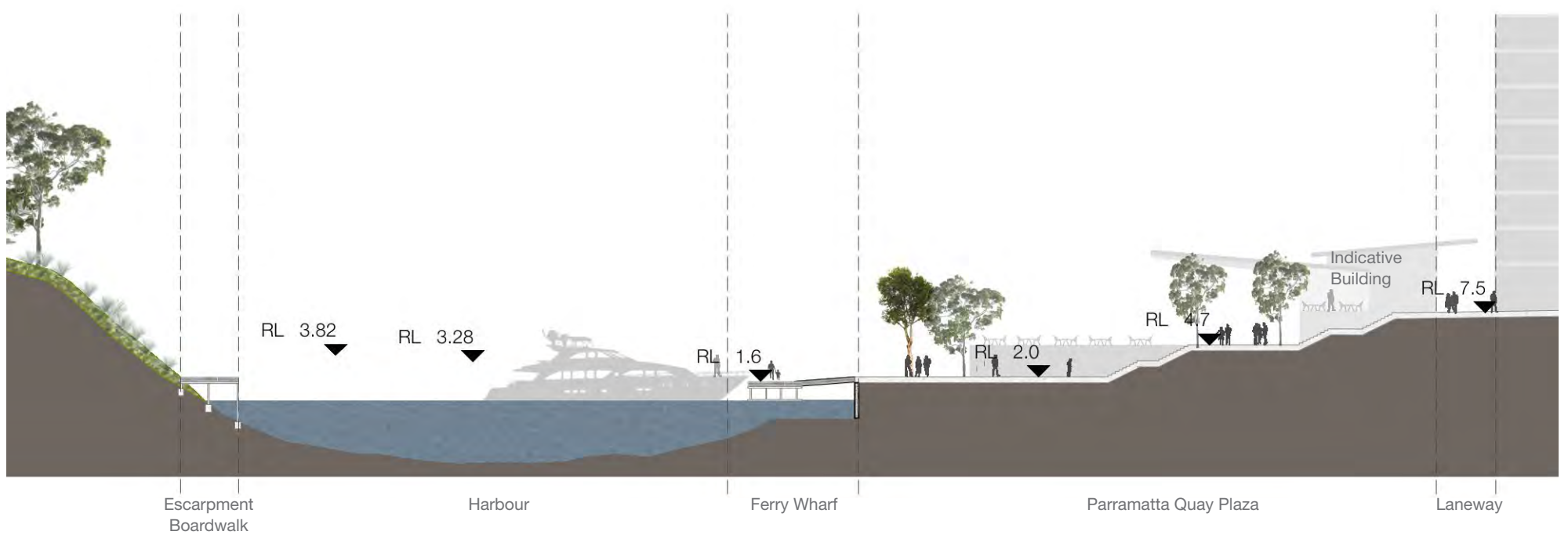




FIGURE 5.13 - PARRAMATTA QUAY
TOP. River Quarter Plan
CHARACTER IMAGE 5. Phillip Street Plaza
CHARACTER IMAGE 6. Parramatta Quay Cafe
CHARACTER IMAGE 7. Bus Terminal
CHARACTER IMAGE 8. Parramatta Valley Cycle Way



TOP. Plan and Section

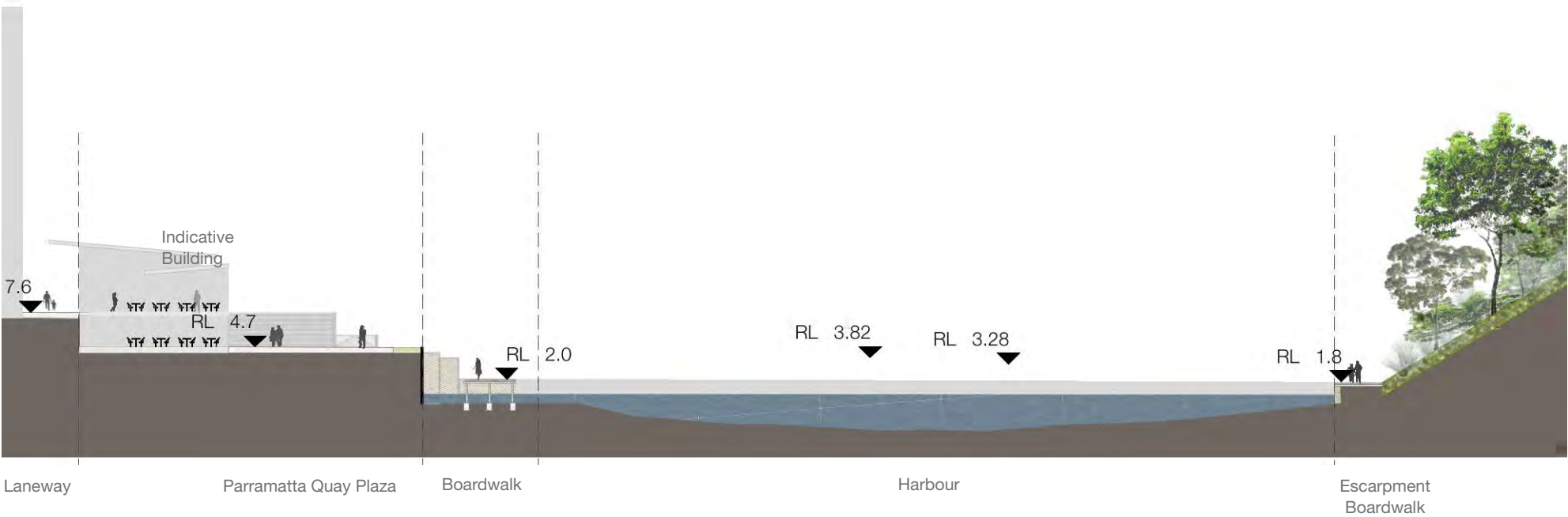


FIGURE 5.15 - SECTION JJ PARRAMATTA QUAY
TOP: Plan and Section



6.0 Exhibition

6.0 Exhibition

6.1 COMMUNITY FEEDBACK

Background

The Draft Parramatta City River Strategy was exhibited for 6 weeks from 8 October to 19 November 2014. It was exhibited together with the Draft Auto Alley Planning Framework and the Draft Parramatta City Centre Planning Framework.

The exhibition was notified in local papers, on Council's website and via Council's social media accounts (Facebook and Twitter). 296 letters were sent to local landowners, state government authorities and a range of community stakeholders. Two public drop-in sessions with Council staff regarding all 3 of the strategy documents were held on 5 November 2014 (day) and 6 November 2014 (evening). The drop-in sessions were attended by over 100 people. All 3 documents also received widespread media coverage during the exhibition period.

Submissions

The following is a summary of the key issues raised in the submissions:

- The desire to see the strategy further developed and delivered.
- The need for integrated management of the area in conjunction with the State Government and other Councils along the river.
- The importance of ongoing engagement and collaboration with adjacent landowners, state government authorities and community stakeholder groups to further develop and deliver the strategy.
- The type, nature and long term viability of social, cultural and retail uses proposed as part of the strategy and the need for these to be unique and compatible with the overall sense of place.

- The need to promote healthy active living opportunities for all ages and to consider the type of uses and amenities required to support this.
- The need to further consider traffic, car parking, bus, light rail, ferry, train and transport links and undertake more detailed multi-modal planning.
- The importance of Aboriginal (Darug) and European heritage in the strategy area, including heritage landscapes and the need to further consider this in design development (particularly of the Kings School site). A suggestion was made that common heritage principles should be established in conjunction with the State Government for the adaptive reuse of heritage buildings and items located within the strategy area.
- The need for the strategy to address flooding generally and for it to be managed at a precinct scale (Note: flood risk and flood engineering reports were not included in the public exhibition process).
- The importance of improving both water clarity and quality to support activities along the river and to further consider the appropriateness of the proposal at the Kings School foreshore.
- The importance of ensuring that recreational uses proposed suit all ages (including adolescents), are not duplicated elsewhere, and are appropriately co-located with respect to heritage and adjoining uses.
- Feasibility of some of the design ideas in particular City Beach and its appropriateness in a flood prone river environment.
- The need for additional refinement of the design and coordination with adjacent state government landowners to ensure that paths through the strategy area comply with DDA requirements, will support movement corridors and are located to improve access to key City locations and provide district connections, including

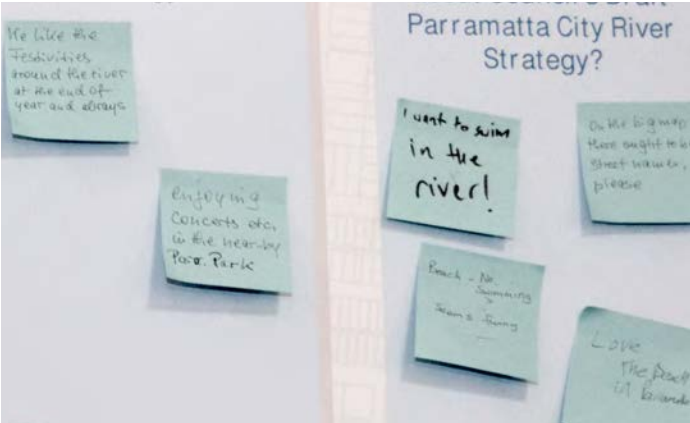


- the need to provide stairs to improve the connection between the end of Stewart Street and the river.
- The need to recognise and address the impacts of heat in the City by increasing the number of trees and shade along the river and through realising the green ring concept proposed in Design Parramatta.
 - The overall scale and location of some of the buildings, the desire to see open space maximised along the river edge and buildings setback, and the consistency of the strategy with existing controls for parts of the strategy area.

Other Feedback that was Received

Informal feedback received at the drop in sessions and via an online survey indicated there was a positive response to the Strategy. At the drop in sessions, 37 people gave the strategy the “thumbs up” whilst 2 people gave it “the thumbs down”.

Council’s Aboriginal and Torres Strait Islander (ATSI) Committee met on 25 November and noted their response to the strategy. The Chairperson, Mr John Robertson, noted previous discussions held by the Committee (28 January 2014) and reiterated that the Committee would like to see the inclusion of a dedicated cultural centre.





7.0 Next Steps and Recommendations

7.0 Next Steps and Recommendations

7.1 NEXT STEPS

The following next steps are based on the outcomes of the project process and look to assist Parramatta City Council in prioritising the future projects that should lead to the transformation of Parramatta City River. The proposed next steps embody all the emerging outcomes of the project and ultimately aim to fulfil the project principles, City River strategies and City River Plan proposed in this report document.

Planning

The planning approach to Paramatta City River Plan clearly demonstrates the design intent of the City River strategy. However, further work is required to deliver the strategies through to implementation. The following recommendations list the future work required to deliver the planning of the City River corridor.

- Review and update the LEP, DCP, built form and public domain guidelines reflect the outcomes of the City River Strategy. Consider developing a palette of materials and

elements for the City River precinct.

- Prepare an activation study to further develop the social, cultural and land-uses required to animate the river corridor through out the year.
- Develop an art/ interpretation plan to add a further level of detail to the Parramatta City River Strategy and Activation Plan.
- Seek guidance from Office of Environment and Heritage with regards to the preparation of a cultural heritage assessment for the river precinct incorporating both European and Aboriginal heritage.
- Proceed to design develop priority precincts including further consideration of community feedback.
- Establish an ongoing funding and delivery mechanism to deliver the City River Strategy.

Community

Future projects that emerge from the Parramatta City River Strategy should involve regular engagement



VISUALISATION 9. River Square daytime activation

with stakeholders and the community. The following recommendations list the future work required to encourage the temporary, short, medium and long term activation of the river through partnerships..

- Council to work with local landowners and business owners to support and promote the activation of both the public and private spaces.
- Council to work with the community to investigate the opportunities of temporarily activating the river corridor during implementation.

Infrastructure

Parramatta City River corridor is characterised by a number of bridges, weirs and streets. These major infrastructure elements form a key component into the revitalisation of the river and so further studies are required to test their capacity for both structural, aesthetic and functional changes. The following recommendations list the future work required to design develop the infrastructure along the City River corridor.

- Consider the outcomes of the City River Strategy from a city wide multi-modal planning perspective. Undertake more detailed planning with respect to traffic.
- Detailed investigation to test flood doors below the 1 in a 100 year flood assessing risk factors, economic viability and appropriate land uses.
- Infrastructure investigation into engineering of the re-aligned river corridor including feasibility of proposed changes to Charles Street and Marsden Street weirs.
- Detailed investigation into early warning flood system within the local catchment.
- Update flood model of the local catchment.
- Develop a stormwater and water quality study for the local catchment.
- Structural assessment to inform design development of Barry Wilde Bridge and Marsden Street Bridge pedestrian enhancements.



7.2 RECOMMENDATIONS

The following recommendations are based on the outcomes of each technical disciplines findings and look to assist Parramatta City Council in further developing and refining the Parramatta City River Strategy.

Flooding

A flood risk and water management study was undertaken for Parramatta City River Strategy by Royal Haskoning DHV. The following high level recommendations should be considered during subsequent phases of design and implementation.

- Where increased human activity is being encouraged in waters edge areas and in the floodplain, emergency procedures and plans should be developed to ensure sufficient flood warning lead time, safe evacuation routes and procedures are in place. A reliable, accurate and timely flood warning system is recommended if the design is to be implemented.
- The existing flood model used for this assessment (MIKE 11 Draft 8) was developed around 2005. Given the changes to the catchment since 2005 it is now considered to be out of date and may not accurately represent the present conditions within the catchment. It is therefore recommended that the flood model is updated, using both the latest software available and the best available information on catchment and floodplain characteristics. During future design development it is recommended that the design is tested using the information from such new flood model. Information from a new and updated flood model such as design levels should be utilised.

Design elements considered to require further investigation are repeated here for convenience:

- **Flood doors** -A number of locations within the design include low-level commercial units with flood doors. This element of the design poses an increased risk, which needs to be managed accordingly. Further investigation is recommended.
- **Board Walks** - The design of the proposed boardwalks requires particular consideration. They represent an encroachment into the existing channel, theoretically causing a hydraulic constraint and increased debris blockage risk. They are likely to be inundated on at least an annual frequency (1 year ARI). The boardwalks and their associated foundations will need to be designed to withstand hydraulic loading and debris collision, proving structurally competent. The design should consider dimensions and a configuration to limit the potential for debris to be captured.
- **Marsden Street Pedestrian Link** - This needs careful design and hydraulic modelling to determine its hydraulic impact. As a minimum the new design should not represent deterioration in hydraulic conveyance or debris blockage compared to the existing structure. Ideally the opportunity should be taken to improve hydraulic conveyance, reduce the risk of debris blockage and therefore reduce water levels during flood scenarios.
- **Charles Street Weir** - A new, reconfigured weir would need to have to show considerations for a number of existing functions, including: (1) hydraulic performance

compared to the existing weir; (2) public access; (3) fish passage; and (4) provision for low flows and a sluice function.

For further detailed recommendations regarding flooding please refer to Royal Haskonings Flood Risk and Water Management Report in Volume 2: Technical Appendix.

Accessibility

An accessibility review of Parramatta City River Plan has been produced to analyse the provisions of disability design and recommend solutions with respect to the Disability Discrimination Act ['DDA'], Building Code of Australia [BCA] and AS1428 series. The following recommendations list the access considerations required in further design development of the City River corridor.

- Consideration to be given to providing handrails at the ramps located along the river corridor.
- Consideration to be given to providing rest seating at maximum intervals of 60 metres alongside the ramp between the Marsden Street Bridge and the southern bank of the Parramatta River to assist people with mobility impairment.
- The provision of level landings at regular intervals is strongly recommended on the 1:14 ramps.
- Consideration to be given to providing ample wheel-chair seating areas for resting, dining and viewing on the southern bank of the Parramatta River.
- Provide an accessible means of ingress into and egress from Water Square in accordance with the DDA Premises Standards 2010 and BCA.
- Provision of passenger lift access from Philip/Charles Streets to the ferry wharf is strongly recommended.
- All buildings will require full compliance with the DDA Premises Standards 2010 and the BCA.

For further detailed recommendations regarding Accessibility please refer to MGAC's Accessibility Report in Volume 2: Technical Appendix.

European Heritage

In general the over-arching strategy considers the heritage values and fabric associated with Parramatta City River Strategy study area with the main objective to embrace the established and identified historical and cultural heritage values while providing an active city hub along the river. A number of actions have been recommended as part of the Strategy, which have been examined against the heritage constraints and opportunities as well as the feedback received from the stakeholder consultation process. The strategy allows for combination of adaptive reuse, new development options and for heritage interpretation in line with the recommendations of relevant previous studies for the riverside and adjacent heritage items and the advice provided in this report.

It is considered that the over-arching Parramatta City River Strategy responds adequately to the constraints and opportunities of the study area in particular those related to the heritage matters. There may be some minimal impacts but these should be considered and resolved during

the detailed strategies for individual item sites or future opportunity sites identified in the McGregor Coxall Strategy.

For further detailed recommendations regarding European Heritage please refer to City Plan Heritage Report in Volume 2: Technical Appendix.

Aboriginal Archaeology

It is highly likely that any development works that would result from the implementation of the PCRS will require further more detailed assessment of Aboriginal cultural heritage. Key recommendations to note are as follows;

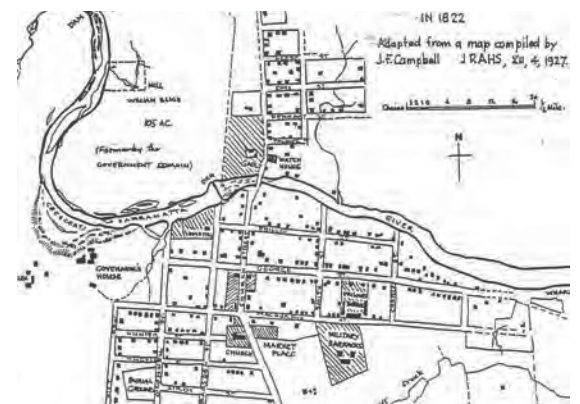
- Indigenous individuals and groups will have a strong cultural connection with all known and unknown Aboriginal sites within Parramatta, and as such should be consulted to guide the incorporation of themes considered important by the DRP in a culturally appropriate manner.
- A Cultural Heritage Assessment report should be considered for the PCRS Project Area to identify and determine cultural heritage within the project area.
- The Cultural Heritage Assessment report will comment on the archaeological significance of the project area and how it may be impacted by any proposed works.
- Assessment for the potential for an area to contain contact period archaeology will need to be undertaken in accordance with the specifications of The Guide for Investigating, Assessing, and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011).
- The Parramatta sand body will need to be assessed under the NPW Act for the potential of Aboriginal objects, and the Heritage Act, 1977, due to its place on the State Heritage Register and for its potential to contain Aboriginal cultural values.
- Geotechnical investigations, as part of the further investigation, across portions of the PCRS Project Area may be necessary to determine the absence and/or presence of the "Parramatta sand body". The relevant permit under the NPW Act and Heritage Act may need to be sought prior to the commencement of the geotechnical investigation.
- The Storm water locations identified in the plan would need further feasibility assessment and design development as part of any upgrade plans for specific sites.

For further detailed recommendations regarding Aboriginal Archeology please refer to Kayandal Archeology Services Report in Volume 2: Technical Appendix.

WSUD

There is an opportunity to soften the River edge in some locations, using planting. There are also potential opportunities for stormwater treatment (for local catchment runoff) within the River edge zone, however this will need to be separate to the River edge planting.

- The design options shown in the Master Plan show a mix of planting, board walks and rock protection. Each of the design options will need modelling to check velocity and shear stress conditions and size rock and erosion protection measures appropriately.
- Brickfield Creek is owned by Sydney Water and they would need to be involved in any works to the channel. Sydney Water has undertaken similar bank naturalisation projects elsewhere.



Appendix A - History of The River

Appendix A - History of the River

ABORIGINAL HISTORY

Parramatta’s name has its origin in Aboriginal language and is commonly translated as ‘the place where the eels lie down’ or ‘head of waters’. It is derived from the word Baramada or Burramatta [Burra meaning place, matta meaning eels]. The Aboriginal group that inhabited the land around present day Parramatta were the Darug People.

Evidence of Aboriginal occupation exists throughout the Parramatta Local Government area, with significant sites in Parramatta Park along the ridgeline of the Crescent and around Domain Creek. Several scarred trees and artefact scatters have also been discovered in this area.

EUROPEAN SETTLEMENT

Parramatta is the second oldest settlement in Australia and early settlers were attracted by the fertile soil of this area.

Modern Parramatta was founded in 1788, the same year as Sydney. The British Colony, which had arrived in January 1788 in the First Fleet at Sydney Cove, had only enough food to support itself for a short time. The soil around Sydney Cove proved too poor to grow the amount of food that required to support the settlers so after reconnaissance missions, Governor Arthur Phillip choose Parramatta as the most likely place for a successful large farm. Parramatta was the furthest navigable point inland on the Parramatta River and the point at which the river became freshwater and suitable for agriculture.

In the late 18th century more colonists lived in Parramatta than in Sydney. Records show 1,970 people in Parramatta in 1792 compared with 1,170 in Sydney. In about 1790 the first winding track linking the two settlements was cut through thick bush.

While connecting roads were built between the two settlements, the river remained the predominant mode of transport and important point of focus for the township of Parramatta until well into the 1800’s. Many of the City’s earliest and most significant civic buildings and public infrastructure were positioned in close proximity to the river or aligned to take advantage of the aspect it afforded.

With the construction of the rail-line, industrialisation arrived at Parramatta. This changed the nature of development and focus of the city. The natural beds of the river were channelised during the depression and in the 1950’s the city turned its back on its river frontage. The City retreated from the water’s edge and the river began to take on a ‘back of house’ character, aggravated in part by the corridors regular inundation by flooding.

SECOND CBD

Parramatta was nominated as the second CBD for Sydney in 1968 and has been one of the successes of Sydney’s centres policy. In 1970 Parramatta provided around 10,000 jobs, today around 40,000 people are employed in the Parramatta Local Government Area, with the CBD projected to grow substantially over the next decade. The Parramatta Regional Environmental Plan (REP)forecasts job potential at around 60,000 by 2021 and this is broadly consistent with more recent NSW Government projections.

The relocation of State and Federal Government jobs to Parramatta has been a catalyst for development. Recent commitments have been to locate the headquarters of NSW Police and Sydney Water to Parramatta and the development of the civic and justice precincts has contributed to the increased levels of high skilled employment with increased jobs in finance and business services supported by the knowledge based employment in the Westmead Hospital and University of Western Sydney.

In recent times the river has become a place both for daily recreation and large scale community and cultural gatherings. Special events such as fireworks on New Years Eve or the festival of Loy Krathong attract up to 25,000 people. However on a day to day basis the river corridor lacks any concentrated level of activation.

The plans, maps and images on the adjacent page show the growth and development of Parramatta over the past two hundred years. The alignment of the historic street grid is based on George Street and Market Street {later Philip Street] There is a strong relationship between the river and the urban development with building lots extending down to the waters edge. The buildings were also set back presumably to prevent water ingress during flood events.

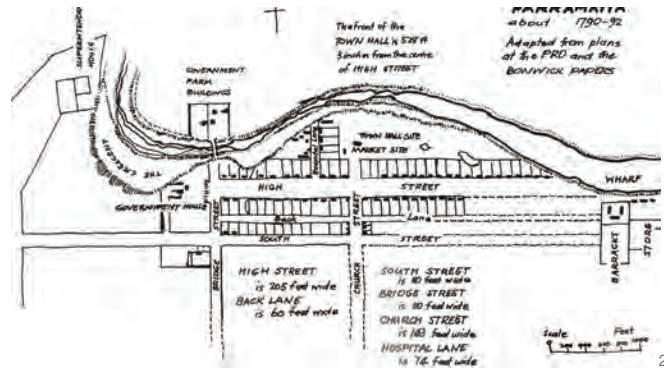
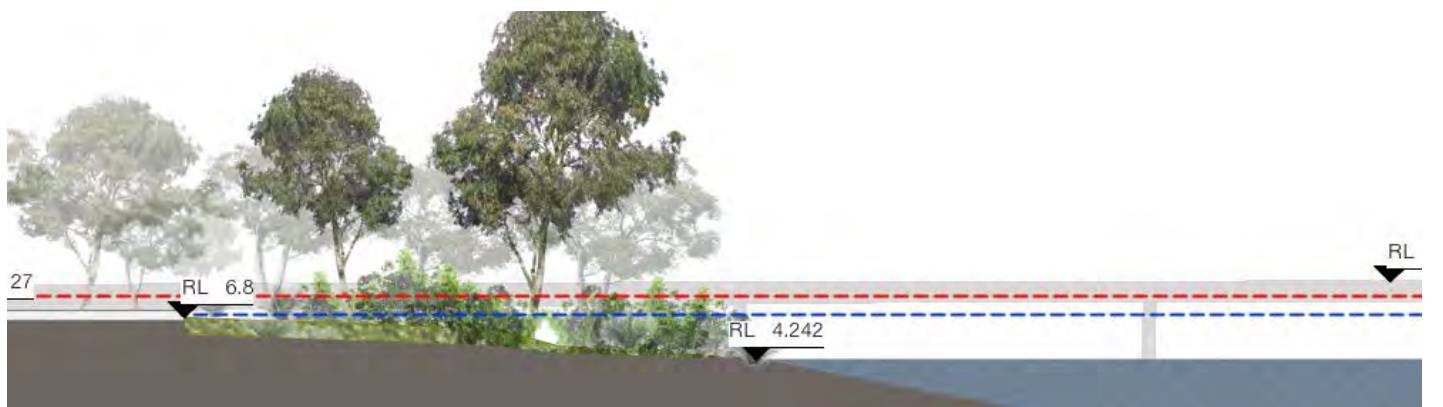


IMAGE 1. Government House 1791
IMAGE 2. Plan of Parramatta 1790 - 1792
IMAGE 3. View Along George Street 1796
IMAGE 4. Plan of Parramatta 1804
IMAGE 5. View across Parramatta River 1809
IMAGE 6. Plan of Parramatta 1822
IMAGE 7. Impression of Parramatta 1827
IMAGE 8. Parramatta 1943
IMAGE 9. Parramatta Today
IMAGE 10. Proposed Parramatta Square Project



Appendix B - Precinct Analysis

Appendix B - Precinct Analysis

RIVER PRECINCTS

The precinct analysis section provides a more detailed analytical understanding of the four precincts identified in the site analysis section.

Precinct 1

Precinct 1 is characterised by its neighbouring relationship with Parramatta Park to the west, The Justice Precinct to the south and educational land ownerships including the old Kings school Heritage building to the north. The precinct has a weak relationship with the waterfront, built form sits a large distance back from the river front and is inward facing, orienting activity away from the riverbank. Pedestrian and cycle connections to Parramatta Park and Pirtek Stadium

are weak in the north and fragmented by O’Connell street to the south. In both cases the walkway is removed from the riverfront. The walkway to the north sits behind vegetation at RL 7.00 2 or more meters above the water bank. To the south pedestrian access sits at street level between RL 8.0 near O’Connell and RL 10.0 near Marsden Street. Other notable changes/ elements within the area include.

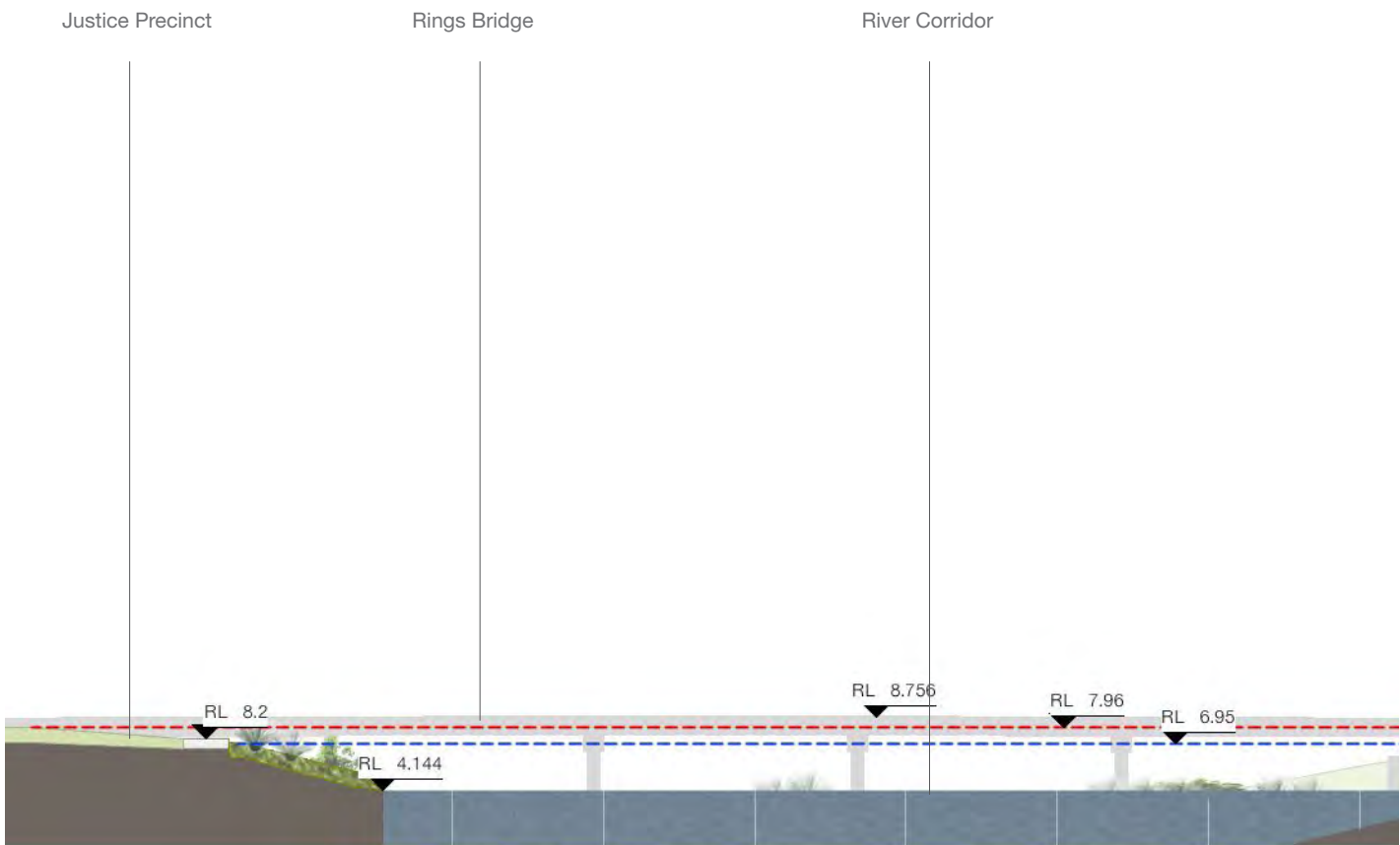
- Draft Masterplan of Cultural Precinct for Old Kings School and subject land.
- Crown land property (22A O’Connell street) listed for disposal.

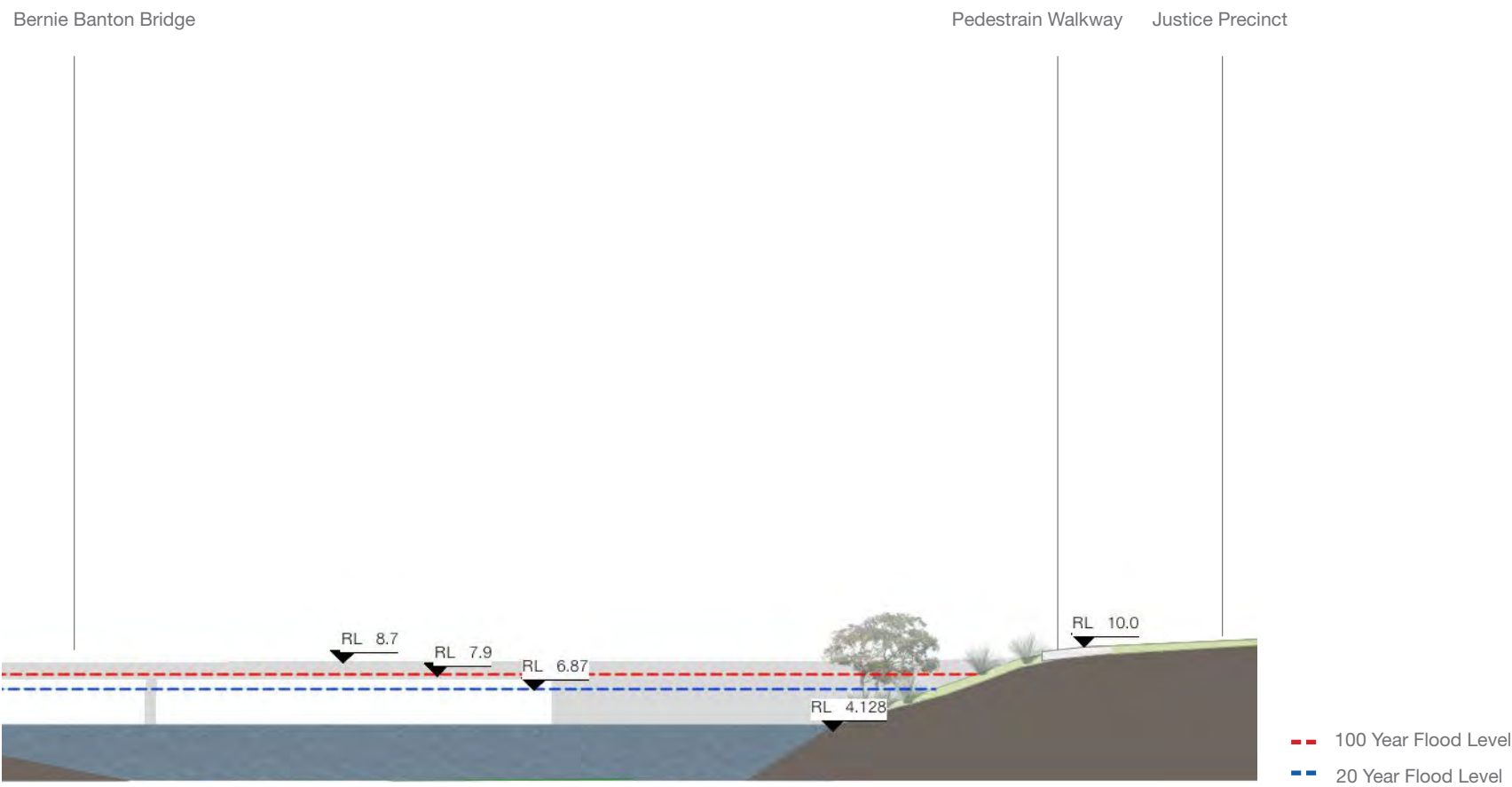
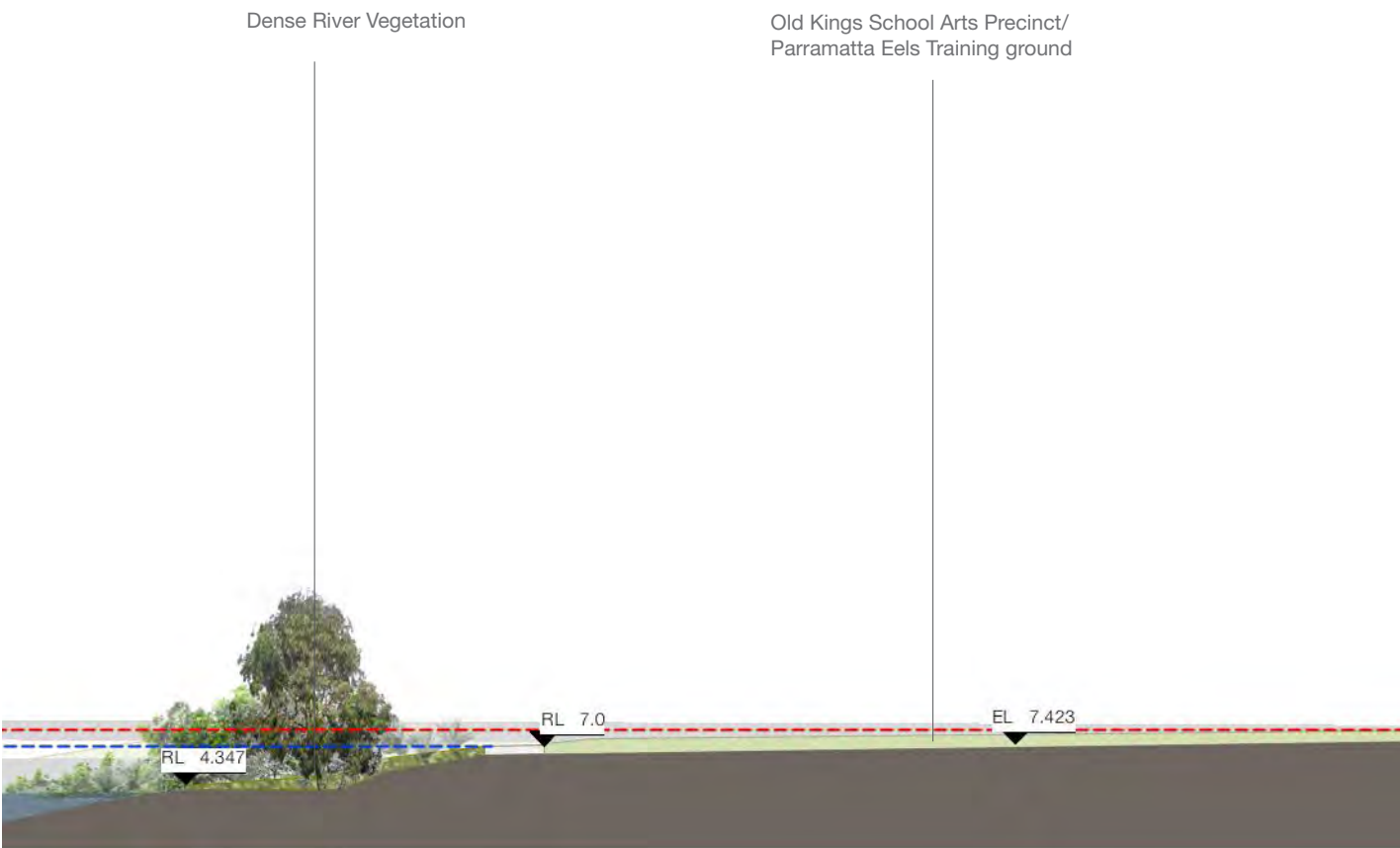


PRECINCT 1 ANALYSIS



IMAGE 1. View Towards Parramatta Park [2014]
IMAGE 2. View Towards Overgrown Vegetation Along Kings School [2014]
IMAGE 3 View Towards Kings School [2014]
IMAGE 4. View Towards Justice Precinct [2014]
IMAGE 5. View Along Marsden Street Weir [2014]





Precinct 2

Precinct 2 is Characterised by the Marsden Street Weir to the west, Lennox bridge to the east, The Riverside Theatre in the north and Lennox car park to the south. The area is subject to much future development including:

- The Riverside Parramatta project to replace the Lennox car park on the south bank and Riverside theatre car park to the north west, The intention for these buildings is to have ground floor retail to activate the upper level of the river.
- The Lennox bridge portals to provide foreshore pedestrian access between Precinct 2 and Precinct 3.

Both riverbanks have a poor relationship with built form, while the Riverside Parramatta project may address this issue to the south and north- east, the Riverside Theatre podium disconnects the river from active space. The top of the podium sits at RL 8.00 4m above the RL 4.00 river bank.

Pedestrian links to precinct 1 are weak in the north and broken by Marsden Street in the south. RL level difference between foreshore level and street level varies between 3-5m.

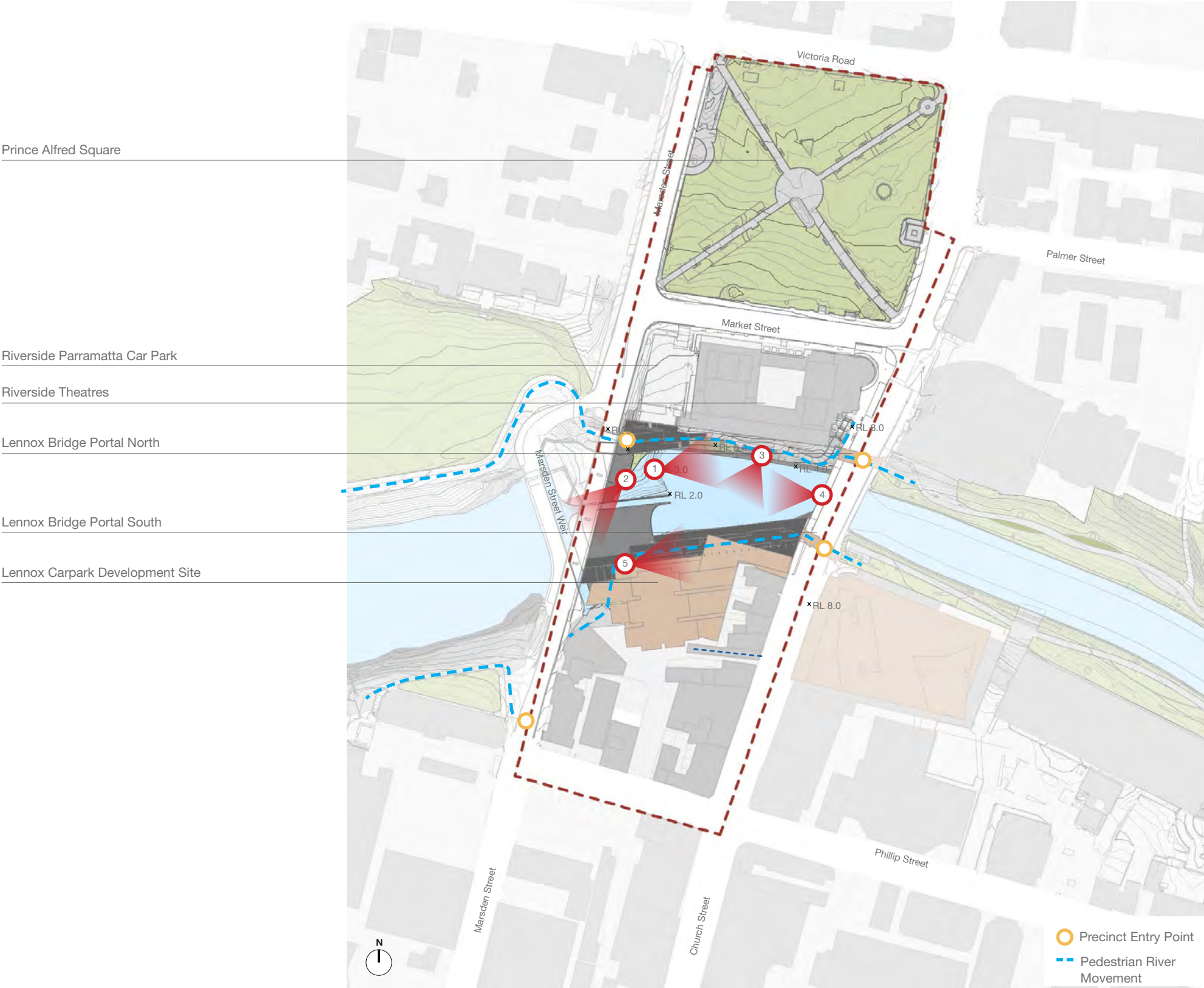
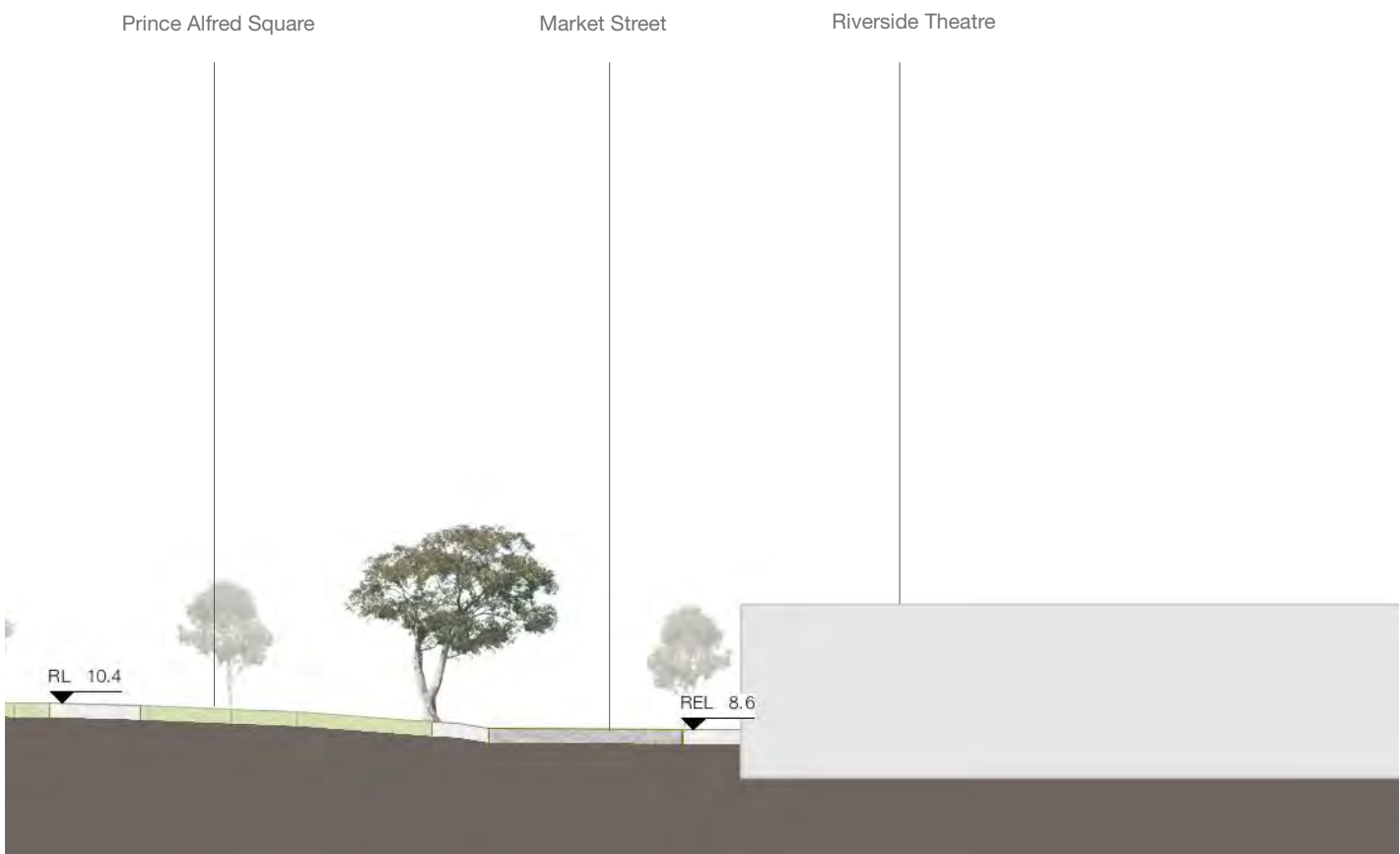
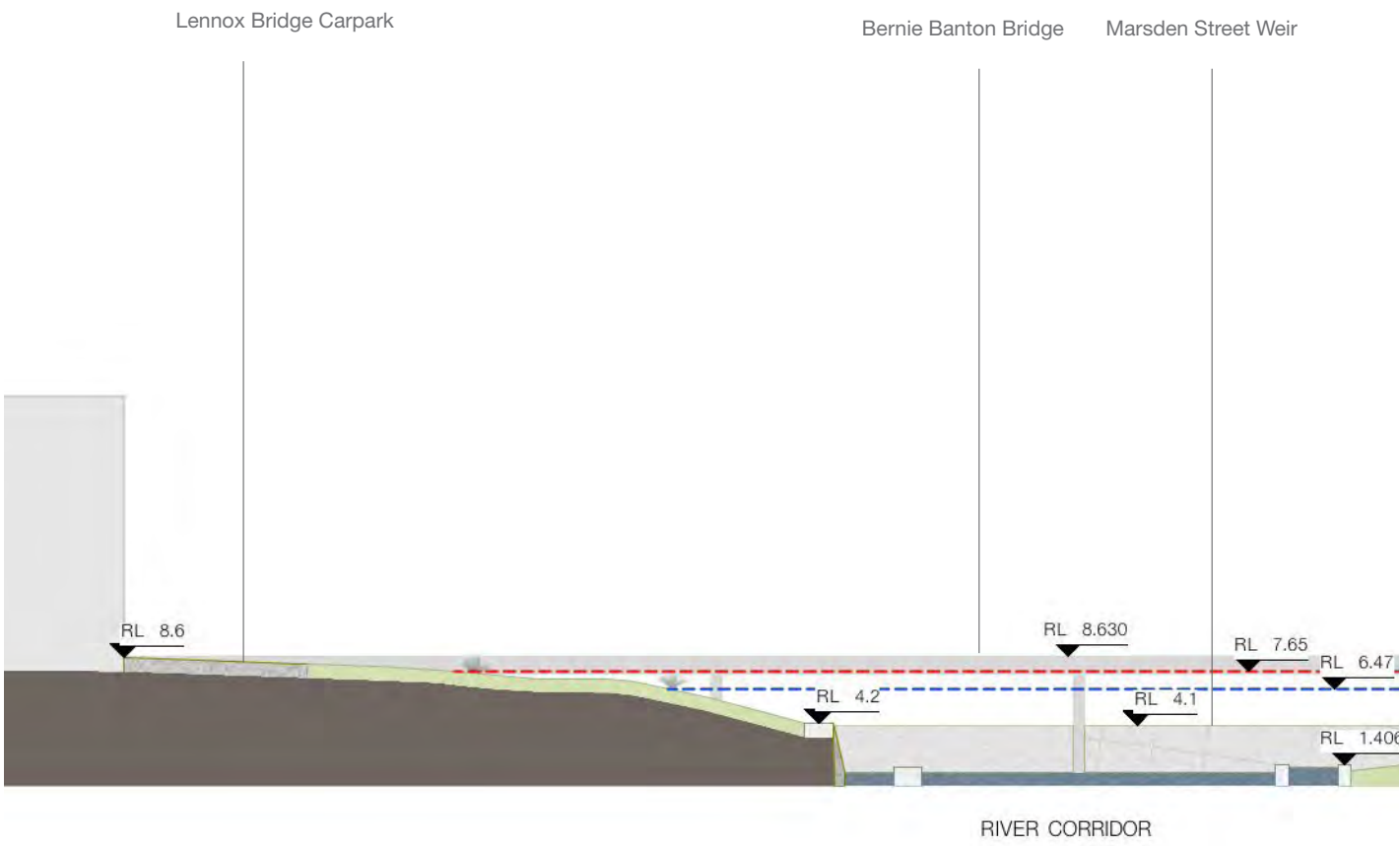
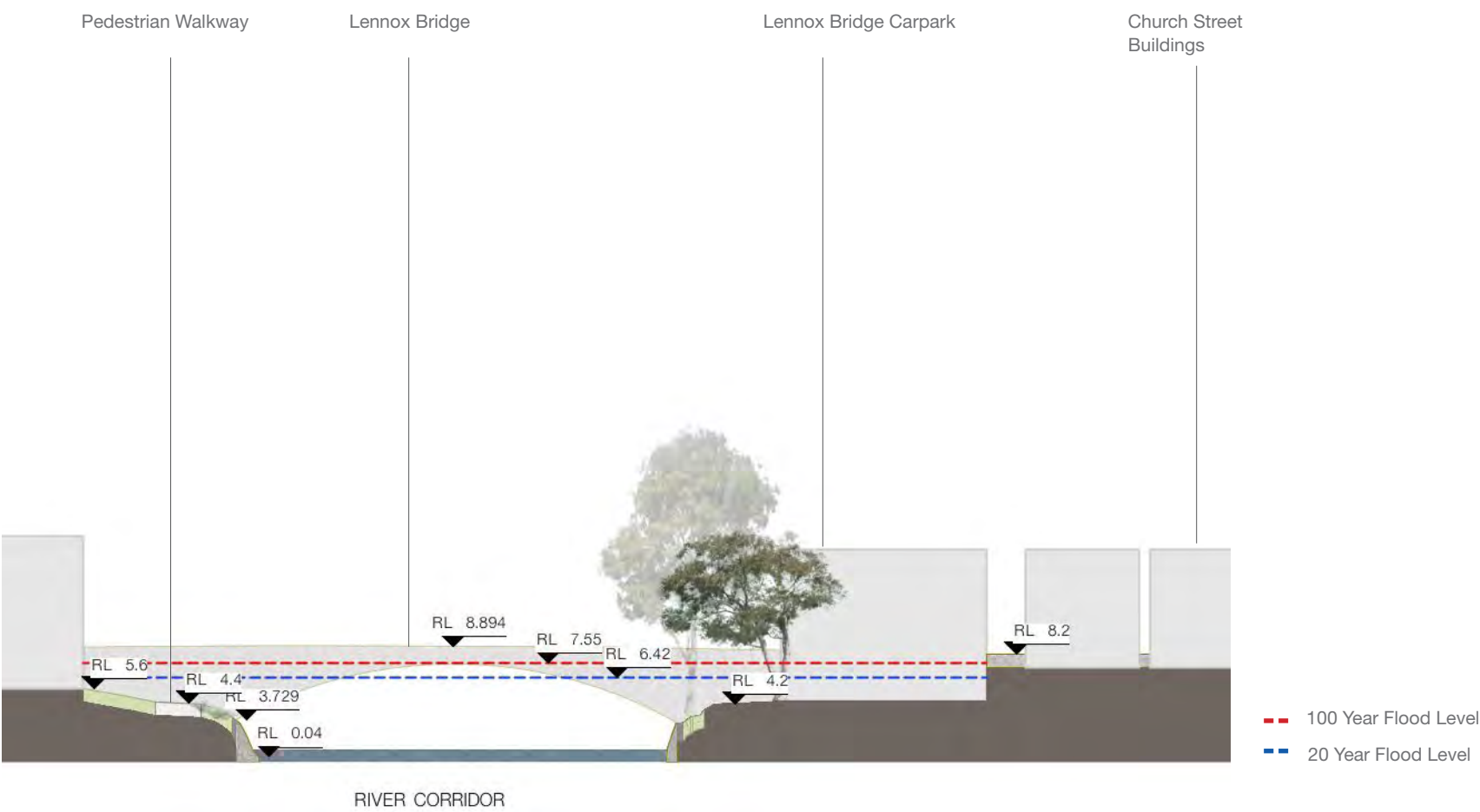
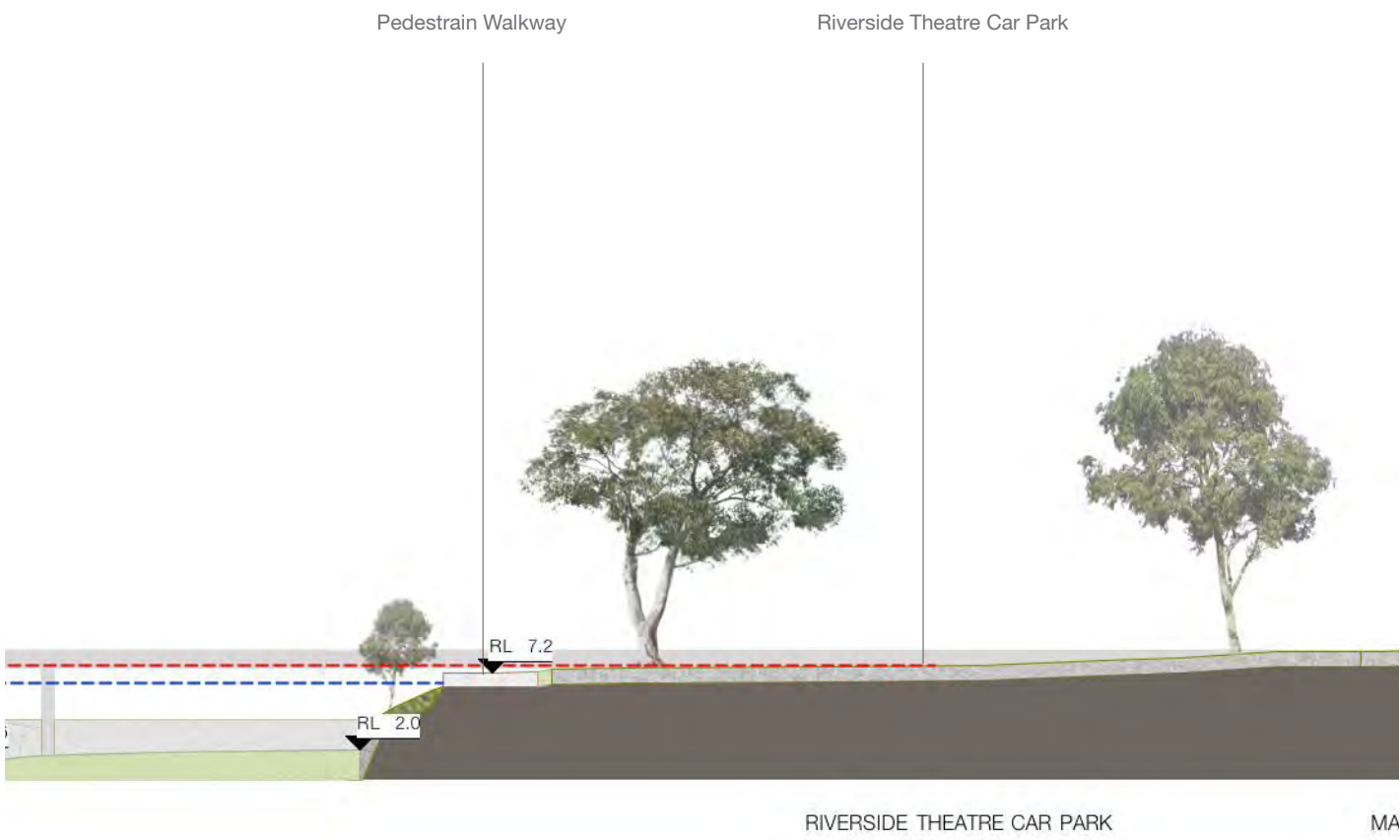




IMAGE 1. View Towards Lennox Bridge [2014]
IMAGE 2. View Under Marsden Street Bridge [2014]
IMAGE 3. View Towards South Bank of River Bridge [2014]
IMAGE 4. View Along river corridor towards Riverside Theatre [2014]
IMAGE 5. View Towards Marsdon Street Weir & Lennox Bridge [2014]





Precinct 3

Precinct 3 is the largest and most central precinct within the site boundary. It has much existing public domain work, the strongest connection to public transport and an active strip for daily exercise. Possibility for cycle use within this area is high however it is limited in many cases by access. The foreshore edge sits at a consistent RL 2.0 separating it from street level by between 6m in the south and between 6 - 11m in the north. The site has two footbridges, the Barry Wilde footbridge sitting at RL 2.0, foreshore level and the Elizabeth Street footbridge at street level between RL 8-10.00. Access from the Elizabeth street footbridge is currently restricted to the north bank. The Precinct is characterised by Lennox bridge to the west, Strata high density residential developments to the north, CBD mixed use to the South and the Charles Street weir to the East.

Both Northern and southern river frontage is highly inactive dominated by blank podium wall, carparks and retaining

walls. There is also a strong lack of riparian habitat as well as shade and vegetation. The precinct is also used or large scale events and has a highly active playground between Brickfields Creek and the Elizabeth street footbridge. The Creek itself proposes Sydney water run off issues decreasing water quality,

A number of changes have been proposed for the South East bank including 330 Church Street (a large development site) and sevealal Design Parramatta projects.

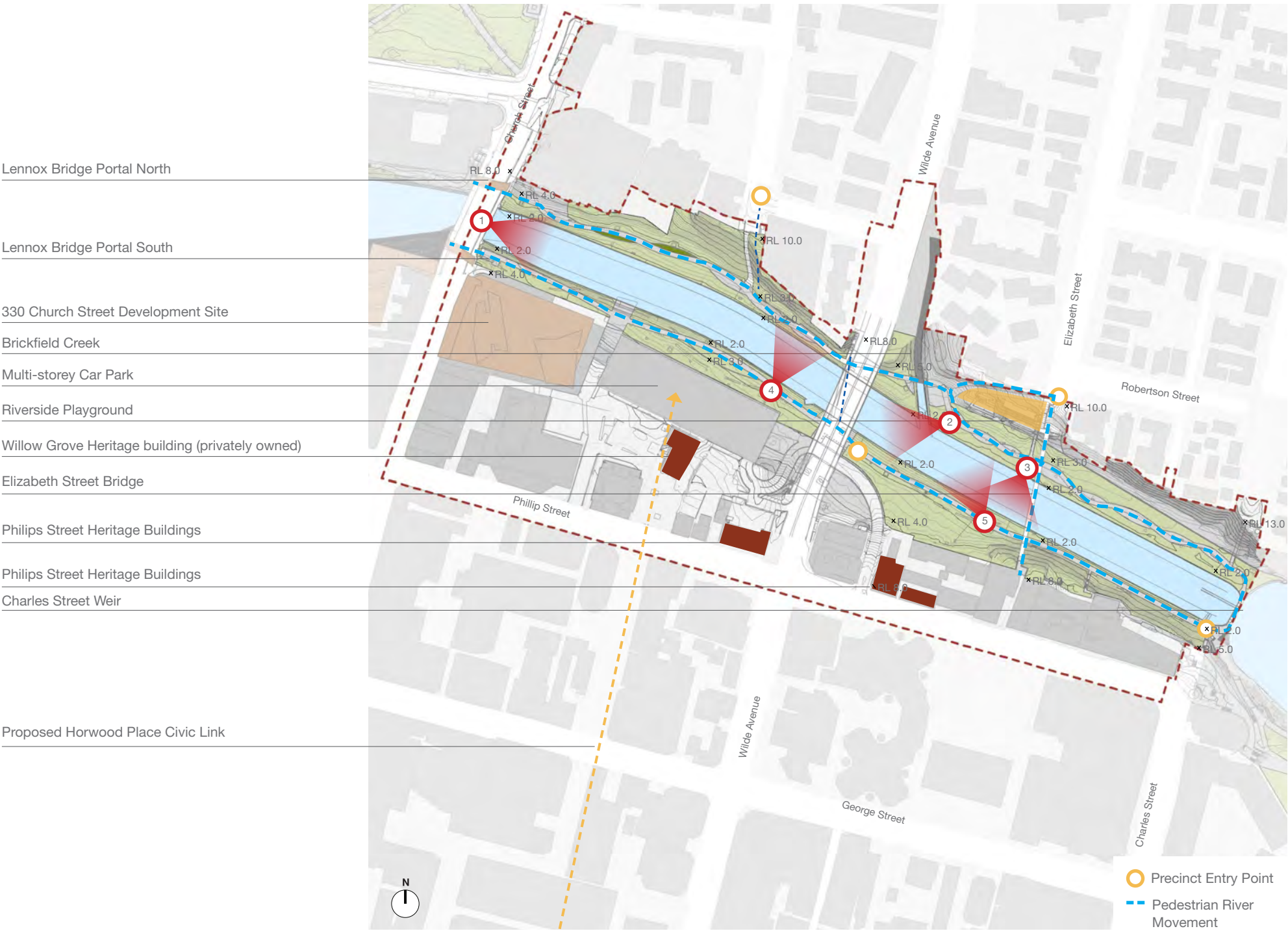
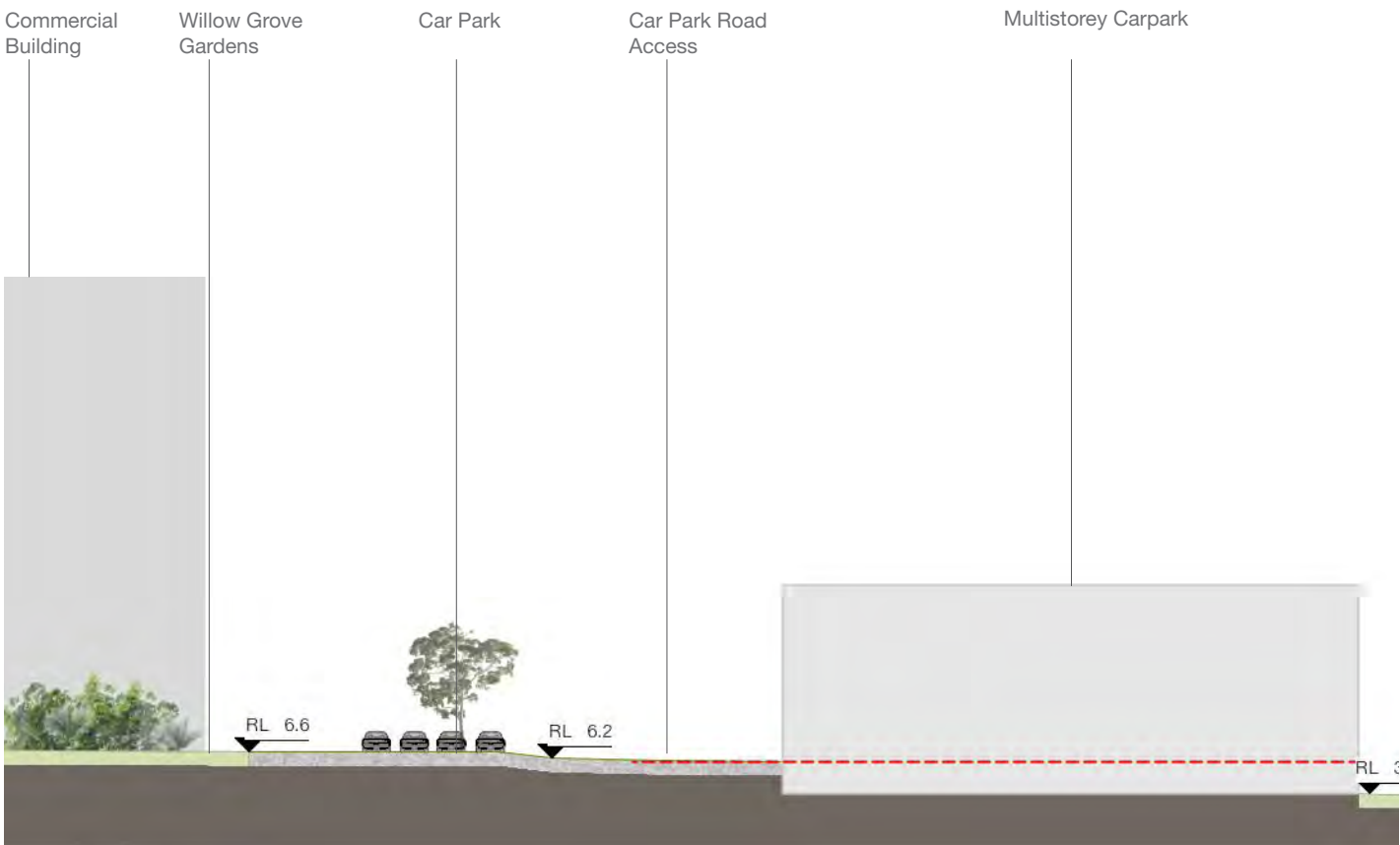
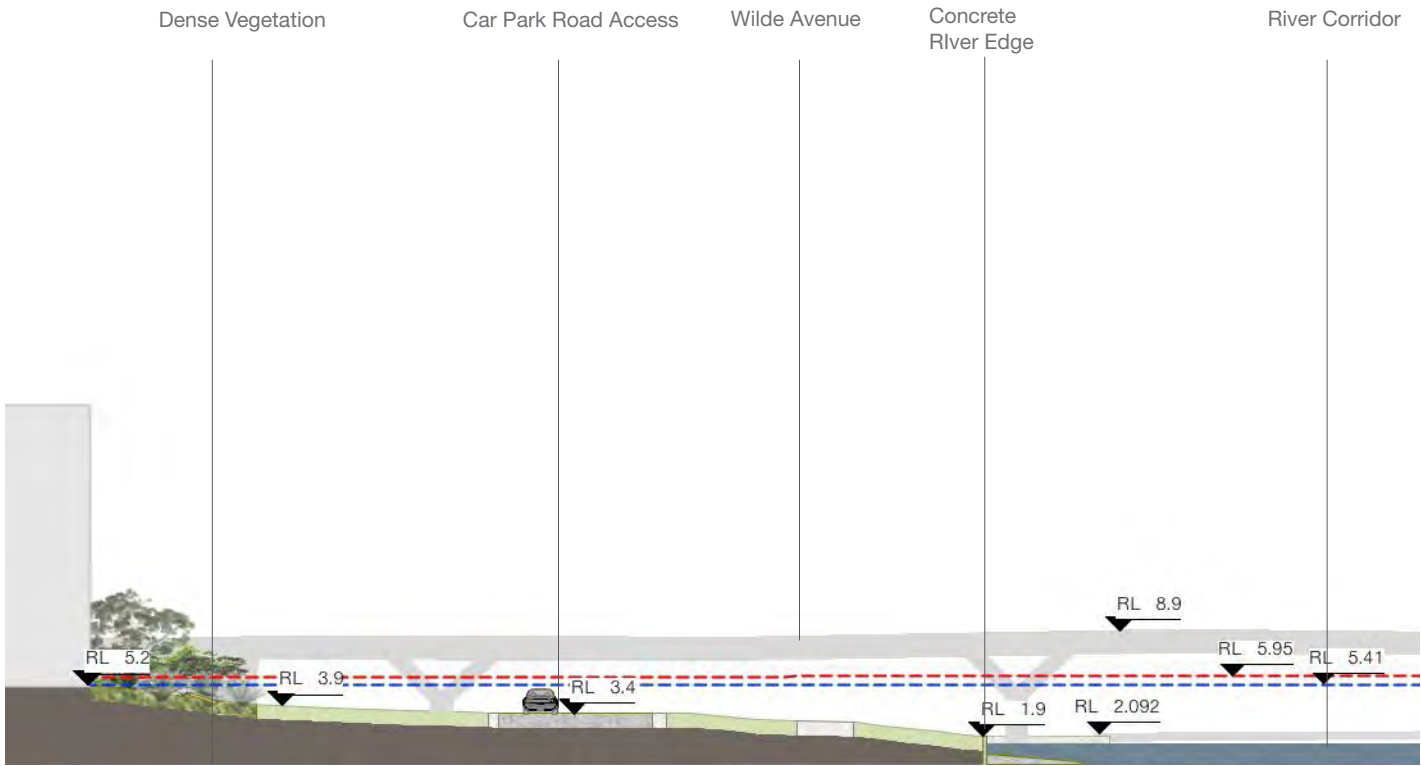
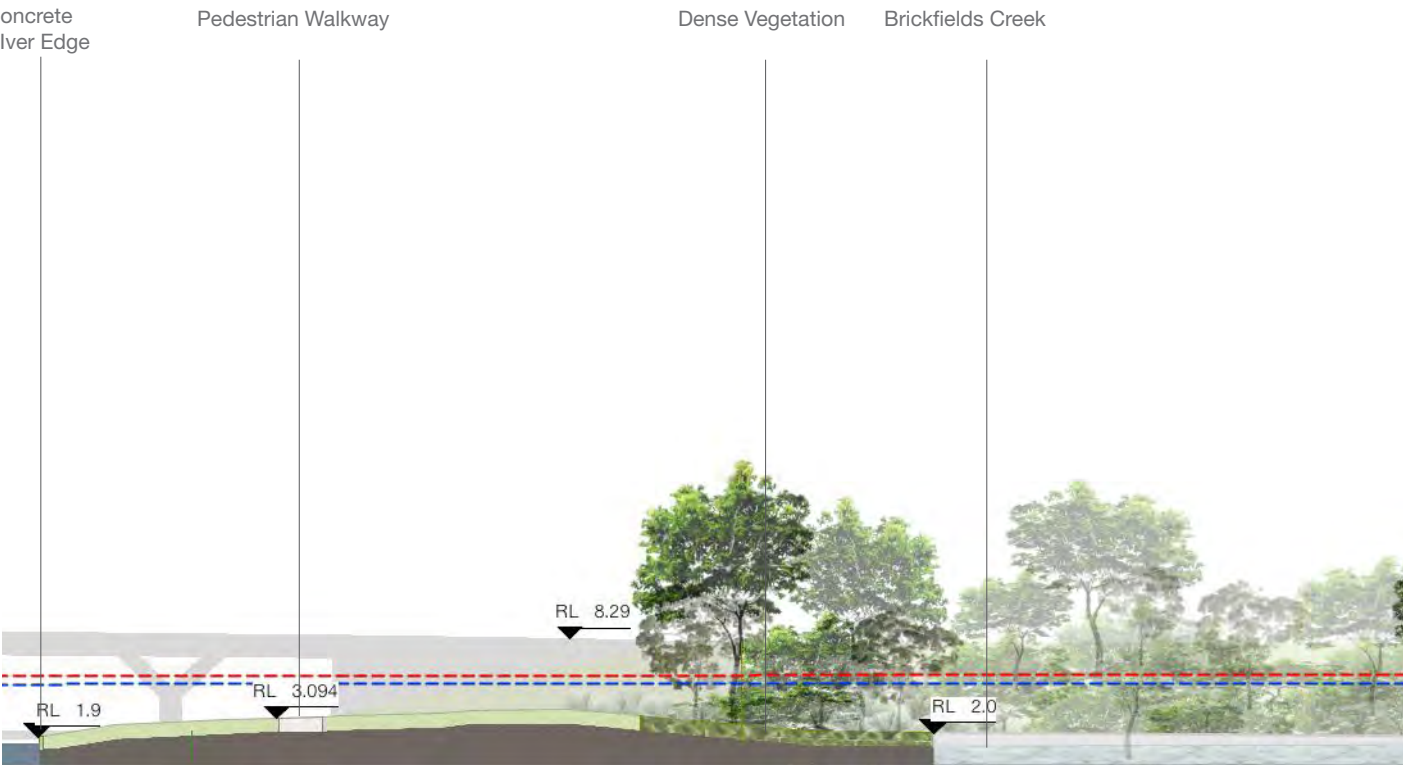




IMAGE 1. View Along River Corridor From Lennox Bridge [2014]
IMAGE 2. View Towards Barrow Bridge & Brickfield Creek [2014]
IMAGE 3. View Towards South Bank [2014]
IMAGE 4. View Towards North Bank [2014]
IMAGE 5. View Towards Riverside Park [2014]





Precinct 4

Precinct 4 is characterised by the Paramatta Ferry Wharf in the south west, The Gasworks Bridge in the east and steep escarpment and vegetation to the north. The precinct is subject to tidal change due to its harbour water. This water changes is also reflected in a change of vegetation and water quality. The precinct acts as a gateway to Paramatta however the main pedestrian route into the CBD is highly cluttered and only serviced by one bus stop which offers a free loop service directing away from the River bank.

The southern bank host parts of the Paramatta Valley Cycle way. Stronger pedestrian and Cycle links are also proposed for the northern bank as part of the Council/RMS escarpment Boardwalk. On the southern Bank contour provide a much slighter slope to street level than in other precincts, the northern escarpment however is the steepest on site.

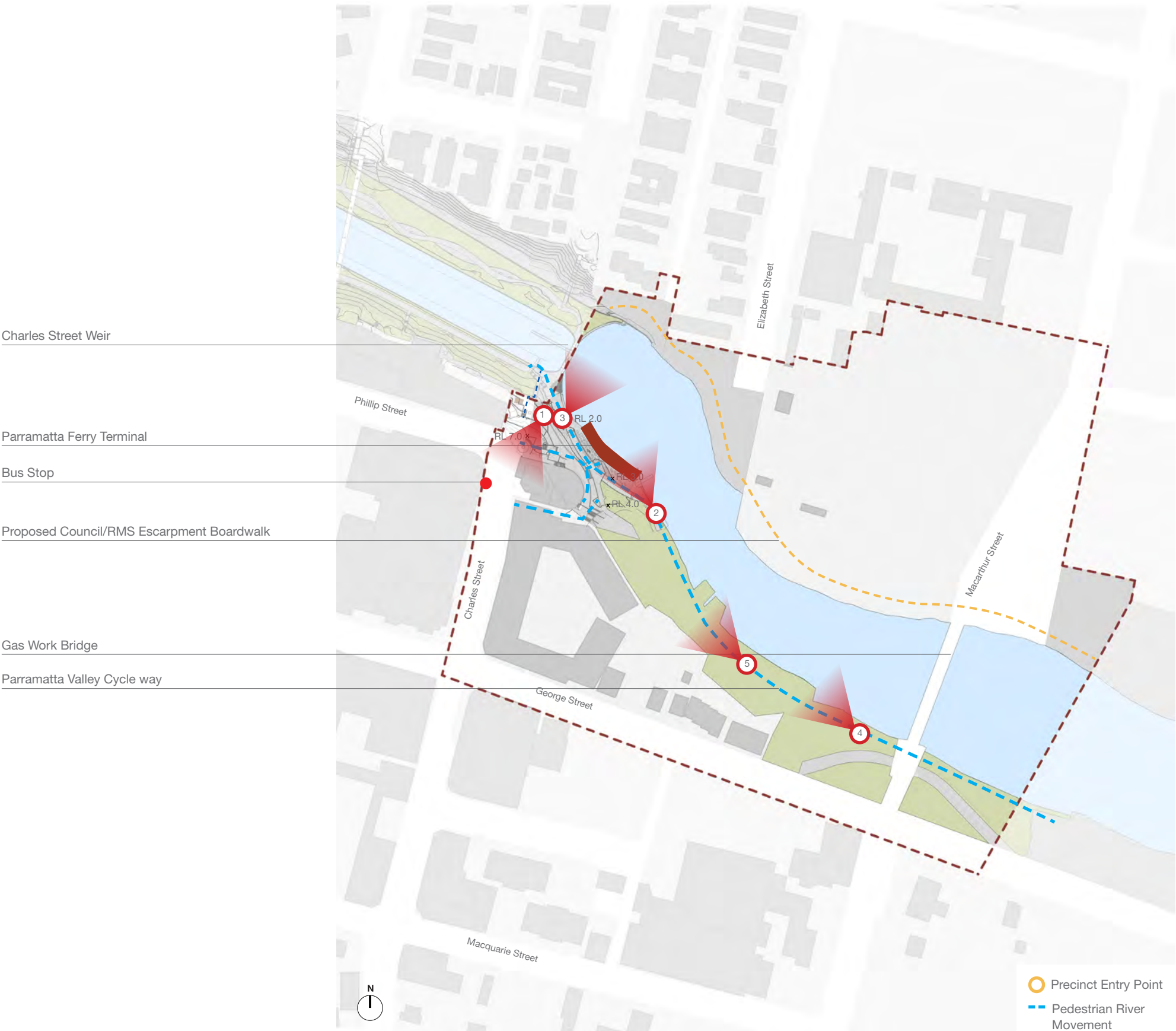
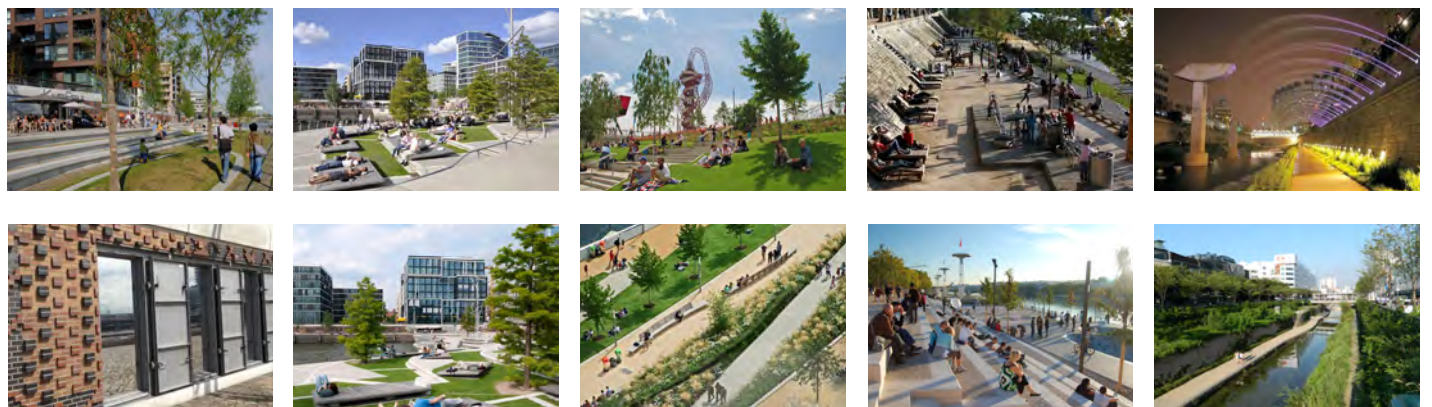




IMAGE 1. Entry to Parramatta CBD [2014]
IMAGE 2. View Towards Ferry Wharf [2014]
IMAGE 3. View Towards Charles Street Weir & Ferry Wharf [2014]
IMAGE 4. View Along Parramatta Valley Cycleway [2014]
IMAGE 5. View Along Parramatta Valley Cycleway [2014]







Appendix C - International Precedents

Appendix C - International Precedents

INTRODUCTION

In response to the analysis produced a series of project challenges have been identified that summarise the issues facing Parramatta City River. These challenges are;

- A poor river arrival experience
- A lack of riverside destinations
- A lack of respect for the river's history
- Inactive river frontage
- Low quality built form
- Disconnected river movement
- Limited city to river connections
- Poor environmental quality
- Inconsistent environmental quality
- High frequency flooding

This section illustrates a series of international best practice projects that respond to similar challenges, delivering vibrant destinations that are safe and active places for people to enjoy. They provide specific examples in river activation, flood resilience, improved river access and movement and the establishment of an attractive landscape character. The international precedent projects are;

- Hafencity, Hamburg [Germany]
- River Lea, London [United Kingdom]
- Lyon Waterfront, Lyon [France]
- Cheonggyecheon, Seoul [Korea]
- River Activity [General]
- Flood Mitigation Measures [General]

HAFENCITY, HAMBURG

Overview

Hafen City is a 155 hectare site located on the harbour foreshore of Hamburg, Germany. This precedent although considerably larger than the Parramatta River project provides excellent examples in introducing river activation, flood resilience, terracing and high quality landscape.

Background

In 2000 the City decided to transform part of the former Harbour area into a new residential, office and retail area. A master plan was made for “HafenCity” with the aim to build an attractive living environment in the heart of the city closely connected to the water. The area lies in front of the main dike-line of Hamburg adjacent to the Elbe River.

HafenCity is a vast waterfront development and urban rehabilitation project of located in Hamburg, the largest German port and the second in Europe, after Rotterdam. In addition to revitalizing the downtown and bringing urban life near the water, this project is an important attempt to carry out sustainable design, implemented in the contemporary architecture and urban design of public spaces located in the area.

Flood Resilience

Rather than building a dike around HafenCity, the City developed a mix of innovative strategies to manage flood risk. Surrounding HafenCity by dikes would have created a series of distinct disadvantages. Proximity to large expanses of water is what gives the new district much of its charm; dikes would have deprived it of the many exciting sight lines down to the water - particularly in the public built



IMAGE 1. Hafencity, Hamburg, Terracing & Bunker Activation
IMAGE 2. Hafencity, Hamburg, Bunker Program & Flood Doors
IMAGE 3. Hafencity, Hamburg, Bunker Activation & Level Change
IMAGE 4. Hafencity, Hamburg, Retail Bunker Activation

environment. Another point is that complete enclosure of the 126 hectare site by dikes would have had to have been completed before any construction of buildings began; a technical and economic tour de force of that kind would also have put the successive development of the district in question.

The City decided to introduce the so-called “Warftenkonzept”, by building on elevated plots in front of the main dyke line with heights of +7.5 meters above NN, soon to be upgraded to + 8.30 meters NN for the new to be developed neighbourhoods resulting from new predictions for sea level rise. This meant that the area could be developed plot by plot, and that development could start straight away. All newly built infrastructure in HafenCity is elevated to allow access of the fire brigade during storm surges. In addition individual built-in flood resistance for buildings (‘Objektschutz’) was introduced, i.e. flood protection measures to individual buildings such as flood doors and walls, as well as the institutionalization of “Flutschutzgemeinschaften” among property owners and inhabitants of particular neighbourhoods in HafenCity. They are responsible for flood preparedness, for timely alert during a flood event and for closing the mobile flood protection walls.

Activating the River Edge

HafenCity has adopted the concept of mixed use not as an add-on feature but as its raison d’etre — every single building in the new development has to serve more than one purpose. In some cases, this means ground-floor retail with residences or offices above, but many HafenCity buildings go much further.

As defence against future floods and potential sea-level rise, much of the new neighbourhood is built on a street level raised 15 feet above the level of the old dock; the original dock level has been preserved in the form of 10 kilometers (about 6 miles) of meandering quayside promenades. To ensure street level activation dock-level retail spaces are equipped with portal doors in the style of a cargo ship, which can be closed against rising waters.

Open Space Terracing

The design approach for HafenCity carefully and skilfully mastered the different topographical levels of the site. The original ground levels of the entire HafenCity were vulnerable to flooding and the ground was therefore raised by 3.0m. This necessary restructuring of the ground was interpreted playfully and integrated into the overall design.

The three levels of the Magellan-Terrassen a major public space in the site were interconnected by short ramps and vast stairways that extend from the area of the future Sandtorpark down to the basin. The vast stepped surfaces of the bottom level enable visitors to experience the changing tides from close by.

The Marco-Polo-Terrassen directly adjoins the Magellan-Terrassen and forms another Waterfront Square. The public space is softer and greener than its urban neighbour. This plaza also negotiates the difference in height from the water surface up to higher ground above high water levels with three terraces. Its undulating landscape area includes mounds covered with lawn and forms the first green island of HafenCity. Well placed ramps and stairways interconnect the terrace levels and give access to the areas for rest and recreation.



IMAGE 5. Hafen City, Public Terraces and Paths
IMAGE 6. Hafen City, Public Terraces and Fixed Furniture
IMAGE 7. Hafen City, Public Terraces/ temporary activation
IMAGE 8. Hafen City, River Frontage and Hardscape

RIVER LEA, LONDON

Precedent Purpose

River Lea is located within the 250 hectare Olympic site in Stratford, London. This precedent provides an excellent example in river restoration, flood resilience and introducing a natural landscape to a former industrial site.

Background

This reach of River Lea was largely inaccessible to the public, had steep sided banks with low value habitat and a lack of geomorphological diversity due to navigational resectioning. The river also caused flood risk issues locally and effected neighbourhoods downstream, as the channel morphology encouraged flow conveyance and pushed issues downstream to areas where water could get out of bank. The regeneration of the river in Stratford hoped to improve the catchment and particularly areas at risk of flooding downstream.

River Restoration

As part of the Olympic Park development, a reach of the River Lea at North Park was allocated for restoration. Through early engagement with the Olympic Delivery Authority, the Environment Agency were able to ensure that the designs to improve the North Park river system incorporated improved river profiles and a variety of marginal and riparian habitats.

A phased approach to construction was adopted. Contaminated land was treated, new river bank profiles were excavated, and an agreed landscape and planting strategy implemented. Significant bank reprofiling works were undertaken to lower the bank and reconnect the

channel with its floodplain. Areas of land previously contaminated by low-value riparian vegetation were lowered to create a floodplain that could also be used for flood storage purposes. Vegetation clearance works were aimed at allowing landscape and amenity benefits to be recognised by opening up the river for the public. Key benefits of the project were;

- New bank profiles have created a new flood storage facility on the River Lea for 1 in 50 year flood events;
- Water conveyance has also been improved by reducing how quickly flow passes through the system. This has benefits for flood risk and aids marginal vegetation establishment;
- New bankside habitat creation;
- Improved public access to the water course;
- As part of an integrated water and flood management scheme, the northern parklands collect, absorb, cleanse and slowly release water into the river via porous paving, bio - swales, ponds and wet woodlands.
- 350 thousand wetland plants line the rivers and wetlands - many grown from seeds and cuttings collected on site before work commenced.
- Fish channels have been cut into the wetlands for spawning and as refuges during floods.
- Uniquely, perennial meadows have been sown throughout the north Park, which provide spectacular flower displays and are excellent for wildlife. Nearly 50 species of birds including kingfishers, cormorants, black redstarts and the rare cuckoo have been spotted in the Park.



IMAGE 1. River Lea, river corridor and floating stage
IMAGE 2. River Lea, upper and lower level movement
IMAGE 3 River Lea, level change and lawn
IMAGE 4. River Lea, pedestrian walkways

BERGES DU RHONE, LYON

Precedent Purpose

Berges Du Rhone forms a 10 hectare riverside side in Lyon, France. This precedent offers an understanding in how to sympathetically reconnect a stretch of river that was disconnected to the city centre.

Background

Lyon was built at the confluence of the River Rhône and its tributary the Saône River on the Presqu’île Peninsula, which is now occupied by the old city centre. As with many other fluvial cities, its relationship with the river started to deteriorate with the Industrial Revolution. In 2003, the City Council and the Greater Lyon Urban Community, an organism of metropolitan scope, called for entries in a competition with the idea that recovering the left bank would bring about reconciliation between the city and its river.

Connecting the City to the River

The precedent study demonstrates how the city of Lyon successfully redeveloped the Berges Du Rhone embankment - an area in the densely built-up city centre - as a sequence of leisure and recreation spaces for the benefit of its citizens. The relationship between the city and the river was redefined. The project continues to generate considerable long-term beneficial effects in regards to the image, identity and quality of life experienced along the river. Key features of the riverside project are as follows;

- The design concept divides the embankment into a sequence of eight different sections at regular intervals connecting to the adjoining urban areas by ramps and flights of stairs;

- In the middle, around the Pont de la Guillotiere close to the city centre, it is urbane, stony with regular spaces and many recreation areas.
- The upper level, in contact with the urban fabric, has a path running along its edge, separating vehicular traffic next to the buildings from the circulation of pedestrians on the side next to the wall and the river.
- The lower level promenade is sub-divided lengthwise into two strips; a pedestrian path directly along the river and behind this a cycle path. There are also strips for resting, playing games and sports or just watching;
- Lighting stresses the linearity of the riverbank and literally highlight the bridges;
- A number of automatic bike rental stations were installed along the Rhone Embankment;
- This grandstand is a site of major significance. Facing the cupolas of the Hôtel Dieu it is a civic space which, with the river as its backdrop, is now the venue for such multitudinous events as concerts, parades, screenings, fireworks and even the passing of the Tour de France;
- The stone quay wall between the low wharf and the embankment is characterised by a terrace of seating steps. The trees aim to shade people sitting on the steps, whilst a pool located alongside the river all people to cool their hands and feet;
- Wooden deck chairs can be found along the Les Iles Jardins complementing the garden character of the area;
- Their are over 6000sqm of open space, most of them lawn for picnicking, sunbathing and playing games.
- Floating restaurants are permanently moored along the riverbank;



IMAGE 5. Berges Du Rhone, public recreation/ level change
IMAGE 6. Berges Du Rhone, Public Terraces
IMAGE 7. Berges Du Rhone, Water Activation
IMAGE 8. Berges Du Rhone, Access Terracing & Ramps

CHEONGGYECHEON, SEOUL

Precedent Purpose

Cheonggyecheon River is a 40 hectare stretch of river in Cheonggyecheon, Seoul. This precedent provides an excellent example in river restoration and how Green Infrastructure can raise land values, improve the quality of city life and increase city centre connectivity.

Background

The aging elevated freeway and concrete deck covering the Cheonggyecheon stream posed safety risks and needed to be repaired or removed. The government wanted to improve connectivity between the city’s north and south sides, which the freeway divided.

The Seoul Metropolitan Government chose to dismantle the elevated freeway and concrete deck covering the stream. To improve north-south linkages, 22 bridges -- 12 pedestrian bridges and 10 for automobiles and pedestrians -- were proposed to connect the two sides of the Cheonggyecheon.

Green Infrastructure

This project highlighted an important paradigm shift, changing from an autocentric development-oriented urban landscape to one that values the quality of life of its people and the importance of functioning ecosystems. By demolishing an elevated freeway and uncovering a section of the historic Cheonggyecheon Stream, the Cheonggyecheon Restoration Project created both ecological and recreational opportunities along a 3.6-mile corridor in the centre of Seoul. The project has proven catalytic, spurring economic growth and development in

an area of Seoul that had languished over the last several decades. Key features of the project are as follows;

- Provides flood protection for up to a 200-year flood event and can sustain a flow rate of 118mm/hr.
- Increased overall biodiversity by 639% between the pre-restoration work in 2003 and the end of 2008 with the number of plant species increasing from 62 to 308, fish species from 4 to 25, bird species from 6 to 36, aquatic invertebrate species from 5 to 53, insect species from 15 to 192, mammals from 2 to 4, and amphibians from 4 to 8.
- Reduces the urban heat island effect with temperatures along the stream 3.3° to 5.9°C cooler than on a parallel road 4-7 blocks away. This results from the removal of the paved expressway, the cooling effect of the stream, increased vegetation, reduction in auto trips, and a 2.2-7.8% increase in wind speeds moving through the corridor.
- Reduced small-particle air pollution by 35% from 74 to 48 micrograms per cubic meter. Before the restoration, residents of the area were more than twice as likely to suffer from respiratory disease as those in other parts of the city.
- Increased the price of land by 30-50% for properties within 50 meters of the restoration project. This is double the rate of property increases in other areas of Seoul.
- Increased number of businesses by 3.5% in Cheonggyecheon area during 2002-2003, which was double the rate of business growth in downtown Seoul; increased the number of working people in the Cheonggyecheon area by 0.8%, versus a decrease in downtown Seoul of 2.6%.



IMAGE 1. Cheonggyecheon, Riverside Art & Walkway
IMAGE 2. Cheonggyecheon, Waterside Activation - Art
IMAGE 3 Cheonggyecheon, River edge walkway at night
IMAGE 4.Cheonggyecheon, Naturalised River edge and planting

ACTIVITY EXAMPLES

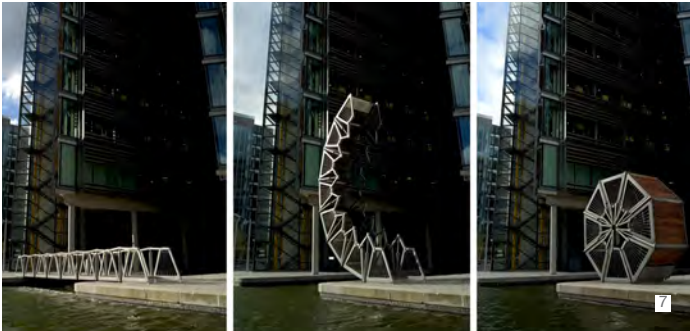
Badeschiff, Berlin

The Badeschiff allows citizens to swim in a safe and sanitary environment in their river, at least in a figurative sense. The Spree itself is far too polluted to permit safe bathing.



The Curling Bridge, London

The Rolling Bridge is a type of curling movable bridge. To allow the passage of boats, the hydraulic pistons are activated and the bridge curls up until its two ends join.



Bregenz Floating Stage, Austria

A floating stage, with 7,000 seats, is the location for large-scale opera or musical performances on a stage over water on the shores of Lake Constance.



Serpentine River, London

Model boating forms a regular water activity in many cities. London is one such example where many of the local estuaries are used for riverside hobbies.



FLOOD MITIGATION EXAMPLES

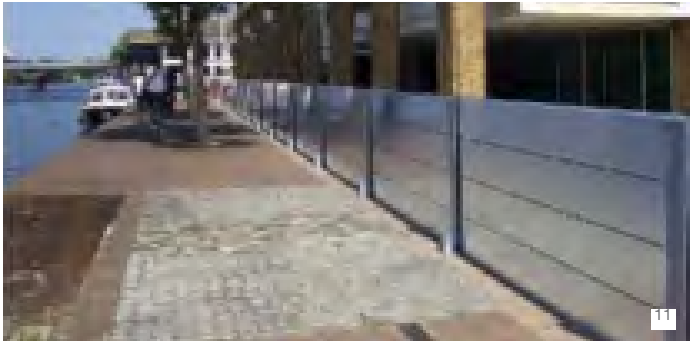
Nijmegen, Holland

- Improving conveyance and accommodation of flood flows.
- ‘Room for the River’ sets back the traditional levees and provides a greater river corridor to activate the river



Various Projects, United Kingdom

- Temporary and demountable defences used where there is sufficient warning time to erect structures



Hong Kong, China

- Use of upstream gauges and telemetry
- Acoustic warning delivered to local villages.
- Pre-determined alert level used



Venice, Italy

- Forecast Flood Center of Venice Italy – acoustic signals warn the population and visitors of Venice 3 hours before a flood reaching 110 cm.
- Signals start from 18 powerful sirens



IMAGE 5. Badeschiff, offline pool - Activation
IMAGE 6. Bregenz Floating Stage -
IMAGE 7 London, Curling Bridge - Activation
IMAGE 8. London, Water Activity - Activation
IMAGE 9. Nijmegen, Holland - River Corridor
IMAGE 10. Hong Kong, Flood Warning System
IMAGE 11. UK, demountable defences
IMAGE 12. Venice, Flooding



Appendix D - Design Elements

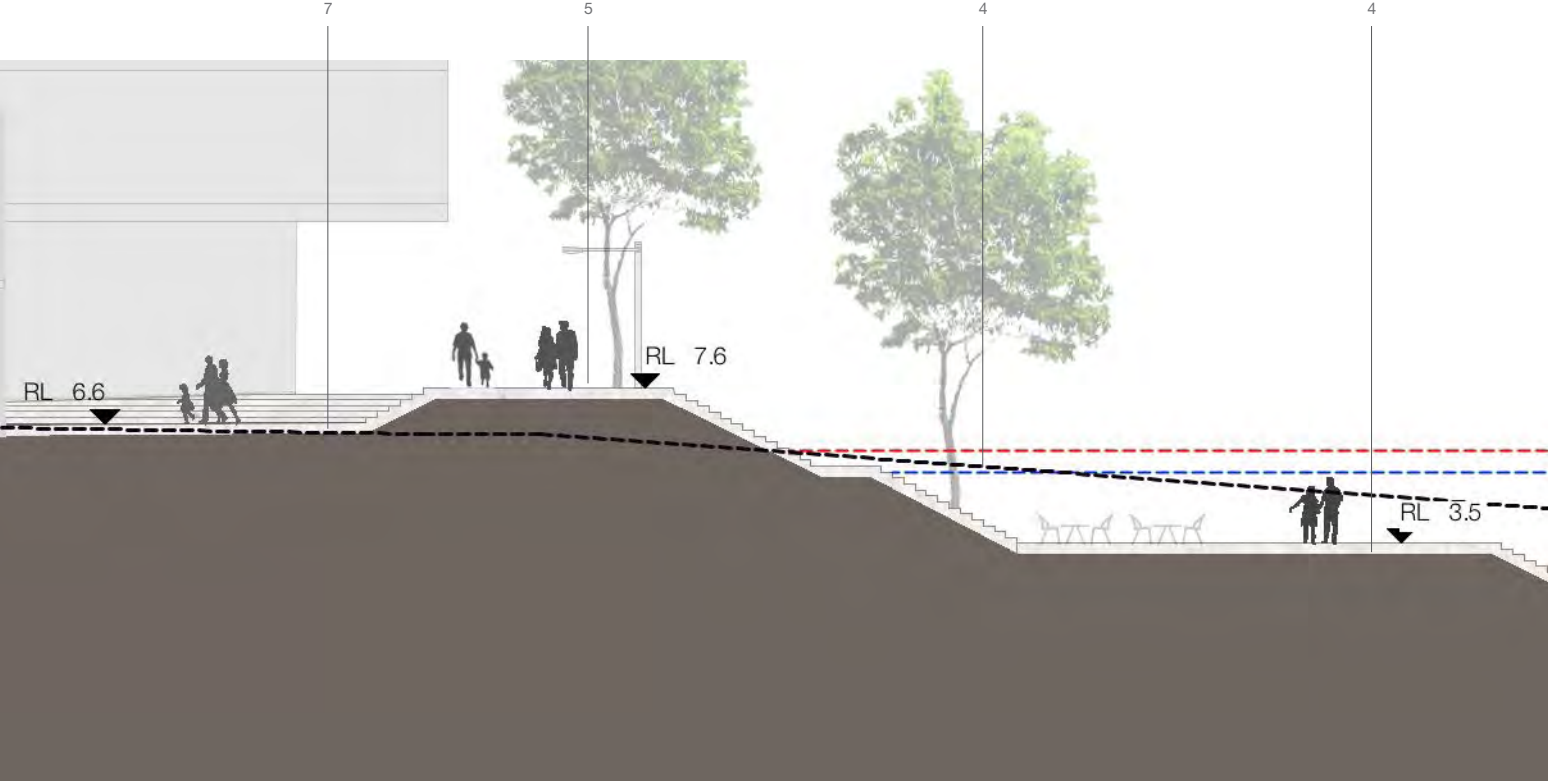
Appendix D - Design Elements

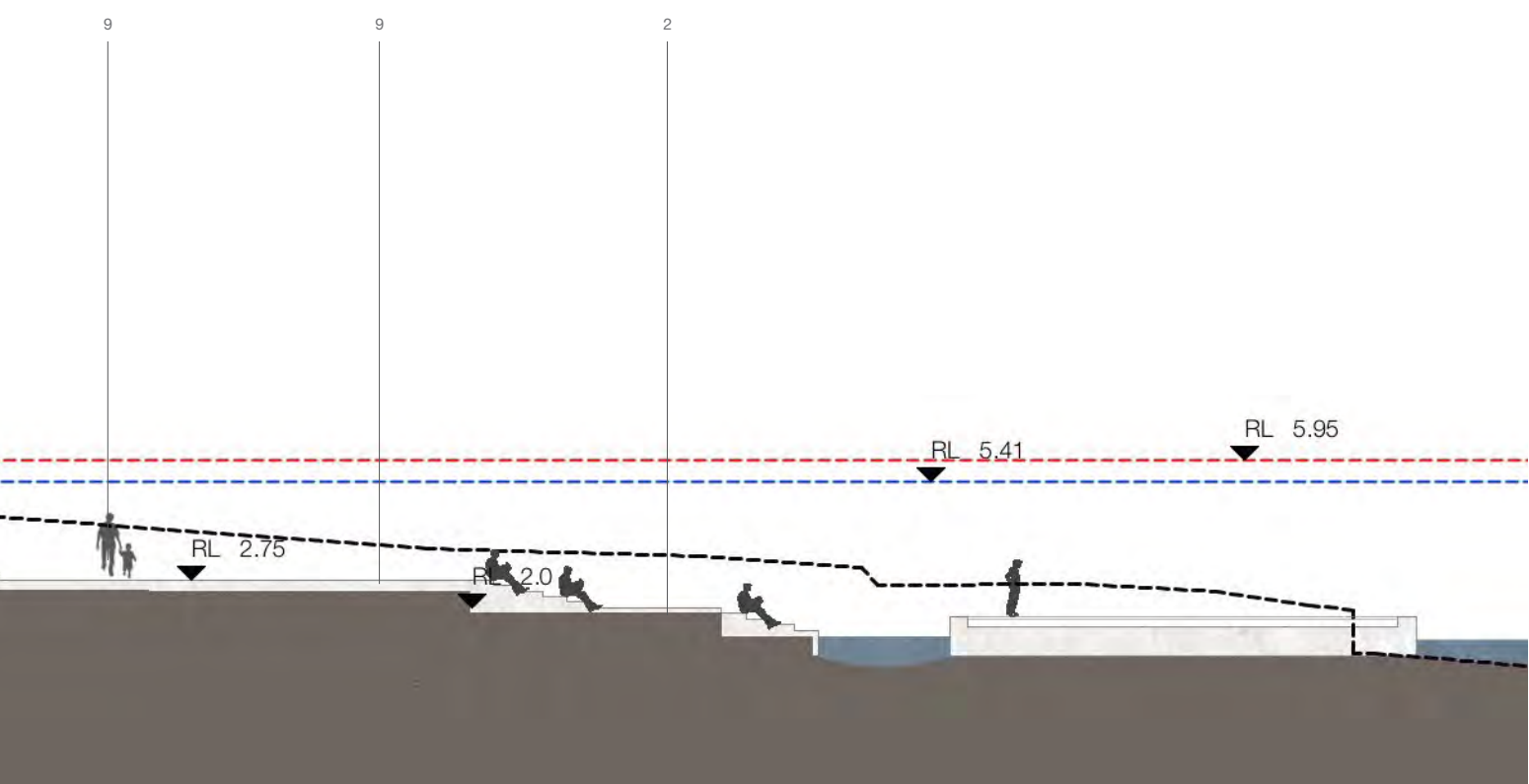
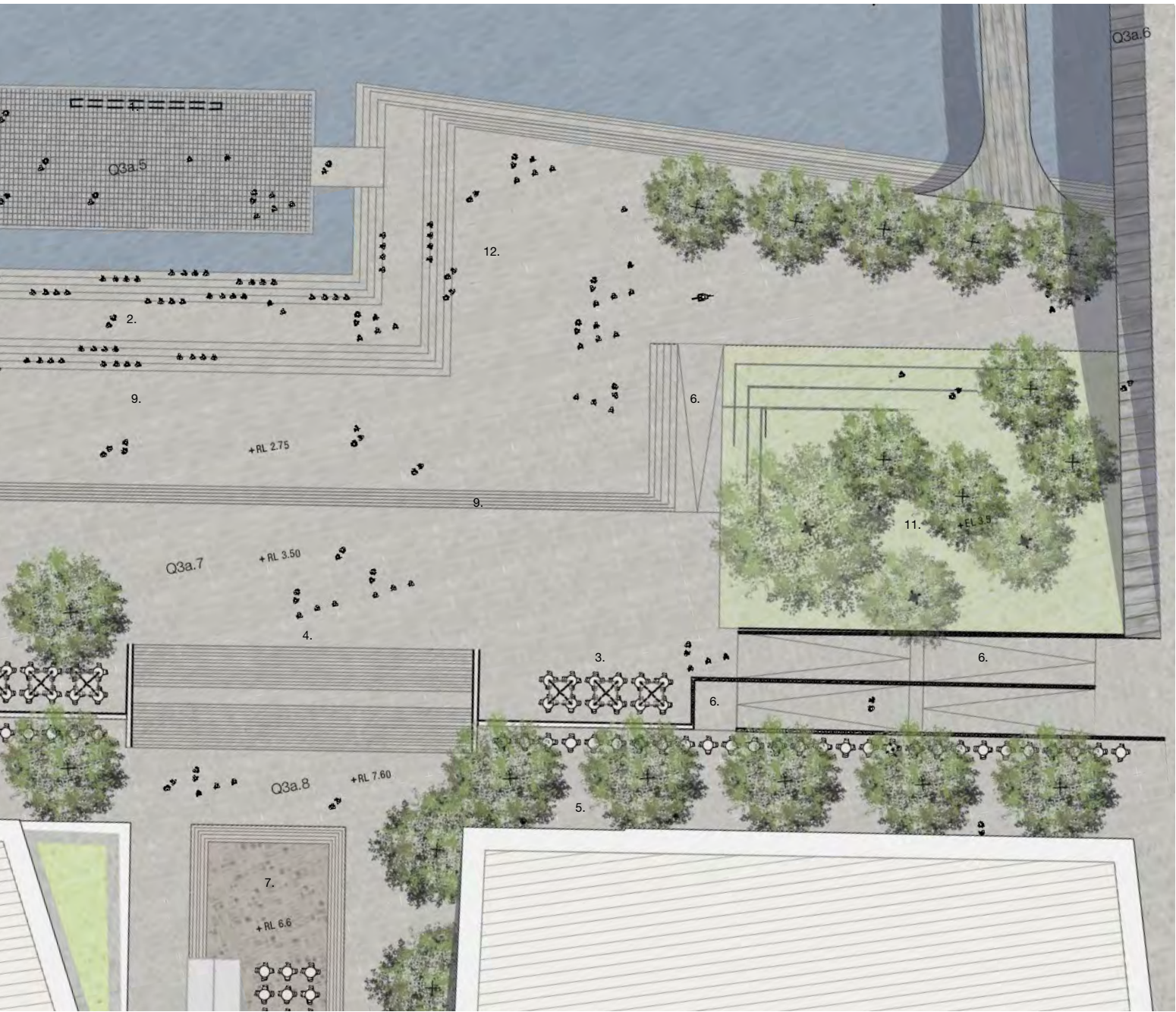
RIVER SQUARE

Design Ideas

- 1. Water Square Adaptable Floating Stage/Cinema
- 2. Water Square Public Space - In event mode this space includes all surrounding terraces and steps as well as viewing from the Grand Boulevard to accommodate 10,000 people.
- 3. Bunker Program - All Cafe/Retail Program on the mid level terrace/River Square Plaza is equipped with flood Resilient doors and temporary outdoor furniture which can be easily removed and stored in the case of flooding.
- 4. Grand Steps - The 'Grand Steps' continue the width of the Horwood Civic link though to River Square to maximise city connection and egress.
- 5. Grand Boulevard - Upper level Boulevard sits above the flood line and creates an easy look out over River Square Plaza and Water Square and is activated by river facing retail/dining.
- 6. Universal Accessible ramps - All ramps between lower, mid and upper levels provide universal access throughout the public domain.
- 7. Willow Grove – Proposed Plaza and Adaptive reuse – Proposed plaza to retain the original ground level of Willow Grove to create an intimate space and frame the heritage building.
- 8. Bunker Public Amenities - All public amenities such as toilets and change rooms are equipped with flood resilient doors.
- 9. Public Steps/seating - Forming a amphitheatre around Water Square, the plaza steps allow for informal movement and seating throughout the public domain.
- 10. River Square Plaza - Plaza scale designed to accommodate large crowds/events.
- 11. River Square Park
- 12. Water Square Maintenance Access
- 13. River Square Park
- 14. Water Square Maintenance Access

Note: Building form reflects future development potential and is indicative only.





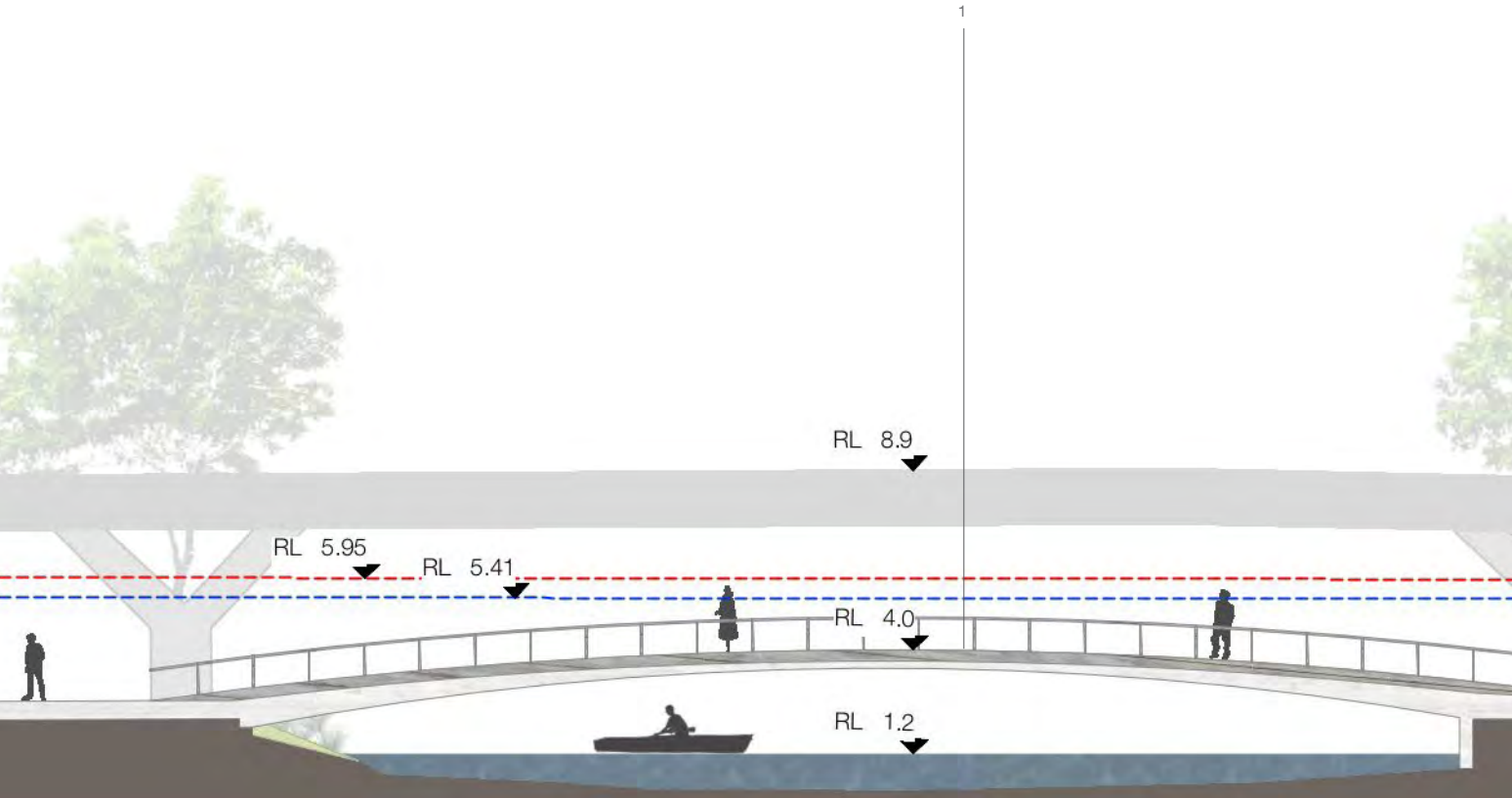
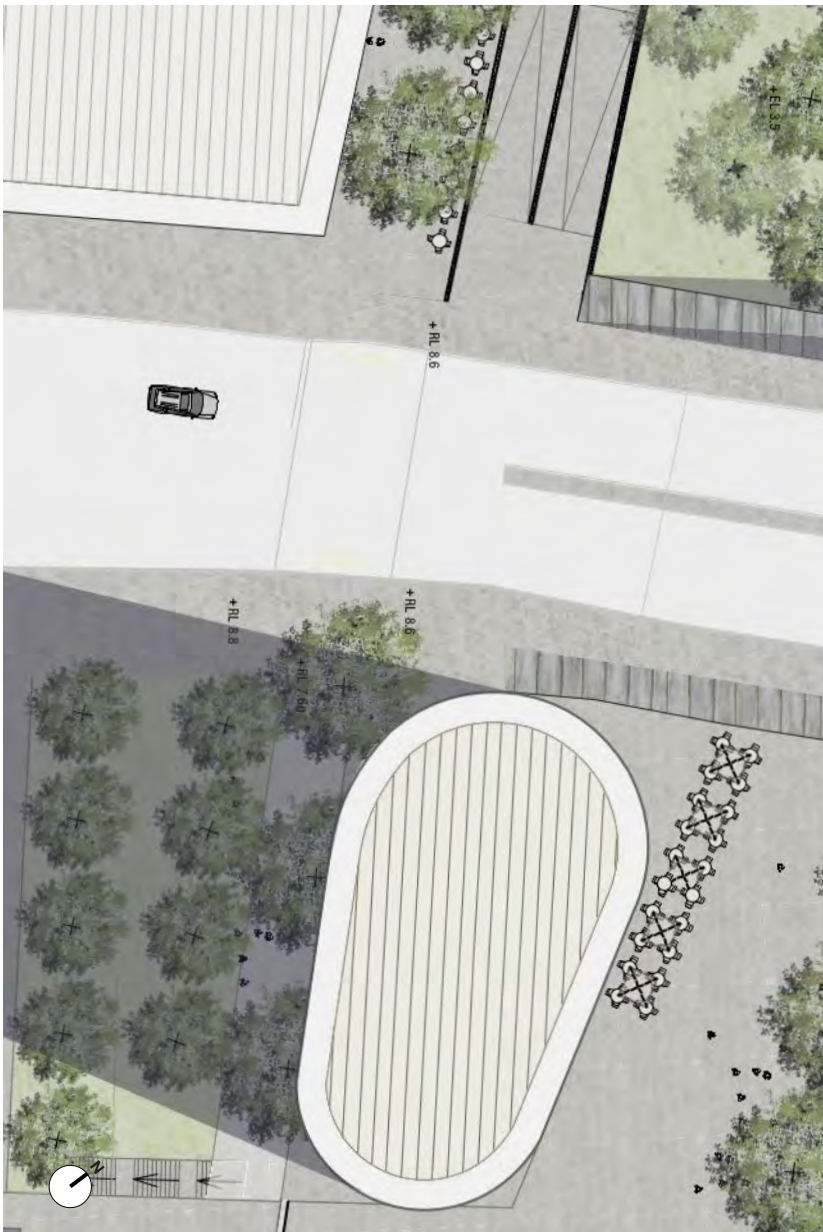
BARRY WILDE BRIDGE

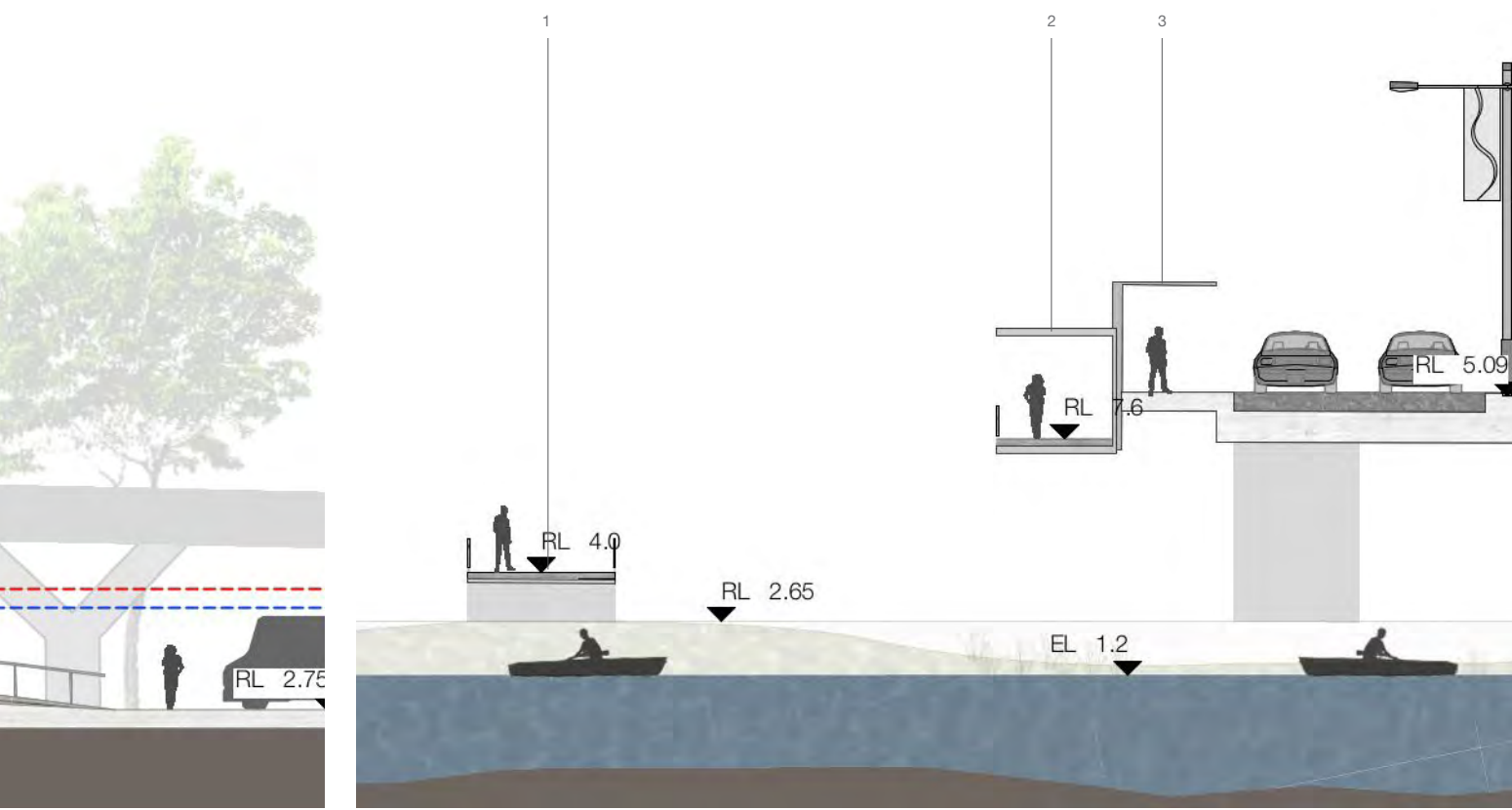
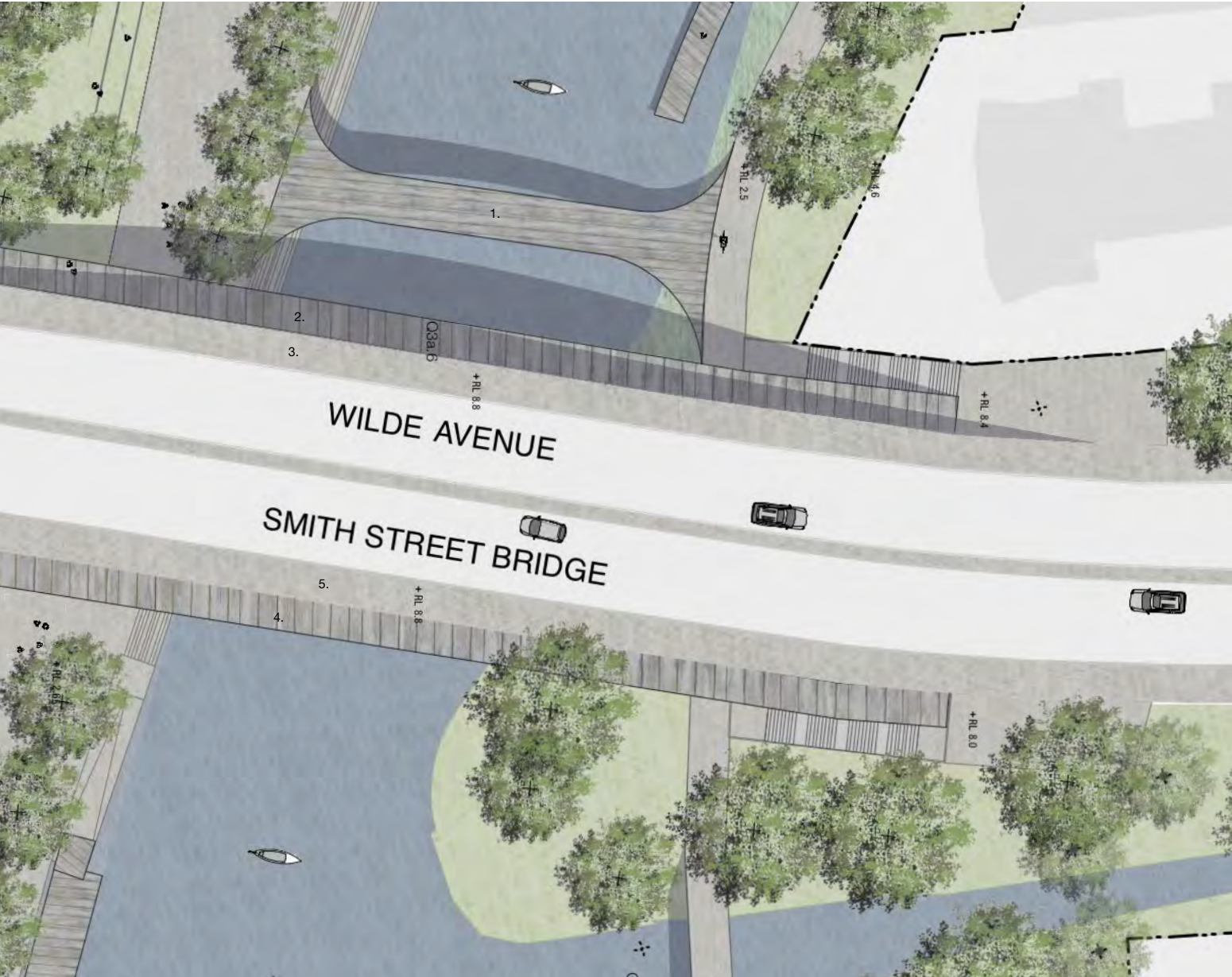
Design Ideas

- 1. Barry Wilde Shared Footbridge - Lower level flood resistant shared bridge allows for access between Parramatta Square and the North bank terraces, arc ramped at 1:14, peaks above water level to RL 4.0 to allowing for a 2.5-2.8m small boat clearance below.
- 2. Barry Wilde Bridge Pedestrian Connection West - An upper level pedestrian connection aesthetically enhances the bridge and separates pedestrian movement from heavy Wilde avenue traffic and roadside cycle movement.
- 3. Barry Wilde Bridge Cycle Connection West - An upper level road side cycle establishes a faster movement corridor for cyclists separated from pedestrian traffic.
- 4. Barry Wilde Bridge Pedestrian Connection East - An upper level pedestrian connection aesthetically enhances the bridge and separates pedestrian movement from heavy Wilde avenue traffic and roadside cycle movement.
- 5. Barry Wilde Bridge Cycle Connection East - An upper level road side cycle establishes a faster movement corridor for cyclists separated from pedestrian traffic.

Note:

- Building form reflects future development potential and is indicative only.
- Further structural testing is required for new bridge connections.



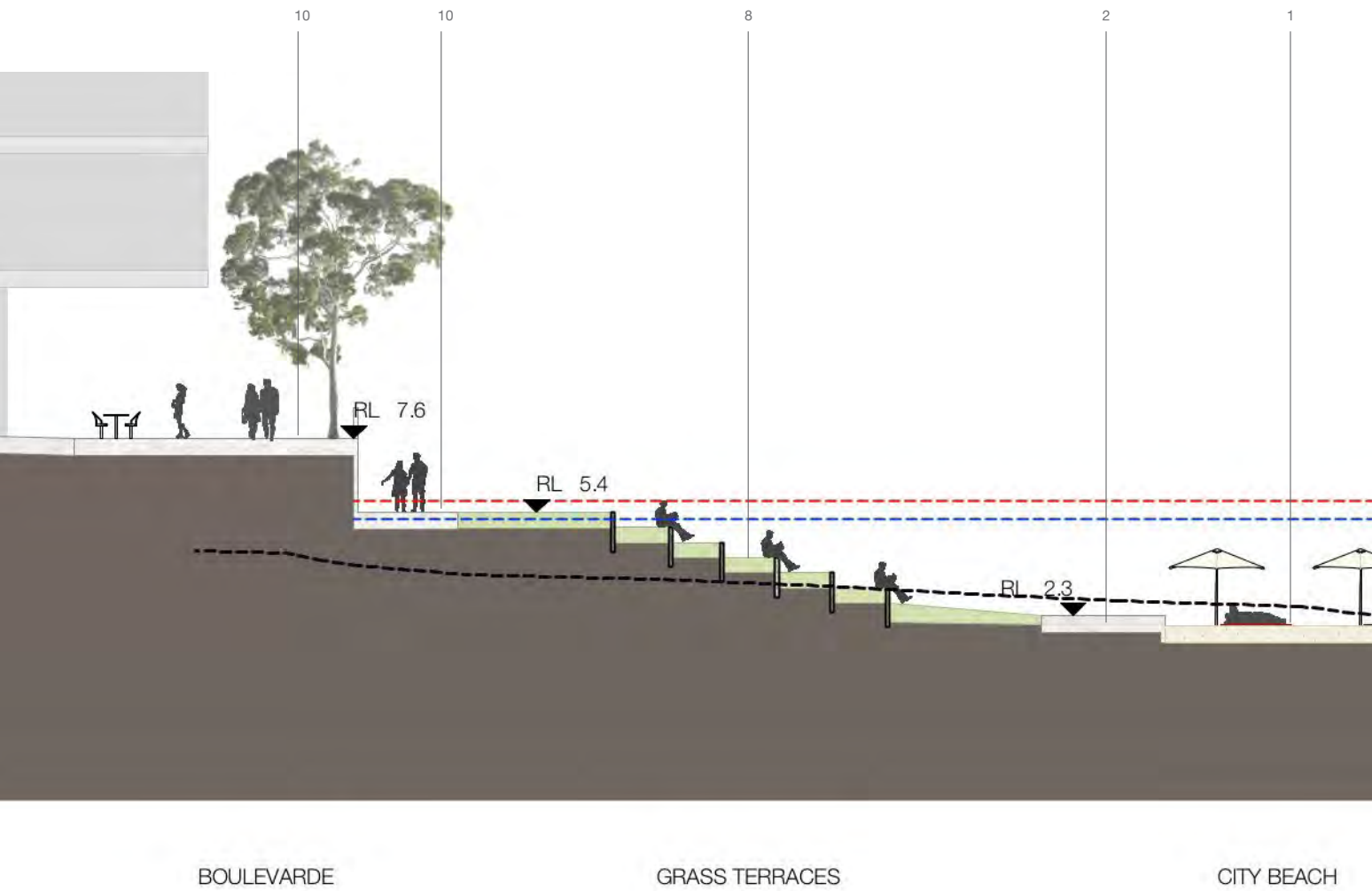
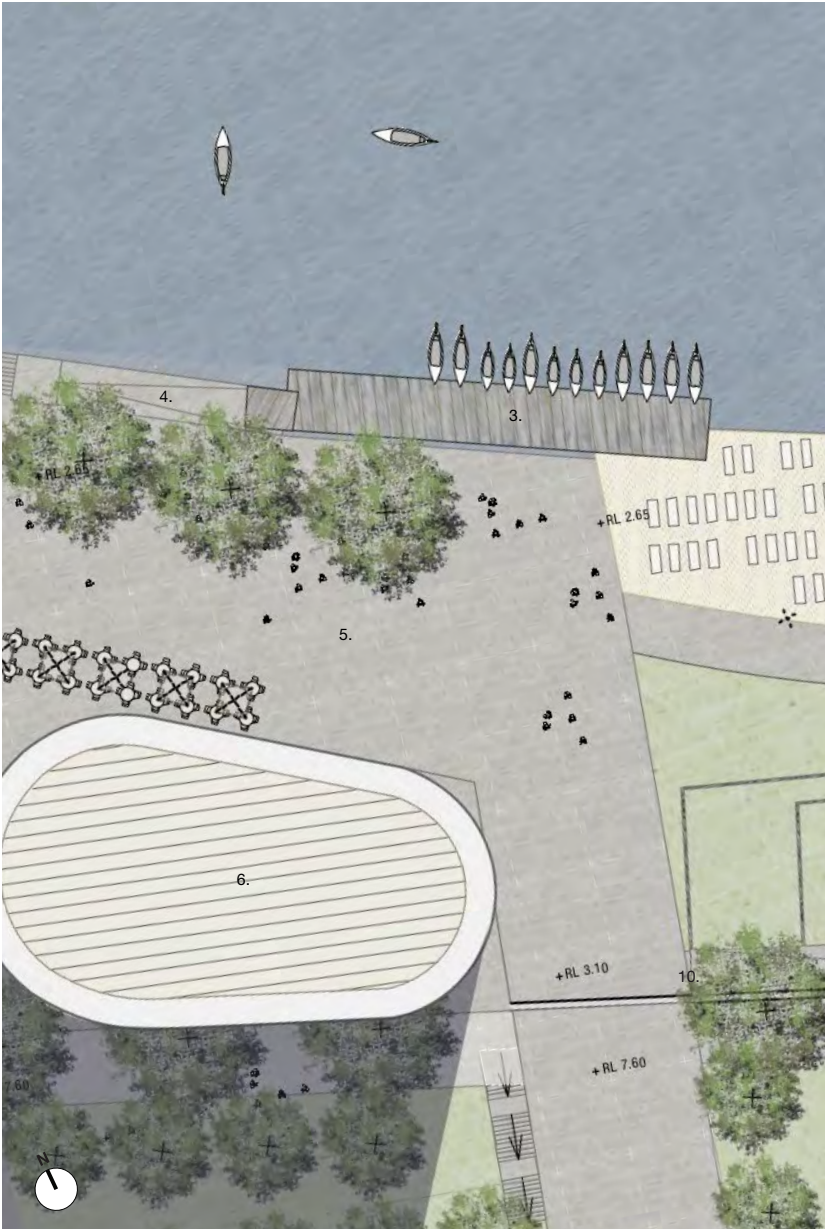


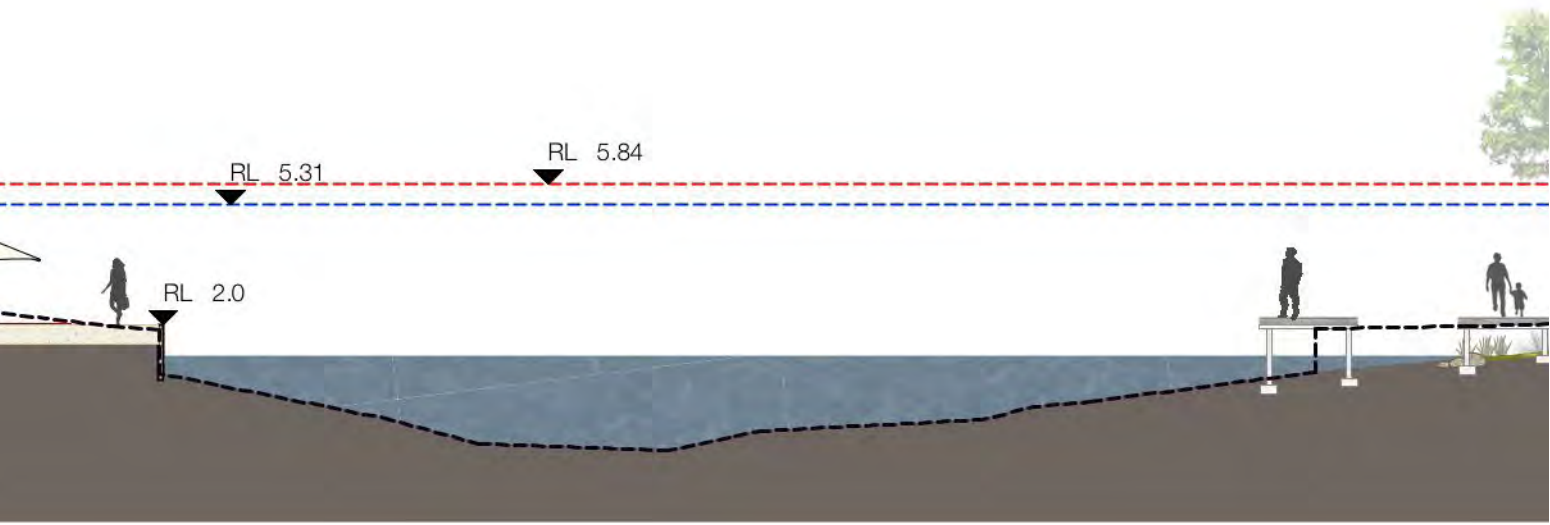
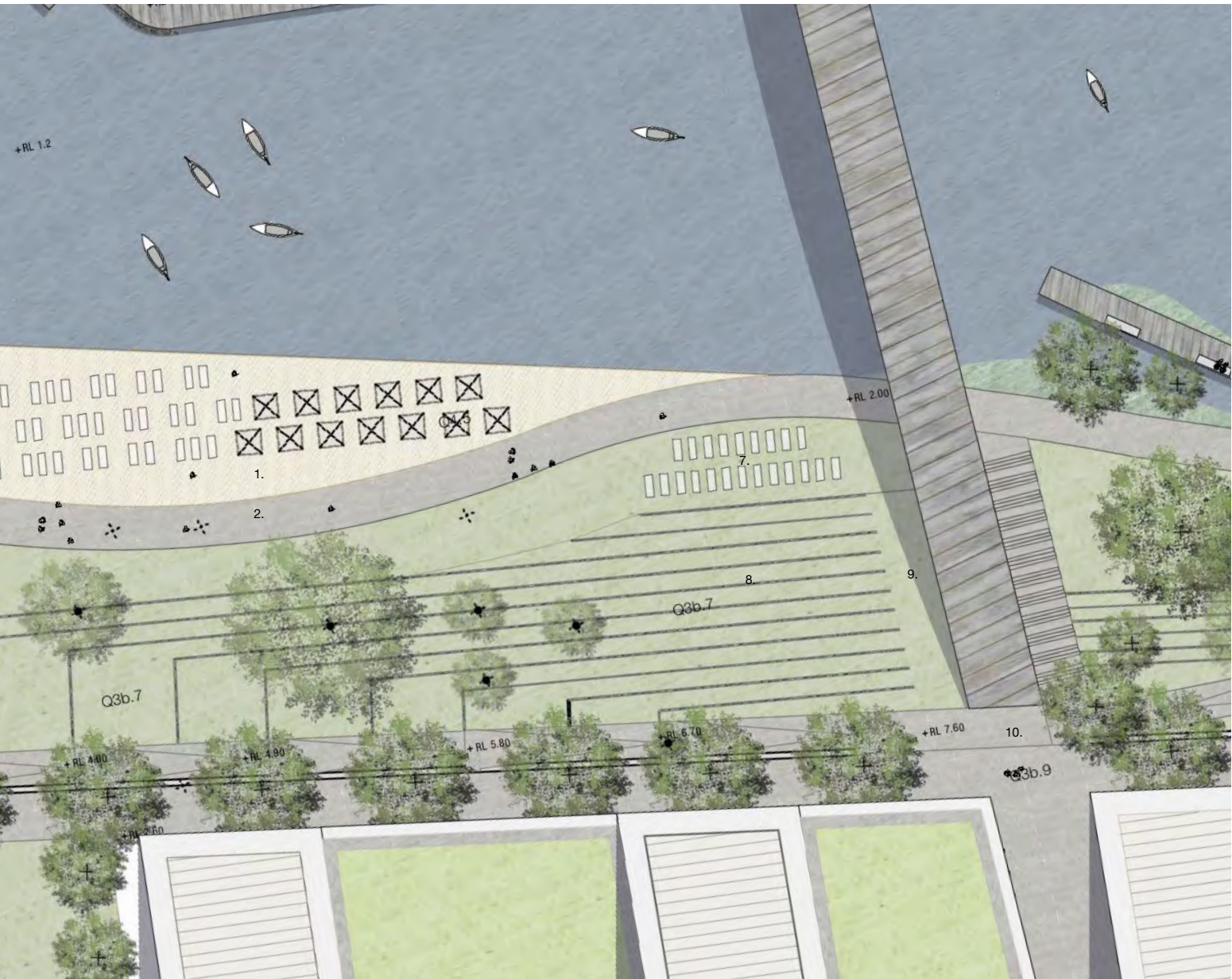
CITY BEACH

Design Ideas

- 1. City Beach - Public Beach for lounging, elevated from the river and equipped with flexible beach furniture which can be stored and rearranged depending on event mode/activity type. At present Parramatta river cannot be used for primary contact activities such as swimming, however providing future improvements to water quality could potentially allow for a safe swimming environment in the future..
- 2. Shared Path - Shared path separating beach edge from grass terraces.
- 3. Floating Boat Dock - Boat dock hub for recreational boating hire, departure and arrival.
- 4. Boat dock hard scape ramp.
- 5. City Beach Plaza
- 6. New Aboriginal cultural centre – Proposed cultural centre to be equipped with lower level storage for beach furniture and boats.
- 7. Grass lounge
- 8. City Beach grass Terraces.
- 9. Heritage Feature to be retained
- 10. Universal Access to Boulevard and Elizabeth Street Footbridge.

Note: Building form reflects future development potential and is indicative only.





- 100 Year Flood Level
- 20 Year Flood Level
- Existing Ground Level

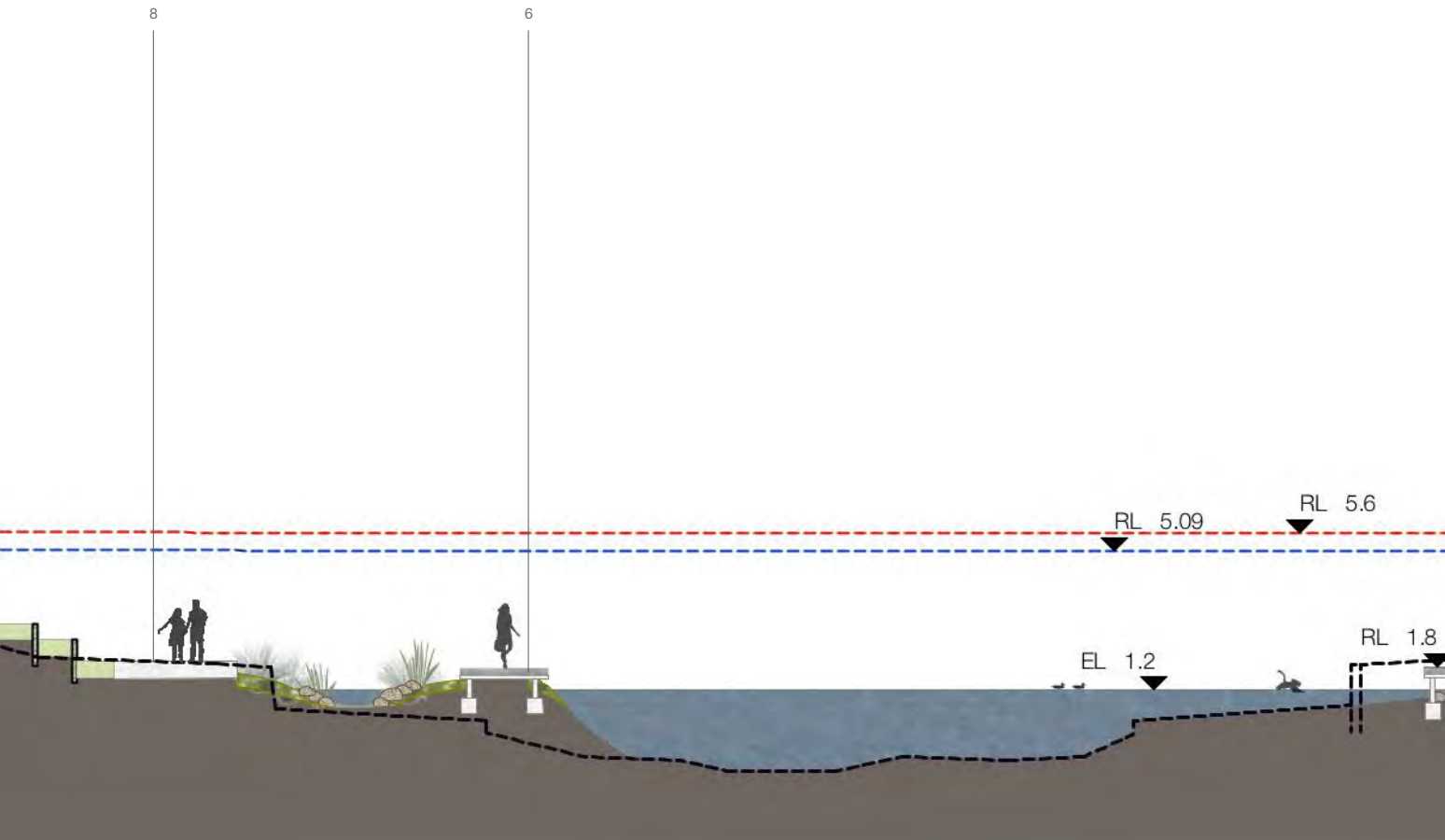
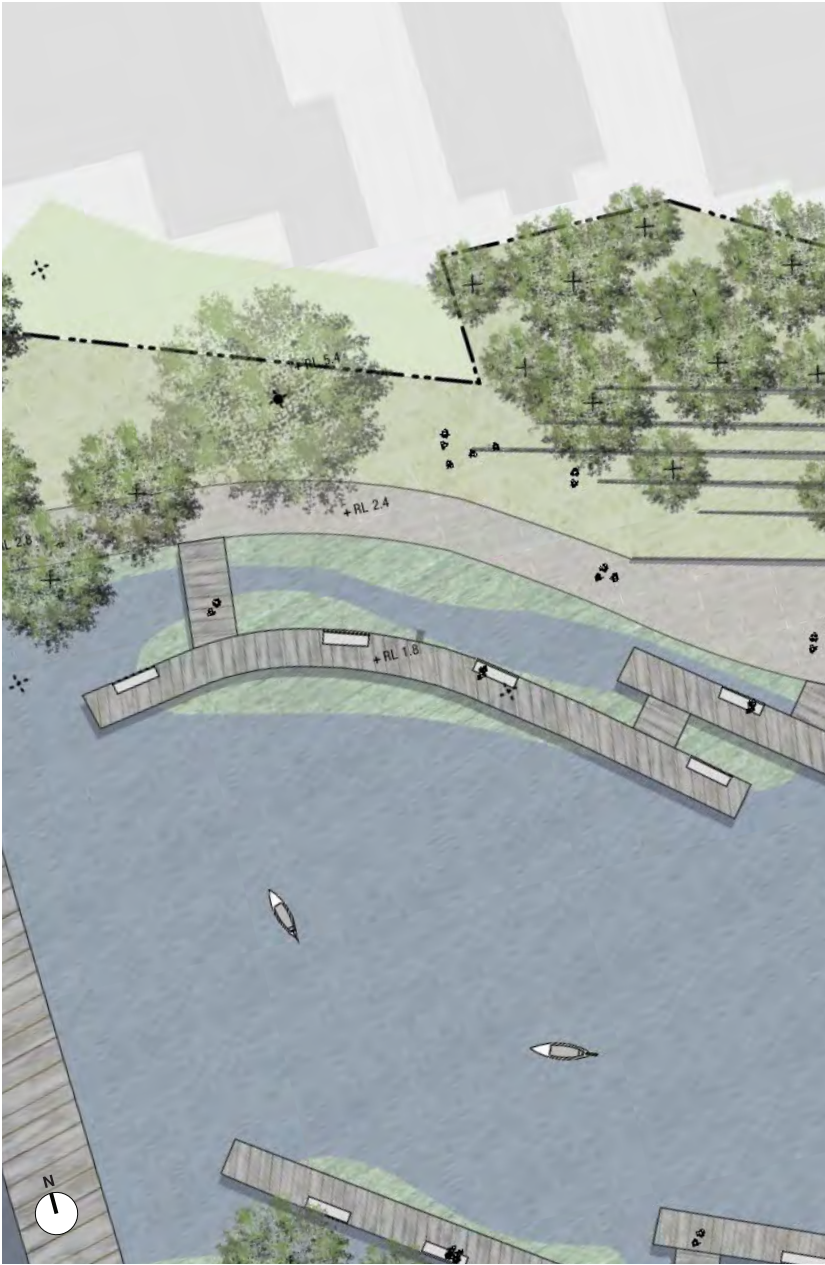
RIVER CORRIDOR

NORTH BANK TERRACE

Design Ideas

- 1. Access to Robertson Street - Ramped and stair access established between lower level riverside shared path and Queens Avenue.
- 2. Access to Queens Avenue - Ramped and stair access established between lower level riverside shared path and Robertson Street.
- 3. Universal Treetop Walk - Tree top walk links Robertson Street with Queens Avenue and provides universal access to terraces and lower level riverside public domain without affecting the flooding profile.
- 4. Terrace and Treetop Walk access ramp - Access ramp integrated seamlessly with foreshore terrace seating and Queens Street Access steps.
- 5. Terrace seating - Foreshore terraced seating allowing for public recreation and new riverside event focal point.
- 6. Foreshore Pedestrian Boardwalk
- 7. Coffee/Food Cart
- 8. Shared Path

Note: Building form reflects future development potential and is indicative only.



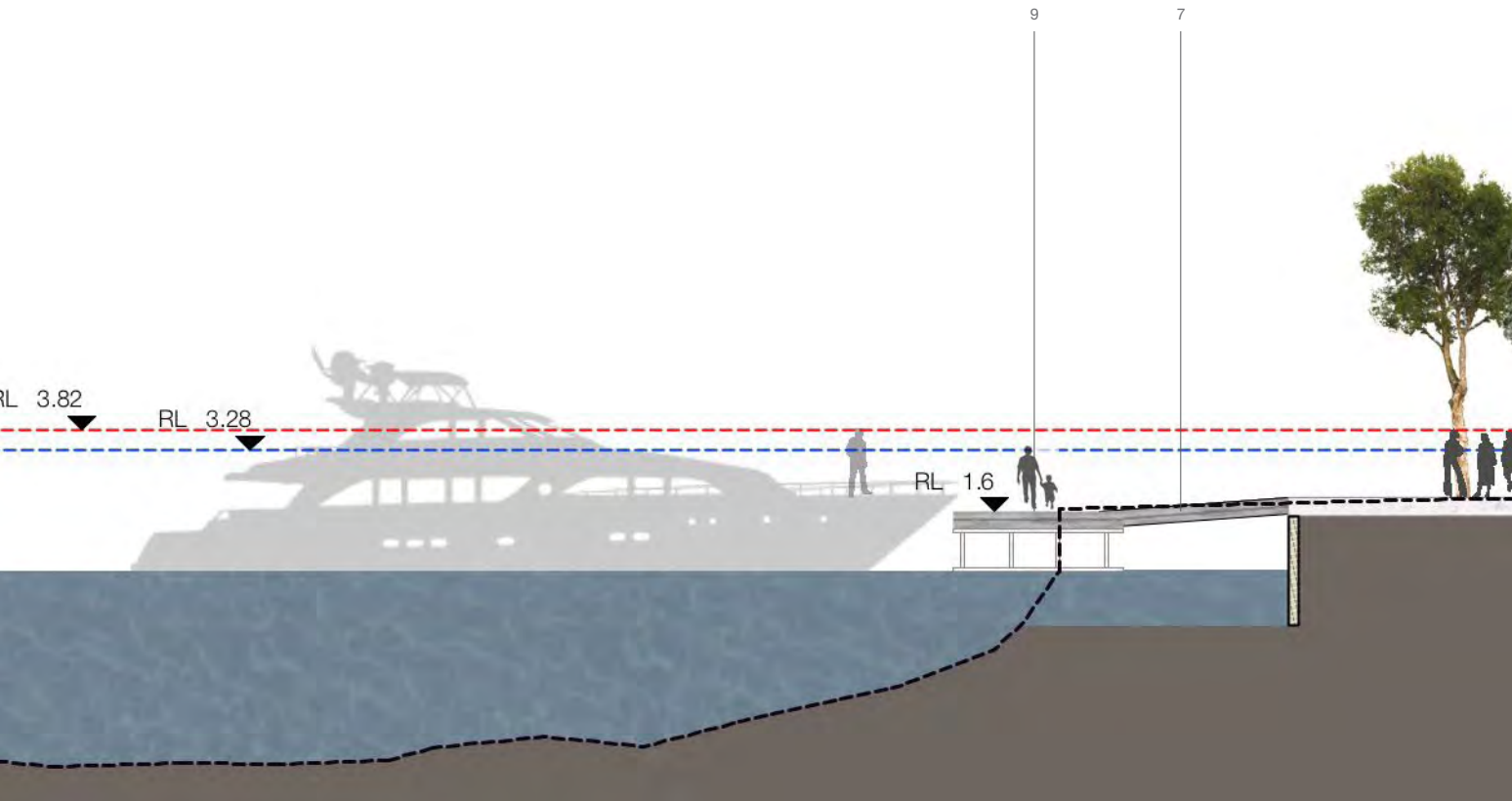
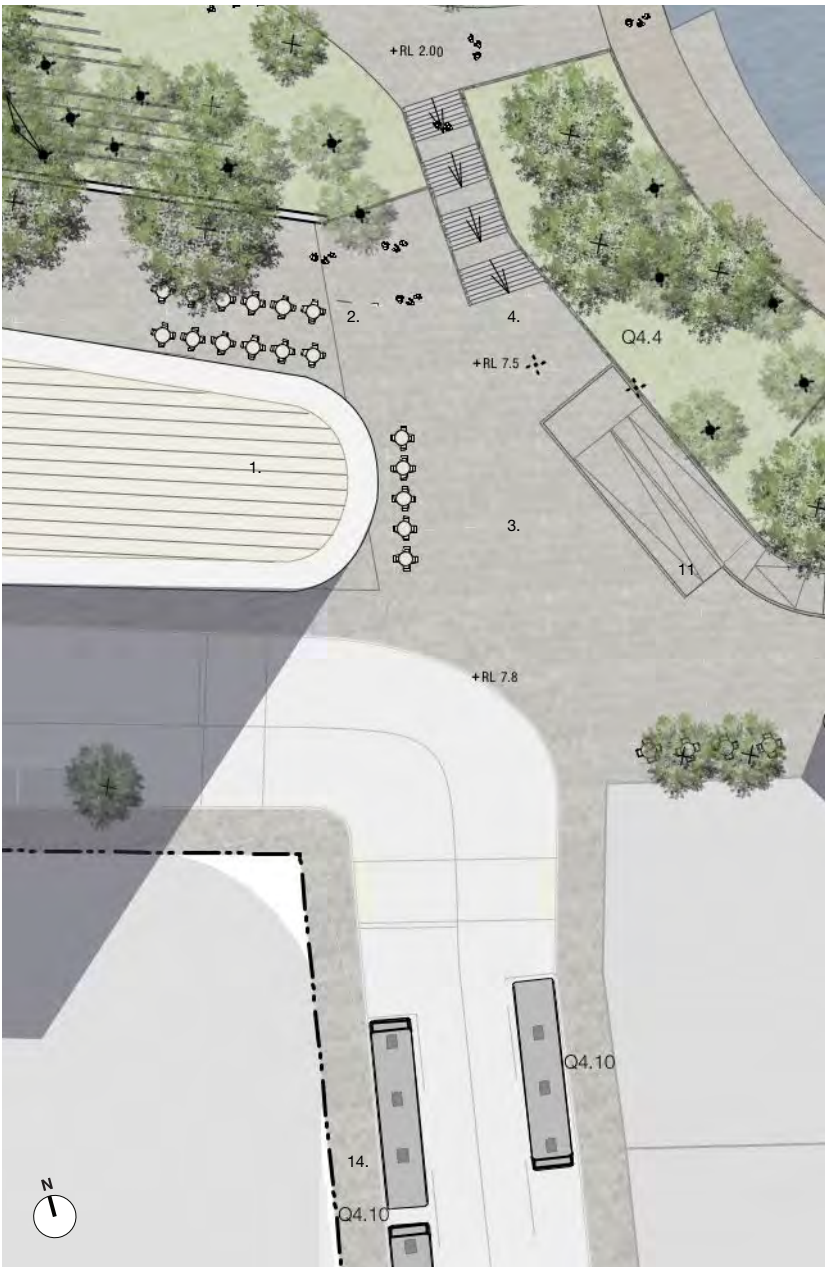


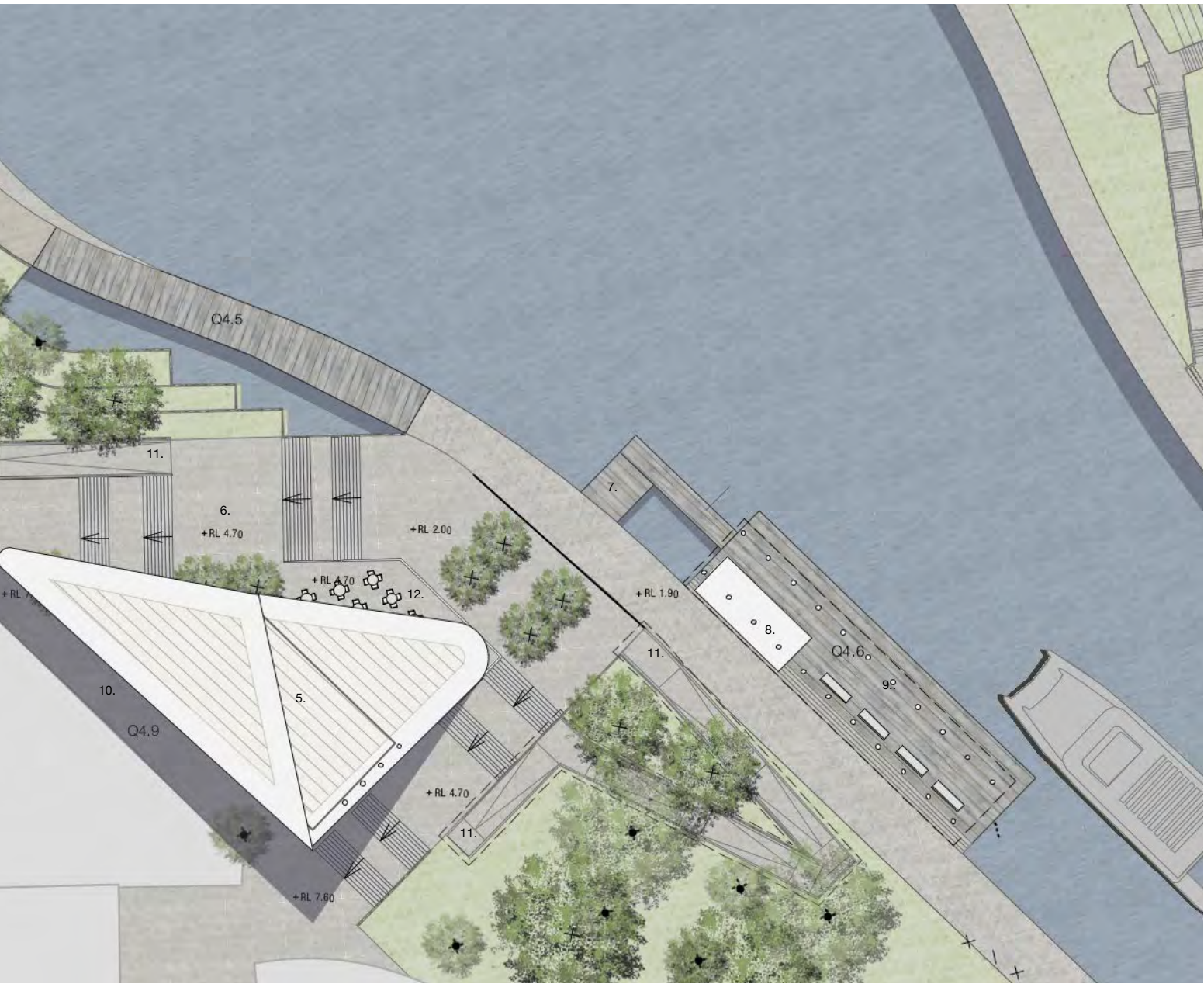
PARRAMATTA QUAY

Design Ideas

- 1. New Landmark Building – Proposed high quality flatiron form building would provide Parramatta with gateway landmark for arrival by ferry.
- 2. Boulevard Connection to Church Street Plaza
- 3. Church Street Plaza
- 4. Stair Access to Charles Street Weir.
- 5. New Landmark Parramatta Quay Arrival Centre/Cafe and dining.
- 6. Parramatta Quay Arrival Steps - Steps extend movement and alignment of Phillip street establishing a stronger link between the new ferry wharf and the city.
- 7. Parramatta Ferry Wharf Access Ramp
- 8. Parramatta Ferry Wharf building
- 9. New floating Wharf - Proposed high quality new wharf designed and positioned to meet the requirements of the ferry turning circle.
- 10. Active Laneway link
- 11. Universal access ramp between Upper, mid and lower public domain levels.
- 12. Parramatta Quay Outdoor dining plaza - Outdoor dining with views over the ferry wharf and harbour to the weir and natural escarpment.

Note: Building form reflects future development potential and is indicative only.





- 100 Year Flood Level
- 20 Year Flood Level
- Existing Ground Level

RIVER EDGE DETAIL

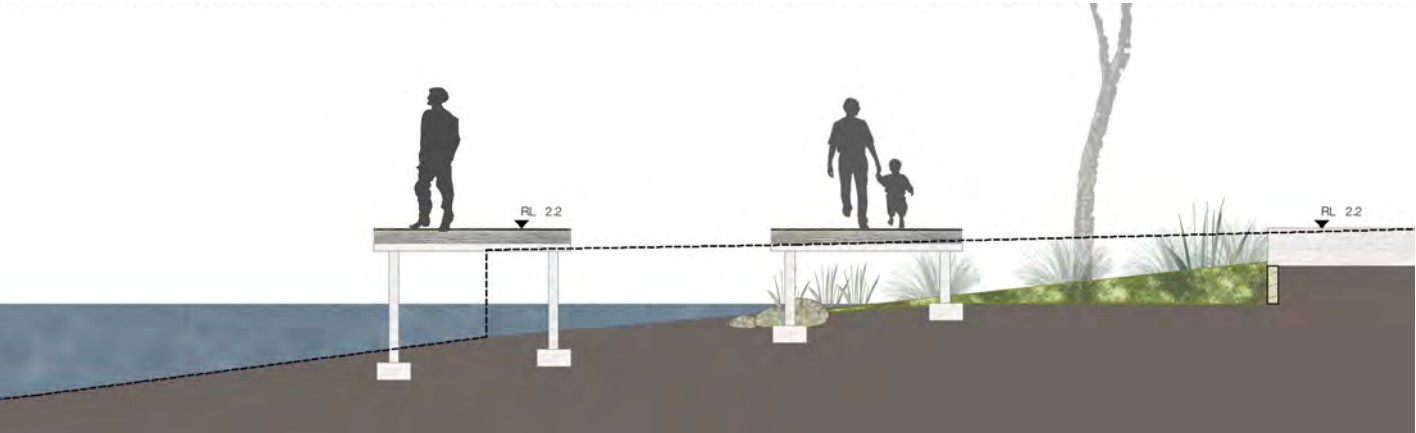
Design Ideas

The Master plan is characterised by a series of different approaches to treating the river edge, these work together to ensure overall site amenity and requirements though consistent material and landscape character, safety and flood resilience, and improving water quality and habitats while strengthening the unique characteristics of each precinct. These details are as follows;

Boardwalk & Naturalised River Edge 1

Location: Various points across Precincts 1 & 3.

- Removed river edge for riverside pedestrian and cycle movement.
- Raised boardwalk above river.
- Raised boardwalk over naturalised embankment

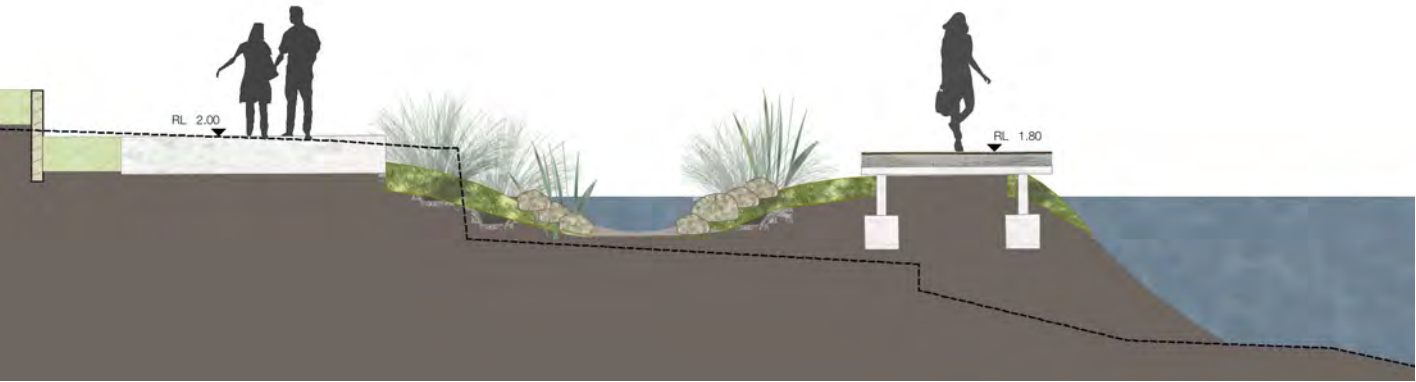


Boardwalk & Naturalised River Edge 2

Location: Various points across Precincts 1 & 3.

- Removed linear river edge for riverside pedestrian and cycle movement edge.
- Developed mounds of natural vegetation to create wetland channels between river boardwalk and public

- domain edge.
- Channel vegetation to provide natural bio-filtration enhancing water quality.
- Mounds may incorporate boardwalk paths.



Boardwalk & Naturalised River Edge 2

Location: Various points across Precincts 1 & 3.

- Removed linear river edge for varied riverside pedestrian and cycle movement edge.
- Retaining wall to support naturalised endemic embankment

- Raised boardwalks at stepped lower levels slightly elevated over the embankment and river edge for closer engagement with the river and separation from shared way.

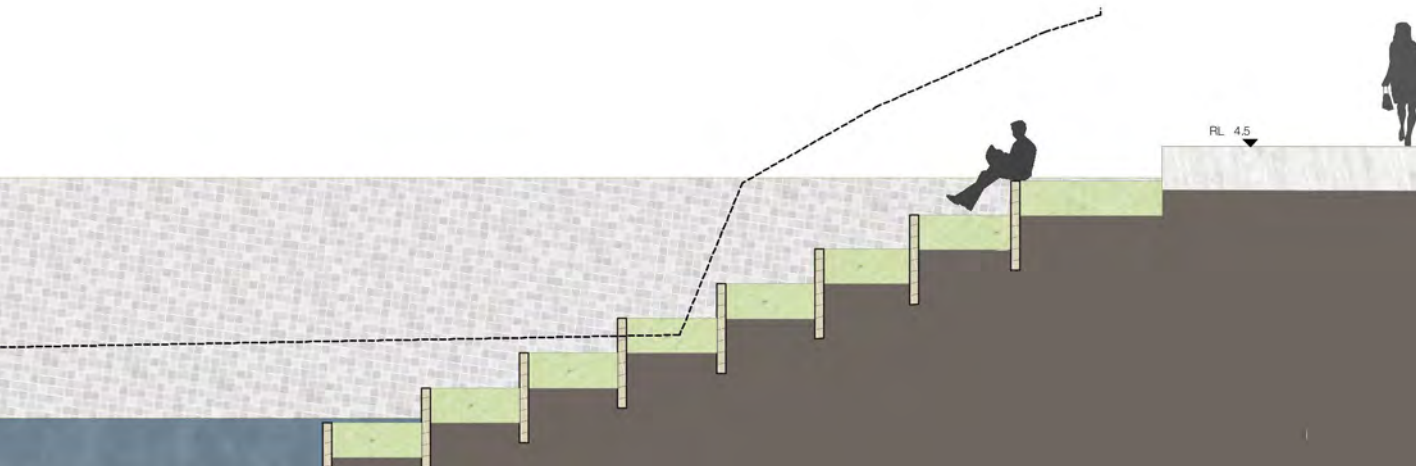


Grass Terraced Edge

Location: Precinct 2

- Removal of existing retaining wall and graded landscape.
- Develop Grass terraces for public seating at 450mm drop from RL 4.5 stepping down into the river.

- Terrace edge creates riverside amphitheatre/potential event space and riverside seating of bunker cafe & dining.

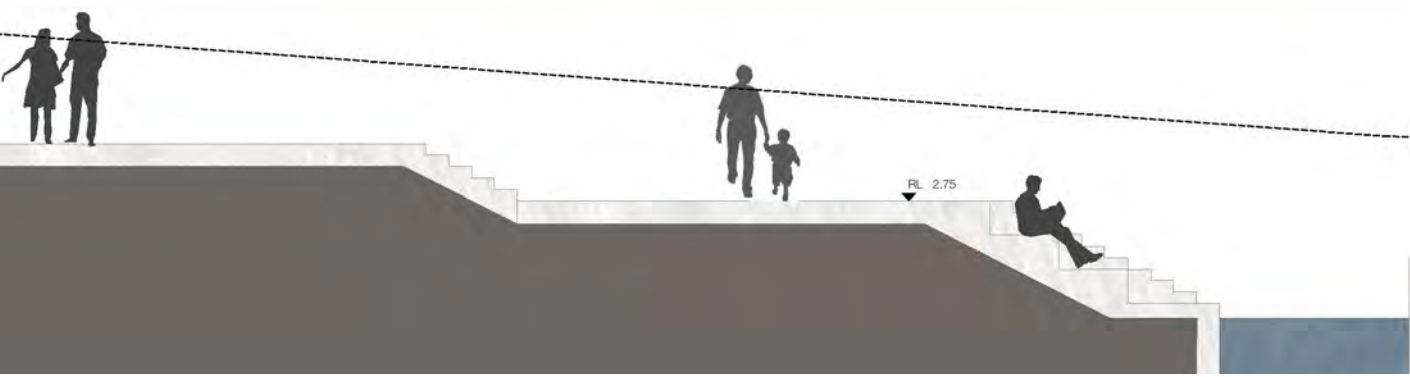


River Step Edge

Location: Precinct 3, River Square and Adjacent public domain.

- Removal of existing linear river edge.
- Removal of natural embankment for hardscape works

- Standard hard scape 150mm steps dropping down from shared path to below waters edge creating stepped river side seating.
- Steps descend to water surface

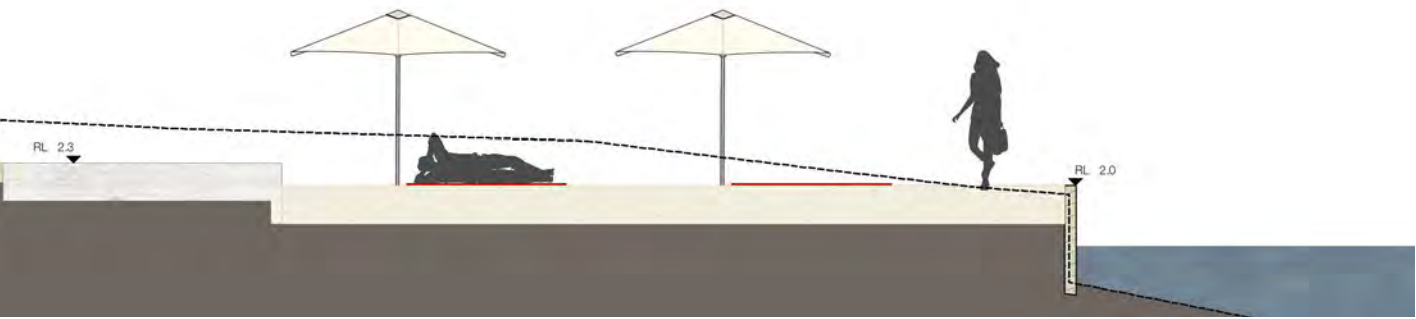


City Beach Edge

Location: Precinct 3

- Retain existing river edge profile.
- Replace existing retaining wall.
- Narrow retaining wall separate and elevates the beach

sand from the rivers edge creating the visual connection of a riverside beach while deterring primary contact with the river.



--- Existing Ground Level

