

Brisbane City Council

Kangaroo Point Riverwalk Options Analysis and Concept Design

Options Analysis Report

Reference: NR [REDACTED]

Rev 1 | 23 June 2023



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Job number: NR [REDACTED]

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Released under RTI - DTMR

1. Introduction

Arup has been commissioned by Brisbane City Council (BCC) to undertake the Options Analysis (OA) and Concept Design (CD) for the Kangaroo Point Riverwalk project, to connect Captain Burke Park (Kangaroo Point) and Mowbray Park (East Brisbane) with a continuous link catering to cyclists, pedestrians and other active transport modes. This project aims to address the “missing link” in the existing cycling and pedestrian network, as identified by the cycling community, the Department of Transport and Main Roads (TMR) and BCC.

1.1 Study purpose

TMR and BCC are committed to providing safe cycling infrastructure to encourage mode shift towards more sustainable modes of transport. Council is currently completing the draft Active Transport Network Plan (ATNP), a review of Brisbane’s Bicycle Network Overlay in City Plan, to improve network connectivity and safety. Through this review and from feedback received from the cycling community, TMR and BCC are aware of a “missing link” in the network of existing cycling infrastructure between Kangaroo Point and East Brisbane. The Kangaroo Point community requires new infrastructure to improve connectivity for all active transport modes and encourage sustainable travel within a rapidly changing inner city region.

The Kangaroo Point Riverwalk has committed funding within the 2020-2024 State budget and the project is listed in Queensland Transport and Roads Investment Program (QTRIP) as a high priority project to “fill pathway network gaps to create an unbroken bike and pedestrian path between Captain Burke Park, Kangaroo Point and Mowbray Park, East Brisbane”.

The study shall develop a preferred walking and riding connection between Frank Nicklin Dry Dock (Kangaroo Point) and Mowbray Park (East Brisbane), and between Frank Nicklin Dry Dock and the future Deakin Street underpass, which links to the Kangaroo Point Green bridge which is currently under construction. The project will maximise access and return on investment from the Kangaroo Point Green bridge by providing a key connection to the Deakin Street underpass access and fill a critical gap in the active transport network. The study will also identify enhancement opportunities for the existing promenade from Park Avenue at Mowbray Park to the north for approximately 240m towards the Frank Nicklin Dry Dock. It is essential that options cater for e-mobility use under the current road rules.

The study will comprehend the current and future issues, constraints, and opportunities, and determine prospective infrastructure upgrade solutions for the study area. The study will then develop a concept design for the recommended upgrade options with high level cost-benefit analysis. The conclusions will be used to inform TMR and Council’s forward program, project prioritisation and determine the requirements for the next stages of planning and design.

The purpose of the study is to:

- Improve the safety of all road users through the introduction of infrastructure for pedestrians (including wheelchairs, prams etc.), cyclists and e-mobility users which is separated from road vehicles.
- Improve pedestrian, cyclist, and e-mobility access through the provision of a high-quality facility that connects to the surrounding active and public transport network. The facility shall establish a continuous walking and riding connection between Frank Nicklin Dry Dock, Kangaroo Point and Mowbray Park, East Brisbane, and between Frank Nicklin Dry Dock and the future Deakin Street underpass. The study will also identify enhancement opportunities for the existing promenade from Park Avenue at Mowbray Park to the north towards the Frank Nicklin Dry Dock.
- Limit impact on transport network efficiency through the consideration of all modes in current and future scenarios.
- Complement the public transport network to ensure multi-modal connectivity is supported.

1.2 Delivery objectives and milestones

To achieve the purpose of the study, BCC has defined the following key delivery objectives and milestones:

- Ensure that suitable options for the Riverwalk are recommended, which appropriately address the key challenges identified by Council and the project team.
- Review existing planning, projects, and data.
- Consider existing and future active transport needs.
- Identify and review network gaps, deficiencies, opportunities, and constraints, including mapping.
- Develop up to three treatment options for active transport facilities to address the needs of all users.
- Prepare a multi-criteria analysis (MCA) to determine the preferred option(s).
- Prepare high-level concept plans and cost estimates for the preferred option(s), including land requirements.
- Recommend staged project delivery options, including identification of “quick wins” that could be delivered within a timeframe of 1-2 years, subject to funding.

1.3 Background

Over the past decade, BCC has released strategies specific to Kangaroo Point, such as the *River's Edge Strategy*, the *Kangaroo Point Peninsula Draft Renewal Strategy*, and the *Kangaroo Point Peninsula Neighbourhood Plan*. These documents outline the community's desire for increased active transport connectivity along the Kangaroo Point peninsula and surrounding inner-city precincts. This has created an opportunity to improve the existing network and deliver new infrastructure.

Through the strategies mentioned above, a missing active transport link has been identified between the Frank Nicklin Dry Dock and Mowbray Park. The Kangaroo Point Riverwalk project aims to address the missing link through improved access and activity along the Brisbane River. The project also aims to identify opportunities for enhancement along the existing promenade section from Park Avenue at Mowbray Park to the north towards the Frank Nicklin Dry Dock, as well as developing a connection to the Kangaroo Point Green Bridge project via Cairns Street and Deakin Street. Further opportunities for enhancing the existing promenade between Captain Burke Park and the Frank Nicklin Dry Dock will also be identified.

1.4 Study area

The study area spans from Captain Burke Park in Kangaroo Point to Mowbray Park in East Brisbane and is divided into three extents, as shown in Figure 1:

- *Study extent A* represents the missing link in the active transport network, between Frank Nicklin Dry Dock to Mowbray Park (and the existing active transport facility along Lytton Road). The project aims to provide a continuous active transport facility between these areas and to the broader active transport network.
- *Study extent B* represents the existing Kangaroo Point Riverwalk between Captain Burke Park and the Frank Nicklin Dry Dock. The project seeks to identify opportunities for enhancements to the existing infrastructure.
- *Study extent C* represents the link between the Kangaroo Point Riverwalk project to the future Kangaroo Point Green Bridge via the Deakin Street / Main Street active transport underpass, which is currently under construction.



Figure 1: Study area extent (BCC, 2022)

1.5 Purpose of report

The Kangaroo Point Riverwalk project has four phases, as listed below.

- Phase 1: Strategic context
- Phase 2: Strategic assessment
- Phase 3: Technical assessment
- Phase 4: Options analysis report (current phase of project)

The purpose of this Options Analysis Report is to collate all the material that was prepared as part of the previous phase of the project. The intent is to limit the amount of duplicate material and to provide a summary that guides readers towards the information that they are seeking.

2. Strategic context

2.1 Purpose

The *Strategic Context Working Paper* NR [REDACTED] can be found in Appendix A.1. The report achieved the following:

1. Reviewed relevant policies, planning and strategy documents to ensure integration and alignment between the key project objectives and the strategic direction for the project area.
2. Reviewed existing conditions including land use planning, existing transport infrastructure and road safety history.
3. Identified key opportunities such as existing, planned and proposed active transport infrastructure (including proposals in conjunction with other transport projects) and constraints to help inform the basis of design for the OA and CD.
4. Justified the project rationale.
5. Collated all findings from the Strategic Context phase of the project.

2.2 Content

The contents from the *Strategic Context Working Paper* NR [REDACTED] are summarised in Table 1. The appendices of the report have been removed and collated within Appendix A of this report.

Table 1: Strategic context contents

Heading	Title	Description
1	Introduction	Presents the same information as this report. It includes the study purpose, delivery objectives and milestones, background, study area and purpose of report.
2	Gap analysis	Includes a review of state and local policies, plans, and strategies. It also considers future projects and current transport conditions.
3	Movement and place	Includes a review of land use integration, as well as key challenges related to movement and place.
4	Environment and cultural heritage	Includes the review findings from the initial planning and environmental advice provided by Council.
5	Stormwater, flooding and maritime	Includes the preliminary assessment of stormwater, flooding and maritime considerations.
6	Opportunities and constraints	Includes key observations from the initial site visits, as well as a summary of opportunities and constraints
7	Project rationale	Summarises the key aspects of the report and highlights the elements that form part of the project rationale.
8	Basis of design	Includes details of the design standards and performance criteria that were applied to the development of design options.

3. Strategic assessment

3.1 Purpose

The *Strategic Assessment Working Paper* ^{NR} [redacted] can be found in Appendix B.1. The report achieved the following:

1. Discussed the considerations that drove the route development and assessment criteria.
2. Developed active transport alignment options for each of the study areas.
3. Developed assessment criteria to identify the preferred option/s.
4. Documented the outcomes from the multi-criteria analysis (MCA) workshop.
5. Documented the findings of additional investigations to address risks identified during and following the MCA workshop.
6. Collated all findings from the Strategic Assessment phase of the project.

3.2 Content

The contents from the *Strategic Assessment Working Paper* ^{NR} [redacted] are summarised in Table 2. The appendices of the report have been removed and collated within Appendix B of this report.

Table 2: Strategic assessment contents

Heading	Title	Description
1	Introduction	Presents the same information as this report. It includes the study purpose, delivery objectives and milestones, background, study area and purpose of report.
2	Route development and assessment considerations	Includes details of how the project qualifies for the Cycle Network Local Government Grants Program. It also includes a summary of the project justification and desirable criteria to guide the project.
3	Route alignment options	Includes a summary of all the route alignments that were identified. It also includes potential alignment options through Mowbray Park.
4	Planning, environment and cultural heritage	Includes a summary of the planning, land-use, environment and cultural heritage considerations used to identify opportunities and constraints associated with the route alignment options.
5	Urban design and architecture	Includes a review of the urban design and architecture considerations associated with the route alignment options.
6	Stormwater, flooding and maritime	Includes a review of the stormwater, flooding and maritime considerations associated with the route alignment options.
7	Route assessment criteria	Includes details on the process used to establish the criteria for the multi-criteria analysis (MCA). It also summarises the criteria weightings and scoring methodology.
8	Multi-criteria analysis	Includes a summary of the MCA workshop as well as the results.
9	Post-MCA assessments	Includes details of several assessments that were carried out after the MCA to inform the preferred option to be carried through to the next phase.
10	Summary	Includes a summary of the report.

4. Technical assessment

4.1 Purpose

The *Technical Assessment Working Paper* NR [redacted] can be found in Appendix C.1. The report achieved the following:

1. Reviewed the key constraints to the design development, including environment, cultural heritage, flooding, safety, and public utility plant.
2. Explained the concept design development, including aspects to be investigated in future design stages.
3. Provided responses to stakeholder comments.
4. Included details of the cost estimate, including risks and staging.
5. Collated all findings from the Technical Assessment phase of the project.

4.2 Content

The contents from the *Technical Assessment Working Paper* NR [redacted] are summarised in Table 3. The appendices of the report have been removed and collated within Appendix C of this report.

Table 3: Technical assessment contents

Heading	Title	Description
1	Introduction	Presents the same information as this report. It includes the study purpose, delivery objectives and milestones, background, study area and purpose of report.
2	Environment and cultural heritage	Includes the review findings from the detailed planning and environmental advice provided by Council. It also summarises the key environmental advice and permits that may be required for the project.
3	Flooding	Includes a review of the anticipated flooding impacts from the concept design riverwalk.
4	Safety	Includes a summary of key safety aspects that informed the concept design, including those generated from the road safety audit and the safety in design register.
5	Public utility plant	Includes a summary of public utility plant (PUP) that will potentially be impacted by the concept design. It also provides a summary of the meetings held with various public utility authorities (PUA).
6	Concept design development	Includes a detailed summary of the concept design development across the whole study area.
7	Stakeholder comments	Includes a summary of comments received from stakeholders, as well as the responses provided.
8	Prioritisation and costing	Includes a summary of the key project risks. It also includes details on staging for the project, as well the P90 cost estimate.
9	Summary	Includes a summary of the report and next steps for the project.

Appendix A – Strategic context

Released under RTI - DTMR

A.1 Strategic Context Working Paper

The appendices of the *Strategic Context Working Paper* have been removed and collated within Appendix A of this report.

Released under RTI - DTMR

Brisbane City Council

Kangaroo Point Riverwalk Options Analysis and Concept Design

Strategic Context Working Paper

Reference NR [redacted]

Rev 3 | 13 April 2023



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Job number NR [redacted]

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1. Introduction

Arup has been commissioned by Brisbane City Council (BCC) to undertake the Options Analysis (OA) and Concept Design (CD) for the Kangaroo Point Riverwalk project, to connect Captain Burke Park (Kangaroo Point) and Mowbray Park (East Brisbane) with a continuous link catering to cyclists, pedestrians and other active transport modes. This project aims to address the “missing link” in the existing cycling and pedestrian network, as identified by the cycling community, the Department of Transport and Main Roads (TMR) and BCC.

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Through this review and from feedback received from the cycling community, TMR and BCC are aware of a “missing link” in the network of existing cycling infrastructure between Kangaroo Point and East Brisbane. The Kangaroo Point Riverwalk requires new infrastructure to improve connectivity for all active transport modes and encourage sustainable transport within a rapidly changing inner city region.

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The study will comprehend the current and future issues, constraints, and opportunities, and determine prospective infrastructure upgrade solutions for the study area. The study will then develop a concept design for the recommended upgrade options with high level cost-benefit analysis. The conclusions will be used to inform TMR and Council’s forward program, project prioritisation and determine the requirements for the next stages of planning and design.

The purpose of the study is to:

- Improve the safety of all road users through the introduction of infrastructure for pedestrians (including wheelchairs, prams etc.), cyclists and e-mobility users which is separated from road vehicles.
- Improve pedestrian, cyclist, and e-mobility access through the provision of a high-quality facility that connects to the surrounding active and public transport network. The facility shall establish a continuous walking and riding connection between Frank Nicklin Dry Dock, Kangaroo Point and Mowbray Park, East Brisbane, and between Frank Nicklin Dry Dock and the future Deakin Street underpass. The study will also identify enhancement opportunities for the existing promenade from Park Avenue at Mowbray Park to the north towards the Frank Nicklin Dry Dock.
- Limit impact on transport network efficiency through the consideration of all modes in current and future scenarios.
- Complement the public transport network to ensure multi-modal connectivity is supported.

1.2 Delivery objectives and milestones

To achieve the purpose of the study, BCC has defined the following key delivery objectives and milestones:

- Ensure that suitable options for the Riverwalk are recommended, which appropriately address the key challenges identified by Council and the project team.
- Review existing planning, projects, and data.
- Consider existing and future active transport needs.
- Identify and review network gaps, deficiencies, opportunities, and constraints, including mapping.
- Develop up to three treatment options for active transport facilities to address the needs of all users.
- Prepare a multi-criteria analysis (MCA) to determine the preferred option(s).
- Prepare high-level concept plans and cost estimates for the preferred option(s), including land requirements.
- Recommend staged project delivery options, including identification of “quick wins” that could be delivered within a timeframe of 1-2 years, subject to funding.

1.3 Background

Over the past decade, BCC has released strategies specific to Kangaroo Point, such as the *River's Edge Strategy*, the *Kangaroo Point Peninsula Draft Renewal Strategy* and the *Kangaroo Point Peninsula Neighbourhood Plan*. These documents outline the community's desire for increased active transport connectivity along the Kangaroo Point peninsula and surrounding inner-city precincts. This has created an opportunity to improve the existing network and deliver new infrastructure.

Through the strategies mentioned above, a missing active transport link has been identified between the Frank Nicklin Dry Dock and Mowbray Park. The Kangaroo Point Riverwalk project aims to address the missing link through improved access and activity along the Brisbane River. The project also aims to identify opportunities for enhancement along the existing promenade section from Park Avenue at Mowbray Park to the north towards the Frank Nicklin Dry Dock, as well as developing a connection to the Kangaroo Point Green Bridge project via Cairns Street and Deakin Street.

1.4 Study area

The study area spans from Captain Burke Park in Kangaroo Point to Mowbray Park in East Brisbane and is divided into three extents, as shown in Figure 1:

- *Study extent A* represents the missing link in the active transport network, between Frank Nicklin Dry Dock to Mowbray Park (and the existing active transport facility along Lytton Road). The project aims to provide a continuous active transport facility between these areas and to the broader active transport network.
- *Study extent B* represents the existing Kangaroo Point Riverwalk between Captain Burke Park and the Frank Nicklin Dry Dock. The project seeks to identify opportunities for enhancements to the existing infrastructure.
- *Study extent C* represents the link between the Kangaroo Point Riverwalk project to the future Kangaroo Point Green Bridge via the Deakin Street / Main Street active transport underpass, which is currently under construction.



Figure 1: Study area extent (BCC)

1.5 Purpose of report

The Kangaroo Point Riverwalk project has four phases, as listed below.

- Phase 1: Strategic context (current phase of project)
- Phase 2: Strategic assessment
- Phase 3: Technical assessment
- Phase 4: Options analysis report

The purpose of this report is to:

1. Review relevant policies, planning and strategy documents to ensure integration and alignment between the key project objectives and the strategic direction for the project area.
2. Review existing conditions including land use planning, existing transport infrastructure and road safety history.
3. Identify key opportunities such as existing, planned and proposed active transport infrastructure (including proposals in conjunction with other transport projects) and constraints to help inform the basis of design for the OA and CD.
4. Justify the project rationale.
5. Collate all findings from the Strategic Context phase of the project.

1.6 Stakeholder engagement

Stakeholder involvement and acceptance will be a key element to the successful delivery of the Kangaroo Point Riverwalk project. A proactive approach to stakeholder engagement throughout delivery will enable key stakeholders to have multiple opportunities for ongoing contribution and feedback. This engagement allows expertise, local knowledge and insights to directly inform the planning and technical solution. As a result, the final recommended CD will be more robust and is more likely to have a high level of understanding and support from key stakeholders and the broader community.

The following groups and key stakeholders have been identified to be consulted as part of the project:

- Brisbane City Council (BCC) – Project Lead
 - BCC Project Team – led by Michael Geise (BCC Project Manager)
 - BCC City Projects Office (CPO) – Planning and Design
 - BCC Transport Planning and Operations (TPO)
 - BCC Community & Stakeholder Engagement (CaSE)
 - BCC Transport for Brisbane (TfB)
 - BCC Development Services
 - BCC Asset Management
- Department of Transport and Main Roads (TMR) – Project Sponsor
 - Walking and Cycle planning unit
 - Active Transport Investment Planning team (ATIP)
 - Metropolitan District planning team
 - Engineering and Technology Branch (E&T) – technical review team
 - Accessibility subject matter experts
- South Brisbane Member of State Parliament (Local MP)
- Local Councillor for the Gabba Ward
- Bicycle Queensland (BQ)
- Space 4 Cycling BNE
- Bicycle User Group - Brisbane CBD BUG
- Queensland Walks
- Department of Environment and Science (DES)
- Maritime Safety Queensland (MSQ)
- Local residents and businesses
- People using the existing cycle and pedestrian network
- Public utility authorities

The BCC Project Team have confirmed that all stakeholder engagement shall be undertaken by their internal Project Team including consultation specialists (CaSE). The Arup team may be invited to participate in meetings and workshops with key stakeholders when requested by the BCC Project Manager.

1.6.1 Project Control Group

The Project Control Group (PCG) will be the main decision-making body for the project. The PCG will address and manage key issues and risks identified by the Project Team, Technical Working Group (TWG) and other stakeholders, and ensure the Study remains on track. The PCG will keep senior management of both TMR, and Council briefed on progress and developments and consult them as required. Members of the Project Team will also attend and participate at PCG meetings to provide updates and advice but will not form part of the PCG decision making process.

1.6.2 Technical Working Group

The Technical Working Group (TWG) will provide input on all aspects of the project, considering public transport, active transport, road operations and land use planning for the project area. The TWG will work together to develop, assess, and prioritise options and interventions that best achieve the objectives of the project. The TWG is a multi-disciplinary group of experts assembled by the Project Team to provide technical inputs into deliverables, workshops and meetings as required. TWG members are to represent the interests of their business units within both TMR and Council. The TWG will have a core group of representatives with other technical experts invited as required. TWG membership is dynamic in the sense that certain technical input may only be required at some phases of the project. TWG meetings and workshops will be co-chaired by the Public and Active Transport Manager, Transport Planning Operations (BCC) and Director of Active Transport (TMR), with Arup invited by BCC's Project Manager when required.

In addition to the TWG and PCG, it is recommended that proactive engagement with key stakeholders listed within Section 1.6 at key milestones is undertaken to gather and share information and to seek feedback to shape a solution that is well understood and supported by the broader community.

1.6.3 Community Engagement

Brisbane City Council undertook community engagement from 24 October to 21 November 2022. The engagement was predominantly online through the Council *Yoursay* page, with a survey and interactive map providing the community with multiple methods to provide their feedback to help inform the Kangaroo Point Riverwalk project.

A *Communication and Engagement Evaluation Report* capturing the feedback is included in Appendix H. A summary of the key highlights are summarised below:

- Very strong interest shown in riverwalk connectivity from Dockside to Mowbray Park.
- Interest shown for continuous walking and cycling paths.
- Interest in improvements to connectivity around the Kangaroo Point peninsula and to the new Kangaroo Point Green Bridge.
- Interest in reducing traffic speed throughout the Kangaroo Point peninsula.
- Interest in improving safety, wayfinding, and lighting around the Kangaroo Point peninsula.

1.6.4 Confidentiality Requirements

BCC has advised that the Kangaroo Point Riverwalk project is sensitive in nature and is to be treated as confidential by the Arup project team. On this basis, Arup have established internal systems to restrict access to project files to approved project team members only and to establish communications protocols to only liaise with the BCC Project Team (contact to be Michael Geise) and within the Arup Project Team.

Due to the confidentiality requirements of the project and as instructed by BCC Project Manager, Arup will not undertake any stakeholder engagement activities unless requested by the BCC Project Team.

2. Gap analysis

2.1 State and Local policies, plans, and strategies

There are a wide range of Queensland Government and Local Government policies, plans and strategies which are relevant to the Kangaroo Point Riverwalk project. These documents provide important context for the project and ensures integration and alignment with State and Local strategic intent for the area. The policies, plans and strategies relevant to the project are presented in Table 1.

Table 1: Policies, plans and strategies relevant to the Kangaroo Point Riverwalk

Agency	Document
State	
Queensland Government	TMR Queensland Transport Strategy 2019 SEQ Regional Plan 2017 (ShapingSEQ) TMR Cycling Infrastructure Policy (CIP) 2017 TMR Queensland Cycling Strategy 2017-2027 and Cycling Action Plan 2020-2022 TMR Road Safety Policy 2022 TMR South East Queensland Principal Cycle Network Plan (PCNP) and Priority Route Maps (PRM) addendum TMR Queensland Walking Strategy 2019-2029 and Walking Action Plan 2022-2024 TMR Queensland Walking Strategy 2019-2029 and Walking Action Plan 2022-2024
Local	
Brisbane City Council	BCC Brisbane Active Transport Strategy 2012 – 2026 Brisbane Vision 2031 Transport Plan for Brisbane - Strategic Directions and Implementation Plan 2018 Brisbane Bicycle Network Overlay (part of Brisbane City Plan 2014) Brisbane's E-Mobility Strategy (2021-2023) Eastern Active Transport Study 2021 Kangaroo Point Peninsula Neighbourhood Plan Mowbray Park Vision Brisbane Active Transport Network Plan (Draft)

An overview and description of relevance for each document can be found in Appendix A. The key strategic drivers captured through the policy and planning review were:

- Expanding the active transport network through Kangaroo Point and providing improved accessibility in the area.
- Providing a continuous and connected active transport network that allows access to key destinations and the broader transport network in line with the PCNP and Brisbane bicycle network overlay.
- Providing safe active transport infrastructure for all ages and abilities, which is inviting and attractive to help drive modal shift towards active travel in the area.
- Improving the sustainability of the transport network and reducing car-reliance by providing convenient and competitive active travel option for locals.

2.2 Future Projects

Planned infrastructure projects will work in conjunction with the Kangaroo Point Riverwalk to create a seamless active transport network within the study area. Several infrastructure projects were identified through the review and are listed below. A detailed summary of each future project and its relevance to the Kangaroo Point Riverwalk project is summarised below, with details found in Appendix B.

- Kangaroo Point Green Bridge including active transport underpass from Main Street to Deakin Street (currently under construction)
- CityLink Cycleway trial (now permanent as of November 2022)
- Veloway 1 (V1) Lower River Terrace Velo bridge (currently in planning)
- Kangaroo Point Bikeway Upgrades (currently in early planning)
- Mowbray Park Masterplan including ferry terminal upgrade (currently being master planned)
- Dockside ferry terminal upgrade (construction in 2023)
- Mowbray Park Ferry Terminal upgrade (construction in 2024 following Dockside ferry terminal upgrade)

The following sub-sections cover critical projects which either connect to or fall within the study area.

2.2.1 Kangaroo Point Green Bridge

The Kangaroo Point Green Bridge, delivered by BCC, will provide an active transport connection between the CBD and Kangaroo Point. This project includes a new underpass of the Bradfield Highway near Scott Street. The objective of this project is to encourage active travel in Brisbane's inner south and eastern suburbs. On the CBD side, the green bridge will connect with the CityLink cycleway along Edward Street and the Botanic Gardens and Eagle Street promenade.

The Kangaroo Point Riverwalk project will provide a vital connection to the Kangaroo Point Green Bridge by connecting to the Deakin Street underpass, as illustrated in Figure 2.

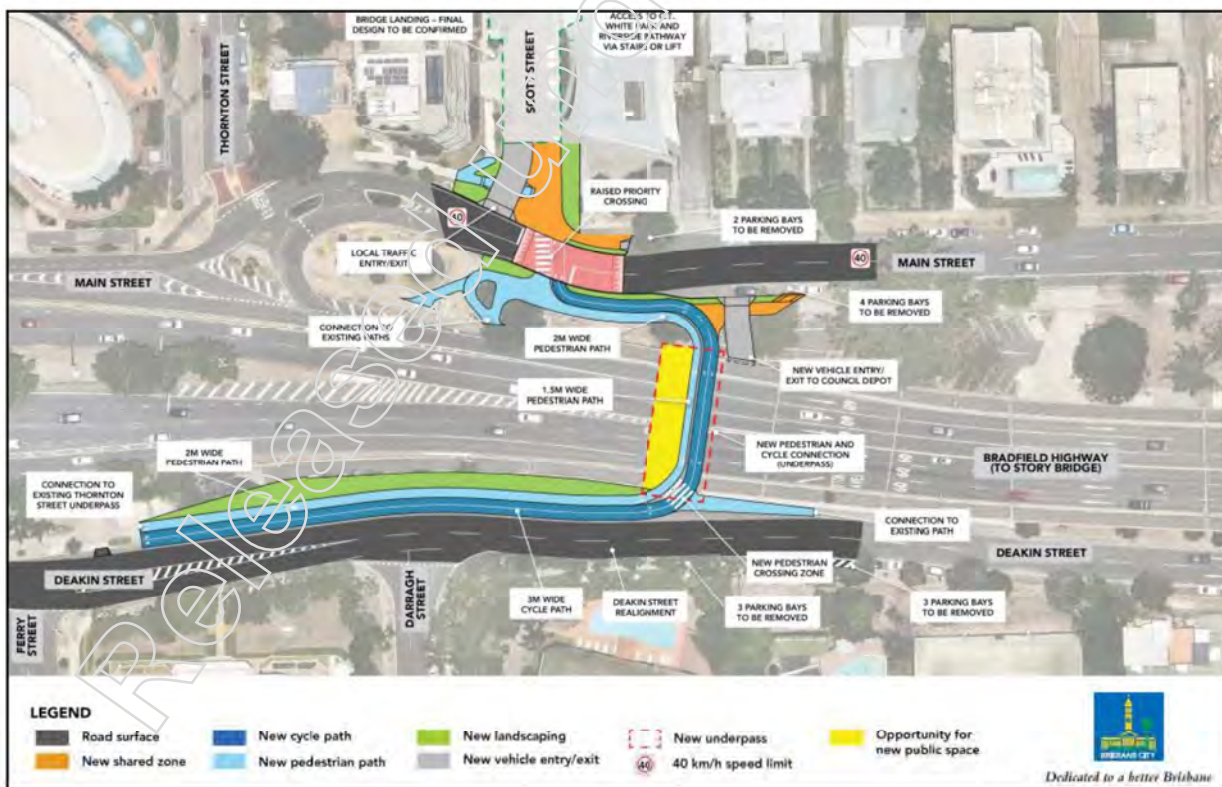


Figure 2: Kangaroo Point Green Bridge Deakin Street connection (BCC)

2.2.2 Citylink Cycleway

The CityLink Cycleway is a joint initiative between Brisbane City Council and the Queensland Government. The project is trialling a new separated two-way bikeway in stages along selected streets in the Brisbane City centre, connecting directly to the future Kangaroo Point Green Bridge. As of November 2022, Council announced that the trial was a success and that it would be shortly made permanent, with future routes in the planning, as shown in Figure 3.

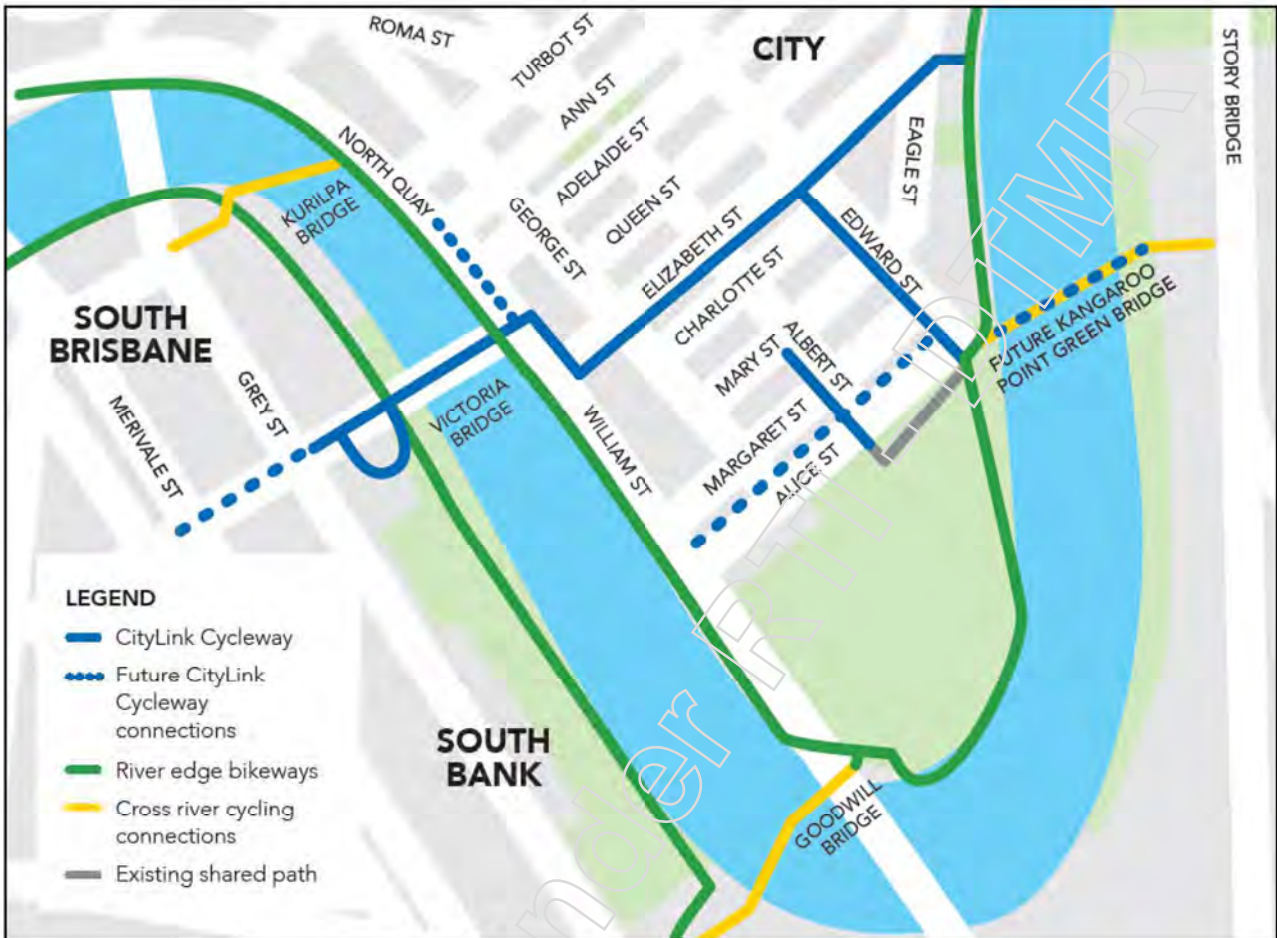


Figure 3: CityLink cycleway (BCC)

The CityLink Cycleway, in conjunction with the Kangaroo Point Green Bridge and Kangaroo Point Riverwalk projects, creates an opportunity for a continuous active transport connection from the CBD to the inner eastern suburbs of Brisbane. Providing a continuous facility will help encourage modal shift towards walking and cycling.

As shown in Figure 3, the existing CityLink facilities in the CBD include Victoria Bridge, Edward Street and Albert Street, with planned future connection to the Kangaroo Point Green Bridge, along Alice Street, along North Quay and extending into South Brisbane towards West End.

2.2.3 Dockside Ferry Terminal upgrade

The upgrade of the Dockside Ferry terminal is scheduled for completion in late 2023. The upgrade of terminal is focussed on allowing larger sized vessels such as ‘KittyCats’ to moor and provide cross river connectivity. The upgrade will include accessibility improvements such as new ramps and access to the Dockside boardwalk promenade, as shown in Figure 4.



Figure 4: Docksider Ferry Terminal upgrade architectural design (BCC)

2.2.4 Mowbray Park Masterplan and Ferry Terminal upgrade

The Mowbray Park ‘Vision’ was established in 2021 and outlined a high-level future layout and look for the park, which is illustrated in the concept design in Figure 5. Currently, Council is developing a more detailed masterplan which will set out the specifics and priority projects, which will see the park transform into a more activated and vibrant place.

The Kangaroo Point Riverwalk project will provide a vital connection between the Kangaroo Point peninsula and Mowbray Park. The project will help drive activity for the park by providing improved access and an enjoyable user experience. Mowbray Park is a critical link between the Riverwalk and the existing high-quality facility along Lytton Road (towards the inner eastern suburbs of Brisbane). Therefore, it is critical that the Riverwalk planning aligns with the Mowbray Park masterplan to achieve a connected and continuous pathway network.

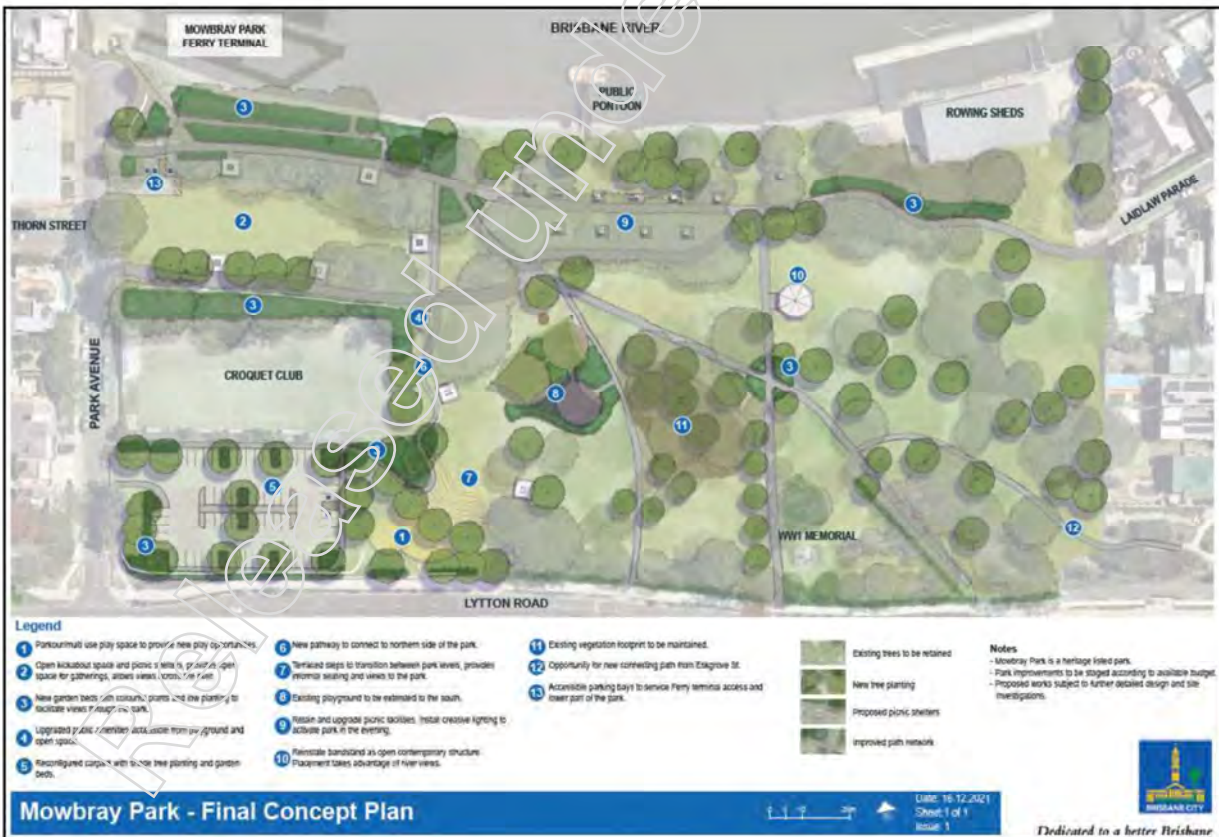


Figure 5: Mowbray Park concept design (BCC)

In addition to the masterplan, the Mowbray Park Ferry Terminal is planned for upgrade in 2024 (shown in Figure 6). The upgrade of the terminal is planned to follow the Dockside Ferry terminal upgrade (which is scheduled for completion in late 2023). The upgrade is focussed on accessibility improvements. The Kangaroo Point Riverwalk project will likely have direct interface with the Mowbray Park Ferry Terminal at the end of Park Avenue.



Figure 6: Mowbray Park Ferry Terminal upgrade architectural design (BCC)

2.3 Current Transport Conditions

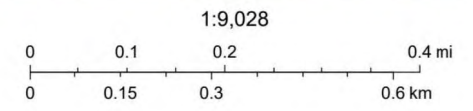
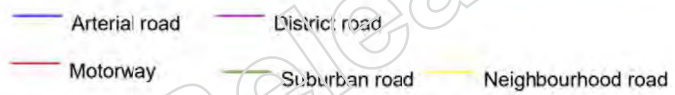
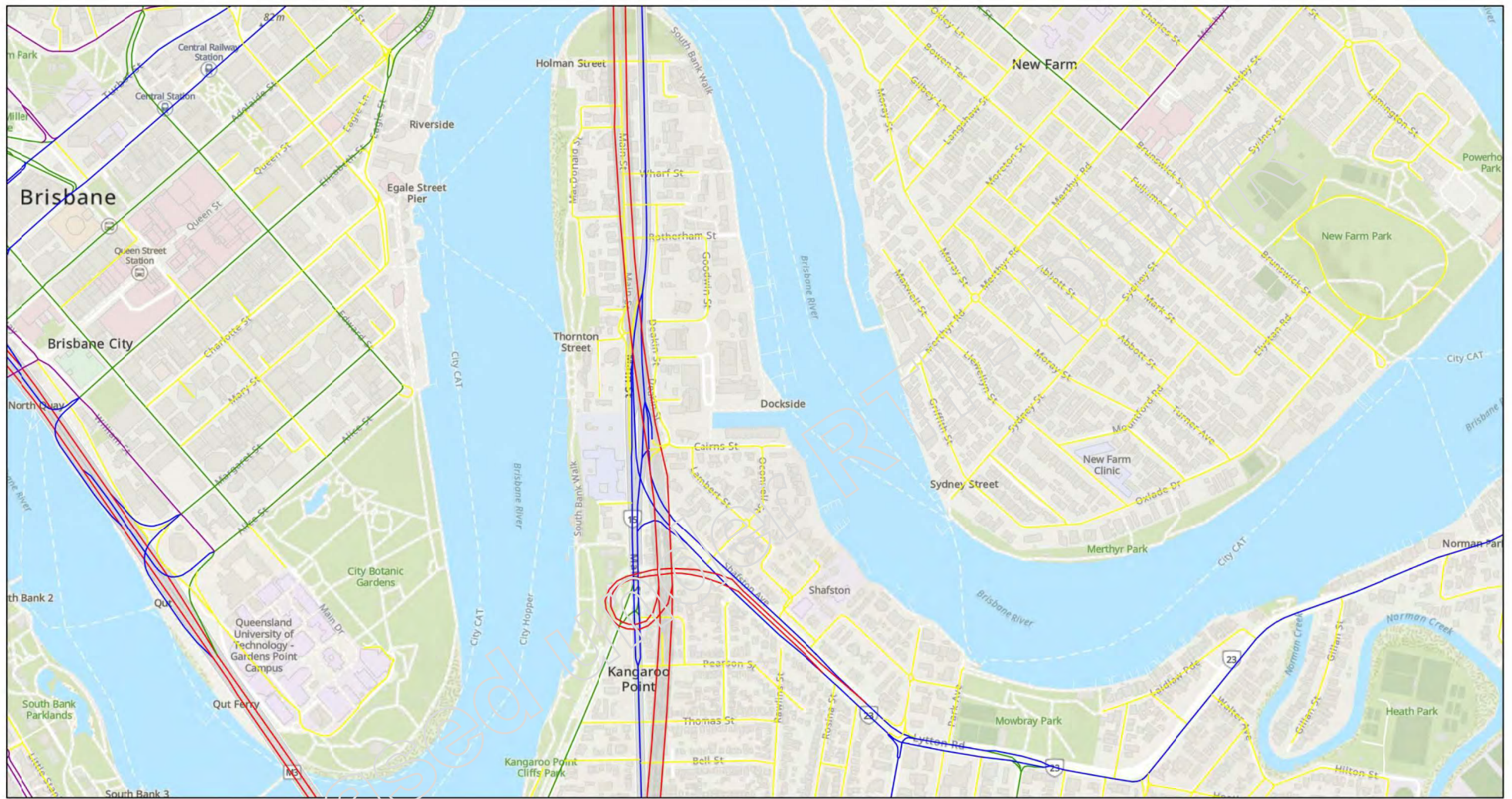
2.3.1 Transport Networks

The Kangaroo Point Riverwalk project will include, utilise and expand on the existing active transport infrastructure to address specific gaps in the network to address the project objectives. Providing connections that link up to the existing active transport network and specifically aim to address gaps in this network, will provide a more connected and continuous network, which provides a safer, more direct and more legible transport outcome thereby facilitating greater modal shift towards active transport. As part of this project, opportunities for enhancement of existing infrastructure have been identified and are outlined in Section 6.

Maps of existing road, cycle and public transport networks for the study area are presented in Figure 7, Figure 8 and Figure 9. Currently, there is a lack of connectivity through and within the Kangaroo Point Peninsula with key observations including:

- A complex (indirect and complex wayfinding) and hilly walking and cycling route between Dockside and Mowbray Park.
- A high-quality separated cycle track and parallel footpath installed along the south eastern corner of Mowbray Park continuing east along Lytton Road.
- Inconsistent treatments for walkers and cyclists including on-road bike lanes, on-road Bicycle Awareness Zones (BAZ), cycle tracks, share paths and footpaths. This inconsistency makes wayfinding more difficult, reduces rider comfort and reduces safety as walkers and cyclists may appear in locations not easily anticipated by motorists.

- A lack of connectivity within the Kangaroo Point Peninsula to the Brisbane River waterfront and open green spaces including Mowbray Park, Dockside and Captain Bourke Park.
- Connections to the riverfront require use of on-road sections where cyclists are required to share road space with motorists.
- Ferry terminals at Mowbray Park, Dockside, Holman St (all provide convenient cross river connections to Riverside (Eagle Street precinct), Howard Smith Wharf, Sydney Street and New Farm Park
- Bus stops are located along Shafston/Lytton Road (routes 232, 227, P216, P221, P226, P228, P231 and P236), providing access to the direct bus routes predominantly across the Storey Bridge (to the CBD). There are also bus stops along Main Road (routes 234, N154) and looping down under the Storey Bridge at Baildon Street (route 27 and 234). However, there are generally poor bus stop access towards the northern end of the peninsula, and the existing 27 and 234 services which do service the peninsula at Baildon St only run services back into the CBD, compared to services on Shafston/Lytton Road and Main Road which do have routes connecting to other major public transport nodes such as from the CBD to Bulimba, Cannon Hill and Wynnum, as well as CBD to Woolloongabba bus station.
- Bus Stops are located along walking and cycling routes and create pinch points in the path width where cyclists and pedestrians are at increased risk of an incident
- Lack of road network connectivity with major barriers such as Main Street and Shafston Avenue impacting walkability of the peninsula.
- A community segmented by the arterial road corridor consisting of Bradfield Highway / Main Street / Shafston Avenue / Lytton Road. This means that the east and west of Kangaroo Point are segmented and connectivity for active users is minimal.



Esri, Geoscience Australia, NASA, NGA, USGS, Esri Community Maps Contributors, Department of Resources, Dept. of Environment and Science, Geoscape, Esri, HERE, Garmin, Foursquare, METI/ NASA, USGS

Figure 7: Existing road network

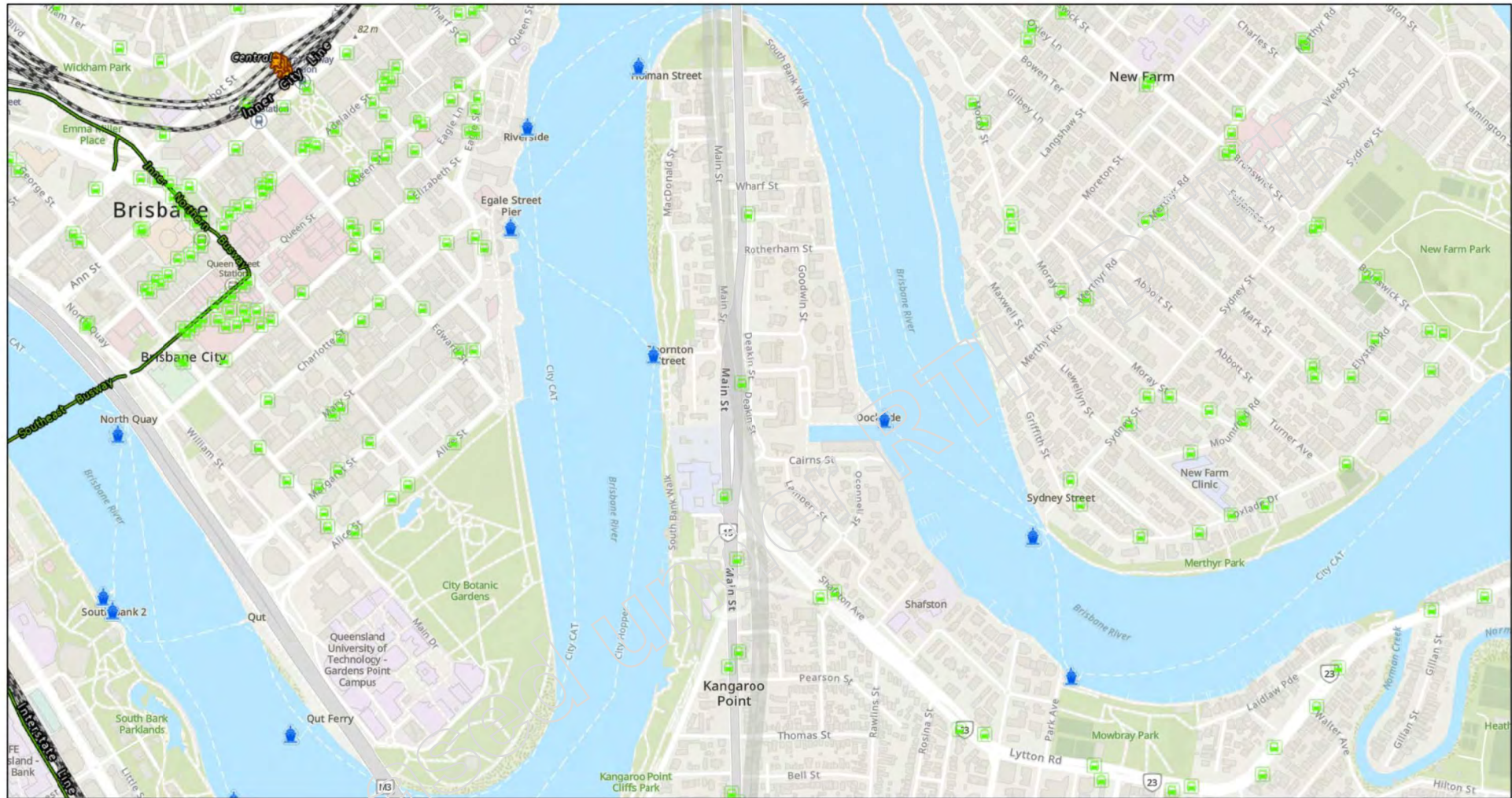
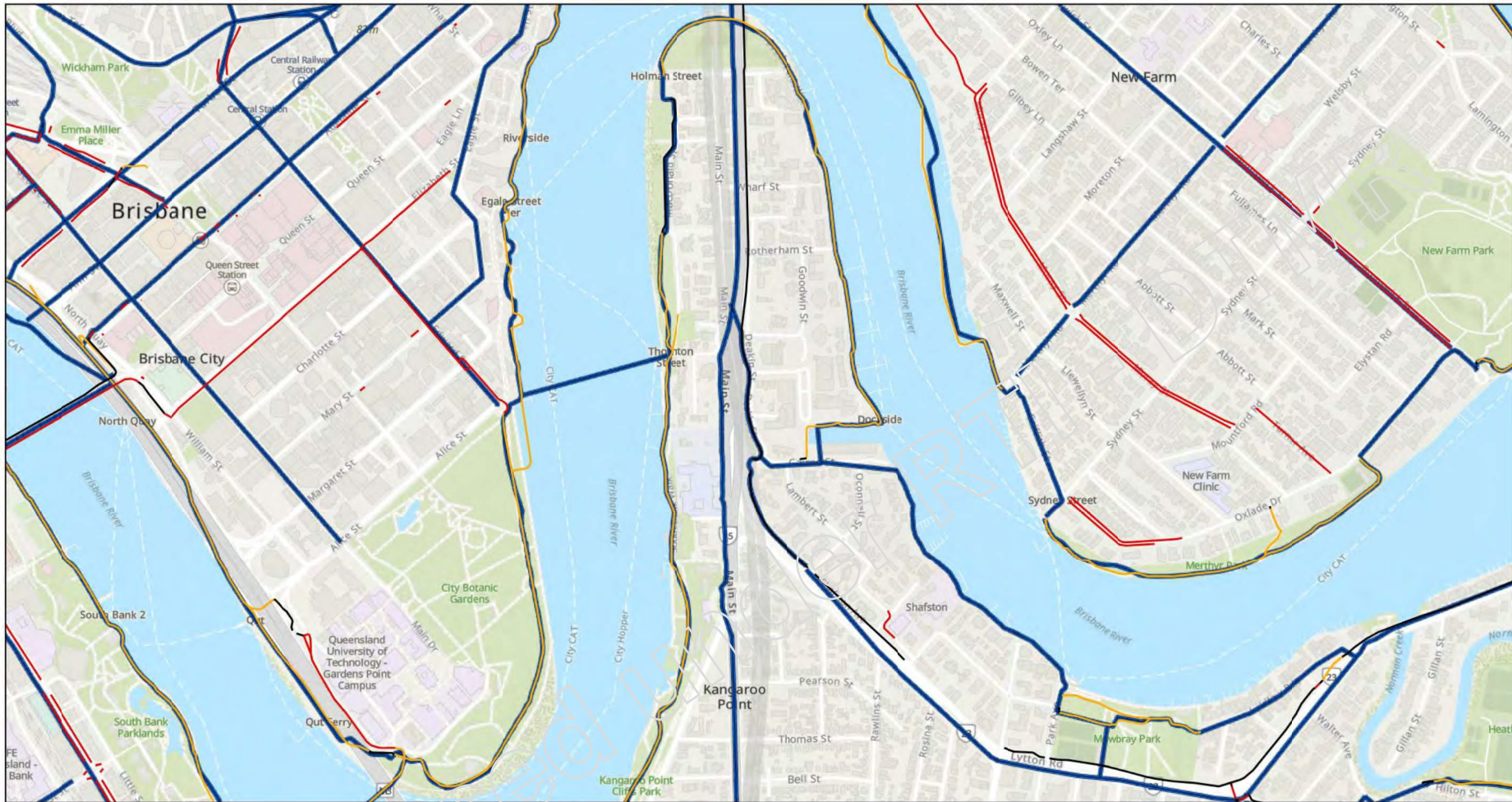
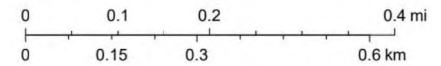


Figure 8: Existing PT network



- On Road
 - Off Road
 - Principal
 - On Verge
- Principal Cycle Network Plan**

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Figure 9: Existing and planned AT network¹

¹ Pathway asset data yet to be attained

Table 2 outlines the average weekday traffic volumes and posted speeds on key roads within the study area.

Table 2: Traffic volumes and speeds within study area²

Road	Road hierarchy	Average weekday volume ³	Posted speed
Lytton Road	Arterial	45,646	60km/h
Shafston Avenue	Arterial	47,010	60km/h
Main Street/Bradfield Highway (north)	Arterial	18,750	60km/h
Main Street/Bradfield Highway (south)	Arterial	14,797	60km/h
Wellington Road (north)	Arterial	2,623	60km/h
Wellington Road (south)	Arterial	18,593	60km/h
Deakin Street	Neighbourhood	7,981	60km/h
Thorn Street	Neighbourhood	2,226	50km/h
Rotherham Street	Neighbourhood	N/A	50km/h
Cairns Street	Neighbourhood	N/A	50km/h
Lambert Street	Neighbourhood	N/A	50km/h
O'Connell Street	Neighbourhood	N/A	50km/h
Park Avenue	Neighbourhood	N/A	50km/h

2.3.2 Road safety

As active travellers are considered “vulnerable road users” in Queensland, road and traffic interaction is considered a major barrier to the uptake of cycling and walking as a mode of transport. As per TMR’s *Cycling Infrastructure Policy*, it is critical to deliver adequate and safe active transport facilities to protect vulnerable road users.

TMR’s *Road Safety Policy* outlines important considerations regarding safety standards, with the objective of reducing the number of fatal and serious injury crashes for all road users. The policy identifies the following standards for cyclists and pedestrians:

- Pedestrian crossings shall be provided on all approaches at signalised intersections.
- Pedestrian crossing protection shall be provided.
- Left-turn slip lanes should be avoided at intersections.

A road safety audit (RSA) of the existing conditions was conducted in early November 2022 with the objective to identify foreseeable hazards for all users. The RSA process places a particular focus on the reduction in fatal and serious injuries. Once finished, the *RSA Report* will be included as Appendix E.

To illustrate where pedestrian and cyclist crashes have occurred within the study area, crash data between 2017 and 2021 was reviewed and is presented in Figure 10.

² Table displays only roads with available and recent count data, not all roads within the study area.

³ Available count data between 2018-2021.

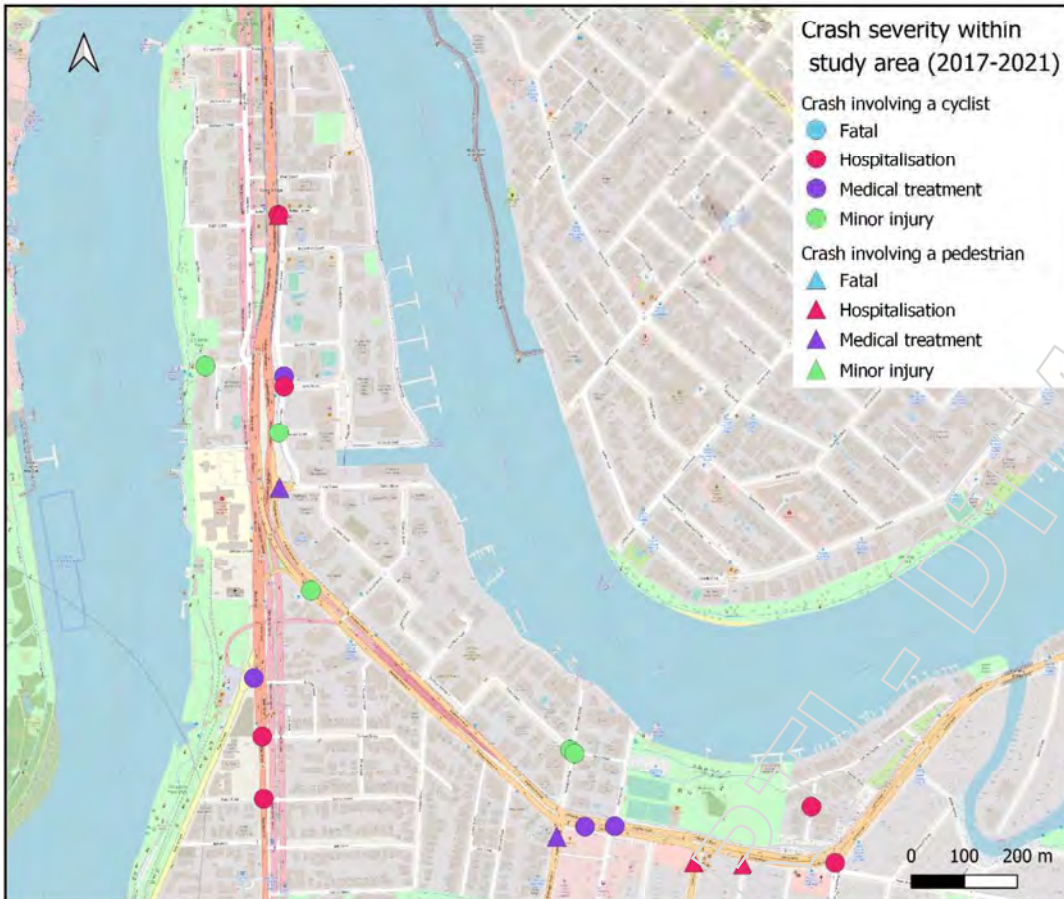


Figure 10: Cyclist and pedestrian crash severity, 2017-2021

Approximately 20 crashes involving a cyclist or pedestrian occurred throughout the study area between 2017 and 2021, indicating the need for safer and separated active transport infrastructure. 75% of all vulnerable road user crashes involved a cyclist and 25% involved pedestrians, with 75% of crashes requiring medical treatment or hospitalisation. The data shows that the highest number of crashes occur along busier roads such as Shafston Avenue and Lytton Road. As noted in Table 2, Shafston Avenue and Lytton Road have high daily traffic volumes within the study area (and a high posted speed). Additionally, there are small clusters of crash hot spots around key activity centres, such as Mowbray Park.

2.3.3 Active travel desire lines

A heatmap output from Strava has been extracted to analyse the existing desire lines of active transport users, where the intensity of the line represents demand (refer to Figure 11). It is acknowledged that Strava users may skew towards more fitness-orientated cyclists and runners, rather than an accurate cross-section of the existing active transport users in the area (such as pedestrians, slower cyclists and e-mobility users of various ages and abilities). As the observations listed below should be considered accordingly:

1. There is an existing desire for users to utilise the “back streets” of Lambert Street and Thorn Street instead of the more direct route of Shafston Avenue.
2. Considerably more users appear to be utilising the facilities on Lytton Road instead of the route through Mowbray Park and Laidlaw Parade.
3. Most users on Lytton Road peel off at Wellington Road or Lambert Street instead of continuing along Shafston Avenue.
4. Desire line along Deakin Street to connect under Bradfield Highway at Rotherham Street. This is to be expected, and much of this demand will be catered for by the proposed underpass being provided as part of the Kangaroo Point Green Bridge project.
5. Southern demand predominantly from Wellington Road.



Figure 11: Strava heatmap of project area (Strava)

Released under PII - DTMR

3. Movement and place

Movement and Place is a conceptual framework for understanding the existing and intended function of movement and place within an area. This process can help identify a purpose of the transport network through planning and design principles and ensure that place function intents can be achieved for a space. The framework recognises networks may have competing roles regarding its ability to transport people and goods (movement function) and as destinations (place function).

Figure 12 outlines the key destinations, land uses and indicative desire lines within the study area. This mapping exercise is a critical step in predicting active user types and broader transport network integration opportunities. Leveraging the existing active transport network and understanding how the Kangaroo Point Riverwalk project can best connect and serve its users will serve to maximise the use of the facility and return on investment.

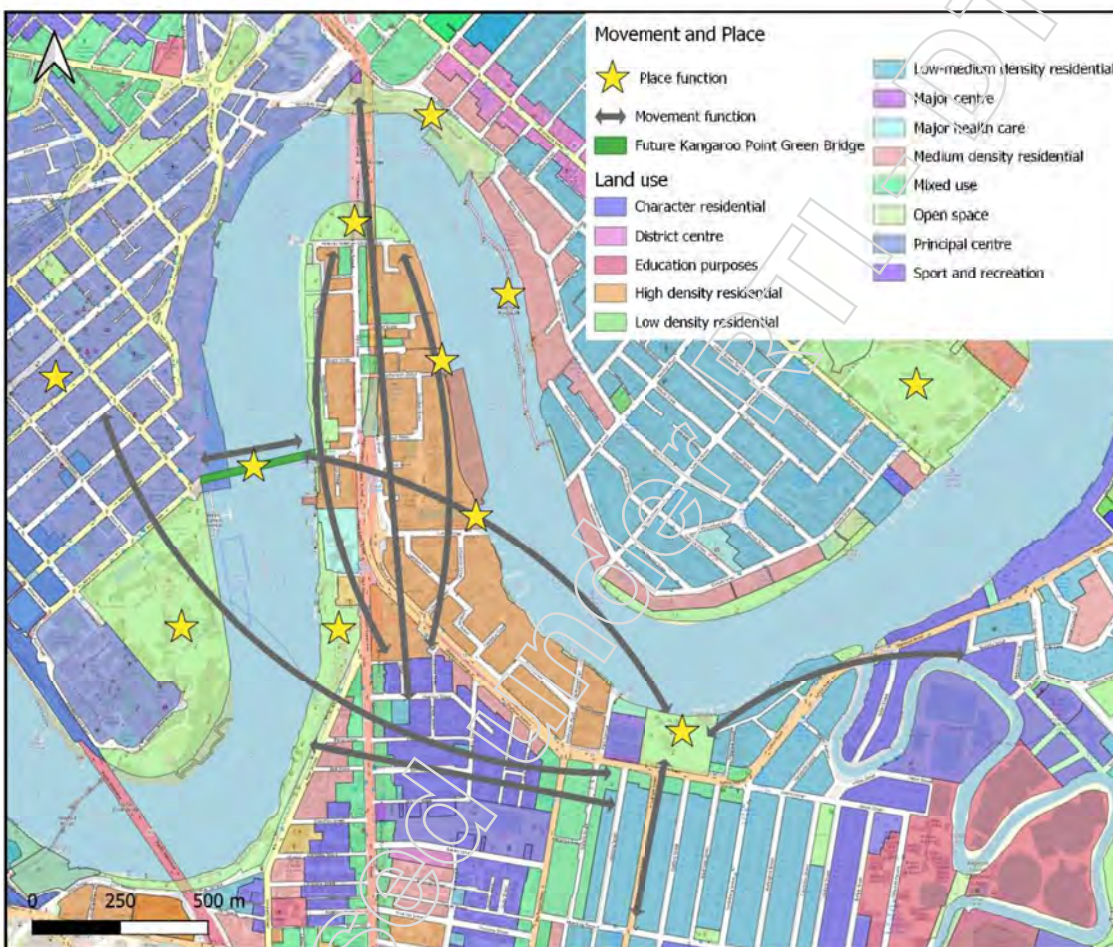


Figure 12: Movement and place assessment

A key observation from Figure 12 is that the preferred route option will likely have significant movement function and traverse areas which also have significant place function (such as the riverfront area). This is a key consideration, as the project will strive to preserve and enhance both movement and place functions within the space.

3.1.1 Land use integration

The *Neighbourhood Plan* outlines Council's intent to increase density in Kangaroo Point peninsula area while maintaining views and enhancing connectivity and public realm. High density residential areas in the Kangaroo Point Riverwalk project area are required to maintain public access and be serviced by high quality streetscape including shade trees and pathways for active modes. There are also clear requirements for the Docks precinct, requiring public access be maintained along the existing promenade and through

the dry dock area. The dry dock area is a major opportunity for public realm enhancements, including improved east-west connections from Deakin Street and Main Street to the riverfront.

3.1.2 Movement and place challenges

The Kangaroo Point Riverwalk project offers the opportunity not only to connect people to places, but to also be a place in its own right. This will help deliver the public space and streetscape outcomes sought from the *Neighbourhood Plan* by creating an attractive facility which delivers an inviting place, as well as delivering the movement needs for the area.

As the riverfront is a key 'place' where locals and visitors flock to enjoy and dwell, there is inherently a conflict with the high movement demand expected along the river (including recreators, visitors and commuters).

While it is critical to acknowledge the issue of movement and place significance in this area, it should be sighted as a major opportunity for the Kangaroo Point Riverwalk project to achieve the intended outcomes for both movement and place. When a preferred route is determined, it will be critical that the facility can facilitate the needs a wide range of users, which will include 'dwellers' who are those staying and enjoying the space.

Further detail around facility requirements to address both movement and place elements can be found in the *Basis of Design* report (Appendix F). Movement and place significance will need to be a key consideration as part of the Strategic Assessment phase of the project.

4. Environment and cultural heritage

Arup has reviewed the *Initial Planning and Environmental Advice (high level)* completed by Brisbane City Council. This section presents the background review findings of the environmental advice for the Kangaroo Point Riverwalk study areas. This process can help identify any more environmental constraints and provide additional environmental advice. Arup also conducted a high-level desktop review of public, State and Commonwealth databases (refer to Appendix I), to assist in determining the previously recorded ecological attributes, and ecological attributes with the potential to occur within and adjacent to the project area, including a review of the following:

- Department of Environment and Science's (DES) Protected Plants Flora Survey Trigger Map.
- Department of Resources' (DoR) Vegetation Management Supporting Map.
- Queensland Government's WildNet database.
- The former State Planning Policy's (SPP) South-east Queensland Koala Habitat Values mapping.
- Queensland government's Queensland waterways for waterway barrier works GIS layer.
- DES' State-wide biodiversity corridor mapping.
- Atlas of Living Australia / iNaturalist.
- Commonwealth Department of Climate Change, Energy, the Environment and Water's (DCCEEW) *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (PMST) to determine the matters of national environmental significance (MNES) that have the potential to occur within and adjacent to the Project area.

Table 3 summarises the key environmental advice and permits that may be required for the project. Overall, the following permits and approvals are likely to be required for the project:

- Development approval for operational works for removal, destruction, or damage of marine plants.
- Development approval for tidal works.
- Development approval for interfering with quarry material on State coastal land above high-water mark.
- Network access permit for Urban Utilities.
- Consultation with Council in accordance with the *Memorandum of Understanding: Early Engagement on Possible Tree Removals*.
- Early notification to the Program Planning and Integration (PPI) City Standards is required to be undertaken during the design stage for any planned vegetation clearing activities.

Other permits and approvals may be required, such as contaminated land and acid sulfate soils, pending final design of the project areas. Air, noise, water quality, erosion and sediment control, biosecurity (fire ants / weeds) and waste will need to be considered as the design progresses. Management of these aspects will need to be considered during the construction phase and must be incorporated as part of the Environmental Management Plan (EMP).

Table 3: Environmental requirements and advice

Environmental requirements	Environmental advice
Regulated vegetation	<ul style="list-style-type: none"> The only vegetation shown on the vegetation management regional ecosystem map is RE 12.1.3 least concern (refer to Figure 13). However, this patch of vegetation is adjacent to the project area and does not traverse the study areas. Therefore, construction is unlikely to have a direct impact on this section of vegetation. The vegetation found within the study areas has been classified as category X and has therefore been historically cleared/ is not considered important from a legislative perspective. If clearing is required, it would be considered exempt clearing work.
Marine plants	<ul style="list-style-type: none"> Study area A and B are located near mangroves and therefore may impact these marine plants. Grey Mangrove (<i>Avicennia marina</i>) was identified as near the project area. A development approval is required for operational works for removal, destruction, or damage of marine plants. If marine plants are present a marine plant survey will be required to assess impacts and to support a development application.
Tidal works and Coastal Management District	<ul style="list-style-type: none"> The proposed works will be undertaken in an area subject to tidal influence (Brisbane River) and within a Coastal Management District (CMD) (except for Study extent C which will be entirely on road). A development approval is required for 'tidal work' and 'interfering with quarry material on State coastal land above high-water mark.'
QLD Heritage Place	<ul style="list-style-type: none"> Study extent A is adjacent to, and potentially crosses Lot 10 on RP135198, which is listed on the Queensland heritage register. It also is adjacent to one property listed on the Queensland heritage register Lot 1 on RP174592. Study extent B crosses one property listed on the Queensland heritage register: Lot 0 on SP201635. If the works will not have a detrimental impact or will only have a minimal detrimental impact on the cultural heritage significance of the place, a heritage exemption certificate (HEC) may be given.
Local Heritage	<ul style="list-style-type: none"> Study extent B crosses two properties listed on the Brisbane heritage register: Lot 0 on SP201635 (also a QLD heritage place) and Lot 0 on BUP12743, which is listed on the Brisbane heritage register. Study extent A crosses two properties listed on the Brisbane heritage register: Lot 0 on BUP12743 and Lot 100 on RP96906 and potentially crosses Lot 10 on RP135198 (also a QLD heritage place). Study extent A also crosses two properties listed on the Brisbane heritage register Lot 100 on RP96906, Lot 1 on RP174592 (also QLD heritage).
Acid sulfate soils (ASS)	<ul style="list-style-type: none"> Brisbane's <i>City Plan 2014</i> identifies that an ASS investigation and preliminary ASS management plan will be required if less than 500m³ of soil is disturbed and the water table is not affected. If greater than 500m³ of soil is disturbed or the water table is affected, an ASS investigation report and a full ASS management plan is required.
Contaminated Land	<p>The following lots are listed on the DES EMR:</p> <ul style="list-style-type: none"> Study extent B: Lot 0 on BUP12743, Lot 0 on SP201635 and Lot 00000 on BUP106839. Study extent B: Lot 0 on BUP12743, Lot 1 on RP10904 and Lot 0 (9999) BUP101701 (a child parcel of base parcel Lots 5 and 6 SL807308) has been subject to hazardous contaminant. Study extent A: Lot 0 on BUP12743, Lot 0 on SP201635 and Lot 00000 on BUP106839. Study extent C is on or adjacent to the following lots listed on the BrisMAP contaminated land (restricted) layer: <ul style="list-style-type: none"> Lot 0 on BUP12743 Lot 1 on SP324724 Lot 1 on RP10904 Lot 900 on SP332357. Further investigation will be required once the design progresses and the extent of ground disturbance is known. A contaminated land management plan may be required. If soil is removed from these land parcels a soil disposal permit will be required. No UXO has been identified within 500 m of the project area.

Environmental requirements	Environmental advice
Fauna	<ul style="list-style-type: none"> The Study extents are within a highly urbanised area and would mostly be located on existing roads, boardwalk, and pathways. An ecological assessment or species management plan may be required. As the designs are not yet known, Brisbane City Council has recommended that further advice will need to be sought from PEU on receipt of design plans. <p>Desktop searches were undertaken to identify threatened fauna in the area and included a WildNet database search and an EPBC Act Protected Matters Search Tool (PMST). The coordinates -27.4687, 153.0373 were used and a 1km buffer was applied for these searches. Due to the buffer, the threatened species identified may not be relevant for this particular area, however, should be considered to potentially occur. Results from the searches found:</p> <ul style="list-style-type: none"> No threatened species were recorded on the WildNet database search. 56 threatened fauna species were recorded on the EPBC Act PMST, including: <ul style="list-style-type: none"> 28 bird species One frog species Four fish species Ten mammal species Ten reptile species Two shark species. <p>A likelihood of occurrence and significant impact assessment has not been completed; however, due to the urbanised location of the project areas these species are unlikely to reside in the area or occur in significant population sizes.</p>
Vegetation clearing/impacts	<ul style="list-style-type: none"> The project area is not within a 'high risk' area under the Flora Survey Trigger Map for Clearing Protected Plants in Queensland. Therefore, a protected plants flora survey is not required. It is unclear whether vegetation requires removal. The vegetation within the proposed alignment comprises marine plants, landscaped gardens and scattered street trees. Any works within the tree protection zone or removal of any <i>Natural Assets Local Law 2003</i> (NALL) protected vegetation on Council managed land, will require approval from Program Planning and Integration – PPI City Standards and be supported by an arboricultural impact assessment. Works within the tree protection zone or removal of any NALL protected vegetation on private land will require a NALL Permit from Compliance and Regulatory Services (CaRS).
Waterways	<ul style="list-style-type: none"> The Brisbane River is mapped as a tidal (grey) waterway for Queensland waterways for waterway barrier works. In tidal waters, new multi-span bridges are not waterway barrier works when: <ul style="list-style-type: none"> scour protection cannot extend more than 5m upstream, or 5m downstream beyond the footprint of the bridge the pier/pile and/or pier/pile platform can be within the low flow channel but does not change the characteristics of the low flow channel (i.e. cause scouring of the low flow channel banks or bed). The proposed works are not expected to limit or impede fish passage and as such do not constitute any waterway barrier works. During construction floating silt curtains may need to be installed within the waterway to contain the works area; however, as the silt curtain will not be installed across the waterway impeding fish passage, this will not constitute any temporary waterway barrier works.
Public utilities	<ul style="list-style-type: none"> The works will occur within close proximity to Urban Utilities infrastructure such as a sewer reticulation area and underground sewer services. A Network Access Permit is likely to be required.
Aboriginal heritage and Native Title	<ul style="list-style-type: none"> Works are located in a Category 3 (developed area) under the Department of Seniors, Disability Services, Aboriginal and Torres Strait Islander Partnerships (DSDSATSIP) Aboriginal Cultural Heritage Duty of Care Guidelines. The relevant cultural heritage party for the area are the Jagera People #2 and the Turrbal People. A Native title notification will not be required for works on the Brisbane River due to Native Title not existing in relation to any part of the land or waters in the claim area of the Turrbal People. Native title has been extinguished for: work on freehold land held by Council or privately owned land, if Council holds a State lease, for roads gazetted prior to 1975 or after 1996, native title is extinguished (Wellington Road, Holman Street, Rotheram Street, Cairns Street, Deakin Street and Main Street). If work is required on State land for which Council has no tenure to authorise the works, native title will need to be assessed. Once the design is confirmed, the requirement for native title will need to be further assessed.

Environmental requirements	Environmental advice
European heritage	<ul style="list-style-type: none"> Council searches indicated that the works are not likely to impact any other locally significant structures that weren't mentioned in the Planning Regulation section. Council searches identified a drain at Kangaroo Point, Thorn Street (Study extent A). Impacts to this structure will need to be considered during design.
Zoning	<ul style="list-style-type: none"> Council's intent for future development in the study area is set out in the Brisbane City Plan 2014 (City Plan). Broadly, it identifies intended land use and development through zoning. Zones across the study area include: general residential, recreation and open space, mixed use, and special purpose (refer to Figure 14).
Tenure	<ul style="list-style-type: none"> Land across the study area is predominantly comprised of freehold tenure, reserve, road, and unallocated state land (within the river). A number of easements providing for access are also present across the study area (refer to Figure 15)
Council parks	<ul style="list-style-type: none"> A number of Council public parks are located in the study area, including Captain Burke Park, Castelbar Street Park, Wellington Road Park West, and Mowbray Park (refer to Figure 16). Council Consent for works in public parks will need to be sought from Brendon Whittaker Public Space Operations (PSO) Greenspace Technical Coordinator (South) and copy in Program Planning and Integration (PPI) Planning Parks (email: BI-CS-PPI-Planning-Parks@brisbane.qld.gov.au) in accordance with the <i>Public Land and Council Assets Local Law 2014</i>. In the event a third-party contractor is to undertake the works, the contractor will need to obtain a Vehicle Access Permit for undertaking the works under the <i>Public Land and Council Assets Local Law 2014</i>.



Figure 13: Vegetation management regional ecosystem map

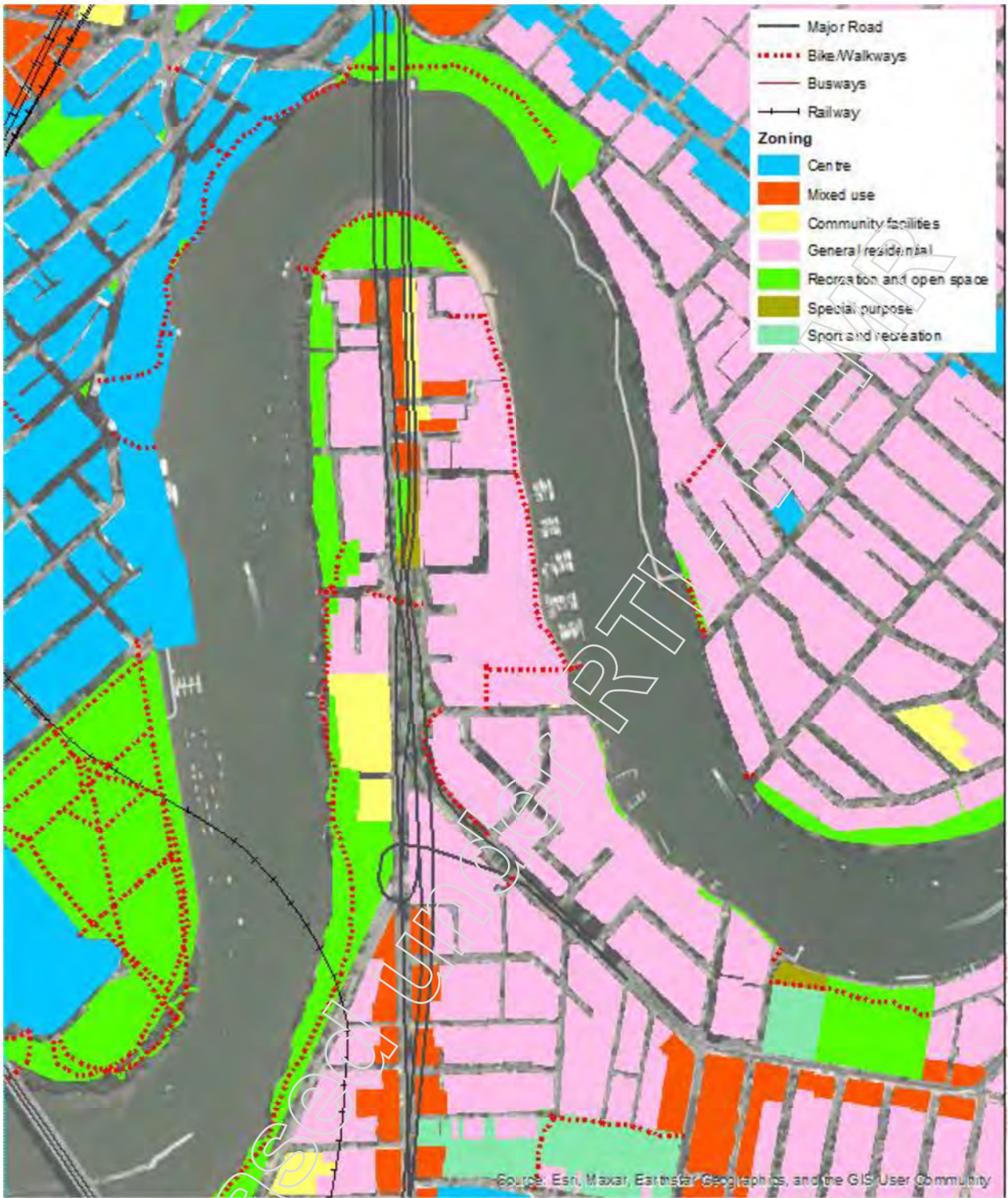


Figure 14: Zoning map



Figure 15: Land tenure



Figure 16: Council parks

5. Stormwater, flooding and maritime

As part of the Strategic Context phase of the project, Arup has undertaken a preliminary assessment of stormwater, flooding and maritime considerations.

The outcomes of this review are included in the *Stormwater, Flooding and Maritime Technical Note* (Appendix G).

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6. Opportunities and constraints

The following section presents the findings of the background review of the study area and the site inspections, categorised into opportunities and constraints. Appendix C outlines the opportunities and constraints identified and will be referenced throughout this section.

6.1 Site visit summary

A site visit of the study area was undertaken by the Arup team on Wednesday 5 October 2022 and Sunday 16 October 2022. The site visits were conducted on bicycle. A summary of key observations from the site visit are listed in Table 4, with additional details available in the *Site Visit Report* (Appendix D).

Table 4: Site visit key observations

Location	Key observations
Lambert St / O'Connell St / Thorn St	Indirect route along relatively wide road cross section (facilitating on-street parking). Street trees. Narrow footpaths. Steep grades. Mixture of Bicycle Awareness Zones (BAZ) line marking, bicycle lanes and footpaths. Difficult wayfinding for pedestrians and cyclists.
Shafston Ave	Direct route (from Lytton Road to Kangaroo Point Green Bridge). Simplified wayfinding. Moderately steep grades. High traffic volumes. Existing continuous shared path with some constrained sections pinch points (particularly at bus stops, from overgrown vegetation, poorly positioned road furniture).
Riverfront (at Mowbray Park)	Privately owned jetties access along the river edge, shared path of varying width with some pinch points near property accesses, several recreational users (walking in small groups or with dogs). Edge protection of the riverfront is intermittent only – risk of walkers or cyclists falling into the river. The riverfront walkway from Mowbray Park to the north is not a continuous link. It provides access to the high density residential properties only.
Riverfront (at Dockside precinct through to Captain Bourke Park)	Existing timber boardwalk in poor condition resulting in poor walking/riding comfort. Risk of trips, slips or falls. Several obstacles due to marina (including power supply and waste bins), underutilised public realm near dry dock.
Cairns Street	Poor safety and priority for vulnerable road users, particularly close to Deakin St intersection. Unsignalised left turn slip lanes at Cairns Street signalised intersection.
Deakin Street	Road is narrow and unsuitable for less confident cyclists to share the space on-road with motorists. Generally poor for pedestrian connectivity (especially with future underpass to the Kangaroo Point Green Bridge).
Mowbray Park	Poor legibility and connectivity through park, particularly near the ferry terminal.
General	Wayfinding is currently poor for active modes, particularly from Mowbray Park to Cairns Street.

6.2 Constraints

An overview constraints assessment has been undertaken across the project area and covers the following elements: infrastructure and access, environment, and land.

6.2.1 Infrastructure and access

Existing infrastructure often poses a constraint on future active transport networks as they have not been delivered with suitable cycle or pedestrian infrastructure to meet current and future demands.

Key infrastructure and access constraints are outlined in Table 5.

Table 5: Infrastructure and access constraints⁴

Reference (Appendix C)	Location	Constraint
3	Existing Kangaroo Point Riverwalk near dockside marina and ferry terminal	Space-proofing required for marina services (including waste, bicycle racks, supplies, etc.).
4	Existing footpath access under Bradfield Highway (opposite Ferry Street)	Existing footpath connection from Deakin St to Main St under the Bradfield Highway is very narrow and unsuitable for cyclists. It is acknowledged that the new Kangaroo Point Green Bridge project will be providing a new high standard underpass of the Bradfield Highway, which the project will connect with.
5	Existing Kangaroo Point Riverwalk along the Dockside Marina	Power supply to marina crosses existing promenade.
6 & 27	Between Ferryman’s Bridge and Cairns Street	The access in and around Dockside and the Dry Dock is currently poor. Paths seem to be set up for walkers, but not riders. Wheelchair access is via narrow and complex ramps.
7, 9 & 17	Shafston Avenue and Lytton Road	Active user crossings at intersections have no specific treatments to improve safety, connectivity, comfort for vulnerable users. High traffic volumes are also observed along Lytton Road and Shafston Avenue which create a barrier for connectivity.
8	Lambert Street	Steep gradient at roundabout approach. Not ideal for cyclists, particularly less experienced riders.
19	Existing Kangaroo Point Riverwalk near Dockside	Lookout without shade or shelter.
24	Existing Kangaroo Point Riverwalk near Dockside	Observed obstacles for cyclists including light posts, trees and gaps in pavement.
25	Existing Kangaroo Point Riverwalk near the Dockside Dry Dick	Parts of timber boardwalk in disrepair.
29	Cairns Street	Futureproofing required for potential bridge connection between Cairns Street and Merthyr Road.

Further information is required to identify infrastructure constraints relating to waterway access requirements. This will reveal the access needs from the river (Waterway Access Plan) and how and where any structures need to be constructed in the River.

6.2.2 Environment and Heritage

The Brisbane River greatly contributes to the amenity of the Kangaroo Point Riverwalk project. However, it poses a significant physical barrier for the project’s design and construction. Figure 17 shows the BCC flood data extents over the study area and demonstrates that the majority of the study area has a low to medium likelihood of flooding.

Due to an increase in severe weather as a result of climate change, heavy flooding is becoming an increasing risk in the South-East Queensland area, particularly along the Brisbane River and connecting estuaries. Ensuring the designed Kangaroo Point Riverwalk is resilient will be an important element of providing a long-term sustainable active transport route.

⁴ More detailed and refined analysis will occur as the project progresses to further understand key constraints and project risks



Figure 17: Flood overlay within study area (BCC)

Figure 18 and Figure 19 capture the extent of the flooding experienced in February 2022, which seems to inundate the Mowbray Park Ferry Terminal and the riverside pathways through Mowbray Park.



Figure 18: Mowbray Park flood impacts, February 2022 (BCC)



Figure 19: Mowbray Park Ferry Terminal flood impacts, February 2022 (BCC)

Table 6 outlines the various environmental and heritage constraints within the study area.

Table 6: Environmental and heritage constraints

Reference (Appendix C)	Location	Constraint
21	Crane bases, end of Wharf Street	Local heritage place must be preserved.
27	Dockside Dry Dock area	Local heritage place must be preserved.
28	Cairns Street	Local heritage place must be preserved.
33	Brisbane River (various locations)	Existing waterway flora (such as mangroves) will need to be preserved.

6.2.3 Land

The study area is highly developed, with a variety of land uses surrounding the proposed project site. These various land uses present a land constraint as the built-up residential and commercial areas create complex tenure arrangements of public infrastructure and results in limited options for on-road routes with comfortable grades. In these locations, providing separated facilities may not be possible, unless parking or traffic lanes are removed and reallocated to pedestrians and cyclists. Table 7 outlines the land constraints present in the study area.

Table 7: Land constraints

Reference (Appendix C)	Location	Constraint
1	Existing Kangaroo Point Riverwalk (between Captain Burke Park and Dockside Dry Dock)	Series of established trees that provides screening for residents
2	Kangaroo Point riverfront property ownership and access	Promenade owned by private body corporate, therefore existing asset condition and maintenance responsibility needs to be confirmed. For section between Dockside and Mowbray Park where there is no existing riverfront public access, this will likely require access easements, especially where there are existing pontoons and river access.
10, 16	Shafston Avenue	Indented bus stop
11	Lambert Street	On-street parking and residential access
14	Shafston Avenue	Multi-residential driveways, light posts, signs and gantries
27	Dockside Dry Dock and Marina	The Dockside Dry Dock and marina both hold significance with the community and will need to remain. The <i>Neighbourhood Plan</i> outlines that there is an intent to maintain the Dry Dock's ability to be used for marine vessels in the future. Therefore, the project will need to maintain usable access to the dry dock.

6.3 Opportunities

Through a review of policies, planning and strategies, planned future projects, existing conditions and the site survey, opportunities have been identified for the Kangaroo Point Riverwalk project which are summarised below, with Table 8 outlining specific opportunities identified through the site survey:

- The project strongly aligns with State and Local Government strategies, plans and policies as it expands the active transport network, facilitates sustainable activity and can help to provide safe active transport infrastructure for all ages and abilities.
- The project will complement future projects within the study area, such as the Kangaroo Point Green Bridge and CityLink Cycleway, to create a seamless active transport network.
- The project presents an opportunity to enhance existing active transport infrastructure and address the lack of connectivity within and around the Kangaroo Point peninsula.
- The project presents an opportunity to reduce the number of crashes involving vulnerable road users (such as pedestrians and cyclists) within the study area by providing a safe and fit-for purpose facility connecting to the well-established active transport network in the area.
- The study area is already well utilised by active transport users meaning establishing the need for the upgrades to provide a suitable facility for all levels of experience and various user requirements. The existing pedestrian and cyclist volumes are anticipated to increase significantly with the introduction of the Kangaroo Point Green Bridge which will reduce the travel time and distances from Brisbane south eastern suburbs into the CBD.

Table 8: Opportunities

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7. Project rationale

This report has been developed to capture the initial research and analysis that has been undertaken to identify background, gaps, existing conditions, movement and place context, constraints and opportunities associated with the Kangaroo Point Riverwalk project. Completing this key active transport link offers the opportunity to enable modal shift and maximise the return on investment for the recent active transport facility delivered as part of Wynnum Road Upgrade Stage 1 and the upcoming Kangaroo Point Green Bridge, with a large portion of potential active travel commuters coming from the inner eastern suburbs. Delivering a safe, connected and attractive active transport network is a critical piece to the puzzle in terms of sustainably managing increased travel demand on the Kangaroo Point Peninsula.

The report has highlighted the following key elements, which together form the rationale for the project:

- Strong alignment with State and Local government policies, plans and strategies in regard to delivering a connected and sustainable transport network for the Kangaroo Point Peninsula.
- Enhances the existing active transport network by filling an identified missing link, while also complementing and integrating with future planned projects within the study area.
- Creates an opportunity to enhance existing facilities and provide a safe and comfortable movement and place outcome for a wide range of users of all ages and abilities.
- Increased active transport participation and reducing car-dependence in the area.

8. Basis of design

Several design standards, technical documents and Council publications will be used throughout the project life cycle. The *Basis of Design* report (found in Appendix F) outlines the relevant standards and guidelines to use for each design discipline in order of precedence, as specified by BCC. Council's City Plan *Schedule 6 Planning scheme policies – SC6.16 Infrastructure design planning scheme policy* was used as the basis for the preparation of the relevant standards and guidelines.

The areas covered in the *Basis of Design* report include:

- City planning and urban design
- Bikeway planning
- Pedestrian and bike paths
- Geometric design
- Drainage design
- Structural design
- Traffic engineering and design
- Landscape design
- Roadway lighting
- Erosions and sediment control
- Environmental design
- Pavement design
- Wayfinding and signage
- Noise management
- Cost estimating
- Standard specifications
- Standard drawings
- Drafting and presentation

Appendix A – Planning and policy review

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Appendix B – Future projects

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Appendix C – Opportunities and constraints map

It is noted that this map can also be found in Appendix B of the *Site Visit Report*.

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Appendix D – Site Visit Report

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Appendix E – Road Safety Audit Report

Released under RTI - DTMR

Appendix F – Basis of Design

Released under RTI - DTMR

Appendix G – Stormwater, Flooding and Maritime Technical Note

Released under RTI - DTMR

Appendix H – Community Engagement Report

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Appendix I – Environment and cultural heritage desktop searches




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A.2 Planning and policy review





Appendix A of the *Strategic Context Working Paper*






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Policy / Plan	Summary	Relevance
<p>TMR Queensland Transport Strategy 2019</p> 	<p>The Queensland Transport Strategy outlines the following strategic outcomes for the State:</p> <ul style="list-style-type: none"> • Accessible, convenient transport • Safe journeys for all • Seamless personalised journeys • Efficient, reliable, and productive transport for people and goods • Sustainable, resilient, and liveable communities 	<p>The Kangaroo Point Riverwalk project strongly aligns with strategic outcome 5 as a key direction is ‘making active transport more convenient and attractive.’</p> <p>Through the enhancement of existing facilities and an extension to improve connectivity to surrounding precincts and the Kangaroo Point Green Bridge, the project will facilitate a safe and accessible network, ultimately contributing to a more sustainable city.</p>
<p>SEQ Regional Plan 2017 (ShapingSEQ)</p> 	<p>ShapingSEQ has a 50-year vision, with five (5) key goals underpinning this vision. Those goals are:</p> <ul style="list-style-type: none"> • Grow • Prosper • Connect • Sustain • Live <p>The Connect goal seeks to support “Moving people, products and information efficiently”.</p> <p>Active transport under the Connect goal has the following strategies:</p> <ul style="list-style-type: none"> • Prioritise active transport as the primary mode in regional activity centres. • Provide an extensive, convenient, and safe active transport network throughout the region’s urban areas. • Provide active transport connections to existing and planned high-frequency public transport stops and stations, centres, schools and tertiary education institutions. <p>ShapingSEQ promotes active transport as an effective means of connecting people with places locally, supporting healthy living, minimising impact on the environment and reducing congestion. Promoting active transport as a favoured, practical option in SEQ means prioritising connections to support walking and cycling to maximise accessibility to and from employment, educational institutions such as schools and universities, public transport stops and stations and centres.</p>	<p>The Kangaroo Point Riverwalk study area is within the South East Queensland region. ShapingSEQ 2017 is the Queensland Government’s plan to guide the future development of the South East Queensland region, prepared in collaboration with the region’s 12 local governments. The plan draws inspiration from the community.</p> <p>ShapingSEQ has specific mention of providing well-designed streets, paths and public spaces that provide physical separation from motorised traffic, wayfinding and adequate shade and amenities play an important role in encouraging people to walk and ride as an everyday activity, which directly inform our approach for determining the basis of design for the Kangaroo Point Riverwalk facility.</p>
<p>TMR Cycling Infrastructure Policy (CIP) 2017</p> 	<p>The CIP requires that all projects on the Principal Cycle Network (PCN) explicitly cater for cycling through provision of dedicated cycle facilities, to provide a safe space for cycling. The CIP also states for cycling infrastructure and facilities to be planned, designed and constructed so that they are fit for purpose and deliver value for money and realisable benefits. The objectives of this policy are to:</p> <ul style="list-style-type: none"> • Improve transport connectivity within and between communities • Facilitate growth in the number of cycling trips • Mainstream the planning, provision and maintenance of cycling infrastructure and facilities on the state-controlled transport network • Expand catchments for public transport services by ensuring the integration of cycling infrastructure and facilities as part of 	<p>The CIP is an important tool for the Kangaroo Point Riverwalk project and other major projects through Brisbane over the next 10 years, as it sets the policy position to include suitable active transport provision as part of any TMR-led or funded project.</p> <p>The Kangaroo Point Riverwalk project aims to address key objectives of the CIP, including ‘improving transport connectivity within and between communities’ and ‘improve the safety of all road users’ by providing the missing link identified by the community as well as improvements to existing facilities.</p>

Policy / Plan	Summary	Relevance
	<p>the public transport (road, rail, bus and pathway) system</p> <ul style="list-style-type: none"> • Improve the safety of all road users. 	
<p>TMR Queensland Cycling Strategy 2017-2027 and Cycling Action Plan 2020-2022</p> 	<p>Through the Queensland Cycling Strategy 2017–2027, the Queensland Government is taking action to ensure that, as the population grows, people are supported to choose cycling as a convenient, enjoyable, and healthy way to travel and socialise. This strategy sets the direction for cycling in Queensland over the next decade.</p> <p>The strategy identifies five key priorities:</p> <ul style="list-style-type: none"> • Building and connecting infrastructure to grow participation • Encouraging more people to ride • Sharing our roads and public spaces • Powering the economy • Using research and data in decision making. <p>This strategy goes hand in hand with The Queensland Cycling Action Plan that focuses on the practical issues which need to be actioned immediately to encourage more people to cycle. Every two years, the action plan is updated and published alongside a new report on the state of cycling in Queensland. This assists with prioritising efforts as cycling participation grows, adapting to new technologies and transport options, and ensuring that changes that have an impact on cycling are responded to effectively.</p> <p>The plan committee identifies five key objectives that the government wants to achieve in the next ten years, these being:</p> <ul style="list-style-type: none"> • More cycling, more often in Queensland • Cycle networks that are complete, connected and integrated with other transport modes • Positive perceptions of cycling throughout Queensland • Cycling helping the Queensland economy to prosper • A strong evidence base that guides decision making about cycling. 	<p>The Kangaroo Point Riverwalk project strongly aligns with this strategy, as it aims to encourage more people to cycle by improving cycle connectivity, providing a better integrated active transport system, and delivering a comfortable and attractive environment catered to all ages and abilities.</p> <p>The strategy and supporting action plan provide high level guidance for design and delivery of the cycle network, such as barriers to riding and the types of projects sought to deliver priority outcomes.</p>
<p>TMR Road Safety Policy (2022)</p> 	<p>TMR’s Road Safety Policy aims to implement principles, processes and practices that will reduce the number of fatal and serious injury crashes. It outlines safety standards to ensure the construction of safer roads for all users. The policy identifies key provisions to achieve safer road environments for cyclists and pedestrians:</p> <ul style="list-style-type: none"> • Pedestrian crossings shall be provided on all approaches at signalised intersections • Pedestrian crossing protection shall be provided • Left-turn slip lanes should be avoided at intersections 	<p>The Road Safety Policy is an important document for informing the safety standards of the Kangaroo Point Riverwalk project. The project aims to meet the safety standards outlined in the policy, particularly the standards relating to cyclists and pedestrians. These standards will be a crucial consideration in assessing opportunities for enhancement of existing facilities and the design elements required of the preferred route.</p>
<p>TMR South East Queensland Principal Cycle Network Plan (PCNP) and Priority Route Maps (PRM) addendum</p>	<p>The PCNP guides the design/delivery of the active transport network and facilitates funding partnerships between State and Local Government for cycle infrastructure on agreed upon links.</p> <p>Priority Route Maps (PRMs) are addendums to the PCNP, and identify the delivery priority, State and Local governments have assigned principal cycle</p>	<p>The Kangaroo Point Riverwalk study area aligns to the Principal Cycle Routes on TMR’s PCNP for South East Queensland.</p> <p>The Riverwalk segment between Holman Street at Captain Burke Park to the Dry Dock at Dockside development is categorised as Route Priority B and all</p>

Policy / Plan	Summary	Relevance
	<p>routes to guide State and Local government planning, design, and investment. Priority is given to:</p> <ul style="list-style-type: none"> • Links, typically protected cycle tracks/veloways, which connect centres and key attractors. • Completing the active transport network within 5km of key centres to deliver a connected network to an immediate catchment. • Ensuring safe and connected routes are provided to schools and higher education institutions, focusing on a 3km catchment around schools. • Providing active transport links to key public transport stations and stops. <p>The PRM classifies each route from the SEQ PCNP into five different priorities:</p> <ul style="list-style-type: none"> • Priority A – focus for delivery in the next 10 years • Priority B – focus for delivery in the next 10 to 15 years • Priority C – focus for delivery in the next 15 to 20 years • Priority D – focus for delivery in the next 20 years or more • Unprioritised – Either already constructed or not considered a priority for investment at the time of writing. 	<p>other segments are categorised as Route Priority A, highlighting that both State and Local government recognise the importance of filling the ‘missing link’ in this area.</p> 
<p>TMR Queensland Walking Strategy 2019-2029 and Walking Action Plan 2022-2024</p> 	<p>The Queensland Walking Strategy coordinates and integrates the state’s approach to walking so communities can be made better for people of all ages and abilities.</p> <p>The strategy and supporting action plan provide high level guidance for design and delivery of walking infrastructure, insights around barriers to walking and the types of projects sought to deliver priority outcomes.</p>	<p>The Kangaroo Point Riverwalk project aims to provide for a wide range of active transport users, which includes walkers of all ages and abilities, which includes people with a disability.</p> <p>This project strongly aligns to the objectives of the strategy by aiming to improve connectivity to key attractors and the provision of a safe and welcoming environment for people walking.</p>
<p>BCC Brisbane Active Transport Strategy 2012 – 2026</p> 	<p>The Brisbane Active Transport Strategy 2012-2026, aims to create high quality, connected accessible pathway network and attract people of all ages to walk and cycle. The vision of this Strategy is:</p> <p><i>“For active transport in Brisbane to deliver a high quality, connected and accessible pathway network that will encourage people of all ages and abilities to walk and ride more often.”</i></p> <p>A target has been set of 1 in 5 (20%) of transport trips to be undertaken by walking or cycling by 2026. An outline is provided on how the Council proposes to deliver a high-quality pathway network to make walking and cycling an easy choice for Brisbane people.</p> <p>Its aim is for people to recognise that active transport has health, congestion reduction, environmental and economic benefits.</p>	<p>The Kangaroo Point Riverwalk project supports the objectives outlined in the Brisbane Active Transport Strategy by improving cycling and pedestrian network connectivity and promoting active transport as a favoured, practical travel option.</p> <p>The Kangaroo Point Riverwalk project can help deliver modal shift desired by this strategy by providing convenient links to local destinations, recreation and public transport, which may result in other positive outcomes such as reduced parking demand and traffic congestion.</p>
<p>Brisbane Vision 2031</p>	<p>The vision for Brisbane set out in this document is for residents and visitors to adopt sustainable travel choices that include walking, cycling and public transport. Eight key themes have been developed to achieve the overall vision and each theme contains objectives and actions which have been developed to</p>	<p>The Kangaroo Point Riverwalk project can help deliver a more accessible, connected, active, healthy and green city, which closely aligns with the themes of the Vision.</p>

Policy / Plan	Summary	Relevance
	<p>provide a framework for quantifiable actions and to achieve the set targets.</p> <p>The themes of the vision are:</p>  <ul style="list-style-type: none"> • Our accessible, connected city • Our active, healthy city • Our clean, green city • Our friendly, safe city • Our New World City • Our smart, prosperous city • Our vibrant, creative city • Our well-designed, subtropical city 	<p>The most relevant theme to the Kangaroo Point Riverwalk project is “our accessible, connected city”, with the relevant corresponding aspirations being:</p> <ul style="list-style-type: none"> • Brisbane is an accessible city for everyone. Residents, workers, students, visitors, and business people can move easily throughout the city. • Road, public transport, and active transport networks provide safe, efficient, fast, and reliable travel options throughout the city. These networks help deliver economic benefits to Brisbane and support our growing community and changing economy.
<p>Transport Plan for Brisbane – Strategic Directions and Implementation Plan 2018</p> 	<p>The Transport Plan for Brisbane – Strategic Directions provides the framework to ensure Brisbane’s transport network meets the future needs of the city. Walking and cycling currently represent a relatively low portion of travel mode choice within Brisbane, with an active trips being more prevalent around the CBD and inner-city areas where there is greater density and active transport connections present.</p> <p>To support the release of the Transport Plan for Brisbane – Strategic Directions, Brisbane City Council developed the Transport Plan for Brisbane – Implementation Plan 2018. The implementation plan outlines short-to-medium term actions that assists in achieving the outcomes of the transport plan, contributing to enhancing the liveability and economic prosperity of Brisbane, harnessing innovation and evolving the transport networks to meet Brisbane’s Vision 2031.</p>	<p>The Plan outlines a number of committed bikeways to be delivered within Brisbane by 2023 that will improve the network performance over the medium to long-term. The Kangaroo Point Riverwalk project can help deliver the outcomes sought by the Plan by providing a high-quality and connected facility, which is an attractive travel option for locals within the project area, providing convenient connections to local destinations.</p> <p>The plan outlines the Kangaroo Point Bikeway as a key project in the pipeline to be delivered within 5 years. The Kangaroo Point Riverwalk project will play a vital role in achieving a continuous cycle facility for the Kangaroo Point Peninsula.</p>
<p>Brisbane Bicycle Network Overlay (Brisbane City Plan 2014)</p> 	<p>The Brisbane City Plan 2014 is Council’s plan for the development of Brisbane. Included within the City Plan is a cycle network overlay and associated maps. The cycle network overlay map identifies the following sub-categories:</p> <ul style="list-style-type: none"> • Primary cycle route • Secondary cycle route • Local cycle route • Riverwalk typologies 	<p>The overlay indicates that within the study area, study extent A is categorised a Primary Cycle Route, study extent B is categorised as Riverwalk (typology 2) and study extent C is a partial primary cycle route on Deakin Street local cycle route on the western end of Cairns Street.</p> <p>The Kangaroo Point Riverwalk project aligns with the broader BCC cycling network to increase cycle connectivity between Brisbane inner city suburbs and the Brisbane CBD.</p>
<p>Brisbane’s E-Mobility Strategy (2021-2023)</p> 	<p>Brisbane City Council developed the Brisbane e-mobility strategy to provide guidance to private and public enterprise and support the use of sustainable and more energy-efficient transport options across Brisbane. The e-mobility strategy outlines Council’s priorities on e-mobility including policies, plans for infrastructure and safety considerations for future partnerships.</p>	<p>The following elements of Brisbane’s E-Mobility strategy are relevant to the Kangaroo Point Riverwalk:</p> <ul style="list-style-type: none"> • Transport services and infrastructure help to enable e-mobility as a replacement for short car trips, especially for the first-and-last mile to public transport.

Policy / Plan	Summary	Relevance
	<p>The vision outlined in the strategy is for a connected city, where transport enhances liveability, supports business and investment, takes advantage of new technology and keeps riders and pedestrians safe.</p>	<ul style="list-style-type: none"> Our transport infrastructure helps to improve safety and public confidence and helps the e-mobility industry to grow.
<p>Eastern Active Transport Study (2021)</p> 	<p>The Eastern Active Transport Study is a Council-led planning study aimed to develop solutions to fill two 'missing links' in the bicycle network in the eastern Brisbane area. The study focused on concepts and staging for two key corridors connecting the CBD to Wynnum and West End to Carindale. The study identified the CBD to Wynnum alignment along Kangaroo Point Green Bridge-- Deakin Street-- Shafston Avenue-- Lytton Road to Norman Creek and onwards along Wynnum Road, Manly Road and Wondall Road to Wynnum. This Study fills the route between the CBD and Lytton Road and therefore ties into the future prioritisation of the rest of the route to Wynnum, opening up the CBD to the eastern suburbs.</p>	<p>The Kangaroo Point Riverwalk project delivers a key component of the Eastern Active Transport Study, which identifies the missing link in the bicycle network between eastern Brisbane and the CBD. Specifically, the project addresses the connection between Kangaroo Point Green Bridge and Lytton Road.</p> 
<p>Kangaroo Point Peninsula neighbourhood plan 2019</p> 	<p>The Kangaroo Point Peninsula neighbourhood plan contains the following objectives for the area:</p> <ul style="list-style-type: none"> Support growth that provides for the needs of the established residential community and provides leisure and lifestyle opportunities for residents and visitors. Facilitate high-quality public realm and streetscape improvements in conjunction with new development. Enhance pedestrian and cycle links to parks and the Brisbane River. Update planning provisions for the neighbourhood plan area 	<p>The plan outlines intentions for the following specific areas relevant to the project area:</p> <ul style="list-style-type: none"> Urban context such as streetscape requirements, public realm connections and movement) Dockside precinct to keep safe and well-connected public access areas, open landscaped areas, drydock as a historical landmark with opportunities for river access provides pedestrian connections between Goodwin Street and the riverside portion of the Dockside walkway area. <p>The Kangaroo Point Riverwalk project will help deliver the objectives of the neighbourhood plan by enhancing leisure and lifestyle through improved access to the waterfront and enhancing pedestrian and cycle links in the area. The project also has the opportunity to deliver positive public realm and placemaking outcomes, where is a priority of the neighbourhood plan.</p>
<p>Mowbray Park Vision 2021</p> 	<p>The Mowbray Park vision outlines a conceptual plan for the park which covers the following high level elements:</p> <ul style="list-style-type: none"> Play spaces Gardens Public amenities and picnic facilities Shade tree planting and existing vegetation maintained New pathways (including north-south connections and new connection to Eskgrove Street) Terraced steps Reinstated bandstand Accessible parking bays servicing Ferry and park 	<p>The Kangaroo Point Riverwalk project will connect to Mowbray Park. Mowbray Park plays a key role in ensuring the Kangaroo Point Riverwalk facility is connected to the broader active network (notably the existing active facility on Lytton Road).</p>

Policy / Plan	Summary	Relevance
<p>Brisbane Active Transport Network Plan (Draft)</p>	<p>The draft active transport network plan for Brisbane outlines the proposed active transport network for Brisbane. The following hierarchy of routes is identified across the city:</p> <p>LEGEND:</p> <ul style="list-style-type: none"> — Red – Primary route — Dark blue – secondary route — Light blue – local route — Riverwalk <p>The network hierarchy proposed for the project area is shown below (extract from the draft):</p> 	<p>The green line in the map represents the waterfront ‘Riverwalk’ alignment, which will be interrogated as part of the options development and assessment phase of the project.</p> <p>The red line (primary route) along Shafston Avenue/Lytton Road, as well as Lambert Street and Thorn Street alignment options will also be investigated and considered in the options development.</p> <p>The draft network also shows Wellington Road as a dark blue (secondary) route, which is an important point, as this represents a desire line from the south and there will need to be a high quality secondary connection to this once the preferred route is identified.</p>




Release




A.3 Future projects

Appendix B of the *Strategic Context Working Paper*

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Project	Summary	Relevance
<p>Kangaroo Point Green Bridge</p> 	<p>The Kangaroo Point Green Bridge, delivered by BCC, will provide an active transport connection between the CBD and Kangaroo Point. This project includes a new underpass of the Bradfield Highway near Scott Street.</p> <p>The objective of this project is to encourage active transport in Brisbane's inner south and eastern suburbs.</p>	<p>The Kangaroo Point Riverwalk project will provide a vital connection between the Kangaroo Point Green Bridge and the Kangaroo Point peninsula.</p> <p>The inclusion of this link will create an integrated active transport network connecting Kangaroo Point and East Brisbane.</p>
<p>CityLink Cycleway</p> 	<p>The CityLink Cycleway is a joint initiative between Brisbane City Council and the Queensland Government. The project is trialling a new separated two-way bikeway in stages along selected streets in the Brisbane City centre, connecting directly to the future Kangaroo Point Green Bridge.</p>	<p>The CityLink Cycleway, in conjunction with the Kangaroo Point Green Bridge and Riverwalk projects, creates an opportunity to connect cycle infrastructure from the CBD to the inner south and eastern suburbs of Brisbane.</p> <p>The provision of a connected cycleway will encourage a shift towards active transport, thereby reducing traffic congestion and promoting a healthier and more sustainable city.</p>
<p>Veloway (V1) Lower River Terrace Velobridge</p> 	<p>Upgrades to the V1 are being made in stages to remove multiple road crossings and to improve safety where on-road crossings still exist. TMR has undertaken a planning study for a new bridge between the Kangaroo Point Bikeway at Lower River Terrace and the V1.</p>	<p>The inclusion of the Kangaroo Point Riverwalk project will provide a connection between East Brisbane to the V1, thereby creating an opportunity for cyclists to access a dedicated bikeway between East Brisbane, Kangaroo Point, South Brisbane and Eight Mile Plains.</p> <p>The ability to access the 17-kilometre bikeway from the project will provide a safe and efficient route for people riding bikes and improve active travel connectivity to the wider bicycle network, hospitals, education facilities and public transport hubs.</p>
<p>Kangaroo Point Bikeway Upgrade Stage 1 (Captain Cook Bridge to Thornton Street)</p>	<p>Upgrades to the existing Kangaroo Point Bikeway are proposed, with Stage 1 to enter early planning phase in FY 2022/23 subject to funding. The project would seek to improve the level of service provided by the bikeway to meet current standards and future needs.</p>	<p>The addition of the Kangaroo Point Riverwalk project will complement the planned upgrades for the Kangaroo Point Bikeway, which provides a connection to South Bank, Goodwill Bridge and the Veloway (V1). It is important that the needs and design requirements of the Riverwalk be communicated with the Kangaroo Point Bikeway Upgrade team so that a consistent and coherent facility can be delivered across the whole Kangaroo Point peninsula.</p>
<p>Mowbray Park Masterplan</p>	<p>The Mowbray Park 'Vision' was established in 2021 and outlined a high level future for the park. Currently, BCC is working on a more detailed masterplan which will set out the specifics and priority projects which will see the park transform into a more activated and vibrant place.</p>	<p>The Kangaroo Point Riverwalk project will provide a vital connection between the Kangaroo Point peninsula and Mowbray Park. The project will help drive activity for the park through improved access.</p> <p>It is critical that the Riverwalk project is coordinated with the Mowbray Park masterplan to ensure there is alignment with pathway planning. Mowbray Park is a critical link</p>

Project	Summary	Relevance
<p>MOWBRAY PARK VISION – final concept plan</p> 		<p>between the Riverwalk and the existing high quality facility along Lytton Road (towards the inner eastern suburbs of Brisbane).</p>
<p>Dockside Ferry Terminal upgrade</p> 	<p>The upgrade of the Dockside Ferry terminal is scheduled for completion in late 2023. The upgrade of terminal is focussed on allowing larger sized vessels such as 'KittyCats' and will also replace ramp landings to provide improved accessibility.</p>	<p>The Riverwalk project will have direct interface with the Dockside ferry terminal. A key element will be ensuring that legible and understandable for ferry patrons, as patrons will need to access and cross the existing boardwalk.</p>
<p>Mowbray Park Ferry Terminal upgrade</p> 	<p>The upgrade of the Mowbray Park Ferry terminal is planned to follow the Dockside Ferry terminal upgrade (which is scheduled for completion in late 2023). The upgrade of Mowbray Park ferry terminal is focussed on accessibility improvements.</p>	<p>The Riverwalk project will have direct interface with the Mowbray Park ferry terminal at the end of Park Avenue. An observation from the site visit was that there is currently poor access from the ferry terminal to Mowbray Park and the surrounding footpaths.</p>

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A.4 Opportunities and constraints map

Appendix C of the *Strategic Context Working Paper*

NR

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A.5 Site Visit Report

Appendix D of the *Strategic Context Working Paper* ^{NR}

The *Site Visit Report* also includes a copy of the opportunities and constraints map.

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Brisbane City Council

Kangaroo Point Riverwalk Options Analysis and Concept Design

Site Visit Report

Reference: NR

Rev 2 | 12 April 2023



This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number: NR

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1. Introduction

1.1 Background

Arup has been commissioned by Brisbane City Council (BCC) to undertake the Options Analysis (OA) and Concept Design (CD) for the Kangaroo Point Riverwalk project, which connects Captain Burke Park in Kangaroo Point and Mowbray Park in East Brisbane with an unbroken cyclist and pedestrian path. This project aims to address the “missing link” in the existing cycling and pedestrian network, as identified by the cycling community, the Department of Transport and Main Roads (TMR) and BCC. Figure 1 shows the project area.



Figure 1: Study area extent (BCC, 2022)

1.2 Purpose

The purpose of this report is to summarise the activities, route and key observations from the Arup team’s site visit. The site visit was conducted to gain a better appreciation for user requirements focusing on walking, cycling and e-mobility and specific issues including signs, lighting, path alignment, visibility, speed, obstructions, pavement issues and conflict points.

2. Site visit

The site visit was conducted between 9am and 11am on Wednesday 5 October 2022. The site visit was conducted by the Arup team, including:

- NR [redacted] Project Manager
- NR [redacted] Project Director
- NR [redacted] Transport Planning Lead

A subsequent site visit was conducted by NR [redacted] (Civils Lead) on Sunday 16 October 2022.

2.1 Saddle survey route

Due to the size of the project area, a 'saddle survey' was determined the most efficient way to cover the project area in a meaningful way. The saddle survey involved the team riding their bikes through the project area and stopping regularly to discuss key observations such as major constraints and opportunities. The saddle survey followed the route shown in Figure 2.

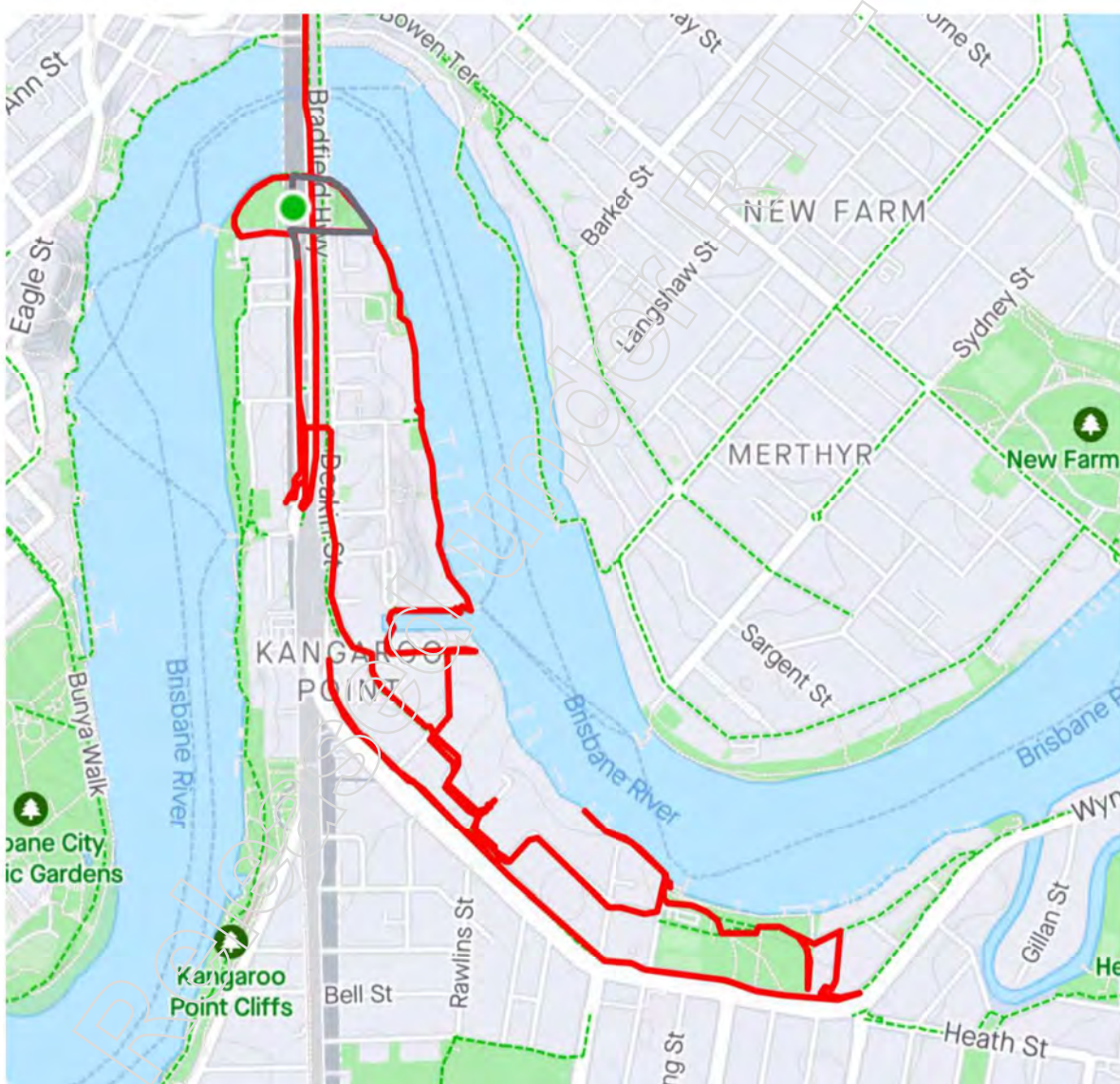


Figure 2: Saddle survey route

2.2 Key observations

A summary of the key observations from the site visit is presented in Table 1.

Table 1: Key observations

Location	Key observations
Lambert St / O'Connell St / Thorn St	Wide road with steep grades, on-street parking, street trees, narrow footpaths.
Shafston Ave	Direct, moderately steep grades, high traffic volumes, existing continuous shared path with some pinch points (bus stops, overgrown foliage, street furniture).
Riverfront	Privately owned jetties access along the river edge, shared path of varying width with some pinch points near property accesses, several recreational users (walking in small groups or with dogs).
Dockside precinct	Existing timber boardwalk in poor condition, several obstacles due to marina (including power supply and waste bins), underutilised public realm near dry dock.
Cairns Street	Poor safety and priority for vulnerable road users, particularly close to Deakin St intersection.
Deakin Street	Road is narrow and unsuitable for riders, generally poor for pedestrian connectivity (especially with future underpass to the Kangaroo Point Green Bridge).
Mowbray Park	Poor legibility and connectivity through park, particularly near the ferry terminal.
General	Wayfinding is currently poor for active modes, particularly from Mowbray Park to Cairns Street.

3. Constraints and opportunities

The constraints and opportunities identified during the site visit are documented in Appendix B. Details of these observations are listed in Table 2, with the Item ID being aligned with the map shown in Appendix B.

Table 2: Constraints and opportunities summary

Item ID	Type	Details
1	Constraint	Series of established trees that provide screening for residents.
2	Constraint	Promenade owned by private body corporate. Existing asset condition and maintenance responsibility to be confirmed. Potential transfer of ownership to be considered.
3	Constraint	Space-prooing required for marina services, including waste, bicycle racks, supplies, etc.
4	Opportunity	Existing e-mobility node.
5	Constraint	Power supply to marina crosses existing riverwalk, creating a tripping hazard for pedestrians and a slipping hazard for cyclists.
6	Constraint	Existing constrained ramped access between Ferryman's Bridge and Cairns Street, including multiple tight switchbacks that constrain cyclist access.
7	Constraint	Signals at the intersection of Cairns St and State Route 23 prevent continuous flow for cyclists and pedestrians.
8	Constraint	Steep gradients along Lambert St and O'Connell St.
9	Constraint	Signals at the intersection of O'Connell St and Shafston Ave prevent continuous flow for cyclists and pedestrians.
10	Constraint	Indented bus stop with no dedicated waiting area for public transport patrons.

Item ID	Type	Details
11	Constraint	On-street parking and residential access creates safety concerns for cyclists.
12	Opportunity	Improvements to cyclist safety treatments along local streets. This could be achieved by implanting cycle lanes, advisory lanes or improving the location of bicycle awareness zone symbols.
13	Opportunity	Improvements to safety of contraflow cycle lane.
14	Constraint	Multi-residential driveways, light posts, signs and gantries all create hazards for cyclists and pedestrians.
15	Opportunity	Improve cyclist and pedestrian amenity along Shafston Avenue by extending the separated path on Lytton Rd.
16	Constraint	Bus stop creates a significant pinch-point in an already highly constrained path.
17	Constraint	Signals at the intersection of Wellington Rd and Shafston Ave prevent continuous flow for cyclists and pedestrians.
18	Opportunity	Opportunity to create more permeable movement between promenade and beach.
19	Constraint	Lookout without shade or shelter, limiting utilisation.
20	Opportunity	Increasing the servicing amenities for people and their dogs.
21	Constraint	Crane bases, local heritage place.
22	Opportunity	Retail opportunities for additional outside dining.
23	Opportunity	Opportunity to apply a consistent treatment of pavement surface, furniture, lights and trees across the full extents of the promenade.
24	Constraint	Obstacles for cyclists, including light posts, trees, gaps in pavement and sharp turns.
25	Constraint	Parts of timber boardwalk in disrepair, creating a tripping hazard for pedestrians and a tyre puncturing hazard for cyclists.
26	Opportunity	Increase the amount of on-river retail at moored boats.
27	Constraint	Dry dock, local heritage place.
28	Constraint	Substation No. 11, local heritage place.
29	Constraint	Future proofing for potential future bridge connection between Cairns Street and Merthyr Road, to consider in landing for riverwalk.
30	Constraint	High risk of pedestrian-vehicle conflict at existing on-street parking by heritage sub-station.
31	Opportunity	Wide existing road cross-section represents an opportunity to improve amenity for cyclists and pedestrians.
32	Opportunity	Extension of existing promenades.
33	Constraint	Existing waterway flora.
34	Opportunity	Existing e-mobility nodes.
35	Opportunity	Ramped connection to Wellington Street to allow for DDA access.
36	Opportunity	Transition to path within Mowbray Park.

Appendix A – Site Photos

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<p>Park Av and Lytton Rd intersection</p> 	<p>Wellington Rd, Lytton Rd and Shafston Ave intersection</p> 
<p>Shafston Ave bus stop, near Wellington Rd</p> 	<p>Shafston Ave gantry, near Wellington Rd</p> 
<p>Thorn St and Shafston Ave intersection</p> 	<p>Castlebar St and Shafston Ave intersection</p> 

Shafston Ave bus stop, near O'Connell St



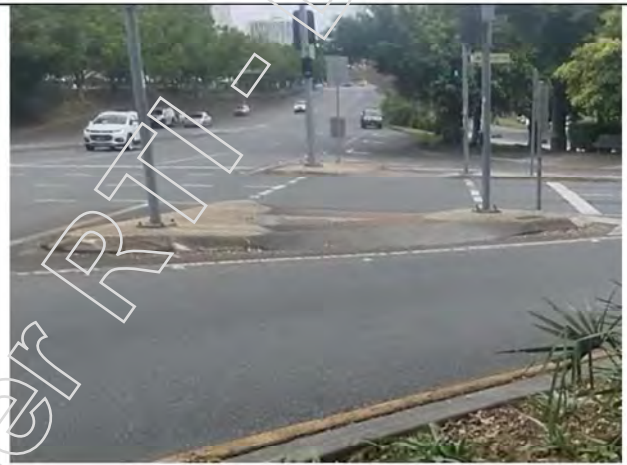
O'Connell St and Shafston Ave intersection



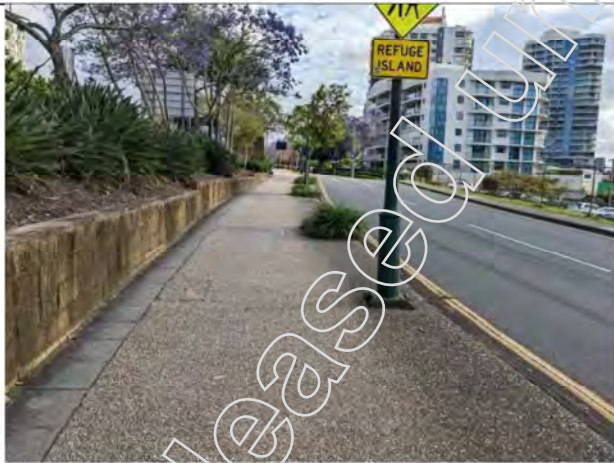
Footpath between O'Connell St and Cairns St



Cairns St and Shafston Ave intersection



Deakin St footpath



Deakin St cyclist ramp



<p>Holman St path ramp</p> 	<p>Connection to Captain Burke Park</p> 
<p>Wide promenade near Holman St Pier</p> 	<p>Open space near crane bases</p> 
<p>Constrained width near Rotherham St</p> 	<p>Area near Rotherham St with street furniture, trees and light all on same side of path</p> 

Timber boardwalk adjacent to marina



Timber boardwalk adjacent to marina



End of Riverside Prom



Dockside Walk



Northern access to Ferryman's Brg



Southern access to Ferryman's Brg



Cairns St and O'Connell St intersection



Sub-station at the end of Cairns St



Lambert St and O'Connell St roundabout



Lambert St, facing towards Cairns St



Lambert St and Cairns St intersection



Cairns St and Deakin St intersection



Lambert St and Castlebar St intersection



Contraflow path on Shafston Ave



Thorn St



Wellington Rd promenade access



Mowbray Park ferry terminal and promenade access



End of promenade parallel to Thorn St, west of Mowbray Park



Appendix B - Opportunities and Constraints Map

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A.6 Road Safety Audit Report

Appendix E of the *Strategic Context Working Paper*, ^{NR} [redacted]

For the Road Safety Audit with designer responses, refer to Appendix C.3 of this report.

Released under RTI - DTMR

Brisbane City Council

Kangaroo Point Riverwalk Options Analysis and Concept Design

Existing Conditions Road Safety Audit

Reference NR [redacted]

Rev 1 | 28 November 2022



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1. Introduction

Arup has been engaged by Brisbane City Council (BCC) to undertake an Options Analysis (OA) and Concept Design (CD) for the Kangaroo Point Riverwalk project.

The Kangaroo Point Riverwalk project will connect Captain Burke Park in Kangaroo Point and Mowbray Park in East Brisbane with an unbroken cyclist and pedestrian path. This project aims to address the “missing link” in the existing cycling and pedestrian network, as identified by the cycling community, the Department of Transport and Main Roads (TMR) and BCC.

Arup has been commissioned to undertake a Road Safety Audit (RSA) of the existing conditions to identify potential safety issues and inform the options analysis process. This report documents the RSA findings.

1.1 Study area

The study area considered as part of the RSA is shown in Figure 1 below, with the study area encompassing the Kangaroo Point Riverwalk project area between Captain Burke Park in the north and Mowbray Park in the south. The RSA study area includes the off-road shared path along Shafston Avenue. The study focuses on issues pertaining to active transport users and the study largely excludes roadways.

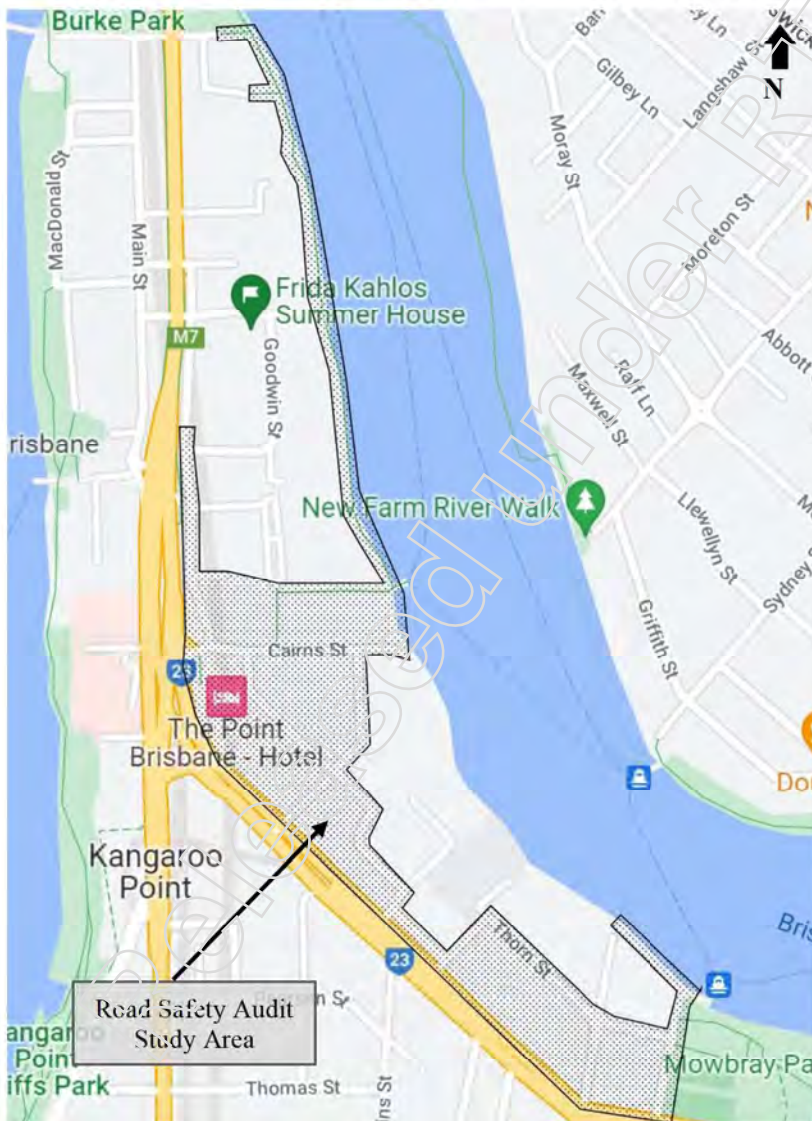


Figure 1: Overview of RSA study area

2. Audit process

2.1 The road safety audit

The *Austrroads Guide to Road Safety Part 6: Road Safety Audit (2022)* defines an RSA as a:

“formal examination of a future road or traffic project or an existing road or road related area, in which an independent, qualified team reports on the project’s crash potential and actual safety performance respectively.”

An audit is not a check against the design standards and does not imply compliance with the standards, which may represent the minimum requirements. The essential elements of this definition are that the audit:

- is completed by an independent and qualified audit team;
- considers the safety of all road users (unless specified within the audit brief), crash types and severities;
- is aligned with the Safe System principles which focuses on eliminating fatal and serious injury crash potential; and
- can be conducted on proposed or existing roads.

The objective of an RSA is to identify foreseeable hazards for all users. It does not guarantee safety. The RSA process provides a reasonable, but not absolute, hazard identification method for all road users with a particular focus on the reduction in fatal and serious injuries.

The benefits of conducting RSAs include:

- the exposure of road users to safety risks can be reduced;
- the likelihood of crashes on the road network can be reduced; and
- the severity of crashes that occur can be reduced.

2.2 Limitations of road safety audit

Whilst RSAs are detailed in some respects, they represent a relatively brief assessment of a road network or of an associated feature and are not intended to extend to or investigate every aspect which may potentially have some level of influence on road function or safety.

It should not be expected that a review has been carried out in relation to issues requiring specific verification testing in order to confirm conformity with all of the relevant (and possibly exacting) standards, or where a level of detailed investigation is required that is inconsistent with the general audit process.

In an audit it may be appropriate to ensure the existence of aspects such as roadway lighting, but the actual levels or quality would not be verified in absolute terms.

In general, auditors are unfamiliar with the roads under review and may be unaware of all of the circumstances of use of a road or all of the conditions that exist from time to time (e.g. specific traffic manoeuvres, sun glare from a building during a short period of the day).

2.3 Audit team

This RSA was undertaken by:

- Audit team lead – ^{NR} [redacted] (Associate Principal Traffic Engineer);
- ^{NR} [redacted] (Associate Civil Engineer); and
- ^{NR} [redacted] (Traffic Engineer)

Both ^{NR} [redacted] are registered as Senior Road Safety Auditors on the TMR Road Safety Auditor Register.

2.4 Information sources

References used for the RSA include:

- Austroads Guide to Road Safety
- Austroads Guide to Road Design
- Austroads Guide to Traffic Management
- TMR Road Planning and Design Manual
- TMR Manual of Uniform Traffic Control Devices (MUTCD).

2.5 Inception meeting

An inception meeting was held on 26 October 2022 between ^{NR} [redacted] (Transport Lead) from the project design team ^{NR} [redacted] from the audit team. As part of the inception correspondence a map of the subject area indicating required extents and relevant design team site visit reports were provided to the audit team.

2.6 Site visit

A day site visit was conducted on Wednesday 2 November 2022 and a night site visit on Thursday 3 November 2022 to assess the existing conditions in the study area. The day inspection was between 11.00am – 2.00pm. The night inspection was between the hours of 7.00pm – 8.00pm. The weather conditions on both site inspections were clear.

All traffic movements were recorded with a dash cam video. The road area was also inspected on foot during the daytime inspection only. Photographs were taken of particular locations during the site inspections.

These inspections form the basis of the audit finding, which are detailed in subsequent sections of this report.

2.7 Methodology

This RSA was carried out to review the preliminary design in the vicinity of the site and its potential to compromise road user safety, including vulnerable road users. It was undertaken in accordance with the practices outlined in the *Austroads Guide to Road Safety Part 6: Road Safety Audit* (2022). The audit covers physical features of the existing network which may affect road user safety and it has sought to identify potential safety deficiencies.

However, the auditors point out that no guarantee is made that every deficiency has been identified. Further, if all recommendations in the report were to be followed, this would not guarantee that the existing roads are 'safe' rather the adoption of the recommendations should improve the level of safety of the roads.

Safety deficiencies identified in this report have been rated based on the likelihood and severity of a traffic accident resulting from the identified issue as described in Table 1, Table 2, Table 3 and Table 4. These tables have been produced from *Austroads Guide to Guide to Road Safety Part 6: Road Safety Audit* (2022).

Table 1 Likelihood

Frequency	Description
Almost Certain	Occurrence once per quarter
Likely	Occurrence once per quarter to once per year
Possible	Occurrence once per year to once every three years
Unlikely	Occurrence once every three years to once every seven years
Rare	Occurrence less than once every seven years

Table 2 Severity Guidance

		CRASH SPEED (km/h)									
		<10	10	20	30	40	50	60	70	80	90
Crash type	Pedestrian (vs HV)										
	Cyclist (vs HV)										
	Motorcyclist (vs car)										
	Pedestrian (vs car)										
	Cyclist (vs car)										
	Pole/Tree Impact (car)										
	Motorcyclist (vs car)										
	Side Impact (HV vs car)										
	Side Impact (car vs car)										
	Head On (HV vs car)										
Head on (car vs car)											

The information contained within the severity guidance sheet is a general indication only.

Table 3 Resulting level of risk

			Severity				
			Insignificant	Minor	Moderate	Serious	Fatal
			Property damage	Minor first aid	Major first aid and/or presents to hospital (not admitted)	Admitted to hospital	Death within 30 days of crash
Likelihood	Almost Certain	One per quarter	Medium	High	High	Extreme (FSI)	Extreme (FSI)
	Likely	Quarter to 1-year	Medium	Medium	High	Extreme (FSI)	Extreme (FSI)
	Possible	1 to 3 years	Low	Medium	High	High (FSI)	Extreme (FSI)
	Unlikely	3 to 7 years	Negligible	Low	Medium	High (FSI)	Extreme (FSI)
	Rare	>7 years	Negligible	Negligible	Low	Medium (FSI)	High (FSI)

Table 4 Corresponding priorities for mitigation

Risk	Description
Negligible	No action required
Low	Should be corrected or the risk reduced if the treatment is low cost
Medium	Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high
High	Should be corrected or the risk significantly reduced, even if the treatment cost is high
Extreme	Must be corrected regardless of cost

Possible actions have been suggested for the identified deficiencies. These should be considered as a guide to assist with the investigation of remedial measures.

2.8 Interpretation of audit results

As set out in the RSA guidelines, responsibility for the RSA always rests with the road controlling authority and not with the auditor. An asset owner is under no obligation to accept all the of audit recommendations. Also, it is not the role of the auditor to agree to or approve of the asset owner’s response to the audit. Rather, the audit provides the opportunity to highlight potential safety issues and have them formally considered by the asset owner, in conjunction with all other asset considerations.

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3. Audit findings

3.1 Summary of findings and recommendations

A summary of the findings and their subsequent risk rating is listed below in Table 5 with a detailed description of each finding presented in Appendix A. The findings are not presented in order of relative safety, importance, priority for treatment, or chainage.

Table 5 Summary of audit findings

Item	Finding	Risk Rating
1	TGSI at driveways	Low
2	Edge drop-off of footpaths	Medium
3	Direction of kerb ramps	Medium (FSI)
4	TGSI at crossings	Low
5	Speed advisory signage	High (FSI)
6	Pedestrian refuge islands	Medium
7	Lighting	High
8	BAZ Symbols	Medium
9	Ponding water	Low
10	Missing fencing along riverside of walk	High (FSI)
11	Sharp connection from Rotherham Street	Low
12	Effective width of Dockside Walk	Medium
13	Speed signage on Dockside Walk	Medium
14	Interaction of marina servicing and pedestrians/cyclists	Medium
15	Ramp gradient on Dockside Walk at Ferry Street	Low
16	Electrical cabling on Dockside Walk	Medium
17	Conflicting cyclist signage on Dockside Walk	Low
18	Obstructions at entry ways to Dockside Walk	Medium
19	Narrow connection between Ferryman's Bridge and Dockside Walk	Medium
20	CPTED issues at Cairns Street entrance to Ferryman's Bridge	Medium
21	Narrow cross-section at Deakin Street / Darragh Street	Medium
22	Line marking at Deakin Street / Darragh Street	Medium
23	Lack of speed controls for cyclists	Low
24	Pole overhanging Deakin Street	Medium
25	Redundant kerb ramp at Ferry Street	Low
26	No separation of footpath on Deakin Street	Medium

Item	Finding	Risk Rating
27	Vertical wall on Deakin Street	Medium
28	Lack of pedestrian crossing facility across Deakin Street at Cairns Street	High
29	Missing footpath on Prospect Street	Low
30	Narrow footpath on Prospect Street	Low
31	Grades at Deakin Street / Prospect Street intersection	Low
32	Reverse out driveways on Cairns Street	High (FSI)
33	Lack of wayfinding guidance for path users	High (FSI)
34	Pedestrian crossing on Cairns Street	Medium
35	Pedestrian crossing southbound left turn slip lane from Shafston Avenue	High (FSI)
36	Pedestrian crossing southbound left turn slip lane from Deakin St	High
37	Storage lanes at Cairns Street intersection	Medium
38	Storage lanes at Cairns Street intersection	High (FSI)
39	Pedestrian crossing on Cairns Street	High (FSI)
40	Driveway / parking / cyclist conflicts on O'Connell Street	Medium
41	Parking blocking visibility on O'Connell Street	High
42	Lane widths at O'Connell Street / Lambert Street intersection	High (FSI)
43	Overgrown foliage on O'Connell Street	Low
44	Kerb ramps and TGSI at O'Connell Street / Shafston Avenue	Medium (FSI)
45	Midblock pedestrian crossing on Lambert Street	Medium
46	Midblock pedestrian crossing visibility on Lambert Street	High
47	Horizontal rail fencing on Lambert Street	Medium (FSI)
48	Overhanging foliage on Shafston Avenue shared path	Low
49	Signage reducing path width of Shafston Avenue shared path	Medium
50	Bus stop on shared path	Medium
51	No signage indicating shared path	Low
52	Gantry sign and barrier	Medium
53	Narrow footpath on Castlebar Street	Low
54	Signage reducing path width of Shafston Avenue Service Road	Low
55	No separation of footpath on Shafston Avenue Service Road	Medium
56	Contraflow bicycle lane on Shafston Avenue Service Road	High (FSI)
57	Pavement arrows at intersection of Shafston Avenue Service Road and Castlebar Road	Low

Item	Finding	Risk Rating
58	Crossing on Thorn Street	Low
59	Phone booth on footpath on Thorn Street	Low
60	Missing kerb ramp on Thorn Street	Low
61	Parking blocking visibility on Thorn Street	Medium
62	Lane widths at Thorn Street / Wellington Road intersection	High (FSI)
63	No crossing provided on one leg of the Thorn Street / Wellington Road intersection	Low
64	No separation of footpath on Thorn Street	Low
65	Thorn Street cycle desire line across intersection	Medium
66	Overgrown foliage on Thorn Street	Low
67	Redundant kerb ramp on Wellington Road	Low
68	Lack of crossing sight distance available at Wellington Road / Shafston Avenue intersection	High (FSI)
69	Narrow footpath on Park Avenue	Low
70	Grades on Park Avenue	Medium
71	No separation of footpath on Park Avenue	Medium
72	Mowbray Park Jetty Walk conflict point with converging paths	Low
73	Obstructions within path areas	Medium

4. Audit team statement

This RSA was carried out by the audit team based on the provided information and informed by the site inspection undertaken.

Suggested actions have been indicated, where applicable. Such actions are not likely to be the only possible measures available, therefore it is recommended that any suggested actions provided be used only as a guide, and that other treatments should be considered.

The audit findings and suggested actions included in this report have been compiled by the following persons:

NR
[Redacted]

NR [Redacted] (Associate Principal Traffic Engineer)

Senior Road Safety Auditor

Date: 28 November 2022

NR
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Senior Road Safety Auditor

Date: 28 November 2022

NR
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NR [Redacted] (Traffic Engineer)

Road Safety Auditor

Date: 28 November 2022

Appendix A – Road Safety Audit Findings

Released under RTI - DTMR

Released under RTI - DTMR

A.7 Basis of Design

Appendix F of the *Strategic Context Working Paper* NR

Released under RTI - DTMR

Brisbane City Council

Kangaroo Point Riverwalk Options Analysis and Concept Design

Basis of Design

Reference: NR

Rev 2 | 12 April 2023



This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number: NR

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1. Introduction

Arup has been commissioned by Brisbane City Council (BCC) to undertake the Options Analysis (OA) and Concept Design (CD) for the Kangaroo Point Riverwalk project, to connect Captain Burke Park (Kangaroo Point) and Mowbray Park (East Brisbane) with a continuous link catering to cyclists, pedestrians and other active transport modes. This project aims to address the “missing link” in the existing cycling and pedestrian network, as identified by the cycling community, the Department of Transport and Main Roads (TMR) and BCC.

1.1 Purpose of report

The purpose of this report is to document the project philosophy/vision, design criteria and principles that will be used as the basis of design for all planning and option development completed as part of this study.

Developing clear design and performance criteria seeks to ensure that the options developed are consistent with the project objectives and suitable for the project environment. In addition, early agreement of the parameters with BCC and TMR is intended to avoid abortive works, with the project team clear on the design parameters required for all active transport facility options.

1.2 Glossary

Table 1 summarises a list of abbreviations used throughout this report.

Table 1: Abbreviations

Abbreviation	Description
AGRD	Austrroads Guide to Road Design
AGRS	Austrroads Guide to Road Safety
AGTM	Austrroads Guide to Traffic Management
ATIP	Active Transport Investment Program
BCC	Brisbane City Council
CCTV	Closed-circuit television
CD	Concept Design
CPTED	Crime Prevention through Environmental Design
HPR	Highest Priority Route
LGA	Local Government Area
LTS	Level of Traffic Stress
MCA	Multi-criteria analysis
OA	Option Analysis
PCN	Principal Cycle Network
PCNF	Principal Cycle Network Plans
SEQ	South-East Queensland
TMR	Department of Transport and Main Roads
TRUM	Traffic and Road Use Management Manual

Table 2 lists key terms referenced throughout this document, as defined in TMR's *Selection and design of cycle tracks guidelines*.

Table 2: Terms and definitions

Terms	Definition
Bike lane	An on-road special purpose lane for the exclusive use of bicycles.
Cycle track	A physically separated (one-way or two-way) bicycle-only facility with clear bicycle priority at intersections. Under the Road Rules, separated path rules apply to cycle tracks.
Off-road	A path located outside the road corridor, possibly through a park, reserve, easement, within a public transport corridor or other public or private land not open to motor vehicle traffic.
On-road	Where bicycles are operated in a general-purpose traffic lane, special purpose lane, auxiliary lane, a lane shared with parked cars or road shoulder.
Shared path	A pedestrian and bicycle facility that gives pedestrians priority under the Queensland Road Rules.
Separator	An area that divides a bicycle facility or path from the footpath, nature strip or roadway.

Released under RTI

2. Project understanding

2.1 Study purpose

TMR and BCC are committed to providing safe cycling infrastructure to encourage mode shift towards more sustainable modes of transport. Council is currently completing the draft Active Transport Network Plan (ATNP), a review of Brisbane's Bicycle Network Overlay in City Plan to improve network connectivity and safety.

Through this review and from feedback received from the cycling community, TMR and BCC are aware of a "missing link" in the network of existing cycling infrastructure between Kangaroo Point and East Brisbane. The Kangaroo Point Riverwalk requires new infrastructure to improve connectivity for all active transport modes and encourage sustainable transport within a rapidly changing inner city region.

The Kangaroo Point Riverwalk has committed funding within the 2020-2024 State budget and the project is listed in Queensland Transport and Roads Investment Program (QTRIP) as a high priority project to "fill pathway network gaps to create an unbroken bike and pedestrian path between Captain Burke Park, Kangaroo Point and Mowbray Park, East Brisbane".

The study shall develop a preferred walking and riding connection between Frank Nicklin Dry Dock (Kangaroo Point) and Mowbray Park (East Brisbane), and between Frank Nicklin Dry Dock and the future Deakin Street underpass. The project will maximise access and return on investment from the Kangaroo Point Green bridge by providing a key connection to the Deakin Street underpass access and fill a critical gap in the active transport network. The study will also identify enhancement opportunities for the existing Riverwalk between Captain Burke Park and Frank Nicklin Dry Dock. It is essential that options cater for e-mobility use under the current road rules.

The study will comprehend the current and future issues, constraints, and opportunities, and determine prospective infrastructure upgrade solutions for the study area. The study will then develop a concept design for the recommended upgrade options with high level cost-benefit analysis. The conclusions will be used to inform TMR and Council's forward program, project prioritisation and determine the requirements for the next stages of planning and design.

The purpose of the study is to:

- Improve the safety of all road users through the introduction of infrastructure for pedestrians (including wheelchairs, prams etc.), cyclists and e-mobility users which is separated from road vehicles.
- Improve pedestrian, cyclist, and e-mobility access through the provision of a high-quality facility that connects to the surrounding active and public transport network. The facility shall establish a continuous walking and riding connection between Frank Nicklin Dry Dock, Kangaroo Point and Mowbray Park, East Brisbane, and between Frank Nicklin Dry Dock and the future Deakin Street underpass. The study will also identify enhancement opportunities for the existing Riverwalk between Captain Burke Park and Frank Nicklin Dry Dock.
- Limit impact on transport network efficiency through the consideration of all modes in current and future scenarios.
- Complement the public transport network to ensure multi-modal connectivity is supported.

2.2 Delivery objectives and milestones

To achieve the purpose of the study, BCC has defined the following key objectives and milestones:

- Ensure that suitable options for the Riverwalk are recommended, which appropriately address the key challenges identified by Council and the project team.
- Review existing planning, projects, and data.

- Consider existing and future active transport needs.
- Identify and review network gaps, deficiencies, opportunities, and constraints, including mapping.
- Develop up to three treatment options for active transport facilities to address the needs of all users.
- Prepare a multi-criteria analysis (MCA) to determine the preferred option(s).
- Prepare high-level concept plans and cost estimates for the preferred option(s), including land requirements.
- Recommend staged project delivery options, including identification of “quick wins” that could be delivered within a timeframe of 1-2 years, subject to funding.

2.3 Background

Over the past decade, BCC has released strategies specific to Kangaroo Point, such as the *River’s Edge Strategy*, the *Kangaroo Point Peninsula Draft Renewal Strategy* and the *Kangaroo Point Peninsula Neighbourhood Plan*. These documents outline the community’s desire for increased active transport connectivity along the Kangaroo Point peninsula and surrounding inner-city precincts. This has created an opportunity to improve the existing network and deliver new infrastructure.

Through the strategies mentioned above, a missing active transport link has been identified between the Frank Nicklin Dry Dock and Mowbray Park. The Kangaroo Point Riverwalk project aims to address the missing link through improved access and activity along the Brisbane River. The project also aims to identify opportunities for enhancement along the existing riverwalk section between Captain Burke Park and the Frank Nicklin Dry Dock, as well as developing a connection to the Kangaroo Point Green Bridge project via Cairns Street and Deakin Street.

2.4 Study area

The study area spans from Captain Burke Park in Kangaroo Point to Mowbray Park in East Brisbane and is divided into three extents, as shown in Figure 1.

- *Study extent A* represents the missing link in the active transport network, between Frank Nicklin Dry Dock to Mowbray Park (and the existing active transport facility along Lytton Road). The project aims to provide a continuous active transport facility between these areas and to the broader active transport network.
- *Study extent B* represents the existing Kangaroo Point Riverwalk between Captain Burke Park and the Frank Nicklin Dry Dock. The project seeks to identify opportunities for enhancements to the existing infrastructure.
- *Study extent C* represents the link between the Kangaroo Point Riverwalk project to the future Kangaroo Point Green Bridge via the Deakin Street / Main Street active transport underpass, which is currently under construction.



Figure 1: Study area extent (BCC, 2022)

2.5 Gap analysis

The *Strategic Context Working Paper* ^{NR} includes a detailed gap analysis which covers the following aspects:

1. Review of relevant policies, planning and strategy documents to ensure integration and alignment with key objectives and strategic direction for the project area.
2. Review of the existing conditions including land use planning, existing transport infrastructure and road safety history.
3. Review of planned and proposed new active transport infrastructure, including proposals in conjunction with other transport projects.

2.6 User profile

A review was undertaken of the surrounding land uses and points of interest to understand the likely current and future user groups within the extents of the project. The identified users and their needs are listed within Table 3. It should be noted that “walking” also includes jogging, running, and moving with the help of a mobility device (such as a wheelchair, mobility cane or a walking frame).

Table 3: User profile

Types of users	User profile and needs
All users	<ul style="list-style-type: none"> • Clear signage and wayfinding. • Adequate lighting to enable use outside of day-light hours
Commuter cyclists	<ul style="list-style-type: none"> • Walking and cycling to places of employment. • Higher speed environment. • Typically separated path / cycle track facilities.

Types of users	User profile and needs
E-mobility (e-bikes, e-scooters, e-skateboards, etc.)	<ul style="list-style-type: none"> Higher speed environment. Typically separated path / cycle track facilities.
Elderly or limited mobility	<ul style="list-style-type: none"> Low-stress, safe and comfortable path. Rest areas.
Families	<ul style="list-style-type: none"> Walking and cycling. Low-stress environment with shared / separated path / cycle track facilities. Facilities (e.g. water, toilets etc.).
Fitness	<ul style="list-style-type: none"> Confident cyclists prefer separated facilities / cycle track. Recreational cyclists and walkers will accept shared path facilities.
New users	<ul style="list-style-type: none"> Walking and cycling. Comfortable, attractive, and direct connection with shared / separated path / cycle track facilities.
Public transport	<ul style="list-style-type: none"> Walking or cycling to public transport nodes (e.g. rail, bus, ferry etc.). Shared / separated path / cycle track facilities.
Recreational	<ul style="list-style-type: none"> Confident cyclists prefer separated facilities / cycle track. Recreational cyclists and walkers will accept shared path facilities.
School students	<ul style="list-style-type: none"> Walking and cycling to schools. Low-stress, safe and comfortable path. Typically, shared path facilities.
Visitors	<ul style="list-style-type: none"> Multilingual users / tourists. Low-stress environment with shared / separated path facilities.

2.7 Preferred type of facility

A number of potential alignments will be considered as part of the OA process. Between the Frank Nicklin Dry Dock and Mowbray Park, the project will investigate facilities along major roads, through local streets, and along the Brisbane River.

2.7.1 Major roads

The major roads within the study are high speed environments (60km/h), heavily trafficked and have a crash history. TMR's *Selection and design of cycle tracks guideline Table 2.1* suggests high-quality parallel off-road separated or shared path or cycle tracks are preferred over bicycle lanes due to the high-speed difference of greater than 20 km/h or more.

This acknowledges that separated cycle facilities can cater for both commuter and recreational cyclists of varying skill and confidence levels and would offer a desired level of safety and protection from the relatively hostile cycle environment in parts of the study area (particularly where there is a lack of facilities).

The proposed treatments along major roads (in priority order) to be adopted are as follows:

1. Separated one-direction or two-way cycle track and footpath on both sides of major road.
2. Separated two-way cycle track and footpath on one side of major road.
3. Off-road shared path on one side of major road and on-road bike lanes on both sides of major road.
4. On-road bike lanes (considering separation from traffic lanes) on both sides of major road.

2.7.2 Local roads

On roads with a posted speed equal to or less than 50km/h, TMR's *Selection and design of cycle tracks guideline Table 2.1* suggests bicycle lanes or cycle tracks are preferred on a primary bicycle route. If kerbside parking is required, cycle tracks are preferred over bicycle lanes due to door zone conflicts.

It is acknowledged that reduced posted speeds (40km/h) may also be possible along local roads. Under these low-speed conditions, mixed traffic options may be appropriate where spatial constraints limit the ability to include cycle lanes.

The proposed treatments along local roads (in priority order) to be adopted are as follows:

1. Separated one-direction or two-way cycle track and footpath on both sides of local road.
2. Separated two-way cycle track and footpath on one side of local road.
3. Off-road shared path on one side of major road and on-road bike lanes on both sides of local road.
4. On-road bike lanes (considering separation from traffic lanes) on both sides of local road.
5. Cycle street.
6. Advisory bicycle lanes.
7. Bicycle awareness zones.

2.7.3 Public parks

For cycle path connections located away from the road network, typically outside of road corridors and running through public parks, the desirable treatment is a high-quality shared path or separated facility/cycle tracks.

The proposed treatments along public parks (in priority order) to be adopted are as follows:

1. Two-way separated cycle track with parallel footpath.
2. Shared path.

2.7.4 Crossing treatments

Table 4 presents the categories of crossing treatments with regard to cycle connectivity, delay and safety. As the project area crosses a number of roads along its route, crossing treatments will be reviewed on a case-by-case basis to suit site-specific requirements/constraints.

Table 4: Crossing treatment comparison

Treatment	Cyclist connectivity	Delay (for through cyclists)	Cyclist safety
Grade separation	Low (no connectivity to local network)	Low	Good (no conflicts). Potential CPTED issues for underpasses.
Grade separation with ramp access to local network	Potentially good (allows for connectivity to local network)	Low	Good (no conflicts). Potential CPTED issues for underpasses.
At-grade signalised	Potentially good (allows for connectivity to local network)	Medium to high (depending on signal phasing)	Medium to good (depends on whether turn filtering is allowed)
At-grade unsignalised via raised priority crossing	Potentially good (allows for easy connectivity to local network)	Low to medium (priority for cyclists and pedestrians)	Medium (priority provided for cyclists)
At-grade unsignalised (including via refuge island)	Potentially good (allows for easy connectivity to local network)	Low to medium (depending on road vehicle volumes)	Poor to medium (uncontrolled crossing)

3. Basis of design

The following section outlines the design standards and performance criteria to be applied to the development of design options. The described criteria are considered to form the minimum standard required to allow the project objectives to be achieved.

3.1 Design standards

Several design standards, technical documents and Council publications will be used throughout the project life cycle. The sections below outline the relevant standards and guidelines to use for each disciplinary area in order of precedence, as defined by BCC. Council's City Plan *Schedule 6 Planning scheme policies – SC6.16 Infrastructure design planning scheme policy* was used as the basis for the preparation of the relevant standards and guidelines.

3.1.1 City Planning and Urban Design

1. Economic Development Queensland (EDQ) Priority Development Area (PDA) Development Scheme / Interim Land Use Plans
2. Master Plans
3. BCC Brisbane Vision 2031
4. BCC Transport Plan for Brisbane - Strategic Directions
5. BCC Transport Plan for Brisbane - Implementation Plan 2018
6. BCC Kangaroo Point peninsula neighbourhood plan 2019
7. BCC City Plan 2014 incl. Brisbane Standard Drawings
8. TMR Road planning and design manual
9. BCC Subdivision and Development Guidelines
10. Queensland Government Guideline - Crime Prevention Through Environmental Design (CPTED)

3.1.2 Bikeway Planning

1. Economic Development Queensland (EDQ) Priority Development Area (PDA) Development Scheme / Interim Land Use Plans
2. Master Plans
3. BCC Brisbane Vision 2031
4. BCC Transport Plan for Brisbane - Strategic Directions
5. BCC Transport Plan for Brisbane - Implementation Plan 2018
6. BCC Brisbane Active Transport Strategy 2012 – 2026
7. BCC Adopted Local Plans (where applicable)
8. BCC City Plan 2014 incl. Brisbane Standard Drawings
9. Queensland Cycling Strategy 2017-2027
10. Queensland Walking Strategy 2019-2029
11. TMR Cycling Infrastructure Policy
12. TMR Principal Cycle Network Plans
13. TMR Guideline – Priority Cycle Route Improvement Plan

14. TMR Road planning and design manual
15. BCC Subdivision and Development Guidelines
16. Queensland Government Guideline - Crime Prevention Through Environmental Design (CPTED)

3.1.3 Pedestrian and Bike Paths

1. BCC City Plan 2014 incl. Brisbane Standard Drawings
2. The following TMR publications with equal precedence;
 - a. TMR Guideline – Fencing and edging treatments for cycling infrastructure
 - b. TMR Guideline – Raised priority crossings for pedestrian and cycle paths
 - c. TMR Guideline – Selection and design of cycle tracks
 - d. TMR Guideline – Treatment options to improve safety of pedestrians, bicycle riders and other path users at driveways
 - e. TMR Traffic and Road Use Management Manual (TRUM)
 - f. Other TMR guidelines published on the TMR website will also be referenced as required to inform specific treatments
3. The following Austroads publications with equal precedence;
 - a. Austroads – Cycling Aspects of Austroads Guides
 - b. Austroads – Guide to Road Design
 - c. Austroads - Level of Service Metrics (for Network Operations Planning)
4. The following publications with equal precedence;
 - a. AS 1428 Design for access and mobility
 - b. Queensland Government Guideline - Crime Prevention Through Environmental Design (CPTED)
5. AS 2890.3 Bicycle parking

3.1.4 Geometric Design

1. BCC City Plan 2014 incl. Brisbane Standard Drawings
2. The following TMR Standards with equal precedence;
 - a. TMR Manual of Uniform Traffic Control Devices (MUTCD)
 - b. TMR Road planning and design manual
 - c. TMR Traffic and Road Use Management Manual (TRUM)
 - d. Other TMR guidelines published on the TMR website will also be referenced as required to inform specific treatments
3. The following Austroads and Australian Standards with equal precedence;
 - a. Cycling Aspects of Austroads Guides
 - b. Guide to Road Design
 - c. Guide to Traffic Management
 - d. AS1742 MUTCD
4. The following TMR Guidelines with equal precedence;

- a. Fencing and edging treatments for cycling infrastructure
- b. Providing for people walking and riding at roundabouts
- c. Selection and design of cycle tracks
- d. Treatment options to improve safety of pedestrians, bicycle riders and other path users at driveways
- e. TransLink Public Transport Infrastructure Manual (PTIM)
- f. Active Transport Investment Program (ATIP)

5. BCC Subdivision and Development Guidelines

3.1.5 Drainage Design

1. IPWEAQ Queensland Urban Drainage Manual (QUDM)
2. BCC Stormwater Outlets in Parks and Waterways
3. Water by Design Water Sensitive Urban Design (WSUD) Technical Design Guidelines for South East Queensland
4. TMR Road drainage manual
5. BCC Subdivision and Development Guidelines

3.1.6 Structural Design

1. SC 6.16 Infrastructure Design Planning Scheme Policy (PSP), Chapters 4 and 8, BCC City Plan 2014
2. AS5100 Set-2017 Bridge Design Set
3. AS 1428.1-2009 Design for access and mobility – General requirements for access – New building work
4. Waterway Design: a guide to the hydraulic design of bridges, culverts and floodways (Austroads, 1994)
5. AS2159-2009 Piling – Design and Installation
6. AS4678-2002 Earth-retaining structures
7. AS1170.2-2011 Structural design actions Part 2: Wind actions
8. TMR Standard Drawings, Specifications and Design Criteria for Bridges and Other Structures
9. BCC Reference Specifications for Engineering Work
10. BCC Standard Drawings

3.1.7 Traffic Engineering and Design

1. TMR Manual of Uniform Traffic Control Devices (MUTCD)
2. The following Austroads and TMR guidelines and policies with equal precedence;
 - a. Cycling Aspects of Austroads Guides
 - b. Guide to Road Safety
 - c. Guide to Traffic Management
 - d. TMR Guideline - Providing for people walking and riding at roundabouts
 - e. TMR Guideline – Raised priority crossings for pedestrian and cycle paths

- f. TMR Guideline – Selection and design of cycle tracks
 - g. TMR Guideline – Treatment options to improve safety of pedestrians, bicycle riders and other path users at driveways
 - h. TMR Road Safety Policy
 - i. TMR Traffic and Road Use Management Manual (TRUM)
3. AS 1742 MUTCD

3.1.8 Landscape Design

- 1. BCC City Plan 2014 incl. Brisbane Standard Drawings
- 2. Queensland Government Guideline - Crime Prevention Through Environmental Design (CPTED)
- 3. BCC Subdivision and Development Guidelines
- 4. The following TMR publications with equal precedence;
 - a. TMR Fauna Sensitive Road Design – Volume 1
 - b. TMR Guideline – Fencing and edging treatments for cycling infrastructure

3.1.9 Roadway Lighting

- 1. BCC City Plan 2014 incl. Brisbane Standard Drawings
- 2. Energex Work Category Specification 47.3 Public Lighting Rate 2 Design
- 3. Queensland Government Guideline - Crime Prevention Through Environmental Design (CPTED)

3.1.10 Erosion and Sediment Control

- 1. Water by Design Water Sensitive Urban Design (WSUD) Technical Design Guidelines for South East Queensland
- 2. TMR Road drainage manual
- 3. BCC Sediment Basin Design, Construction and Maintenance
- 4. BCC Natural Channel Design
- 5. BCC Erosion Treatments for Urban Creeks
- 6. TMR Environmental processes manual

3.1.11 Environmental Design

- 1. TMR Environmental processes manual
- 2. TMR Fauna Sensitive Road Design – Volume 1
- 3. The following publications with equal precedence;
 - a. Water by Design Water Sensitive Urban Design (WSUD) Technical Design Guidelines for South East Queensland
 - b. BCC City Plan 2014 incl. Brisbane Standard Drawings

3.1.12 Pavement Design

- 1. The following publications with equal precedence;
 - a. BCC City Plan 2014 incl. Brisbane Standard Drawings
 - b. BCC Reference Specifications for Civil Engineering Works

2. TMR Pavement Design supplement
3. Austroads – Guide to Pavement Technology

3.1.13 Wayfinding and Signage

1. BCC Bicycle Signage Manual
2. TMR Guideline – Bicycle network signage and wayfinding
3. TMR Manual of Uniform Traffic Control Devices (MUTCD)
4. AS 1742 MUTCD
5. Queensland Government Guideline - Crime Prevention Through Environmental Design (CPTED)

3.1.14 Noise Management

1. TMR Transport Noise Management Code of Practice

3.1.15 Cost Estimating

1. TMR Project Cost Estimating Manual

3.1.16 Standard Specifications (if required)

1. BCC Reference Specifications for Civil Engineering Works
2. TMR Technical Specifications

3.1.17 Standard Drawings

1. BCC City Plan 2014 incl. Brisbane Standard Drawings
2. TMR Standard Drawings

3.1.18 Drafting and Presentation

1. BCC CPO CADD Standards (CA19/308756 to be provided in data transfer)
2. BCC City Plan 2014 incl. Brisbane Standard Drawings
3. BCC Subdivision and Development Guidelines

3.2 Design criteria

Design criteria for Kangaroo Point Riverwalk are presented in Table 5.

Table 5: Design Criteria

Element	Value	Guideline reference	Guideline description/commentary
Cycle track (one-way)	2.0m (with 0.4m min, 1.0m desirable separator)	TMR Selection and design of cycle tracks guideline Table 2 Figure B1.04 TMR Supplement Volume 1: Part 10 – Traffic Control and Communication Devices	One-way cycle track on each side of the road is preferred over a two-way cycle track for improved safety and operations at intersections, however land use location may result in a two-way cycle track being preferred. Where funding is not available for physically separated cycle track designed in accordance with these guidelines, a buffered bicycle lane is a low-cost option. To separate bicycle riders from traffic, painted median and frangible bollards are installed. Section 7.1 Bicycle lane separation devices in Transport and Main Roads' Supplement to Austroads' Guide to Traffic Management Part 10 Traffic and Road Use Management manual Volume 1 provides further guidance on preferred treatments and design characteristics of bicycle lane separation devices.
Cycle track (two-way)	3.0m (with 0.4m min, 1.0m desirable separator)	AGRD06A Appendix A TMR Selection and design of cycle tracks guideline	One-way cycle track on each side of the road is preferred over a two-way cycle track for improved safety and operations at intersections, however land use location may result in a two-way cycle track being preferred.
Bike lane	1.5m min 1.8m preferred	BSD-5102 BCC City Plan SC6.16 Table 3.6.3.2A	On-carriageway bike lanes may be required for some parts of the active transport connection/s. Options to separate cycle lanes from vehicle traffic lanes will be considered on a case by case basis.
Kerbside lane	4.5m 5.5m on major roads	BCC City Plan SC6.16 Ch3.6.3.2	Where on-road cycle routes are required where off-peak kerbside parking is permitted the width of the kerbside lane should be considered to provide adequate separation between parked cars, cyclists and moving vehicle traffic.
Verge width	3-6m	BCC City Plan SC6.16 Ch3.6.3.3	Verge widths to be a minimum of 6m where an off-road cycle/share path greater than or equal to 3m is to be used.
Shared Path corridor width	8m-9m Primary route	BCC City Plan SC6.16 Table 4.3.2.A	These widths apply to shared paths for primary routes beyond the road corridor and represent the optimal scenario and best case space-proofing.
Footpath (within road corridor)	1.2m abs min 1.5m des min	AGRD06A Table 5.1	Footpaths are complementary to the cycle facilities provided, enabling people walking to be suitably catered for. Footpath width should be increased where applicable to accommodate wheelchair users and higher foot traffic volumes.

Element	Value	Guideline reference	Guideline description/commentary
Footpath (outside road corridor)	2.0 – 4.0m	BCC City Plan SC6.16 Table 4.3.3.A	Footpaths are complementary to the cycle facilities provided, enabling people walking to be suitably catered for.
Shared Path width (outside road corridor) Shared Path width (within road corridor)	3.0 – 6.0m dependent on the classification of bicycle route as primary or secondary 3.0 – 4.0m	BCC City Plan SC6.16 Table 4.3.3.A TMR RPDMS3P6A Table 6A-2 AGRD P6A Section 5.5.2 AGRD P6A Figure 3.5 TMR Selection and design of cycle tracks guideline	If space permits in the shared corridor, on primary cycle routes shared paths should be up to 6m wide to allow for adequate separation.
Design speed (cyclists)	30km/h (desirable) 25km/h (min)	AGRD P6A Section 5.2 ATIP	It is acknowledged that the proposed facilities are to also cater to micro-mobility users, with micro-mobility users' speeds limited to 25km/h (by legislation) and 12km/h on shared paths.
Horizontal curve of shared path (without superelevation)	Minimum radius of 25m for design speed 30km/h	AGRD Part 6A Section 5.3	Where practicable designers should not design for the minimum radius as tight curves can result in sight distance restrictions, a poor level of service and some cyclists choosing an informal alternative path to avoid the restriction. Exceptions include locations where the alignment is severely constrained (e.g. steeply sloping land) and where smaller radii cannot be avoided. However, isolated tight bends that do not have preparatory approach geometry should be avoided as at night, in an unlit environment, curve warning signage may not be visible with bicycle lights.
Shared path gradient	3% desirable maximum	BCC City Plan SC6.16 Ch12.4.3.1 (20)	Where different levels are connected, the gradient of the path of travel should be minimised and the preferred maximum gradient is 3%. Use of steeper gradients are to be agreed with BCC on a case by case basis.
Cycle track grade	5% desirable maximum	AGRD Part 6A Section 5.4.3 TMR RPDMS3P6A 5.4.2	Gradients steeper than 5% should not be provided unless it is unavoidable. It is most important that sharp horizontal curves or fixed objects do not exist near the bottom of hills, particularly where the approach gradient is steep (greater than 5%) and relatively straight. On grades steeper than 5% cyclists tend to work the bicycle from side to side or wobble. The path width in the uphill direction should be widened by an additional 0.5 m to allow for this operating characteristic.
Resting places	Located at following maximum intervals and gradient of path of travel:	BCC City Plan SC6.16 Ch12.4.3.2	Riverside facility resting places should be located adjacent to the path of travel, are accessible from the path, include provisions for seating and for people in wheelchairs.

Element	Value	Guideline reference	Guideline description/commentary
	1 in 3 = 60m 1 in 20 = 37m 1 in 14 = 14m		
Crossing Points	3.0m minimum	BCC City Plan SC6.16 Ch12.4.3.5	Are not required on shared points, except at key points to link to destinations, features of interest or activity nodes and are required on separated paths across riverside paths at access points and to access associated riverside facilities. They should be highlighted by a change in materials or treatment, together with signage and use tactile indicators that are 300mm x 300mm and 40mm thick cast concrete paving units, achieving a minimum R12 or Class 'V' slip resistance rating.
Clearance to fence/barrier/obstacle adjacent to a shared path	1.0m desirable. Min 0.5m	AGRD Part 6A Section 5.5.2 BCC City Plan SC6.16 Ch12.4.3.1	Where the areas beside the path and the path alignment are both relatively flat a lateral clearance of at least 1.0 m (0.5 m absolute minimum) should be provided between the edge of any path for cycling and any obstacle, which if struck may result in cyclists losing control or being injured. However, on high-speed paths it is most desirable to have a clearance considerably greater than 1.0 m. This is particularly important on small radius horizontal curves where cyclists may lean in when travelling around the curve. A minimum 0.5m wide obstacle-free zone shall be provided adjacent to the path, with the exception of cyclist holding rails that are located 0.3m from the edge of the path.
Overhead clearance / vertical clearance for full width above path	Minimum 2.4m Minimum 3.6 m – where access is required for emergency and maintenance vehicles	BCC City Plan SC6.16 Ch12.4.3.1	This should apply to tree branches, underpasses, doorways, sign structures and any other overhead structure. Where it is absolutely necessary to use the minimum clearance (e.g. at sites where space is constrained and the achievement of a greater clearance would have significant implications regarding the cost of a facility or impacts on other infrastructure) the designer should obtain the agreement of the relevant authority/agency. The designer should confirm site specific access requirements for maintenance and emergency vehicles from the relevant authority.
Batters (cut/fill)	1:6 (desirable)		Localised steepening or retaining structures may be specified in constrained locations. Steepened embankments or retaining structures within the clear zones to be mitigated by appropriate fence/safety barrier.
Fence adjacent to a batter or drop off	Fence not required for a 1:4 batter (or flatter) with a 1.0 m (or greater) verge. Refer to figure 5.10 of ADRGP6A or fence requirements outside these limits.	AGRD Part 6A Section 5.5.3	The installation of a fence at the side of a path used by cyclists is desirable where: <ul style="list-style-type: none"> • there is a steep batter or large vertical drop located in close proximity to the path • the path is adjacent to an arterial road and it is necessary to restrict cyclist access to the road • a bridge or culvert exists on a path • a hazard exists adjacent to a particular bicycle facility

Element	Value	Guideline reference	Guideline description/commentary
			<ul style="list-style-type: none"> cyclists are likely to be ‘blazing a separate trail’ at an intersection between paths or around a path terminal. <p>Fences may also be needed where the path geometry, e.g. a downhill grade followed by a sharp curve in the path may be a location where cyclists misjudge the speed the curve can accommodate and run off the path.</p>
Path crossfall	Max 2.5% for concrete path, lower is desirable (i.e. 1.0%)	AGRD Part 6A Section 5.6.1	The crossfall of a paved pedestrian path may vary from flat (but achieving an adequately drained surface) to 2.5%. Provided that drainage is satisfactory, a lower crossfall is preferred (i.e. 1.0%) as a higher crossfall may cause problems for some people. Where paths are for pedestrian use or shared use, the needs of other path users (e.g. mobility impaired pedestrians) should be considered. In particular, AS 1428.1:2009 specifies that a path crossfall should not exceed 2.5% (1 in 40) or 3% (1 in 33) if the path has an asphalt surface.
Stopping sight distance (SSD) for cyclists	54m as calculated using 30km/h design speed and 5% grade. Twice SSD length required for two-way bicycle paths.	AGRD Part 6A Section 5.7.1	<p>The value for SSD is based on the ‘worst case’ scenario when using the design values for maximum gradient and design speed (as documented in this table). For other design speeds and vertical grades the designer should recalculate SSD based on the methodology presented in AGRD Part 6A Section 5.7.1.</p> <p>All two-way bicycle paths should be designed to provide a sight distance between opposing cyclists at least equivalent to twice the required stopping sight distance, to ensure cyclists who are overtaking can avoid head-on-collisions.</p>
Vertical alignment			Match existing where possible. Maximum grades noted in this table under “cycle track grade”.
Horizontal alignment			Suitable alignment geometry for cyclist design speed (noted in this table).
Access to adjacent properties	Continual access		Existing access to be maintained where possible. Where not possible, alternative access to be provided.
Lighting	In accordance with AS1158 – lighting sub-category PP3	BCC City Plan SC6.16 Ch12.9.3	The lighting design is to be constructible, maintainable, sustainable, safe and affordable. It should have regard to the ability to access the installation for maintenance, cost of equipment used, and the availability and cost of spare and replacement parts.
Pavement design	Design life flexible pavements: 20 years Design life for rigid pavements: 40 years	BCC City Plan SC6.16 Ch 3.5.2 (1)	<p>Where the 20 year design traffic load for flexible pavements exceeds 1×10^7 ESAs, a 40-year design life is required.</p> <p>Vehicle/pedestrian/cyclist counts to be provided by BCC. No traffic modelling/studies to be undertaken.</p>

Element	Value	Guideline reference	Guideline description/commentary
Riverside Surface treatments	Broom finished concrete with green slip resistant coating for bicycle lanes. Class V	BCC City Plan SC6.16 Ch 12.4.3.6	For shared paths and pedestrian paths concrete to be broom finished. Shared path to achieve a Class V in accordance with AS 4586 slip resistance classification of new pedestrian surface material.
Riverside fixed structures minimum finished levels	Minimum 500mm from underside of superstructure to highest astronomical tide Minimum 300mm from underside of headstocks to highest astronomical tide	BCC City Plan SC6.16 Ch12.5.2.6	Refer QUDM for commentary on highest astronomical tide.
Longitudinal drainage	Barrier Kerb Semi-Mountable Kerb Type A Gully Lip-in-line Bike safe grate	BSD-2001 TMR: Selection and design of cycle tracks BSD-8051 BCC City Plan SC6.16 Ch4.6.1 (4)	Liaise with Council's Flood management unit who will undertake assessment of stormwater and flooding for the various options. Review assessment and document review findings with any potential issues and risks flagged, suggesting potential treatments to inform cost estimates. Assumptions to be made based on best practise design for similar infrastructure. New gully pits and kerbs may be required depending on cycle track separation type.
Bridges/culverts/ Retaining walls – Design Life	Design life of bridge and retaining walls 100 years Design life of accessible elements, bearings, drainage, lighting columns, balustrades etc. 50 years	BCC City Plan SC6.16 Ch 8.2.3, 8.2.11, 8.5.4	
Bridges/culverts/ Retaining walls – Materials	Concrete: Concrete exposure class and grade in accordance with BCC City Plan SC6.16 Ch 8.2.4.2	BCC City Plan SC6.16 Ch 8.2.4.2	Materials to comply with Chapter 8.2.23 of BCC City Plan SC6.16. Stainless steel reinforcement is generally provided in elements and connections that are more vulnerable to water/chloride ingress. The substructure will be designed with electrical continuity to allow for future cathodic protection.

Element	Value	Guideline reference	Guideline description/commentary
Bridges/culverts/ Retaining walls – Loading	<u>Concrete unit weight:</u> 25kN/m ³	AS5100.2 CI 6.1	
	<u>Steel unit weight:</u> 77kN/m ³		
	<u>Live Load:</u> 5kPa	BCC City Plan SC6.16 Ch 8.2.22.4	Crowd live loads are to include Live Load reductions as per Figure 8.1 of AS5100.2.
	<u>Service Vehicle:</u> 6.1T GVM service vehicle	BCC City Plan SC6.16 Ch 8.2.22.4	Service vehicle loads to consider wheel loading of 20kN on 150mm ² or 15kN on 100mm ² .
	<u>Minimum Lateral restraint:</u> 500kN	AS5100.2 CI 10	
	<u>Vessel Impact:</u> TBC with BCC	AS5100.2 CI 16	Vessel impact, vertical clearances and design requirements to maintain access to be confirmed following completion of Stormwater, Flooding and Maritime Technical Note.
	<u>Flood and debris load:</u> TBC with BCC	AS5100.2 CI 16	Serviceability (20 year ARI) and ultimate (100 year ARI) flood velocities and levels to be confirmed following the hydraulic model. Depth of debris mat of 3.0m, to be confirmed following hydraulic modelling.
	<u>Earthquake:</u> BEDC-1	AS5100.2 CI 15	
	<u>Thermal:</u> Bridge temperatures ranges 5°C to 48°C	BCC City Plan SC6.16 Ch 8.2.22.5, AS5100.2 CI 18	Acceptance of BEDC-1 to be agreed with BCC.
	<u>Wind Load:</u> Basic wind speed Ultimate V2000 = 63m/s Service V20 = 38m/s	AS5100.2 CI 17, AS1170.2 CI 3, 4	
	Terrain category 1.0, Shielding multiplier 1.0		
	<u>Balustrade:</u> Handrail: 3kN/m outwards horizontal	AS5100.2 CI 12.5	
Handrail/top rail: 0.75kN/m vertical,			

Element	Value	Guideline reference	Guideline description/commentary
	1.5kN/m outwards horizontal. Infill: 1.5kPa horizontal, 1.5kN any direction <u>Live Load Surcharge:</u> Greater of 5kPa or BCC design maintenance vehicle <u>Compaction Surcharge:</u> 12kPa <u>Backfill to walls:</u> Effective internal friction angle: $f' = 30$ degrees Effective cohesion: $c' = 5$ Unit weight: $g = 20\text{kN/m}^3$	BCC City Plan SC6.16 Ch 8.3.8, AS5100.2 CI 14 AS4678 CI J9 AS5100.2 CI 6.4	The handrail loading is to include 20 year ARI flood loads as per BCC City Plan SC6.16 Ch 8.2.11.2; the preferred approach for the handrails is to design them to withstand flooding (non-collapsible). Compaction load based on use of light compaction equipment, to be accepted by BCC, alternative equipment may require an increased design load. A Geotechnical Assessment is outside the scope of this study. Soil parameters have been assumed based on standard values for backfill.
Public utility plant			PUP information is limited to the DBYD and Council GIS data (eBIMAP2) (no survey available). Where PUP identified as an unavoidable potential clash, this is to be flagged and documented, indicative treatment to be proposed (i.e. relocate, protect, abandon) for cost estimate only. No design to be documented.
Road furniture			Provisions for signage (including interruptive and wayfinding), seating, bins, drinking fountains, bicycle parking rails, bollards etc. are to be captured within the cost estimate report. These will be based on benchmarked assumptions of total capital works. No design of these items will be undertaken as part of this study.
Riverwalk balustrade		BCC City Plan SC6.16 Ch12.7.3 AS1428.2	As a general guide, a balustrade is required if there is no buffer of planting and the ratio of the height of the river bank to the distance of the path from the edge is less than 1:2 (1V:2H). Where balustrade is required, it should be designed to suit both cyclists and walkers and must be designed in compliance with AS1428.2.
Riverside Path Level	RL 2.1 AHD (minimum)	SC6.16 Ch 12.4.3.1	Paths are a minimum of RL 2.100 AHD and at a level to connect to adjoining paths.

Element	Value	Guideline reference	Guideline description/commentary
Flooding	Greenfield (including parkland): aim 10% AEP (desirable) Brownfield (adjacent roadway): Match existing road profile/ immunity	Section 21.4 of TMR Options for Designers of Pedestrian and Cyclists Bridges to achieve value-for-money	10%AEP is assumed acceptable design flood level based on current standards and best practise. Liaise with Council's Flood management unit who will undertake assessment of stormwater and flooding for the various options. Review assessment and document review findings with any potential issues and risks flagged, suggesting potential mitigations to inform cost estimate only; no flood modelling or design to be undertaken.
Geotechnical			No geotechnical assessment will be undertaken as part of this study. Available information and assumptions made to inform the cost estimate.
Level of Traffic Stress	LTS 1	TMR: Selection and design of cycle tracks	The LTS methodology can assist practitioners to determine the most appropriate bicycle facility type to create a safe cycling environment for all users.

Appendix A – Problems identification and project benefits (BCC, 2022)

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A.8 Stormwater, Flooding and Maritime Technical Note

Appendix G of the *Strategic Context Working Paper* (

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Brisbane City Council

Kangaroo Point Riverwalk Options Analysis and Concept Design

Stormwater, Flooding and Maritime Technical Note

Reference NR [Redacted]

Rev 1 | 11 November 2022



This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number NR [Redacted]

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1. Introduction

Arup has been commissioned by Brisbane City Council (BCC) to undertake the Options Analysis and Concept Design for the Kangaroo Point Riverwalk project, to connect Captain Burke Park (Kangaroo Point) and Mowbray Park (East Brisbane) with a continuous link catering to cyclists, pedestrians and other active transport modes. This project aims to address the “missing link” in the existing cycling and pedestrian network, as identified by the cycling community, the Department of Transport and Main Roads (TMR) and BCC.

1.1 Purpose of report

The purpose of this report is to provide a preliminary assessment of stormwater, flooding and maritime considerations for the project. The assessment is based on information received to date from Council’s Flood Management Unit, as well as information obtained from desktop studies and site visits.

1.2 Glossary

Table 1 summarises a list of abbreviations used throughout this report.

Table 1: Abbreviations

Abbreviation	Description
AGR	Austrroads Guide to Road Design
ARR	Australian Rainfall & Runoff
BCC	Brisbane City Council
CD	Concept Design
OA	Option Analysis
QUDM	Queensland Urban Drainage Manual
SEQ	South-East Queensland
TMR	Department of Transport and Main Roads

2. Project understanding

2.1 Study purpose

The study shall develop a preferred walking and riding connection between Frank Nicklin Dry Dock (Kangaroo Point) and Mowbray Park (East Brisbane), and between Frank Nicklin Dry Dock and the future Deakin Street underpass. The project will maximise access and return on investment from the Kangaroo Point Green bridge by providing a key connection to the Deakin Street underpass access and fill a critical gap in the active transport network. The study will also identify enhancement opportunities for the existing Riverwalk between Captain Burke Park and Frank Nicklin Dry Dock. It is essential that options cater for e-mobility use under the current road rules.

The study will comprehend the current and future issues, constraints, and opportunities, and determine prospective infrastructure upgrade solutions for the study area. The study will then develop a concept design for the recommended upgrade options with high level cost-benefit analysis. The conclusions will be used to inform TMR and Council's forward program, project prioritisation and determine the requirements for the next stages of planning and design.

The purpose of the study is to:

- Improve the safety of all road users through the introduction of infrastructure for pedestrians (including wheelchairs, prams etc.), cyclists and e-mobility users which is separated from road vehicles.
- Improve pedestrian, cyclist, and e-mobility access through the provision of a high-quality facility that connects to the surrounding active and public transport network. The facility shall establish a continuous walking and riding connection between Frank Nicklin Dry Dock, Kangaroo Point and Mowbray Park, East Brisbane, and between Frank Nicklin Dry Dock and the future Deakin Street underpass. The study will also identify enhancement opportunities for the existing Riverwalk between Captain Burke Park and Frank Nicklin Dry Dock.
- Limit impact on transport network efficiency through the consideration of all modes in current and future scenarios.
- Complement the public transport network to ensure multi-modal connectivity is supported.

2.2 Delivery objectives and milestones

To achieve the purpose of the study, BCC has defined the following key objectives and milestones:

- Ensure that suitable options for the Riverwalk are recommended, which appropriately address the key challenges identified by Council and the project team.
- Review existing planning, projects, and data.
- Consider existing and future active transport needs.
- Identify and review network gaps, deficiencies, opportunities, and constraints, including mapping.
- Develop up to three treatment options for active transport facilities to address the needs of all users.
- Prepare a multi-criteria analysis (MCA) to determine the preferred option(s).
- Prepare high-level concept plans and cost estimates for the preferred option(s), including land requirements.
- Recommend staged project delivery options, including identification of "quick wins" that could be delivered within a timeframe of 1-2 years, subject to funding.

2.3 Background

Over the past decade, BCC has released strategies specific to Kangaroo Point, such as the *River's Edge Strategy*, the *Kangaroo Point Peninsula Draft Renewal Strategy* and the *Kangaroo Point Peninsula Neighbourhood Plan*. These documents outline the community's desire for increased active transport connectivity along the Kangaroo Point peninsula and surrounding inner-city precincts. This has created an opportunity to improve the existing network and deliver new infrastructure.

Through the strategies mentioned above, a missing active transport link has been identified between the Frank Nicklin Dry Dock and Mowbray Park. The Kangaroo Point Riverwalk project aims to address the missing link through improved access and activity along the Brisbane River. The project also aims to identify opportunities for enhancement along the existing riverwalk section between Captain Burke Park and the Frank Nicklin Dry Dock, as well as developing a connection to the Kangaroo Point Green Bridge project via Cairns Street and Deakin Street.

2.4 Study area

The study area spans from Captain Burke Park in Kangaroo Point to Mowbray Park in East Brisbane and is divided into three extents, as shown in Figure 1.

- *Study extent A* represents the missing link in the active transport network, between Frank Nicklin Dry Dock to Mowbray Park (and the existing active transport facility along Lytton Road). The project aims to provide a continuous active transport facility between these areas and to the broader active transport network.
- *Study extent B* represents the existing Kangaroo Point Riverwalk between Captain Burke Park and the Frank Nicklin Dry Dock. The project seeks to identify opportunities for enhancements to the existing infrastructure.
- *Study extent C* represents the link between the Kangaroo Point Riverwalk project to the future Kangaroo Point Green Bridge via the Deakin Street / Main Street active transport underpass, which is currently under construction.



Figure 1: Study area extent (BCC, 2022)

3. Stormwater assessment

3.1 Stormwater considerations

Existing drainage infrastructure is generally present throughout the study area. This assessment assumes all existing drainage infrastructure is sized appropriately according to BCC City Plan requirements to convey stormwater away from road network.

The current drainage treatments and conditions along the riverside throughout the study area vary significantly in some instances, which may in part be due to the current ownership and maintenance arrangements along the riverfront. That is, currently body corporates are responsible for the stretch of riverside promenade that coincides with the promenade adjacent to their buildings. The variety of different owners and the varying levels of maintenance applied would likely account for much of the differing treatments observed. For example, Figure 2 below from Study extents A and B respectively shows two very different promenade treatments. The timber decking would allow almost immediate runoff with water draining between decking boards (but would pose a slipping hazard for cyclists), whilst the other treatment is impermeable with sheet flow across the path and into the river.

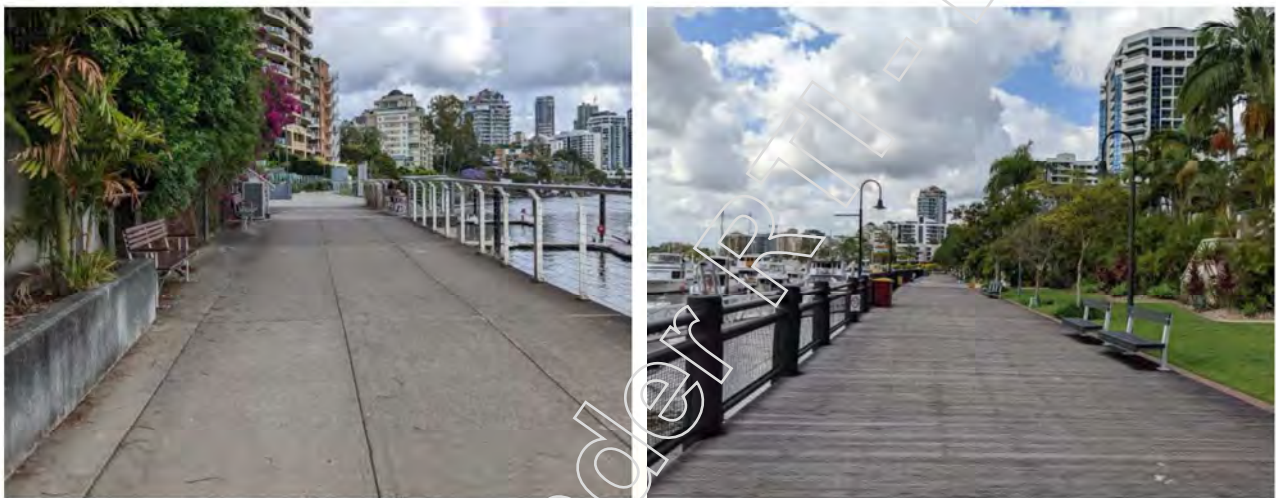


Figure 2: Example riverside treatment for Study extent A (left) & Study extent B (right)

3.1.1 Study extent A

The shared path treatment along the riverside through Study extent A primarily consists of exposed aggregate and stainless-steel balustrading allowing water to sheet flow directly from the path down into the river as can be seen in Appendix A.1.2. Several retaining walls are also present adjacent to the path in this section, with no weep-holes present suggesting subsoil drainage behind the retaining structures discharges into the existing drainage network.

The elevated properties adjacent to the riverwalk also mean that ramps are located in some sections to give the public access from street level down onto the promenade, an example of this can be seen in Figure 3. On main thoroughfares with high pedestrian/cyclist traffic you might expect to see some drainage measure at the top of the ramp to capture excess stormwater and prevent excessive flows down the ramp as seen in Appendix A.2.1. Note that the ramp in Figure 3 below to access the Mowbray Park ferry, does not have a grated trench drain.

For existing footpath throughout the study area, particularly along Lytton Road and Shafston Avenue (refer to), the verge from the property boundary to the back of kerb appears to have crossfall from the property boundary back towards the kerb, as you would typically expect. This means that currently stormwater runoff from the verge is captured in gully pits along the carriageway.



Figure 3: Ramp to promenade – Mowbray Park Ferry



Figure 4: Existing verge crossfall – Shafston Ave

Figure 5 shows the presence of a gully pit on the upstream side of a pedestrian/cyclist crossing across Thorn Street. This is typical of what you would expect to see upstream of a kerb ramp and crossing point in highly trafficked areas to maintain acceptable flow widths and velocities through the crossing point (consistent with QUDM requirements). However, there are several crossings that were observed to not follow this measure of ‘best practice’, which may be acceptable based on design rainfall events, maximum flow widths and velocities. Crossings at Castlebar Road and a pedestrian crossing at a signalised intersection at Wellington Road were observed with no upstream gully pits before the crossing (Appendix A.1.3 and A.1.4).



Figure 5: Kerb ramp with gully pit

3.1.2 Study extent B

Study extent B has a mix of riverside treatments, from timber decking through to impermeable exposed aggregate shared path bordered by either stainless steel balustrade (Figure 6) or concrete nib walls (). The sections of promenade that are hard bordered by concrete nib walls have low points adjacent to the wall where field inlets are located capturing stormwater and then discharging to the Brisbane River. The degree of debris blocking these field inlets varies significantly along the promenade. Some level of regular maintenance is clearly required at some of these locations to remove debris. Where there is no nib wall next to the path (e.g. steel balustrade) the site assessment suggests stormwater sheet-flows across the path and discharges into the river. There are also several green spaces and garden beds present along this section of the river providing opportunity to capture some of the stormwater, which would be especially relevant in minor storm events reducing the amount of flow across the shared path.



Figure 6: Riverside with steel balustrade



Figure 7: Riverside with concrete wall and blocked inlet

There were also ramps from street level down to the promenade, with grated trench drains being provided at the top of some observed ramps (refer Appendix A.2.1), which is consistent with best design practice for ramps on major pedestrian and cyclist routes.

3.1.3 Study extent C

Similar to Study extent A, the existing footpaths and verge from the property boundary to the back of kerb appears to have crossfall from the property boundary back towards the kerb, as you would typically expect. This means that currently stormwater runoff from the verge is captured in gully pits along the carriageway. Additionally, the verge and footpaths along Cairns Street appear to have significant long-fall, which will also assist in the swift removal of stormwater from footpaths/verges, refer Appendix A.3.1. A spoon drain is also present at the northern end of Lambert Street at the Cairns Street intersection (Appendix A.3.2). Drains of these types are typically present at intersections of crowned roads and can be challenging to maintain. The presence of this drain may also impact rider comfort for any on-road cycle facility.

At the eastern end of Cairns Street cul-de-sac near Dockside, there is a concrete channel present which discharges stormwater captured from the road surface and surrounding verge into the Brisbane River. Figure 8 shows the concrete channel which has severe cracking and movement across the channel surface and at the construction joints where the channel ties into the adjacent kerb. There also appears to be some kind of obstruction at the end of the channel, just before the point of discharge. The condition of this channel will further degrade with time.



Figure 8: Concrete channel

4. Flooding assessment

4.1 Available data

4.1.1 Brisbane River Catchment Flood Study (BRCFS)

The Brisbane River Catchment Flood Study (BRCFS) was undertaken following the major floods which occurred 2011 and was completed in 2017. The flood study was a collaborative effort between multiple councils in SEQ and multiple consultants.

The BRCFS is a complex regional flood study, which utilises a Monte Carlo / Joint Probability analysis to derive design flood behaviours. This approach is required within the Brisbane River Catchment as result of the variability in dam levels and tidal conditions which can have significant impact on the catchment response to rainfall.

Due to the large number of runs required to satisfy the Monte Carlo approach, a “Fast Model” was developed. This model utilised a one-dimensional schematisation only and was used to simulate approximately 12,000 event scenarios. Once specific events were selected from the suite of simulated events, they were simulated through the “Detailed Model” which utilised a one-dimensional / two-dimensional dynamically linked model.

The model results for the 10% AEP event and 1% AEP event from the detailed model (sourced from BCC) have been utilised for the assessment of existing flood behaviours within the project area. Specifically, height, depth and velocity results have been utilised for this assessment.

4.1.2 Indooroopilly Riverwalk

Arup was engaged by BCC to undertake the detailed design of the Indooroopilly Riverwalk. As part of this project flood modelling was undertaken to inform the likely afflux which would be a consequence of the proposed structure.

As a result of this work, Arup has strong understanding of the potential blockage that an in-river pedestrian structure would incur as well as the extent and magnitude of the corresponding flooding impacts.

4.1.3 Green Bridges cumulative impact assessment

Arup was engaged by BCC to undertake a cumulative impact assessment of the network of Green Bridges proposed across the Brisbane River and Breakfast Creek.

As part of these works, Arup undertook a model development task where all new river structures including ferry terminals and pontoons/riverwalks that are part of the River Access Network were included. Undertaking this task throughout the entire river reach has provided an understanding of the typical afflux extents seen through construction of structures which interact with the fringes of the main river channel.

4.2 Flooding behaviours

4.2.1 Baseline flooding conditions

Utilising the flood grids obtained from the BRCFS model, peak flood levels and velocities have been extracted for the project at various cross sections for the 10% AEP and 1% AEP events. For reference a 1% AEP flood velocity map with relevant cross section locations is shown in Figure 9.

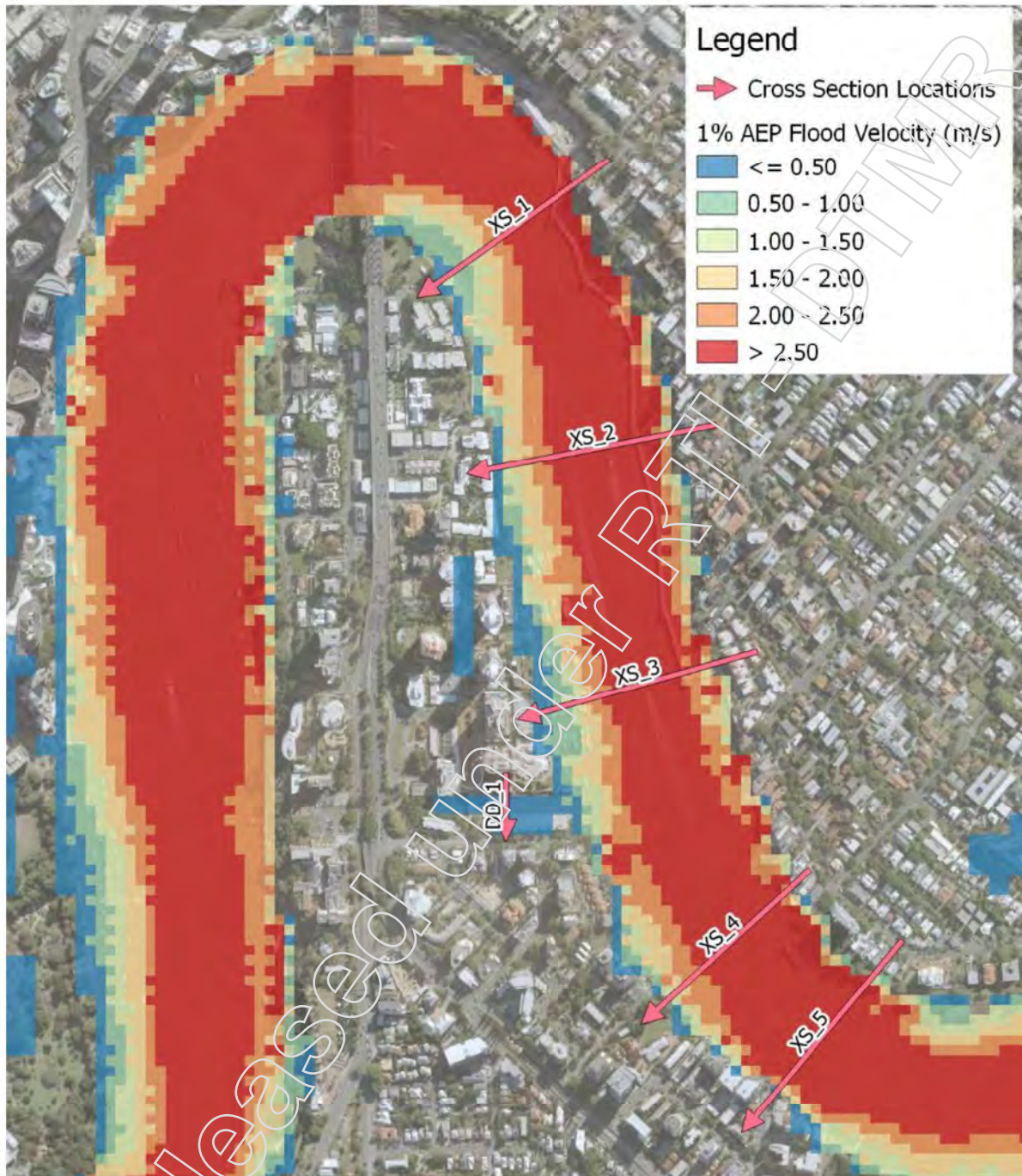


Figure 9: 1% AEP Peak Flood Velocity

Flood heights and velocities are shown in Figure 10 through to Figure 15. Note that the sections are relevant to various study extents as per the following list and the cross section chainages run from the left bank (New Farm) to the right bank (Kangaroo Point):

- Study extent A – XS4, XS5
- Study extent B – XS1, XS2, XS3
- Study extent C – DD1

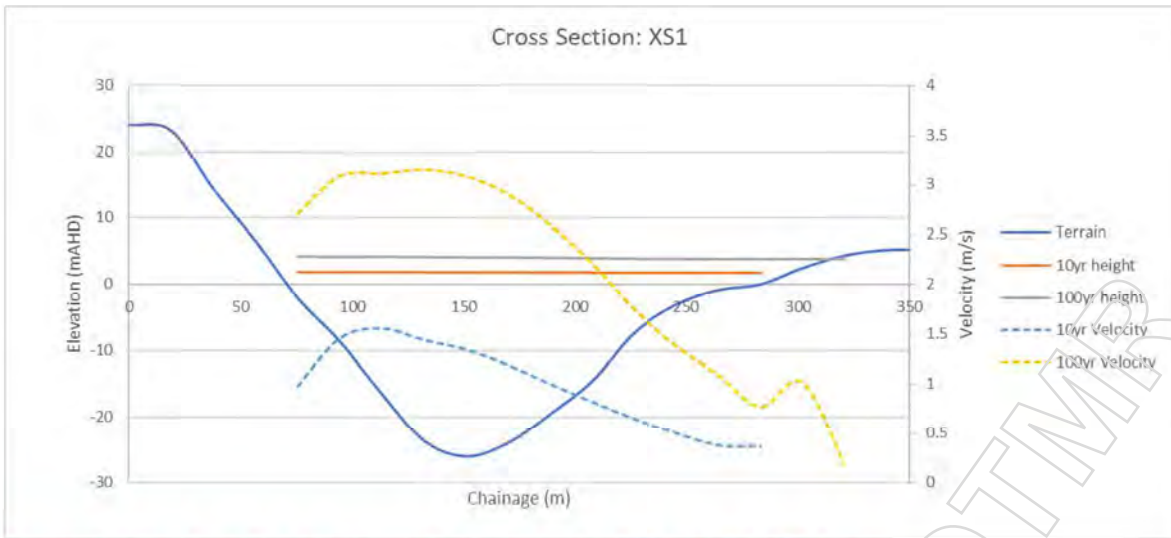


Figure 10: XS1 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events

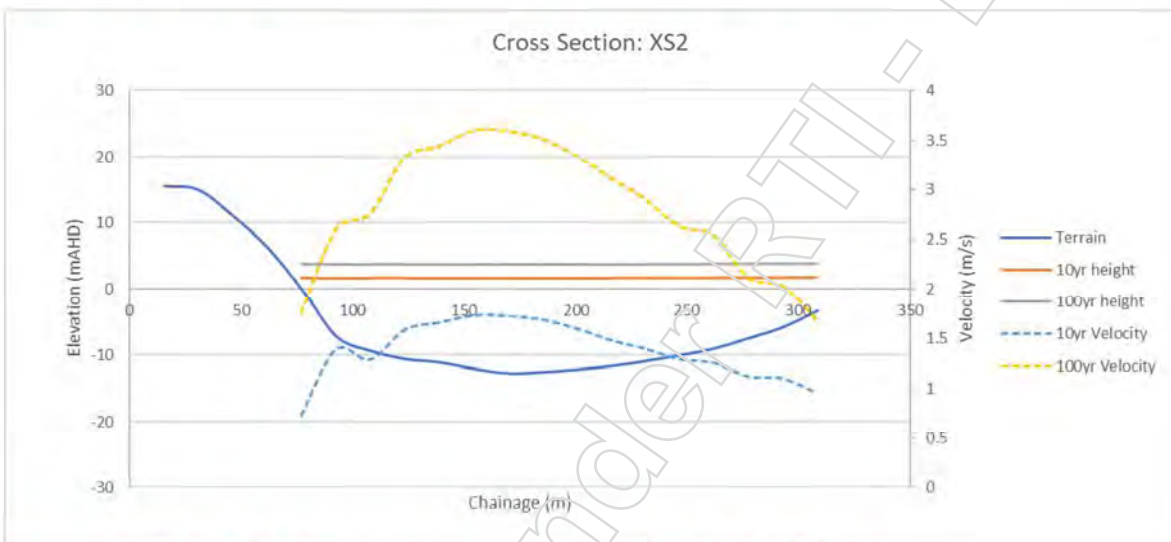


Figure 11: XS2 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events

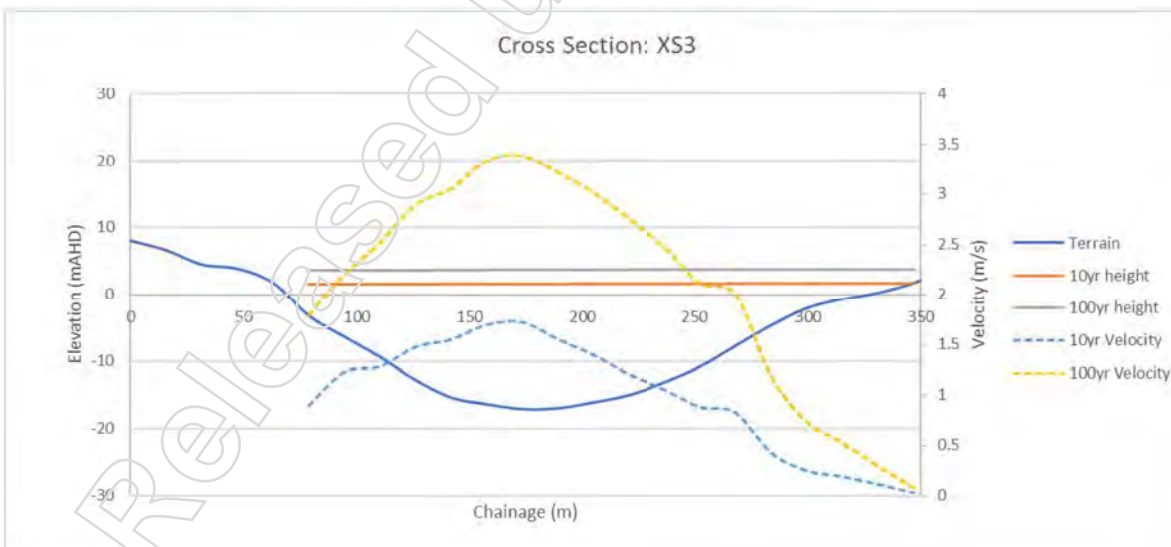


Figure 12: XS3 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events

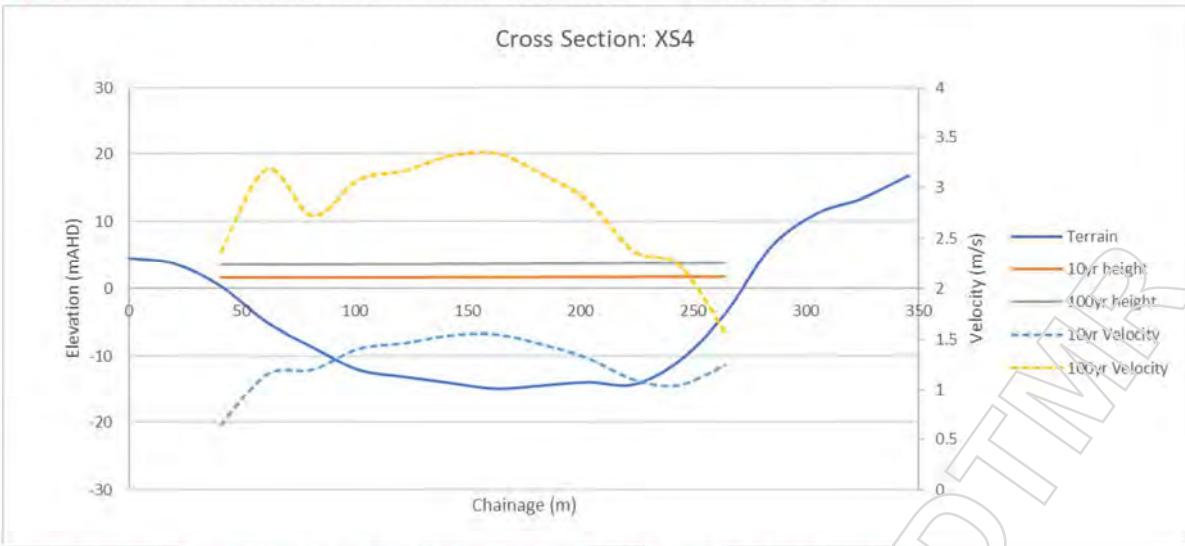


Figure 13: XS4 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events

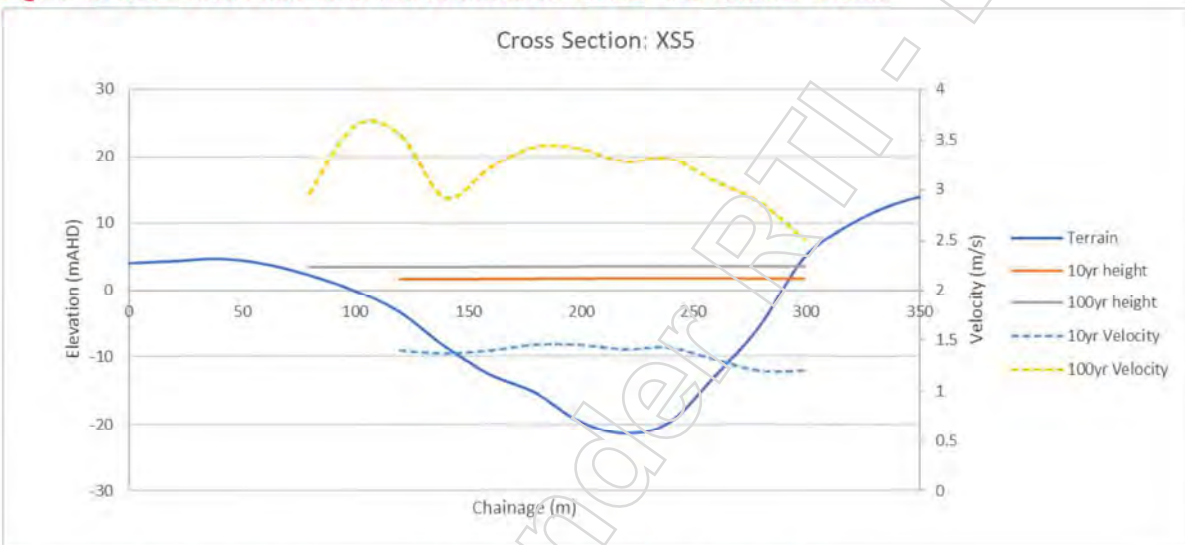


Figure 14: XS5 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events



Figure 15: DD1 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events



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5. Maritime assessment

5.1 Maritime considerations

5.1.1 Study extent A

The maritime considerations in Study extent A include:

- Various existing marinas and pontoons
- Existing vessel traffic
- BCC Ferry Terminals (including Dockside, Mowbray Park and Sydney Street)

Various existing privately owned marinas and pontoons are located in Study extent A, as shown in . Access to the pontoons in the upstream (northern) end is directly from private residences. Access to the pontoons in the downstream (southern) end involves crossing the existing boardwalk. As shown in , this is either via locked gates or underpass.



Figure 16: Existing privately owned pontoons and Sydney Street Ferry Terminal



Figure 17: Access to existing pontoons via locked gate (left) and underpass (right)

Existing vessels on the Brisbane River include:

- BCC passenger CityCat and inner city CityHopper ferry services
- Commercial vessels (including passenger charter vessels)
- Recreational vessels
- Passive craft (non-power-driven vessels such as rowing boats, canoes and kayaks)

The most common vessel on the Brisbane River in this vicinity is the BCC passenger CityCat and inner city CityHopper ferry services. The Sydney Street Ferry Terminal is located on the opposite side of the river to Study extent A and will be a significant constraint for any in-river riverwalk options as these will result in a reduction of the navigation channel width. The Dockside and Mowbray Park ferry terminals are located at either end of Study extent A. Ferry manoeuvring to these terminals will need to be considered for any in-river riverwalk options.

The upper harbour limit for Brisbane is located downstream of the site and commercial vessels are generally limited to passenger charter vessels and occasional construction barges.

5.1.2 Former Dry Dock

Some of the active transport route options proposed involve constructing a bridge over the entrance to Evan Deakin/Frank Nicklin Dry Dock (referred to in this section as the former Dry Dock) to remove the need to divert along Cairns Street to Ferryman's Bridge.

Evan Deakin/Frank Nicklin Dry Dock was originally constructed for Hugh Moar in 1884 and is listed on the Local Heritage register¹. The use of the former Dry Dock has varied over the years with the latest use being as a marina for small recreational vessels as part of the Dockside as shown in Figure 18. As shown in Figure 20, the majority of the berths in the existing marina are 10m long berths. However, this marina has been removed in recent years and the former Dry Dock site is currently vacant. As shown in Figure 19, the existing marina piles are still present, however all of the pontoons have been removed. It is understood that Dockside Marina are intending to construct a new marina in the future, however no details of this proposed marina are known.

Assuming that the layout of the proposed marina is similar to the previous marina and due to the limited width of the former dry dock, it is assumed that vessels would likely be in the order of 8-12m. Power boats with a length of 12m are likely to have an air draft of approximately 4 to 7m. Yachts with a length of 12m are likely to have an air draft of 15-18m.

¹ BCC Local Heritage Places. Heritage Citation: Evans Deakin Dry Dock (former). Accessed on 10th November 2022.

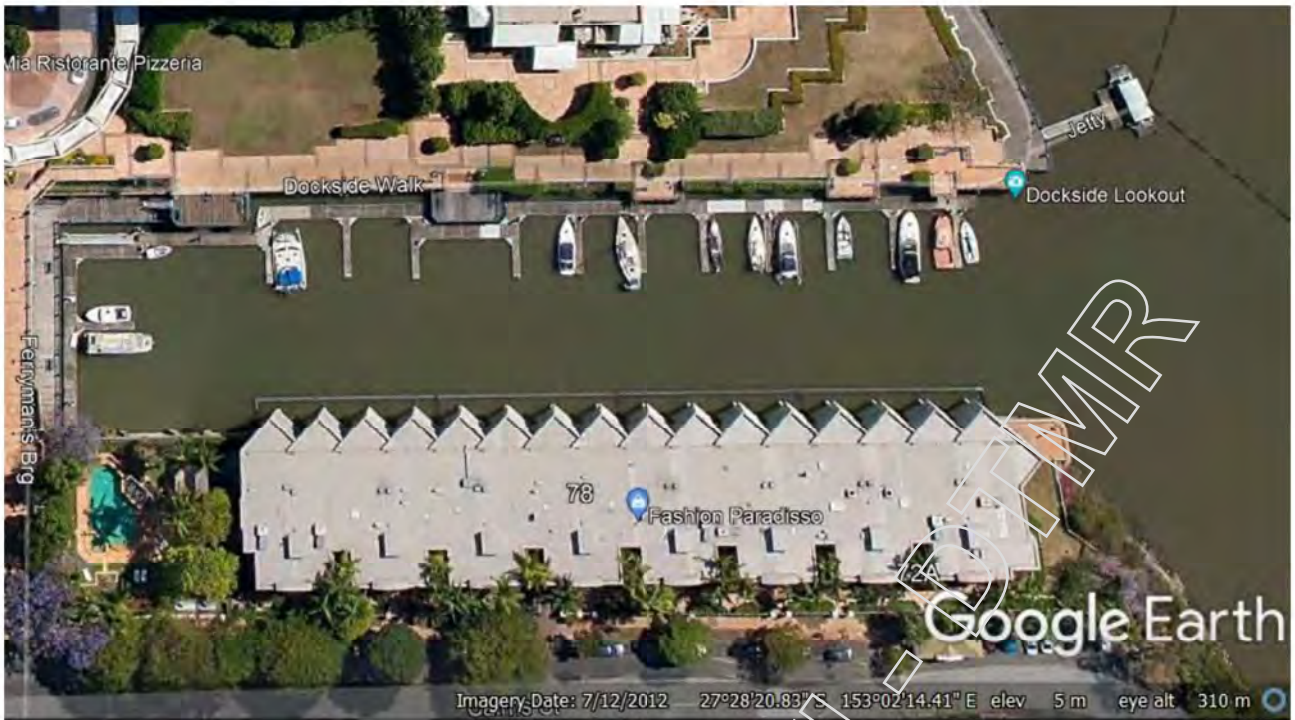


Figure 18: Marina layout in 2012



Figure 19: Existing condition of the former Dry Dock

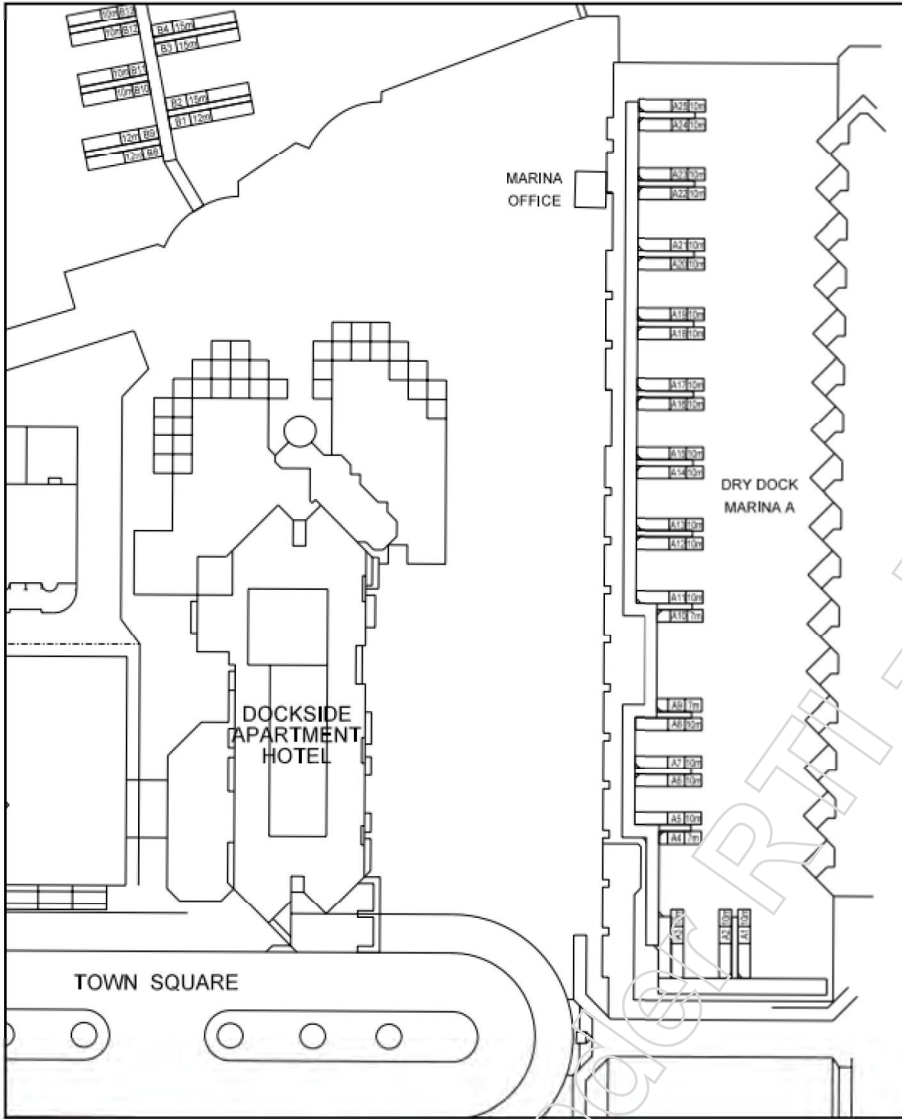


Figure 20: Existing Docksider Marina Plan (source <https://www.docksidermarina.com.au>)

Appendix A – Stormwater assessment site photos

A.1 Study extent A

A.1.1



Grassed verge along Lytton Road providing opportunity for runoff from minor storm events to be naturally captured whilst slowing down any sheet flow that may occur.

A.1.2



Typical promenade treatment exposed aggregate, stainless steel balustrade and raised adjacent blocks with retaining walls present.

A.1.3



Wellington Road²: No gully pit present on upstream side of signalised pedestrian crossing.

² Source: *Google Maps 2022*

A.1.4



Castlebar Street: No gully pit present on upstream side of kerb ramp and crossing. Gully pit present on downstream side.

A.2 Study extent B

A.2.1



Grated trench drain present at the top of the ramp down onto the promenade (end of Rotherham Street).

A.3 Study extent C

A.3.1



Cairns Street: View of the vertical grades present along Cairns St.

A.3.2



Lambert Street / Cairns Street intersection: Spoon drain.

A.9 Community Engagement Report

Appendix H of the *Strategic Context Working Paper*

NR [Redacted]

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Communication and Engagement Evaluation Report

Kangaroo Point active travel study

Business Area: CPO | Community and Stakeholder
Engagement
Project Owner: TPO/ TMR
Budget Program: Program 1: Public and Active Transport

November 2022

Version 1.1

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Dedicated to a better Brisbane

Executive Summary

Brisbane City Council has been engaged through the Queensland Government Department of Transport and Main Roads (TMR) to investigate options to complete a missing link in the active travel network between Mowbray Park, East Brisbane and Captain Burke Park, Kangaroo Point.

This active travel study forms part of Council's ongoing network review process to help improve active travel options for Brisbane residents, visitors and commuters.

As part of this study, it was important to identify and understand community experiences along this corridor, particularly how people ride, walk, use a mobility device or other devices to get around the area.

We wanted to better understand the reasons why local residents choose a travel option and the challenges they face when using active travel options in the study area.

It is also important to understand the community's interest in connecting with the new Kangaroo Point green bridge via Main Street and Deakin Street.

We invited the community to have their say between 24 October and 21 November 2022. The community could provide feedback via an online survey or dropping a pin on a map with localised feedback, and also provide feedback to the project team via phone or email.

There were 1,400 page total page views, 1,201 aware visitors, 605 online surveys completed, 25 contributors to the drop-a-pin map tool (93 pins placed), six email submissions, three key stakeholder meetings and one phone call to the project hotline.

Highlights from the community consultation included:

- Interest shown in riverwalk connectivity from Dockside to Mowbray Park
- Interest shown for continuous walking and cycling paths
- Interest in improvements to connectivity around the Kangaroo Point precinct and to the new Kangaroo Point Green Bridge
- Interest in reducing traffic speed throughout the Kangaroo Point precinct
- Interest in improving safety, wayfinding and lighting around the Kangaroo Point precinct

The community feedback clearly indicates support for extending the riverwalk from Dockside to Mowbray Park as well as making improvements to connectivity to the new Kangaroo Point green bridge.

As part of the study, we will also review technical input alongside community input when considering the high-level expected benefits, impacts, cost, risks, and opportunities of active travel options in the study area.

The broad range of high-level information we are analysing includes:

- local and network-wide traffic studies, including both current and forecast traffic volumes
- current and proposed land use in the local area
- environmental studies
- heritage studies
- community input
- Council planning documents, such as:
 - City Plan 2014
 - Active Transport Network Plan and strategic transport planning

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- Southeast Queensland Principal Cycle Network Plan and Priority routes.

Once we have completed our review of the technical and community input for active travel study in early 2023, the next step will be to inform the community of the study outcome by releasing a project update letter. The letter will outline how the community input informed the outcomes, any potential next steps or actions, and the timeframe in which these would be completed.

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1. Introduction

1.1. Background

The section of riverfront pathways, back streets and main roads that run between Mowbray Park (adjacent to Lytton Road) and Captain Burke Park (adjacent to Main Street and the Story Bridge) are not considered to be a direct route for active travel users and present legibility and connectivity issues for the community as a whole.

Comparatively, the New Farm Riverwalk provides 2.5 kilometres of direct shared path from Teneriffe to New Farm Park.

Council will investigate and develop options to complete a missing link in the active travel network between Mowbray Park, East Brisbane and Captain Burke Park, Kangaroo Point.

The project will also focus on the area from the new Main Street and Deakin Street pedestrian underpass (being delivered as part of the Kangaroo Point Green Bridge project) and the Kangaroo Point Riverwalk along Cairns Street.

The project will investigate where improvements to the existing riverwalk connection can be achieved (from nearby Dockside ferry terminal to Captain Burke Park).

1.2. About the project

The scope of the study is to review missing links in the active travel network and understand the communities' experiences and challenges alongside technical inputs to identify opportunities.

As this project is in the early investigation stage, a broad range of high-level information is being analysed to determine the challenges and opportunities that currently exist when travelling through this area. This includes:

- community input
- local and network-wide traffic studies, including both current and forecast traffic volumes
- current and proposed land use in the local area
- environmental studies
- heritage studies
- Council planning documents, such as the *City Plan 2014* and *Transport Plan for Brisbane*.

This study will identify and evaluate all available options and select the most promising solutions to progress them to a concept design. The study also outlines the next steps for the project and timeframes. The options review and concept design will be presented back to TMR for final review and approval.

On 24 October 2022, Council distributed a DL style pamphlet (see appendix A) to approximately 5,000 properties (see appendix D) in Kangaroo Point and East Brisbane inviting the community to participate and 'have their say' on their experiences as part of the active travel review. The consultation was open for feedback from the community until 21 November 2022. Approximately seven signs were also installed in the local area (see appendix C) with QR codes linking people to Council's webpage to complete the survey or drop-a-pin on a map to provide comments on improvements that could be made to the area in terms of active travel.

Figure 1. area of investigation for the active travel study in Kangaroo Point, Mowbray Park and East Brisbane



PD22/56948

2. Strategic communications approach

A community consultation strategy was developed to seek feedback to understand the challenges and opportunities that currently exist for local residents who travel around the study area. Community feedback will help inform the active travel study, along with a range of technical inputs.

The engagement approach for community consultation regarding the active travel study involves both **inform** and **consult** elements.

At an inform level, Council provided education and information to the community about the transport planning process and the potential deliverables of the Kangaroo Point active travel study.

At a consult level, Council invited the community to have their say and contribute to the active travel study to ensure a holistic view of the community's experiences with active travel, the challenges and opportunities was obtained and analysed.

2.1. Consultation period

Community consultation started on 24 October 2022 and closed on the 21 November 2022.

Methodology

With limited budget available for the delivery of the project, all engagement activities were completed online. Briefings were completed with the local Councillor and State Member for Parliament, who undertook their own social media and in-person engagement sessions to promote the project.

The Community and Stakeholder Engagement team selected key communication tools to generate awareness about the active travel study and provide channels for feedback.

Stakeholders were encouraged to provide feedback using any of the following options:

- Scanning the QR code on the flyer or onsite signage to:
 - complete an online survey
 - complete the drop-a-pin on a map tool
- calling the dedicated project hotline or Council's 24-hour Contact Centre
- emailing the project team

Table 1 summarises the communication and engagement activities undertaken during the consultation period.

Table 1: Summary of communication and engagement tools during consultation

Activity	Date	Detail
TMR briefing	13 October 2022	Darrin (A/Director Transport Planning Projects TMR) and Luke Manley (Program Director, Civil and Transport) briefed Minister Bailey regarding the studies and planned engagement approach. This meeting was positive and supportive.
Councillor Jonathan	20 October and 26 October 2022	The project team briefed the Councillor on the planned engagement activities and purpose of the

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Activity	Date	Detail
Sriranganathan briefing		active travel study. The meetings were positive with a lot of detailed feedback provided.
MP Amy MacMahon briefing	21 October 2022	The project team briefed the Member on the planned engagement activities and purpose of the active travel study. The meetings were positive with a lot of detailed feedback provided.
Contact Centre brief	21 October 2022	A brief was issued to Council's Contact Centre for the engagement.
Key stakeholder email	24 October 2022	Key project information was emailed to key project stakeholders, including: <ul style="list-style-type: none"> • TMR • North Brisbane Bicycle User Group • Brisbane West Bicycle User Group • Queensland Walks • Space for Cycling • Queensland Fire and Rescue • Queensland Police • Queensland Ambulance Service • Taxi Council Queensland • Cycle.org • Cycling Brisbane • Bicycle Queensland • RACQ • Dockside Apartments – Body Corporate and residents • St Helena Apartments – Body Corporate and residents • Moreton View Tower and Villas – Body Corporate and residents • The Lawn Bar + Café • Medley restaurant (General Manager Nick Pavlakis) • Marina owner, Mr Ken Allsop
Webpage	24 October 2022	The project webpage went live to provide information about the active travel study.
Online survey & drop-a-pin map	24 October 2022	The online survey was linked to the QR codes on the flyers, signage and linked to the corporate website. The survey and map provided residents the tools to provide feedback.
DL Flyer	24 October 2022	A DL flyer was distributed to approximately 5,000 properties in the target study area with a QR code to link them to the website, survey and map.
Project update outcome	early 2023 TBC	A project update will be developed and distributed to the 5,000 properties in the target study area to advise of the outcomes of the engagement and highlights from the engagement.

2.2. Communications overview

All communication materials developed included consistent messaging to explain the scope and purpose of the active travel study. The online survey was carefully developed to gather feedback and information that would be beneficial in informing the study as well as provide data integrity. The online survey was also developed drawing on previous surveys Council had completed, such as the *Ferry Network Review*, *CityLink Cycleway Trial* and *North Brisbane Bikeway*.

A mapping tool was also used for residents to drop-a-pin on the map and comment on specific areas and visually see other peoples' feedback in a transparent way. This tool was used drawing on the success of other projects such as the *Mowbray Park vision*.

Analysis and reporting on the survey results has delivered useful data, meaningful insights, and aided decision-making for internal stakeholders to determine next steps.

3. Feedback and results

3.1. Overall feedback received

In total, there were **605** online surveys completed, **93 pins placed** on the map tool by **25** contributors to the drop-a-pin map tool, six email submissions, three key stakeholder meetings and one phone call to the project hotline.

In total there was approximately **1,400 total visits to the engagement HQ page, with 1,200 aware visitors** during the consultation period.

Of these numbers, 781 people visited multiple project pages and 1,201 people visited at least one project page.

3.2. Key insights

- 98% of respondents indicated they actively travel through the study area
- The top three items selected for what responders **liked most** about their active travel experience included:
 - Riverfront pathways (81%)
 - Access to home / work (43%)
 - Connectivity to paths and riverwalks (43%)
- Top **challenges identified** when actively travelling between Captain Burke Park and Mowbray Park were:
 - Connectivity to existing paths or riverwalk (75%)
 - Separation between people walking, riding, and driving (51%)
 - Connection to crossing points (32%)
- The top items which **would encourage them to actively travel more** in this area included:
 - A riverwalk (77%)
 - Improved connectivity to/from the new Kangaroo Point green bridge (49%)
 - Separated facilities for people walking and riding (41%)
- The **most commented location** on the map tool (drop-a-pin on the map, see appendix E) was the section between Dockside and Cairns Street with more than 30 pins placed and the common theme was completing a riverwalk in this missing section.

3.3. Online survey

There were **605 online** surveys completed for the Kangaroo Point active travel study. This final number excludes duplicate responses completed by the same person to ensure data integrity.

The final survey data outlining all results (including the raw data) can be found in Records Manager – PD22/56949 (survey raw data and survey responses).

Overall, 466 respondents (77%) who completed the online survey live in the study area, with the highest percentage of respondents between the age of 35-64 (63%).

Most respondents (98%) indicating that they actively travel through the study area.

3.2.1 Analysis of respondents – online survey

Suburb

Majority of respondents being from the catchment area of local suburbs including Kangaroo Point and East Brisbane. A breakdown of respondents by suburb:

Suburb	Percentage	Actual number
Kangaroo Point	58%	352
East Brisbane	29%	174
Woolloongabba	2%	10
West End	1%	6
Annerley	1%	6
Norman Park	1%	5
South Brisbane	1%	5
Morningside	1%	4

Table 2: Breakdown of survey respondents by suburbs

Further responses were received from respondents who live outside the distribution catchment area.

Travel patterns

To understand respondent travel patterns, the survey asked several questions relating to:

- How responders travel through the study area
- What mode do they use most commonly to travel through the study area
- What times responders travel through the study area
- how often they travel through the study area
- purpose of travel
- suburbs they start their journey from
- whether a car is parked in the study area or not.

Respondents were asked how they travel through the study area and the following responses were noted:

- 91% - walk/run/mobility device
- 65% - private vehicle
- 47% - bicycle
- 30% - ride share / taxi
- 29% - bus
- 19% - e-mobility device (e-scooter, e-bike, e-skateboard)

- 1% - commercial vehicle

Note: totals add up to more than 100% as respondents could choose more than one response.

Responders were then asked which mode of transport they **use most** through the study area and were asked to choose only one. The responses noted:

- 65% - walk/run/mobility device
- 16% - private vehicle
- 13% - bicycle
- 3% - e-mobility device
- 2% - bus
- 1% - ride share / taxi
- 0% - commercial vehicle

When asked if the mode they most commonly use is their preferred mode of transport, 77% respondents indicated 'yes'. These results show that while responders use various modes of transport, they typically will use active travel over other modes.

Responders were asked how often they travel through the study area.

Frequency	Percentages
3 or more days in a typical week	77% (464 responses)
1 or 2 times in a typical week	15%
Not every week but at least once a month	7%
Less frequently than once a month, but more often than every 6 months	1%

Table 3: Breakdown of respondents travel habits

Of the 77% who travel 3 or more days in a typical week:

- 54% typically travel through the study area during peak periods (7am-9am and/ or 3pm-5pm) on the weekday
 - With 46% travelling outside of peak periods
- Responders also indicated that they travel through the study area more on a weekday versus on a weekend.

When asked what suburb responders start their journey from, the top percentage of suburbs included Kangaroo Point (58%) and East Brisbane (29%).

Purpose of travel

The below figure indicates respondents purpose of travel through the study area.

Note: totals add up to more than 100% as respondents could choose more than one response.

This figure indicates that responders are actively moving around the study area and appear to prioritise fitness, recreation or sport. The response percentages also highlight there is a high proportion of multi-purpose trips.

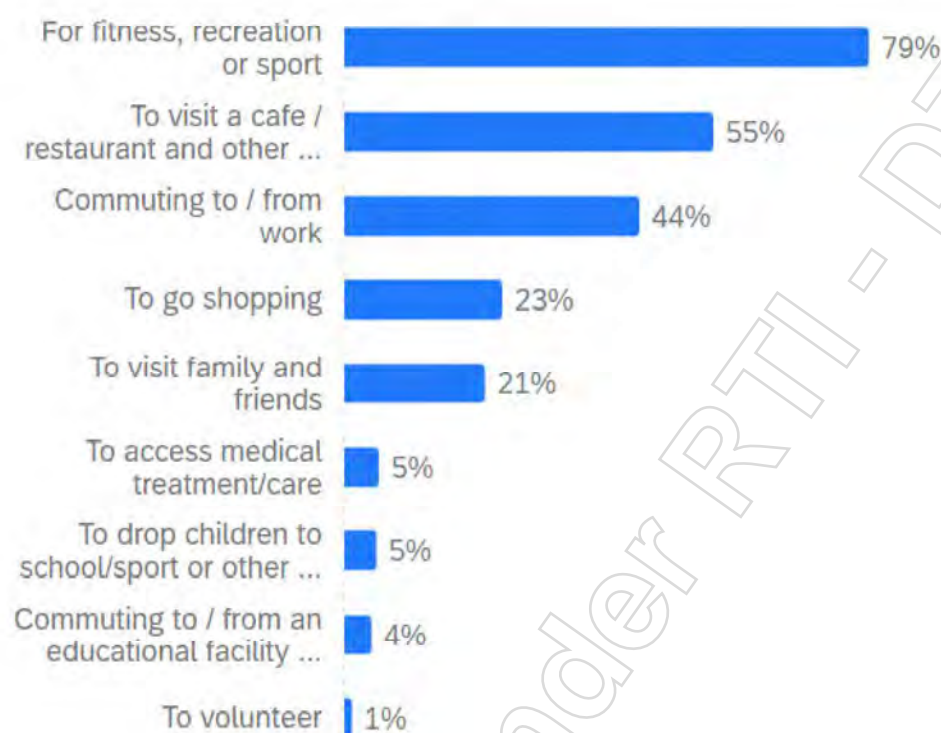


Figure 2 indicating the purpose of travel percentages

When asked if responders parked their car on a street in the study area, 81% indicated no and 19% indicated yes.

Of those responders who park their car in the study area:

- 27% indicated they park daily in the study area
- 26% indicated several times a week
- 25% indicated a few times a month
- 12% a few times a fortnight
- 10% once a week

Active travel

Responders were asked to indicate **what they liked** about their current active travel experiences. The below table highlights the options that people selected.

Option	Percentage
Riverfront pathways	81%
Access to your home or place of work	43%
Connectivity to existing paths or riverwalk	43%
Easy access to local destinations	29%
Off-road connections	20%
Separated shared path connections	17%
Other (free text)	3%

Table 4: Breakdown of what respondents liked most about their current active travel trip

Note: totals add up to more than 100% as respondents could choose more than one response.

The below figure shows what top items respondents chose as being the main things that would encourage them to use active travel options in this area. Multiple options could be chosen.

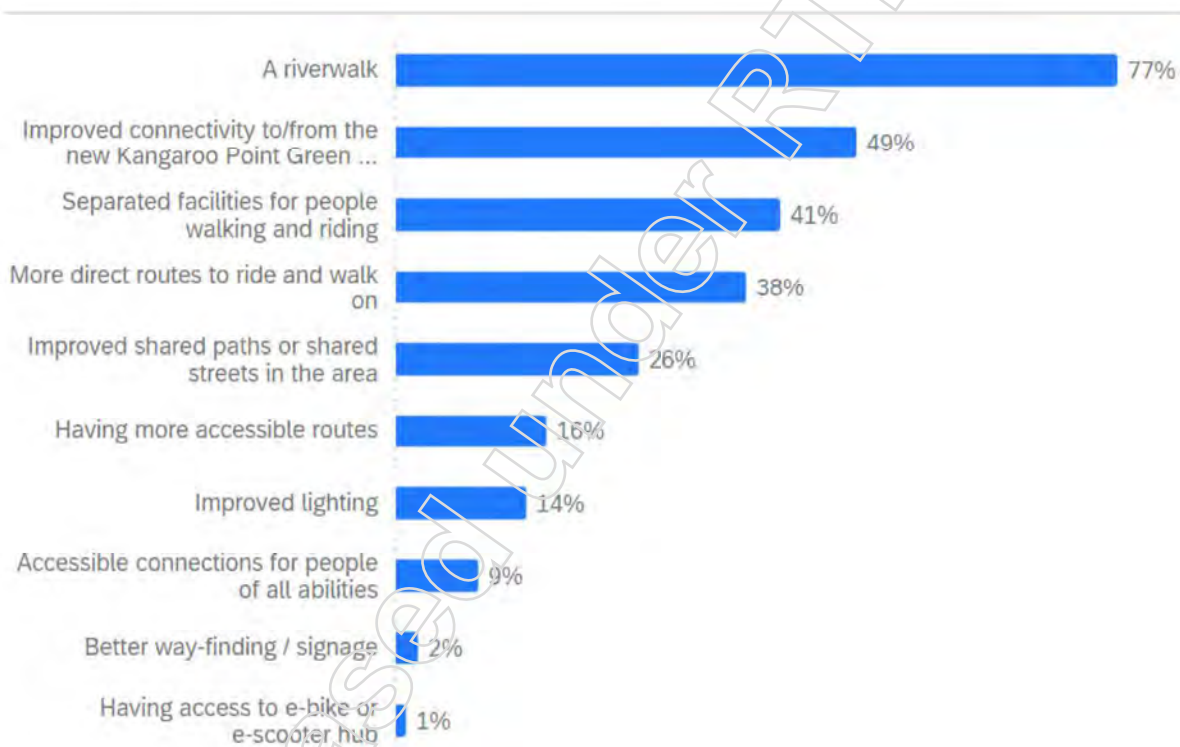


Figure 3 percentages of what respondents chose as being the main items that would encourage more active travel.

When respondents were asked to indicate how likely they would be to choose active travel if key items were implemented or improved, most respondents indicated they would be very likely to choose active travel if:

- there was better connectivity between Captain Burke Park and Mowbray Park (67%)
- better shared paths (67%).

It should be noted that options of 'somewhat unlikely' and 'not sure' were also included in this question, however received very few responses.

Item	Somewhat likely	Very likely
Accessible connections for people of all abilities	1%	5%
Better connectivity from Captain Burke Park to Mowbray Park	3%	67%
Better shared paths	3%	67%
Better wayfinding /signage	0%	1%
Having access to an e-bike or e-scooter hub	0%	1%
Improved connectivity to/from the new Kangaroo Point Green Bridge underpass at Deakin Street	3%	1%
Improved lighting	2%	7%
More direct routes to ride and walk on	2%	26%
Public access to the river from the end of Cairns Street	2%	31%
Riverwalks	4%	65%
Separated facilities for people walking and riding	3%	29%

Table 4: Breakdown of what respondents indicated as their likelihood to choose active travel if key items were improved in the study area.

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Challenges

The challenges for active travel that scored the highest for majority of our responders were:

- Connectivity to existing paths or riverwalk
- Separation between people walking, riding and driving
- Connection/s to crossing points
- Safety

In the free text section, respondents noted the challenges including:

- A lack of riverwalk between Mowbray Park and Dockside was a main challenge
- Inconsistent pathways and access
- Perceived safety for cyclists and pedestrians is lacking in the study area
- Having to navigate narrow pathways, challenging hills or road conditions. Current lack of ferry services creates a significant challenge
- Others indicated that their journey is impeded by current infrastructure. Some indicated that safety, lighting and shading is not great in the area as well.

It should be noted that these sentiments are repeated throughout the survey.

Safety

Respondents were asked to select three things that make them feel safe when choosing to actively travel. The top items chosen by responders included:

- Separation from people driving
- Connectivity to existing bikeway and pathway networks
- Lighting and well-lit paths
- Access to off-road connections

3.4. Map tool

There were **25 contributors and 93 pins placed** on the online mapping tool (see appendix E) which allowed for respondents to drop-a-pin and place a comment in response to the primary question of **‘What improvements would make your active travel experience more enjoyable?’**.

Respondents were not restricted on how many pins they were able to place so based on the amount of pins placed versus the number of contributors, we can assume that respondents placed multiple pins. This could also potentially mean there is a percentage of duplication in the pins placed.

The mapping activity data outlining all results (including the raw data) can be found in Records Manager – PD22/56949 (survey data and survey responses).

Table 5: Breakdown of respondents feedback by location on the mapping tool

Location	Key feedback from the map summarised
Dockside	<ul style="list-style-type: none"> • Riverwalk connection from Dockside to Mowbray Park • Improvements to existing riverwalk/boardwalk area • Re-open the ferry terminal at Dockside • Improve lighting
Lambert Street	<ul style="list-style-type: none"> • Improve pedestrian paths • Remove on-street car parking and reduce speed environment
Thorn Street	<ul style="list-style-type: none"> • Reduce speed environment
Darragh Street	<ul style="list-style-type: none"> • Restrict vehicle movements on Darragh Street • Reduce speed environment
Shafston Avenue	<ul style="list-style-type: none"> • Separate bike movements and connect into new Green Bridge
Rotherham Street	<ul style="list-style-type: none"> • Improve lighting
Deakin Street	<ul style="list-style-type: none"> • Improve traffic efficiency • Improve crossing for pedestrian and cyclists • Provide separation for cyclists and pedestrians and connect to the new Green Bridge • Improve access / loading outside of businesses
Captain Burke Park (East)	<ul style="list-style-type: none"> • Improve signage and wayfinding • Widen footpaths • Safety improvements for cyclists and pedestrians
Cairns Street	<ul style="list-style-type: none"> • Separate pedestrian and cyclist movements • Improve accessibility from the riverwalk to Cairns Street

3.5. Written submissions

3.3.1 Analysis of participants – written submissions

During the consultation period, Council received **seven incoming emails** from stakeholders providing feedback. **One key piece** of written feedback came from MP Amy MacMahon, South Brisbane Electorate.

Written feedback – MP Amy MacMahon – 22 November 2022

Key items submitted for consideration on the Kangaroo Point active travel study included:

- A riverwalk connection between Mowbray Park and Dockside should be completed as soon as possible.
- Support for implementing interim measures to improve pathways through Kangaroo Point
- Communicate often and clearly with local residents
- Provide good access to and past the new Dockside ferry terminal
- There is a lack of maintenance for existing riverwalk.
- Include connecting bike lanes and shared walkways from Cairns Street to Kangaroo Point green bridge.
- Provide easy access to existing bike lanes on Lytton Road.

Overview of other key feedback from written submissions:

- Improve pedestrian connectivity to Main Street.
- Improvements to existing boardwalk.
- Corner of Ferry Street and Deakin Street – signalise the intersection and crossing point to enhance safety.
- Deakin Street, just north of Darragh Street – improve safety and a dedicated pedestrian crossing to connect in with Kangaroo Point green bridge.
- Riverwalk – a bridge/ riverwalk from dockside through to join in at Cairns Street.
- Reduced speed limits – feedback provided around reducing the speed in the entire Kangaroo Point precinct to 30km/hr given the high density living and unsafe driver behaviours.
- Pedestrian crossings – install more at-grade pedestrian platforms/ crossings throughout the study area
- Improve footpath widths generally around the area.
- Provide separated movements for people cycling or using an e-mobility device to people walking and running.

4 Conclusion

4.1 Consultation closure and recommendations

The community feedback clearly indicates support for extending the riverwalk from Dockside to Mowbray Park as well as making improvements to connectivity to the new Kangaroo Point green bridge.

Key highlights from the community consultation included:

- Interest shown in riverwalk connectivity from Dockside to Mowbray Park
- Interest shown for continuous walking and cycling paths
- Interest in improvements to connectivity around the Kangaroo Point precinct and to the new Kangaroo Point Green Bridge
- Interest in reducing traffic speed throughout the Kangaroo Point precinct
- Interest in improving safety, wayfinding and lighting around the Kangaroo Point precinct

Council will develop a project update (Community update) which will outline the highlights from the consultation period. The update will inform the community of the different stages of transport planning and the current stage of planning to set accurate expectations with stakeholders around project delivery timeframes.

We will review technical input alongside community input when considering the high-level expected benefits, impacts, cost, risks, and opportunities of active travel options in the study area. Upon completion of this, anticipated for early 2023, we will provide an update to the community.

The Community and Stakeholder Engagement team anticipate that local residents will expect Council to undertake further detailed planning towards a congestion reduction project. It is recommended that communication approaches and materials are developed with a view to manage these community expectations during any subsequent phase of the planning stage.

4.2 Consultation closure activities

Activity	Dates
Consultation close out and project update	early 2023
Records management	Ongoing from late 2022 All filing and Correspondence Management System (CMS) entries completed at the conclusion of the consultation period.

Appendix A: DL flyer – Consultation

Kangaroo Point Active Travel Study



We are undertaking an active travel study between Captain Burke Park, Kangaroo Point and Mowbray Park, East Brisbane.

This active travel study is part of our ongoing network review process to help improve active travel options for Brisbane residents, visitors and commuters.

As part of this study, it is important we understand your experiences when riding or walking through this area.

You are invited to have your say on your experiences as part of this active transport review.

We are interested in how, why and when you travel between Captain Burke Park, Kangaroo Point and Mowbray Park, East Brisbane. We are also interested in potential connections to Main Street and Deakin Street where active travel improvements are planned as part of the new Kangaroo Point Green Bridge.

Your feedback will help us better understand your travel through the area and any opportunities or challenges you face along your route. Community feedback will be considered alongside our technical inputs as we develop any potential improvement options.

You can find out more about how to provide feedback over the page.

HAVE YOUR SAY

You can provide feedback by:

- completing an online survey
- dropping a pin on a map
- contacting the project team below
- visiting brisbane.qld.gov.au and search 'Kangaroo Point study'

Community consultation closes on 21 November 2022.

Scan the QR code to read more about the project and have your say.




NEXT STEPS

We are committed to keeping the community informed and will provide an update following the consultation period with outcomes and next steps.

This planning study is an initiative of the Queensland Government.

CONTACT US

To find out more information or ask any questions:

 1800 669 416 (business hours)

3403 8888 (24 hours)

 cityprojects@brisbane.qld.gov.au

Appendix B: social media

Facebook - Social media posts

Councillor Sriranganathan Facebook post from 20 October 2022.



Jonathan Sriranganathan, Councillor for The Gabba

2m · 🌐

I was going to write this as an internal note for my staff but then figured I might as well turn it into a public Facebook post so everyone else is in the loop too.

Next week, the council is going to start a fairly rushed public consultation process on two 'Active Travel Studies' they are undertaking within the Gabba Ward.

One is for the Kangaroo Point Riverwalk and adjoining streets between Mowbray Park and Captain Burke Park, and the other is for Melbourne Street, Boundary Street and Vulture Street linking South Brisbane, West End and the hospital precinct at Woolloongabba.

There's only going to be one month of consultation (at least for this initial stage of the two studies) ending in late November, and it's all going to be online, with minimal printed promotion and no face-to-face engagement opportunities.

Obviously I think that for such a big, well-resourced organisation like BCC, such a limited consultation process is pretty poor. The risk is that if the council doesn't properly explain the drivers for change, people who are so used to being screwed over by council decisions might not realise that this is actually a genuinely positive opportunity to deliver some good outcomes for the inner-south side in terms of improving pedestrian and cyclist safety and creating streets for people.

Both studies are being undertaken by the council on behalf of the State Government. They are connected to some election commitments Labor made before the last state election to fund completion of the riverwalk and new bike lanes in South Brisbane. (There was also money allocated for a corridor study of Montague Road which I understand will be undertaken separately)

The paradox is that although the process is quite rushed, the feedback residents provide will be more likely than other council consultations to actually influence practical outcomes, because unlike some projects the council consults on, there is already (some) state government funding attached, and there are no big corporate sector interests lobbying against positive change (except perhaps for a few construction companies who like driving big trucks through the middle of West End).


From what I can gather, the reason it's all so rushed is that the council signed a memorandum of understanding with the State Government to undertake these studies and make some recommendations on how the money should be spent right at the start of the year, but got really busy with flood clean-up and major projects like the Brisbane Metro and the Bus Network Review. Then they realised they're supposed to get concepts back to the State Government by early next year and now they're scrambling to catch up.

So they actually ARE somewhat interested in resident feedback and what kinds of changes the community will support, but the team is on pretty tight timeframes to have those conversations with the community.

All this means that it's actually going to be worth taking a few minutes to provide your feedback via this council consultation process. I expect the online surveys won't be great in terms of how they're drafted, and I'm concerned a lot of people will miss out on the chance to give feedback due to the tight timeframes, but that doesn't mean we should throw the baby out with the bathwater. Keep an eye out for further social media updates on this next week, and make sure you're signed up to my email newsletters via www.jonathansri.com/updates so you don't miss anything important.




Cr Sriranganathan & MP Amy MacMahon – Facebook posts from 8 November 2022


 **Jonathan Sriranganathan, Councillor for The Gabba** 8 Nov · 🌐

Just a reminder for anyone who'd like to see completion of the riverwalk between Kangaroo Point and East Brisbane that we're doing a little Q&A in Mowbray Park this Sunday morning...

<https://www.facebook.com/events/894786405235159>



SUN, 13 NOV
Info + Q&A session: Active transport opportunities for East Brisbane & Ka... ☆ Interested

 **Amy MacMahon - Greens MP for South Brisbane** 8 Nov · 🌐

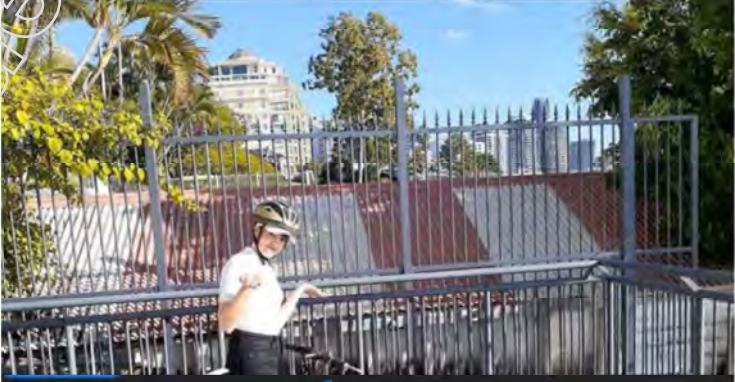
🦘 East Brisbane and Kangaroo Point neighbours! 🦘

Join [Jonathan Sriranganathan, Councillor for The Gabba](#) and I at Mowbray Park on Sunday morning to chat about the current Kangaroo Point Riverwalk consultation.

The BCC are looking for feedback on how people get around the neighbourhood, to inform plans for completing the Kangaroo Point Riverwalk.

The state government promised in 2020 to complete the riverwalk, with an allocation of \$20 million. It's not clear why it's taken so long to get consultation going - but we're keen to make sure as many people as possible have their say.

Join Jonno and I at Mowbray Park at 10am (coffees on us!) to share your ideas and ask any questions.



Appendix C – Example of signage placed in study area



Locations of signs placed in study area.

Appendix D – Distribution area



A.10 Environment and cultural heritage desktop searches

Appendix I of the *Strategic Context Working Paper*

NR [Redacted]

Released under RTI - DTMR

Cultural Heritage Database and Register Search Report

Search report reference number: 123563

The Aboriginal and Torres Strait Islander Cultural Heritage Database (cultural heritage database) and Aboriginal and Torres Strait Islander Cultural Heritage Register (cultural heritage register) have been searched in accordance with the location description provided, and the results are set out in this report.

The cultural heritage database is intended to be a research and planning tool to help Aboriginal and Torres Strait Islander parties, researchers, and other persons in their consideration of the cultural heritage values of particular areas.

The cultural heritage register is intended to be a depository for information for consideration for land use and land use planning, and a research and planning tool to help people in their consideration of the Aboriginal cultural heritage values of particular objects and areas.

Aboriginal or Torres Strait Islander cultural heritage which may exist within the search area is protected under the [Aboriginal Cultural Heritage Act 2003](#) and the [Torres Strait Islander Cultural Heritage Act 2003](#) (the Cultural Heritage Acts), even if the Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships (the Department) has no records relating to it.

The placing of information on the database is not intended to be conclusive about whether the information is up-to-date, comprehensive or otherwise accurate.

Under the Cultural Heritage Acts, a person carrying out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal or Torres Strait Islander cultural heritage. This applies whether or not such places are recorded in an official register and whether or not they are located on private land.

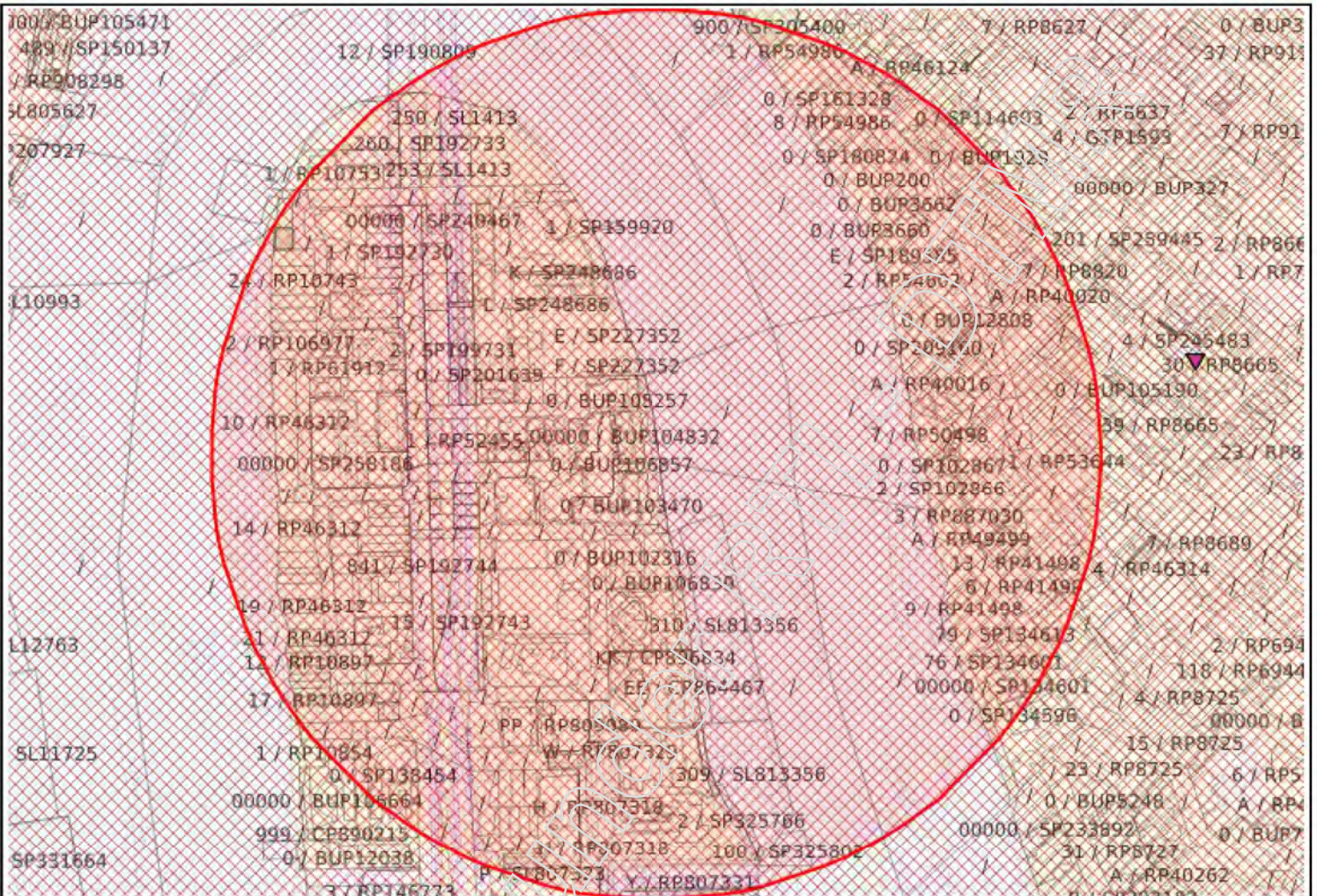
Please refer to the Department website <https://www.qld.gov.au/firstnations/environment-land-use-native-title/cultural-heritage/cultural-heritage-duty-of-care> to obtain a copy of the gazetted Cultural Heritage Duty of Care Guidelines, which set out reasonable and practicable measure for meeting the cultural heritage duty of care.

In order to meet your duty of care, any land-use activity within the vicinity of recorded cultural heritage should not proceed without the agreement of the Aboriginal or Torres Strait Islander Party for the area, or by developing a Cultural Heritage Management Plan under Part 7 of the Cultural Heritage Acts.

The extent to which the person has complied with Cultural Heritage Duty of Care Guidelines and the extent the person consulted Aboriginal or Torres Strait Islander Parties about carrying out the activity – and the results of the consultation – are factors a court may consider when determining if a land user has complied with the cultural heritage duty of care.

Should you have any further queries, please do not hesitate to contact the department via email: cultural.heritage@dssdsatsip.qld.gov.au or telephone: 1300 378 401.

Cultural Heritage Database and Register Search Report



LEGEND

- Parties
- Bodies
- CHMPs
- Study Areas
- DLAs

Reference Number: 123563
 Latitude: -27.468414
 Longitude: 153.037800
 Buffer Distance: 500m

Cultural Heritage Sites

- Pre 1/7/2015 points
- Post 1/7/2015 points
- Post 1/7/2015 points (mitigated)
- Area

Map Projection: Geographic Latitude & Longitude (GDA2020).

The Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships (DSDSATSIP) is the custodian of spatial data provided by various third parties for inclusion in the Aboriginal and Torres Strait Islander cultural heritage online portal. This includes spatial data provided by the National Native Title Tribunal and Aboriginal and Torres Strait Islander parties.

Features shown on this map have been obtained from available sources. It is possible that errors and omissions may exist. The DSDSATSIP disclaims any liability for any errors or omissions that appear in this document.

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Map produced by the Cultural Heritage Unit, DSDSATSIP, Brisbane, Queensland, Australia on 10 November 2022.

1:6,727

Metres 100 200 300

LOCALITY

Cultural Heritage Database and Register Search Report

There are no Aboriginal or Torres Strait Islander cultural heritage site points recorded in your specific search area.

There are no Aboriginal or Torres Strait Islander cultural heritage site polygons recorded in your specific search area.

Cultural Heritage Party/ies for the area:

Reference No.	Federal Court No.	Name	Contact Details
QC1998/026 PRC	QUD6196/98	Turrbal People	c/- Turrbal Association Inc PO Box 3261 SOUTH BRISBANE QLD 4101 Turrbal People Maroochy Barambah Mobile: NR Email: info@turrbal.com.au
QC2003/015 PRC	QUD6014/03	Jagera People #2	Jagera People #2 c/- Jagera Daran Pty Ltd 124 Racecourse Rd ASCOT QLD 4007 Phone: (07) 3868 1244 Mobile: NR Email: NR@jageradaran.com

Cultural Heritage Body/ies for the area:

Departmental Reference No.	Name	Contact Details	Registration Date
CLH000434	Turrbal Association Inc	Turrbal Association Inc PO Box 3261 SOUTH BRISBANE QLD 4101 Turrbal People Maroochy Barambah Mobile: NR Email: info@turrbal.com.au	03/12/2013

There are no Cultural Heritage Management Plans recorded in your specific search area.

There are no Designated Landscape Areas (DLA) recorded in your specific search area.

Cultural Heritage Database and Register Search Report

There are no Registered Cultural Heritage Study Areas recorded in your specific search area.

There are no National Heritage Areas (Indigenous values) recorded in your specific search area.

Released under RTI - DTMR

Cultural Heritage Database and Register Search Report

Glossary

Cultural Heritage Body: An entity registered under Part 4 of the Cultural Heritage Acts as an Aboriginal or Torres Strait Islander cultural heritage body for an area. The purpose of a cultural heritage body is to:

- identify the Aboriginal or Torres Strait Islander parties for an area
- serve as the first point of contact for cultural heritage matters.

Cultural Heritage Management Plan (CHMP): An agreement between a land user (sponsor) and Traditional Owners (endorsed party) developed under Part 7 of the Cultural Heritage Acts. The CHMP explains how land use activities can be managed to avoid or minimise harm to Aboriginal or Torres Strait Islander cultural heritage.

Cultural Heritage Party: Refers to a native title party for an area. A native title party is defined as:

- Registered native title holders (where native title has been recognised by the Federal Court of Australia).
- Registered native title claimants (whose native title claims are currently before the Federal Court of Australia).
- Previously registered native title claimants (the 'last claim standing') are native title claims that are no longer active and have been removed from the Register of Native Title Claims administered by the National Native Title Tribunal. Previously registered native title claimants will continue to be the native title party for that area providing:
 - o there is no other registered native title claimant for the area; and
 - o there is not, and never has been, a registered native title holder for the area.

The native title party maintains this status within the external boundaries of the claim even if native title has been extinguished.

Cultural heritage site points (pre 2015): Aboriginal and Torres Strait Islander cultural heritage sites and places recorded in the database as point data **before** 1 July 2015.

Cultural heritage site points (post 2015): Aboriginal and Torres Strait Islander cultural heritage sites and places recorded in the database as point data **after** 1 July 2015.

Cultural heritage site points (post 2015 mitigated): Aboriginal and Torres Strait Islander cultural heritage sites and places recorded in the database as point data after 1 July 2015 where the recorder has advised the department that the site has been mitigated.

Cultural heritage site polygons: Aboriginal and Torres Strait Islander cultural heritage sites and places recorded in the database as a polygon.

Designated Landscape Areas (DLA): Under the repealed *Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987*, an area was declared a 'designated landscape area' (DLA) if it was deemed necessary or desirable for it to be preserved or to regulate access.

Indigenous Protected Areas (IPA): Areas of land and sea managed by Indigenous groups as protected areas for biodiversity conservation through voluntary agreements with the Australian Government. For further information about IPAs visit <https://www.environment.gov.au/land/indigenous-protected-areas>

National Heritage Areas (Indigenous values): Places listed on the National Heritage List for their outstanding heritage significance to Australia and are protected under the Environment Protection and Biodiversity Conservation Act 1999. For further information about the National Heritage List visit <https://www.environment.gov.au/heritage/about/national>

Registered Cultural Heritage Study Areas: Comprehensive studies of Aboriginal and or Torres Strait Islander cultural heritage in an area conducted under Part 6 of the Cultural Heritage Acts for the purpose of recording the findings of

Cultural Heritage Database and Register Search Report

the study on the register.

Traditional Use of Marine Resources Agreement (TUMRA): Areas subject to agreement between Great Barrier Reef Traditional Owners and the Australian and Queensland governments on the management of traditional use activities on their sea country. For further information about TUMRAs visit <https://www.gbrmpa.gov.au/our-partners/traditional-owners/traditional-use-of-marine-resources-agreements>

World Heritage Areas: Places inscribed on the World Heritage List pursuant to the World Heritage Convention adopted by the United Nations Education, Scientific and Cultural Organisation (UNESCO) and are protected under the [Environment Protection and Biodiversity Conservation Act 1999](#). For further information about World Heritage places in Queensland visit <https://parks.des.qld.gov.au/management/managed-areas/world-heritage-areas>

***Disclaimer:** The Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships is the custodian of spatial data and information provided by various third parties for inclusion in the Aboriginal and Torres Strait Islander cultural heritage online portal. This includes spatial data provided by the National Native Title Tribunal and Aboriginal and Torres Strait Islander parties. Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships is not responsible for the accuracy of information provided by third parties or any errors in this search report arising from such information.*

Released under R.I.C.M.A.



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 10-Nov-2022

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Released under RTI - DTMR

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar)	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	71
Listed Migratory Species:	43

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <https://www.dcceew.gov.au/parks-heritage/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	6
Commonwealth Heritage Places:	3
Listed Marine Species:	76
Whales and Other Cetaceans:	1
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	18
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Moreton bay	Within 10km of Ramsar site	In feature area

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area	In feature area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community may occur within area	In feature area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community may occur within area	In feature area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community may occur within area	In feature area
Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions	Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia			
Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat known to occur within area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area	In feature area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Species or species habitat may occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Roosting known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area	In feature area
FISH			
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat may occur within area	In feature area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In feature area
Neoceratodus forsteri Australian Lungfish, Queensland Lungfish [67620]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
FROG			
Mixophyes fleayi Fleay's Frog [25960]	Endangered	Species or species habitat may occur within area	In feature area
INSECT			
Argynnis hyperbius inconstans Australian Fritillary [88056]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
MAMMAL			
<u>Chalinolobus dwyeri</u>			
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area	In feature area
<u>Dasyurus hallucatus</u>			
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area	In feature area
<u>Dasyurus maculatus maculatus (SE mainland population)</u>			
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area	In feature area
<u>Macroderma gigas</u>			
Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In feature area
<u>Petauroides volans</u>			
Greater Glider (southern and central) [254]	Endangered	Species or species habitat likely to occur within area	In feature area
<u>Petaurus australis australis</u>			
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area	In feature area
<u>Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</u>			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
<u>Potorous tridactylus tridactylus</u>			
Long-nosed Potoroo (northern) [66645]	Vulnerable	Species or species habitat may occur within area	In feature area
<u>Pteropus poliocephalus</u>			
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area	In feature area
<u>Xeromys myoides</u>			
Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
PLANT			
<u>Arthraxon hispidus</u>			
Hairy-joint Grass [9338]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bosistoa transversa Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Corchorus cunninghamii Native Jute [14659]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Cryptocarya foetida Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat may occur within area	In feature area
Cupaniopsis shirleyana Wedge-leaf Tuckeroo [3205]	Vulnerable	Species or species habitat may occur within area	In feature area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Endiandra floydii Floyd's Walnut, Crystal Creek Walnut [52955]	Endangered	Species or species habitat may occur within area	In buffer area only
Gossia gonoclada Angle-stemmed Myrtle [78866]	Endangered	Species or species habitat likely to occur within area	In feature area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Macadamia ternifolia Small-fruited Queensland Nut, Gympie Nut [7214]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat may occur within area	In feature area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Samadera bidwillii Quassia [29708]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area	In feature area
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Congregation or aggregation known to occur within area	In feature area
Coeranoscincus reticulatus Three-toed Snake-tooth Skink [59628]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area	In feature area
Hemiaspis damelii Grey Snake [1179]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat known to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area	In feature area

SHARK

Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding may occur within area	In feature area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species

[[Resource Information](#)]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area	In buffer area only
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardeanna grisea Sooty Shearwater [82651]		Species or species habitat may occur within area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area	In feature area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Marine Species			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Congregation or aggregation known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area	In feature area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat known to occur within area	In feature area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area	In feature area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat may occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area	In feature area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat likely to occur within area	In feature area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding may occur within area	In feature area
Migratory Terrestrial Species			
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Roosting known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat may occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Defence		
Defence - ADFRU BRISBANE - JETSET CENTRE [31862]	QLD	In feature area
Defence - HMAS MORETON [30268]	QLD	In feature area
Defence - HMAS MORETON [30267]	QLD	In feature area
Defence - MCO [31863]	QLD	In feature area
Defence - VICTORIA BARRACKS - BRISBANE [30210]	QLD	In buffer area only
Defence - VICTORIA BARRACKS - BRISBANE [30211]	QLD	In buffer area only

Commonwealth Heritage Places [\[Resource Information \]](#)

Name	State	Status	Buffer Status
Historic			
Brisbane General Post Office	QLD	Listed place	In feature area
Naval Offices	QLD	Listed place	In feature area
Victoria Barracks	QLD	Listed place	In buffer area only

Listed Marine Species [\[Resource Information \]](#)

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area	In buffer area only
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]		Species or species habitat may occur within area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area	In feature area
Diomedea antipodensis gibsoni as Diomedea gibsoni Gibson's Albatross [82270]	Vulnerable	Species or species habitat may occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area	In feature area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In buffer area only
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Roosting known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]		Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In feature area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat known to occur within area overfly marine area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area
Fish			
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area	In feature area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area	In feature area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area	In feature area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area	In feature area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area	In feature area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area	In feature area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area	In feature area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area	In feature area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area	In feature area
Hippocampus kelloggi Kellogg's Seahorse, Great Seahorse [66723]		Species or species habitat may occur within area	In feature area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area	In feature area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area	In feature area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area	In feature area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In feature area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In feature area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area	In feature area
Micrognathus brevis thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area	In feature area
Microphis manadensis Manado Pipefish, Manado River Pipefish [66258]		Species or species habitat may occur within area	In feature area
Solegnathus dunckeri Duncker's Pipehorse [66271]		Species or species habitat may occur within area	In feature area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area	In feature area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area	In feature area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area	In feature area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In feature area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In feature area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area	In feature area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In feature area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In feature area
Reptile			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Congregation or aggregation known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat known to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area	In feature area

Whales and Other Cetaceans

[Resource Information]

Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Orcaella heinsohni as Orcaella brevirostris Australian Snubfin Dolphin [81322]		Species or species habitat likely to occur within area	In feature area

Extra Information

EPBC Act Referrals

[Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Australia TradeCoast Sewerage Pipeline	2001/270	Not Controlled Action	Completed	In feature area
Brisbane GPO & Office Building 259 Queen Street, Brisbane QLD	2015/7556	Not Controlled Action	Completed	In feature area
Cannon Hill Community Links Project	2005/2358	Not Controlled Action	Completed	In feature area
Conservation Works and Additions to Brisbane General Post Office	2010/5405	Not Controlled Action	Completed	In feature area
construction of an multi-agency ecosciences precinct	2007/3563	Not Controlled Action	Completed	In buffer area only
Cross River Rail connecting Dutton Park to Bowen Hills, Brisbane, Qld	2017/7961	Not Controlled Action	Completed	In feature area
Dedicated Bus Carriageway across Brisbane River	2004/1340	Not Controlled Action	Completed	In feature area
Floating Walkway Construction	2001/438	Not Controlled Action	Completed	In feature area
Gateway Motorway Upgrade	2003/1297	Not Controlled Action	Completed	In feature area
Hale Street Bridge Link	2005/2297	Not Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Industrial development	2005/2319	Not Controlled Action	Completed	In feature area
Northern Link Parallel Road Tunnels Project	2007/3824	Not Controlled Action	Completed	In feature area
Pedestrian and Cycle Bridge, Brisbane River	2007/3553	Not Controlled Action	Completed	In feature area
The North-South Bypass Tunnel (NSBT)	2004/1741	Not Controlled Action	Completed	In feature area
TradeCoast to Belmont Transmission Line	2003/1164	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
Cross River Rail	2010/5427	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Works and additions to Brisbane General Post Office	2011/6019	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Released under RIA/DIMR

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
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The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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WildNet species list

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Species: All

Type: All

Queensland status: All

Records: All

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufo	<i>Rhinella marina</i>	cane toad	Y			7
animals	amphibians	Hylidae	<i>Litoria caerulea</i>	common green treefrog		C		4
animals	amphibians	Hylidae	<i>Litoria fallax</i>	eastern sedgefrog			C	3
animals	amphibians	Hylidae	<i>Litoria sp.</i>				C	1
animals	amphibians	Limnodynastidae	<i>Limnodynastes peronii</i>	striped marshfrog			C	5
animals	birds	Acanthizidae	<i>Gerygone levigaster</i>	mangrove gerygone			C	3
animals	birds	Acanthizidae	<i>Sericornis frontalis</i>	white-browed scrubwren			C	3
animals	birds	Accipitridae	<i>Accipiter cirrocephalus</i>	collared sparrowhawk			C	1
animals	birds	Accipitridae	<i>Accipiter fasciatus</i>	brown goshawk			C	1
animals	birds	Accipitridae	<i>Elanus axillaris</i>	black-shouldered kite			C	2
animals	birds	Accipitridae	<i>Haliastur indus</i>	brahminy kite			C	6
animals	birds	Anatidae	<i>Anas gracilis</i>	grey teal			C	1
animals	birds	Anatidae	<i>Anas platyrhynchos</i>	northern mallard	Y			5
animals	birds	Anatidae	<i>Anas sp.</i>				C	1
animals	birds	Anatidae	<i>Anas superciliosa</i>	Pacific black duck			C	14
animals	birds	Anatidae	<i>Aythya australis</i>	hardhead			C	5
animals	birds	Anatidae	<i>Chenonetta jubata</i>	Australian wood duck			C	1
animals	birds	Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian darter			C	3
animals	birds	Apodidae	<i>Apus pacificus</i>	fork-tailed swift			SL	2
animals	birds	Ardeidae	<i>Ardea alba modesta</i>	eastern great egret			C	1
animals	birds	Ardeidae	<i>Ardea intermedia</i>	intermediate egret			C	1
animals	birds	Ardeidae	<i>Bubulcus ibis</i>	cattle egret			C	3
animals	birds	Ardeidae	<i>Butorides striata</i>	striated heron			C	9
animals	birds	Ardeidae	<i>Egretta novaehollandiae</i>	white-faced heron			C	3
animals	birds	Ardeidae	<i>Ixobrychus dubius</i>	Australian little bittern			C	1
animals	birds	Ardeidae	<i>Nycticorax caledonicus</i>	nankeen night-heron			C	2
animals	birds	Artamidae	<i>Cracticus nigrogularis</i>	piebald butcherbird			C	5
animals	birds	Artamidae	<i>Cracticus torquatus</i>	grey butcherbird			C	1
animals	birds	Artamidae	<i>Gymnorhina tibicen</i>	Australian magpie			C	10
animals	birds	Artamidae	<i>Strepera graculina</i>	piebald currawong			C	2
animals	birds	Burhinidae	<i>Burhinus grallarius</i>	bush stone-curlew			C	4
animals	birds	Cacatuidae	<i>Eolophus roseicapilla</i>	galah			C	2
animals	birds	Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike			C	9
animals	birds	Charadriidae	<i>Varellus miles</i>	masked lapwing			C	2
animals	birds	Charadriidae	<i>Varellus miles novaehollandiae</i>	masked lapwing (southern subspecies)			C	2
animals	birds	Cisticolidae	<i>Cisticola exilis</i>	golden-headed cisticola			C	1
animals	birds	Columbidae	<i>Columba leucomela</i>	white-headed pigeon			C	1
animals	birds	Columbidae	<i>Columba livia</i>	rock dove	Y			13
animals	birds	Columbidae	<i>Ocyphaps lophotes</i>	crested pigeon			C	6
animals	birds	Columbidae	<i>Streptopelia chinensis</i>	spotted dove	Y			8
animals	birds	Corvidae	<i>Corvus orru</i>	Torresian crow			C	12
animals	birds	Cuculidae	<i>Eudynamys orientalis</i>	eastern koel			C	1
animals	birds	Cuculidae	<i>Scythrops novaehollandiae</i>	channel-billed cuckoo			C	1
animals	birds	Estrildidae	<i>Lonchura punctulata</i>	nutmeg mannikin	Y			3
animals	birds	Falconidae	<i>Falco cenchroides</i>	nankeen kestrel			C	1
animals	birds	Falconidae	<i>Falco longipennis</i>	Australian hobby			C	3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Falconidae	<i>Falco peregrinus</i>	peregrine falcon		C		2
animals	birds	Halcyonidae	<i>Dacelo novaeguineae</i>	laughing kookaburra		C		4
animals	birds	Halcyonidae	<i>Todiramphus sanctus</i>	sacred kingfisher		C		2
animals	birds	Halcyonidae	<i>Todiramphus sordidus</i>	Torresian kingfisher		C		3
animals	birds	Hirundinidae	<i>Hirundo neoxena</i>	welcome swallow		C		13
animals	birds	Hirundinidae	<i>Petrochelidon ariel</i>	fairy martin		C		1
animals	birds	Hirundinidae	<i>Petrochelidon nigricans</i>	tree martin		C		5
animals	birds	Laridae	<i>Chroicocephalus novaehollandiae</i>	silver gull		C		15
animals	birds	Laridae	<i>Gelochelidon nilotica</i>	gull-billed tern		SL		4
animals	birds	Laridae	<i>Hydroprogne caspia</i>	Caspian tern		SL		4
animals	birds	Laridae	<i>Thalasseus bergii</i>	crested tern		SL		2
animals	birds	Maluridae	<i>Malurus lamberti</i>	variegated fairy-wren		C		2
animals	birds	Megaluridae	<i>Cincloramphus timoriensis</i>	tawny grassbird		C		1
animals	birds	Megapodiidae	<i>Alectura lathami</i>	Australian brush-turkey		C		5
animals	birds	Meliphagidae	<i>Entomyzon cyanotis</i>	blue-faced honeyeater		C		5
animals	birds	Meliphagidae	<i>Lichmera indistincta</i>	brown honeyeater		C		10
animals	birds	Meliphagidae	<i>Manorina melanocephala</i>	noisy miner		C		8
animals	birds	Meliphagidae	<i>Philemon corniculatus</i>	noisy friarbird		C		1
animals	birds	Monarchidae	<i>Grallina cyanoleuca</i>	magpie-lark		C		12
animals	birds	Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian pipit		C		1
animals	birds	Oriolidae	<i>Oriolus sagittatus</i>	olive-backed oriole		C		1
animals	birds	Oriolidae	<i>Sphecotheres vieilloti</i>	Australasian figbird		C		13
animals	birds	Pachycephalidae	<i>Pachycephala rufiventris</i>	rufous whistler		C		1
animals	birds	Passeridae	<i>Passer domesticus</i>	house sparrow	Y			7
animals	birds	Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian pelican		C		7
animals	birds	Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	little pied cormorant		C		4
animals	birds	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	great cormorant		C		1
animals	birds	Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	little black cormorant		C		3
animals	birds	Phalacrocoracidae	<i>Phalacrocorax varius</i>	pied cormorant		C		2
animals	birds	Pittidae	<i>Pitta versicolor</i>	noisy pitta		C		2
animals	birds	Psittacidae	<i>Trichoglossus chloroepidotus</i>	scaly-breasted lorikeet		C		8
animals	birds	Psittacidae	<i>Trichoglossus moluccanus</i>	rainbow lorikeet		C		8
animals	birds	Psophodidae	<i>Psophodes olivaceus</i>	eastern whipbird		C		1
animals	birds	Rallidae	<i>Gallinula tenebrosa</i>	dusky moorhen		C		9
animals	birds	Rallidae	<i>Porphyrio melanotus</i>	purple swamphen		C		1
animals	birds	Rhipiduridae	<i>Rhipidura leucophrys</i>	willie wagtail		C		14
animals	birds	Scolopacidae	<i>Actitis hypoleucos</i>	common sandpiper		SL		1
animals	birds	Strigidae	<i>Ninox boobook</i>	southern boobook		C		2
animals	birds	Sturnidae	<i>Sturnus vulgaris</i>	common starling	Y			7
animals	birds	Threskiornithidae	<i>Threskiornis molucca</i>	Australian white ibis		C		10
animals	birds	Threskiornithidae	<i>Threskiornis spinicollis</i>	straw-necked ibis		C		1
animals	birds	Timaliidae	<i>Zosterops lateralis</i>	silveryeye		C		14
animals	birds	Tytonidae	<i>Tyto novaehollandiae</i>	masked owl		C		1
animals	insects	Nymphalidae	<i>Euploea corinna</i>	common crow				2
animals	insects	Papilionidae	<i>Graphium choredon</i>	blue triangle				1
animals	insects	Papilionidae	<i>Papilio aegaeus aegaeus</i>	orchard swallowtail (Australian subspecies)				1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	insects	Pieridae	<i>Belenois java teutonia</i>	caper white				2
animals	mammals	Delphinidae	<i>Tursiops aduncus</i>	Indo-Pacific bottlenose dolphin		C		1
animals	mammals	Phalangeridae	<i>Trichosurus vulpecula</i>	common brushtail possum		C		1
animals	mammals	Pteropodidae	<i>Pteropus sp.</i>			C		1
animals	ray-finned fishes	Cichlidae	<i>Amatitlania nigrofasciata</i>	convict cichlid	Y			1
animals	reptiles	Agamidae	<i>Intellagama lesueurii</i>	eastern water dragon		C		4
animals	reptiles	Agamidae	<i>Pogona barbata</i>	bearded dragon		C		1
animals	reptiles	Diplodactylidae	<i>Nebulifera robusta</i>	robust velvet gecko		C		1
animals	reptiles	Elapidae	<i>Cacophis harriettae</i>	white-crowned snake		C		2
animals	reptiles	Scincidae	<i>Cryptoblepharus pulcher pulcher</i>	elegant snake-eyed skink		C		4
animals	reptiles	Scincidae	<i>Ctenotus spaldingi</i>	straight-browed ctenotus		C		1
animals	reptiles	Scincidae	<i>Cyclodomorphus gerrardii</i>	pink-tongued lizard		C		1
animals	reptiles	Scincidae	<i>Lampropholis delicata</i>	dark-flecked garden sunskink		C		1
fungi	lecanoromycetes	Parmeliaceae	<i>Xanthoparmelia ballingalliana</i>			C		1/1
plants	land plants	Acanthaceae	<i>Stephanophysum longifolium</i>		Y			1/1
plants	land plants	Cactaceae	<i>Pereskia aculeata</i>	blade apple	Y			1/1
plants	land plants	Commelinaceae	<i>Commelina benghalensis</i>		Y			1/1
plants	land plants	Euphorbiaceae	<i>Ricinus communis</i>	castor oil bush	Y			1
plants	land plants	Poaceae	<i>Cenchrus setaceus</i>		Y			1/1
plants	land plants	Ricciaceae	<i>Riccia</i>					1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*.

The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*.

The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).

This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.

Appendix B – Strategic assessment

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B.1 Strategic Assessment Working Paper

The appendices of the *Strategic Assessment Working Paper* have been removed and collated within Appendix B of this report.

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Brisbane City Council

Kangaroo Point Riverwalk Options Analysis and Concept Design

Strategic Assessment Working Paper

Reference: NR [redacted]

Rev 2 | 10 May 2023



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Job number: NR [redacted]

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1. Introduction

Arup has been commissioned by Brisbane City Council (BCC) to undertake the Options Analysis (OA) and Concept Design (CD) for the Kangaroo Point Riverwalk project, to connect Captain Burke Park (Kangaroo Point) and Mowbray Park (East Brisbane) with a continuous link catering to cyclists, pedestrians and other active transport modes. This project aims to address the “missing link” in the existing cycling and pedestrian network, as identified by the cycling community, the Department of Transport and Main Roads (TMR) and BCC.

1.1 Study purpose

TMR and BCC are committed to providing safe cycling infrastructure to encourage mode shift towards more sustainable modes of transport. Council is currently completing the draft Active Transport Network Plan (ATNP), a review of Brisbane’s Bicycle Network Overlay in City Plan, to improve network connectivity and safety. Through this review and from feedback received from the cycling community, TMR and BCC are aware of a “missing link” in the network of existing cycling infrastructure between Kangaroo Point and East Brisbane. The Kangaroo Point community requires new infrastructure to improve connectivity for all active transport modes and encourage sustainable travel within a rapidly changing inner city region.

The Kangaroo Point Riverwalk has committed funding within the 2020-2024 State budget and the project is listed in Queensland Transport and Roads Investment Program (QTRIP) as a high priority project to “fill pathway network gaps to create an unbroken bike and pedestrian path between Captain Burke Park, Kangaroo Point and Mowbray Park, East Brisbane”.

The study shall develop a preferred walking and riding connection between Frank Nicklin Dry Dock (Kangaroo Point) and Mowbray Park (East Brisbane), and between Frank Nicklin Dry Dock and the future Deakin Street underpass, which links to the Kangaroo Point Green bridge which is currently under construction. The project will maximise access and return on investment from the Kangaroo Point Green bridge by providing a key connection to the Deakin Street underpass access and fill a critical gap in the active transport network. The study will also identify enhancement opportunities for the existing promenade from Park Avenue at Mowbray Park to the north towards the Frank Nicklin Dry Dock. It is essential that options cater for e-mobility use under the current road rules.

The study will comprehend the current and future issues, constraints, and opportunities, and determine prospective infrastructure upgrade solutions for the study area. The study will then develop a concept design for the recommended upgrade options with high level cost-benefit analysis. The conclusions will be used to inform TMR and Council’s forward program, project prioritisation and determine the requirements for the next stages of planning and design.

The purpose of the study is to:

- Improve the safety of all road users through the introduction of infrastructure for pedestrians (including wheelchairs, prams etc.), cyclists and e-mobility users which is separated from road vehicles.
- Improve pedestrian, cyclist, and e-mobility access through the provision of a high-quality facility that connects to the surrounding active and public transport network. The facility shall establish a continuous walking and riding connection between Frank Nicklin Dry Dock, Kangaroo Point and Mowbray Park, East Brisbane, and between Frank Nicklin Dry Dock and the future Deakin Street underpass. The study will also identify enhancement opportunities for the existing promenade from Park Avenue at Mowbray Park to the north towards the Frank Nicklin Dry Dock.
- Limit impact on transport network efficiency through the consideration of all modes in current and future scenarios.
- Complement the public transport network to ensure multi-modal connectivity is supported.

1.2 Delivery objectives and milestones

To achieve the purpose of the study, BCC has defined the following key delivery objectives and milestones:

- Ensure that suitable options for the Riverwalk are recommended, which appropriately address the key challenges identified by Council and the project team.
- Review existing planning, projects, and data.
- Consider existing and future active transport needs.
- Identify and review network gaps, deficiencies, opportunities, and constraints, including mapping.
- Develop up to three treatment options for active transport facilities to address the needs of all users.
- Prepare a multi-criteria analysis (MCA) to determine the preferred option(s).
- Prepare high-level concept plans and cost estimates for the preferred option(s), including land requirements.
- Recommend staged project delivery options, including identification of “quick wins” that could be delivered within a timeframe of 1-2 years, subject to funding.

1.3 Background

Over the past decade, BCC has released strategies specific to Kangaroo Point, such as the *River's Edge Strategy*, the *Kangaroo Point Peninsula Draft Renewal Strategy*, and the *Kangaroo Point Peninsula Neighbourhood Plan*. These documents outline the community's desire for increased active transport connectivity along the Kangaroo Point peninsula and surrounding inner-city precincts. This has created an opportunity to improve the existing network and deliver new infrastructure.

Through the strategies mentioned above, a missing active transport link has been identified between the Frank Nicklin Dry Dock and Mowbray Park. The Kangaroo Point Riverwalk project aims to address the missing link through improved access and activity along the Brisbane River. The project also aims to identify opportunities for enhancement along the existing promenade section from Park Avenue at Mowbray Park to the north towards the Frank Nicklin Dry Dock, as well as developing a connection to the Kangaroo Point Green Bridge project via Cairns Street and Deakin Street. Further opportunities for enhancing the existing promenade between Captain Burke Park and the Frank Nicklin Dry Dock will also be identified.

1.4 Study area

The study area spans from Captain Burke Park in Kangaroo Point to Mowbray Park in East Brisbane and is divided into three extents, as shown in Figure 1:

- *Study extent A* represents the missing link in the active transport network, between Frank Nicklin Dry Dock to Mowbray Park (and the existing active transport facility along Lytton Road). The project aims to provide a continuous active transport facility between these areas and to the broader active transport network.
- *Study extent B* represents the existing Kangaroo Point Riverwalk between Captain Burke Park and the Frank Nicklin Dry Dock. The project seeks to identify opportunities for enhancements to the existing infrastructure. These enhancements will be discussed in more detail in the *Technical Assessment Working Paper* ^{NR} [REDACTED]
- *Study extent C* represents the link between the Kangaroo Point Riverwalk project to the future Kangaroo Point Green Bridge via the Deakin Street / Main Street active transport underpass, which is currently under construction.



Figure 1: Study area extent (BCC, 2022)

1.5 Purpose of report

The Kangaroo Point Riverwalk project has four phases, as listed below.

- Phase 1: Strategic context
- Phase 2: Strategic assessment (current phase of project)
- Phase 3: Technical assessment
- Phase 4: Options analysis report

The purpose of this Strategic Assessment Working Paper is to:

1. Discuss the considerations that drove the route development and assessment criteria.
2. Develop active transport alignment options for each of the study areas.
3. Develop assessment criteria to identify the preferred option/s.
4. Document the outcomes from the multi-criteria analysis (MCA) workshop.
5. Document the findings of additional investigations to address risks identified during and following the MCA workshop.
6. Collate all findings from the Strategic Assessment phase of the project.

2. Route development and assessment considerations

2.1 Strategic context

In Phase 1 of the Kangaroo Point Riverwalk project a *Strategic Context Working Paper* NR was prepared. This document includes the following information which informed the current phase of the project:

1. Summary of key stakeholders and groups.
2. Review of relevant policies, planning and strategy documents to ensure integration and alignment between the key project objectives and the strategic direction for the project area.
3. Review of relevant future projects (either planned or under construction) within proximity of the study area.
4. Review of existing conditions including land use planning, existing transport infrastructure and road safety history. This includes a road safety audit of the existing conditions.
5. Identification of key opportunities and constraints.
6. Understanding the existing and intended function of movement and place within the study area.
7. Preliminary assessment of the following key considerations: environmental and cultural heritage, planning, stormwater, flooding and maritime.
8. Basis of Design report outlining the relevant standards and guidelines to be used by each design discipline in order of precedence.
9. Justification of the project rationale.

2.2 Cycle Network Local Government Grants Program

The Queensland Government is committed to achieving the Queensland Cycling Strategy 2017-2027 vision of 'more cycling, more often'. As part of this, a Cycle Network Local Government Grants Program has been developed to allow the Queensland Government to work closely with local councils to deliver and improve Principal Cycle Networks across Queensland. Funding is being targeted at delivering the Highest Priority Routes (HPR) identified in the Priority Route Maps and Action Plans for each Region's Principal Cycle Network Plan (PCNP).

As shown in Figure 2, the study area includes two parallel routes on the HPR (Priority A Route) – one along Shafston Avenue and the other adjacent to the Brisbane River. Park Avenue, Cairns Street and Deakin Street are also on the HPR. Therefore, this project aims to be delivered under the Cycle Network Local Government Grants Program and has the potential to provide multiple Priority A Routes as part of the same project. The existing promenade section between the Frank Nicklin Dry Dock to Captain Burke Park is identified as a Priority B Route.

TMR's *Program Guidelines – Cycle Network Local Government Grants* document summarises the concept design phase as follows:

- Mandatory for Design project applications and is an output for an Options Analysis project.
- Provides opportunity for high level advice before project progresses to the next stages.
- Concept design should establish a preferred solution and identify major challenges.

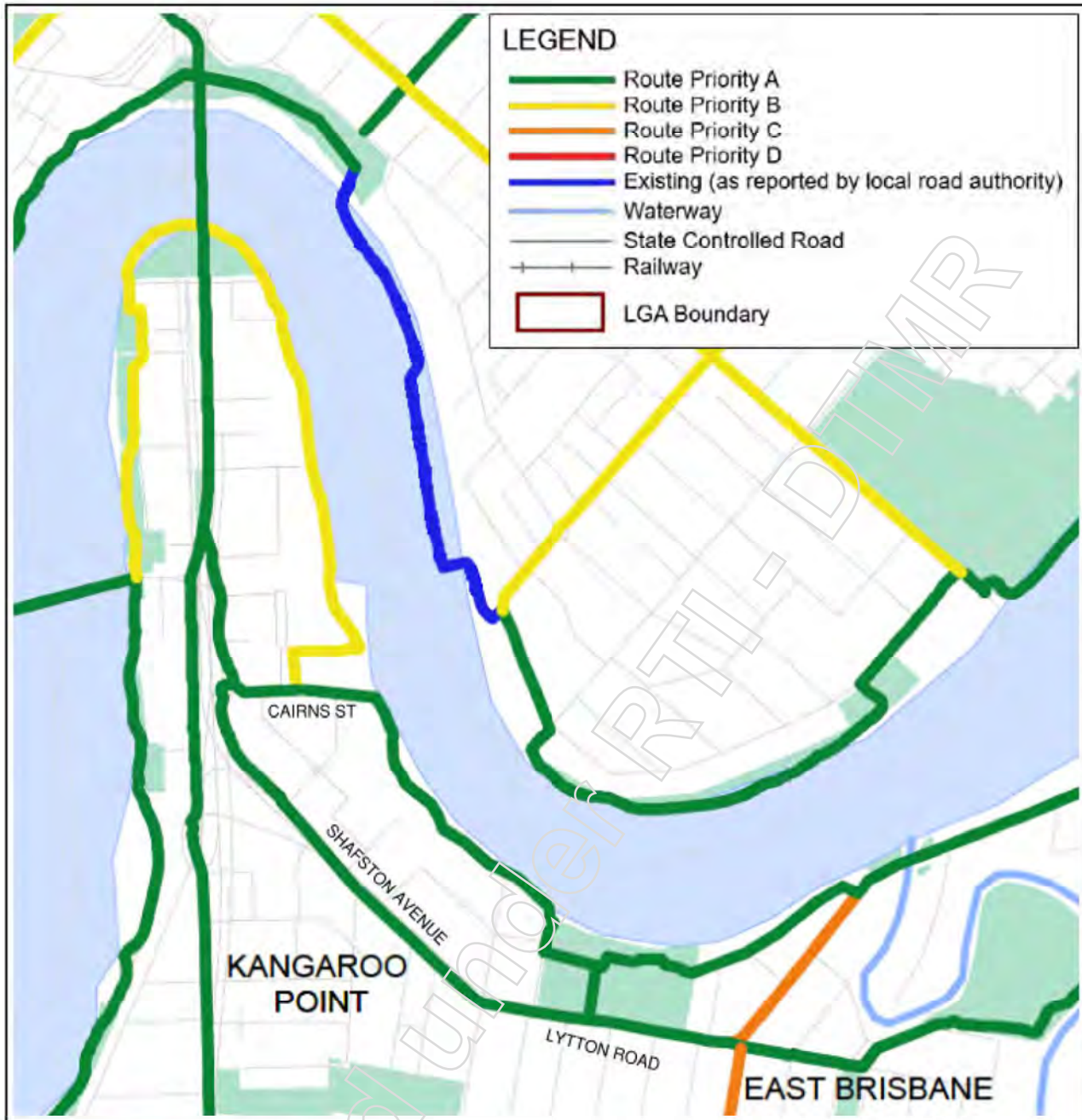


Figure 2: TMR Priority Route Map (TMR, 2021)

To access this funding, applications will be assessed in relation to the following five criteria:

1. **Connectivity** – Improving the connectivity of the bicycle network, linking the community to key local trip attractors (for example, business centres, schools, service hubs and sport and recreational facilities).
2. **Demand** – Projects are adequately designed to accommodate the surrounding population level, considering both current and future population projections (10 years). The project has sufficient capacity to accommodate anticipated use of the facility, including consideration of any peak periods and fluctuating demand patterns.
3. **Network enhancement** – Project contributes to the delivery of the PCN, particularly filling gaps/missing links in the network and addressing barriers to cycling on the network.
4. **Safety improvement** – Project improves safety to bike riders, addressing risks, known hazards and crash locations.

5. Strategic priority – Project is on a Highest Priority Route identified in the Priority Route Maps and Action Plans for the PCN. This includes projects on an alternative alignment that delivers the same network outcome as determined by further planning.

In addition to the assessment criteria, the following three criteria will also be considered when assessing applications:

6. Cost effectiveness – Project costs are appropriate to project scope and are value for money.
7. Attractiveness and comfort – The project creates a safe and secure environment for vulnerable and new bike riders of all ages and abilities (for example, physical separation from traffic).
8. Project feasibility and deliverability – Project can be delivered within required timeframes and has adequately addressed relevant project obstacles, including alignment of designs with the ATIP Technical Requirements.

The minimum design elements required at the OA stage / concept stage include:

- General horizontal alignment
- Typical cross section/s
- Proposed crossing/intersection treatments
- Identification of major structures (if applicable)
- Identification of significant Public Utility Plant (PUP) conflicts
- Identify connections to pedestrian and cycle network and attractors
- Identify general lighting requirements (intersection/mid-block)
- Consideration of conflicts and crossfall at driveways

Refer to TMR's *Program Guidelines – Cycle Network Local Government Grants* for further details.

2.3 Project justification

During the inception phase of the project, Council prepared a summary of the key issues and project benefits that had been identified in consultation with stakeholders. This document can be found in Appendix A, but has also been summarised within this section of the report.

2.3.1 Issues

The following issues were identified within the study area:

- Lack of connectivity through and within Kangaroo Point Peninsula resulting in underutilisation of public and active transport networks.
- Limited public access to important services & destinations resulting in exclusive / isolated amenities and low foot traffic to local businesses.
- Ambiguous / lack of identified active transport routes with many conflict points increasing the risk of crashes for all road users.
- Limited route options with comfortable grades and environment, reducing accessibility and comfort for people of all ages and abilities.
- Complex tenure arrangements of public infrastructure results in a lack of control over maintenance and improvements to the level of service required.

2.3.2 Needs

The priority needs and associated requirements within the study area are summarised in Table 1.

Table 1: Priority needs and requirements

Priority needs	Requirements
Improve connectivity and route choice.	Increase connectivity to the active transport, public transport and road networks.
Improve access to and within the Kangaroo Point Peninsula.	
Improve legibility to encourage use.	Achieve a comfortable, consistent, and continuous active transport route which minimises delays for users.
Improve continuity of active transport route.	
Minimise conflict points.	
Improve comfort for people of all ages and abilities.	
Improve ability to control service quality of infrastructure.	Address the rehabilitation/upgrade of deteriorating infrastructure.

2.3.3 Benefits

The following potential benefits were identified for the project:

- Reduced risk of crashes and injuries.
- Increased active transport network integration.
- Increased utilisation and return on investment in this and other assets.
- Increased access to bus and ferry networks.
- Improved community vibrancy, amenity & local business viability.
- Reduced dependence on private vehicle travel.
- Increased connectivity to and within Kangaroo Point Peninsula, as well as improved connectivity to existing and planned infrastructure (such as the Kangaroo Point Green Bridge, the Main Street and Deakin Street connection, and the upgrades to Mowbray Park).

2.4 Project principles

BCC Transport Planning and Operations (TPO) identified several essential and desirable criteria for the project, as summarised in Table 2.

Table 2: Project criteria (BCC TPO)

Essential criteria	Desirable criteria
Connect: Does the route connect key major destinations as per the primary network route principles?	Continuous/ coherent/ comfortable: Does the route follow an alignment that is relatively flat with the least number of interruptions (road crossings, traffic signals)?
Direct: Does the route provide a direct and legible connection between key destinations?	Vibrant/ attractive: Is the route visually attractive (e.g. does it engage with surrounding land uses/parks) and are there opportunities to provide shading?
Safe/ accessible/ inclusive: Does the route follow an alignment that is safe (avoid high speed and high volume corridors with high numbers of conflict points) that cannot be addressed through design solution?	Secure (CPTED): Does the route follow an alignment with good casual surveillance for users at all times of the day?

3. Route alignment options

It was agreed with Council that the MCA process would seek to identify two preferred options:

1. An ultimate route alignment with a long-term delivery horizon (targeting a continuous delivery program but noting that projects of larger scale and complexity may take multiple years to progress from planning, through detailed design and construction before opening for use).
2. An interim route alignment that can be delivered in the short-term, but importantly has legacy benefits to form part of the active transport network in the area once the ultimate route alignment is finalised.

This phase of the project is focussed on identifying a preferred route alignment option and does not consider in detail the specific location within the corridor or type of treatment for the active transport facility. However, there has been a high-level consideration for potential facility types to ensure the feasibility of alignment options has been considered to inform MCA scoring.

Several potential route alignment options were developed based on the findings from the *Strategic Context Working Paper*^{NR}. The following principles were used to guide the development of the options:

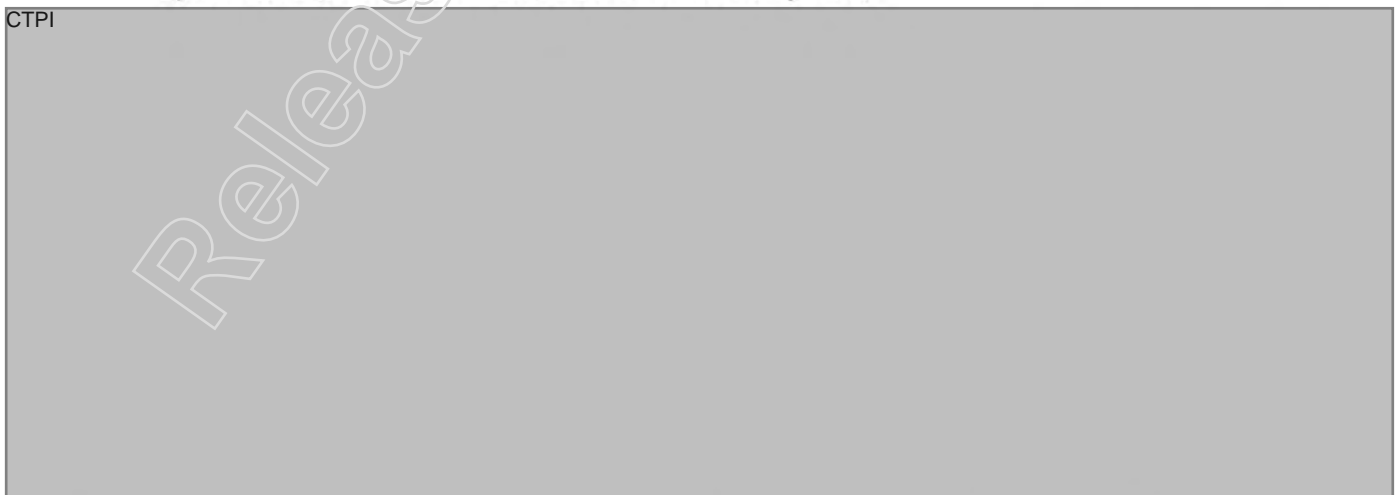
- Council's project objectives for the Kangaroo Point Riverwalk.
- Desire lines, key attractors and public transport locations.
- Terrain, roadside infrastructure, existing path facilities and other constraints.
- Land and property considerations – utilising publicly owned land where possible.
- Connection to existing and future active transport facilities.

Potential minor connections have also been identified for some of the route alignment options. However, these have not been incorporated into the MCA process as they are intended to supplement the preferred option, rather than form an option in their own right. It is noted that after the preferred options are chosen, some of the route alignment options may become minor connections.

3.1 Study area options

The route alignment options discussed in this section of the report are illustrated in Appendix B. The common start (in the north) and end (in the south) of the alignment options are listed below:

- Start: Deakin Street and Ferry Street intersection, joining the future separated cycle track from the underpass connecting to the Kangaroo Point Green Bridge on the western side of Deakin Street.
- End: Park Avenue and Lytton Road intersection, connecting to the existing 3.0m shared path on Lytton Road (on the south-western corner of Mowbray Park).

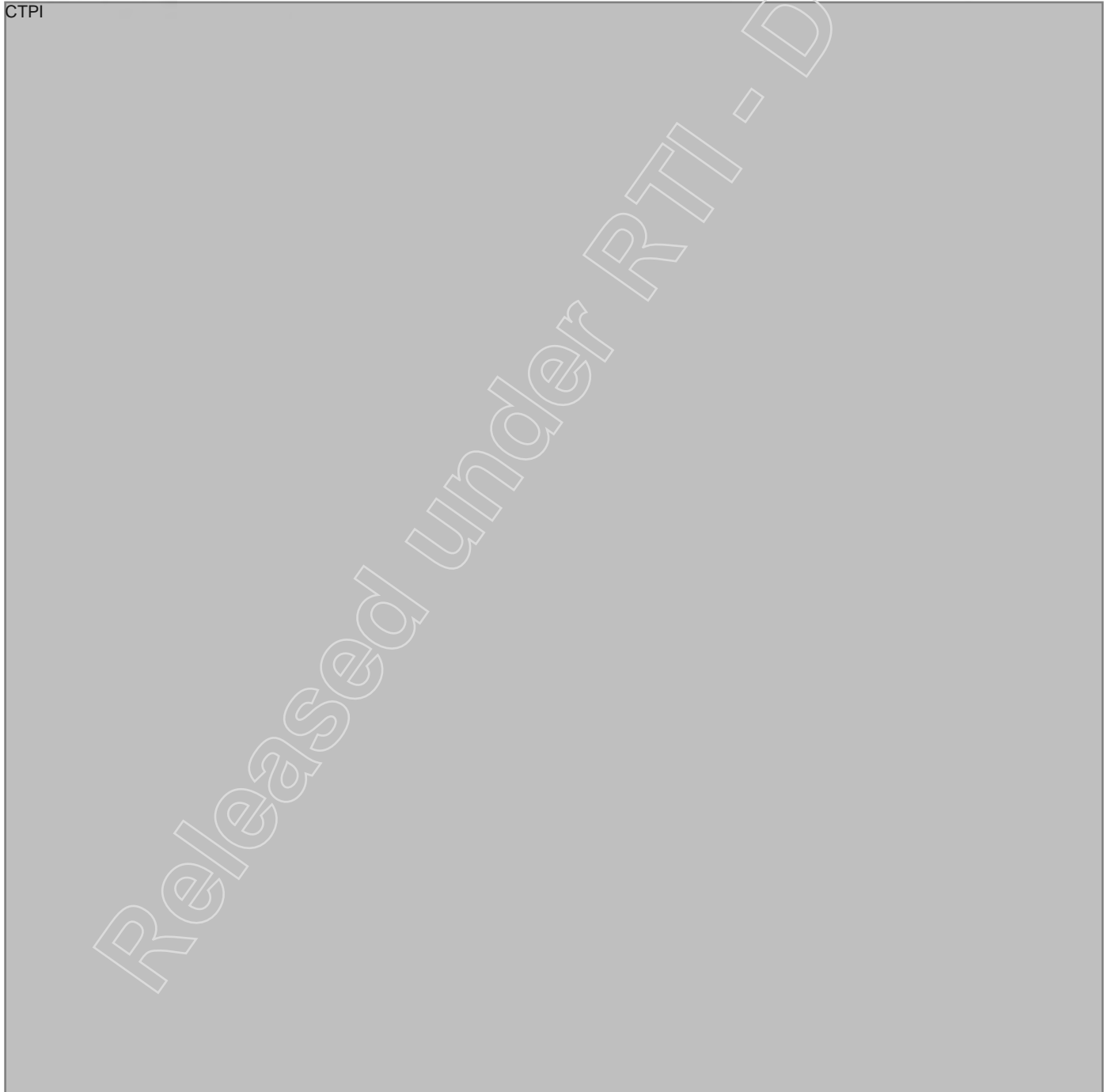


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3.2 Mowbray Park options

As part of the investigation of route alignment options, Arup were requested to explore potential alignment options through Mowbray Park to connect into the separated cycle track along Lytton Road. Four options were investigated and compared in terms of their viability with respect to the key considerations for the project. A summary PowerPoint presentation was prepared and presented / issued to the BCC Parks Team for consideration.



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4. Planning, environment and cultural heritage

4.1 Planning, land use and property

4.1.1 Methodology

This section documents a high-level summary of the planning and land use considerations used to identify existing planning opportunities and constraints associated with the proposed route alignment options within the study area. The following steps were undertaken as a part of the investigation process:

- A review of the current zoning map, provided by BCC through the City Plan 2014, accessed on 21 December 2022.
- A review of aerial imagery, provided by BCC, accessed on 29 November 2022.
- A review of land titles easement information, provided by BCC on 1 August 2022, accessed on 2 December 2022.
- A review of property ownership information, accessed from Pricerunner, accessed 30 November 2022.
- A review of land tenure, provided by BCC, accessed on 22 December 2022.
- A review of development applications, provided by BCC through Development.i. on 28 January 2022, accessed on 29 November 2022.

4.1.2 Overview of existing environment

From a zoning perspective, the study area is predominantly identified within the high density residential (up to 15 storeys, HDR2) zone. It is also characterised by several other zones including special purposes (utility services, SP4), sport and recreation (district, SR2), open space (district, OS2 and metropolitan, OS3), specialised centre (marina, SC6), mixed use (inner city, MU1) and community facilities (community purposes, CF4).

From a tenure and ownership perspective, the study area generally comprises of freehold land, reserve, road, and unallocated state land (within the river). Many easements are identified across the study area for various purposes including cabling, access or vehicular right of way and drainage.

4.1.3 Opportunities and constraints

Potential opportunities and constraints associated with the route alignment options were assessed to identify ways in which existing land use attributes could support the development of the project. The findings from this assessment have been documented in Appendix C.

The most critical opportunities and constraints within the study are shown in Figure 4, with green circles representing opportunities and red circles representing constraints. In general, the most prevalent indicator for potential opportunities was land being owned by BCC, which may be utilised as part of the active transport network.

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4.2 Environment and cultural heritage

In the *Strategic Context Working Paper* ^{NR} [redacted] Arup reviewed the *Initial Planning and Environmental Advice (high level)* completed by Brisbane City Council, and conducted a desktop review of public, State and Commonwealth databases to assist in determining ecological attributes with the potential to occur within proximity of the project area. The review identified environmental constraints and provided advice for the permits/approvals that may be required for the project, which are likely to include the following:

- Development approval for operational works for removal, destruction, or damage of marine plants (grey mangrove).
- Development approval for tidal works.
- Development approval for interfering with quarry material on State coastal land above high-water mark.
- Network access permit for Urban Utilities.
- Consultation with Council in accordance with the *Memorandum of Understanding: Early Engagement on Possible Tree Removals*.
- Early notification to the Program Planning and Integration (PPI) City Standards is required to be undertaken during the design stage for any planned vegetation clearing activities.

Other permits and approvals may be required, such as contaminated land and acid sulfate soils, pending final design of the project areas. Air, noise, water quality, erosion and sediment control, biosecurity (fire ants / weeds) and waste will need to be considered as the design progresses. Management of these aspects will need to be considered during the construction phase and must be incorporated as part of the Environmental Management Plan (EMP).

Refer to Section 4 in the *Strategic Context Working Paper* ^{NR} [redacted] for more details.

5. Urban design and architecture

Potential alignments within the study area were reviewed from an urban design and architecture perspective. The complete review can be found in Appendix D, with a summary provided in Table 6.

Table 6: Urban design and architecture review

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6. Stormwater, flooding and maritime

As part of the Strategic Assessment phase of the project, stormwater, flooding and maritime considerations have been assessed.

The outcomes of this review are included in an updated revision of the Stormwater, Flooding and Maritime Technical Note (Appendix E). The key findings have been summarised in Table 7.

Table 7: Stormwater, flooding and maritime review

Discipline	Observations
Stormwater	<p>In general, the existing runoff is captured by gully pits in the existing road corridor.</p> <p>On the existing promenades runoff is either discharged via scuppers or sheet flow into the Brisbane River.</p> <p>Modifications to existing kerbs will need to account for changes to flow conditions. It may be preferable to provide an on-road separated cycle track instead of widening an existing verge, as this allows the existing kerb and channel (and associated kerb inlet pits) to be retained.</p>
Flooding	<p>Based on Arup's experience with similar projects on the Brisbane River, the afflux associated with a fully in-river structure could be in the order of 10-30mm and could possibly affect a considerable portion of the river and floodplain upstream of the structure.</p> <p>Reducing the in-river structure to the northern extents of the riverwalk (adjacent O'Connell Street) could significantly reduce the afflux. Not only would the in-river structure be almost halved, but it would also be in an area where the peak flood velocities are marginally lower.</p> <p>On-embankment options fully contained to the existing riverbank without any protrusion into the river would have negligible impacts to the current flood behaviour / flood risk on the Brisbane River.</p> <p>The flood heights to be adopted on this project are:</p> <ul style="list-style-type: none"> • 10% AEP = 1.75m AHD • 1% AEP = 3.85m AHD
Maritime	<p>In-river options are generally aligned with existing pontoons and are therefore unlikely to have a significant impact on vessel navigation. To maintain access to these pontoons, it is recommended to relocate (or provide new pontoons) seaward of the proposed riverwalk. Access to these pontoons would be via gangway from the riverwalk and then fixed span to the residential pontoons (similar to existing situation at New Farm Riverwalk on the adjacent side of the river).</p> <p>A riverwalk constructed adjacent to the riverbank is unlikely to have any significant impact on vessel navigation in the river. However, with this option access to the existing pontoons (and any potential future) pontoons would need to be maintained.</p> <p>It is not likely to be practical to provide a fixed span across the mouth of the former Dry Dock that has sufficient air draft clearance for yachts (which are likely to require air draft clearance of 15-18m). It is noted that Dockside Marina already has multiple berths along the river (with no air draft restrictions) and that only relatively small vessels can use the former Dry Dock due to its relatively narrow width. There could be an option for the berths in the former Dry Dock to be used by power vessels that only require a relatively small air draft clearance. However, this would reduce the potential revenue that Dockside Marina might be able to generate from leasing the berths and therefore might not be acceptable to Dockside Marina. Alternatively, an opening span would be required. However, there are several aspects that need to be taken into account when considering this option (refer to Appendix E for details).</p>

7. Route assessment criteria

7.1 Criteria considerations

As described in Section 2, the following aspects were considered when developing the assessment criteria:

- The finding from the *Strategic Context Working Paper* ^{NR} [redacted]
- The requirements of the Cycle Network Local Government Grants Program.
- The key issues, needs and benefits from the project, as identified by BCC and key stakeholders.
- The project principles as identified by BCC TPO.

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8. Multi-criteria analysis

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9. Post-MCA assessments

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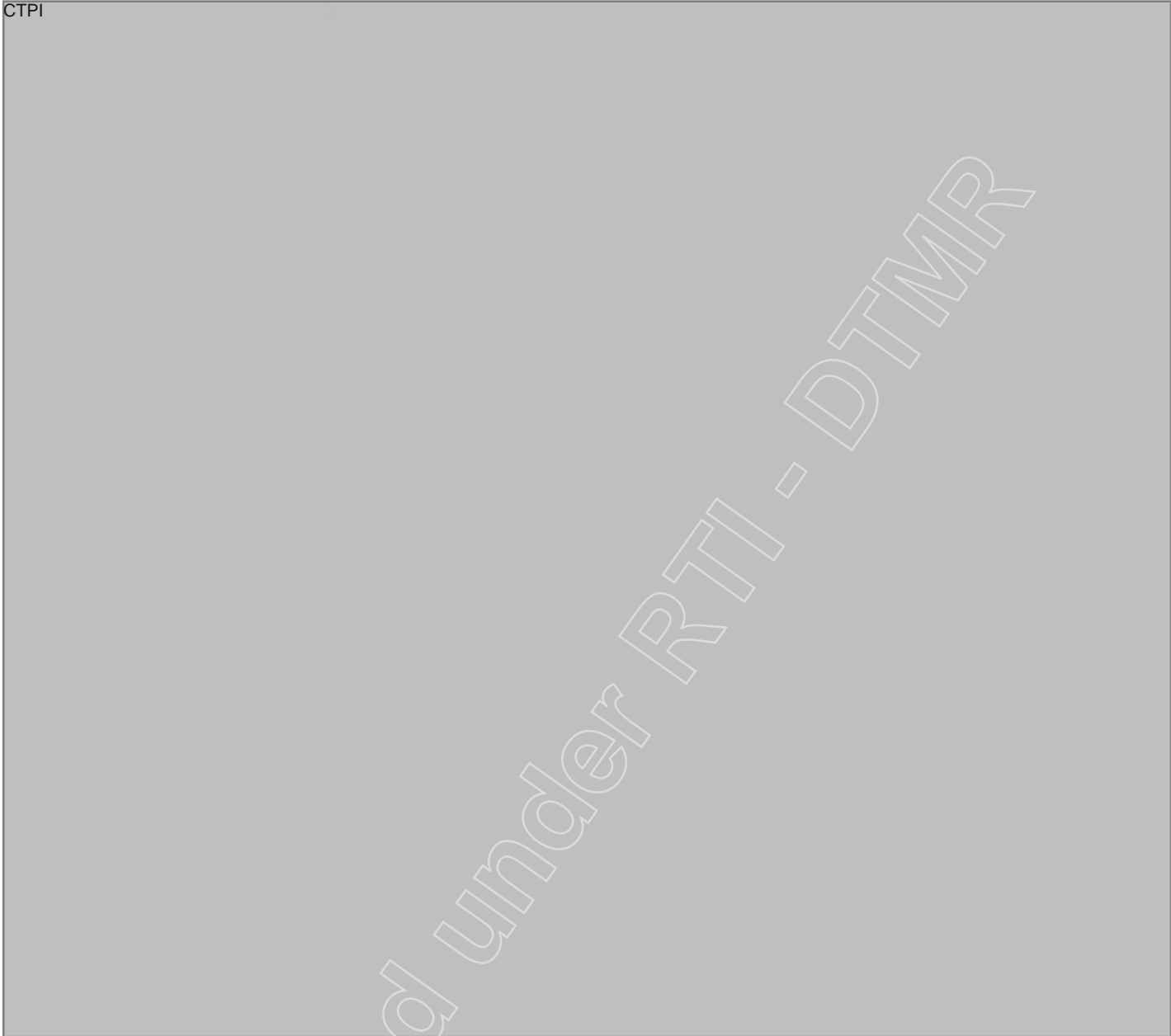
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10. Summary



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Appendix A – Problems identification and project benefits (BCC, 2022)

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Appendix B – Options shortlist sketch

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Appendix C – Planning, land use and property review

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Appendix D – Urban design and architecture review

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Appendix E – Stormwater, Flooding and Maritime Technical Note

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Appendix F – MCA scoring

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Appendix G – MCA results

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Appendix H – MCA selected options sketch

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Appendix I – Dockside alternative options sketch

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Appendix J – Deakin Street interim option sketch

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Appendix K – Options for the intersection of Main Street, Deakin Street and Cairns Street

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B.2 Problems identification and project benefits

Appendix A of the *Strategic Assessment Working Paper* ^{NR}



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B.3 Options shortlist sketch

Appendix B of the *Strategic Assessment Working Paper*

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B.4 Planning, land use and property review

Appendix C of the *Strategic Assessment Working Paper*

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B.5 Urban design and architecture review

Appendix D of the *Strategic Assessment Working Paper*

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B.6 Stormwater, Flooding and Maritime Technical Note

Appendix E of the *Strategic Assessment Working Paper*

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Brisbane City Council

Kangaroo Point Riverwalk Options Analysis and Concept Design

Stormwater, Flooding and Maritime Technical Note

Reference: NR [redacted]

Rev 2 | 9 January 2023



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Job number: NR [redacted]

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1. Introduction

Arup has been commissioned by Brisbane City Council (BCC) to undertake the Options Analysis and Concept Design for the Kangaroo Point Riverwalk project, to connect Captain Burke Park (Kangaroo Point) and Mowbray Park (East Brisbane) with a continuous link catering to cyclists, pedestrians and other active transport modes. This project aims to address the “missing link” in the existing cycling and pedestrian network, as identified by the cycling community, the Department of Transport and Main Roads (TMR) and BCC.

1.1 Purpose of report

The purpose of this report is to provide an assessment of stormwater, flooding and maritime considerations for the project. The assessment is based on information received to date from Council’s Flood Management Unit, as well as information obtained from desktop studies and site visits.

This report builds upon the preliminary assessment that was carried out during the Strategic Context phase of the project to provide a more detailed review of the options that were considered during the Strategic Assessment phase.

1.2 Glossary

Table 1 summarises a list of abbreviations used throughout this report.

Table 1: Abbreviations

Abbreviation	Description
AEP	Annual Exceedance Probability
AGRD	Austrroads Guide to Road Design
ARR	Australian Rainfall & Runoff
BCC	Brisbane City Council
CD	Concept Design
OA	Options Analysis
QUDM	Queensland Urban Drainage Manual
SEQ	South-East Queensland
TMR	Department of Transport and Main Roads

2. Project understanding

2.1 Study purpose

The study shall develop a preferred walking and riding connection between Frank Nicklin Dry Dock (Kangaroo Point) and Mowbray Park (East Brisbane), and between Frank Nicklin Dry Dock and the future Deakin Street underpass. The project will maximise access and return on investment from the Kangaroo Point Green bridge by providing a key connection to the Deakin Street underpass access and fill a critical gap in the active transport network. The study will also identify enhancement opportunities for the existing Riverwalk between Captain Burke Park and Frank Nicklin Dry Dock. It is essential that options cater for e-mobility use under the current road rules.

The study will comprehend the current and future issues, constraints, and opportunities, and determine prospective infrastructure upgrade solutions for the study area. The study will then develop a concept design for the recommended upgrade options with high level cost-benefit analysis. The conclusions will be used to inform TMR and Council's forward program, project prioritisation and determine the requirements for the next stages of planning and design.

The purpose of the study is to:

- Improve the safety of all road users through the introduction of infrastructure for pedestrians (including wheelchairs, prams etc.), cyclists and e-mobility users which is separated from road vehicles.
- Improve pedestrian, cyclist, and e-mobility access through the provision of a high-quality facility that connects to the surrounding active and public transport network. The facility shall establish a continuous walking and riding connection between Frank Nicklin Dry Dock, Kangaroo Point and Mowbray Park, East Brisbane, and between Frank Nicklin Dry Dock and the future Deakin Street underpass. The study will also identify enhancement opportunities for the existing Riverwalk between Captain Burke Park and Frank Nicklin Dry Dock.
- Limit impact on transport network efficiency through the consideration of all modes in current and future scenarios.
- Complement the public transport network to ensure multi-modal connectivity is supported.

2.2 Delivery objectives and milestones

To achieve the purpose of the study, BCC has defined the following key objectives and milestones:

- Ensure that suitable options for the Riverwalk are recommended, which appropriately address the key challenges identified by Council and the project team.
- Review existing planning, projects, and data.
- Consider existing and future active transport needs.
- Identify and review network gaps, deficiencies, opportunities, and constraints, including mapping.
- Develop up to three treatment options for active transport facilities to address the needs of all users.
- Prepare a multi-criteria analysis (MCA) to determine the preferred option(s).
- Prepare high-level concept plans and cost estimates for the preferred option(s), including land requirements.
- Recommend staged project delivery options, including identification of "quick wins" that could be delivered within a timeframe of 1-2 years, subject to funding.

2.3 Background

Over the past decade, BCC has released strategies specific to Kangaroo Point, such as the *River's Edge Strategy*, the *Kangaroo Point Peninsula Draft Renewal Strategy* and the *Kangaroo Point Peninsula Neighbourhood Plan*. These documents outline the community's desire for increased active transport connectivity along the Kangaroo Point peninsula and surrounding inner-city precincts. This has created an opportunity to improve the existing network and deliver new infrastructure.

Through the strategies mentioned above, a missing active transport link has been identified between the Frank Nicklin Dry Dock and Mowbray Park. The Kangaroo Point Riverwalk project aims to address the missing link through improved access and activity along the Brisbane River. The project also aims to identify opportunities for enhancement along the existing riverwalk section between Captain Burke Park and the Frank Nicklin Dry Dock, as well as developing a connection to the Kangaroo Point Green Bridge project via Cairns Street and Deakin Street.

2.4 Study area

The study area spans from Captain Burke Park in Kangaroo Point to Mowbray Park in East Brisbane and is divided into three extents, as shown in Figure 1.

- *Study extent A* represents the missing link in the active transport network, between Frank Nicklin Dry Dock to Mowbray Park (and the existing active transport facility along Lytton Road). The project aims to provide a continuous active transport facility between these areas and to the broader active transport network.
- *Study extent B* represents the existing Kangaroo Point Riverwalk between Captain Burke Park and the Frank Nicklin Dry Dock. The project seeks to identify opportunities for enhancements to the existing infrastructure.
- *Study extent C* represents the link between the Kangaroo Point Riverwalk project to the future Kangaroo Point Green Bridge via the Deakin Street / Main Street active transport underpass, which is currently under construction.



Figure 1: Study area extent (BCC, 2022)

3. Stormwater assessment

3.1 Stormwater considerations

Existing drainage infrastructure is generally present throughout the study area. This assessment assumes all existing drainage infrastructure is sized appropriately according to BCC City Plan requirements to convey stormwater away from the road network.

The current drainage treatments and conditions along the riverside throughout the study area vary significantly in some instances, which may in part be due to the current ownership and maintenance arrangements along the riverfront. That is, currently body corporates are responsible for the stretch of riverside promenade that coincides with the promenade adjacent to their buildings. The variety of different owners and the varying levels of maintenance applied would likely account for much of the differing treatments observed. For example, Figure 2 below from Study extents A and B respectively shows two very different promenade treatments. The timber decking would allow almost immediate runoff with water draining between decking boards (but would pose a slipping hazard for cyclists), whilst the other treatment is impermeable with sheet flow across the path and into the river.

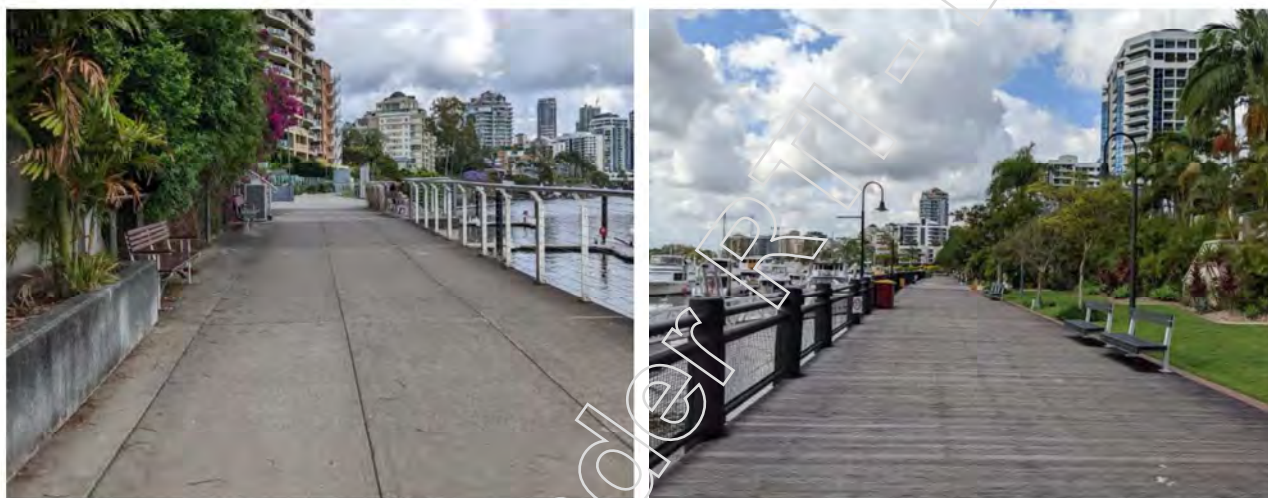


Figure 2: Example riverside treatment for Study extent A (left) & Study extent B (right)

3.1.1 Study extent A

The shared path treatment along the riverside through Study extent A primarily consists of exposed aggregate and stainless-steel balustrading allowing water to sheet flow directly from the path down into the river as can be seen in Appendix A.1.2. Several retaining walls are also present adjacent to the path in this section, with no weep-holes present suggesting subsoil drainage behind the retaining structures discharges into the existing drainage network.

The elevated properties adjacent to the riverwalk also mean that ramps are located in some sections to give the public access from street level down onto the promenade, an example of this can be seen in Figure 3. On main thoroughfares with high pedestrian/cyclist traffic you might expect to see some drainage measure at the top of the ramp to capture excess stormwater and prevent excessive flows down the ramp as seen in Appendix A.2.1. Note that the ramp in Figure 3 below to access the Mowbray Park ferry, does not have a grated trench drain.

For existing footpath throughout the study area, particularly along Lytton Road and Shafston Avenue (refer to), the verge from the property boundary to the back of kerb appears to have crossfall from the property boundary back towards the kerb, as you would typically expect. This means that currently stormwater runoff from the verge is captured in gully pits along the carriageway.



Figure 3: Ramp to promenade – Mowbray Park Ferry



Figure 4: Existing verge crossfall – Shafston Ave

Figure 5 shows the presence of a gully pit on the upstream side of a pedestrian/cyclist crossing across Thorn Street. This is typical of what you would expect to see upstream of a kerb ramp and crossing point in highly trafficked areas to maintain acceptable flow widths and velocities through the crossing point (consistent with QUDM requirements). However, there are several crossings that were observed to not follow this measure of ‘best practice’, which may be acceptable based on design rainfall events, maximum flow widths and velocities. Crossings at Castlebar Road and a pedestrian crossing at a signalised intersection at Wellington Road were observed with no upstream gully pits before the crossing (Appendix A.1.3 and A.1.4).



Figure 5: Kerb ramp with gully pit

3.1.2 Study extent B

Study extent B has a mix of riverside treatments, from timber decking through to impermeable exposed aggregate shared path bordered by either stainless steel balustrade (Figure 6) or concrete nib walls (Figure 7). The sections of promenade that are hard bordered by concrete nib walls have low points adjacent to the wall where field inlets are located capturing stormwater and then discharging to the Brisbane River. The degree of debris blocking these field inlets varies significantly along the promenade. Some level of regular maintenance is clearly required at some of these locations to remove debris. Where there is no nib wall next to the path (e.g. steel balustrade) the site assessment suggests stormwater sheet-flows across the path and discharges into the river. There are also several green spaces and garden beds present along this section of the river providing opportunity to capture some of the stormwater, which would be especially relevant in minor storm events reducing the amount of flow across the shared path.



Figure 6: Riverside with steel balustrade



Figure 7: Riverside with concrete wall and blocked inlet

There were also ramps from street level down to the promenade, with grated trench drains being provided at the top of some observed ramps (refer Appendix A.2.1), which is consistent with best design practice for ramps on major pedestrian and cyclist routes.

3.1.3 Study extent C

Similar to Study extent A, the existing footpaths and verge from the property boundary to the back of kerb appears to have crossfall from the property boundary back towards the kerb, as you would typically expect. This means that currently stormwater runoff from the verge is captured in gully pits along the carriageway. Additionally, the verge and footpaths along Cairns Street appear to have significant long-fall, which will also assist in the swift removal of stormwater from footpaths/verges, refer Appendix A.3.1. A spoon drain is also present at the northern end of Lambert Street at the Cairns Street intersection (Appendix A.3.2). Drains of these types are typically present at intersections of crowned roads and can be challenging to maintain. The presence of this drain may also impact rider comfort for any on-road cycle facility.

At the eastern end of Cairns Street cul-de-sac near Dockside, there is a concrete channel present which discharges stormwater captured from the road surface and surrounding verge into the Brisbane River. Figure 8 shows the concrete channel which has severe cracking and movement across the channel surface and at the construction joints where the channel ties into the adjacent kerb. There also appears to be some kind of obstruction at the end of the channel, just before the point of discharge. The condition of this channel will further degrade with time.



Figure 8: Concrete channel

4. Flooding assessment

4.1 Available data

4.1.1 Brisbane River Catchment Flood Study (BRCFS)

The Brisbane River Catchment Flood Study (BRCFS) was undertaken following the major floods which occurred 2011 and was completed in 2017. The flood study was a collaborative effort between multiple councils in SEQ and multiple consultants.

The BRCFS is a complex regional flood study, which utilises a Monte Carlo / Joint Probability analysis to derive design flood behaviours. This approach is required within the Brisbane River Catchment as result of the variability in dam levels and tidal conditions which can have significant impact on the catchment response to rainfall.

Due to the large number of runs required to satisfy the Monte Carlo approach, a “Fast Model” was developed. This model utilised a one-dimensional schematisation only and was used to simulate approximately 12,000 event scenarios. Once specific events were selected from the suite of simulated events, they were simulated through the “Detailed Model” which utilised a one-dimensional / two-dimensional dynamically linked model.

The model results for the 10% AEP event and 1% AEP event from the detailed model (sourced from BCC) have been utilised for the assessment of existing flood behaviours within the project area. Specifically, height, depth and velocity results have been utilised for this assessment.

4.1.2 Indooroopilly Riverwalk

Arup was engaged by BCC to undertake the detailed design of the Indooroopilly Riverwalk. As part of this project flood modelling was undertaken to inform the likely afflux which would be a consequence of the proposed structure.

As a result of this work, Arup has strong understanding of the potential blockage that an in-river pedestrian structure would incur as well as the extent and magnitude of the corresponding flooding impacts.

4.1.3 Green Bridges cumulative impact assessment

Arup was engaged by BCC to undertake a cumulative impact assessment of the network of Green Bridges proposed across the Brisbane River and Breakfast Creek.

As part of these works, Arup undertook a model development task where all new river structures including ferry terminals and pontoons/riverwalks that are part of the River Access Network were included. Undertaking this task throughout the entire river reach has provided an understanding of the typical afflux extents seen through construction of structures which interact with the fringes of the main river channel.

4.2 Flooding behaviours

4.2.1 Baseline flooding conditions

Utilising the flood grids obtained from the BRCFS model, peak flood levels and velocities have been extracted for the project at various cross sections for the 10% AEP and 1% AEP events. For reference a 1% AEP flood velocity map with relevant cross section locations is shown in Figure 9.

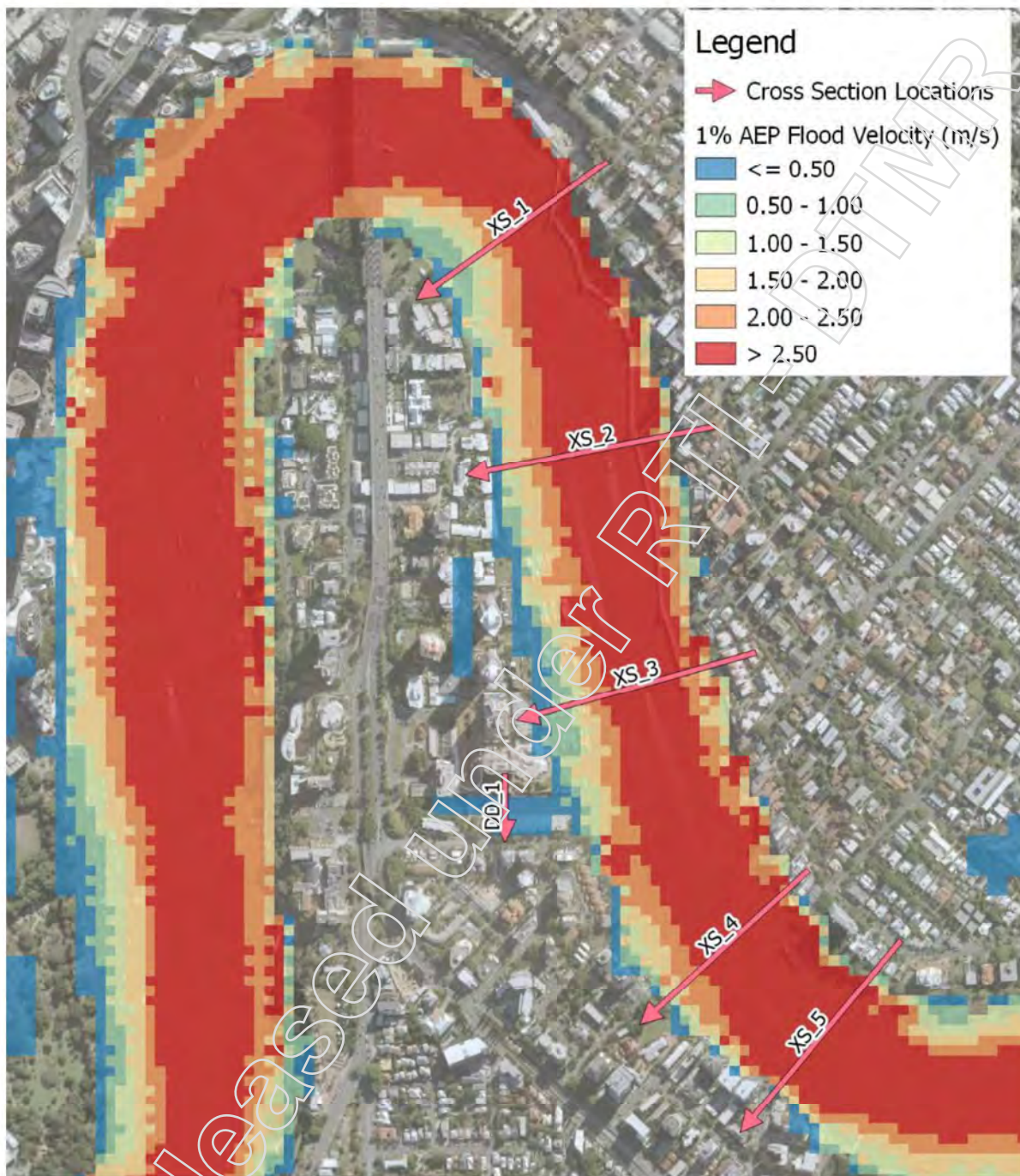


Figure 9: 1% AEP Peak Flood Velocity

Flood heights and velocities are shown in Figure 10 through to Figure 15. Note that the sections are relevant to various study extents as per the following list and the cross section chainages run from the left bank (New Farm) to the right bank (Kangaroo Point):

- Study extent A – XS4, XS5
- Study extent B – XS1, XS2, XS3
- Study extent C – DD1

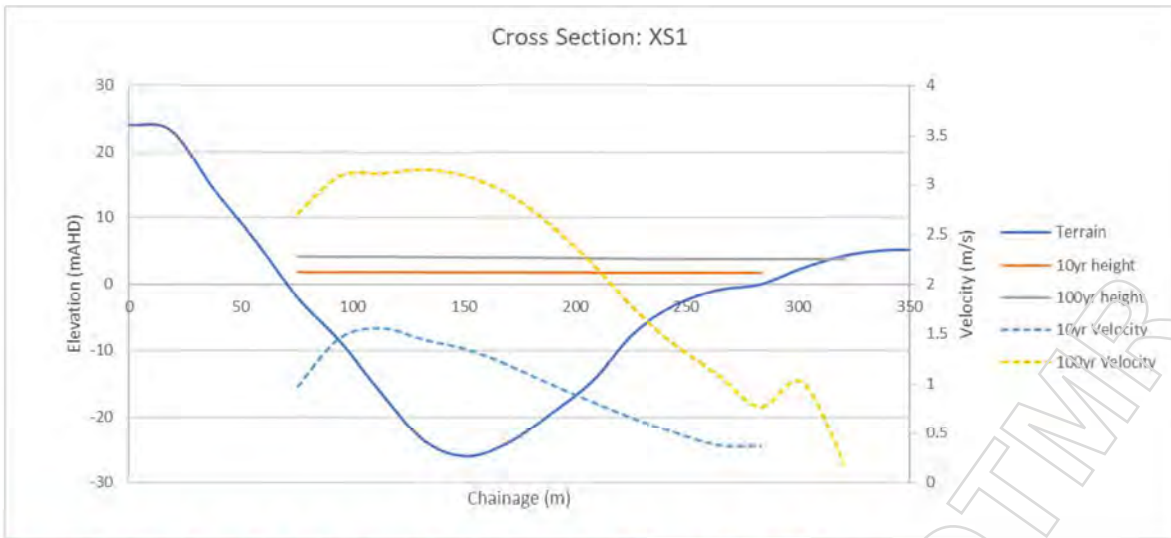


Figure 10: XS1 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events

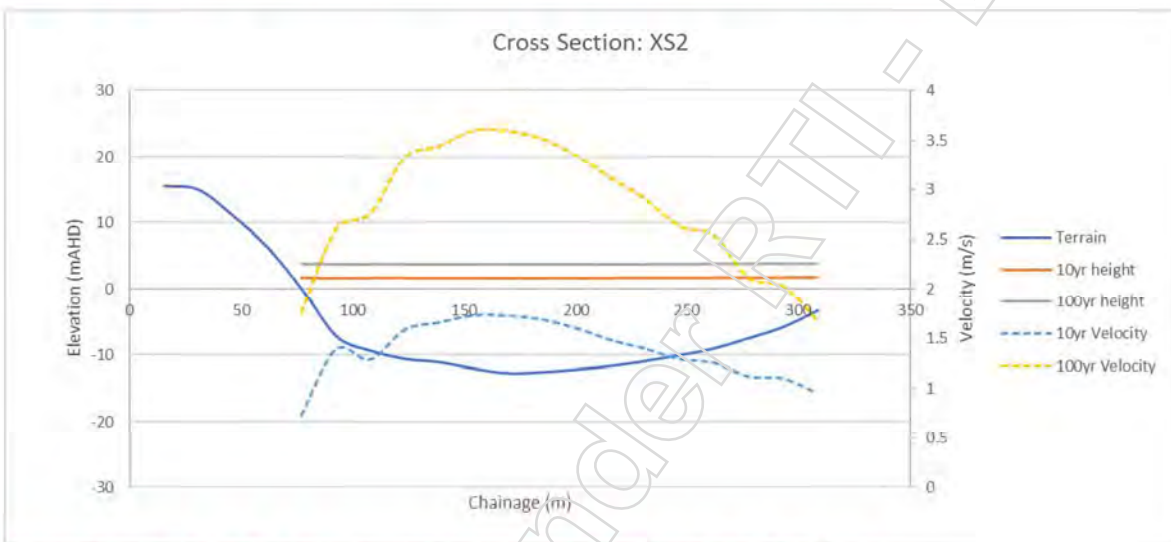


Figure 11: XS2 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events

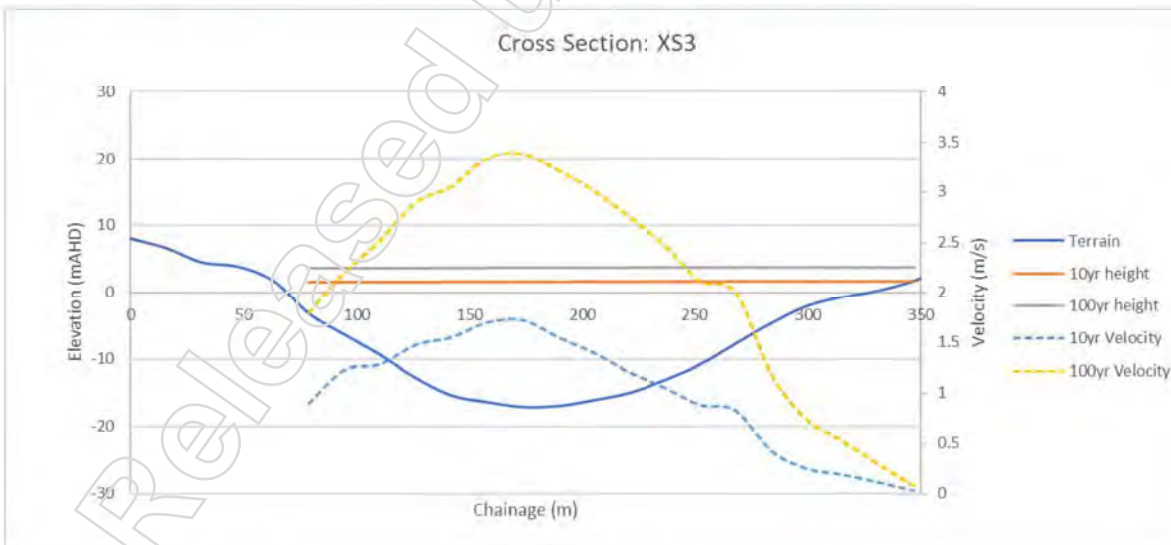


Figure 12: XS3 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events

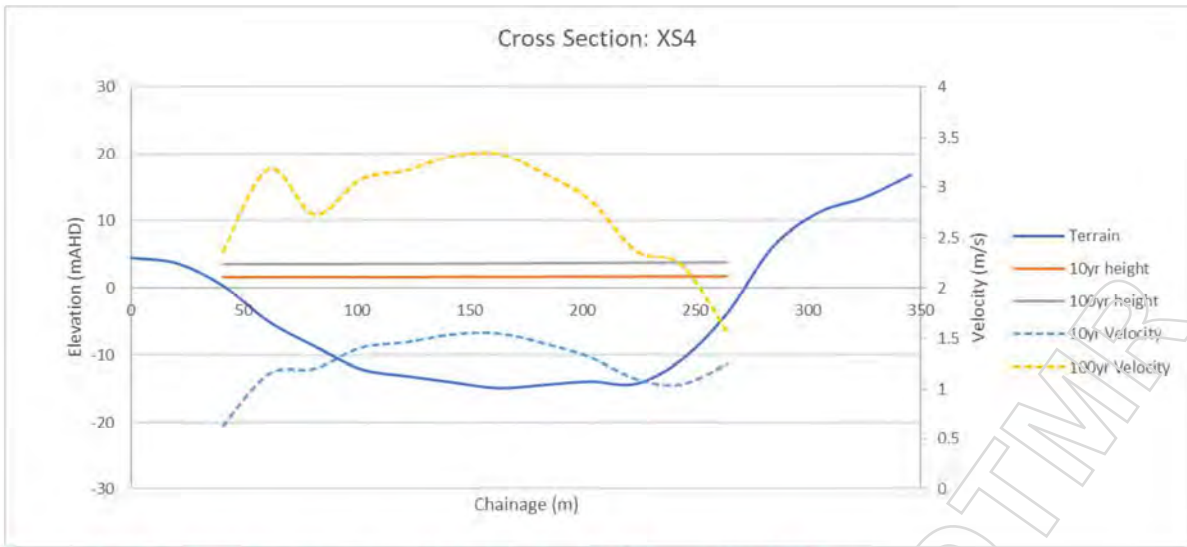


Figure 13: XS4 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events

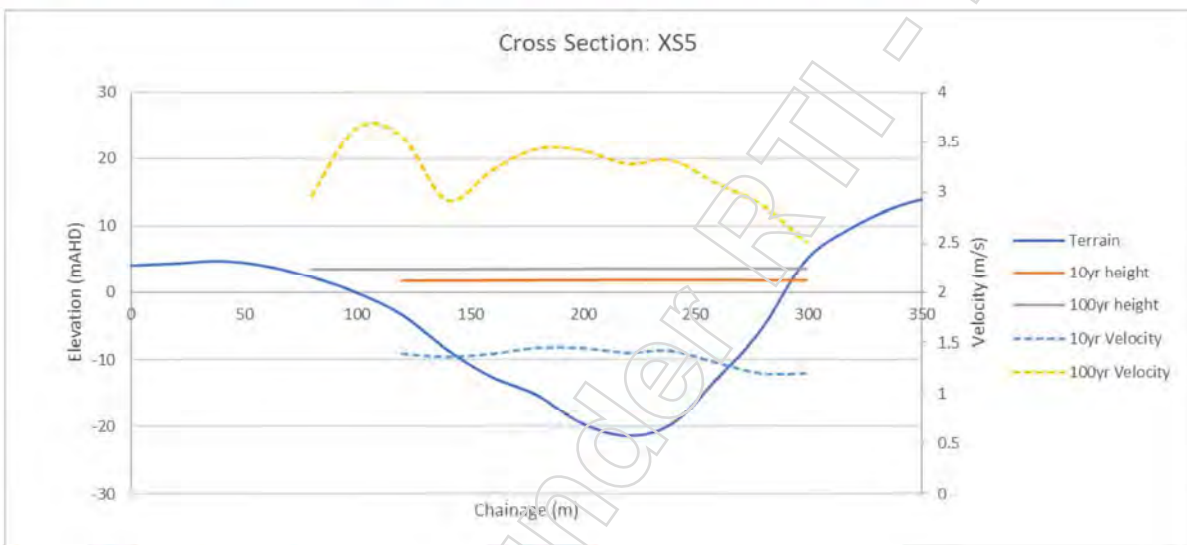


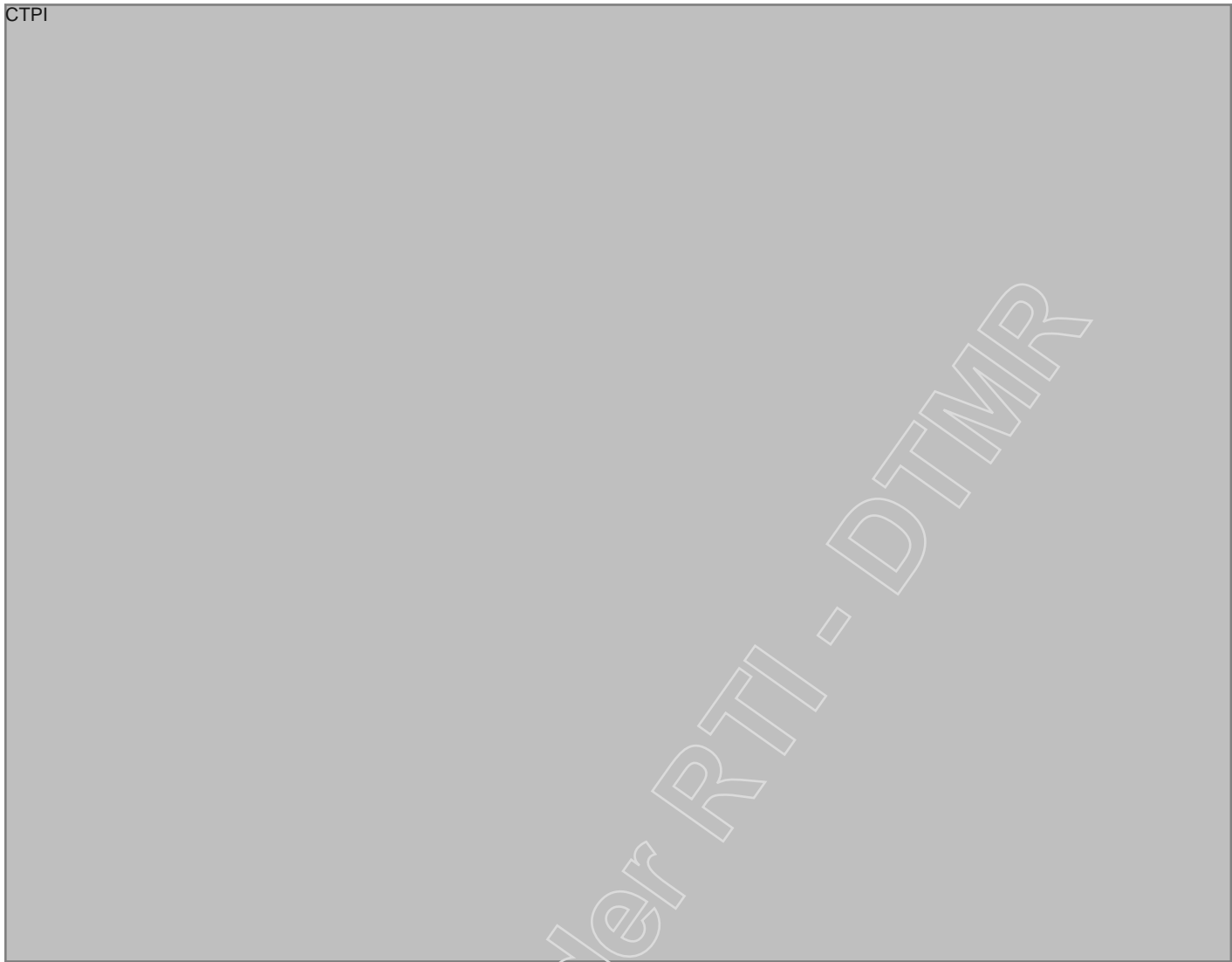
Figure 14: XS5 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events



Figure 15: DD1 – Peak Flood Level and Velocities for 1% AEP and 10% AEP Events

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5. Maritime assessment

5.1 Maritime considerations

5.1.1 Study extent A

The maritime considerations in Study extent A include:

- Various existing marinas and pontoons
- Existing vessel traffic
- BCC Ferry Terminals (including Dockside, Mowbray Park and Sydney Street)

There are various existing privately-owned marinas and pontoons located in Study extent A, as shown in Figure 17. The most notable of these is Castlebar Cove Marina, which has capacity to berth 13 vessels.



Figure 17: Existing privately owned pontoons and Sydney Street Ferry Terminal (Google)

Access to the pontoons in the upstream (northern) end is directly from private residences. Access to the pontoons in the downstream (southern) end involves crossing the existing boardwalk. As shown in Figure 18, this is either via locked gates or underpass.



Figure 18: Access to existing pontoons via locked gate (Mon Reve, left) and underpass (Dundrenan Residences, right)

Existing vessels on the Brisbane River include:

- BCC passenger CityCat and inner city CityHopper ferry services
- Commercial vessels (including passenger charter vessels)
- Recreational vessels
- Passive craft (non-power-driven vessels such as rowing boats, canoes and kayaks)

The most common vessel on the Brisbane River in this vicinity is the BCC passenger CityCat and inner city CityHopper ferry services. The Sydney Street Ferry Terminal is located on the opposite side of the river to Study extent A and will be a significant constraint for any in-river riverwalk options as these will result in a reduction of the navigation channel width. The Dockside and Mowbray Park ferry terminals are located at either end of Study extent A. Ferry manoeuvring to these terminals will need to be considered for any in-river riverwalk options.

The upper harbour limit for Brisbane is located downstream of the site and commercial vessels are generally limited to passenger charter vessels and occasional construction barges.

5.1.2 Former Dry Dock

Some of the active transport route options proposed involve constructing a bridge over the entrance to Evan Deakin/Frank Nicklin Dry Dock (referred to in this section as the former Dry Dock) to remove the need to divert along Cairns Street to Ferryman’s Bridge.

Evan Deakin/Frank Nicklin Dry Dock was original constructed for Hugh Moar in 1884 and is listed on the Local Heritage register¹. The use of the former Dry Dock has varied over the years with the latest use being as a marina for small recreational vessels as part of the Dockside, as shown in Figure 19. As shown in Figure 21, the majority of the berths in the existing marina are 10m long berths. However, this marina has been removed in recent years and the former Dry Dock site is currently vacant. As shown in Figure 20, the existing marina piles are still present, however all of the pontoons have been removed. It is understood that Dockside Marina are intending to construct a new marina in the future, however no details of this proposed marina are known.

Assuming that the layout of the proposed marina is similar to the previous marina and due to the limited width of the former dry dock, it assumed that vessels would likely be in the order of 8-12m. Power boats with a length of 12m are likely to have an air draft of approximately 4 to 7m. Yachts with a length of 12m are likely to have an air draft of 15-18m.

¹ BCC Local Heritage Places. Heritage Citation: Evans Deakin Dry Dock (former). Accessed on 10th November 2022.

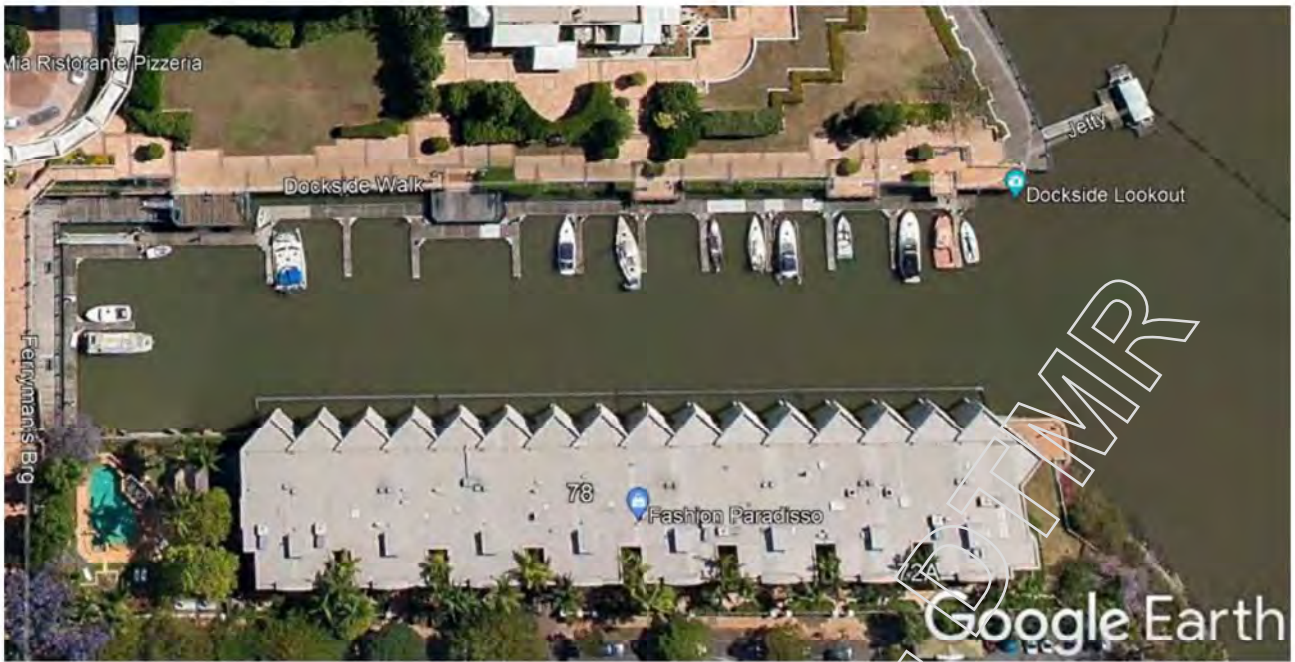


Figure 19: Dry Dock Marina layout in 2012 (Google)



Figure 20: Existing condition of the former Dry Dock

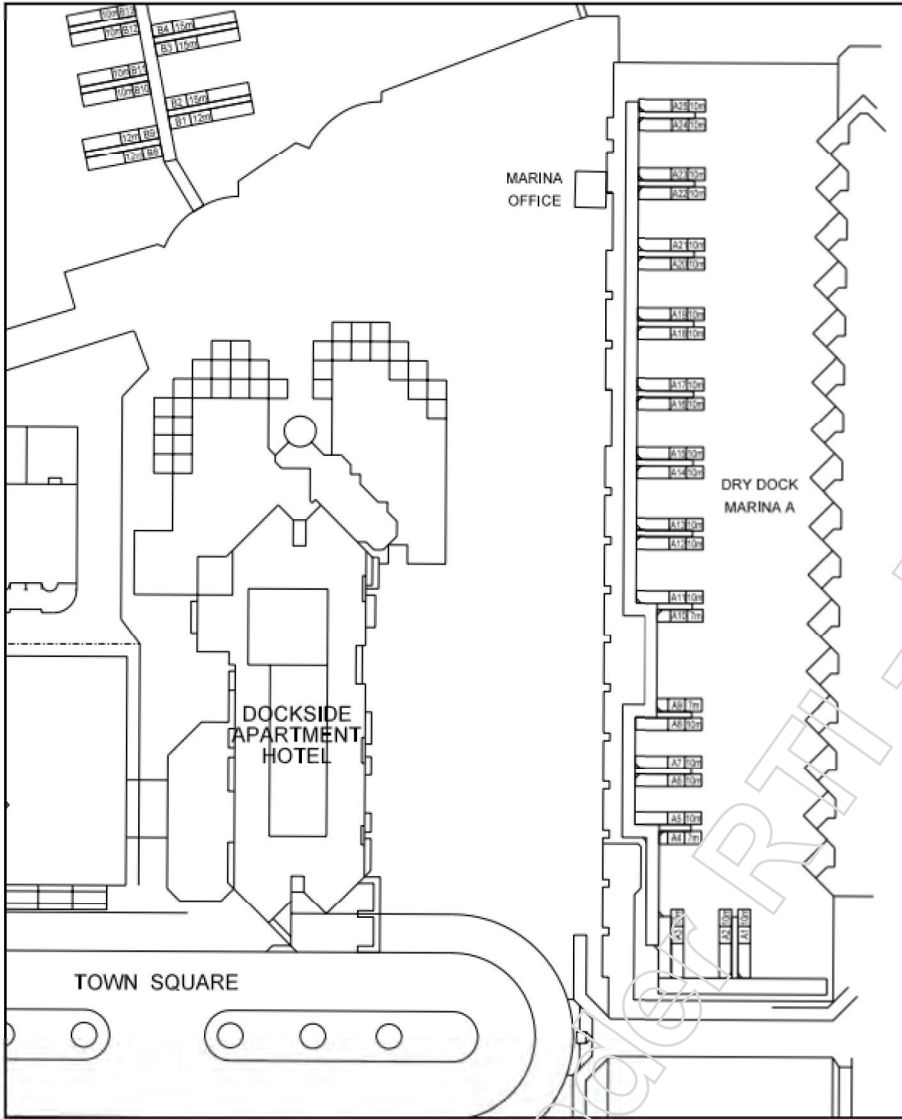


Figure 21: Existing Docks Marina Plan (Docks Marina)

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Appendix A – Stormwater assessment site photos

A.1 Study extent A

A.1.1



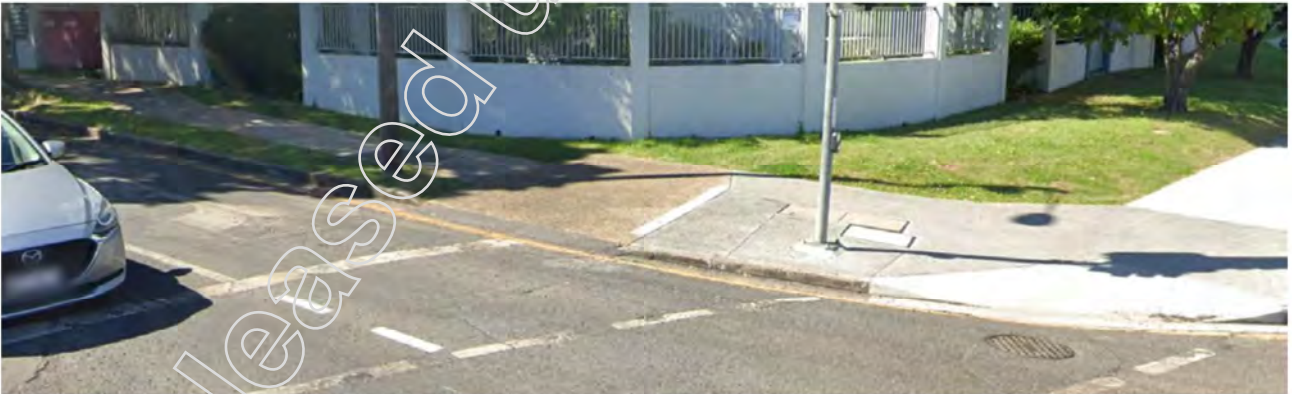
Grassed verge along Lytton Road providing opportunity for runoff from minor storm events to be naturally captured whilst slowing down any sheet flow that may occur.

A.1.2



Typical promenade treatment exposed aggregate, stainless steel balustrade and raised adjacent blocks with retaining walls present.

A.1.3



Wellington Road²: No gully pit present on upstream side of signalised pedestrian crossing.

² Source: *Google Maps 2022*

A.1.4



Castlebar Street: No gully pit present on upstream side of kerb ramp and crossing. Gully pit present on downstream side.

A.2 Study extent B

A.2.1



Grated trench drain present at the top of the ramp down onto the promenade (end of Rotherham Street).

A.3 Study extent C

A.3.1



Cairns Street: View of the vertical grades present along Cairns St.

A.3.2



Lambert Street / Cairns Street intersection: Spoon drain.

B.7 MCA scoring

Appendix F of the *Strategic Assessment Working Paper* (

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B.8 MCA results

Appendix G of the *Strategic Assessment Working Paper*

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B.9 MCA selected options sketch

Appendix H of the *Strategic Assessment Working Paper*

NR

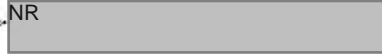
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B.10 Dockside alternative options sketch

Appendix I of the *Strategic Assessment Working Paper* ^{NR}



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B.11 Deakin Street interim option sketch

Appendix J of the *Strategic Assessment Working Paper* NR



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B.12 Options for the intersection of Main Street, Deakin Street and Cairns Street

Appendix K of the *Strategic Assessment Working Paper* ^{NR}



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Appendix C – Technical assessment

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C.1 Technical Assessment Working Paper

The appendices of the *Technical Assessment Working Paper* have been removed and collated within Appendix C of this report.

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Brisbane City Council

Kangaroo Point Riverwalk Options Analysis and Concept Design

Technical Assessment Working Paper

Reference NR [Redacted]

Rev 2 | 23 June 2023



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Job number NR [Redacted]

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1. Introduction

Arup has been commissioned by Brisbane City Council (BCC) to undertake the Options Analysis (OA) and Concept Design (CD) for the Kangaroo Point Riverwalk project, to connect Captain Burke Park (Kangaroo Point) and Mowbray Park (East Brisbane) with a continuous link catering to cyclists, pedestrians and other active transport modes. This project aims to address the “missing link” in the existing cycling and pedestrian network, as identified by the cycling community, the Department of Transport and Main Roads (TMR) and BCC.

1.1 Study purpose

TMR and BCC are committed to providing safe cycling infrastructure to encourage mode shift towards more sustainable modes of transport. Council is currently completing the draft Active Transport Network Plan (ATNP), a review of Brisbane’s Bicycle Network Overlay in City Plan, to improve network connectivity and safety. Through this review and from feedback received from the cycling community, TMR and BCC are aware of a “missing link” in the network of existing cycling infrastructure between Kangaroo Point and East Brisbane. The Kangaroo Point community requires new infrastructure to improve connectivity for all active transport modes and encourage sustainable travel within a rapidly changing inner city region.

The Kangaroo Point Riverwalk has committed funding within the 2020-2024 State budget and the project is listed in Queensland Transport and Roads Investment Program (QTRIP) as a high priority project to “fill pathway network gaps to create an unbroken bike and pedestrian path between Captain Burke Park, Kangaroo Point and Mowbray Park, East Brisbane”.

The study shall develop a preferred walking and riding connection between Frank Nicklin Dry Dock (Kangaroo Point) and Mowbray Park (East Brisbane), and between Frank Nicklin Dry Dock and the future Deakin Street underpass, which links to the Kangaroo Point Green bridge which is currently under construction. The project will maximise access and return on investment from the Kangaroo Point Green bridge by providing a key connection to the Deakin Street underpass access and fill a critical gap in the active transport network. The study will also identify enhancement opportunities for the existing promenade from Park Avenue at Mowbray Park to the north for approximately 240m towards the Frank Nicklin Dry Dock. It is essential that options cater for e-mobility use under the current road rules.

The study will comprehend the current and future issues, constraints, and opportunities, and determine prospective infrastructure upgrade solutions for the study area. The study will then develop a concept design for the recommended upgrade options with high level cost-benefit analysis. The conclusions will be used to inform TMR and Council’s forward program, project prioritisation and determine the requirements for the next stages of planning and design.

The purpose of the study is to:

- Improve the safety of all road users through the introduction of infrastructure for pedestrians (including wheelchairs, prams etc.), cyclists and e-mobility users which is separated from road vehicles.
- Improve pedestrian, cyclist, and e-mobility access through the provision of a high-quality facility that connects to the surrounding active and public transport network. The facility shall establish a continuous walking and riding connection between Frank Nicklin Dry Dock, Kangaroo Point and Mowbray Park, East Brisbane, and between Frank Nicklin Dry Dock and the future Deakin Street underpass. The study will also identify enhancement opportunities for the existing promenade from Park Avenue at Mowbray Park to the north towards the Frank Nicklin Dry Dock.
- Limit impact on transport network efficiency through the consideration of all modes in current and future scenarios.
- Complement the public transport network to ensure multi-modal connectivity is supported.

1.2 Delivery objectives and milestones

To achieve the purpose of the study, BCC has defined the following key delivery objectives and milestones:

- Ensure that suitable options for the Riverwalk are recommended, which appropriately address the key challenges identified by Council and the project team.
- Review existing planning, projects, and data.
- Consider existing and future active transport needs.
- Identify and review network gaps, deficiencies, opportunities, and constraints, including mapping.
- Develop up to three treatment options for active transport facilities to address the needs of all users.
- Prepare a multi-criteria analysis (MCA) to determine the preferred option(s).
- Prepare high-level concept plans and cost estimates for the preferred option(s), including land requirements.
- Recommend staged project delivery options, including identification of “quick wins” that could be delivered within a timeframe of 1-2 years, subject to funding.

1.3 Background

Over the past decade, BCC has released strategies specific to Kangaroo Point, such as the *River's Edge Strategy*, the *Kangaroo Point Peninsula Draft Renewal Strategy*, and the *Kangaroo Point Peninsula Neighbourhood Plan*. These documents outline the community's desire for increased active transport connectivity along the Kangaroo Point Peninsula and surrounding inner-city precincts. This has created an opportunity to improve the existing network and deliver new infrastructure.

Through the strategies mentioned above, a missing active transport link has been identified between the Frank Nicklin Dry Dock and Mowbray Park. The Kangaroo Point Riverwalk project aims to address the missing link through improved access and activity along the Brisbane River. The project also aims to identify opportunities for enhancement along the existing promenade section from Park Avenue at Mowbray Park to the north towards the Frank Nicklin Dry Dock, as well as developing a connection to the Kangaroo Point Green Bridge project via Cairns Street and Deakin Street. Further opportunities for enhancing the existing promenade between Captain Burke Park and the Frank Nicklin Dry Dock will also be identified.

1.4 Study area

The study area spans from Captain Burke Park in Kangaroo Point to Mowbray Park in East Brisbane and is divided into three extents, as shown in Figure 1:

- *Study extent A* represents the missing link in the active transport network, between Frank Nicklin Dry Dock to Mowbray Park (and the existing active transport facility along Lytton Road). The project aims to provide a continuous active transport facility between these areas and to the broader active transport network.
- *Study extent B* represents the existing Kangaroo Point Riverwalk between Captain Burke Park and the Frank Nicklin Dry Dock. The project seeks to identify opportunities for enhancements to the existing infrastructure.
- *Study extent C* represents the link between the Kangaroo Point Riverwalk project to the future Kangaroo Point Green Bridge via the Deakin Street / Main Street active transport underpass, which is currently under construction.



Figure 1: Study area extent (BCC, 2022)

1.5 Purpose of report

The Kangaroo Point Riverwalk project has four phases, as listed below.

- Phase 1: Strategic context
- Phase 2: Strategic assessment
- Phase 3: Technical assessment (current phase of project)
- Phase 4: Options analysis report

The purpose of this Technical Assessment Working Paper is to:

1. Further develop the preferred option identified in the Strategic Assessment phase to produce a Concept Design sufficient to inform costing and delivery strategies.
2. Review the key constraints to inform the preferred option concept design development, including environment, cultural heritage, flooding, safety, and public utility plant.
3. Capture the process of concept design development and identify aspects requiring further investigation in future delivery stages.
4. Review feedback from key stakeholders on the concept design and provide designer responses to stakeholder comments.
5. Define a staged delivery strategy for the project.
6. Include details of the cost estimate, including risks and staging.
7. Collate all findings from the Technical Assessment phase of the project.

2. Environment and cultural heritage

An update of the environment and cultural heritage review for the project has been completed in Table 1. This section provides a more concise review of the background review findings from the environmental advice of the Kangaroo Point Riverwalk study areas. The same desktop assessment results obtained in the initial background review findings (refer to *Strategic Context Working Paper* NR [redacted]) were used in this review.

Table 1 summarises the key environmental advice and permits that may be required for the project. Overall, the following permits and approvals are likely to be required for the project:

- Development approval for operational works for removal, destruction, or damage of marine plants.
- Development approval for tidal works.
- Development approval for interfering with quarry material on State coastal land above high-water mark.
- Network access permit for Urban Utilities.
- Consultation with Council in accordance with the Memorandum of Understanding: Early Engagement on Possible Tree Removals.
- Early notification to the Program Planning and Integration (PPI) City Standards is required to be undertaken during the design stage for any planned vegetation clearing activities.

Other permits and approvals may be required, such as contaminated land and acid sulfate soils, pending final design of the project areas. Air, noise, water quality, erosion and sediment control, biosecurity (fire ants / weeds) and waste will need to be considered as the design progresses. Management of these aspects will need to be considered during the construction phase and must be incorporated as part of the Environmental Management Plan (EMP).

Table 1: Environmental requirements and advice

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[Redacted Table Content]

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3. Flooding

The surface level of the Kangaroo Point Riverwalk meets a 10% AEP immunity, with most of the bridge soffit also being clear of the flood surface. There are only two spans where the flood surface is against the bridge soffit, however, this is due the tie-in levels of the existing surface. The two locations where the soffit is marginally below the 10% AEP flood level is at Castlebar Cover and the northern side of the Dry Dock (Riverside Promenade).

A TUFLOW model has been developed for the Kangaroo Point Riverwalk based upon the Brisbane River Catchment Flood Study (BRCFS). The BRCFS model is a catchment-wide flood model with a 30m grid size. To assess the proposed concept design more reliably, this model has been trimmed and refined to simulate on a 10m grid size.

The trimmed model was utilised to simulate both the 1% Annual Exceedance Probability (AEP) and 5% AEP events for both the existing case and design case scenarios. The results from the simulations have been used to produce peak afflux grids for both events.

The peak afflux results observed for the 5% AEP events indicate that the proposed riverwalk has negligible impacts on flood behaviours in minor events based upon its current design. However, the peak afflux results observed for the 1% AEP event indicates that there is a potential for minor afflux on a small number of properties located either at the southern end of the New Farm Riverwalk, or on Kangaroo Point opposite Eagle Street Pier. This afflux is minor, in the order of 10-12mm, and can likely be mitigated in subsequent design stages.

Details of the flood modelling have been included in a technical note, which can be found in Appendix A.

4. Safety

4.1 Road safety audit

A road safety audit (RSA) of the existing conditions was conducted in early November 2022 with the objective to identify foreseeable hazards for all users. The RSA process placed a particular focus on the reduction in fatal and serious injuries (FSI).

The RSA identified hazards across the whole study area of the project. Where the hazards were located within the proposed alignment, measures were instigated to reduce the likelihood or severity of the risk. The designer responses to the hazards are recorded in the road safety audit in Appendix B.

The Road Safety Audit team also identified several existing hazards which are located outside of the extents of the proposed works. These additional risk items require further consideration by Council to consider treatments as part of regular maintenance and operations.

A summary of the hazards identified within the proposed alignment as having a high-risk rating are shown in Table 2.

Table 2: High risks from road safety audit

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4.2 Safety in design

A safety in design (SiD) assessment is required under occupational health and safety legislation and is an important aspect of the design reviews undertaken by the project team to identify and mitigate safety risks associated with the proposed works at any of the stages of the assets' life, construction, operation and decommissioning. The intention of this legislation is to ensure that hazards and risks that may exist in the design of a workplace are eliminated or controlled at the design stage, so far as reasonably practicable. Several project participants, including clients, have a role to fulfil regarding safety on the project generally. Regardless of whether there is a legislated requirement for SiD in place, there is a requirement to provide a workplace that is safe and without risk as far as reasonably practicable.

This SiD review has focused on unusual aspects of the design which may involve unusual hazards or may require unusual risk controls to eliminate or minimise the risk. It is assumed that hazards that can be adequately addressed by applying solutions/guidelines in existing standards (e.g. code requirements) and that specific industry guidelines have been addressed via adoption of the relevant standards and guidelines.

A SiD workshop was held on 14 February 2023. Participants included key project staff across BCC, TMR and Arup. The outcomes of the review are recorded in the Safety in Design register in Appendix C.

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5. Public utility plant

5.1 Impacts

A Before You Dig Australia (BYDA) search was carried out on 10 February 2023 to understand which public utility authorities (PUAs) have assets within the study area. Due to the large size of the study area, the BYDA search was split into two sub-areas (north and south of Cairns Street). The combined maps from the BYDA search can be found in Appendix D.

Once a preferred alignment was chosen, it was reviewed against the data from BYDA to assess potential impacts to public utility plant (PUP) and where possible to adjust the design to avoid potential impacts. This was compared against site photos and Google Street View to correlate surface features (i.e. pits, manholes, chambers, valves etc.) with the information from BYDA. Potential impacts to PUP have been reviewed and summarised in a register, which can be found in Appendix E. Due to the large size of the study area, the register was split up into the following locations: Deakin Street, Cairns Street, Park Avenue, Shafston Avenue and the Riverwalk.

The following categories were used to assign the expected level of impact to PUP:

- Category 0 – No impact. Asset is believed to be beyond the extents of the project, and as such no impact is anticipated.
- Category 1 – Minor. Asset is located within the project extents and is likely to require protection.
- Category 2 – Major. Asset is located within the project extents and will have multiple pits/chambers/valves affected by the works.
- Category 3 – Critical. Asset is located within the project extents and is likely to require relocation.

The assets with potentially major or critical impacts have been summarised in Table 3. For more details refer to Appendix E. In future stages of the project there will be a need to conduct a survey of Quality Level A and/or B to verify these impacts and identify additional ones.

Table 3: PUP impacts

Location	PUA	Type	Category	Details
Cairns St	BCC	Stormwater	3 - Critical	Stormwater drain and outlet at end of Cairns St. Pipe diameter 225mm, material PVC. Drainage headwall material precast concrete. New pipe to be connected to existing manhole.
Cairns St	Energex	Electricity	2 - Major	Energex owns assets below 33kV along Cairns St. Overhead electrical wires present. Planned future work at intersection of Cairns St and Deakin St. Approximately 2-3 electrical pits will have to be reconstructed to new surface level on Cairns St. 3 electrical green boys will have to be relocated.
Cairns St	NBN	Telecoms	2 - Major	Minor underground assets at Cairns St connecting to Deakin St and Lambert St. Assumed major impact as approximately 2-3 pits and 1 manhole to be reconstructed to new surface level.
Cairns St	Telstra	Telecoms	2 - Major	Main cable located at northern end of Cairns St near Shafston Ave and Cairns St intersection. Main cable connects and runs along Lambert St. Assumed major impact as 3 pits and 2 chambers to be reconstructed to new surface level.
Riverwalk	Energex	Electricity	2 - Major	Energex underground asset under 33kV, running beneath river beyond Cairns St. Advised by Energex that the asset is dead, but there may still be a need to retain it for redundancy.

Location	PUA	Type	Category	Details
Deakin St	APA	Gas	2 - Major	High pressure pipes running along Deakin St connecting to Cairns St and Shafston Ave (63mm PE pipe in 100mm cast iron enveloper). The kerb realignment of Deakin Street will reduce the cover of the asset, which could result in the need to relocate it within the verge.
Deakin St	Urban Utilities	Potable water	2 - Major	Water infrastructure (225mm diameter main) running along Deakin St and connecting to Shafston Ave and Cairns St. 4 valves and 4 hydrants will be affected.
Deakin St	BCC	Stormwater	2 - Major	Stormwater drain connections in verge of Deakin St connecting to Shafston Ave. Main connections in middle of Deakin Rd. Drainage network will be affected by new stormwater pipes and modifications to existing pits.
Deakin St	Telstra	Telecoms	2 - Major	Major conduit bank located at intersection between Deakin St and Cairns St. Some pits may require relocation as part of the changes to the kerb alignment on Deakin Street.
Park Ave	BCC	Stormwater	2 - Major	Stormwater drain pipes running along Park Ave connecting to Lytton Rd. Drainage network will be affected by new stormwater pipes and modifications to existing pits.
Park Ave	NBN	Telecoms	2 - Major	Minor underground assets at west road verge running along Park Ave. Assumed major impact as approximately 4 pits to be reconstructed to new surface level.
Park Ave	Optus	Telecoms	2 - Major	Assumed major impact as 2 manhole/pits on Park Ave to be reconstructed to new surface level.
Park Ave	Telstra	Telecoms	2 - Major	Main cable located at western road verge near Park Ave and Shafston Ave intersection. Assumed major impact as approximately 8-10 pits to be reconstructed to new surface level.
Park Ave	Energex	Electricity	2 - Major	1 electrical green boy on Park Ave to be relocated.
Shafston Ave	APA	Gas	2 - Major	APA has critical high-pressure pipes and priority mains behind pipes along Shafston Ave. 63mm polyethylene pipe in 100mm cast iron casing 90mm polyethylene pipe in 150mm cast iron casing. Several valves will be affected due to reconstruction of footpath.
Shafston Ave	BCC	Stormwater	2 - Major	Stormwater drain pipes and gully pits running along Shafston Ave. New stormwater pipes will require connection to existing manholes. Existing chamber lids to be raised to new surface levels.
Shafston Ave	Energex	Electricity	2 - Major	Energex underground assets below 33kV present at both sides of Shafston Ave. Approximately 7 pits will have to be reconstructed to new surface level, 2 electrical green boys will have to be relocated.
Shafston Ave	Urban Utilities	Potable Water	2 - Major	Water infrastructure (225/300mm diameter main) running along Shafston Ave, connecting to O'Connell St, Castlebar St, Park Ave and Lytton Rd. Several valves and hydrants affected.
Shafston Ave	NBN	Telecoms	2 - Major	Minor underground assets and manholes at road verge running along Shafston Ave. Assumed major impact as approximately 6 pits and 1 manhole to be reconstructed to new surface level.
Shafston Ave	Optus	Telecoms	2 - Major	Optus owns fibre optic cables running along Shafston Ave to the intersection of Rawlins St and then connecting into Rawlins St. Assumed major impact as approximately 5 manholes/pits to be reconstructed/raised to new surface level.
Shafston Ave	Telstra	Telecoms	2 - Major	Some main cables located along Shafston Ave from Thorn St to Park Ave. Assumed major impact as approximately 17 pits and 5 chambers to be reconstructed to new surface level.

5.2 Meetings

Contact was made with all PUAs whose assets are anticipated to be affected (i.e. those categorised as minor, major and critical). Of the nine PUAs contacted, five requested a meeting to be briefed on the project and to understand the potential impact to their assets. Minutes from the meetings held with APA, Energex, Telstra, Optus and Uecomm can be found in Appendix F. The remaining four PUAs either did not respond, advised that their assets are located within other PUA infrastructure or confirmed that the project was at too early a stage of delivery to require further consultation.

A summary of the correspondence with the affected PUAs is provided in Table 4. Contact details have been included for future stages of the project.

Table 4: PUP meetings

PUA	Type	Meeting date	Notes
APA	Gas	19 May 2023	<p>Meeting held with NR (Technical Officer Third Party Engagement). Key things to note:</p> <ul style="list-style-type: none"> The Deakin Street realignment near Cairns Street will impact the existing gas asset. There may be a need to relocate it to be within the verge. Gas main along Shafston Avenue appears to generally be against the property boundary and is believed to be inside a cast iron enveloper. Gas main appears to run beneath the existing footpath on Shafston Avenue service road, which will be removed and landscaped as part of the project. APA have requested to not have any trees in this area. In future stages of the project, a PUP conflict register is to be provided to APA summarising the anticipated impacts to their assets. Potholing is generally required to inform this register. <p>Contact: NR @apa.com.au</p>
BCC	Stormwater	N/A	<p>BCC's Planning and Design team shall be contacted in the next stage of the project once the proposed drainage design has been detailed.</p> <p>Contact: Mehdi Beiki - mehdi.beiki@brisbane.qld.gov.au</p>
Energex	Electricity	9 May 2023	<p>Meeting held with NR (Senior Customer Project Technical Officer). Key things to note:</p> <ul style="list-style-type: none"> Cables crossing beneath the river at the end of Cairns Street are believed to be decommissioned. In the next project phase, there will be a need to submit project details via the Energex portal so that it can have project ID assigned to it. Due to the anticipated long timescale of the project, a job register will be required in the portal to ensure continuity. Energex will likely create a work order to obtain an external consultant to assist with the volume of anticipated work. <p>Contact: NR @energyq.com.au</p>
NBN	Telecoms	N/A	<p>NBN advised that their assets are located within Telstra conduits, and as such advised that a meeting with them was not required.</p> <p>Contact: dbyd@nbnc.com.au</p>
Optus and Uecomm	Telecoms	6 April 2023	<p>Meeting held with NR (Uecomm Senior Manager Network) and NR (Optus Senior Project Engineer). Key things to note:</p> <ul style="list-style-type: none"> Uecomm cables are all within Telstra conduits along the project extents. Optus also has cables in the Telstra conduits, but they have their own pits and conduits on Deakin St, Cairns St, O'Connell St, Lambert St, Castlebar St, Shafston Ave, Thorn St and Park Ave. <p>Contacts: NR @optus.com.au NR @optus.com.au</p>

PUA	Type	Meeting date	Notes
Telstra	Telecoms	10 May 2023	<p>Meeting held with NR (Senior Project Specialist). Key things to note:</p> <ul style="list-style-type: none"> The western side of Deakin Street has several Telstra conduits. Based on the critical nature of these assets, it is recommended that no structural changes are made to this side of the street. There are also several potential clashes at the Deakin and Cairns St intersection. Survey Quality Level A (i.e. potholing) is recommended for conduits along Deakin and Cairns Street. Wellington Road has several assets on the western and eastern side. Survey Quality Level A is recommended to pick up the conduits around the intersection modification with Shafston Avenue. There will likely be some assets beneath the relocated bus stop on Lytton Road. These may require additional protection due to reduction in cover and increased loads from indented bus bay. In future stages of the project, a PUP conflict register is to be provided to Telstra summarising the anticipated impacts to their assets. <p>Contact: NR @team.telstra.com</p>
TPG	Telecoms	N/A	<p>TPG advised that most of their assets are located within Telstra conduits, and as such advised that a meeting with them was not required.</p> <p>Contact: NR @tpgtelecom.com.au</p>
Urban Utilities	Water and sewer	N/A	<p>Urban Utilities advised that until a Service Advice Notice (SAN) is lodged, they are unable to provide general advice. A SAN will need to be submitted in future stages of the project.</p> <p>Contact: DevelopmentEnquiries@urbanutilities.com.au</p>

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6. Concept design development

This section of the report discusses the development of the concept design. It should be read in conjunction with the *Concept Design Drawings* and *Urban Design Outcomes*, which are found in Appendix G and Appendix H, respectively. As well as illustrating the proposed concept design, the drawings also highlight potential opportunities that can be investigated in future design stages.

As agreed with Council, the concept design has been divided into three sections:

1. The ultimate layout represents the infrastructure required to realise the primary objectives of the project. It includes the works along the riverfront, Deakin Street, Cairns Street and Park Avenue.
2. The enhancements layout along Shafston Avenue and Lytton Road represents the short-term delivery goal of the project (noting that the ultimate layout will take several years to be delivered), and will follow the opening of the Kangaroo Point Green Bridge. It is important to recognise that these works have legacy benefits and will form a key part of the active transport network once the ultimate layout is finalised.
3. The enhancements layout between Captain Burke Park and the Frank Nicklin Dry Dock represents opportunities that would be delivered separately to this project.

6.1 General

6.1.1 Basis of design

The Basis of Design (BoD) was developed during Phase 1 and can be found in the *Strategic Context Working Paper*^{NR}. The BoD outlines the standards and performance criteria that were applied to the development of design options.

6.1.2 Survey

The concept design was developed using the following survey information provided by Council:

- Aerial imagery of the study area, captured in 2021.
- LiDAR data of the study area (1m grid size), captured in 2019.
- Cadastral data of the study area.
- Bathymetry data of the Brisbane River (2m grid size), captured in 2020 for the Green Bridges Flood Modelling project.

Future design stages will require topographical survey to be carried out within the construction extents of the project. This should include Quality Level B survey to identify underground utilities, which will then be refined to Quality Level A (i.e. potholing) in areas where potential clashes are identified. As part of the topographical survey, property boundaries adjacent to the works should be confirmed to verify that no additional resumptions are required (refer to Section 6.1.6 for details). Furthermore, due to the dynamic nature of the river bed, updated bathymetry survey is also recommended in future design stages.

6.1.3 Horizontal geometry

Following discussions with BCC and TMR, it was agreed that the Kangaroo Point Riverwalk should aim to achieve a minimum design speed of 25km/h for cyclists. This strikes a balance between creating a desirable facility for cyclists and e-mobility users, while ensuring that speeds are low enough to improve safety to pedestrians using the adjacent path. An appropriate minimum horizontal radius was extrapolated using the data in Table 5.6 of Austroads Guide to Road Design Part 6A. This resulted in a minimum horizontal radius of 15m, which is consistent with the horizontal geometry of Council's Botanic Gardens Riverwalk.

It should be noted that this minimum radius was not feasible at localised constraints, such as at the approach to raised priority crossings. Additional consideration will be required in future design stages to include adequate warning signage alerting users to these areas of constrained geometry.

6.1.4 Vertical geometry

The vertical geometry on the project has generally been dictated by the existing terrain levels and gradients. The project has aimed to work within DDA compliant grades, with the exception of some sections of the existing road corridor which follow the existing road network and achieving DDA compliant grades would require significant civil works and property impacts to achieve the outcome. This is particularly challenging in the following areas:

- The longitudinal grades on the eastern side of Cairns Street reach almost 8%. An area with seating has been nominated in the verge adjacent to the path. While this will provide a potential rest stop, it may be more desirable to use wayfinding signage to direct users with mobility challenges towards Ferryman's Bridge. The path across the bridge and along Dockside Walk provides a DDA compliant (although more indirect) route and provides a means to reach the riverwalk via paths with gentler grades than those along Cairns Street.
- The longitudinal grades on the southern side of Park Avenue reach 8%. An area with seating has been nominated in the verge adjacent to the path. While this will provide a potential rest stop, it may be more desirable to use wayfinding signage to direct users with mobility challenges towards Mowbray Park. The paths through Mowbray Park have a gentler grade than Park Avenue, and as such provide easier access to Lytton Road.

Due to the elevation difference between the existing Riverside Promenade and Cairns Street, the riverwalk across the Dry Dock and connecting to Cairns Street has been graded at a maximum 5% with 1.2m long landings at maximum 19.5m intervals. This is consistent with the vertical geometry of Council's Indooroopilly Riverwalk. Additional consideration will be required in future design stages to ensure that there is adequate warning signage alerting downhill cyclists of the approaching steep grades.

6.1.5 Typical section

In the absence of pedestrian and cyclist forecast numbers, the project has adopted the typical cross-section of the connecting Deakin Street underpass as a minimum desirable width for the separated two-way path (refer to Section 6.3 for details and illustration). These dimensions reflect the desirable minimum widths in the BoD (3m cycle path and 2m pedestrian path). A 1m verge between the cycle path and road kerb has also been included. It should be noted that no separation has been provided between the cycle path and pedestrian path. In future design stages treatments should be explored to provide a clear colour and / or texture contrast at the interface between the two paths to reinforce the separation of path user types.

For the shared path on Shafston Avenue, the project has adopted the 3.0m typical cross-section of the connecting shared path on Lytton Road as a minimum desirable width.

As per the best-practice approach taken on Council's existing riverwalks, pedestrians have been placed on the structure's riverside to facilitate the path's amenity/place function rather than the movement function desired by cyclists and e-mobility users.

On the riverwalk it was recognised that the balustrade could lead to shy line effects for cyclists, which could result in users encroaching the lane of the opposing direction. As per the guidelines in the BoD, a 0.5m offset was applied from the rails of the balustrade, which widened the total width of the cycle lanes to 3.5m. A cyclist deflection rail has been included with a 0.15m clearance from the balustrade's rails, resulting in a clear width of 3.35m for cyclists (the parallel pedestrian path was maintained at a clear width of 2.0m). This is consistent with the typical cross-section of Council's Indooroopilly Riverwalk. Additional consideration will be required in future design stages to ensure that the total width of the riverwalk accounts for the forecast volumes of pedestrians and cyclists. However, it should be noted that there are some areas of the riverwalk that were constrained to a 5.0m total width (including the existing promenades at Castlebar Cove and at Thorn Street). A typical section of the proposed riverwalk is shown in Figure 2.

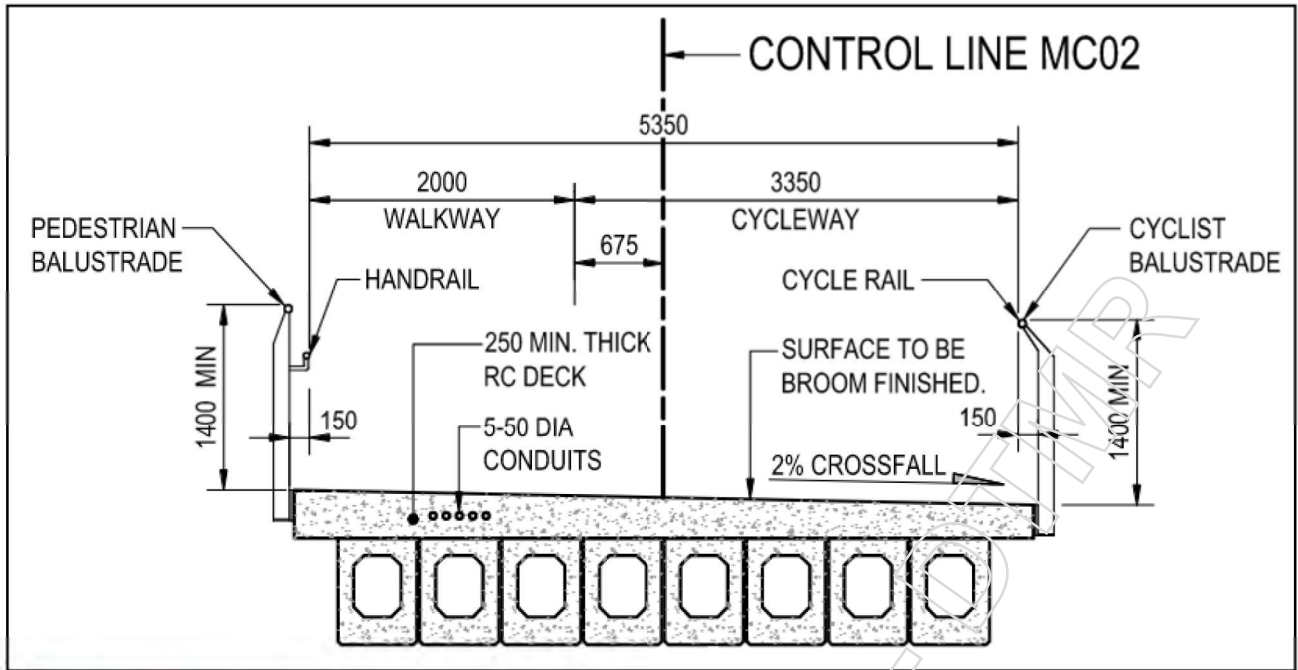


Figure 2: Typical section of riverwalk

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6.1.7 Traffic

As part of the design development, a need has been identified for speed limit reviews to be carried out in future stages of the project. It is recommended that the reviews are carried out within the whole study area, so that they may be applied holistically throughout the Kangaroo Point Peninsula.

The project includes proposed works at several key intersections which require traffic modelling during future stages of delivery to confirm the viability and traffic performance of the concept design. These traffic modelling activities were intended to be completed by Council's traffic team as part of this project phase of delivery, however due to capacity and program constraints, the works were unable to be completed. A separate proposal by Arup to undertake the traffic modelling was also not able to be progressed during this phase due to budget constraints. It is recommended that the following traffic modelling is included in future design stages:

6.2 Riverwalk

6.2.1 Civil

The proposed riverwalk section is approximately 750m in length and includes the following key design features:

- In-river structure across the Dry Dock to connect the Riverside Promenade to Cairns Street (refer to Section 6.2.2 for details). This includes works to the Riverside Promenade, including the separation of cyclists and pedestrians adjacent to the Dockside Ferry Terminal and a new shared zone where it transitions to a shared path. A new ramp has been included connecting Dockside Walk to the Riverside Promenade, as the existing connection is steep and presents a hazard to pedestrians.
- In-river structure connecting Cairns Street to the existing promenade at Castlebar Cove (refer to Section 6.2.2 for details). This includes two rest nodes with seating. The impacted pontoons/gangways of Deakin Point Apartments, Silver Quays Apartments and Castlebar Cove will be reconstructed.
- The existing planters at Castlebar Cove have been removed to provide a minimum 5.0m-wide path.

- On-embankment structure connecting Castlebar Cove to Shafston House (refer to Section 6.2.2 for details).
- In-river structure connecting Shafston House to the existing promenade on Thorn Street (refer to Section 6.2.2 for details). It was not possible to maintain the on-embankment structure through this area due to the presence of a heritage stormwater outlet and heritage boat shed. However, the alignment provides the opportunity to include an additional rest node with seating.
- Separation of cyclists and pedestrians along the existing promenade on Thorn Street. The path width between Wellington Road and Park Avenue reduces to 5.0m to avoid any structural modifications to the promenade.



There are two key intersections on the proposed riverwalk that are worth highlighting:

1. At the connection to the Riverside Promenade it has been proposed that the separated path treatment is carried through to a shared zone adjacent to the steps at Dockside. This was done to maintain separation between ferry commuters and cyclists. Furthermore, the existing connection on Dockside Walk has been blocked off with landscaping, which will direct pedestrians to a new DDA-compliant ramp adjacent to the existing steps. The shared zone pavement marking has been proposed as a transition from the separated path to the existing promenade. Refer to Figure 4 for an illustration.

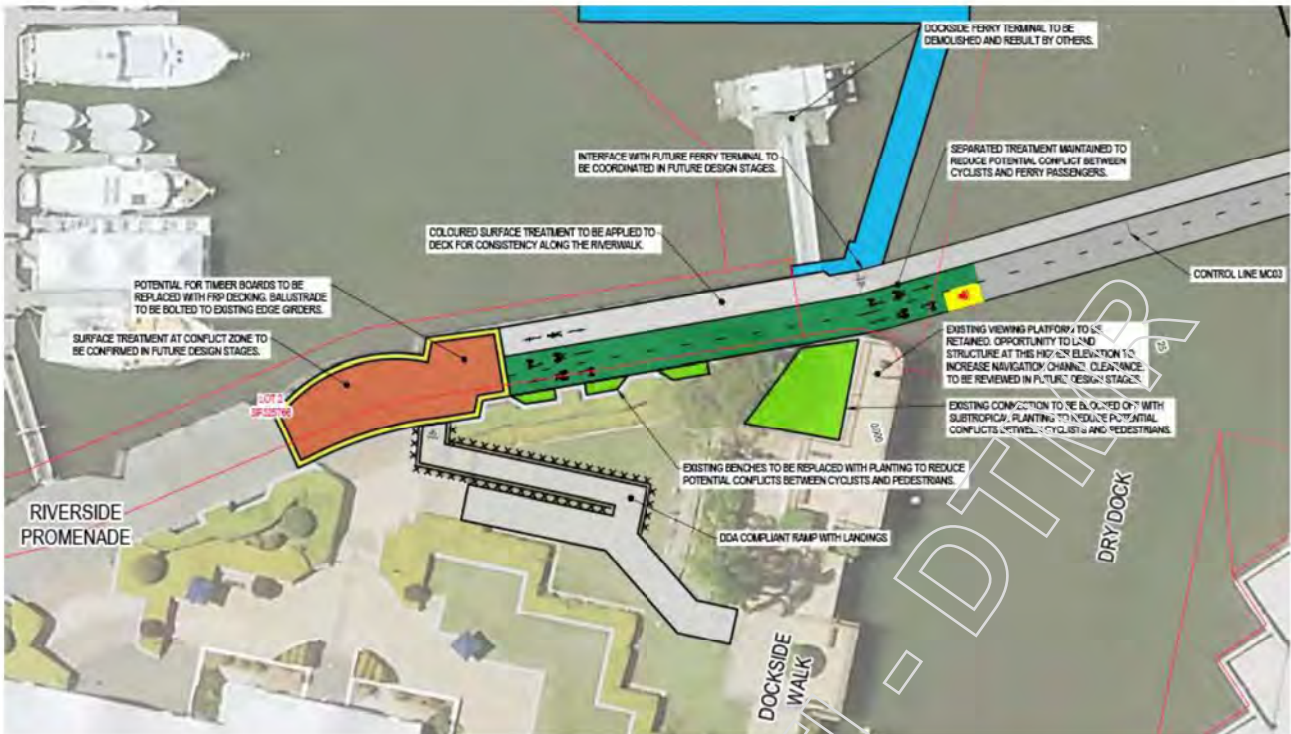


Figure 4: Riverwalk connection at Dockside

- Where the riverwalk intersects with the connection to Cairns Street, priority has been provided along the river. The main reason behind this was to force cyclists and e-mobility users from Cairns Street to slow down on the descent to the main riverwalk. A slip lane has been included for northbound cyclists seeking to turn into Cairns Street, as this will likely be a common movement during morning peak hours. Refer to Figure 5 for an illustration.

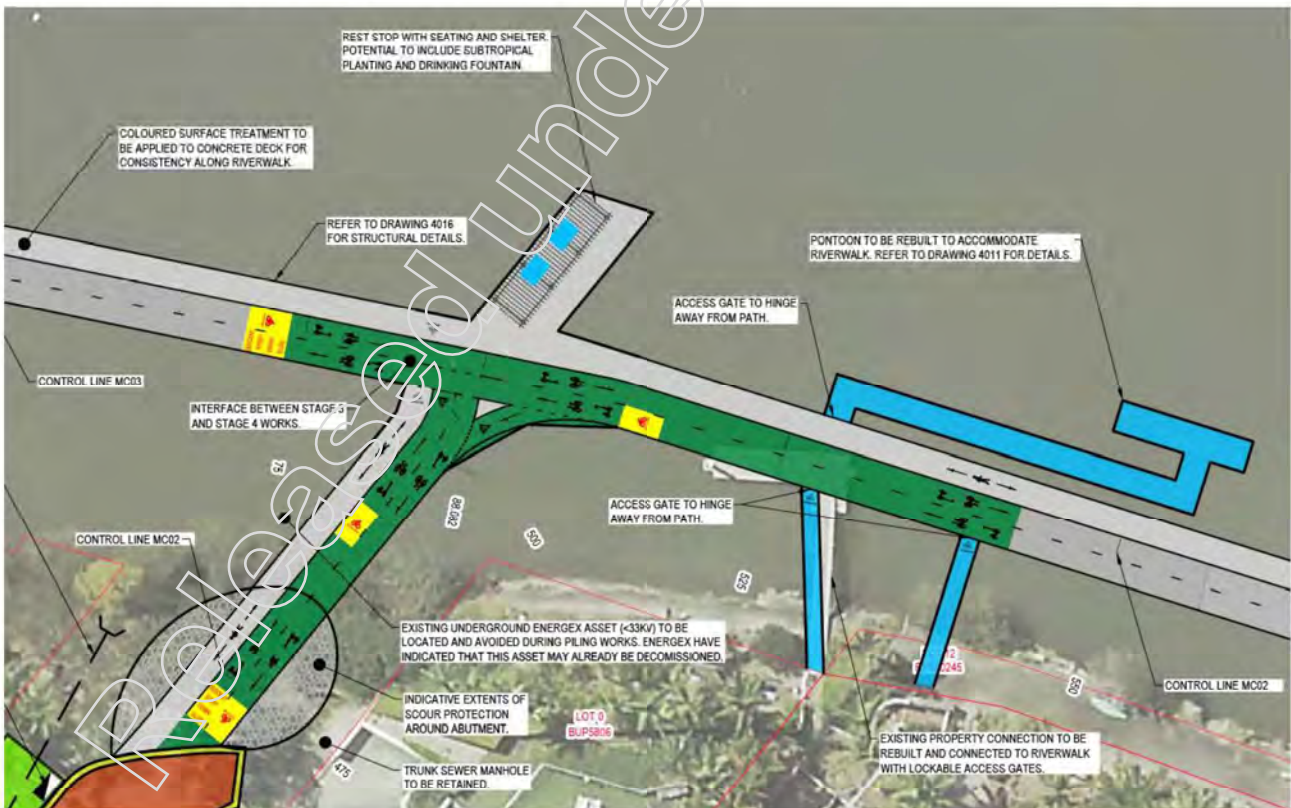


Figure 5: Riverwalk connection at Cairns Street

6.2.2 Structural

The proposed structural form for the riverwalk is divided into six main sections. Where possible the design aims to utilise the existing infrastructure along the water's edge, minimising impact to properties and maintaining water access for existing pontoons. Where new structure is required, the design aims to utilise an efficient, repetitious layout and considers the limited construction access to some areas of the alignment. The six sections are summarised below:

1. Elevated concrete deck unit structure over water from Cairns Street to the northern edge of Castlebar Cove. Refer to Figure 2 for details.
2. Elevated concrete deck unit structure over the Dry Dock. Refer to Figure 2 for details.
3. Micropile concrete path structure with gabion wall protection from southern edge of Castlebar Cove to northern edge of Shafston House. Refer to Figure 6 for details.

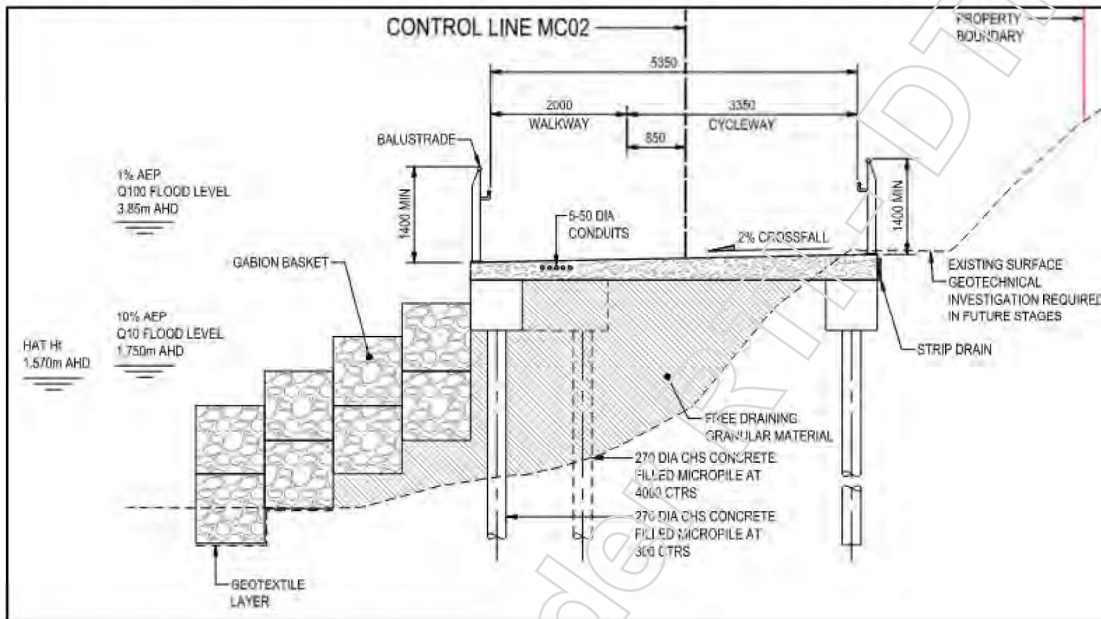


Figure 6: Micropile concrete path structure

4. Utilising the existing blockwork wall in front of Shafston House, with a soil nail wall on the upslope side to increase the width of the path. Refer to Figure 7 for details. A resumption extent has been nominated based on a soil nail depth of 3m. Depending on the geotechnical conditions this may be insufficient, which would require further negotiations with the land owner to come to an agreement.

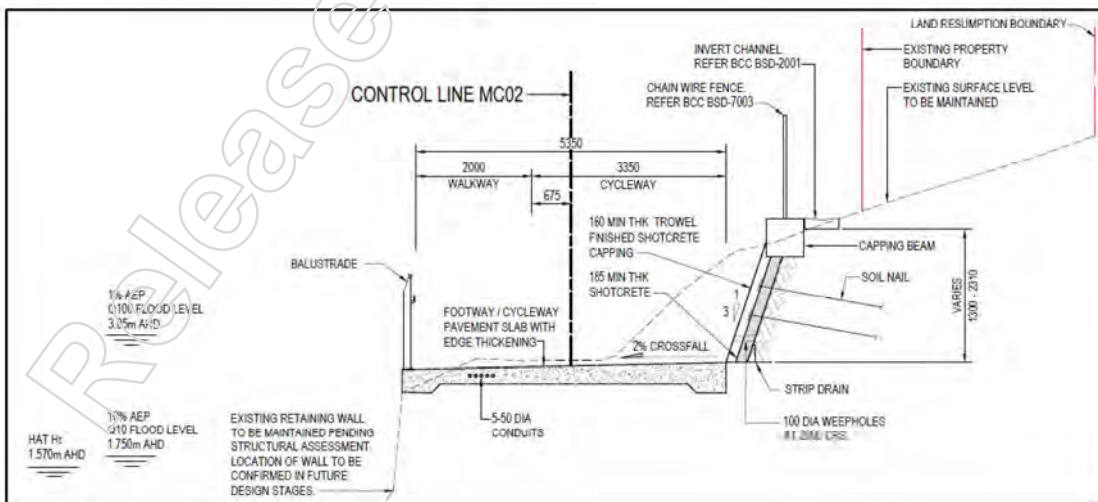


Figure 7: Soil nail wall structure

5. Elevated concrete Super-T girder structure over water from Shafston House to Dundrenan Residences. Refer to Figure 8 for details.

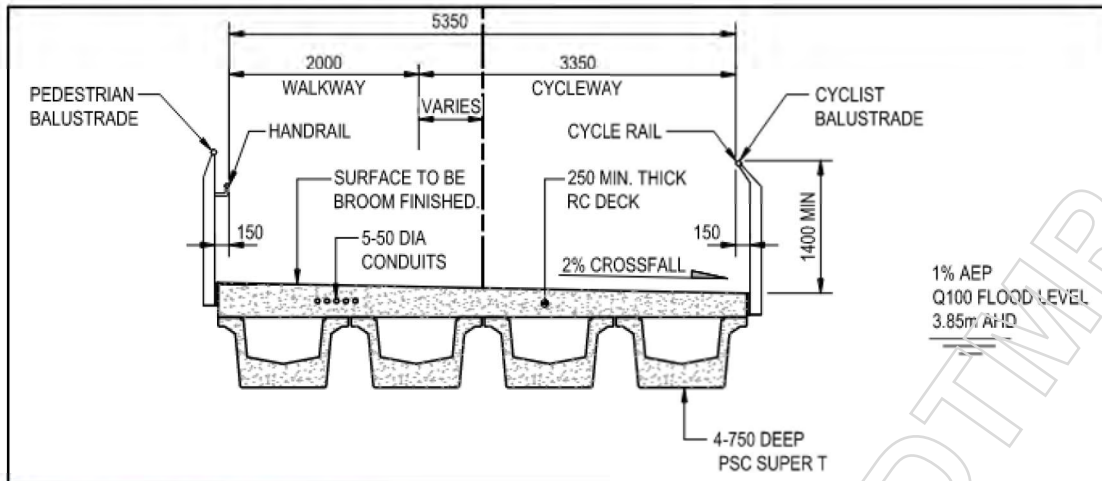


Figure 8: Super-T girder structure

6. Micropile structure in front of Dundrenan Residences, that also spans over the existing pontoon underpass access. Details are similar to those of Figure 6.

The structural form adopted for the elevated sections in the concept design utilises precast prestressed concrete beams with an insitu concrete deck. The piers have insitu concrete infills to create integral connections between the spans. The integral connections aim to reduce the maintenance required in the tidal zone (no bearings) and additional robustness to the structural under flood debris and vessel impact loading.

The foundations in the river are nominated as medium diameter reinforced concrete piles. Single pile piers are desirable to minimise the impact on river afflux. The proposed piles are positioned to minimise interaction with the heritage stormwater drain outlet beneath 50 Thorn Street and the existing heritage boat shed access for 64 Thorn Street.

The structure accommodates several rest nodes, pontoons, and residential connections along the alignment. These are accommodated within the standardised span length arrangements.

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6.2.3 Urban design

The *Strategic Context Working Paper* NR identified that the project will not only provide a means of movement, but it can also act as a place in and of itself. Given the potential city-shaping nature of the riverwalk, the OA phase has investigated potential ways to improve the urban design outcomes of the project. The report documenting these findings can be found in Appendix H.

The unifying design principles covered by the urban design review are listed below:

- Responding to character – planting and shade, Brisbane River, First Nations history and stories, heritage landmarks, and natural elements. Refer to Figure 9 for an illustration of this theme.
- Integrated design – respectful interventions, compatible engineering and architecture, environmentally conscious, and durability from flood events.
- Safe and accessible – passive surveillance, accessible viewpoints, lighting, help points, and CCTV.
- Community driven – integrating with the existing context, respectful consideration, and responsive to privacy concerns.
- Activated – cafes and tables, 24-hour activation, shade and rest points, and public art.

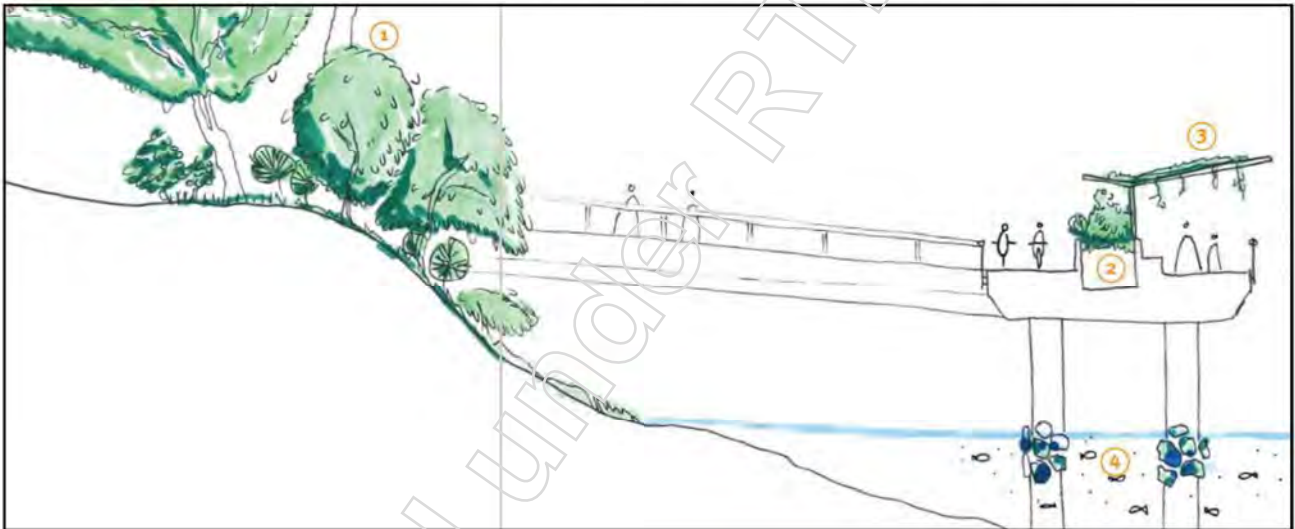


Figure 9: Urban design response to character

6.3 Deakin Street

The works on Deakin Street are approximately 225m in length and include the following key design features:

- Connection to the separated two-way path from the underpass to the Kangaroo Point Green Bridge.
- Raised zebra crossing to connect to Ferry Street. This has been proposed to accommodate the anticipated increase in pedestrian volume due to the Kangaroo Point Green Bridge and the mixed-use development at 31 Ferry Street.
- Kerb realignments on the northern end of Deakin Street to accommodate the two-way separated path. The existing retaining wall on the western side of the street is to be maintained due to the presence of critical underground services in the area. A right-turn pocket into Ferry has been shown as per the concept design of the mixed-use development at 31 Ferry Street. A typical cross-section of this area is shown in Figure 10, with the works on the eastern side of the street shown indicatively.

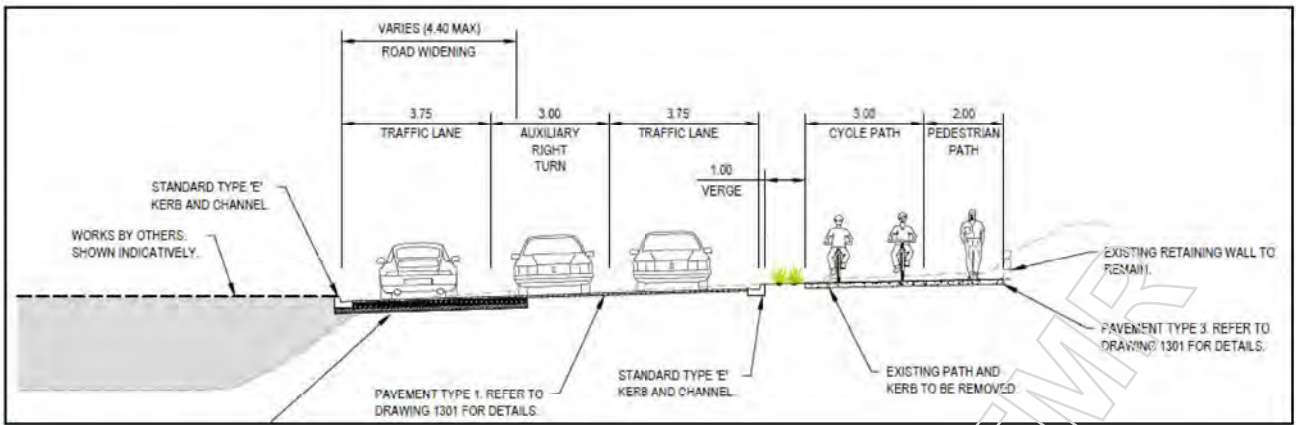


Figure 10: Deakin Street cross-section

- Raised priority crossing on the southern end of Deakin Street, with separated lanes for pedestrians and cyclists. The crossing has been shifted away from Cairns Street to provide adequate sight distance and vehicle storage for northbound vehicles. Refer to Figure 11 for an illustration.

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6.4 Cairns Street

The works on Cairns Street are approximately 280m in length and include the following key design features:

- Major modification to the intersection with Main Street. Cairns Street has been turned into the priority leg, with Deakin Street acting as a minor leg. The slip lanes from/to Main Street have been removed and replaced with a signalised pedestrian crossing. Further details are covered in the *Strategic Assessment Working Paper* ^{NR} [redacted] Refer to Figure 11 for an illustration.
- The two-way separated path becomes a two-way cycle track and footpath. The existing paver footpath has been removed and replaced with a 2.0m wide concrete footpath to reduce risks of slips trips and falls, while a separation kerb has been included to delineate the cycle track from the adjacent vehicle lanes. The inclusion of the on-road cycle track has been achieved by removing approximately 33 car parking spaces on the northern side of Cairns Street. The on-road cycle track was chosen to retain the existing drainage conditions and to limit any impacts to the mature street trees that line Cairns Street providing significant amenity and shading of the facilities. A typical cross-section of this area is shown in Figure 12.

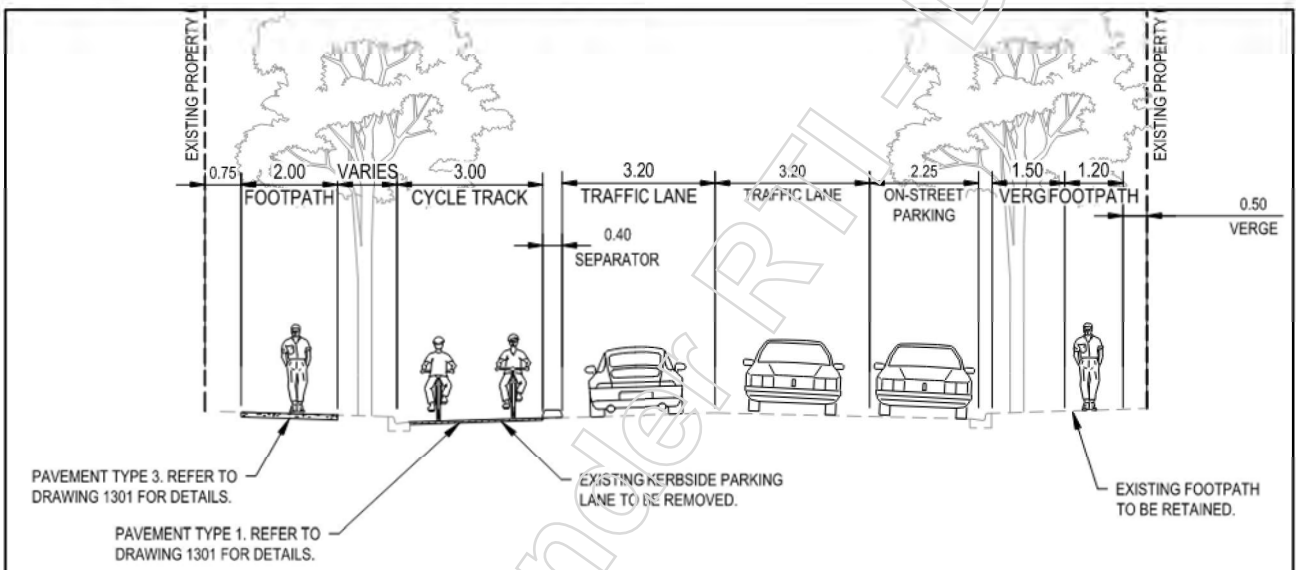


Figure 12: Cairns Street cross-section

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- Lighting upgrades along the southern side of Cairns Street are proposed.

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6.5 Park Avenue

The works on Park Avenue are approximately 170m in length and include the following key design features:

- Realignment of the kerb at the cul-de-sac to accommodate a two-way separated path. Due to spatial constraints the footpath reduces to 1.5m in this area. A 1.5m concrete verge has also been provided to allow for ferry passenger pick-up / drop-off from the cul-de-sac without needing to stand on the cycle track. The existing retaining wall has been lifted to achieve compliant path crossfall. A typical cross-section of this area is shown in Figure 14, while the layout is illustrated in Figure 15.

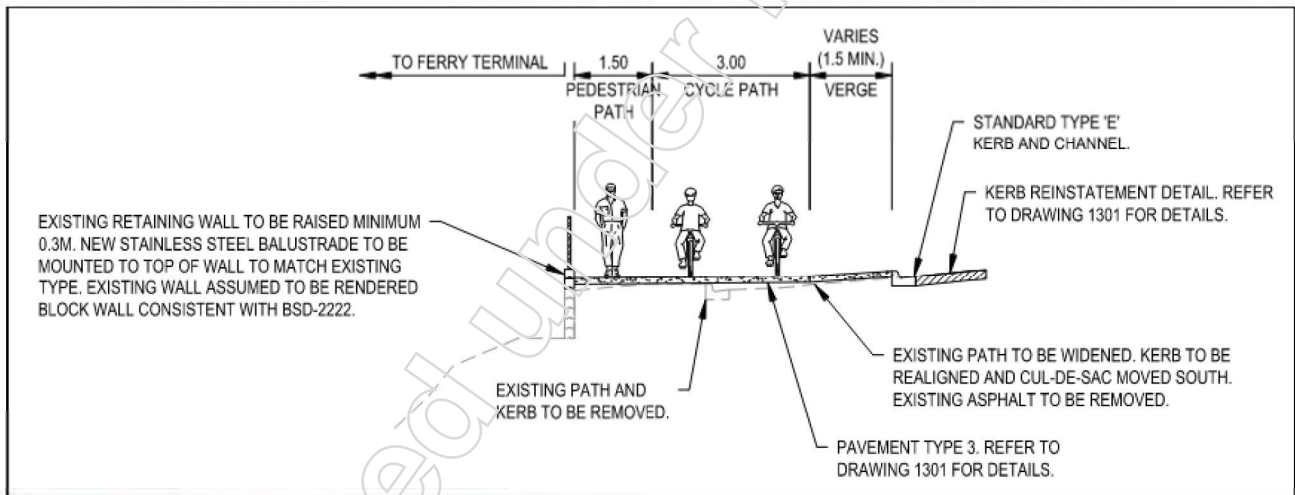


Figure 14: Park Avenue cul-de-sac cross-section

- Connection to the proposed shared path on Shafston Avenue.
- Lighting upgrades along the western side of Park Avenue.

6.6 Shafston Avenue

The works on Shafston Avenue are approximately 810m in length and include the following key design features:

- Connection to the proposed works at Cairns Street.
- The existing footpath has been removed and widened to a 3.0m shared path. A centreline has been included to separate the directions of travel. Additional consideration will be required in future design stages to ensure that there is adequate signage for the shared path.
- Reconstruction of the kerb ramps at the O'Connell Street intersection.

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- Removal of the slip lane onto Wellington Road. The signalised intersection has been modified to accommodate this change.
- Lighting upgrades along the eastern side of Shafston Avenue and at the raised crossings.

6.7 Lytton Road

The works on Lytton Road are approximately 140m in length and include the following key design features:

- Realignment of the existing shared path to tie into the works at Wellington Road and Park Avenue.
- Indented bus bay to replace the bus stop being removed on Shafston Avenue. Due to the elevation difference between the bus bay and the shared path, the adjoining footpaths are offset from the bus stop. A typical cross-section of this area is shown in Figure 20.

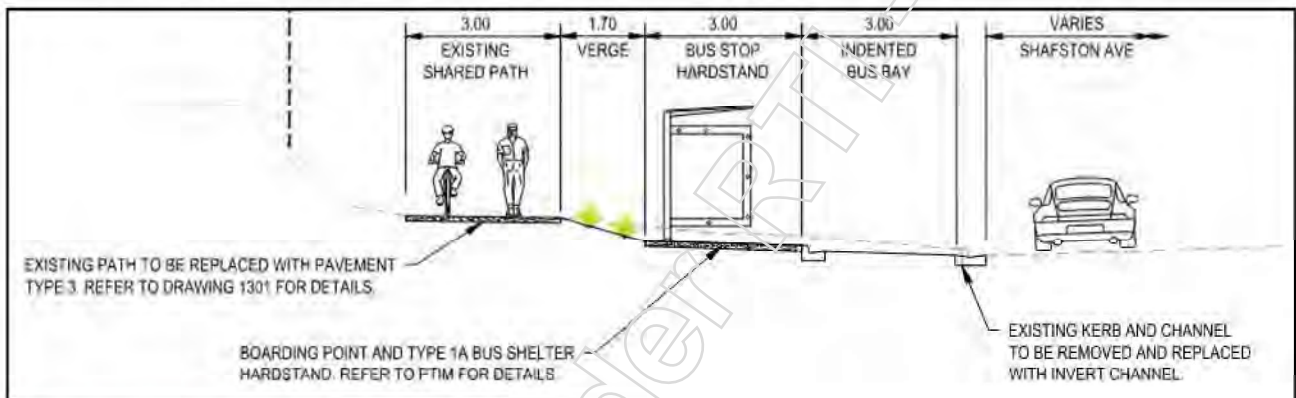


Figure 20: Lytton Road cross-section

- Raised priority crossing at the intersection with Park Avenue.
- Connection to the proposed shared path on Park Avenue.
- Connection to the existing shared path on Lytton Road.
- Lighting upgrades along the northern side of Lytton Road and at the raised crossing.

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7. Stakeholder comments

Multiple comments from a variety of stakeholders have been received throughout the design development process. These comments have been consolidated into a register, which can be found in Appendix I. The register includes details on the comment, as well as the response from the Arup project team.

Details of the sources used for the comments register are included in Table 7.

Table 7: Stakeholder comment details

Organisation	Details	Date received	Source
Queensland Walks	Submission of recommendations for the Active Travel Studies for South Brisbane and Kangaroo Point.	25 January 2023	Forwarded email from Council PM.
Community and Stakeholder Engagement (CaSE), BCC	Communication and engagement evaluation report summarising the results from the community consultation.	2 February 2023	Report and one-page summary from Council PM.
BCC and TMR	A site visit was done to “ground truth” the preliminary concept design and to highlight potential issues.	16 March 2023	PDF mark-up prepared by Arup.
TMR	Drawing mark-up of the preliminary concept design.	16 March 2023	PDF from Council PM.
Transport Planning and Operations (TPO), BCC	Drawing mark-up of the preliminary concept design.	22 March 2023	PDF from Council PM.
Access and Inclusion, BCC	Accessibility review of the preliminary concept design.	30 March 2023	Forwarded email from Council PM.
BCC and TMR	Comments of the updated concept design.	26 May 2023	Comments register from Council PM.

Comments in the register have been left open where further investigation is required in future design stages, or where a closing response was not received from the stakeholder who originated the comment.

8. Prioritisation and costing

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8.2 Staging

Prioritisation and staging assessments were undertaken to confirm the staging and delivery of the project. The assessment process was completed as follows:

1. Identification of staging objectives and priorities.
2. Identification of a preferred delivery strategy in consultation with Council.
3. Identification of packages and sub-packages.

8.2.1 Objectives

The objectives of the staging process are as per the priority needs of the project identified in the *Strategic Assessment Working Paper* ^{NR} and are summarised in Table 9.

Table 9: Staging objectives

Objectives	Evaluation
Improve connectivity and route choice.	Increase connectivity to the active transport, public transport, and road networks.
Improve access to and within the Kangaroo Point Peninsula.	
Improve legibility to encourage use.	Achieve a comfortable, consistent, and continuous active transport route which minimises delays for users.
Improve continuity of active transport route.	
Minimise conflict points.	
Improve comfort for people of all ages and abilities.	
Improve ability to control service quality of infrastructure.	Address the rehabilitation/upgrade of deteriorating infrastructure.

8.2.2 Delivery

A meeting was held with the Council to review the concept design and to determine a recommended delivery strategy. The delivery strategy considered each of the staging objectives, including the feasibility of progressing packages through to construction in an accelerated manor to establish new connections through key missing links in the active transport network. The agreed delivery strategy is illustrated in Appendix K and summarised below:

8.2.3 Packages

The project has been split into packages as listed in Table 10. The packages were based on logical start and end points and were split into sub-packages to provide greater flexibility in delivery (if required).

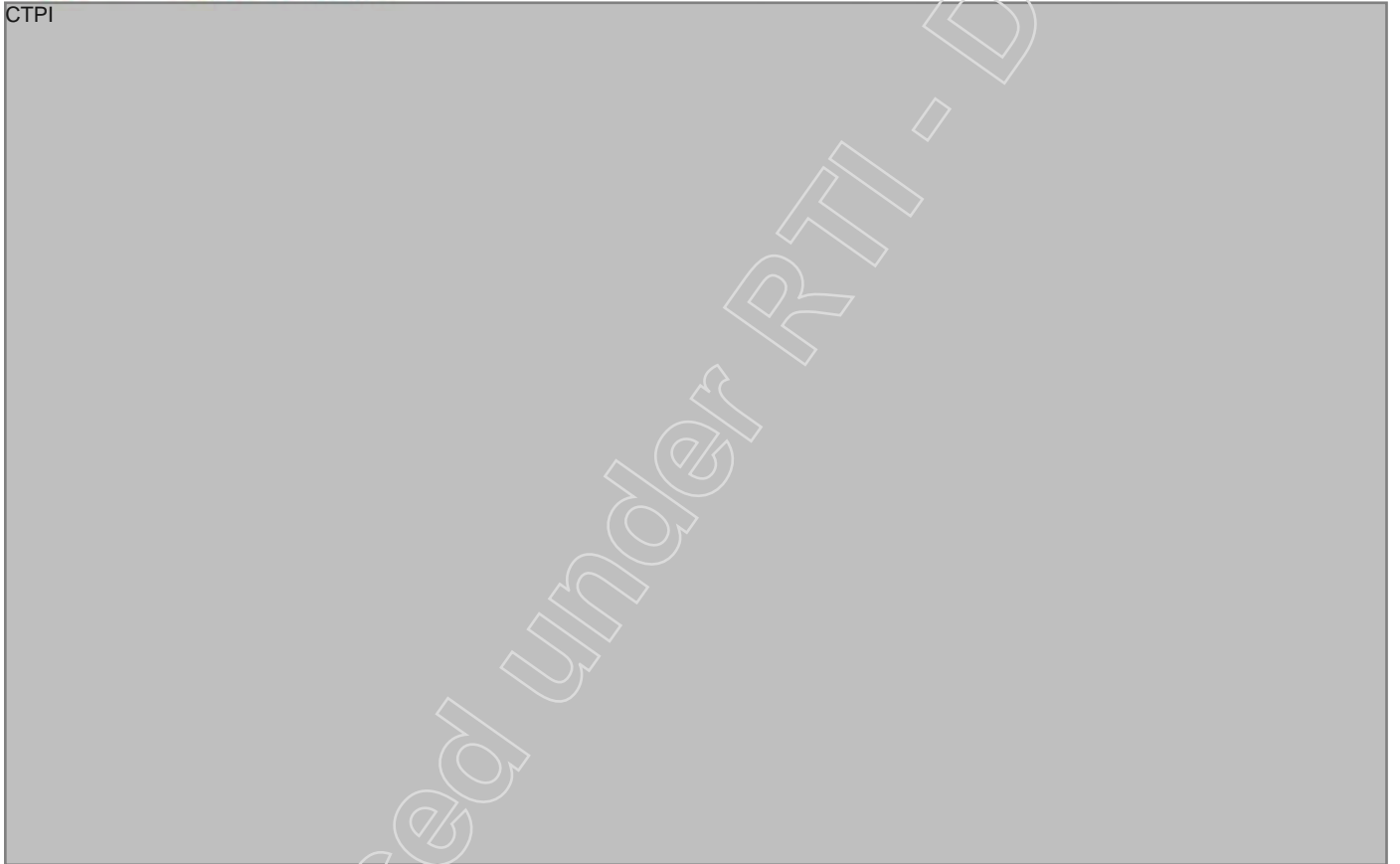
Table 10: Staging packages

Package	Location	Works
Stage 1	Deakin Street and Cairns Street	Works on Deakin Street, including the intersection with Main Street. Works on the western end of Cairns Street, between Main Street and Lambert Street.
Stage 2A	Shafston Avenue	Works on Shafston Avenue between Cairns Street and O'Connell Street.
Stage 2B	Shafston Avenue	Works on Shafston Avenue between O'Connell Street and Castlebar Street.
Stage 2C	Shafston Avenue	Works on Shafston Avenue between Castlebar Street and Thorn Street.
Stage 2D	Shafston Avenue	Works on Shafston Avenue between Thorn Street and Wellington Road.
Stage 2E	Lytton Road	Works on Lytton Road between Wellington Road and Park Avenue.
Stage 3A	Cairns Street	Works on the eastern side of Cairns Street, between Lambert Street and the cul-de-sac.
Stage 3B	Riverwalk	Works between Cairns Street and Castlebar Cove.

Package	Location	Works
Stage 3C	Riverwalk	Works between Castlebar Cove and Shafston House.
Stage 3D	Riverwalk	Works between Shafston House the existing promenade on Thorn Street.
Stage 3E	Thorn Street	Works on the existing promenade of Thorn Street.
Stage 3F	Park Avenue	Works on Park Avenue.
Stage 4	Dry Dock	Works to connect between Cairns Street and the Dockside Ferry Terminal, including the works in front of Dockside.
Stage 5	Riverside Promenade	Works between Dockside and Captain Burke Park. Staging subject to further discussions between Council and the owners of the promenade.

8.3 Cost estimate

CTPI



9. Summary

The Technical Assessment Working Paper has achieved the following:

1. Reviewed the key constraints to the design development, including environment, cultural heritage, flooding, safety, and public utility plant.
2. Explained the concept design development, including aspects to be investigated in future design stages.
3. Provided responses to stakeholder comments.
4. Included details of the cost estimate, including risks and staging.
5. Collated all findings from the Technical Assessment phase of the project.

As agreed with Council, the concept design was split into three sections. These are summarised below and have been split into the corresponding project staging.

1. The ultimate layout represents the infrastructure required to realise the primary objectives of the project.
 - a. Stage 1 includes the works on Deakin Street and the western end of Cairns Street, including the intersection with Main Street.
 - b. Stage 3 includes the works along the eastern side of Cairns Street, the proposed riverwalk, Deakin Street, and Park Avenue.
 - c. Stage 4 includes the works across the Frank Nicklin Dry Dock and at Dockside.
2. The enhancements layout along Shafston Avenue and Lytton Road represents the short-term delivery goal of the project. It forms part of Stage 2 of the project.
3. The enhancements layout between Captain Burke Park and the Frank Nicklin Dry Dock represents opportunities that would be delivered separately to this project. It forms part of Stage 5 of the project.

This working paper is the final report from the investigation phases of the project. In the next phase, all previous working papers will be collated into the *Options Analysis Report* ^{NR} [REDACTED]

The next steps of the project will be to take the concept through preliminary and detailed design stages. Notes have been included throughout this report and in the concept design drawings to highlight where further investigations are required to progress the design.

Appendix A – Flooding Technical Note

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Appendix B – Road Safety Audit Report

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Appendix C – Safety in design register

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Appendix D – BYDA maps

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Appendix E – PUP register

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Appendix F – PUA meeting minutes

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Appendix G – Concept design drawings

The draft concept design drawings were issued separately to this report and have not been appended.

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Appendix H – Improved urban design outcomes

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Appendix I – Stakeholder comments register

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Appendix J – Risk register

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Appendix K – Staging sketch

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Appendix L – Cost estimate report

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C.2 Flooding Technical Note

Appendix A of the *Technical Assessment Working Paper* ^{NR}



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Brisbane City Council

Kangaroo Point Riverwalk Options Analysis and Concept Design

Flooding Technical Assessment Note

Reference ^{NR} [Redacted]

Rev 2 | 23 June 2023



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This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number ^{NR} [Redacted]

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1. Introduction

Arup has been commissioned by Brisbane City Council (BCC) to undertake the Options Analysis and Concept Design for the Kangaroo Point Riverwalk project, to connect Captain Burke Park (Kangaroo Point) and Mowbray Park (East Brisbane) with a continuous link catering to cyclists, pedestrians, and other active transport modes. This project aims to address the “missing link” in the existing cycling and pedestrian network, as identified by the cycling community, the Department of Transport and Main Roads (TMR) and BCC.

1.1 Study purpose

TMR and BCC are committed to providing safe cycling infrastructure to encourage mode shift towards more sustainable modes of transport. Council is currently completing the draft Active Transport Network Plan (ATNP), a review of Brisbane’s Bicycle Network Overlay in City Plan, to improve network connectivity and safety.

Through this review, and from feedback received from the cycling community, TMR and BCC are aware of a “missing link” in the network of existing cycling infrastructure between Kangaroo Point and East Brisbane. The Kangaroo Point community requires new infrastructure to improve connectivity for all active transport modes and encourage sustainable travel within a rapidly changing inner city region.

The study shall develop a preferred walking and riding connection between Frank Nicklin Dry Dock (Kangaroo Point) and Mowbray Park (East Brisbane), and between Frank Nicklin Dry Dock and the future Deakin Street underpass, which links to the Kangaroo Point Green bridge which is currently under construction.

The project will maximise access and return on investment from the Kangaroo Point Green bridge by providing a key connection to the Deakin Street underpass access and fill a critical gap in the active transport network. The study will also identify enhancement opportunities for the existing Riverwalk between Captain Burke Park and Frank Nicklin Dry Dock. It is essential that options cater for e-mobility use under the current road rules.

1.2 Study area

The study area spans from Captain Burke Park in Kangaroo Point to Mowbray Park in East Brisbane and is divided into three extents, as shown in Figure 1.

- *Study extent A* represents the missing link in the active transport network, between Frank Nicklin Dry Dock to Mowbray Park (and the existing active transport facility along Lytton Road).
- *Study extent B* represents the existing Kangaroo Point Riverwalk between Captain Burke Park and the Frank Nicklin Dry Dock.
- *Study extent C* represents the link between the Kangaroo Point Riverwalk project to the future Kangaroo Point Green Bridge via the Deakin Street / Main Street active transport underpass, which is currently under construction.



Figure 1: Study area extent (BCC, 2022)

1.3 Purpose of report

The Kangaroo Point Riverwalk project has four phases, as listed below.

- Phase 1: Strategic context
- Phase 2: Strategic assessment
- Phase 3: Technical assessment (current phase of project)
- Phase 4: Options analysis report

The *Strategic Assessment Working Paper* (NR [redacted]) dated 3 February 2023, provided detailed discussion on the following items:

- Considerations that drove the route development and assessment criteria.
- The design development of the active transport alignment options for each of the study areas.

- The development of assessment criteria to identify the preferred option/s.
- Outcomes of the MCA workshop and the preferred design alignment

Following the submission of the *Strategic Assessment Working Paper*, design development has occurred to a point where a concept design of the preferred option has been established. This concept design has been utilised to conduct a flood impact assessment.

This report documents the assessment methodology and the outcomes of the impact analysis for the proposed design.

1.4 Glossary

Table 1 summarises a list of abbreviations used throughout this report.

Table 1: Abbreviations

Abbreviation	Description
AEP	Annual Exceedance Probability
AGRD	Austroads Guide to Road Design
ARR	Australian Rainfall & Runoff
BCC	Brisbane City Council
CD	Concept Design
KRPW	Kangaroo Point Riverwalk
OA	Options Analysis
QUDM	Queensland Urban Drainage Manual
SEQ	South-East Queensland
TMR	Department of Transport and Main Roads
TUFLOW	Two-dimensional Unsteady FLOW

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3. Available data

3.1 Brisbane River Catchment Flood Study

The Brisbane River Catchment Flood Study (BRCFS) was undertaken following the major floods which occurred 2011 and was completed in 2017. The flood study was a collaborative effort between multiple councils in SEQ and multiple consultants.

The BRCFS is a complex regional flood study, which utilises a Monte Carlo / Joint Probability analysis to derive design flood behaviours. This approach is required within the Brisbane River Catchment as result of the variability in dam levels and tidal conditions which can have significant impact on the catchment response to rainfall.

Due to the large number of runs required to satisfy the Monte Carlo approach, a “Fast Model” was developed. This model utilised a one-dimensional schematisation only and was used to simulate approximately 12,000 event scenarios. Once specific events were selected from the suite of simulated events, they were simulated through the “Detailed Model” which utilised a one-dimensional / two-dimensional dynamically linked model.

The model results for the 10% AEP, 5% AEP and 1% AEP flood events from the detailed model (sourced from BCC) have been utilised for the assessment of existing flood behaviours within the project area. Specifically, height, depth and velocity results have been utilised for this assessment.

3.2 Indooroopilly Riverwalk

Arup was engaged by BCC to undertake the detailed design of the Indooroopilly Riverwalk. As part of this project flood modelling was undertaken to inform the likely afflux which would be a consequence of the proposed structure.

As a result of this work, Arup has used that understanding gained of the potential blockage that an in-river pedestrian structure incurs and the appropriate way to represent the complex structures within the hydraulic model.

3.3 Green Bridges cumulative flood impact assessment

Arup was engaged by BCC to undertake a cumulative flood impact assessment of the network of Green Bridges proposed across the Brisbane River and Breakfast Creek.

As part of these works, Arup undertook a model development task where all new river structures including ferry terminals and pontoons/riverwalks that are part of the River Access Network were included. Undertaking this task throughout the entire river reach has provided an understanding of the typical afflux extents seen because of the construction of structures which interact with the fringes of the main river channel.

4. Kangaroo Point Riverwalk TUFLOW model

4.1 KPRW TUFLOW model overview

The Kangaroo Point Riverwalk TUFLOW model has been developed based upon the BRCFS model. The BRCFS model is a catchment wide flood model with a 30m grid size. To assess the proposed KPRW design more reliably, this model has been trimmed and refined to simulate on a 10m grid size.

The BRCFS model was cutdown to the relevant extent to assess the study area without then hydraulic behaviours being influenced by upstream or downstream boundary conditions.

A summary of the updated base case TUFLOW model is shown in Table 2. An overview of the model set up is shown in Figure 4.

Table 2: Kangaroo Point Riverwalk TUFLOW hydraulic model summary

Parameter	Information
AEP Events Assessed	5% AEP and 1% AEP
Durations Assessed	Critical durations as per BRCFS model outputs (48hr event for 5% AEP and 96hr event for 1% AEP).
Hydrologic Modelling Approach	Inflows sourced from BRCFS model Plot Outputs
TUFLOW version	2020-10-AD-iSP-w64
Solver	TUFLOW HPC GPU
Model Extent	Refer to Figure 4.
Grid Size	10m x 10m
Topographic Data	5m LiDAR (2014) and 2020 Bathymetric Data
Roughness	As per BRCFS
Eddy Viscosity and Turbulence	Wu 3D
Downstream Model Boundary	HT
Hydraulic Model Time Step	Adaptive time step (HPC GPU)
Modelled Scenarios	Existing Case (E01) and design case (KRW01).
Layered Flow Constriction Approach	Method C

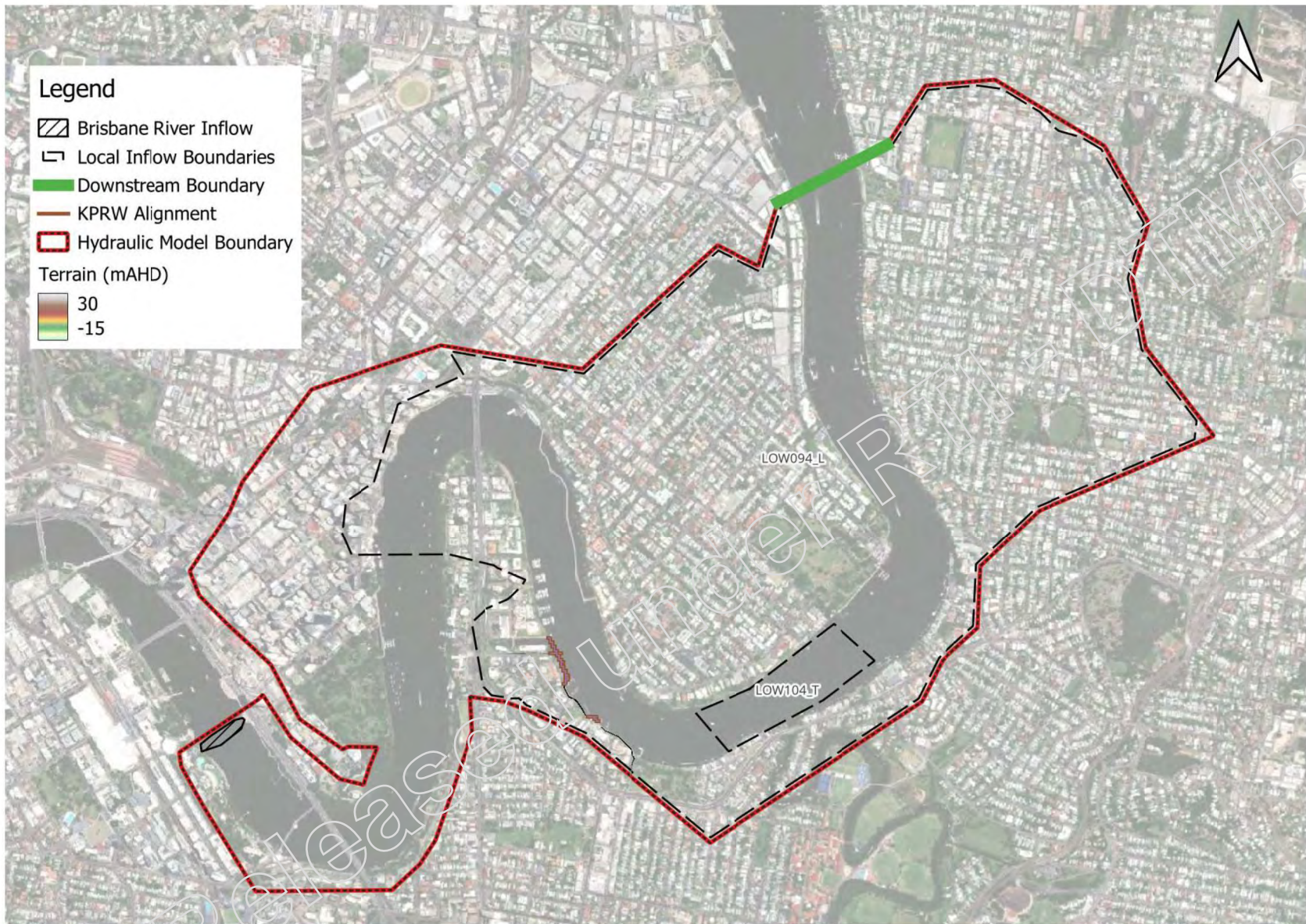


Figure 4: KPRW TUFLOW model schematic

4.2 Model extent

The cutdown model covers the river reach from the South Bank Ferry terminal to around the Teneriffe Ferry terminal. This provides approximately 3.5km both upstream and downstream from the project extents.

4.3 Model boundary conditions

The hydraulic model contains three boundary conditions. The inflow polygon shown at the upstream end of the hydraulic model is the primary Brisbane River inflow. This has been extracted from the BRCFS model.

Secondary inflows have also been applied within the hydraulic model to represent both the Norman Creek inflow and the local catchment inflow for the CBD area. These inflow boundaries have been shown in Figure 4.

The downstream model boundary is a constant height-time (HT) boundary. The BRCFS model utilises a varying HT tidal boundary. To facilitate faster and more stable model simulation, a constant tailwater level has been adopted which aligns with the tidal level at the time of the peak inflow as per the BRCFS downstream boundary files. The main inflow and outflow boundaries for the 5% AEP event and the 1% AEP event are shown in Figure 5 and Figure 6.

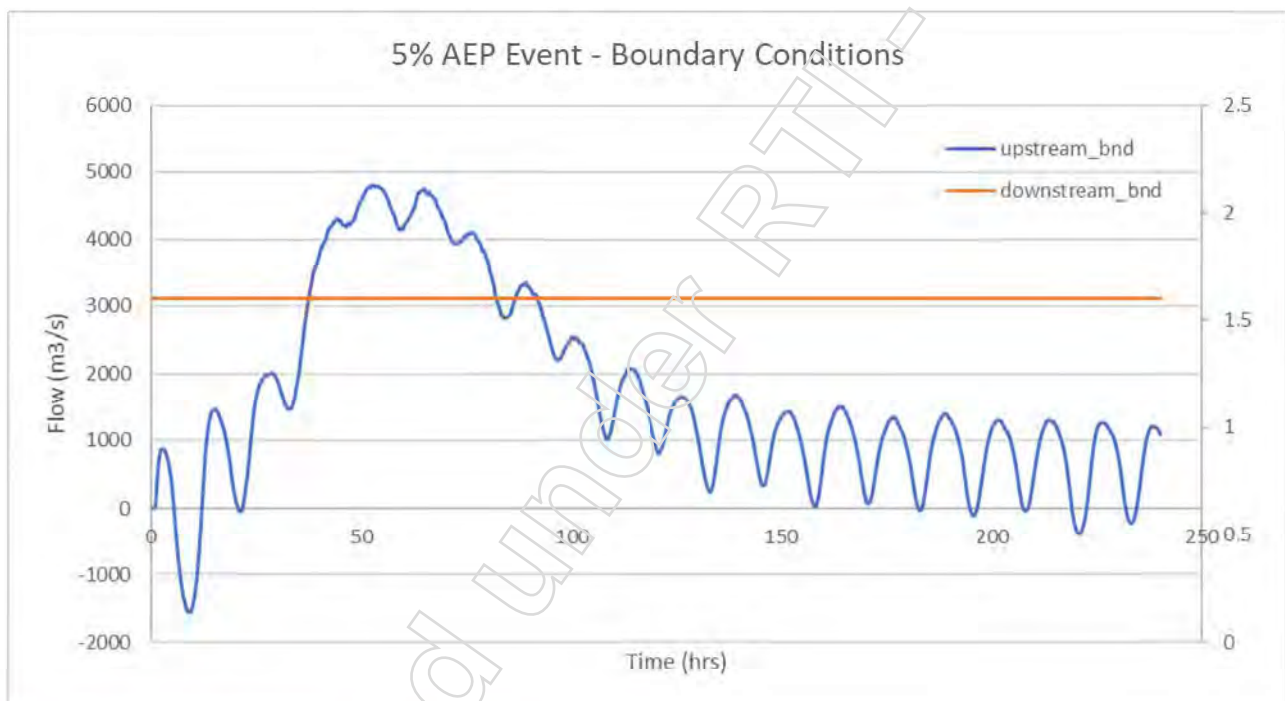


Figure 5: 5% AEP Event – Hydraulic model boundary inputs

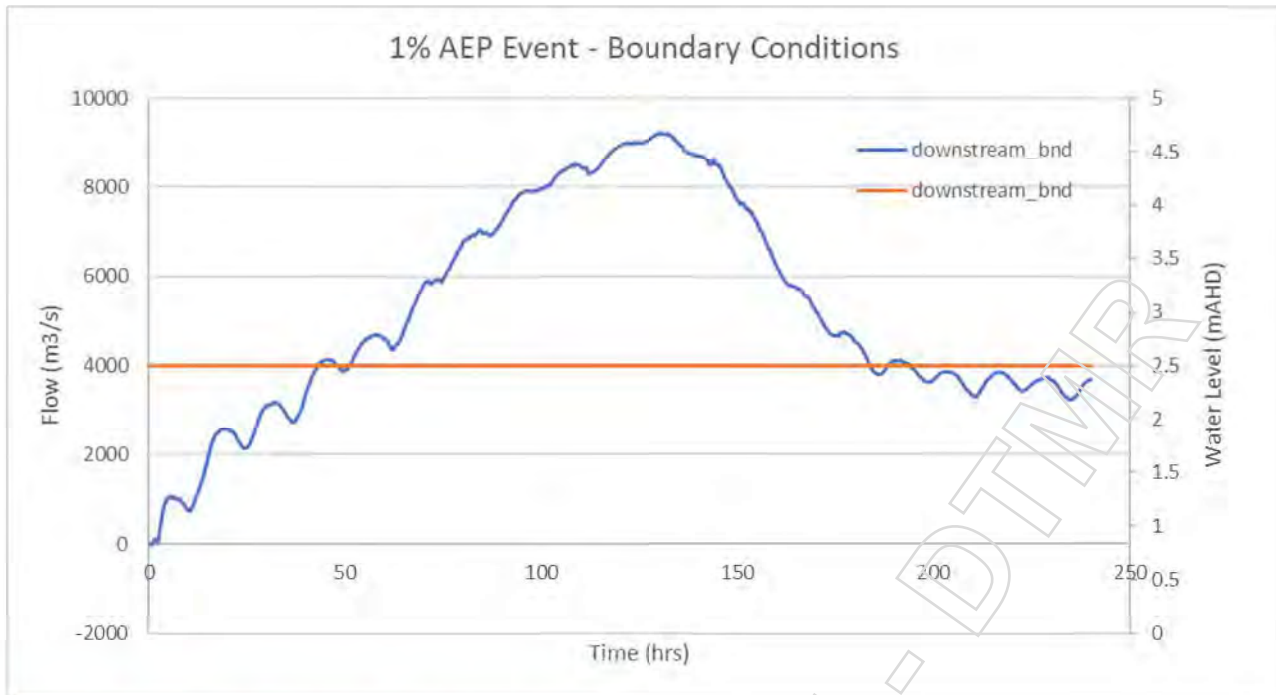


Figure 6: 1% AEP Event – Hydraulic model boundary inputs

4.4 Model topography

The model topography utilises the same data sets as the BRCFS model (2014 LiDAR and 2020 Bathymetric data).

4.5 Initial water level

The initial water level has been set to automatic within the hydraulic model. Consequently, this applies the constant tailwater level as shown in Figure 5 and Figure 6 as the initial water level.

4.6 Validation against full Brisbane River flood model

To ensure that the cutdown model for the Kangaroo Point Riverwalk was adequately representing the broader BRCFS model levels, a comparison of flood levels for the 5% AEP and 1% AEP events was undertaken. A long section was extracted along the centre of the river channel for the length of the cutdown model extent (approximately 9000m). This long section is shown in Figure 7.

For both the 5% AEP event and the 1% AEP event, the cutdown model is within 300mm of the BRCFS model. For the 5% AEP event, the KPRW model yields higher levels than the BRCFS whereas for the 1% AEP event, the KPRW model produces levels lower than the BRCFS model. As per the Figure 7, the elevation of the channel bed is typically around -15mAHD. Consequently, the water depth for the 5% AEP and 1% AEP event is approximately 16m and 18m respectively. Therefore, a difference of 300mm equates to a percentage difference in flood depths for the 5% AEP and 1% AEP events of 1.8% and 1.7% respectively. This difference is sufficient evidence for the cutdown model validation at this concept design stage of the project.

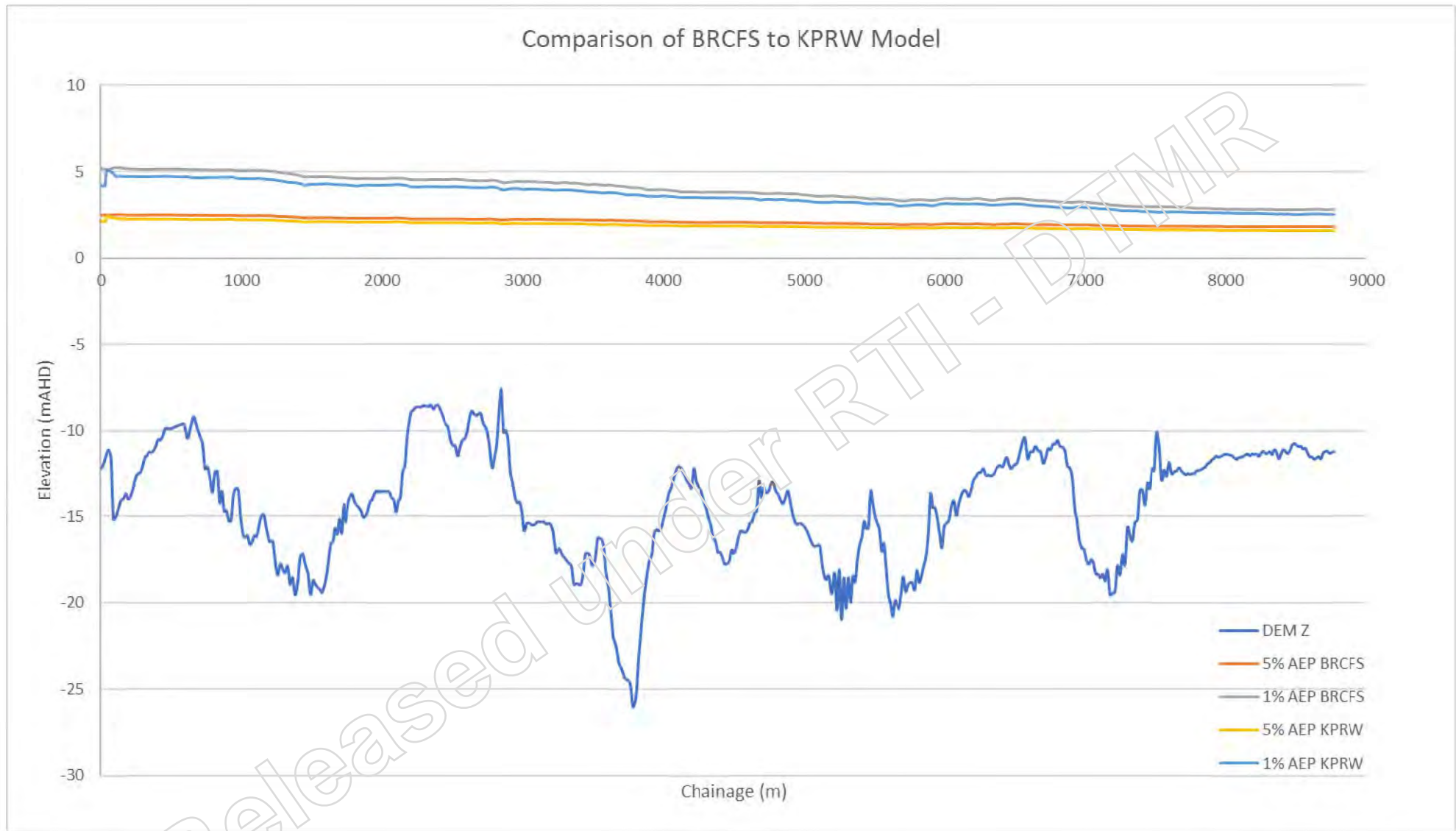


Figure 7: Comparison of BRCFS and KPRW flood levels

5. KPRW representation within TUFLOW model

5.1 General representation of bridge structures – form loss and blockage

The bridge structures are typically represented in TUFLOW as a 2D layered flow constriction ‘2d_lfesh’, following the alignment of the proposed bridge structure. However, the values for the losses vary across the watercourse to account for the density of features in certain parts of the cross-section along the bridge alignment.

Generally, the following approach was applied:

- Layer 1 represents the piles, pile cap, and the piers.
- Layer 2 represents the deck.
- Layer 3 represents the handrails.
- Layer 4 represents an unimpeded layer above Layer 3 (water flows unimpeded by blockage or form loss) which does not require user specification.

The application of the layered flow constriction parameters was uniform across the river/creek for Layer 2 and Layer 3, with Layer 1 being divided into zones depending on the bridge substructure and where the piers are located.

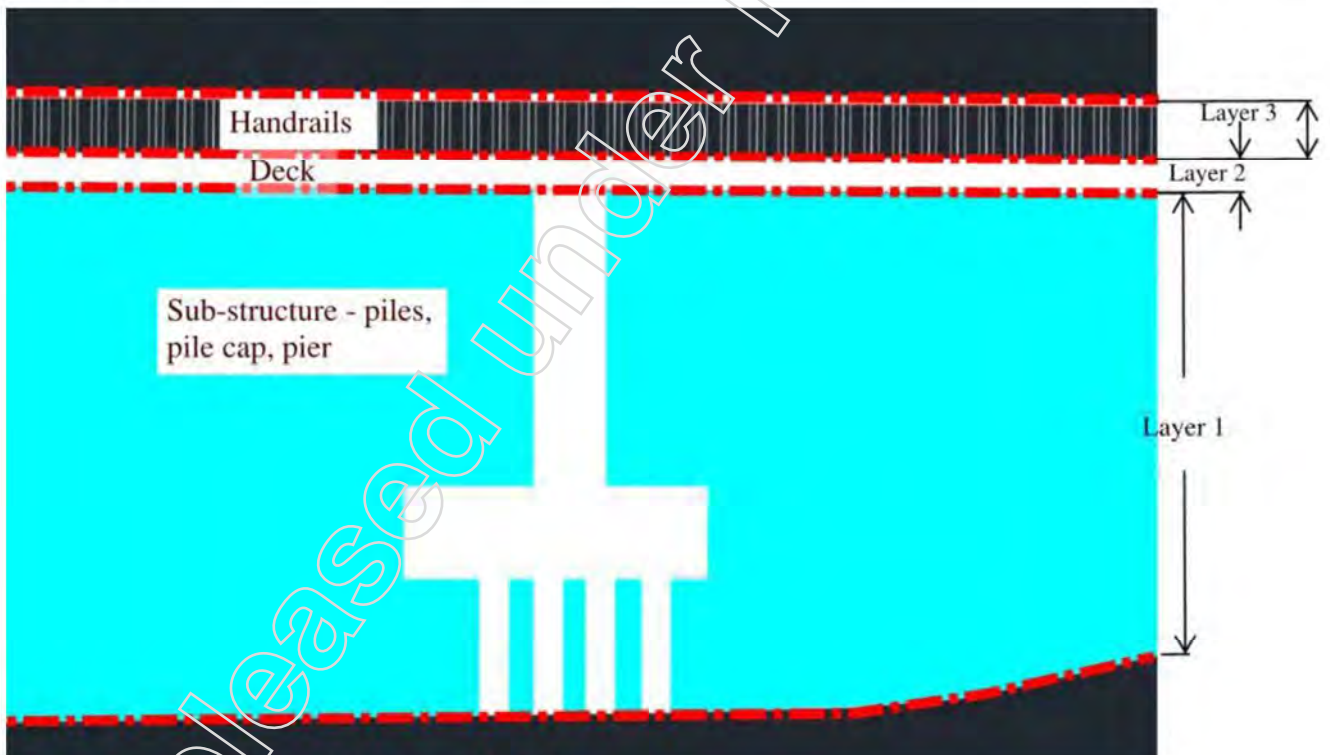


Figure 8: Layered flow constriction layers for a bridge

5.2 Representation of the KPRW alignment

The KPRW alignment consists of segments both on the riverbank and on structure over the river. Where the alignment is on land, the design surface is represented through a Digital Elevation Model which is read directly into the TUFLOW model. The DEM defines the elevations of the cells within the hydraulic model to represent the design levels. Where the design is on structure over the river, the alignment is represented through use of layered flow constrictions as was described in Section 5.1.

The KPRW alignment meets a 10% AEP immunity level, with most of the bridge soffit also being clear of the flood surface. There are only two spans where the flood surface is against the bridge soffit, however this is due the tie in levels of the existing surface. The two locations where the soffit is marginally below the 10% AEP flood level is at Castlebar Cover and the northern side of the Dry Dock (Riverside Promenade).

Along the proposed KPRW alignment, there are three separate pier structures which can be seen in the structural concept design drawings. For each substructure type, a Layer 1 FLC has been calculated based upon the proportion of waterway blockage per grid cell width (i.e. 10m) due to the proposed substructure. The various substructure sizes and relevant L1 FLC value (based upon the 10m grid size) is summarised in Table 3.

Table 3: KPRW parameter summary – Layer 1 form loss coefficients

KPRW Section	Substructure Obstruction	Schematisation Approach	Adopted FLC for L1
1	1 x 1200 Column	LFCSH	0.17 (12% Blockage)
2	1 x 1500 Column	LFCSH	0.2265 (15% Blockage)
3	2 x 900 Column	LFCSH	0.279 (18% Blockage)

Whilst the L1 FLC parameters varied based upon substructure type, the remainder of the LFCSH parameters were more consistent. The remaining 2d LFCSH parameters are defined in Table 4. The LFCSH approach which has been adopted within the KPRW TUFLOW model is Method C, as it is more relevant to overtopped structures. Note that the default approach for the version of TUFLOW being utilised (2020-10-AD) is Portion (or method B).

Table 4: KPRW form loss and blockage parameters

LFC input variable	Value
Layer 1 obvert	Bed level
Layer 1 blocked ratio	0%
Layer 1 Form Loss	As per Table 3
Layer 2 obvert	Varies as per points shown in Figure 9
Layer 2 blocked ratio	100%
Layer 2 Form Loss	1.5625
Layer 2 depth	Generally 1.05m with some sections 1.25m
Layer 3 blocked ratio	20%
Layer 3 Form Loss	0.3
Layer 3 depth	1.45m

The representation of the proposed design within the hydraulic model is shown in Figure 9.

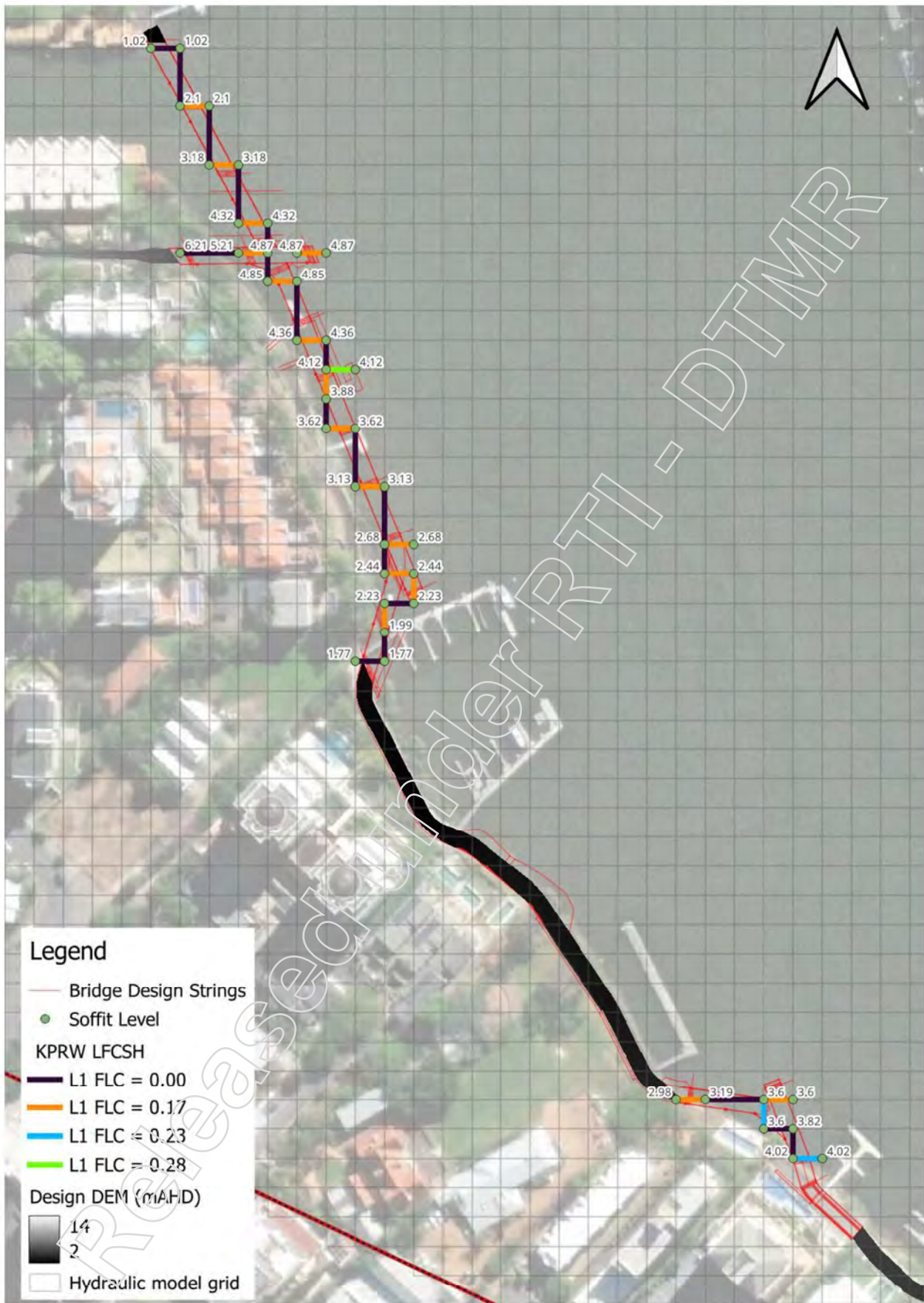


Figure 9: KPRW TUFLOW sub-model schematisation

6. Flooding impacts

The hydraulic model has been used to simulate both the 1% AEP and 5% AEP events for the existing case and design case scenarios. Afflux grids have then been produced for both the 1% AEP and 5% AEP events to determine the difference in peak flood surface because of the proposed design.

The afflux result for the 1% AEP event is shown in Figure 10 and Figure 11, with the two figures presenting a local and regional viewport respectively. The afflux result for the 5% AEP event is shown in Figure 12. General observations are as follows:

- In the 5% AEP event, the proposed design would have negligible impacts, with the difference in peak flood levels being within 10mm of the existing conditions (i.e. afflux of less than 10mm). This behaviour is likely to be similar in other minor AEP events.
- In the 1% AEP event the proposed design would result in afflux of between 10mm and 20mm which propagates up to around the Story Bridge as per Figure 11. Note there is a localised location of high afflux in the Eagle Street area which is due to an edge effect within the hydraulic model (i.e. that afflux is an anomaly). This representation can be refined at latter design stages, and it is likely that this afflux would not appear once more detail is included in the flood model at this location.
- The afflux predicted in the 1% AEP event (shown in Figure 10 and Figure 11) may have minor impacts to a few properties, however this can be further investigated and optimised in subsequent design stages. The key properties of interest are on the southern end of the new farm riverwalk, where afflux values of around 12mm are expected, and on the inside bend of the river opposite Eagle Street, where similarly approximately 10mm to 12mm of afflux is predicted.
- In the 1% AEP event, minor reductions in flood levels are observed on the downstream side of protrusions into the river. This can be seen in Figure 10.

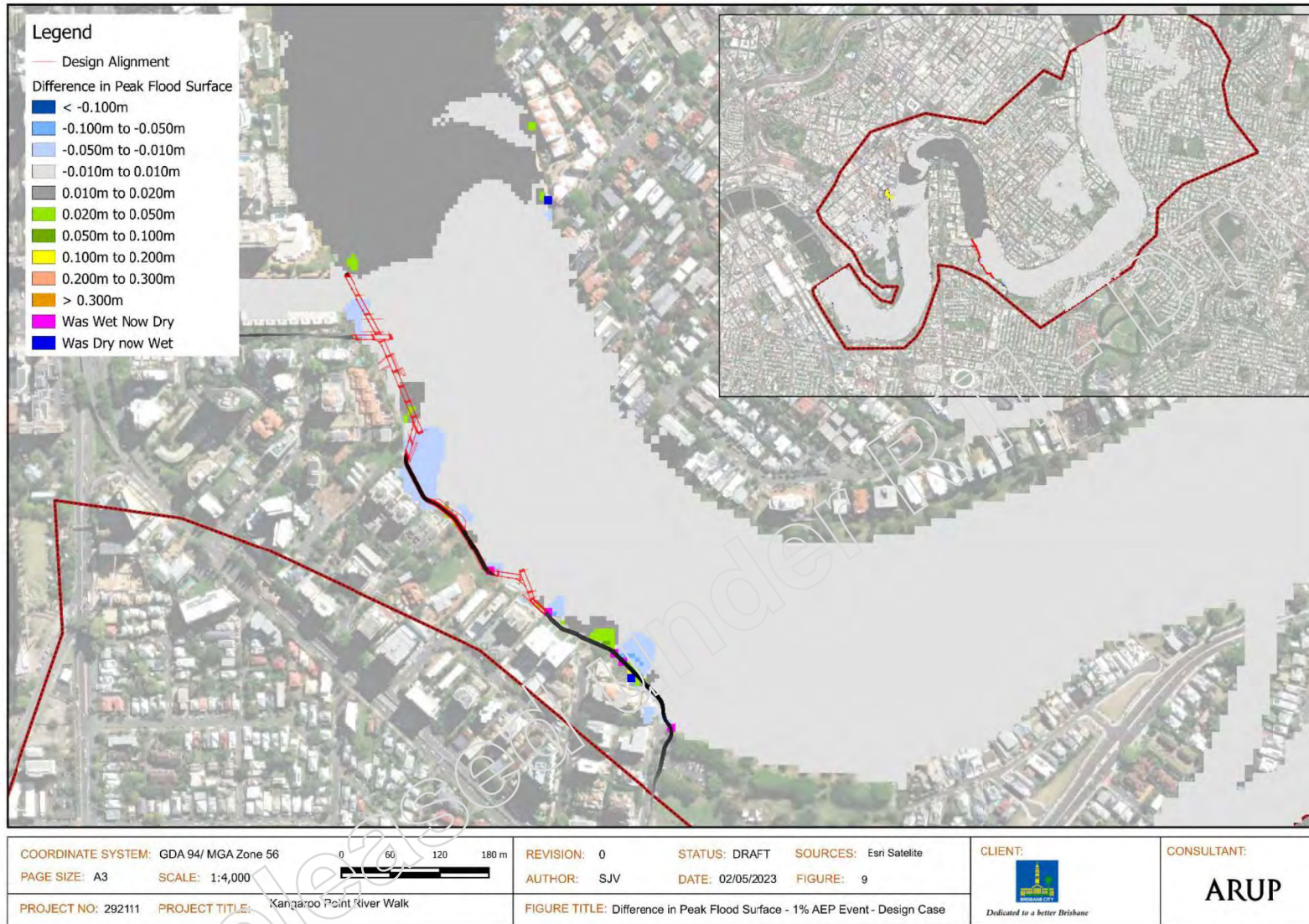


Figure 10: KPRW 1% AEP local peak level afflux

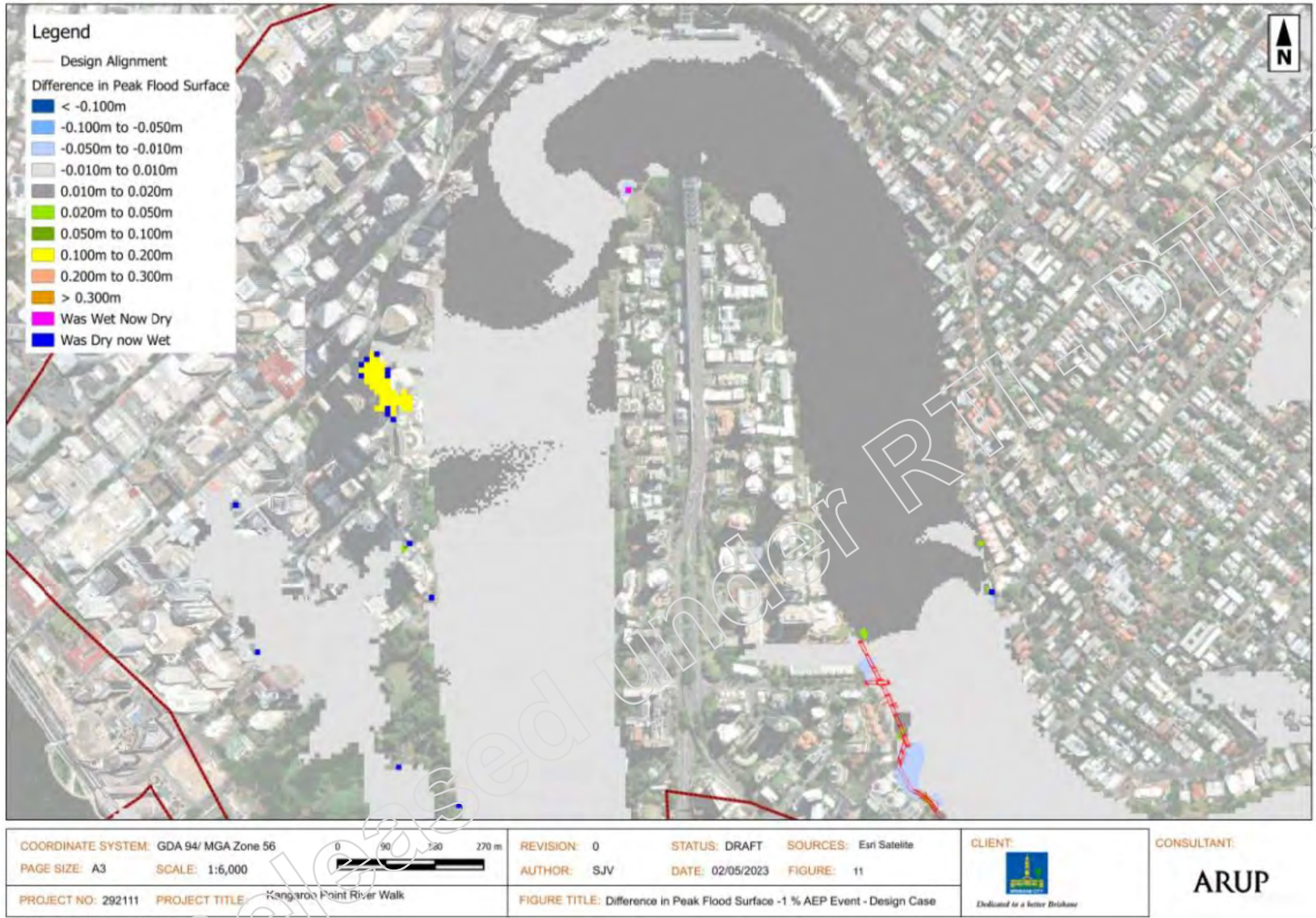


Figure 11: KPRW 1% AEP regional peak level afflux



Figure 12: KPRW 5% AEP local peak level afflux

7. Reliance statement

The sole purpose of this report and the associated services performed by Arup is to undertake a flood impact assessment of the proposed Kangaroo Point Riverwalk in accordance with the scope of services set out in the contract between Arup and Council.

In preparing this technical note, Arup has relied upon, and presumed accurate, information (or confirmation of the absence thereof) provided by Council and/or from other sources. Except as otherwise stated in the report, Arup has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate, or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Arup derived the data from information sourced from Council and/or available in the public domain at the time or times outlined in the technical note. Note that the BRCFS data used by Arup for the study includes the limitations outlined in Section 10 of the BRCFS Technical Summary Report.

The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations, and conclusions expressed in the technical note. Arup has prepared this technical note in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures, and practices at the date of issue of this technical note. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in the technical note, to the extent permitted by law.

All flood models, whether numerical, analytical, or physical, rely on a set of assumptions and requirements to accurately simulate the flow conditions. As no model will provide an exact representation of the complexity of the actual flow, it is important for engineers to understand these assumptions, as they form the limitations of that method. Ignoring or violating these assumptions and limitations or failing to critically analyse the model will produce inaccurate results.

No responsibility is accepted by Arup for use of any part of this technical note in any other context. This modelling data has been prepared on behalf of, and for the exclusive use of Council, and is subject to, and issued in accordance with, the provisions of the contract between Arup and Council. Arup accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this technical note by any third party.

8. Summary

An impact assessment has been undertaken for the concept design of the Kangaroo Point Riverwalk utilising a cut-down version of the BRCFS model developed specifically for this assessment.

The cut-down model has been developed to enable simulation of the Brisbane River within the specific reach from South Bank ferry terminal through to the Teneriffe ferry terminal, which encompasses the project footprint. By adopting the smaller model domain, a finer grid size / model resolution can be adopted which enables better representation of the proposed design.

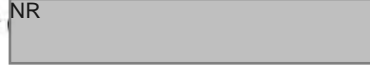
The cut-down model was utilised to simulate both the 1% AEP and 5% AEP events for both the existing case and design case scenarios. The results from the simulations have been used to produce peak afflux grids for both the events simulated, which were shown in Figure 10 and Figure 12.

The peak afflux results observed for the 5% AEP events indicate that the proposed riverwalk alignment has negligible impacts on flood behaviours in minor events based upon its current design status. However, the peak afflux results observed for the 1% AEP event indicates that there is a potential for minor afflux on a small number of properties located either at the southern end of the New Farm Riverwalk, or on Kangaroo Point opposite Eagle Street Pier. This afflux is minor, in the order of 10-12mm, and can likely be mitigated in subsequent design stages.

Released under RTI

C.3 Road Safety Audit Report

Appendix B of the *Technical Assessment Working Paper* NR



Released under RTI - DTMR

Brisbane City Council

Kangaroo Point Riverwalk Options Analysis and Concept Design

Existing Conditions Road Safety Audit

Reference NR [redacted]

Rev 2 | 12 May 2023



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This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number NR [redacted]

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Document Verification

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Name	NR		
Signature			

2	12 May 2023	Filename	NR
		Description	Body of report unchanged from previous version. Designer responses added to Appendix A.

	Prepared by	Checked by	Approved by
Name	NR		
Signature			

		Filename	
		Description	

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1. Introduction

Arup has been engaged by Brisbane City Council (BCC) to undertake an Options Analysis (OA) and Concept Design (CD) for the Kangaroo Point Riverwalk project.

The Kangaroo Point Riverwalk project will connect Captain Burke Park in Kangaroo Point and Mowbray Park in East Brisbane with an unbroken cyclist and pedestrian path. This project aims to address the “missing link” in the existing cycling and pedestrian network, as identified by the cycling community, the Department of Transport and Main Roads (TMR) and BCC.

Arup has been commissioned to undertake a Road Safety Audit (RSA) of the existing conditions to identify potential safety issues and inform the options analysis process. This report documents the RSA findings.

1.1 Study area

The study area considered as part of the RSA is shown in Figure 1 below, with the study area encompassing the Kangaroo Point Riverwalk project area between Captain Burke Park in the north and Mowbray Park in the south. The RSA study area includes the off-road shared path along Shafston Avenue. The study focuses on issues pertaining to active transport users and the study largely excludes roadways.

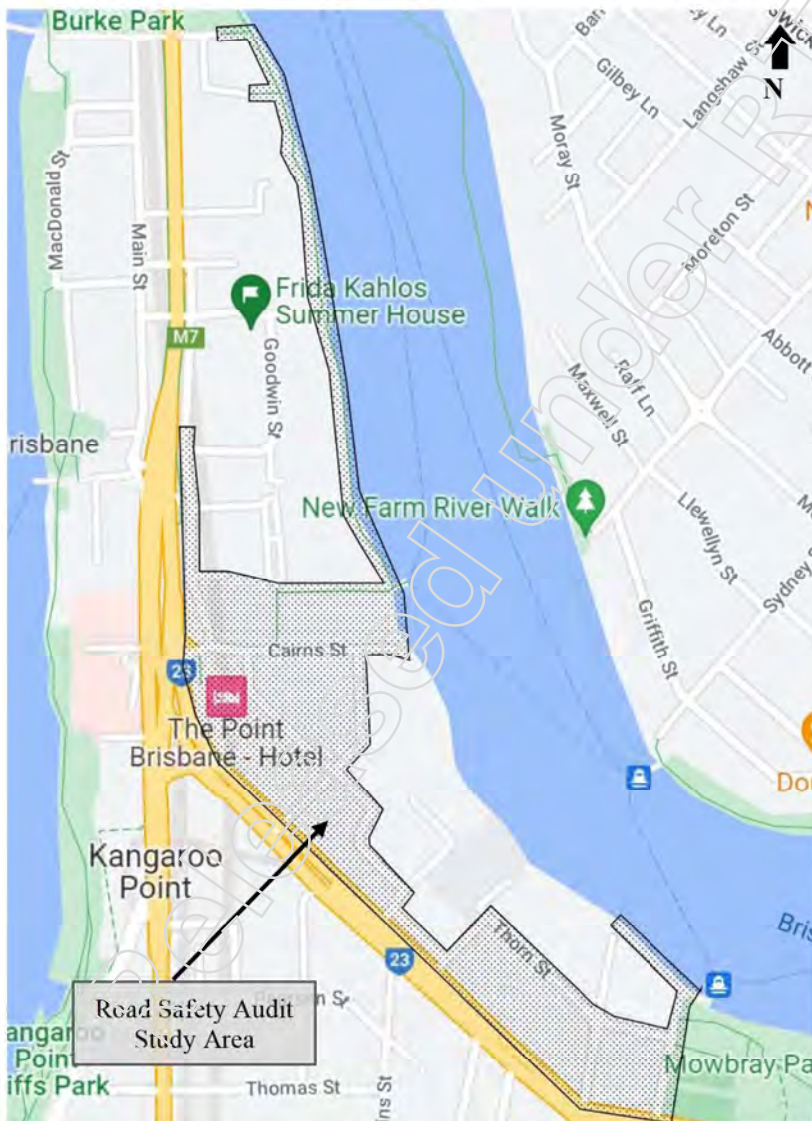


Figure 1: Overview of RSA study area

2. Audit process

2.1 The road safety audit

The *Austrroads Guide to Road Safety Part 6: Road Safety Audit (2022)* defines an RSA as a:

“formal examination of a future road or traffic project or an existing road or road related area, in which an independent, qualified team reports on the project’s crash potential and actual safety performance respectively.”

An audit is not a check against the design standards and does not imply compliance with the standards, which may represent the minimum requirements. The essential elements of this definition are that the audit:

- is completed by an independent and qualified audit team;
- considers the safety of all road users (unless specified within the audit brief), crash types and severities;
- is aligned with the Safe System principles which focuses on eliminating fatal and serious injury crash potential; and
- can be conducted on proposed or existing roads.

The objective of an RSA is to identify foreseeable hazards for all users. It does not guarantee safety. The RSA process provides a reasonable, but not absolute, hazard identification method for all road users with a particular focus on the reduction in fatal and serious injuries (FSI).

The benefits of conducting RSAs include:

- the exposure of road users to safety risks can be reduced;
- the likelihood of crashes on the road network can be reduced; and
- the severity of crashes that occur can be reduced.

2.2 Limitations of road safety audit

Whilst RSAs are detailed in some respects, they represent a relatively brief assessment of a road network or of an associated feature and are not intended to extend to or investigate every aspect which may potentially have some level of influence on road function or safety.

It should not be expected that a review has been carried out in relation to issues requiring specific verification testing in order to confirm conformity with all of the relevant (and possibly exacting) standards, or where a level of detailed investigation is required that is inconsistent with the general audit process.

In an audit it may be appropriate to ensure the existence of aspects such as roadway lighting, but the actual levels or quality would not be verified in absolute terms.

In general, auditors are unfamiliar with the roads under review and may be unaware of all of the circumstances of use of a road or all of the conditions that exist from time to time (e.g. specific traffic manoeuvres, sun glare from a building during a short period of the day).

2.3 Audit team

This RSA was undertaken by:

- Audit team lead - ^{NR} [redacted] (Associate Principal Traffic Engineer);
- ^{NR} [redacted] (Associate Civil Engineer); and
- ^{NR} [redacted] (Traffic Engineer)

Both ^{NR} [redacted] are registered as Senior Road Safety Auditors on the TMR Road Safety Auditor Register.

2.4 Information sources

References used for the RSA include:

- Austroads Guide to Road Safety
- Austroads Guide to Road Design
- Austroads Guide to Traffic Management
- TMR Road Planning and Design Manual
- TMR Manual of Uniform Traffic Control Devices (MUTCD).

2.5 Inception meeting

An inception meeting was held on 26 October 2022 between [redacted] (Transport Lead) from the project design team [redacted] from the audit team. As part of the inception correspondence a map of the subject area indicating required extents and relevant design team site visit reports were provided to the audit team.

2.6 Site visit

A day site visit was conducted on Wednesday 2 November 2022 and a night site visit on Thursday 3 November 2022 to assess the existing conditions in the study area. The day inspection was between 11.00am – 2.00pm. The night inspection was between the hours of 7.00pm – 8.00pm. The weather conditions on both site inspections were clear.

All traffic movements were recorded with a dash cam video. The road area was also inspected on foot during the daytime inspection only. Photographs were taken of particular locations during the site inspections.

These inspections form the basis of the audit finding, which are detailed in subsequent sections of this report.

2.7 Methodology

This RSA was carried out to review the preliminary design in the vicinity of the site and its potential to compromise road user safety, including vulnerable road users. It was undertaken in accordance with the practices outlined in the *Austroads Guide to Road Safety Part 6: Road Safety Audit* (2022). The audit covers physical features of the existing network which may affect road user safety and it has sought to identify potential safety deficiencies.

However, the auditors point out that no guarantee is made that every deficiency has been identified. Further, if all recommendations in the report were to be followed, this would not guarantee that the existing roads are 'safe' rather the adoption of the recommendations should improve the level of safety of the roads.

Safety deficiencies identified in this report have been rated based on the likelihood and severity of a traffic accident resulting from the identified issue as described in Table 1, Table 2, Table 3 and Table 4. These tables have been produced from *Austroads Guide to Guide to Road Safety Part 6: Road Safety Audit* (2022).

Table 1 Likelihood

Frequency	Description
Almost Certain	Occurrence once per quarter
Likely	Occurrence once per quarter to once per year
Possible	Occurrence once per year to once every three years
Unlikely	Occurrence once every three years to once every seven years
Rare	Occurrence less than once every seven years

Table 2 Severity Guidance

		CRASH SPEED (km/h)									
		<10	10	20	30	40	50	60	70	80	90
Crash type	Pedestrian (vs HV)										
	Cyclist (vs HV)										
	Motorcyclist (vs car)										
	Pedestrian (vs car)										
	Cyclist (vs car)										
	Pole/Tree Impact (car)										
	Motorcyclist (vs car)										
	Side Impact (HV vs car)										
	Side Impact (car vs car)										
	Head On (HV vs car)										
Head on (car vs car)											

The information contained within the severity guidance sheet is a general indication only.

Table 3 Resulting level of risk

			Severity				
			Insignificant	Minor	Moderate	Serious	Fatal
			Property damage	Minor first aid	Major first aid and/or presents to hospital (not admitted)	Admitted to hospital	Death within 30 days of crash
Likelihood	Almost Certain	One per quarter	Medium	High	High	Extreme (FSI)	Extreme (FSI)
	Likely	Quarter to 1-year	Medium	Medium	High	Extreme (FSI)	Extreme (FSI)
	Possible	1 to 3 years	Low	Medium	High	High (FSI)	Extreme (FSI)
	Unlikely	3 to 7 years	Negligible	Low	Medium	High (FSI)	Extreme (FSI)
	Rare	>7 years	Negligible	Negligible	Low	Medium (FSI)	High (FSI)

Table 4 Corresponding priorities for mitigation

Risk	Description
Negligible	No action required
Low	Should be corrected or the risk reduced if the treatment is low cost
Medium	Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high
High	Should be corrected or the risk significantly reduced, even if the treatment cost is high
Extreme	Must be corrected regardless of cost

Possible actions have been suggested for the identified deficiencies. These should be considered as a guide to assist with the investigation of remedial measures.

2.8 Interpretation of audit results

As set out in the RSA guidelines, responsibility for the RSA always rests with the road controlling authority and not with the auditor. An asset owner is under no obligation to accept all the of audit recommendations. Also, it is not the role of the auditor to agree to or approve of the asset owner’s response to the audit. Rather, the audit provides the opportunity to highlight potential safety issues and have them formally considered by the asset owner, in conjunction with all other asset considerations.

Released under RTI/OTMR

3. Audit findings

3.1 Summary of findings and recommendations

A summary of the findings and their subsequent risk rating is listed below in Table 5 with a detailed description of each finding presented in Appendix A. The findings are not presented in order of relative safety, importance, priority for treatment, or chainage.

Table 5 Summary of audit findings

Item	Finding	Risk Rating
1	TGSI at driveways	Low
2	Edge drop-off of footpaths	Medium
3	Direction of kerb ramps	Medium (FSI)
4	TGSI at crossings	Low
5	Speed advisory signage	High (FSI)
6	Pedestrian refuge islands	Medium
7	Lighting	High
8	BAZ Symbols	Medium
9	Ponding water	Low
10	Missing fencing along riverside of walk	High (FSI)
11	Sharp connection from Rotherham Street	Low
12	Effective width of Dockside Walk	Medium
13	Speed signage on Dockside Walk	Medium
14	Interaction of marina servicing and pedestrians/cyclists	Medium
15	Ramp gradient on Dockside Walk at Ferry Street	Low
16	Electrical cabling on Dockside Walk	Medium
17	Conflicting cyclist signage on Dockside Walk	Low
18	Obstructions at entry ways to Dockside Walk	Medium
19	Narrow connection between Ferryman's Bridge and Dockside Walk	Medium
20	CPTED issues at Cairns Street entrance to Ferryman's Bridge	Medium
21	Narrow cross-section at Deakin Street / Darragh Street	Medium
22	Line marking at Deakin Street / Darragh Street	Medium
23	Lack of speed controls for cyclists	Low
24	Pole overhanging Deakin Street	Medium
25	Redundant kerb ramp at Ferry Street	Low
26	No separation of footpath on Deakin Street	Medium

Item	Finding	Risk Rating
27	Vertical wall on Deakin Street	Medium
28	Lack of pedestrian crossing facility across Deakin Street at Cairns Street	High
29	Missing footpath on Prospect Street	Low
30	Narrow footpath on Prospect Street	Low
31	Grades at Deakin Street / Prospect Street intersection	Low
32	Reverse out driveways on Cairns Street	High (FSI)
33	Lack of wayfinding guidance for path users	High (FSI)
34	Pedestrian crossing on Cairns Street	Medium
35	Pedestrian crossing southbound left turn slip lane from Shafston Avenue	High (FSI)
36	Pedestrian crossing southbound left turn slip lane from Deakin St	High
37	Storage lanes at Cairns Street intersection	Medium
38	Storage lanes at Cairns Street intersection	High (FSI)
39	Pedestrian crossing on Cairns Street	High (FSI)
40	Driveway / parking / cyclist conflicts on O'Connell Street	Medium
41	Parking blocking visibility on O'Connell Street	High
42	Lane widths at O'Connell Street / Lambert Street intersection	High (FSI)
43	Overgrown foliage on O'Connell Street	Low
44	Kerb ramps and TGSI at O'Connell Street / Shafston Avenue	Medium (FSI)
45	Midblock pedestrian crossing on Lambert Street	Medium
46	Midblock pedestrian crossing visibility on Lambert Street	High
47	Horizontal rail fencing on Lambert Street	Medium (FSI)
48	Overhanging foliage on Shafston Avenue shared path	Low
49	Signage reducing path width of Shafston Avenue shared path	Medium
50	Bus stop on shared path	Medium
51	No signage indicating shared path	Low
52	Gantry sign and barrier	Medium
53	Narrow footpath on Castlebar Street	Low
54	Signage reducing path width of Shafston Avenue Service Road	Low
55	No separation of footpath on Shafston Avenue Service Road	Medium
56	Contraflow bicycle lane on Shafston Avenue Service Road	High (FSI)
57	Pavement arrows at intersection of Shafston Avenue Service Road and Castlebar Road	Low

Item	Finding	Risk Rating
58	Crossing on Thorn Street	Low
59	Phone booth on footpath on Thorn Street	Low
60	Missing kerb ramp on Thorn Street	Low
61	Parking blocking visibility on Thorn Street	Medium
62	Lane widths at Thorn Street / Wellington Road intersection	High (FSI)
63	No crossing provided on one leg of the Thorn Street / Wellington Road intersection	Low
64	No separation of footpath on Thorn Street	Low
65	Thorn Street cycle desire line across intersection	Medium
66	Overgrown foliage on Thorn Street	Low
67	Redundant kerb ramp on Wellington Road	Low
68	Lack of crossing sight distance available at Wellington Road / Shafston Avenue intersection	High (FSI)
69	Narrow footpath on Park Avenue	Low
70	Grades on Park Avenue	Medium
71	No separation of footpath on Park Avenue	Medium
72	Mowbray Park Jetty Walk conflict point with converging paths	Low
73	Obstructions within path areas	Medium

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4. Audit team statement

This RSA was carried out by the audit team based on the provided information and informed by the site inspection undertaken.

Suggested actions have been indicated, where applicable. Such actions are not likely to be the only possible measures available, therefore it is recommended that any suggested actions provided be used only as a guide, and that other treatments should be considered.

The audit findings and suggested actions included in this report have been compiled by the following persons:

NR
[Redacted]

NR [Redacted] (Associate Principal Traffic Engineer)

Senior Road Safety Auditor

Date: 28 November 2022

NR
[Redacted]

NR [Redacted] (Associate Civil Engineer)

Senior Road Safety Auditor

Date: 28 November 2022

NR
[Redacted]

NR [Redacted] (Traffic Engineer)

Road Safety Auditor

Date: 28 November 2022

Appendix A – Road Safety Audit Register

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CTPI

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C.4 Safety in design register

Appendix C of the *Technical Assessment Working Paper* NR

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CTPI

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C.5 BYDA maps

Appendix D of the *Technical Assessment Working Paper*

NR

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C.6 PUP register

Appendix E of the *Technical Assessment Working Paper*

NR

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Input data:

- Before You Dig Australia (BYDA)
- Meetings with asset owners
- Site visits

Category	Explanation
0 - None	Asset not affected.
1 - Minor	Construction over asset.
2 - Major	Construction affects multiple pits/chambers/valves.
3 - Critical	Construction requires realignment of asset.

Location	Asset Owner	Type	Affected?	Category	Details
Cairns St	APA	Gas	Yes	1 - Minor	APA has high pressure pipes running along Cairns St and connecting to Shafston Ave. 63mm and 40mm polyethylene pipes in 80mm cast iron casing.
Cairns St	BCC	Stormwater	No	3 - Critical	Stormwater drain and outlet structure at end of Cairns St to be removed. Pipe diameter 225mm, material PVC. Drainage headwall material precast concrete. New pipe to be connected to existing manhole.
Cairns St	Energex	Electricity	Yes	2 - Major	Energex owns assets below 33kV along Cairns St. Overhead electrical wires present. Planned future work at intersection of Cairns St and Deakin St. Approximately 2-3 electrical pits will have to be reconstructed to new surface level on Cairns St. 3 electrical green boys will have to be relocated.
Cairns St	NBN	Telecoms	Yes	2 - Major	Minor underground assets at Cairns St connecting to Deakin St and Lambert St. Assumed major impact as approximately 2-3 pits and 1 manhole to be reconstructed to new surface level.
Cairns St	Nextgen NCC	Telecoms	No	0 - None	Assumed that asset is not affected.
Cairns St	Optus	Telecoms	No	0 - None	Assumed that asset is not affected.
Cairns St	Urban Utilities	Sewerage and Water	Yes	1 - Minor	Sewerage and water infrastructure running along Cairns St. Sewerage infrastructure connects to properties adjacent to riverwalk and continues along the entire length of adjacent properties. Water infrastructure running along Cairns St connects to O'Connell St and Lambert St, Deakin St, and then onto Shafston Ave. 525mm sewer trunk main on Cairns St at proposed bridge abutment, structural design will need to be developed to avoid impacts to the sewer main and manhole.
Cairns St	Superloop	Telecoms	No	0 - None	Assumed that asset is not affected.
Cairns St	Telstra	Telecoms	Yes	2 - Major	Main cable located at northern end of Cairns St near Shafston Ave and Cairns St intersection. Main cable connects and runs along Lambert St. Assumed major impact as 3 pits and 2 chambers to be reconstructed to new surface level.
Cairns St	Torus Networks	Telecoms	No	0 - None	Assumed that asset is not affected.
Cairns St	TPG	Telecoms	No	0 - None	Assumed that asset is not affected.
Cairns St	Transurban	Road	No	0 - None	Assumed that asset is not affected.
Cairns St	Uecomm	Telecoms	No	0 - None	Assumed that asset is not affected.

Location	Asset Owner	Type	Affected?	Category	Details
Deakin St	APA	Gas	Yes	2 - Major	High pressure pipes running along Deakin St connecting to Cairns St and Shafston Ave (63mm PE pipe in 100mm cast iron envelope). The kerb realignment of Deakin Street will reduce the cover of the asset, which could result in the need to relocate it within the verge.
Deakin St	Aussie Broadband	Telecoms	No	0 - None	Assumed that asset is not affected.
Deakin St	BCC	Stormwater	Yes	2 - Major	Stormwater drain connections in verge of Deakin St connecting to Shafston Ave. Main connections in middle of Deakin Rd. Drainage network will be affected by new stormwater pipes and modifications to existing pits.
Deakin St	BCC	Telecoms	Yes	1 - Minor	Fibre optic cable in verge of Deakin St.
Deakin St	Energex	Electricity	Yes	1 - Minor	Energex owns underground assets below 33kV running along Deakin St and connecting to Cairns St and Shafston Ave. Most assets fall outside project extents.
Deakin St	NBN	Telecoms	Yes	1 - Minor	NBN owns minor underground assets running along Deakin St. most assets seem to fall outside project extents so there will be very little impact.
Deakin St	Nextgen NCC	Telecoms	Yes	1 - Minor	Nextgen NCC owns minor underground assets running along Deakin St and connecting to Shafston Ave.
Deakin St	Optus	Telecoms	Yes	1 - Minor	Optus owns fibre optic cables running along Deakin St and connecting to Shafston Ave. 1 manhole/pit to be reconstructed to new surface level.
Deakin St	Urban Utilities	Sewerage and Water	Yes	2 - Major	Water infrastructure (225mm diameter main) running along Deakin St and connecting to Shafston Ave and Cairns St. 4 valves and 4 hydrants will be affected. Sewerage infrastructure cuts through Deakin St at certain parts.
Deakin St	Superloop	Telecoms	No	0 - None	Assumed that asset is not affected.
Deakin St	Telstra	Telecoms	Yes	2 - Major	Major conduit bank located at intersection between Deakin St and Cairns St. Some pits may require relocation as part of the changes to the kerb alignment on Deakin Street.
Deakin St	Torus Networks	Telecoms	Yes	1 - Minor	Torus Networks own fibre optic cables running along Deakin St in a Telstra conduit.
Deakin St	TPG	Telecoms	Yes	1 - Minor	Minor AAPT power/tel cables running along Deakin St and then connecting to Shafston Ave.
Deakin St	Transurban	Road	No	0 - None	Assumed that asset is not affected.
Deakin St	Uecomm	Telecoms	Yes	1 - Minor	Uecomm owns fibre optic cables running along Deakin St and connecting to Shafston Ave.
Park Ave	APA	Gas	Yes	1 - Minor	APA has high pressure pipes running along Park Ave and connecting to Shafston Ave. 20mm polyethylene pipe in 80mm steel casing and 32mm polyethylene pipe in 63mm polyethylene casing.
Park Ave	BCC	Stormwater	Yes	2 - Major	Stormwater drain pipes running along Park Ave connecting to Lytton Rd. Drainage network will be affected by new stormwater pipes and modifications to existing pits.
Park Ave	Energex	Electricity	Yes	1 - Minor	Energex underground assets below 33kV present in some parts of Park Ave, very little impact. Overhead wires present at Park Ave.

Location	Asset Owner	Type	Affected?	Category	Details
Park Ave	NBN	Telecoms	Yes	2 - Major	Minor underground assets at west road verge running along Park Ave. Assumed major impact as approximately 4 pits to be reconstructed to new surface level.
Park Ave	Nextgen NCC	Telecoms	No	0 - None	Assumed that asset is not affected.
Park Ave	Optus	Telecoms	Yes	2 - Major	Assumed major impact as 2 manhole/pits on Park Ave to be reconstructed to new surface level.
Park Ave	Uecomm	Telecoms	No	0 - None	Assumed that asset is not affected.
Park Ave	Urban Utilities	Sewerage and Water	Yes	1 - Minor	Sewerage and water infrastructure at Park Ave. Water infrastructure runs along full extents of Park Ave. Sewerage infrastructure only at Northern and Southern sections of Park Ave.
Park Ave	Telstra	Telecoms	Yes	2 - Major	Main cable located at western road verge near Park Ave and Shafston Ave intersection. Assumed major impact as approximately 8-10 pits to be reconstructed to new surface level.
Park Ave	Torus Networks	Telecoms	No	0 - None	Assumed that asset is not affected.
Park Ave	TPG	Telecoms	Yes	1 - Minor	PIPE networks and pit running from intersection of Thorn St and Park Ave and connecting to Lytton Rd. Very minimal impact.
Park Ave	Transurban	Road	Yes	1 - Minor	Assets located in vicinity.
Park Ave	Superloop	Telecoms	No	0 - None	Assumed that asset is not affected.
Park Ave	Energex	Electricity	Yes	2 - Major	1 electrical green boy on Park Ave to be relocated.
Riverwalk	APA	Gas	No	0 - None	Assumed that asset is not affected.
Riverwalk	BCC	Stormwater	Yes	0 - None	BCC heritage stormwater drainage pipe outlet located at end of current promenade. Drainage diameter 750mm, material: polycarbonate. Headwall material: CIS concrete. Riverwalk offset from drainage outlet.
Riverwalk	Energex	Electricity	Yes	2 - Major	Energex underground asset under 33kV, running beneath river through Cairns St embankment. Advised by Energex that the asset is decommissioned, but there may still be a need to retain it for redundancy.
Riverwalk	NBN	Telecoms	No	0 - None	Assumed that asset is not affected.
Riverwalk	Nextgen NCC	Telecoms	No	0 - None	Assumed that asset is not affected.
Riverwalk	Optus	Telecoms	No	0 - None	Assumed that asset is not affected.
Riverwalk	Uecomm	Telecoms	No	0 - None	Assumed that asset is not affected.
Riverwalk	Urban Utilities	Sewerage	No	1 - Minor	Sewerage infrastructure located at adjacent properties to riverwalk. Nothing directly affected by work on riverwalk. Construction in vicinity of 525mm sewer trunk and manhole at Thorn St promenade. Structural design to be developed to avoid impact to sewer trunk and manhole. Pipe material: concrete un-reinforced.
Riverwalk	Telstra	Telecoms	No	0 - None	Assumed that asset is not affected.
Riverwalk	Torus Networks	Telecoms	No	0 - None	Assumed that asset is not affected.
Riverwalk	TPG	Telecoms	No	0 - None	Assumed that asset is not affected.
Riverwalk	Transurban	Road	No	0 - None	Assumed that asset is not affected.
Riverwalk	Superloop	Telecoms	No	0 - None	Assumed that asset is not affected.

Location	Asset Owner	Type	Affected?	Category	Details
Shafston Ave	APA	Gas	Yes	2 - Major	APA has high-pressure pipes and priority mains behind pipes along Shafston Ave. 63mm polyethylene pipe in 100mm cast iron casing 90mm polyethylene pipe in 150mm cast iron casing. Several valves will be affected due to reconstruction of footpath.
Shafston Ave	Aussie Broadband	Telecoms	No	0 - None	Assumed that asset is not affected.
Shafston Ave	BCC	Telecoms	Yes	1 - Minor	Fibre optic cables running along Shafston Ave towards T-intersection between Shafston Ave and Wellington Rd.
Shafston Ave	BCC	Stormwater	Yes	2 - Major	Stormwater drain pipes and gully pits running along Shafston Ave. New stormwater pipes will require connection to existing manholes. Existing chamber lids to be raised to new surface levels.
Shafston Ave	Energex	Electricity	Yes	2 - Major	Energex underground assets below 33kV present at both sides of Shafston Ave. Approximately 7 pits will have to be reconstructed to new surface level along Shafston Ave, 2 electrical green boys will have to be relocated.
Shafston Ave	NBN	Telecoms	Yes	2 - Major	Minor underground assets and manholes at road verge running along Shafston Ave. Assumed major impact as approximately 6 pits and 1 manhole to be reconstructed to new surface level.
Shafston Ave	Nextgen NCC	Telecoms	Yes	1 - Minor	Nextgen NCC owns minor assets connecting to Shafston Ave from Deakin St and running south until connecting into Rawlins St.
Shafston Ave	Optus	Telecoms	Yes	2 - Major	Optus owns fibre optic cables running along Shafston Ave to the intersection of Rawlins St and then connecting into Rawlins St. Assumed major impact as approximately 5 manholes/pits to be reconstructed/raised to new surface level.
Shafston Ave	Urban Utilities	Sewerage and Water	Yes	2 - Major	Water infrastructure (225/300mm diameter main) running along Shafston Ave. Water infrastructure connecting to O'Connell St, Castlebar St, Park Ave and Lytton Rd. Several valves and hydrants affected. Sewerage infrastructure connecting to Castlebar St, Thorn St, Park Ave and Lytton Rd.
Shafston Ave	Superloop	Telecoms	No	0 - None	Assumed that asset is not affected.
Shafston Ave	Telstra	Telecoms	Yes	2 - Major	Some main cables located along Shafston Ave from Thorn St to Park Ave. Assumed major impact as approximately 17 pits and 5 chambers to be reconstructed to new surface level.
Shafston Ave	Torus Networks	Telecoms	No	0 - None	Assumed that asset is not affected.
Shafston Ave	TPG	Telecoms	Yes	1 - Minor	AAPT power/tel cables running along Shafston Ave and connecting to Rawlins St. PIPE network starting North of Lambert St and Shafston Ave intersection running south along Shafston Ave and connecting into Thorn St.
Shafston Ave	Transurban	Road	Yes	1 - Minor	Assets located in vicinity. Contact Transurban for more detail on asset type as not much detail given in BYDA.
Shafston Ave	Uecomm	Telecoms	Yes	1 - Minor	Uecomm owns fibre optic cables running along Shafston Ave till the intersection of Rawlins St and then connecting into Rawlins St.

C.7 PUA meeting minutes

Appendix F of the *Technical Assessment Working Paper*

NR [Redacted]

Released under RTI - DTMR

C.8 Concept design drawings

Appendix G of the *Technical Assessment Working Paper*

NR

Released under RTI - DTMR

C.9 Improved urban design outcomes

Appendix H of the *Technical Assessment Working Paper*

NR

Released under RTI - DTMR

Released under RTI - DTMR

C.10 Stakeholder comments register

Appendix I of the *Technical Assessment Working Paper*

NR [Redacted]

Released under RTI - DTMR

Released under RTI - DTMR

C.11 Risk register

Appendix J of the *Technical Assessment Working Paper*

NR [Redacted]

Released under RTI - DTMR

Released under RTI - DTMR

C.12 Staging sketch

Appendix K of the *Technical Assessment Working Paper* (

NR [Redacted]

Released under RTI - DTMR

Released under RTI - DTMR

C.13 Cost estimate report

Appendix L of the *Technical Assessment Working Paper* NR

Released under RTI - DTMR

NN:NN:17363L002
22 June 2023

Arup
Level 4, 108 Wickham Street
Fortitude Valley QLD 4006 Australia

Attention: NR [redacted] NR [redacted]@arup.com)

Dear NR [redacted]

KANGAROO POINT RIVERWALK | CONCEPT DESIGN COST ESTIMATE

As requested, we have prepared concept design cost estimate for the Kangaroo Point Riverwalk for four stages. The table below shows the summary of our Cost Estimate. Refer to Appendix A for detailed breakdown of the Cost Estimate.

CTPI



SCOPE OF WORKS

The scope of works includes the following.

- Stage 1 – Upgrading of existing footpaths, crossings and intersections including minor landscaping and resurfacing of Deakin Street from Ferry Street to Cairns Street.

- Stage 2 – Upgrading of existing footpaths, crossings and intersections including minor landscaping and resurfacing of Shafston Avenue / Lytton Road from Cairns Street to Park Avenue.
- Stage 3 – Upgrading of existing footpaths along Cairns Street and Park Avenue including minor landscaping and road resurfacing. Upgrading of existing footpath along Brisbane River from Park Avenue to Cairns Street including construction of new bridges, micro-piling and shotcrete to land cut slope along Brisbane River.
- Stage 4 – Construction of new bridge over the Dockside Dry Dock

INFORMATION USED

Our estimates are based on the concept design documentation provided and cost estimate review comments provided by Arup on 20 June 2023.

COSTING METHODOLOGY

The Estimate is based on the options analysis and concept design documentation, bill of quantities and other clarifications provided by ARUP during the estimating process. RLB did not do quantity measurements.

The construction cost estimate is prepared and represented the following three categories:

- Direct Job Costs
- Preliminaries (Indirect Job Costs)
- Off-site Overheads and Profit

Direct Job Costs have been prepared by adopting unit rate and first principles method where applicable.

Indirect Job Cost is included to cover the cost of Contractor's project management, works management (Supervisors, administration staff, surveyors, etc.), mobilisation and demolition, site facilities establishment and operating cost, equipment idle time, consumables (stationery, miscellaneous materials), small items of plant and equipment (pumps, generators, staff vehicles, etc.), insurances and bonds, permits and fees and safety.

Contractor's Off-site Overhead and Margin is included to cover the finance such items as their corporate business unit costs and profit margin.

RLB have adopted probabilistic risk assessment model for both planned and unplanned risk using @Risk software and based on the PCEM 8th edition guidelines published by DTMR. Refer appendix B for @risk output from the risk analysis.

ASSUMPTIONS

The following assumptions have been made in the preparation of this estimate:

- All works will be undertaken by a qualified and experienced contractor
- Works will be procured under one single contract package and will be awarded to one single contractor
- The Contractor undertaking the works will have unimpeded access to the site
- It is expected that the construction area will be closed to the public while construction works are underway

- Planning and approvals will be in place before construction commencement
- All works have been allowed to be undertaken during the day except for Stage 1 (Deakin Street) and Stage 2 (Shafston Avenue / Lytton Road) which will be staged and completed during the day and night.
- Storage and site facilities areas will be provided adjacent to site free of charge and the Contractor will rehabilitate it at completion.
- Land acquisition cost as provided by Arup/BCC.
- PUP cost as provided by Arup/BCC and RLB have added preliminaries, margin and contingency.
- Traffic signal at the intersection of Deakin Street and Cairns Street is to be removed and replaced.
- Traffic signal at the intersection of Shafston Avenue and Wellington Road is to be removed and replaced.
- All bridge piling and deck works are to be installed using floating equipment
- Micropiles in drawing 4012PR are also to be installed using floating equipment due to access unavailability.
- Gabion protection works are to be delivered and installed using floating equipment
- Water depth is sufficient for barge to perform bridge piling, micropiling and gabion works.

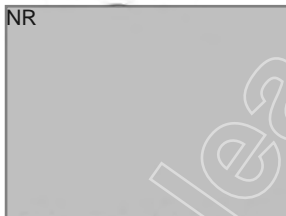
EXCLUSIONS

- Rock excavation
- Treatment and removal of contaminated materials
- Works other than specifically identified in the design documents
- Authority Fees and Charges
- Qleave
- Statutory and environmental approvals
- Goods and Services Tax (GST)

We trust this meets with your requirements, but if you have any queries or require further information, please do not hesitate to contact the undersigned.

Yours sincerely,

NR



Rider Levett Bucknall

NR

@au.rlb.com

**APPENDIX A:
CONCEPT DESIGN COST ESTIMATE**

KANGAROO POINT RIVERWALK

CONCEPT DESIGN COST ESTIMATE



LOCATION SUMMARY

Rates Current At May 2023

CTPI

