

Sydney Harbour Bridge Cycleway Northern Access Project

Response to community questions – March 2022

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Summary

This document responds to some of the queries raised by local community representatives during recent consultation on design concepts for a ramp at the northern end of the Sydney Harbour Bridge Cycleway.

It is not a full analysis of all feedback received. This will be covered in a consultation outcomes report that will be produced shortly.

Background

The Sydney Harbour Bridge cycleway provides the only cycling link between Sydney CBD and North Sydney CBD, which are the largest and third largest commercial centres respectively in NSW. It provides a vital connection between and the existing Kent Street cycleway in Sydney CBD and the Lower North Shore.

Access to the Sydney Harbour Bridge cycleway has been discussed for more than two decades, with alternatives to the 55 steps first being explored by the Office of Public Works in 1999. Over that time, the problem has not gone away. We still have a sub-standard connection to the only cross-harbour cycle route in the Eastern Harbour City, which was until very recently, the busiest route in the whole of Sydney.

In mid-2020, motivated by the documented rise of cycling and re-invigorated by Government policy to encourage more bike trips within 10 kilometres (km) of major commercial centres, Transport for NSW (Transport) took a fresh look at this problem.

From the outset, the project team has endeavoured to work closely with key stakeholders and the community to ensure the design outcomes are sympathetic and complementary to this nationally and internationally iconic site.

We have met North Sydney Council (NSC) officers, Cr Mutton, former Mayor Gibson and representatives from the Lavender Bay Precinct Committee and the Milsons Point Resident Action Group several times during the project development process. In addition, we have conducted two extensive community consultations within a six-month period. These consultations have materially influenced our course of action.

We appreciate the concerns of community members in the immediate area and the passion they demonstrate for their neighbourhood. Our objective remains to deliver a sculpturally beautiful yet functional piece of infrastructure at this important location that benefits the community and visitors and is celebrated by all Australians.

We are confident the Sydney Harbour Bridge Cycleway Northern Access Project (the Project) is based on a sound rationale, robust design excellence principles, a thorough exploration of ramp alternatives and options, and strong public support.

Responses

Access to the bike network

- The Project has long been identified as a cycling infrastructure investment priority and a critical 'missing link' in the cross-harbour bike network. It will make the cycleway accessible to a wider and more representative section of the community, transforming cycling from an activity available only to the relatively fit, to the obvious transport mode for many.
- The Project connects to Council's proposed Cycle Route 1 (which runs along Alfred Street South, crosses Lavender Street, extends up Middlemiss Street and joins the Pacific Highway to West Street) and Route 3 (in the North Sydney Integrated Bike Strategy, which links the Sydney Harbour Bridge with Cremorne, Neutral Bay and Mosman via Burton Street, Broughton Street and Kurraba Road). It will deliver the first part of Route 1 through the Alfred Street South Bike Path and integrates well with Route 3 by providing a safe connection to Burton Street.
- Many community members have suggested that the HarbourLink Project, which was proposed by North Sydney Council in 2012, would be a better way to connect the cycleway to the North Shore bike network. This proposal was admirable in intent but was untested. We have assessed and it found it to be technically unfeasible.

Safety for cyclists, pedestrians, and motorists

- The width of the Sydney Harbour Bridge cycleway currently allows two cyclists at most to safely pass each other. The existing tidal flows of users (southbound in the morning, northbound in the evening) mean there are currently plenty of opportunities for overtaking.
- We have modelled the current and potential upper limit of the cycleway. From this we know that riders could still safely overtake until such time as capacity reaches roughly four times its current capacity.
- Our proposed Alfred Street Bike Path design takes into account the Austroads guidelines for commuter cycle facilities, which are there to ensure the provision of safe infrastructure for riders and pedestrians. The design is still at an early stage and will be subject to a Safety in Design Review.

Supporting cycling growth

- Numerous data sources have been used to demonstrate both an actual demand for the Project, and latent demand that would be 'untapped', through improved access to the existing cycleway.
- The modelled upper capacity of the cycleway with a ramp is more than quadruple its current capacity with the steps. This is more than sufficient capacity to meet cycling demand over the coming decades while ensuring the safety of all users.

Impacts to heritage, open space, and views

- Transport has delivered a robust Design Excellence process which is grounded in NSW Government Policy and supported by key heritage and design experts. We have sought external challenge and input, and our process has been supported by the Government Architect NSW, Heritage NSW, and the Heritage Council Approvals Committee.

- Both a linear and looped concept were placed on public display in June 2021. The linear option received strong public support overall, and higher levels of support among the immediate community, relative to the looped option. The linear option is preferred because it is more functional for cyclists, provides better rideability and removes conflict with pedestrians in Bradfield Park and the Kirribilli markets. The linear option required considerably less ramp length and structure compared to the loop.
- The three linear design concepts placed on public display in December 2021 present considered responses to the challenge of delivering a much-needed piece of cycling infrastructure in a highly important location.
- The linear ramp will deliver minimal loss of public open space and has been designed to respond sensitively to key heritage sightlines. The visual impacts are expected to be lower, and more easily resolved and mitigated.

Data on current cycleway use

The rolling average of weekday cycle trips over a ten-year period is just below 2,000. This figure is derived from publicly available data taken between 2009-2019 from counters on the Sydney Harbour Bridge cycleway. Further clarification on this data can be found in the Livestream event Questions and Answers document placed on our engagement portal.¹

Project cost and business case

A Business Case has been developed for this project which has undergone a rigorous assurance process. It has demonstrated a healthy Cost Benefit Ratio based on independently verified project costs. The Project value will be released after the procurement of a delivery contractor has been completed.

Community engagement

We have involved stakeholders, community groups and the wider public throughout the project development and design process. Our process has been transparent and genuine. We appreciate some local community members do not want to see a bike ramp in Bradfield Park but, a vast majority of the wider public do. After more than two decades, four sets of investigations, and over 30 options explored, our investigations have demonstrated a ramp presents a technically feasible solution that will deliver significant mode-shift over the next decade and which, through Design Excellence, can respond sensitively to the context of this nationally significant location.

Ramp alternatives

Our investigations began with an exploration of lifts, elevators and putting a bike path on the deck of the bridge.

We found that lifts and elevators would reduce the existing capacity of the cycleway, fail to enhance the riding experience (critical to delivering mode-share) and would still have heritage and open space impacts. We found that a bike lane on the harbour bridge would need to operate with existing cycleway to enable a route going both north and south.

¹ <https://caportal.com.au/tfnsw/sydney-harbour-bridge-cycleway/fags> - see response to the last question

We then assessed around 30 ramps options against heritage, open space and rideability criteria to arrive at two alignment options that were consulted on in June 2021.

We have noted several alternative options put forward by the community during the consultation periods. We appreciate these contributions and have looked at them all. Unfortunately, most either fail minimum rideability requirements or would have greater open space and heritage impacts than the ramp option we are progressing.

We have also assessed a recent proposal for a looped ramp on Bradfield Park Central and have met community representatives onsite to discuss this. Unfortunately, this does not meet the rideability criteria we have set for the project.

Supporting information

Access to the bike network

Connection

The Sydney Harbour Bridge cycleway provides the only cycling link between Sydney CBD and North Sydney CBD, which are the largest and third largest commercial centres respectively in NSW. It provides a vital connection between the existing Kent Street cycleway in Sydney CBD and the Lower North Shore.

The Project links to cycle routes through the North Shore that are proposed by North Sydney Council, and which Transport is supporting Council to deliver.

Route 1 (the NorthShore Cycleway) is proposed to run between the Sydney Harbour Bridge and West Street and was described by Council as a “separated bi-directional cycleway within the existing road reserve” in its Cycling Strategy.²

The Route 1 alignment runs along Alfred Street South, crosses Lavender Street, extends up Middlemiss Street and joins the Pacific Highway to West Street. North Sydney Council consulted the community on this project in 2018. The Alfred Street bike path, which is proposed as part of the Project, delivers the first part of this route between the Sydney Harbour Bridge and Middlemiss Street.

Transport is working collaboratively with North Sydney Council to develop the plans for the section along the Pacific Highway.

The Project is also consistent with Route 3 in the North Sydney Integrated Bike Strategy, which links the Sydney Harbour Bridge with Cremorne, Neutral Bay and Mosman via Burton Street, Broughton Street and Kurraba Road. Transport provided North Sydney Council with a \$2,728,500 grant allocation to deliver this route which Council unfortunately returned to Transport for NSW in July 2021.

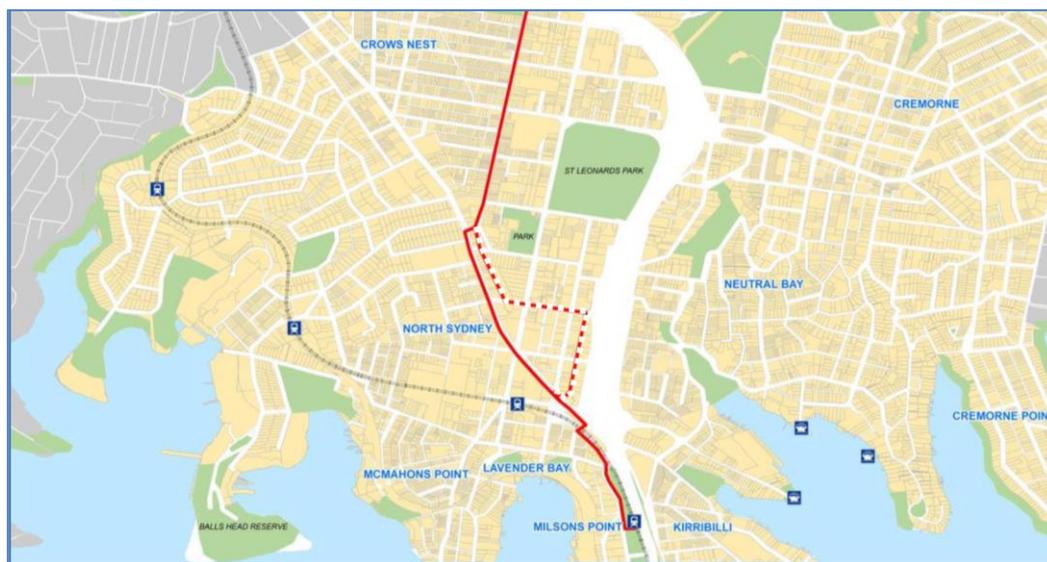


Figure 1 Alignment of the proposed North Shore Cycleway, proposed by North Sydney Council

² North Sydney Integrated Cycling Strategy, 2014, North Sydney Council and GTA Consultants, p.24

HarbourLink

Several community members have suggested that Transport should pursue the HarbourLink project³ which was put forward by Council in 2012.

The HarbourLink proposal included a business case that demonstrated the benefits of an elevated shared connection of the Sydney Harbour Bridge with Cammeray, but did not include design concepts, beyond an indicative alignment.

Transport has reviewed the proposal and identified several issues that prevented it from being developed further.

- **The Bridge cannot support cantilevered structures.** HarbourLink appeared to attach a shared path to the side of the Sydney Harbour Bridge. A Ramp Options Feasibility Study undertaken in 2012, demonstrated the bridge and masonry wall do not have adequate capacity to carry additional loads from a cantilever structure.⁴
- **The curves and gradients would be too steep.** The bend required to take the ramp under the Lavender Street viaduct would be too tight to meet the Austroads Guide to Road Design Section 5. It would also extend out over the Lane 1 Harbour Bridge off-ramp, potentially impeding traffic. Even if it were possible to bend the ramp to the east side of the Bridge viaduct, the bend to then take the ramp north would also be too sharp, and the gradient to then connect upwards to the old tramway 'stub' would be too steep to meet standards.
- **Tree impacts would be potentially significant.** HarbourLink would extend an elevated shared path through the mature tree cover in Bradfield Park North. Given it is not feasible to attach a cantilevered structure to the Bridge, the path would need to be supported by pillars running the entire length of Bradfield Park. It is likely this would require significant tree removal.
- **HarbourLink does not serve east-bound cyclists.** HarbourLink would take all cyclists to North Sydney and would not serve the 20 per cent of cyclists who currently loop back at Milsons Point to go east towards Mosman. To address this issue, the proposal would have to include a means to cross to the east of the Bradfield Highway, adding to the proposal's complexity, impact, and cost.

Accessibility

The steps at the northern end of the cycleway are an unavoidable and known impediment to accessing the Sydney Harbour Bridge cycleway. This is acknowledged in North Sydney Council's Integrated Cycling Strategy.⁵

Fit and healthy cyclists have little problem with the steps. But older bike riders, those with heavy e-bikes and Cargo bikes, disabled people on modified bikes and people cycling with children, often struggle. The bridge is used by tens of thousands of people every day. Everyone should have access to all modes of transport across the bridge.

³ www.sydneyharbourlink.com

⁴ Sydney Harbour Bridge Cycle Ramp Options Feasibility Study (2012), p.38

⁵ North Sydney Integrated Cycling Strategy, 2014, North Sydney Council and GTA Consultants, p.15

The challenges of limited access will continue to be an issue with the growth of e-bikes. Sales of e-bikes are increasing year-on-year, from about 9000 in 2016/17 to about 50,000 in 2019/2020.⁶ A conventional mountain bike weighs up to 15 kilograms and an e-bike can weigh more than 30 kilograms.

The proposed ramp is not just aimed at less able-bodied riders. The interruption presented by the steps reduces the attractiveness of cycling as an alternative to car use and acts as a deterrent for potential riders. Transport's Customer Value Proposition Research⁷ identified that nearly half of Sydneysiders fall into the 'interested but concerned' category of cyclists identified by the Portland Office of Transportation.⁸ The research also identifies uninterrupted and undisturbed travel as the most important feature to encourage cycling.

For this reason, removing the steps will facilitate a greater uptake of cycling by those who may physically be able to negotiate the steps but chose not to due to perceptions of ease, comfort, or safety.

Safety for cyclists, pedestrians, and motorists

Width of the Sydney Harbour Bridge cycleway

The SHB cycleway is generally 2.5 metres wide. This is the minimum standard for a two-way local cycle path as per the Austroads guidelines.⁹

We appreciate the minimum desirable width for a major bike path is three metres, which is the standard we aim for, for new major bike routes. Nonetheless, the existing tidal flows of users (southbound in the morning, northbound in the evening) mean there are currently plenty of opportunities for overtaking, allowing cyclists to travel largely at the speed of their choosing.

As outlined below, our modelling has demonstrated the cycleway has 'room for growth' and could cater for significantly higher numbers of bike trips before safe overtaking becomes constrained.

It should be noted the cycleway is an existing bike path and the only cross-harbour bike route in the Eastern Harbour City. Retrofitting the bridge to meet a contemporary standard would involve extensive engineering with inevitable heritage impacts or take out two lanes of traffic (see below for further explanation). This is not an approach Transport is willing to take when there is demonstrated capacity benefits to be achieved by using the existing cycleway, while also ensuring safety of all users.

Alfred Street Bike path

The Alfred Street Bike path will allow riders to safely ride within their own dedicated space and adjoin the wider bike network in North Sydney. The design aims to retain on street parking and enhance pedestrian movements by removing riders from the shared path and upgrading existing crossings.

⁶ Austroads, National Cycling Participation Survey 2019, p16

⁷ <https://opendata.transport.nsw.gov.au/dataset/active-transport-customer-value-proposition-cvp-reports>

⁸ <https://www.portlandoregon.gov/transportation/article/158497>

⁹ See Section 7.5.4 of Cycling Aspects of Austroads Guides (Austroads), 2011

The designs for the Lavender Street roundabout and associated active transport crossings have gone through substantial consultation with network operations, bus operations, bicycle user groups and traffic modellers to ensure best practice and a safe outcome for road users is achieved. Consultation with local community and North Sydney Council traffic team has commenced and will inform the design as it evolves through the next stage of safety in design.

In response to previous consultations, the project team incorporated safe access and egress along Alfred Street South for bike riders to and from the existing bike network. Safe crossings have been proposed for both riders and walkers on Alfred Street and Lavender Street. They have been designed in coordination with Transport technical directions for road design and allow riders to remain in saddle when crossing, without the need to dismount.

A fully separated facility will allow for safe riding north into the existing Middlemiss Street bike lane on Council’s local road network. Active transport solutions further north through North Sydney CBD are currently being assessed as part of adjoining major projects.

The 20 per cent of riders heading east from Milsons Point could use the ramp and separated cycleway on Alfred Street that leads them to Burton Street, where they can join the existing bike network on Council’s local roads.

Supporting cycling growth

Cycling demand

Data from counters on the Sydney Harbour Bridge cycleway show that the ten-year (2009-2019) weekly average number of trips is just below 2,000 per day. It also shows the highest 365-day rolling weekday average occurred in March 2014 (2350) and that Tuesdays and Wednesdays are the busiest day of the week. This suggests most bike trips over the bridge are journeys to work.¹⁰

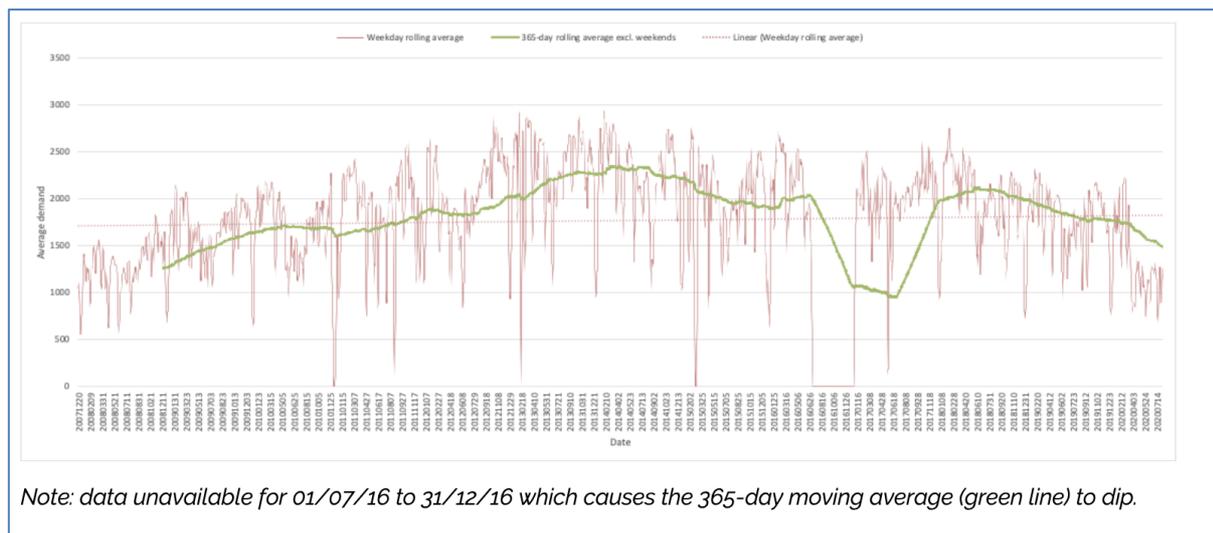


Figure 2 Average weekday demand (7 day and 365 day) 12/2007-07/2020

¹⁰ <https://roads-waterways.transport.nsw.gov.au/roads/bicycles/statistics/index.html>

The data shows the number of bike trips over the bridge has been declining since 2014. However, demand data from the City of Sydney, bike sales data, Journey to Work information, and our own customer research all demonstrate the popularity of, and interest in, cycling is growing strongly. So, far from disproving the need for this project, we have concluded demand for cross-bridge bike trips is suppressed, and that improved access would be met with increased and wider ridership.

Our approach is a proactive one driven by Government policy to increase mode-share for cycling: build the infrastructure to facilitate and encourage cycling uptake, rather than react only when existing infrastructure is pushed to the limit.

The following points are relevant to this conclusion:

- **Bike sales are growing:** bicycle sales have hit record levels in Australia over the past year, with Bicycle Industries Australia forecasting 50 per cent growth in sales.¹¹ Sales of e-bikes are increasing year-on-year as the technology matures, from about 9000 in 2016/17 to about 50,000 in 2019/2020.¹²
- **Demand grows strongly where infrastructure is provided:** The City of Sydney's twice-yearly cycling count, which has run since 2010, has shown strong demand growth since 2015 and doubling of bike trips over the last 10 years.¹³
- **There is unmet need for bike trips across the bridge:** An analysis of Journey to Work data shows that in the AM peak alone there are 73,801 trips across the bridge. These trips come from within a 10km distance and therefore could be done by bike. The cycleway is the only cross-harbour bike link in the Eastern Harbour City. Anyone cycling between the North Shore and Sydney CBD will have no choice but to use it.
- **There is high latent demand in the local area:** The Bike Use Propensity Index created by the Institute of Sensible Transport shows that areas with the highest estimated latent demand for bike usage include McMahons Point, Milsons Point, Neutral Bay, St Leonards, Crows Nest and Cremorne.¹⁴
- **There is high latent demand across Greater Sydney:** Transport's Cycling Customer Value Proposition Research shows that almost half of the Greater Sydney population is 'interested but concerned' about cycling. The research also showed that uninterrupted and undisturbed travel is important to encourage cycling.
- **There is high latent demand for tourism and leisure cycling:** Despite its iconic location, the bridge cycleway attracts limited tourism and leisure trips, with average weekend trips 56 per cent below the average weekday. This contrasts with walking trips on the eastern side of the bridge, where the average weekend day is 25 per cent higher than an average weekday according to City of Sydney data.¹⁵

¹¹ <https://bicyclensw.org.au/record-numbers-of-bikes-sold/>

¹² Austroads, National Cycling Participation Survey 2019, p.16

¹³ City of Sydney (2021) 'Cyclists in the City', <https://opendata.transport.nsw.gov.au/dataset/cycling-count>

¹⁴ <https://opendata.transport.nsw.gov.au/dataset/cycling-propensity>

¹⁵ <https://www.cityofsydney.nsw.gov.au/public-health-safety-programs/walking-counts>

Cycleway capacity

To understand the current and potential capacity of the Sydney Harbour Bridge cycleway we created two dynamic simulation models. The first model looked at the dynamics of the northern safety barrier constraint, modelled using assumptions validated against security camera footage. These assumptions included:

- A transition speed for cyclists to ascend/descend the 55 steps
- A slight delay at the top of the steps as cyclists ready to transition (in both directions)
- A transition speed for cyclists moving through the barriers (in both directions)
- A delay as southbound cyclists mount their bikes after the barriers and accelerate
- An approach speed for cyclists heading northbound
- A delay as northbound cyclists dismount to transition through the safety barriers

The second model looked at the impact of removing the steps to determine the theoretical maximum throughput of the cycleway. The model dynamically allocated a preferred speed to cyclists, simulated behaviour across the cycleway; calculated the time and space required for overtaking and tested various bike rider arrival rates.

This modelling demonstrates that removing the steps and the barriers would more than quadruple the upper capacity of the cycleway – as shown in the table below.

	Trips per hour	Direction
Busiest recorded day (Ride to Work day 2017)	600	Both
Modelled upper capacity with steps	800-900	Both
Modelled upper capacity without steps (while still allowing overtaking)	2000	Single

Topology and demand

Some argue the Project cannot overcome the steep gradients and topology of Sydney, or the limitations of the cycleway's 2.5 metre width, and that this will limit the uptake of cycling.

International examples demonstrate it is possible to create a strong cycling culture and network in hilly cities. San Francisco is known for its many hills and is one of the USA's top cycling cities. The topology of Portland's inner suburbs is challenging yet it is an exceptionally bike-friendly city.

In addition, our modelling demonstrated the cycleway has 'room for growth' and could cater for significantly higher numbers of bike trips before safe overtaking becomes constrained.

Impacts to heritage, open space, and views

Adherence to Design and Heritage Policy

The Sydney Harbour Bridge is a national heritage item and Transport is committed to ensuring the ramp design is sensitive and responsive to such an iconic structure.

We also recognise the site, and its context, are highly valued by the local community. Bradfield Park is a much-loved and cared for public open space that provides an important recreational function. The open space is also overlooked by adjacent residential apartments and businesses. It is crucial the ramp is carefully and thoughtfully designed.

The Project has been developed under the auspices of the July 2021 Sydney Harbour Bridge Conservation Management Plan (CMP).¹⁶ This is the primary heritage management document for the project and takes precedence on heritage matters.

The Project's Design Excellence Strategy sits under the CMP. It has been prepared to establish a design and review process for the northern approach to SHB cycleway and to document the landscape, architectural, heritage and visual impact considerations for the Sydney Harbour Bridge Northern Cycleway Access project.

The Design Excellence Strategy have been developed in collaboration with the Government Architect's Office NSW (GAO) and Heritage NSW. The document has strict regard to key policies including:

- *Better Placed*, Government Architect, NSW, September 2017
- *Design Guide for Heritage*, Government Architect, NSW, September 2019
- *Design in Context*, NSW Heritage Office & Royal Australian Institute of Architects NSW Chapter, 2005
- *Evaluating Good Design*, Government Architect, NSW, Issue 01, 2018
- *NSW State Design Review Panel*, Government Architect, NSW, Issue 02, 2018
- *Government Architect's Design Excellence Competition Guidelines*, Government Architect, NSW, Draft May 2018

The CMP and Design Excellence Strategy are reference documents for the Project and provide an evidence base for stakeholders and design professionals engaged in the project. The Strategy is supported by a Supplementary Detailed Heritage Framework¹⁷ which provides further detail on statutory context, an overview of existing heritage policies, a summary of heritage constraints and opportunities and guidelines for the design of new elements within the site's heritage context and significance. This is also supported by the Aboriginal Design Principles document¹⁸ which seeks opportunities for the Project to Connect with Country and include Aboriginal culture.

¹⁶ <https://roads-waterways.transport.nsw.gov.au/about/environment/protecting-heritage/sydney-harbour-bridge/index.html>

¹⁷ <https://roads-waterways.transport.nsw.gov.au/projects/01documents/sydney-harbour-bridge/shb-detailed-heritage-framework.pdf>

¹⁸ <https://roads-waterways.transport.nsw.gov.au/projects/01documents/sydney-harbour-bridge/shb-cycleway-aboriginal-design-principles.pdf>

Collaboration with design experts

Transport has engaged the most competent professionals to undertake the design of the ramp and so the proposal responds sensitively to the site and context. Heritage, urban design, architecture, and Designing with Country experts have been involved throughout the design process to date and these professionals will continue to work hard to create the very best possible design outcome.

We have also worked closely with Heritage NSW and the Heritage Council Approvals Committee throughout the development of the initial designs, so the ramp conserves the site's heritage values.

Our collaboration with external design experts has involved:

- regular meetings with representatives of Heritage NSW
- four presentations to the Transport for NSW Design Review Panel, which comprises external design experts and is chaired by the Government Architect's Office
- four presentations to the Approvals Committee of the NSW Heritage Council, with more scheduled
- a competitive design process to facilitate the best-possible design development of the linear design alignment
- establishing a Design Jury of leading design experts to assess each design and make recommendation to Transport for NSW.

Feedback from stakeholders confirms the Project is taking a considered and robust approach to Design Excellence and Heritage management, as indicated below:

"The Panel commended the team for the effort that is going into this project, the innovative process and the effort to involve smaller architectural and urban design firms. The Panel is hopeful it will set a new benchmark for projects."

Transport for NSW Design Review Panel meeting 26 July 2021, SHB Cycleway Access Project, Advice sheet

"The Heritage Council Approvals Committee supports the following:

a) The design competition process.

b) A linear scheme.

*c) Inclusion of the Approvals Committee's advice and comments into the design brief."*¹⁹

Minutes of the NSW Heritage Approval Committee 3 August 2021

¹⁹ <https://www.heritage.nsw.gov.au/assets/AC-3Aug21-Minutes-CONFIRMED-signed-210906.pdf>

Data on current cycleway use

It is correct to say the rolling average of weekday cycle trips over a ten-year period is just below 2,000. This figure is derived from publicly available data taken between 2009-2019 from counters on the Sydney Harbour Bridge cycleway.

We took the opportunity to clarify the figure at the Community Livestream on Wednesday 15 December, and in a follow up questions and answers document placed on our engagement portal.²⁰

The number of bike trips over the Bridge has been declining since 2014 but, for the reasons outlined on page 11, we have concluded that trips across the Bridge are suppressed.

Our approach is a proactive one, driven by Government policy and strategy to increase mode-share for cycling. Build the infrastructure to facilitate and encourage cycling uptake, rather than react only when existing infrastructure is pushed to the limit.

Project cost and business case

A Business Case has been developed for this project which has undergone a rigorous assurance process. It has demonstrated a healthy Cost Benefit Ratio based on independently verified project costs. The Project value will only be released after the procurement of a delivery contractor has been completed.

Community engagement

We have involved stakeholders, community groups and the wider public throughout the project development and design process. Our process has been transparent and genuine.

The initial stages of our process was directly shaped by Council's preference for an on-deck or lift solution, and questions about whether the cycleway was sufficiently wide enough to warrant investment. We undertook these investigations with an open mind and the results are outlined in this response and in our public collateral.

Between July 2020 and May 2021, we held 24 meetings with Council, local community groups, cycling groups and stakeholders and have twice taken options to the wider public to ask for feedback.

We held five meetings with senior Council officials during this period, and five attended by community representatives including Councillor Ian Mutton, former Mayor Jilly Gibson, the Lavender Bay Precinct Committee, and the Milsons Point Resident Action Group. At these meetings we provided a full presentation on our project rationale and investigations and outlined our proposed process moving forward.

We have invited Council to collaborate with us to help shape the design of the ramp and deliver a positive outcome for the local and wider community.

The results of our June consultation period showed more than 80 per cent of survey respondents support a ramped access to the cycleway and 68 per cent support a linear design. Our wider consultation indicates a high level of community support.

²⁰ <https://caportal.com.au/tfnsw/sydney-harbour-bridge-cycleway/faqs> - last question

We acknowledge that 60 per cent of respondents in the immediate postcodes of 2060 and 2061 oppose the project. However, two fifths are in support which is significant given the rate of response in those two immediate postcodes was the highest across all postcodes.

We appreciate some local community members do not want to see a bike ramp in Bradfield Park yet, a vast majority of the wider public do. After more than two decades, four sets of investigations, and over 30 options explored, our investigations have demonstrated a ramp presents a technically feasible solution that will deliver significant mode-shift over the next decade and which, through Design Excellence, can respond sensitively to the context of this globally significant location.

Ramp alternatives

Community members have suggested a lift or traveller as an interim solution until an on-deck bike lane can be found. Others have made several suggestions for alternative ramp designs.

Lifts

To assess the viability of lifts, dynamic modelling was undertaken using AnyLogic modelling software, which allowed for a range of scenarios and parameters to be tested (for example the type of lift, or whether the steps remained open).

Our lifts model assumed:

- Three cargo lifts (redundancy of one)
- Un/loading platform at top
- A no-ride zone between stairs and lifts
- 1000 riders in peak hour (the current upper capacity limit of the cycleway) with 70:30 directional split
- Cyclists push their bikes at a constant speed of 1.5 metres per second
- Spatial envelope of a bike plus rider is 1.8m (length) by 1.1m (width)
- Cyclists follow a random arrival pattern across an hour, but arrive according to an overall rate (e.g., 300 cyclists per hour travelling northbound)

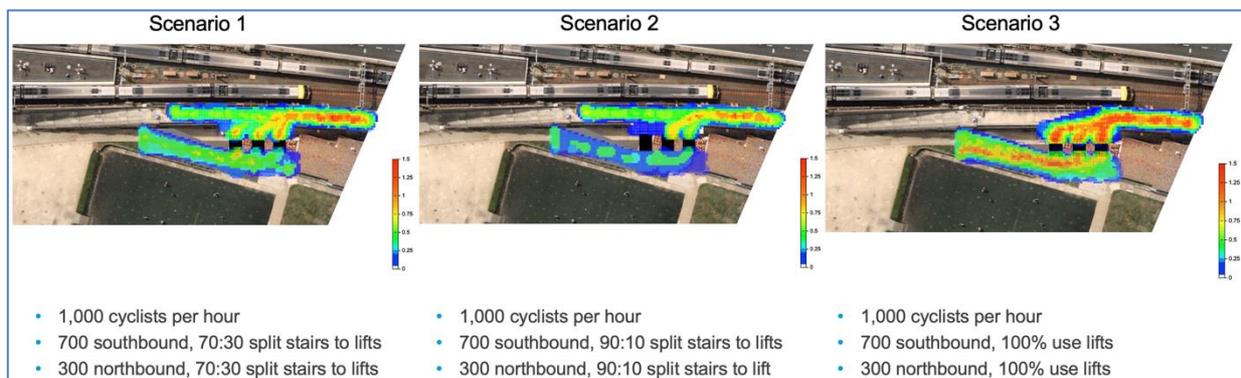


Figure 3 AM peak scenario testing – lifts



Figure 4 PM peak scenario testing - lifts

The figure above shows the outputs of the scenario testing conducted for the AM and PM peak. Areas of red are where more than one cyclist try to share the same space at the same time. Modelling demonstrated that crowding would occur even if only 10 per cent of cyclists used the lift as an alternative

It was concluded a lift solution would not be a viable option, as it would:

- reduce current cycleway capacity
- do little for safety outcomes, as most cyclists would still take the stairs to avoid queuing
- slow down journey times because of the no-ride zone needed to allow safe queuing in the peaks
- negatively impact on rideability as cyclists would still be required to dismount to safely use the lifts.

Travellators

To assess the viability of travelators we first found international examples of similar solutions to the implications of using similar solutions in Sydney. We found travelators that had been used in outdoor settings to overcome steep changes in gradient over a similar vertical distance (11 metres). We found no examples of an outdoor travelator that did not have some form of permanent cover.

Our modelling of travelators assumed:

- Three travelators (north, south and redundancy)
- Sufficient width for bike and rider (1100mm)
- Canopy to protect for rain
- Speed of 0.4 m/s (based on product specifications)
- Vertical rise of 11 metres
- Incline of 12 per cent
- 2 x 26 metre sections with 3 x 5 metre landing platforms

Mock-ups demonstrate the spatial impact of the travelators in situational context.

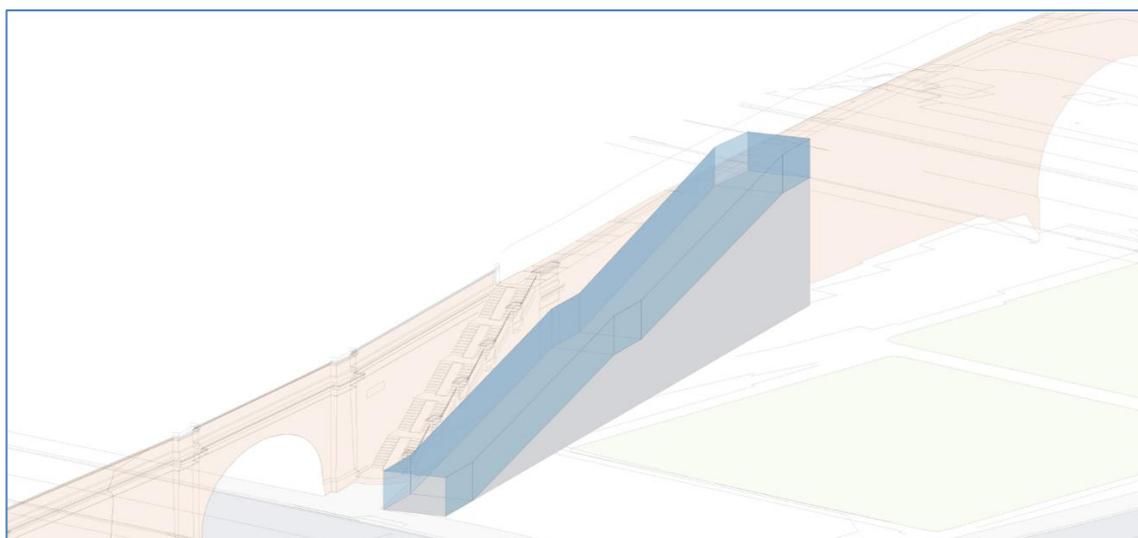


Figure 5 Approximate spatial requirement of three travelators with weather protection

A run of 52 metres is needed to meet the vertical distance. At a speed of 0.4m/s, the time taken to travel from ground to the cycleway would be more than two minutes (130 seconds plus walking time between the two travelators). This is about four times the time it takes to use the steps.

In capacity terms, analysis found each travelator could theoretically move about 530 cyclists per hour or 1,060 in the peak direction. This is a greater than the current capacity with the steps, but half the upper operational capacity with a ramped access.

However, modelling assumed riders would remain stationary on the travelator, which research suggests is the normal behaviour. With the width of a travelator not allowing cyclists to overtake, this would mean that someone choosing to stand still would have a large impact on everyone queueing behind and limit the travelators' through-put.

Furthermore, riders would tend to arrive in groups at peak times, creating temporary 'bunching' and bottlenecks. These would be compounded by the effect of riders mounting and dismounting, and work to further reduce the effective capacity of the travelator.

Finally, a bank of travelators would be a significant visual impact. While the footprint may be relatively smaller than a ramp, the travelators' bulk and limited potential for bespoke design refinement makes this an unfeasible option.

On-bridge cycle path

We have looked extensively at the feasibility of putting bikes back on the deck of the bridge while noting that other public transport uses such as busway are also potential options.

Only lane 1 or lane 8 could be used as a cycleway as it is not possible to safely access the middle lanes of traffic. If lane 1 were to be used for bikes, safety barriers would be necessary to protect cyclists for 70km/h traffic. However, this would reduce the width of the lane to around 2.2 metres (from 2.8 metres) - narrower than the cycleway and not wide enough for a two-way cycle path, as per the Austroads guidelines.²¹ A lane could be used as a one-way bike path, but we would then need to keep the existing cycleway to create a bi-directional route.

At 4.2 metres, lane 8 of the Bridge is wide enough for a two-way bike lane. However, it is not connected to the 'spine' of the bike network on Kent Street in Sydney CBD. Swapping the bike path to the east side of the bridge would therefore require the CBD bike network to be re-positioned, or extensive on-road works to get bikes from the bridge back to the Kent Street Cycleway. There would be considerable engineering challenges in separating city-bound bikes and east-bound cars heading over the Cahill Expressway.

Alternative ramps

More than 30 options to replace the steps have been considered over the years, which generally fall into four categories:

- Lifts and travelators
- Ramps going through the bridge viaducts or structure
- Linear ramps extending north of Burton Street
- Looped ramps extending south of Burton Street

We assessed the feasibility of 14 of those options, rationalised from previous studies and recent investigations. Following an extensive review of overseas and local standards and guidelines, the minimum Austroads Guidelines of 5 per cent grade (maximum 80 metres continuous sections) and 10 metre radius curve was adopted. This reflects parameters necessary to achieve the Project's safety, capacity, and equity of accessibility objectives.

The significant height difference between the ground surface and the Bridge deck meant that many ramp options were too steep and/ or had curves that were too tight for safe bike riding. Consequently, application of the rideability criteria resulted in only five of the 14 options being suitable.

1. A linear ramp north of Burton Street offset from the Bridge wall
2. A linear ramp north of Burton Street abutting the Bridge wall
3. A looped ramp south of Burton Street in a figure 9 shape
4. A looped ramp south of Burton Street in a figure 8 shape
5. A double looped south of Burton Street

Heritage advice that structure should be set back from the bridge resulted in Option 2 being discounted. Further assessment then discounted Options 3 and 4, as they would need extend out across the bowling to meet rideability criteria. This left the two shortlisted ramp alignments which were consulted on in June 2021.

²¹ see Section 7.5.4 of Cycling Aspects of Austroads Guides (Austroads), 2011

Community suggestions

We have noted several alternative options put forward by stakeholders and the community during the consultation periods. We appreciate these contributions and have looked at them all.

Unfortunately, most either fail minimum rideability requirements or would have greater open space and heritage impacts than the ramp option we are progressing. Around 20 suggestions were put forward during the June 2021 consultation and our response is summarised in the Consultation Outcomes Report.²²

Community proposal for Bradfield Park Central

Community members have put forward a design by local architect George Gallagher for a loop at Bradfield Park Central. This has been reviewed in detail by Transport and a response can be found at <https://caportal.com.au/tfnsw/sydney-harbour-bridge-cycleway>

Contact us

If you have any questions or would like more on the Sydney Harbour Bridge Cycleway Northern Access Project, please contact our project team:

²² <https://roads-waterways.transport.nsw.gov.au/projects/01documents/sydney-harbour-bridge/sydney-harbour-bridge-cycleway-community-consultation-report-2021-08.pdf>

Sydney Harbour Bridge Cycleway Northern Access Project
Response to community questions



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