lot 22+23)	375	6-20
32-34 Shepherd St (Lot 3+4)	178	17
33-31 Shepherd St (Lot 5+6)	339	18-22
TOTAL	1201	

While this SIA and Social Infrastructure Study relate to 20, 26, 28, 32-34, 33-31 Shepherd Street it is important to note that it is part of a larger master planned Shepherd Street Precinct undergoing urban renewal of the East and West side of Shepherd St with 1500 total apartments in towers ranging from 5 to 24 storeys.

2.3. Proposed social infrastructure and services

Community Facilities and transport infrastructure

The applicant is currently proposing to provide the following social infrastructure as part of the Shepherd St Precinct:

- Adaptive re-use of the Paper Mill heritage building including a number of small tenancies/shops and potential for community space
- A public shared footpath/cycleway along the Georges river by delivering a raised boardwalk on the riverbank between 20 and 33 Shepherd St developments. The boardwalk is proposed to be 2.5m wide with lookouts and on grade access points and connection to existing pedestrian/cycle pathways
- Upgrade the open space of Mill Park to include a variety of community uses for public benefit, including play space, community garden, outdoor gym, informal amphitheatre, BBQ and picnic areas
- Upgrades to Lighthorse Park including improved lighting, landscaping and playground upgrades
- Car share spaces
- Bike share pod on site and at Liverpool and Casula Stations, and
- Shuttle bus to Casula Station at peak hours to, and possibly to other locations (such as Westfield) off-pea.

The applicant is investigating the re-opening of Woodbrook Road underpass to the south of the precinct to address increased traffic at peak hours.

Public and Communal Open Space

The applicant is currently proposing to provide the following social infrastructure as part of the Shepherd St Precinct:

- Approximately 11,000m2 of semi-private communal open space in the proposed development, including communal rooftop gardens
- Approximately 14,000m2 total of semi-private communal open space in the Shepherd Street Precinct
- Approximately 16,000m2 of public open space in the Shepherd Street Precinct including embellishing Mill Park.

In addition, the applicant is proposing to provide upgrades to Lighthorse Park including landscaping and playground equipment upgrades.

Table 2Proposed open space in the Shepherd Street Precinct

Type	m2
Public open space	Approx. 16,000m2 (including Mill Park)
Semi-private communal open space	Approx. 14,000m2
Total	**Approx. 30,000m2**