Redfern North Eveleigh Paint Shop Precinct

Bridge catchment analysis

7 July 2023 | Version 5.0

Quality Assurance

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Version	Date	Details
1.0	11 October 2021	Issued to TfNSW
2.0	18 April 2023	Updated to reflect bridge design
3.0	19 April 2023	Refinement of land-use areas to rezoning approval
4.0	1 July 2023	Addition of ATP trips
5.0	7 July 2023	Addition of ATP trips (LES update)

Questions to be answered

Is there a need and/or benefit of an active transport bridge between North and South Eveleigh?

1. Who would benefit from the bridge?
   - Spatial catchment analysis

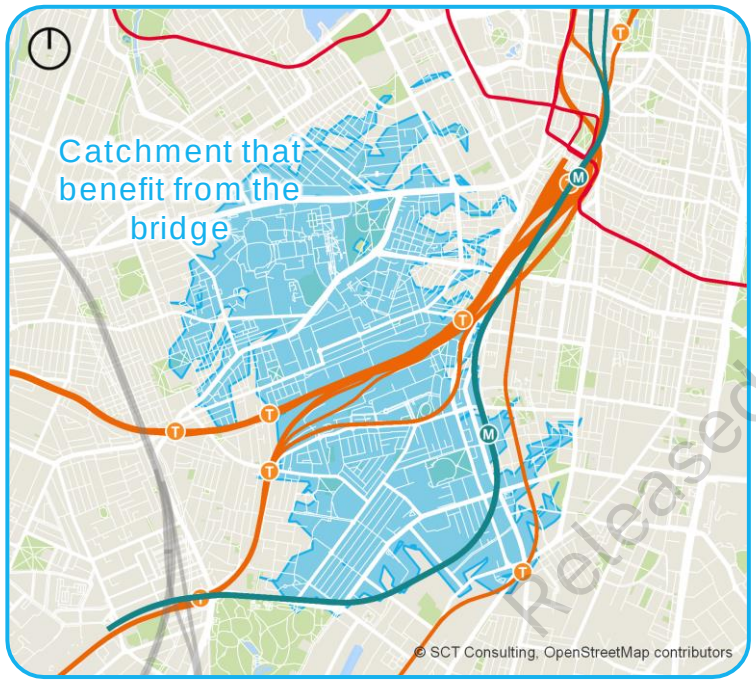
2. What quantum of people are likely to use the bridge?
   - Review of existing travel patterns (analysis of mobile phone data)
   - Confidence in data
   - Expected users of the bridge

3. How integral is the Redfern-North Eveleigh development to improving use of the bridge?
   - Potential increase in users of the bridge based on changes in land-use (including retail)

Executive summary

Catchment analysis

Determine who benefits from the bridge compared to the existing scenario and future scenario (with Redfern Station southern concourse).



Travel time saving

An estimate of the average travel time benefits for a customer using the bridge (compared to other alternative corridor crossings).

Average travel time saving

3 minutes

per cross-corridor journey.

Executive summary

Current demand

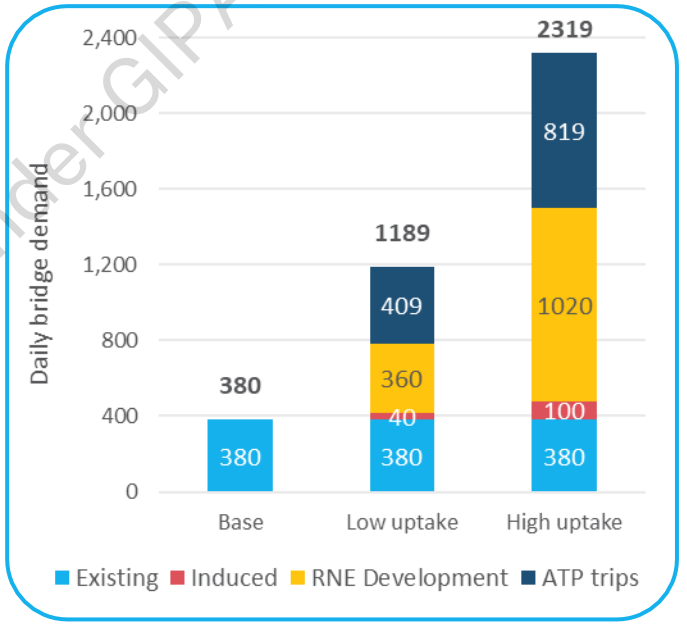
Who may use the bridge based on existing travel patterns?

340-420 journeys per weekday

Future demand

Increase in customers due to:

- Provision of the bridge (induced trips)
- Development of Redfern North Eveleigh Precinct



Productivity

The cumulative benefit of the bridge.

59-116 people-hours saved

per typical weekday.

[01]

Who would benefit from the bridge?

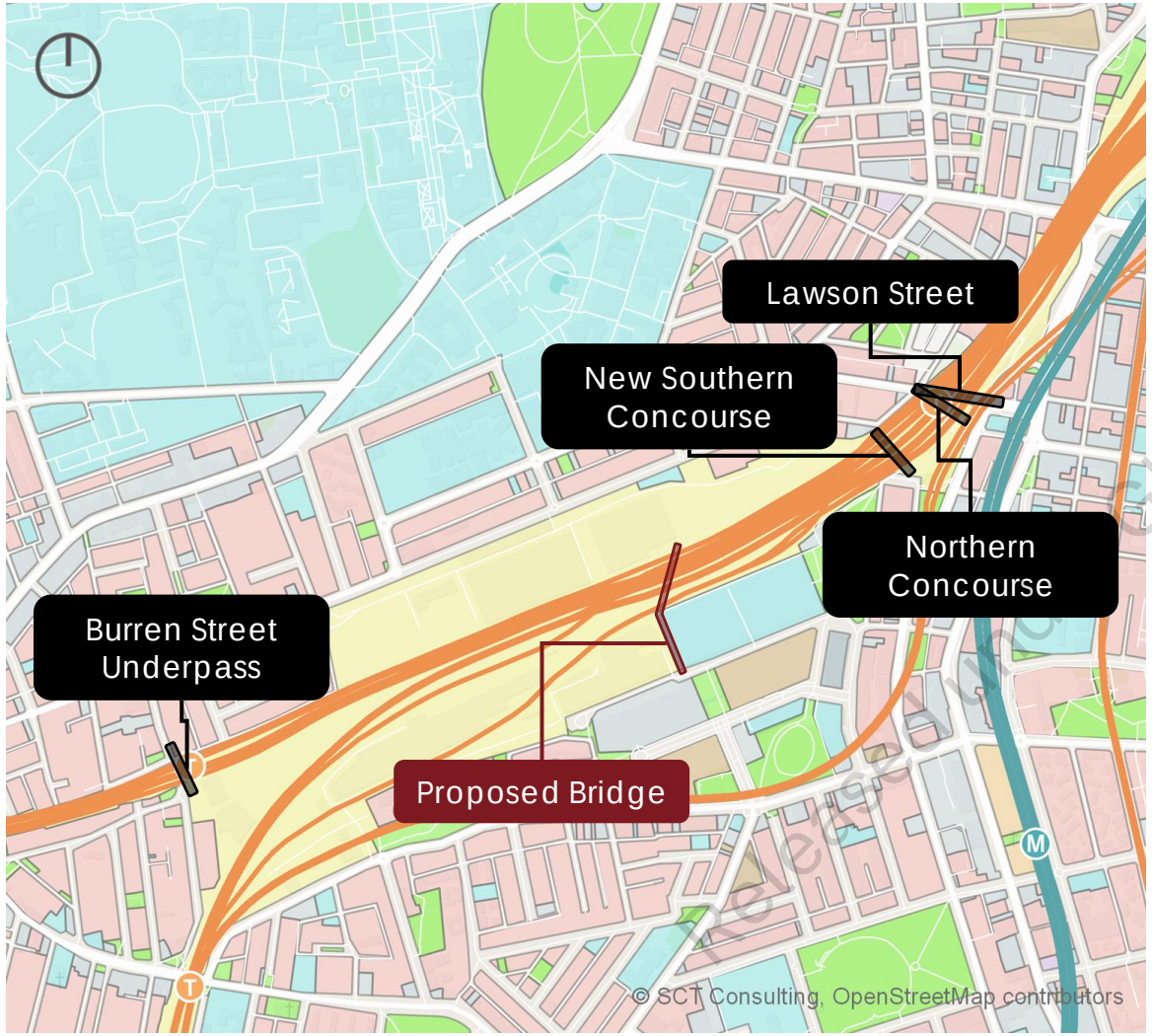
Existing rail corridor crossings

All existing crossings included in analysis.

- Travel time for each route is calculated based on a typical walk speed of 1.35 metres per section
- Additional travel time has been added for:
  - Vertical transport (including stairs or lifts)
  - Road crossings (penalty by type: signalised, zebra and uncontrolled).

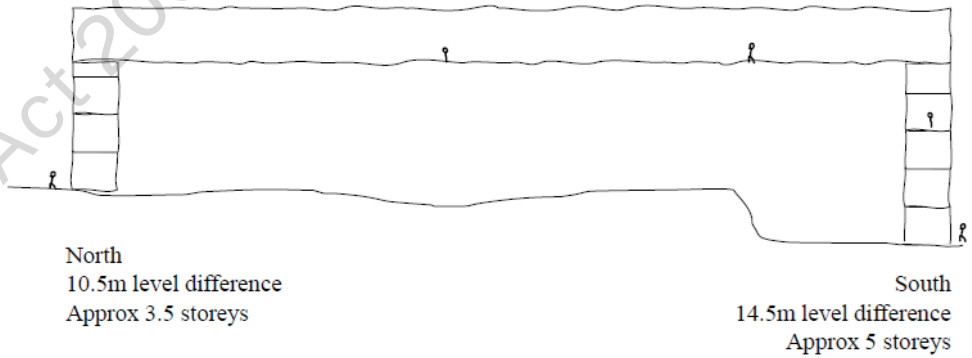
Example Extract:
Redfern Station concourses (existing northern and new southern).

Proposed rail corridor crossing



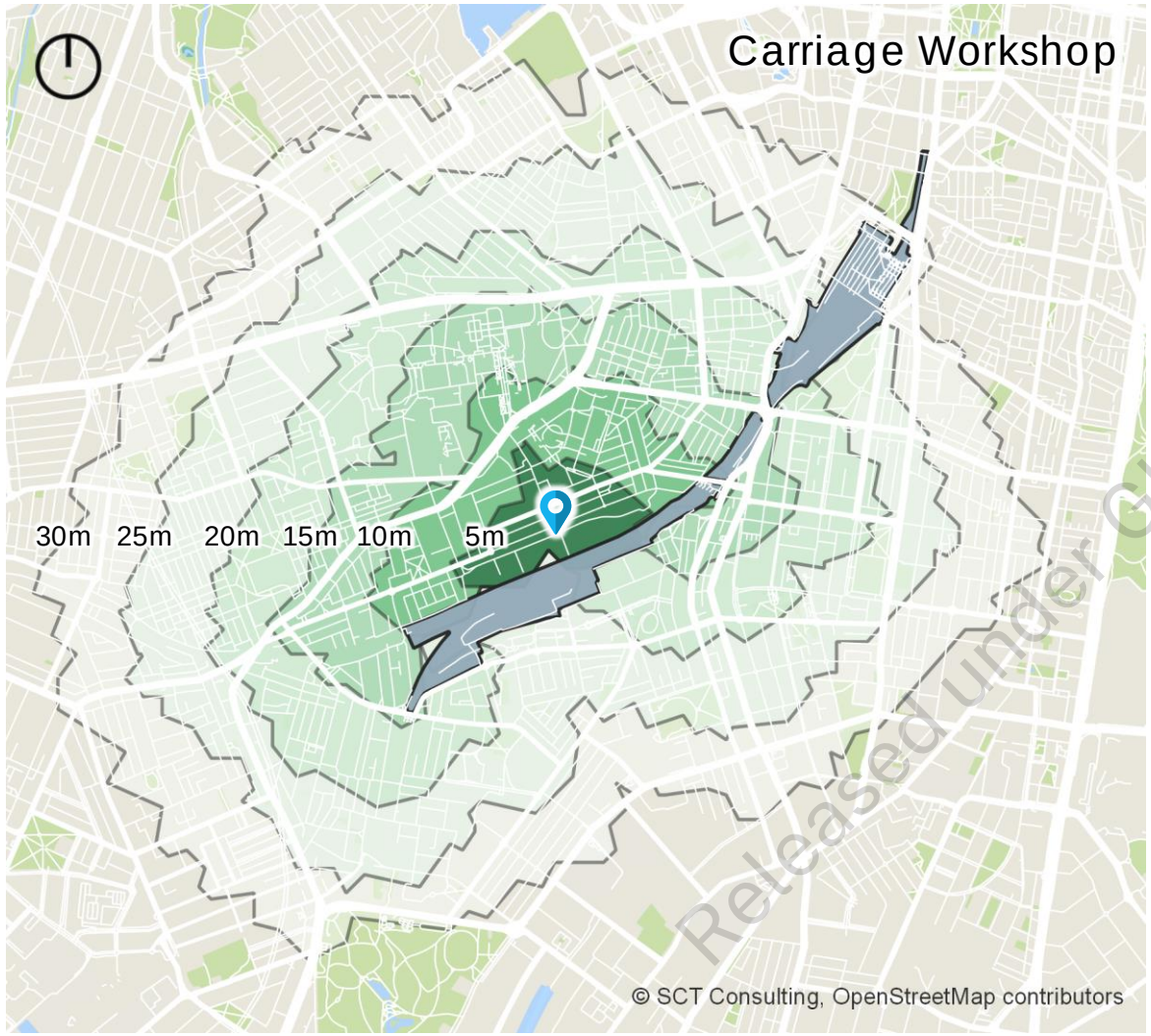
Proposed bridge included in assessment. Based on Arup (November 2022) design pack, the following characteristics have been included:

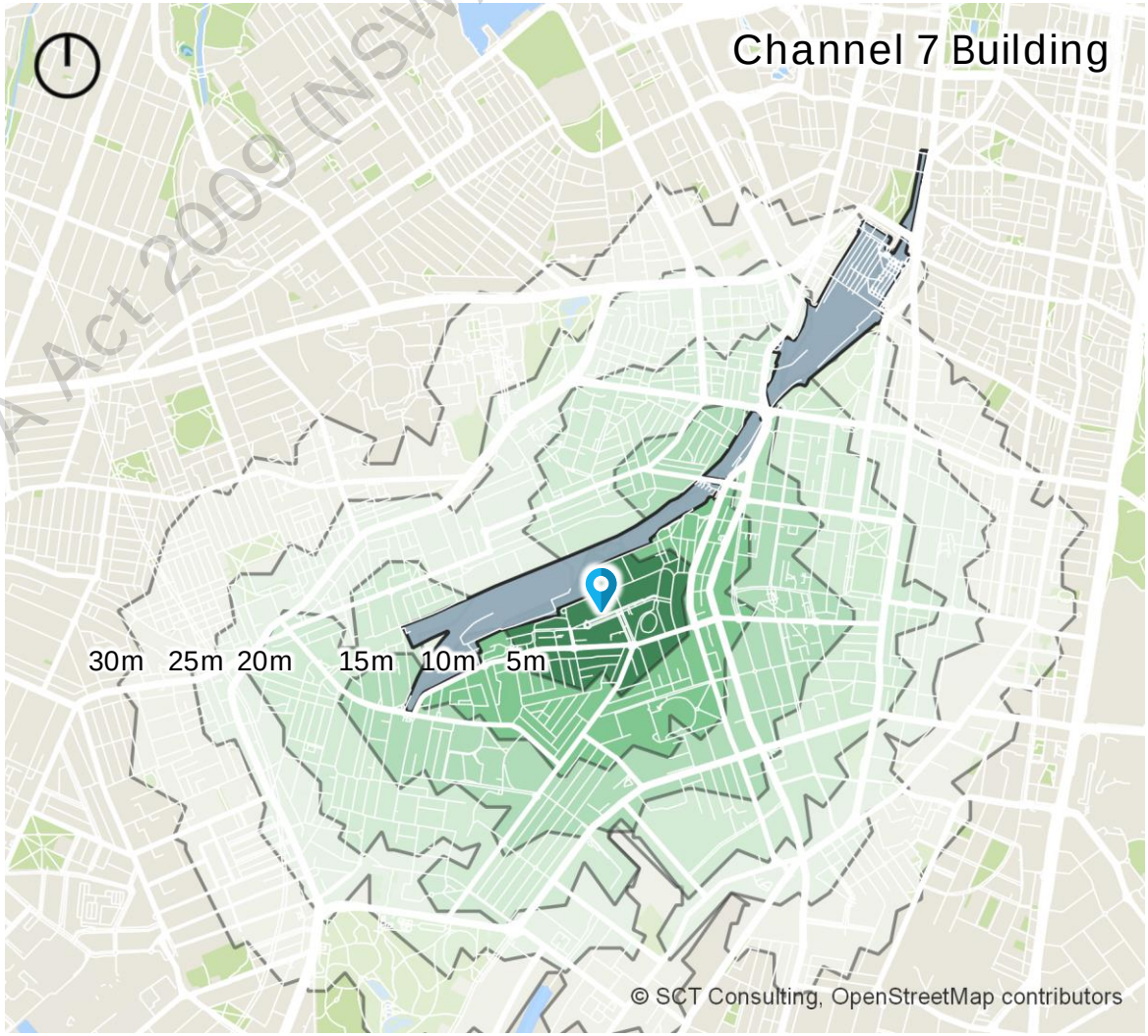
- Bridge connecting North and South Eveleigh
- Lift access is provided on both ends, based on indicative heights:



- Due to the height of the bridge, it is unlikely users would utilise the stairs as the main form of vertical transport (unless they opt to do so from a hedonic perspective i.e. for exercise).
- Therefore the travel time of the bridge has been based on a first-principles lift travel time assessment.
- With two lifts at each end, the average trip time (including wait and travel time) is estimated at 33 seconds (north) and 39 seconds (south).
- Including the lifts and extended deck (over the maintenance facility) on the southern end to Locomotive Street, the total crossing time is approximately 4 minutes.

Existing 30-minute walking catchments

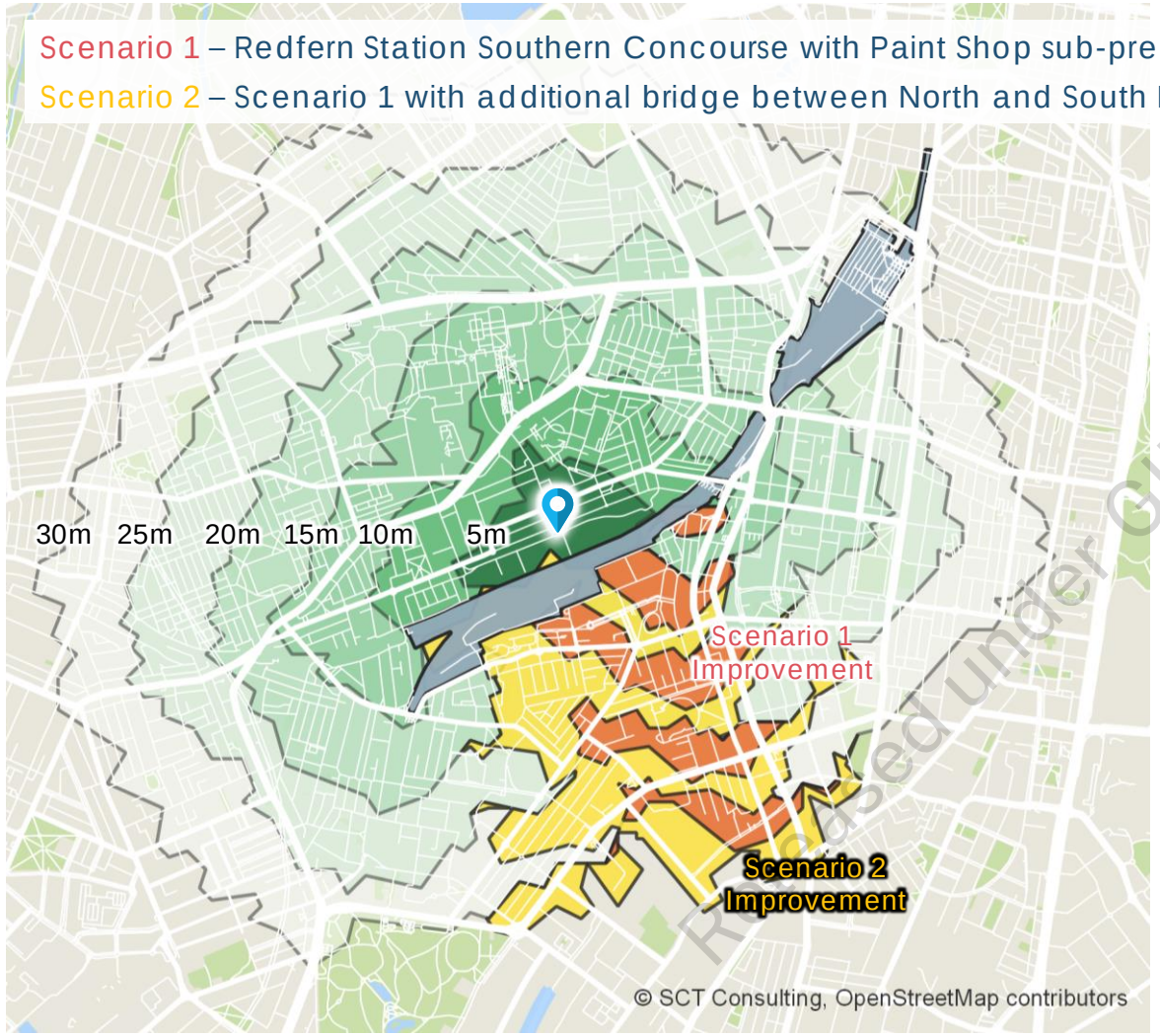


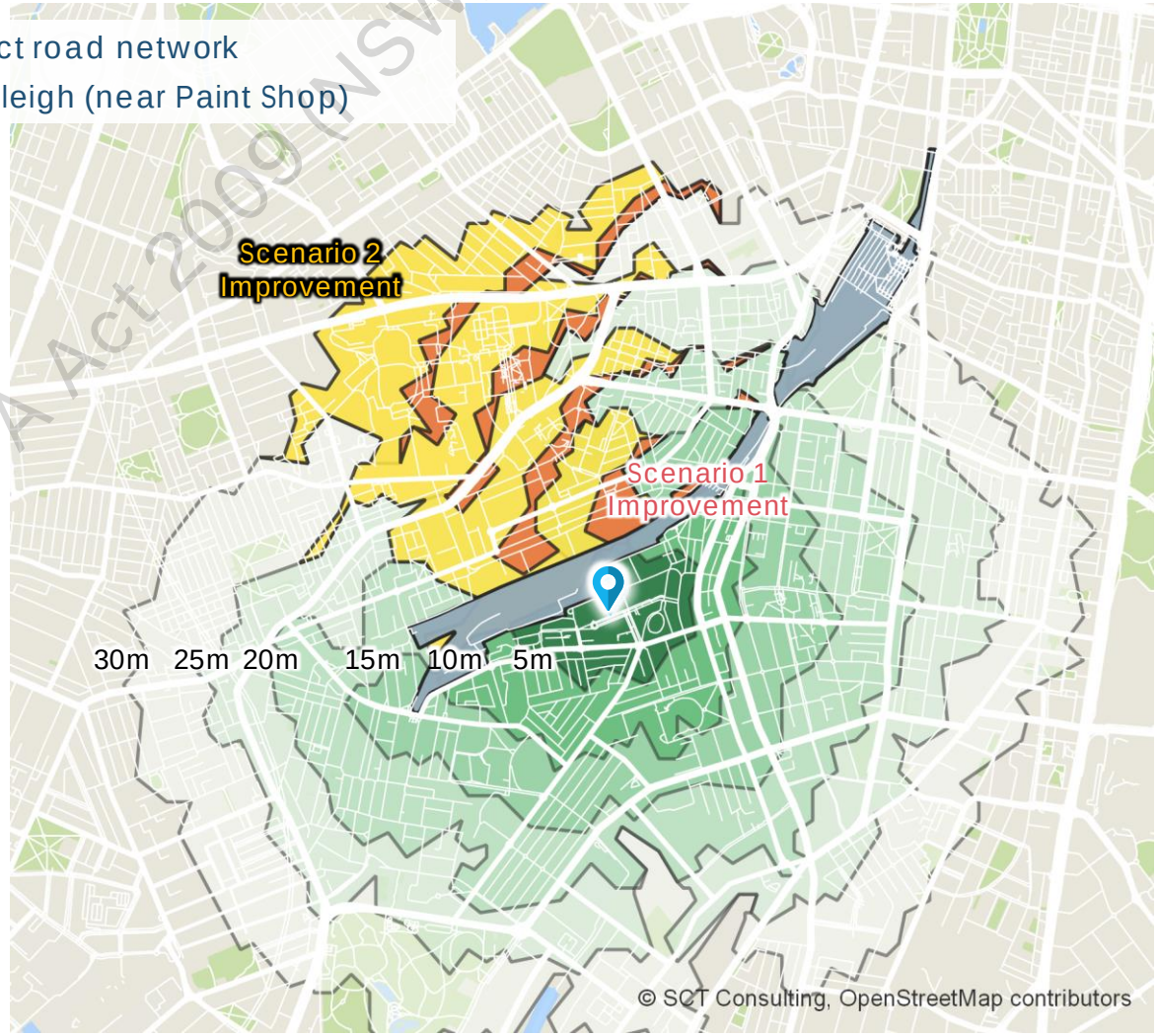


Improvements to 30-minute walking catchments

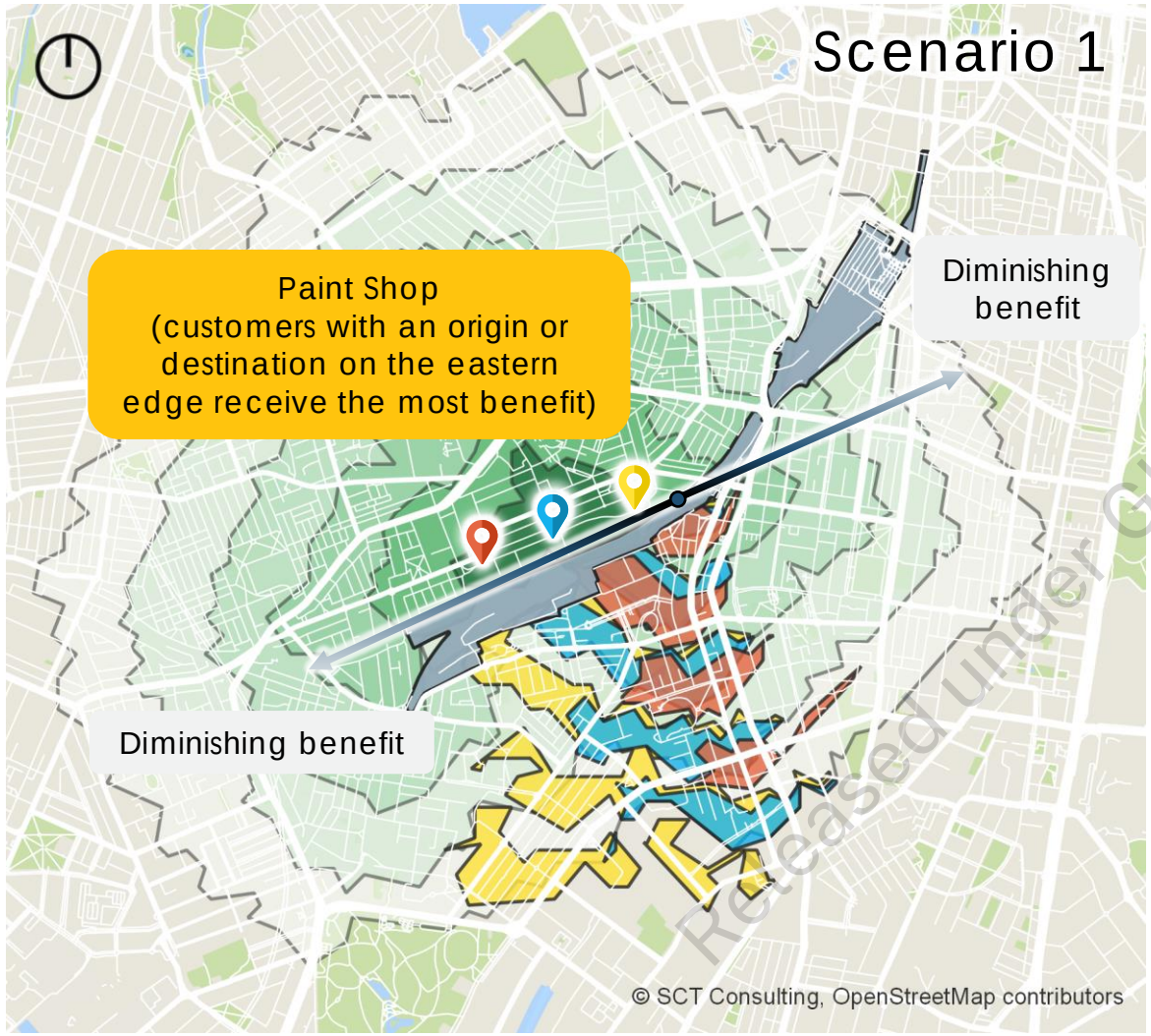
Scenario 1 – Redfern Station Southern Concourse with Paint Shop sub-precinct road network

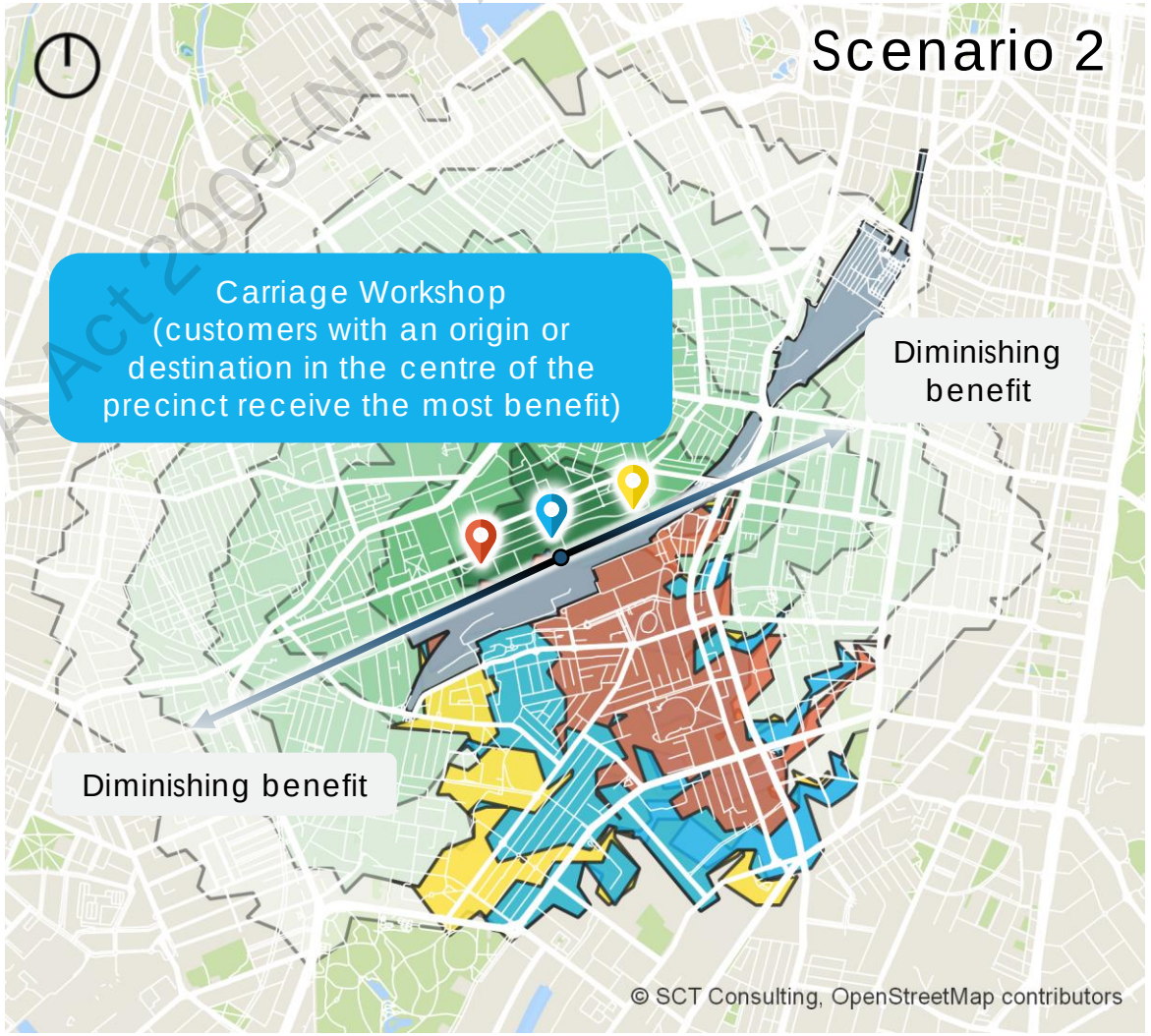
Scenario 2 – Scenario 1 with additional bridge between North and South Eveleigh (near Paint Shop)



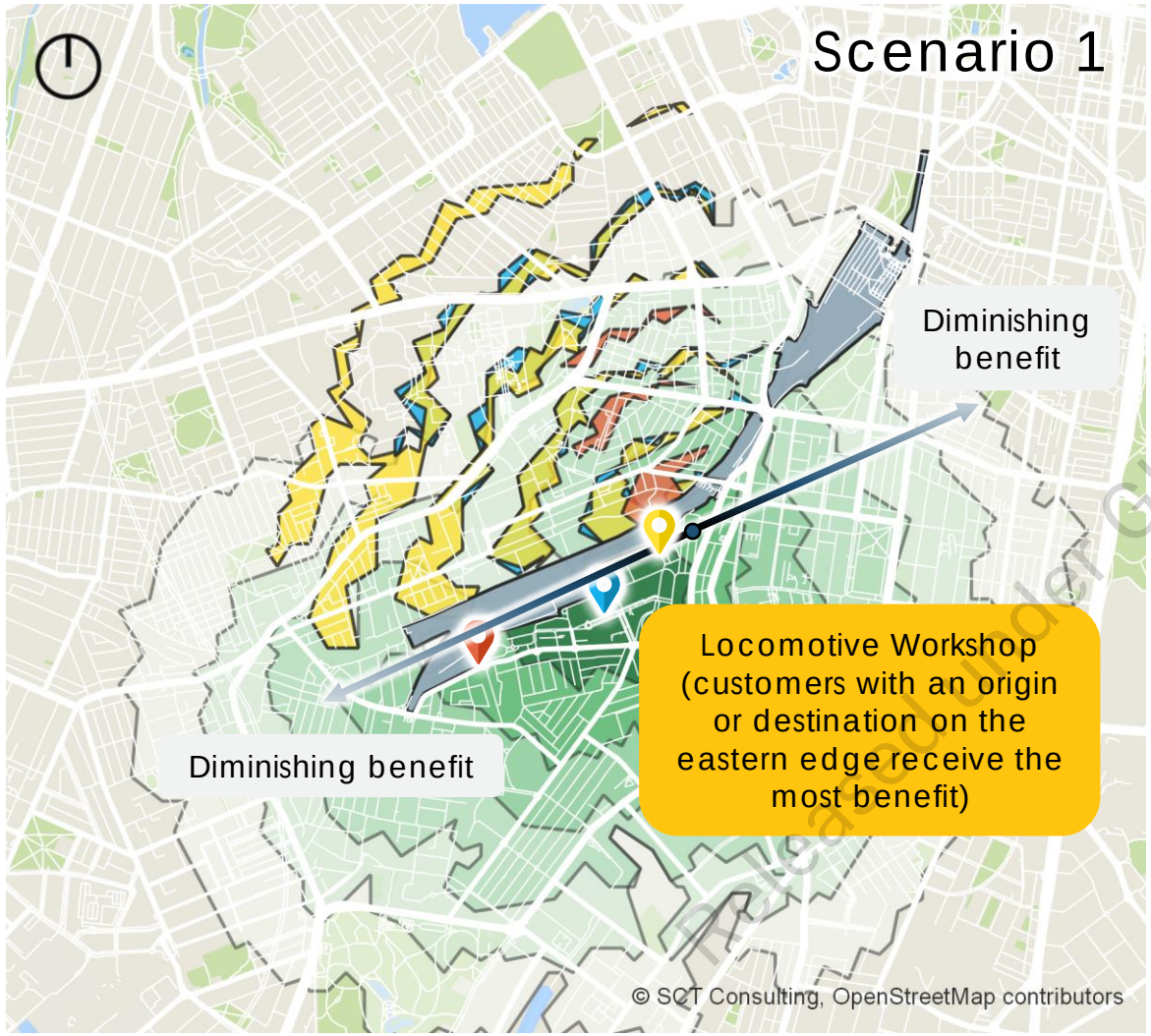


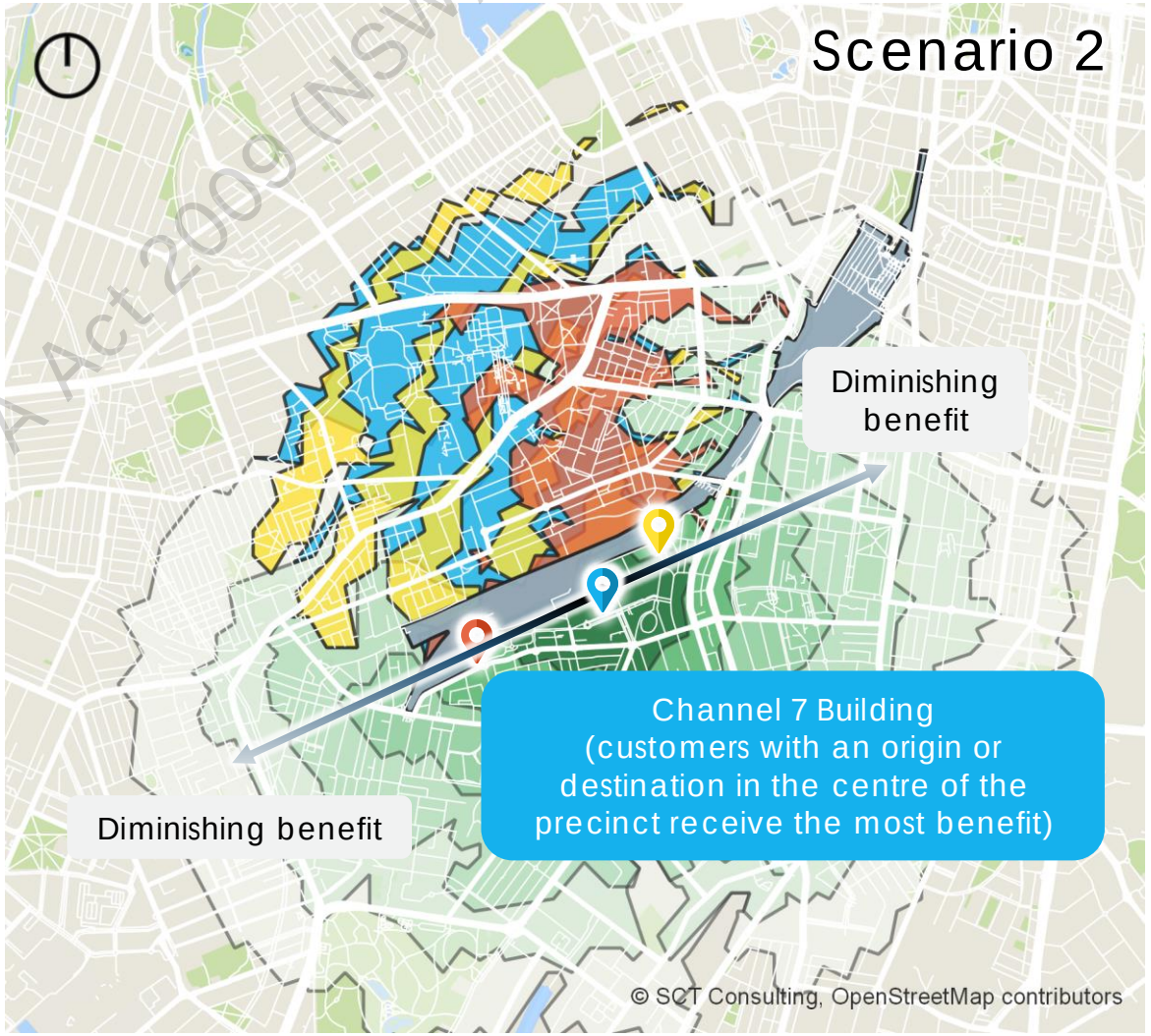
Northern Sites – Improvements by location



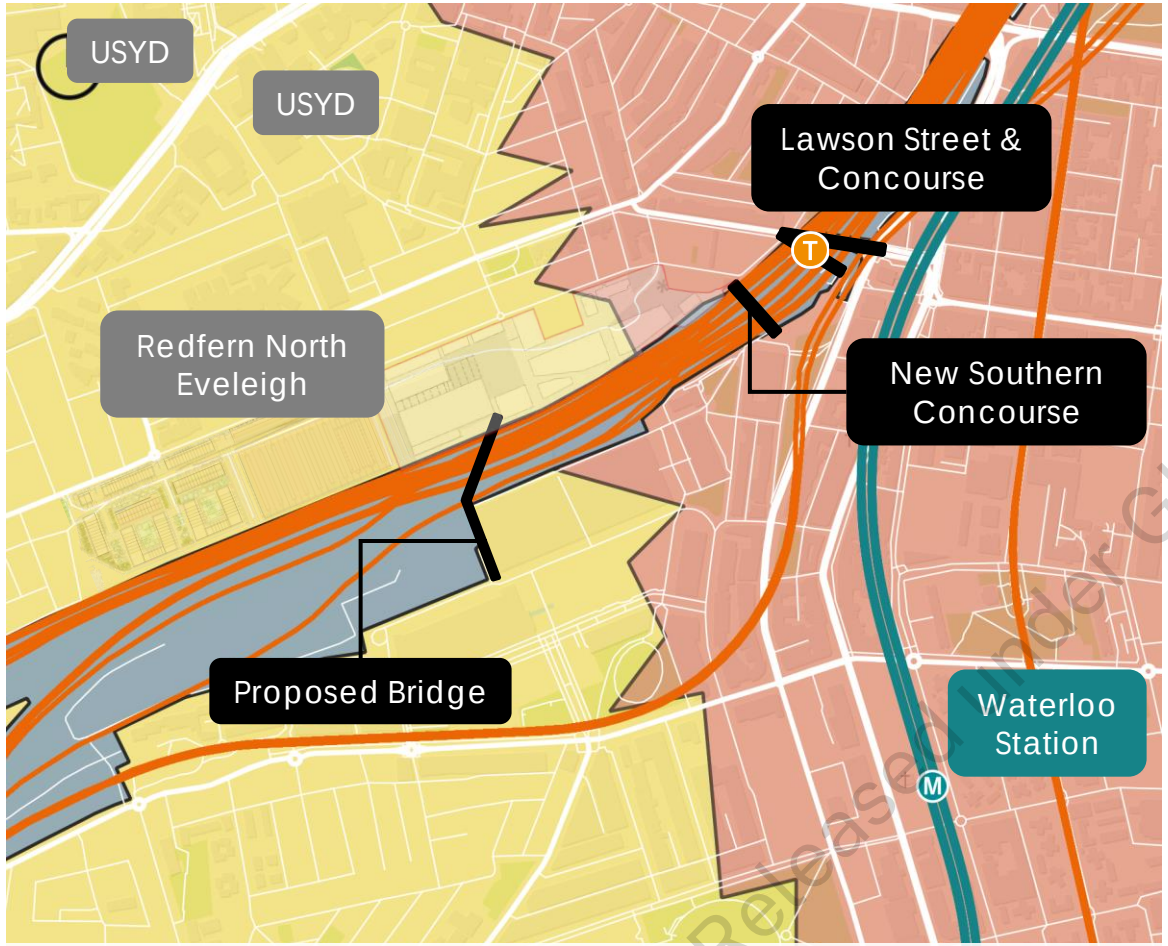


Southern Sites – Improvements by location





Southern Concourse versus Proposed bridge



Scenario 1 – Redfern Station Existing and Southern Concourse

Scenario 2 – Proposed bridge between North and South Eveleigh

A comparison of the two alternative groups of crossing options, resulted in the following observations of cross-corridor journeys:

- Bridge connecting North and South Eveleigh is the most attractive (from a travel time perspective) for majority of the RNE precinct.
- The New Southern Concourse is more attractive for access to the commercial developments on the eastern end of RNE.
- Customers (in particular students) who may travel between Waterloo Station (Sydney Metro City & Southwest) and the University of Sydney (USYD) Campus may find it more attractive to use the new proposed bridge between the station and campus.
- Other key destinations such as Broadway Shopping Centre, University of Technology Sydney (UTS) are better served by the New Southern Concourse and existing connections to the north.

Scenario 2 benefit – land use

Main beneficiaries of the additional bridge are cross-rail corridor journeys to/from:

- Urban residential
- Public services (University of Sydney)
- Commercial (North and South Eveleigh precincts). Noting RNE precinct is currently listed as infrastructure (railways).
- Light industrial and commercial (Waterloo and Green Square)

Travel time saving (range)

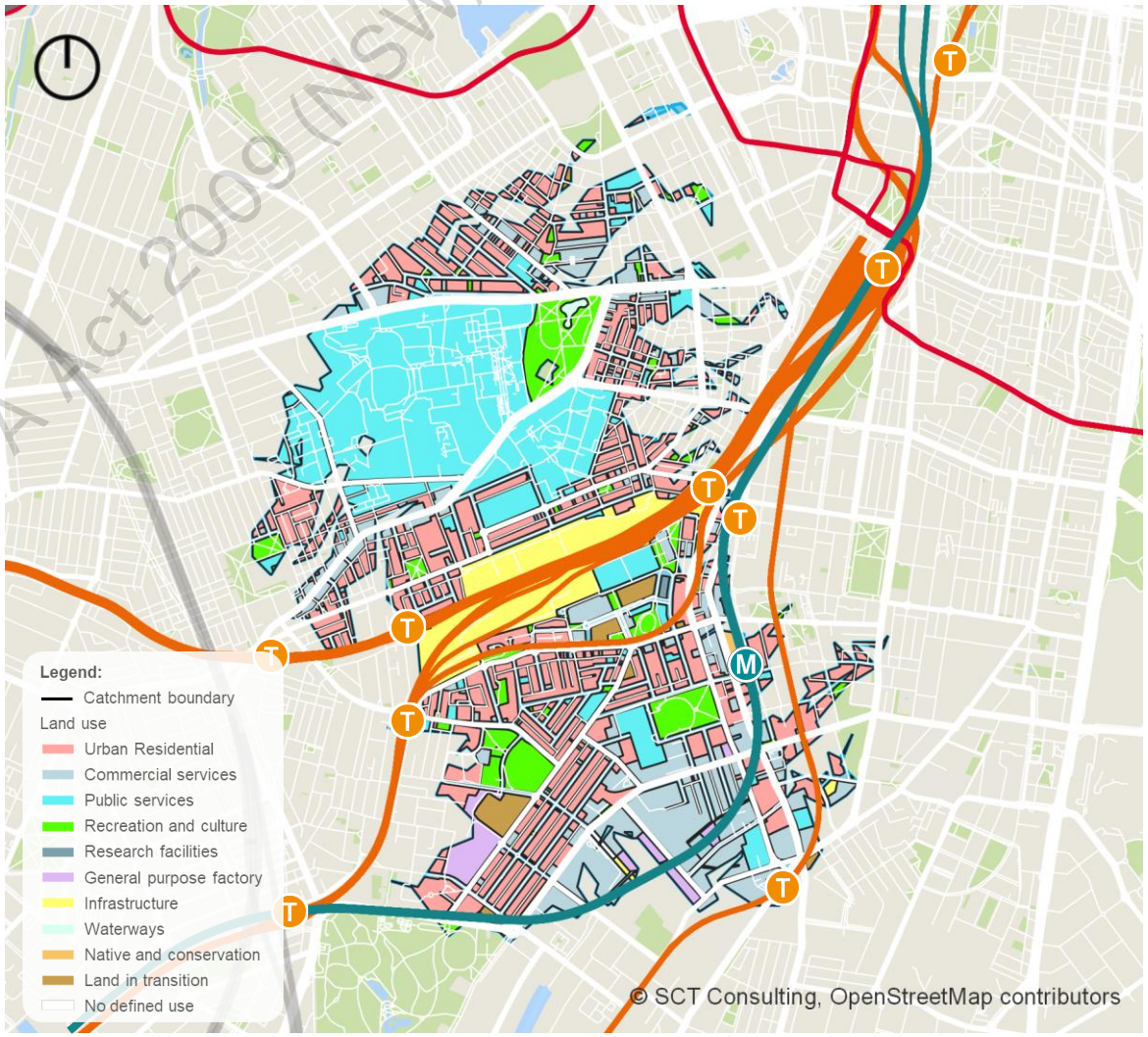
Up to 12 minutes

For cross-corridor journeys in the highlighted regions. For some customers, the benefit may be more; likewise, the benefit may be less for others.

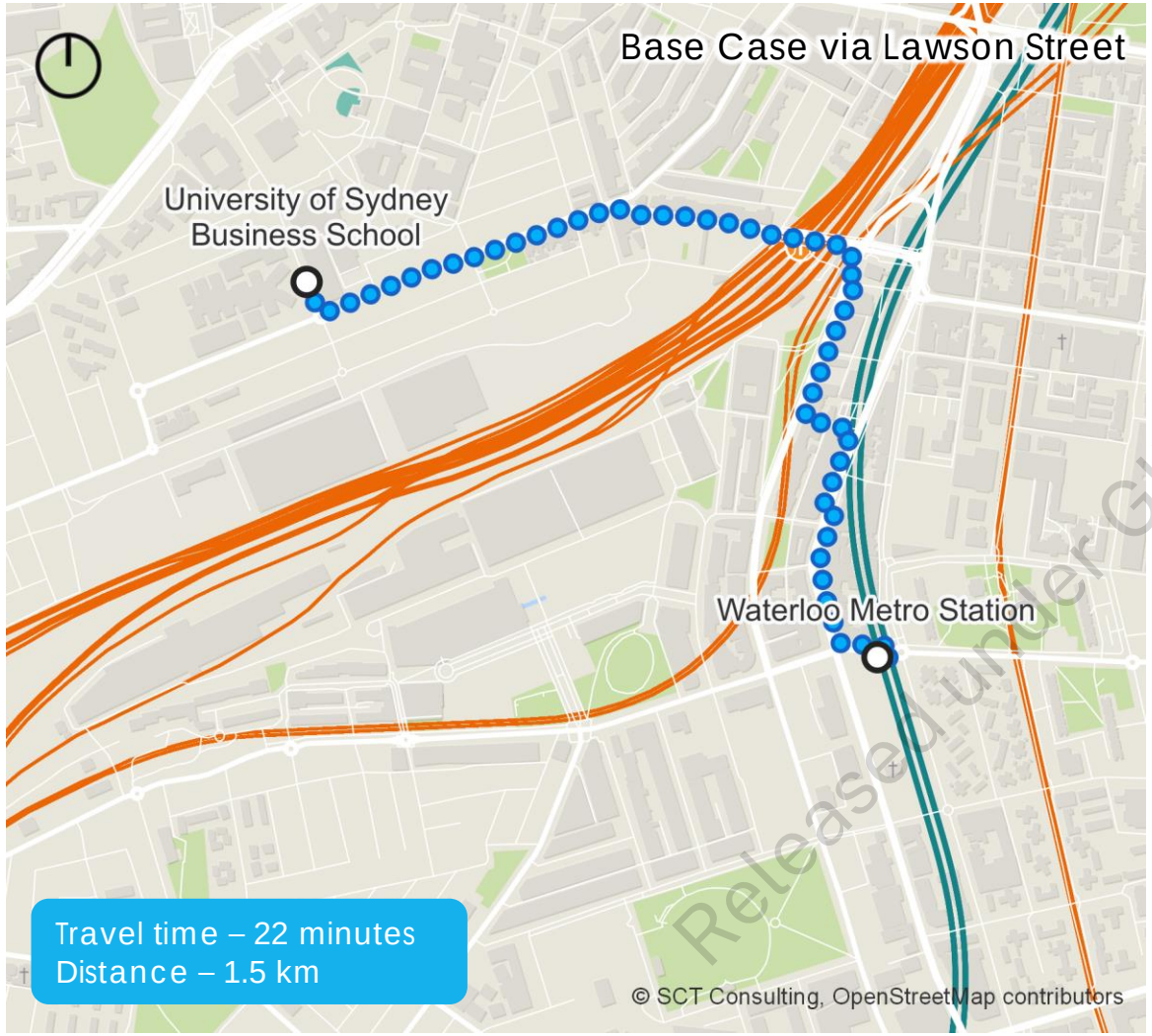
Average of travel-time saving

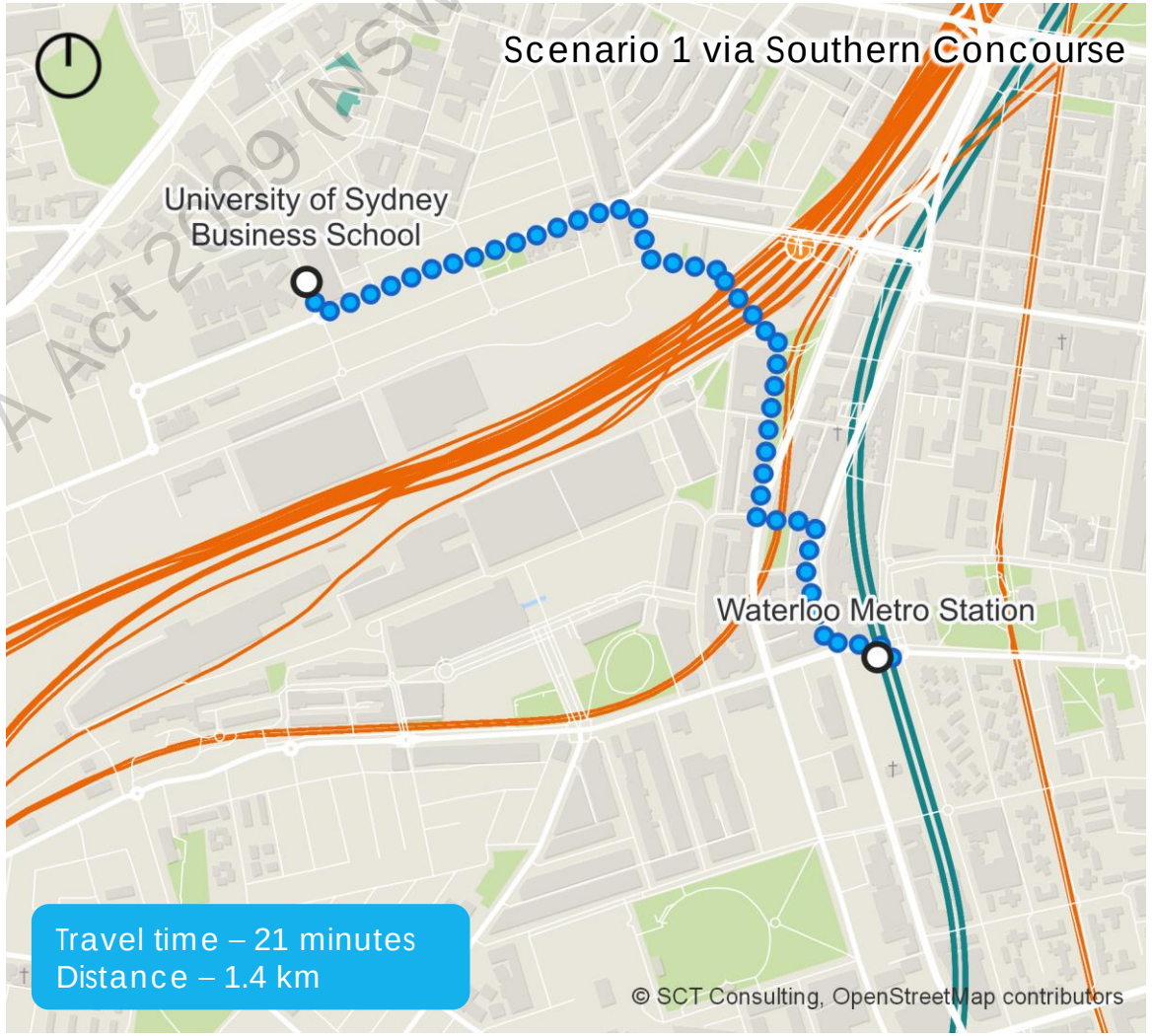
3 minutes

Weighted average based on forecast population and employment data (2036) across the walking catchment.

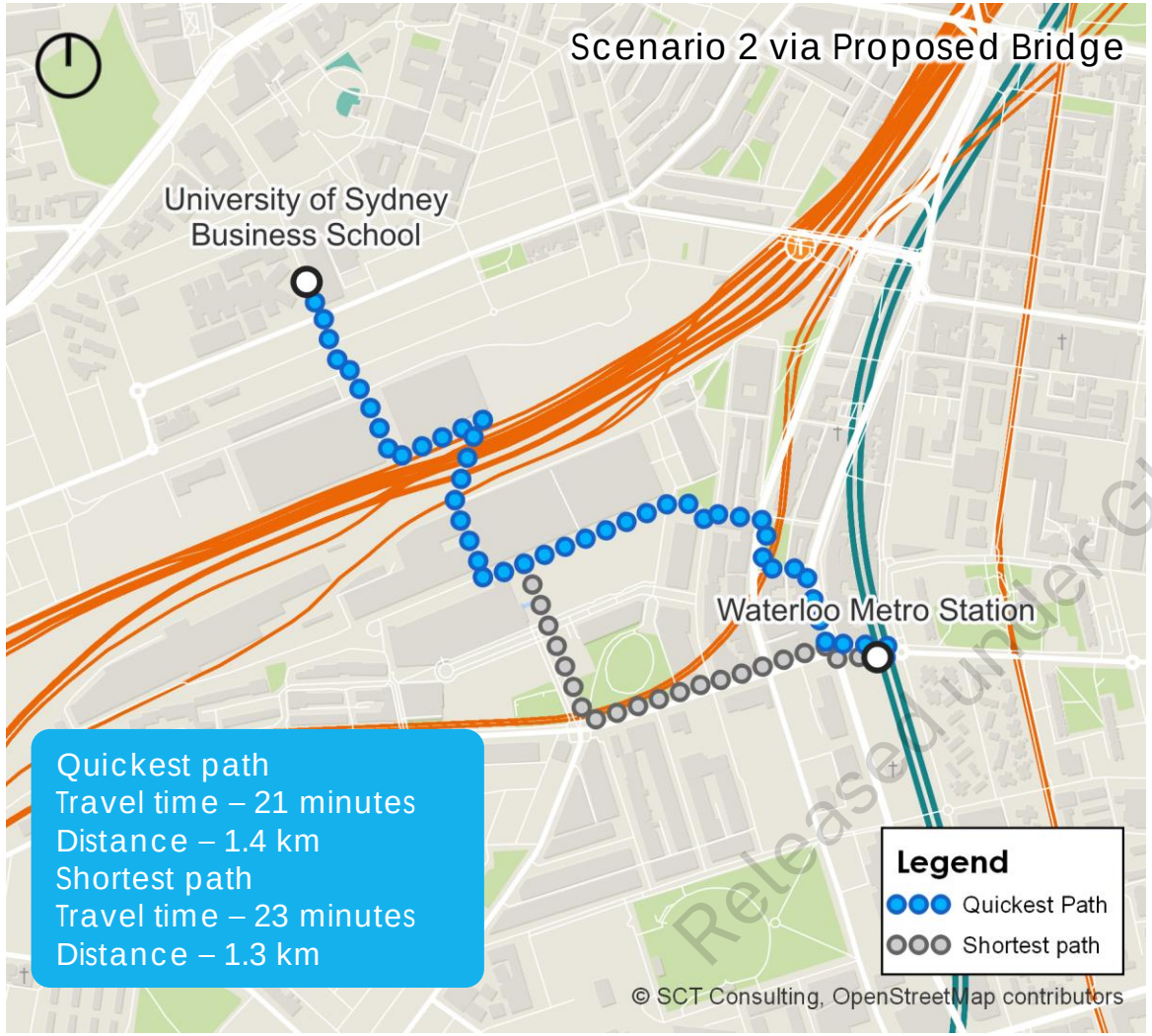


Travel time savings – example route





Travel time savings – example route



A comparison of the paths between *Waterloo Metro Station* and the *University of Sydney Business School* under multiple scenarios resulted in the following observations of cross-corridor journeys:

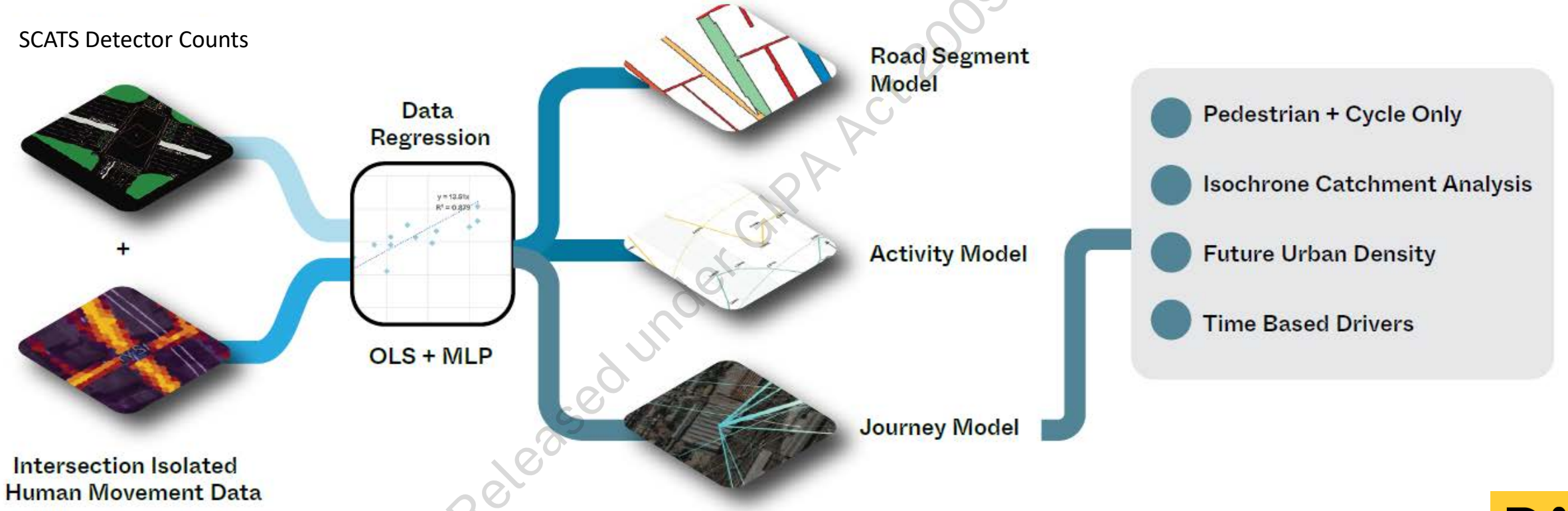
- Access through the southern concourse or proposed bridge are equally as attractive from a travel time and walk distance perspective.
  - The proposed bridge will not require Opal tap-on/off and may provide a better walking environment with less congestion (compared to the southern concourse) which may increase its attractiveness.
- The new proposed bridge provides an improved travel time and distance compared to the base case (via Lawson Street).
- With the proposed bridge option, the lift waiting time and time spent in the lift contributes to ~1-minute of the total travel time.

[02]

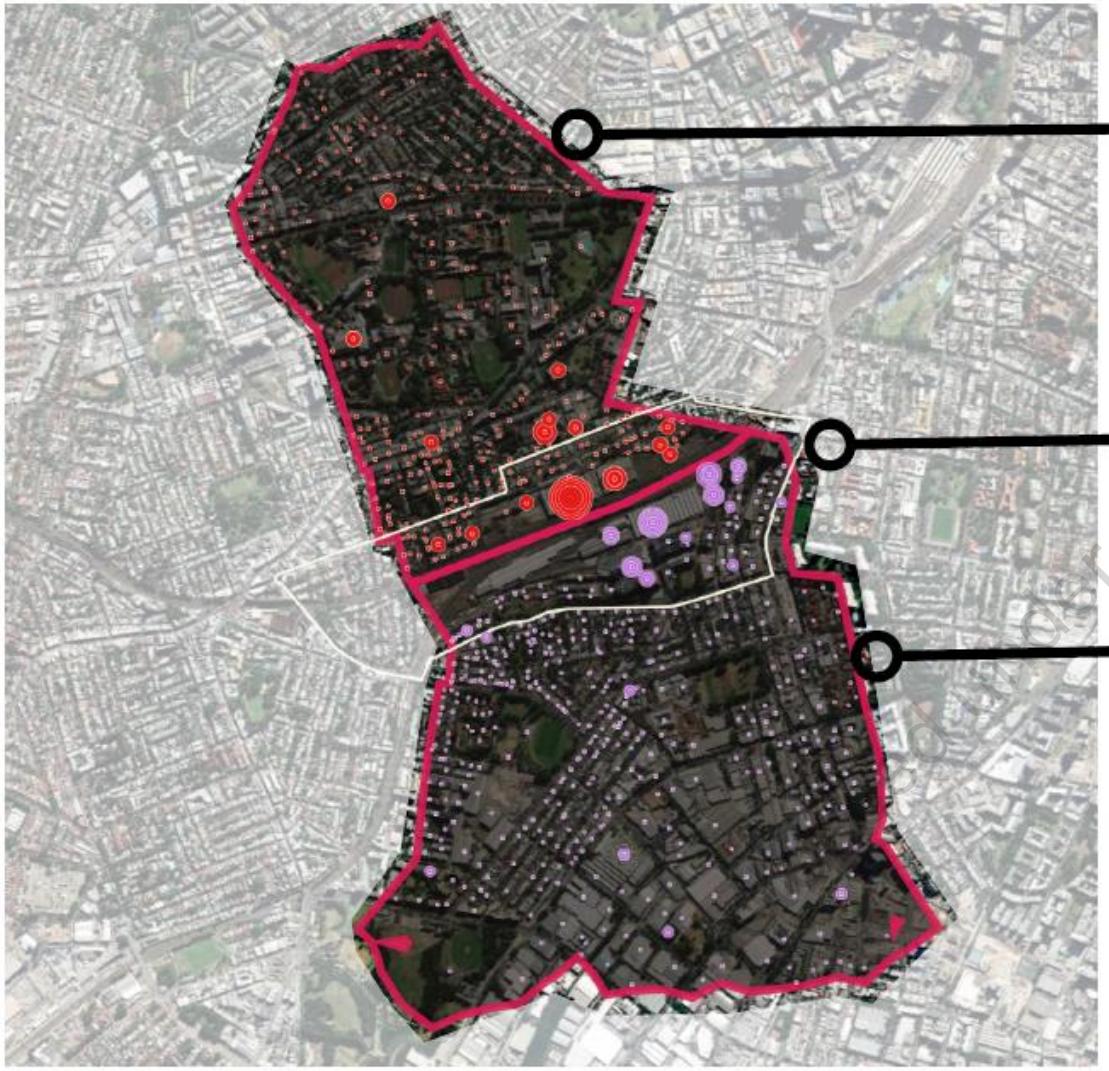
What quantum of people are likely to use the bridge?

Bridge demand analysis - process

We used a number of data processing methods to predict the number of journeys per hour that would use the proposed bridge.



Current observed cross-corridor origins and destinations



North

Primary Generator: University of Sydney

Precinct Boundary

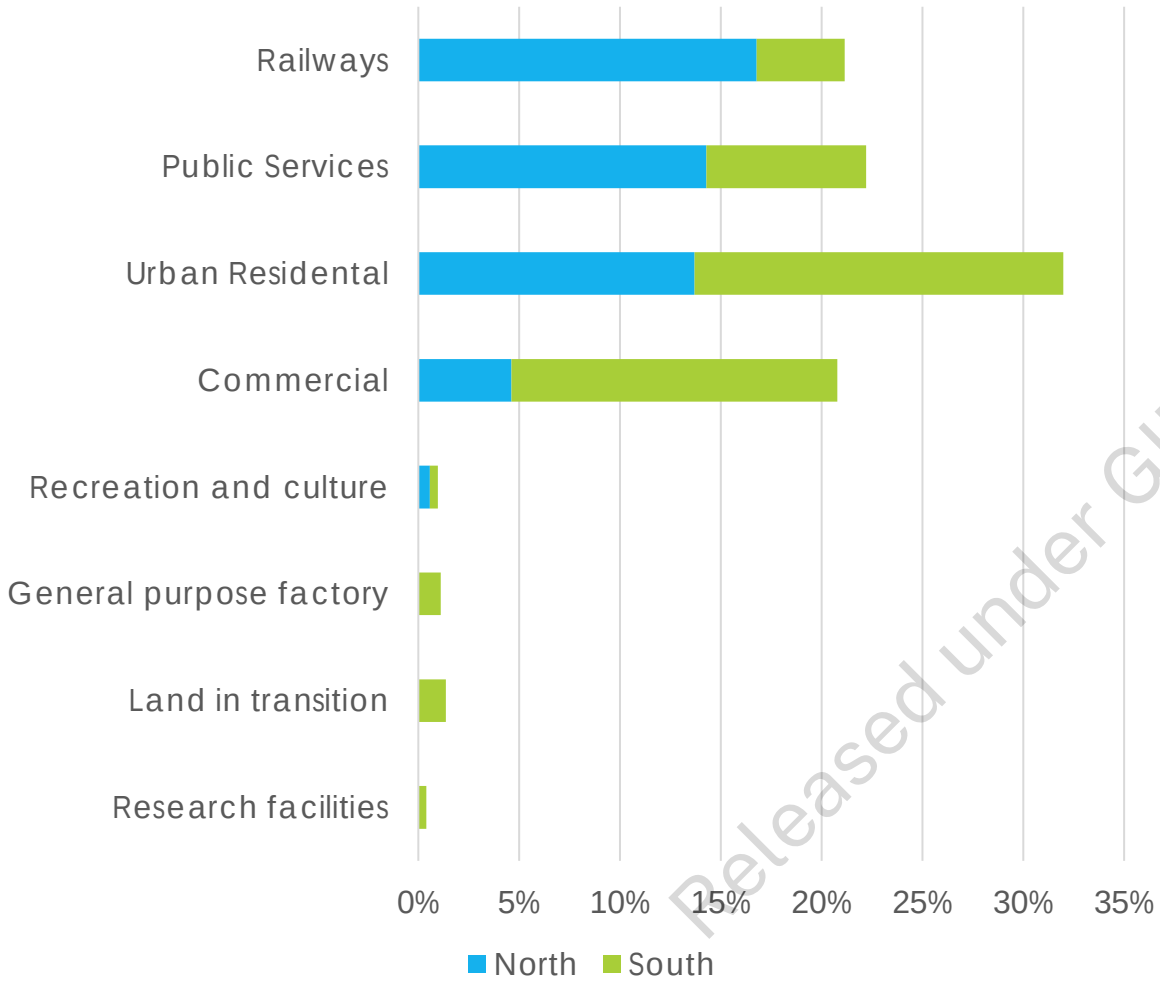
Percent of Total Journeys: 26%

(Excludes Redfern Station activity)

South

Primary Generator: Urban Residential

Cross-corridor trips by land-use



(Excludes Redfern Station activity – some areas around corridor including RNE precinct are classified as Railways)

Journey origins

(the reciprocal can be assumed for a return journey)

32%

Journeys originate from residential land-uses

<2%

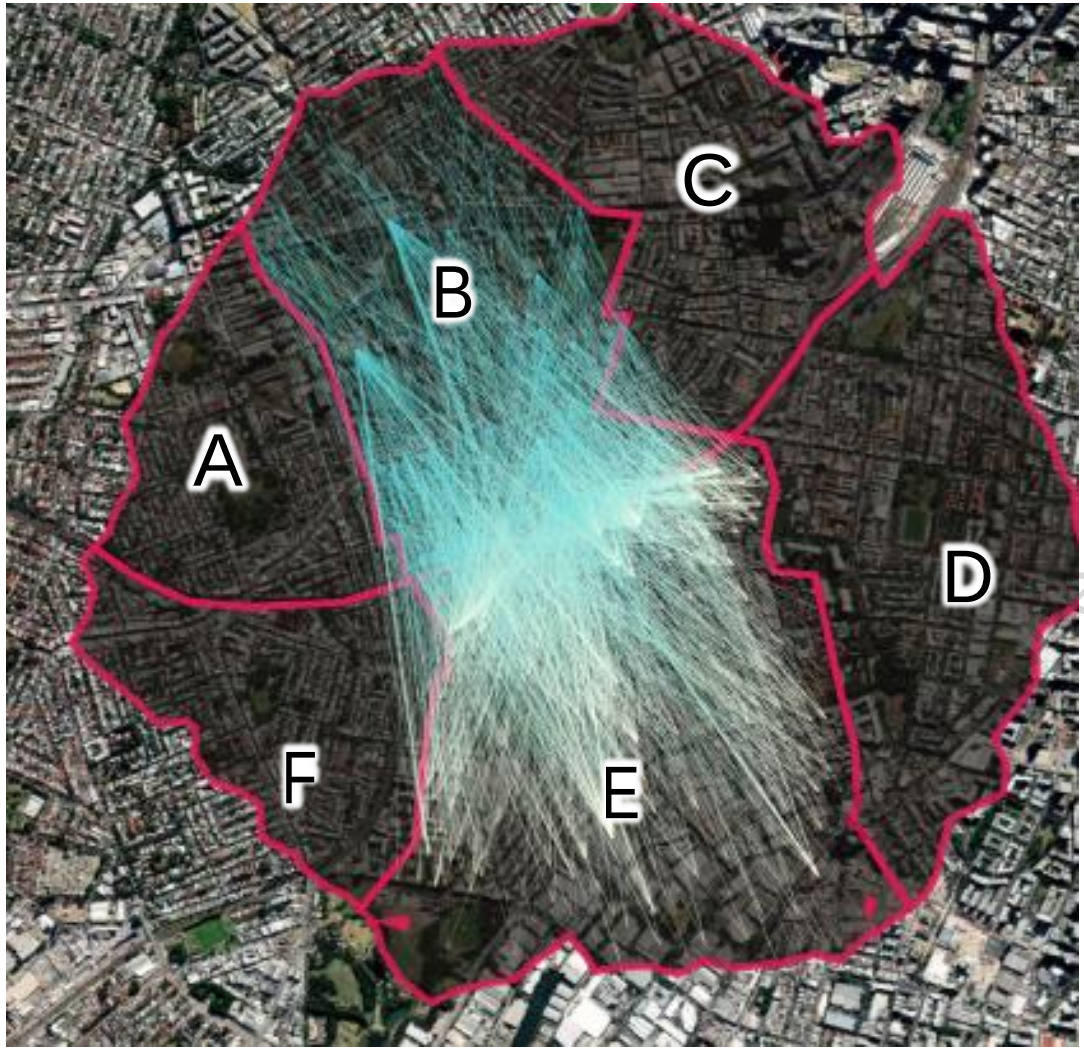
Journeys originate from land-uses classified as recreation and culture.

Study area - benefiting regions (and O-D connections)

Catchment analysis indicates greatest benefit to Regions B and E (and travel to and from these locations).

Regions A – F and C –D already have high levels of permeability, which is corroborated by high observed trips.

Current demand for bridge



Validated trips

340-420 journeys per day

R^2 Average

0.8875

Typical walking characteristics

53% less than 1000m in length

Peaks:

8:15-9:15 AM

4:45-5:45 PM

About the model:

Model Size: 152,470 Journeys

Number of Buildings: 1,391

Time Interval: 15 minutes

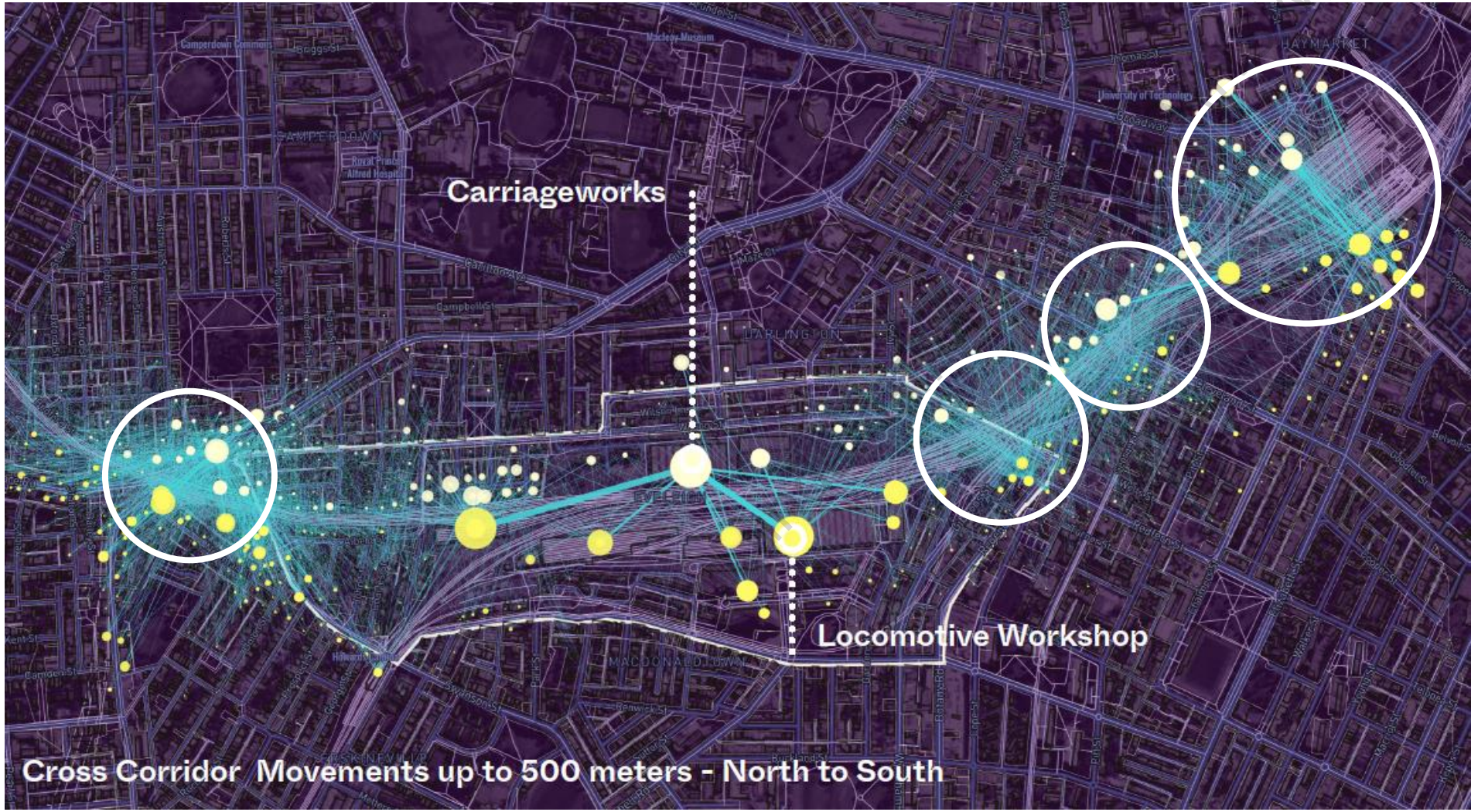
Time Series: Weekdays Only

Mode: Non-Vehicle

[03]

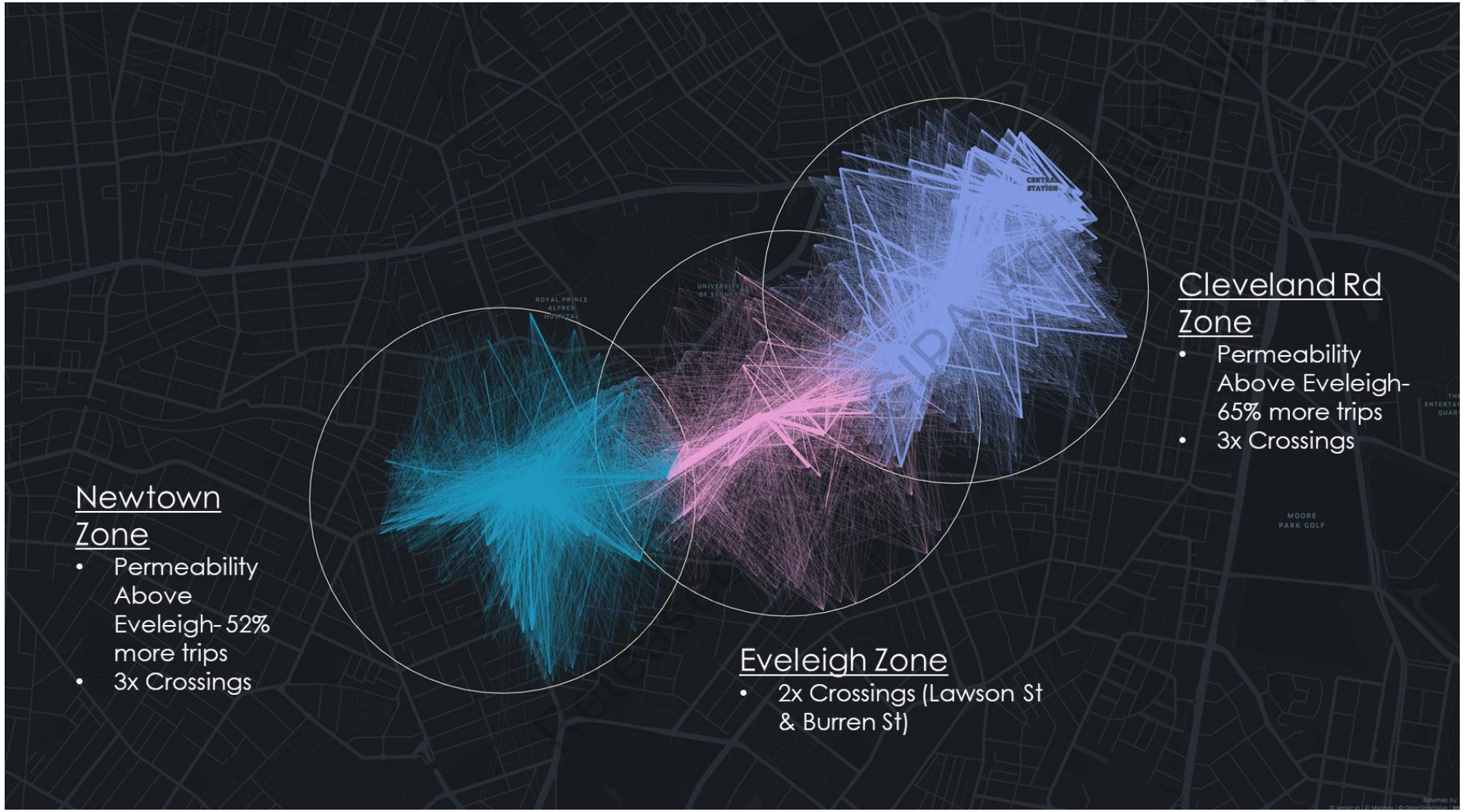
Role of Redfern-North Eveleigh development?

Increased activity due to attractions



Observed activity due to generators and attractions either side of the rail corridor (with a nearby crossing).

Increased activity due to attractions



Conservative assumption for uptake in activity

+10% to +25%

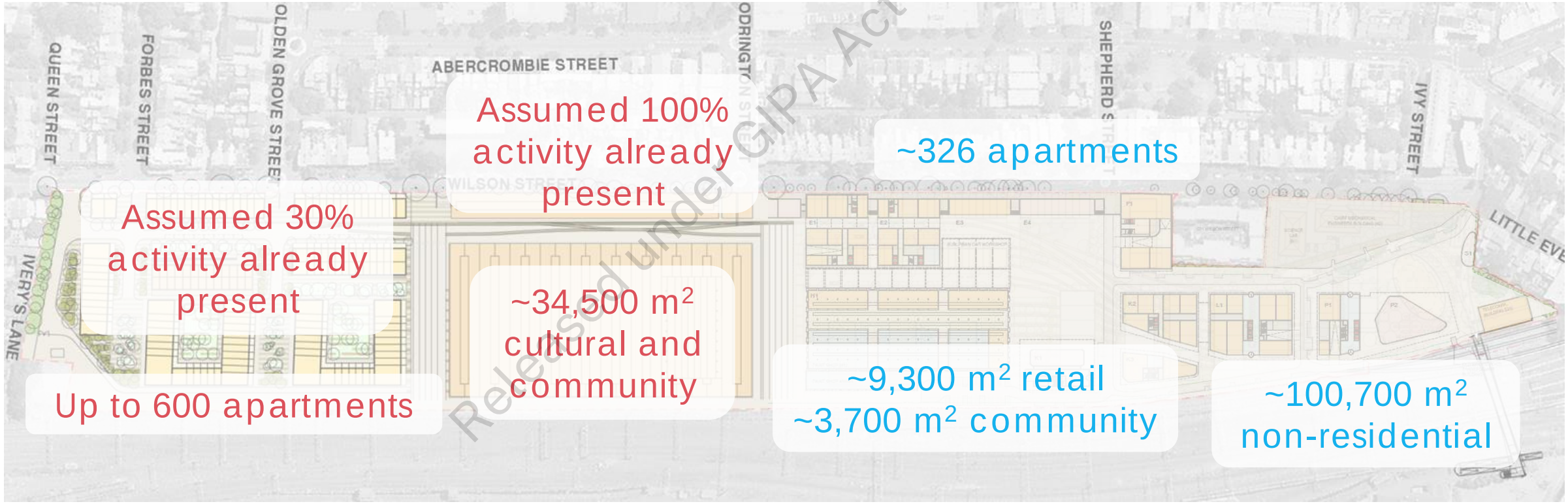
Based on observed activity in adjacent regions.

Increased activity due to land-use uplift

Proportion of Redfern-North Eveleigh precinct will utilise the bridge. Bridge may be used for access to and from the precinct and recreational purposes including lunch breaks to move between attractions at either the north or south precinct.

+10-20% of RNE precinct daily population

(includes customers who would use the bridge multiple times per day – with current 10-20% walk mode share for the precinct)



[04]

Outcomes

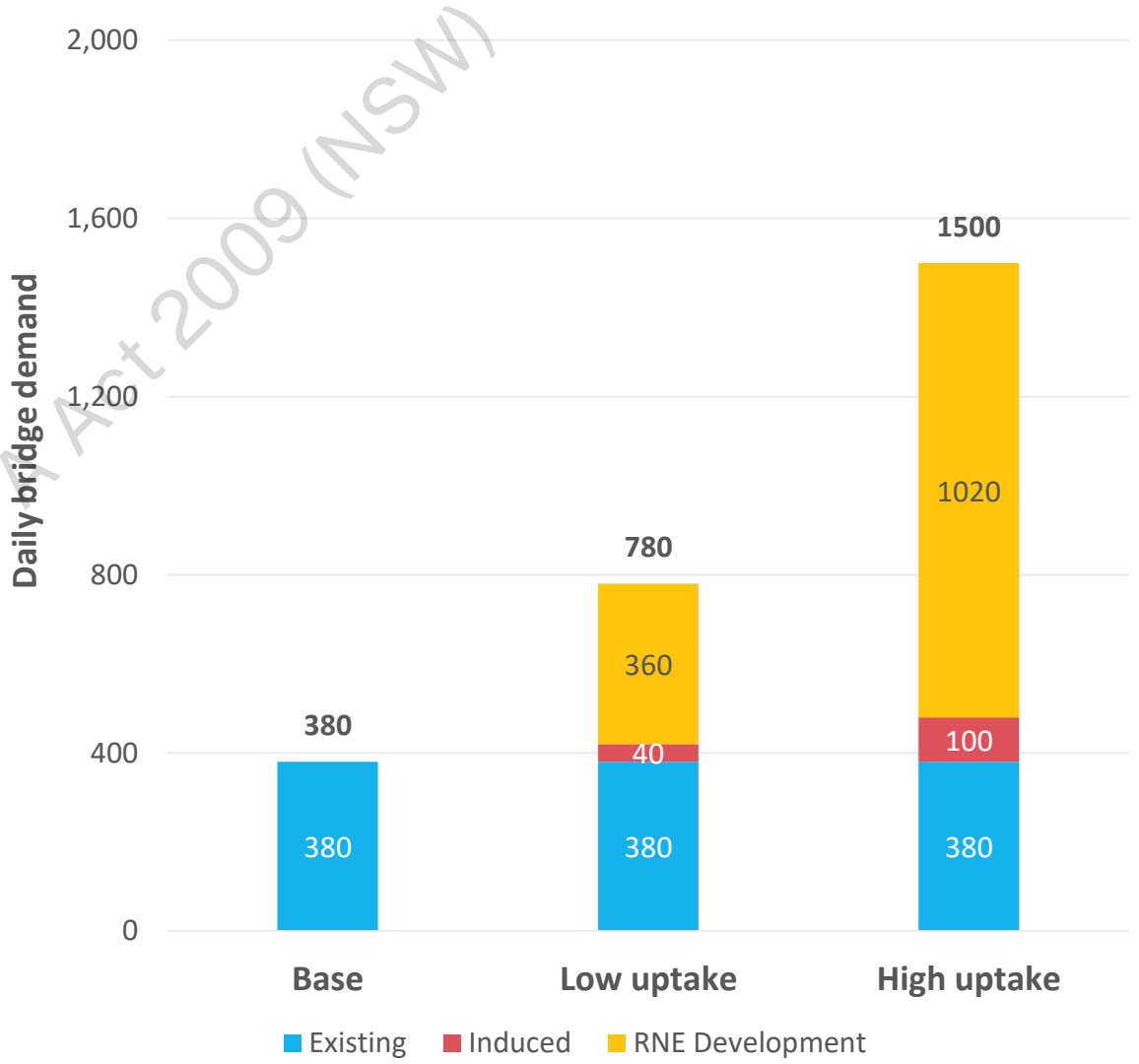
Potential bridge users

Induced demand:

- Increased permeability between generators and attracts
- Lower level of activity either side of rail corridor compared to regions like Newtown

RNE development related demand:

- Single largest contributor to use. The daily count includes an estimate for trips to and from the precinct.
- Assumes the proposed bridge is the most attractive option for:
  - 100% of residential, community and cultural land uses.
  - 70% of commercial land use. Some high-density commercial is located on the eastern edge, closer to the southern concourse, making the proposed bridge less attractive for these customers.
- Assumes precincts are being established as self-serving for residents and employees.
  - If land uses are linked between RNE and South Eveleigh, we would expect more daily trips.



Potential benefit – daily productivity

Average travel time saving

3 minutes

per cross-corridor journey.

Base scenario

19 hours

Reduced travel time for customers daily (typical weekday).

Low uptake scenario

39 hours

Reduced travel time for customers daily (typical weekday).

High uptake scenario

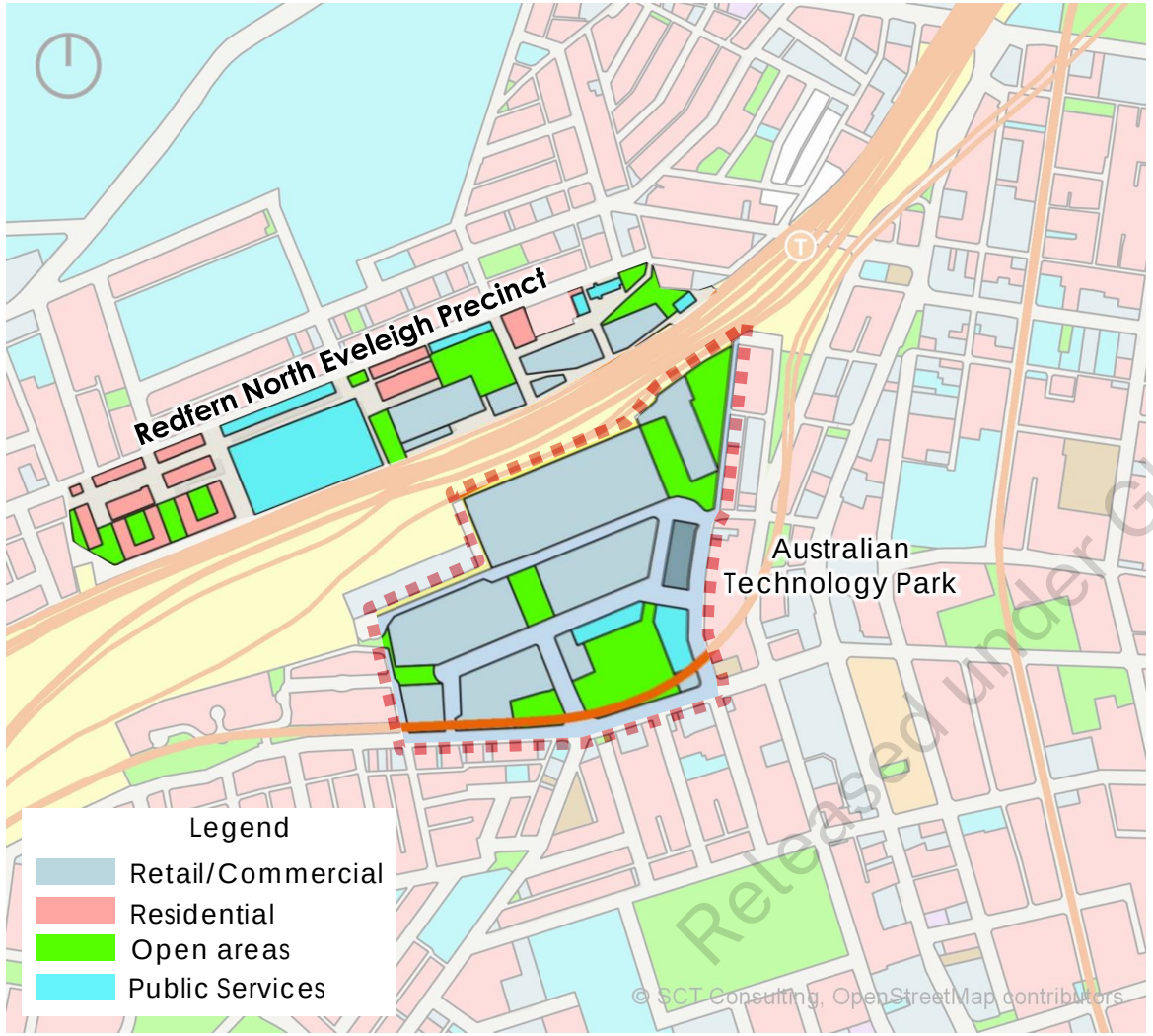
75 hours

Reduced travel time for customers daily (typical weekday).

[05]

Australia Technology Park – Sensitivity analysis (Retail)

Overview of Australian Technology Park (ATP) Land Use



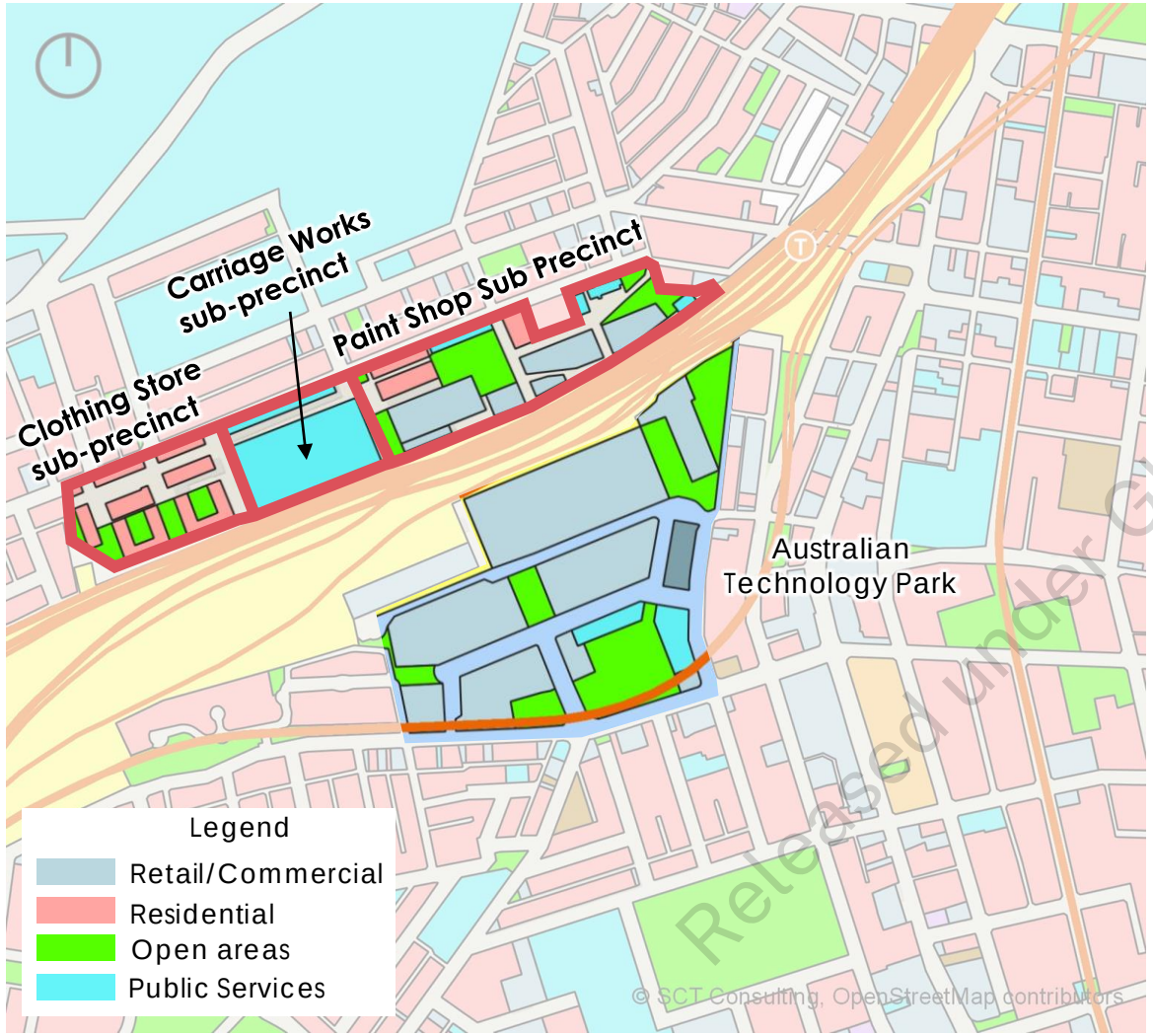
- Stage 1
  - Media Centre Building (Channel 7 Building ~40,000m^2 GFA)
  - Biomedical Building (~7,600m^2 GFA)
  - NICTA Building (~11,200m^2 GFA)
  - National Innovation Centre (NIC) (~7,000m^2 GFA)
  - International Business Centre (IBC) (~950m^2 GFA)
  - Locomotive Workshop (Conference and Exhibition Centre ~25,000m2 GFA)
- Stage 2
  - Commercial/ office premises – 102,542m^2 GFA
  - Retail – 2,790m^2 GFA
  - Childcare -1,649m^2 GFA
- The Large Erecting Shop (LES) with 15,000 m2 GFA has been considered for trip calculations despite falling outside the ATP.

Key outcomes

Combined GFA: 214,181 m^2 GFA

Approximate employees: 11,750, based on an employee rate of:
- 1:18 m2 GFA (commercial)
- 1:35 m2 GFA (retail and other)

Overview of Redfern-North Eveleigh Precinct Land Use



There are three sub-precincts within the Redfern-North Eveleigh Precinct

- Paint Shop sub-precinct
  - Up to 326 apartments
  - 9,300m^2 retail
  - 3,700m^2 community area
  - 100,700m^2 non-residential area
- Carriage Works sub-precinct
  - 34,500m^2 community area (assumed 100% delivered)
- Clothing Store sub-precinct
  - Already partially delivered (some trips already observed)
  - Up to 600 apartments (assumed 30% delivered)

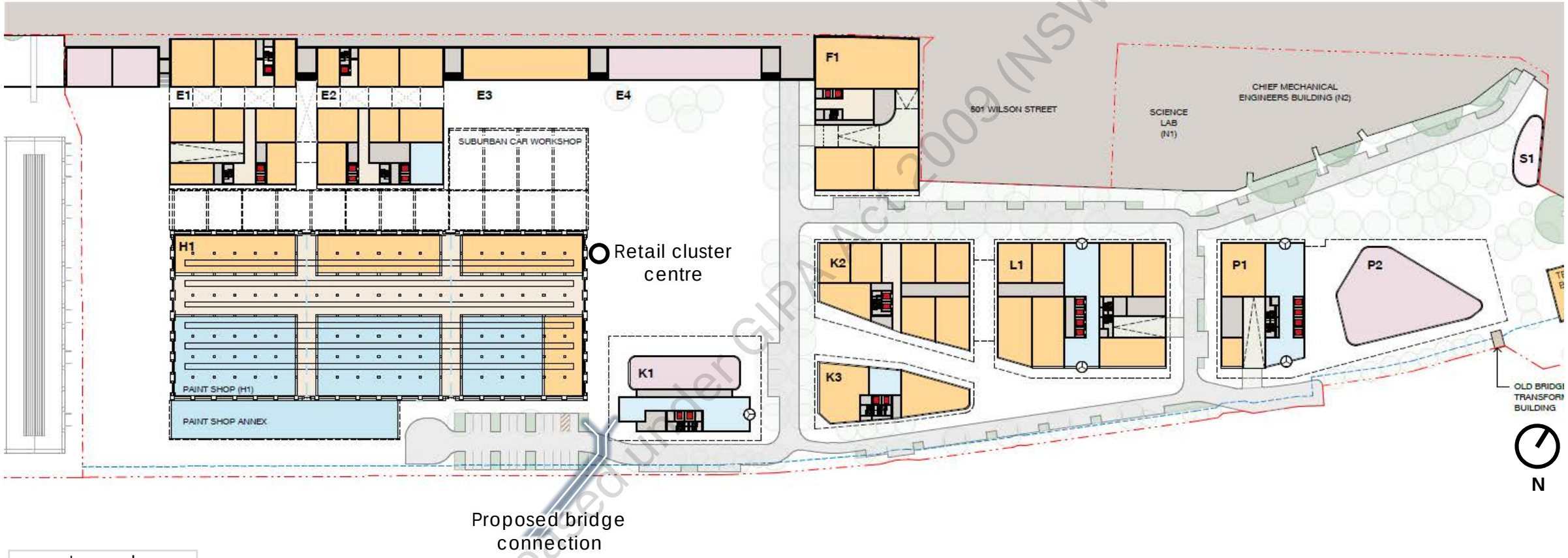
Key outcomes

Approximate "new" employees: 5,930 based on an employee rate of:

- 1:18 m2 GFA (commercial)
- 1:35 m2 GFA (retail)
- 1:50 m2 GFA (community)

Approximate "new" residents : 1,570 based on dwelling rate of 2.1 persons per apartment.

Paint Shop Sub-Precinct Land use



Key outcome
The proposed bridge connects to the Paint shop precinct at the central location close to the majority of the retail areas.

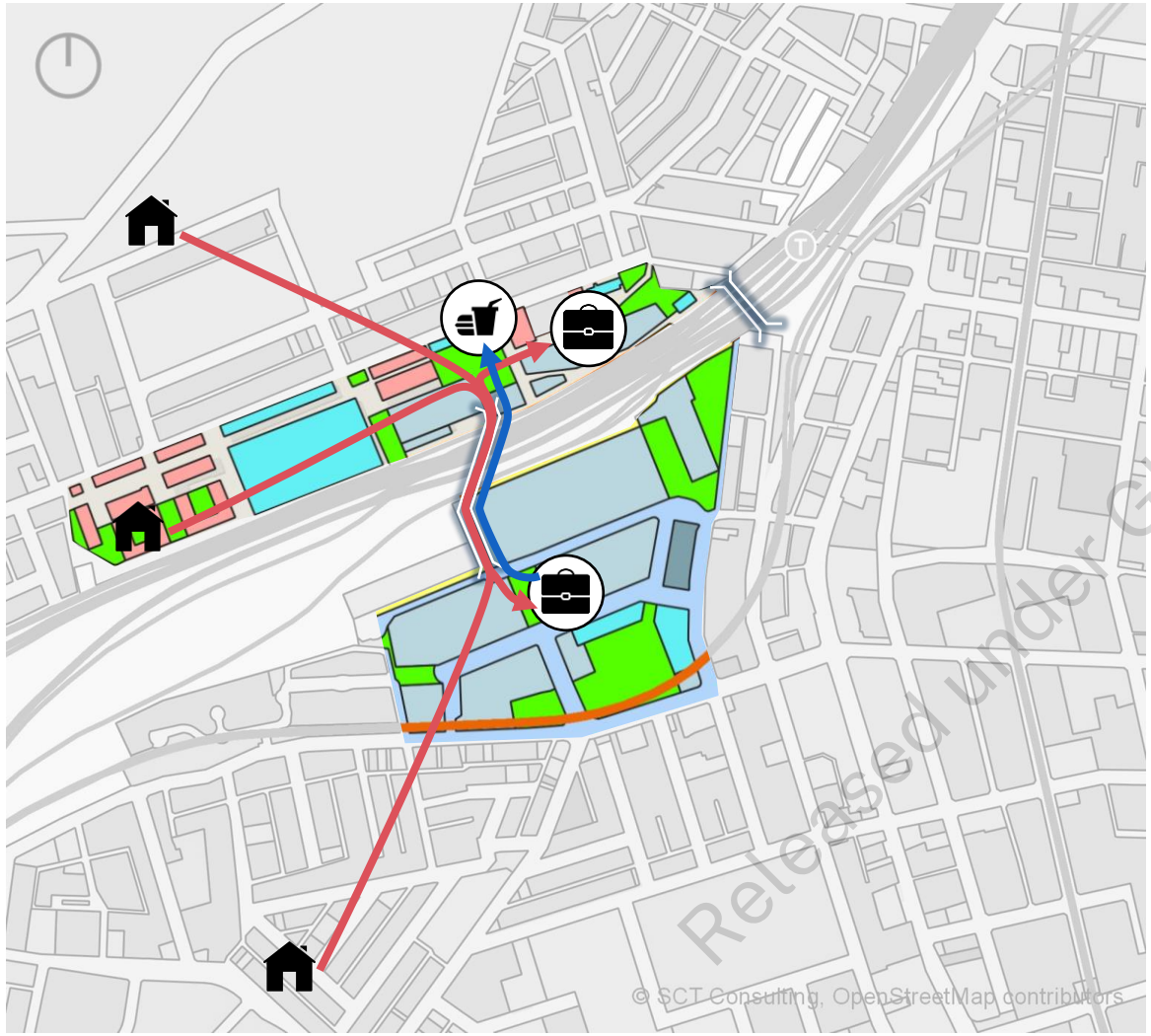
Paint Shop Sub-Precinct Land use

- Proposed bridge connection on the northern side of the rail corridor is located near the Paint Shop sub-precinct retail cluster.
- On the southern side, the bridge is near Village Square Park, between Media Centre Building and Commonwealth Bank (Foundry) Building.

Key outcomes

Both of the proposed bridge end connections are near high-demand land uses.

Trip type overview



The overarching analysis, which considers trips within a 2-kilometre catchment, leverages existing travel patterns. This analysis has already included the following trips:

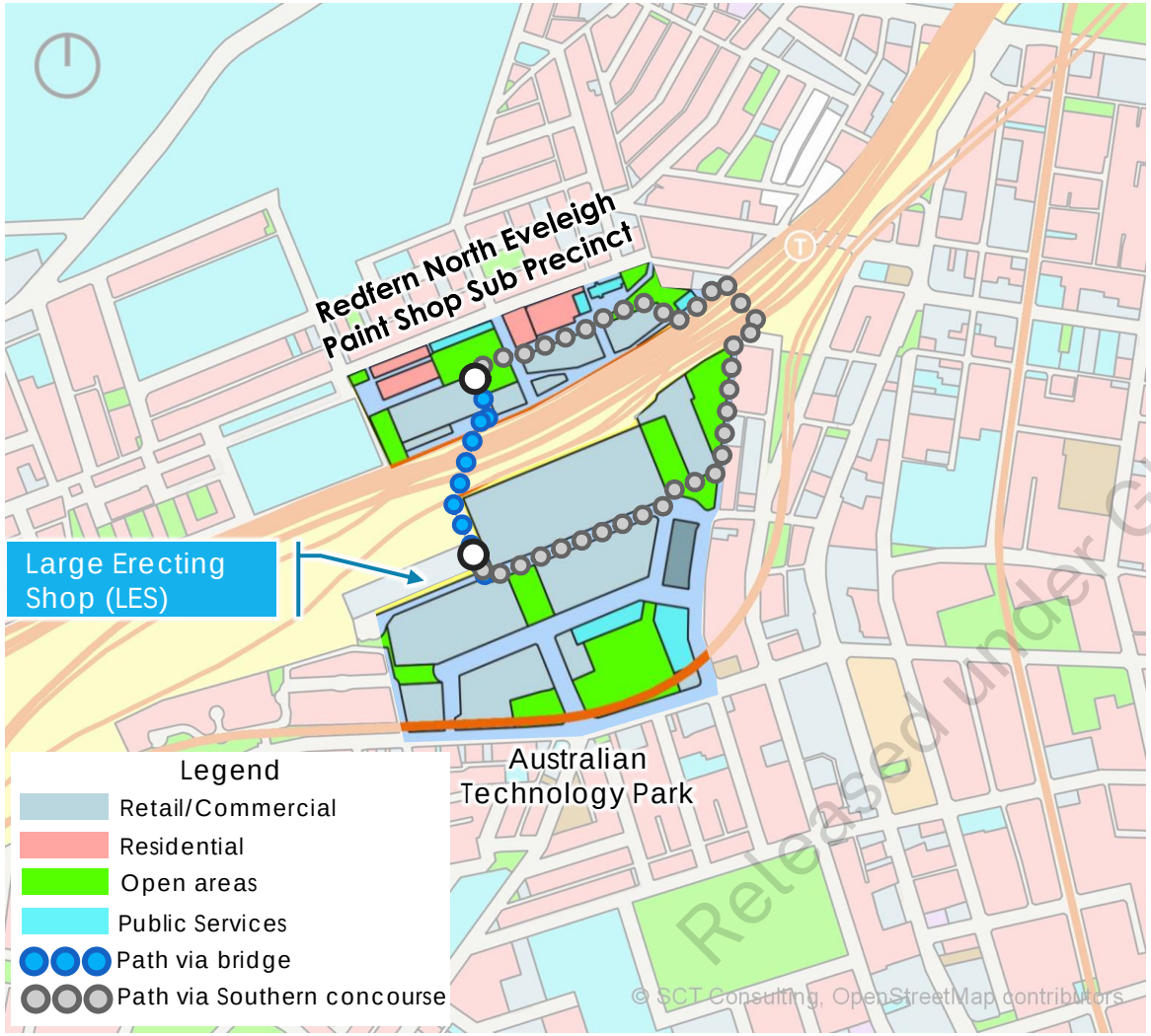
- External origins/destinations to ATP or RNE – captured in the overarching analysis
- ATP to/from RNE commercial-residential – partially captured in the overarching analysis

Trips between ATP and RNE which are work-related business trips (i.e. commercial-commercial), would be limited in number and are difficult to estimate without inherent knowledge of the future tenants. Hence these have not been estimated. However, it is envisaged that the conservatism within the overarching analysis would sufficiently capture these trips.

A key trip category that has not been considered is trips between ATP and RNE commercial/residential to retail (such as food and beverage) throughout the day. These trips (and their respective likelihood of using the proposed bridge) are considered in this chapter.

- Assumptions for trip estimation
  - 70% of total employees attend office on a typical day
  - 50% purchase lunch/visit any other retail facility
  - ~5-10% likely to go to the RNE Paint shop precinct. 5% is being used as a low uptake and 10% for the high uptake scenario.
  - Return trip is assumed to be via the same route

Large Erecting Shop (LES) to RNE retail cluster



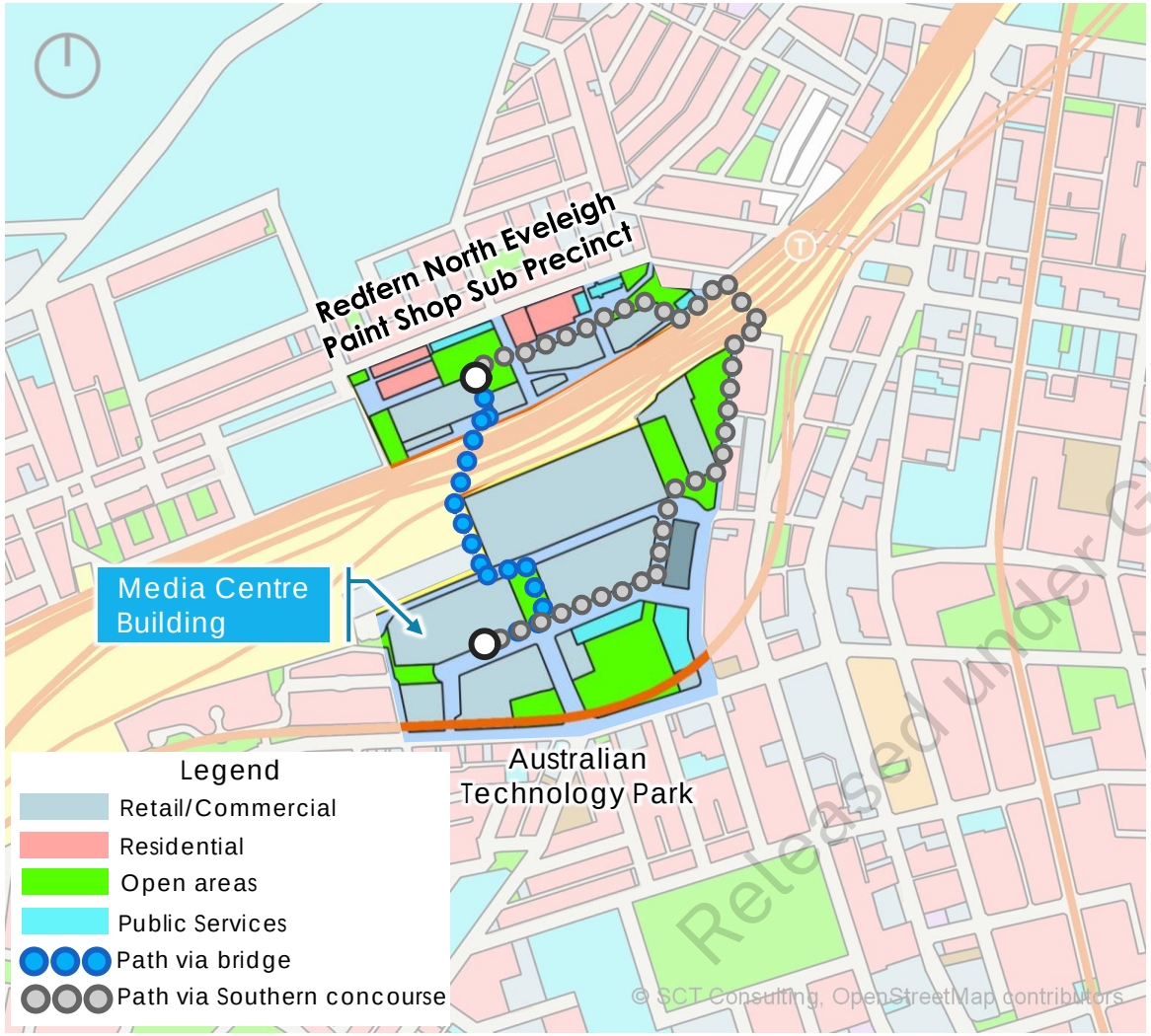
Large Erecting Shop (LES)

- Land use:
  - Commercial/ office premises – 15,000 m2 GFA
- Number of employees – 833
- Travel time to RNE retail cluster
  - via southern concourse – 14 minutes
  - via proposed bridge – 5 minutes 17 seconds
- Number of daily trips via bridge – 29 to 58 trips

Key outcomes

Travel time saving due to proposed bridge – 8 minutes 43 seconds
Number of daily trips via bridge – 29 to 58 trips

Media Centre Building to RNE retail cluster



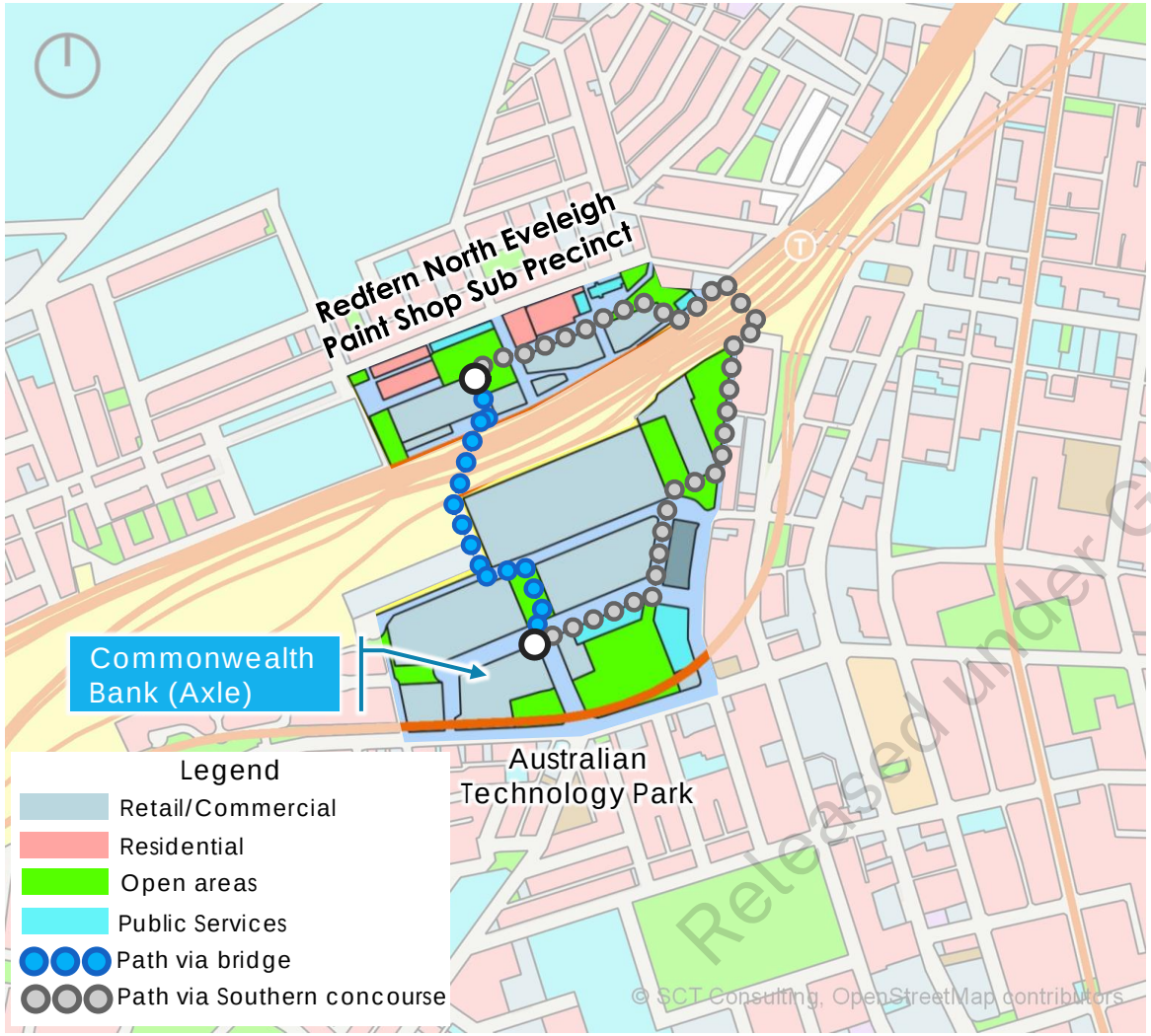
Media Centre Building (Channel 7, NEP, etc.)

- Land use:
  - Commercial/ office premises – 40,000 m2 GFA
- Number of employees – 2,222
- Travel time to RNE retail cluster
  - via southern concourse – 14 minutes 43 seconds
  - via proposed bridge – 8 minutes
- Number of daily trips via bridge – 78 to156 trips

Key outcomes

Travel time saving due to proposed bridge – 6 minutes 43 seconds
Number of daily trips via bridge – 78 to156 trips

Commonwealth Bank (Axle) to RNE retail cluster



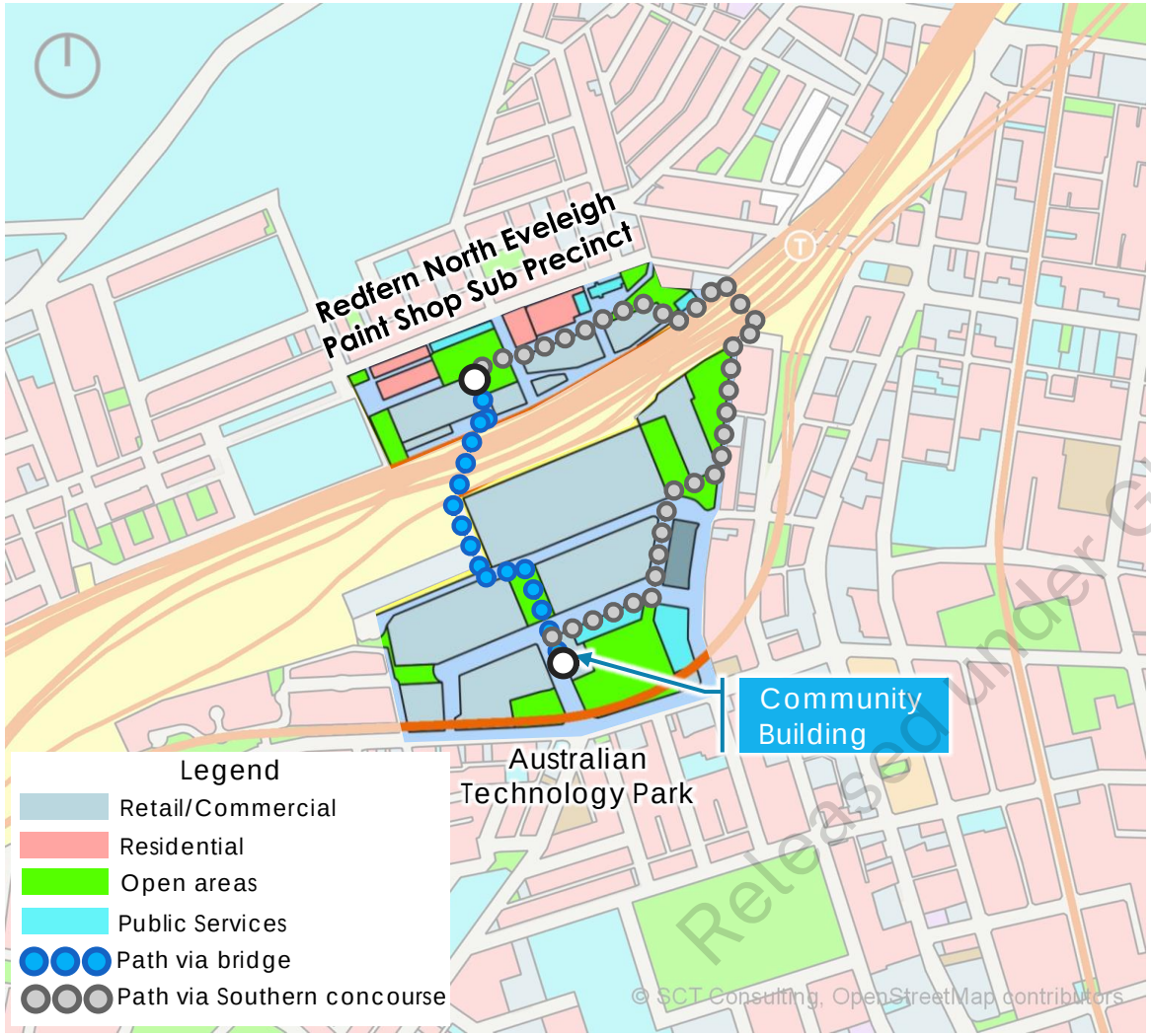
Commonwealth Bank (Axle)

- Land use:
  - Commercial/ office premises – 45,663 m2 GFA
  - Retail – 314 m2 GFA
  - Childcare – 855 m2 GFA
- Number of employees – 2,570
- Travel time to RNE retail cluster
  - via southern concourse – 14 minutes 11 seconds
  - via proposed bridge – 7 minutes 33 seconds
- Number of daily trips via bridge – 90 to180 trips

Key outcomes

Travel time saving due to proposed bridge – 6 minutes 37 seconds
Number of daily trips via bridge – 90 to180 trips

Community Building to RNE retail cluster



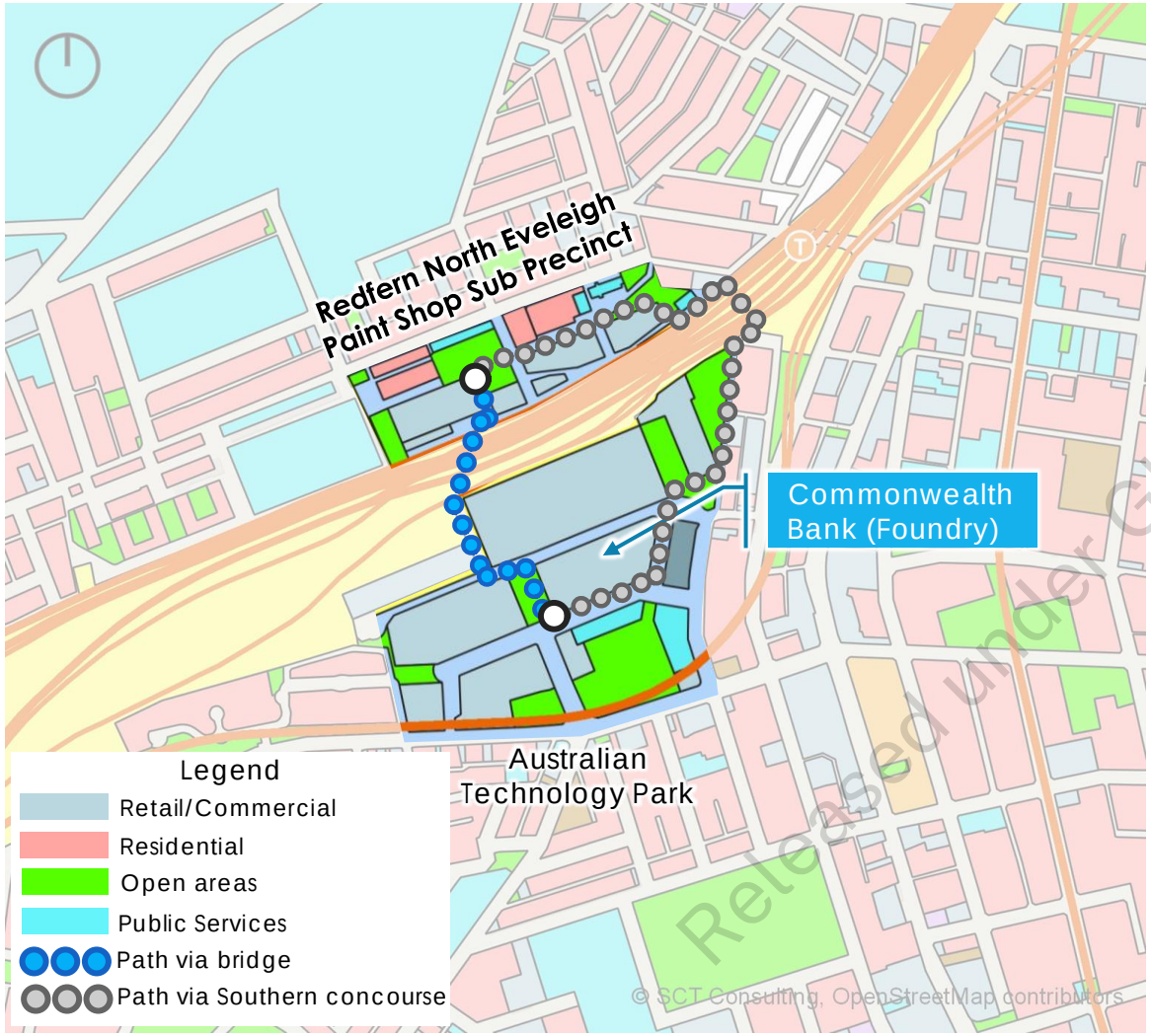
Community Building

- Land use:
  - Commercial/ office premises – 2,286 m2 GFA
  - Retail – 381 m2 GFA
  - Childcare – 794 m2 GFA
- Number of employees – 161
- Travel time to RNE retail cluster
  - via southern concourse – 14 minutes 15 seconds
  - via proposed bridge – 7 minutes 42 seconds
- Number of daily trips via bridge – 6 to 11 trips

Key outcomes

Travel time saving due to proposed bridge – 6 minutes 34 seconds
Number of daily trips via bridge – 6 to 11 trips

Commonwealth Bank (Foundry) to RNE retail cluster



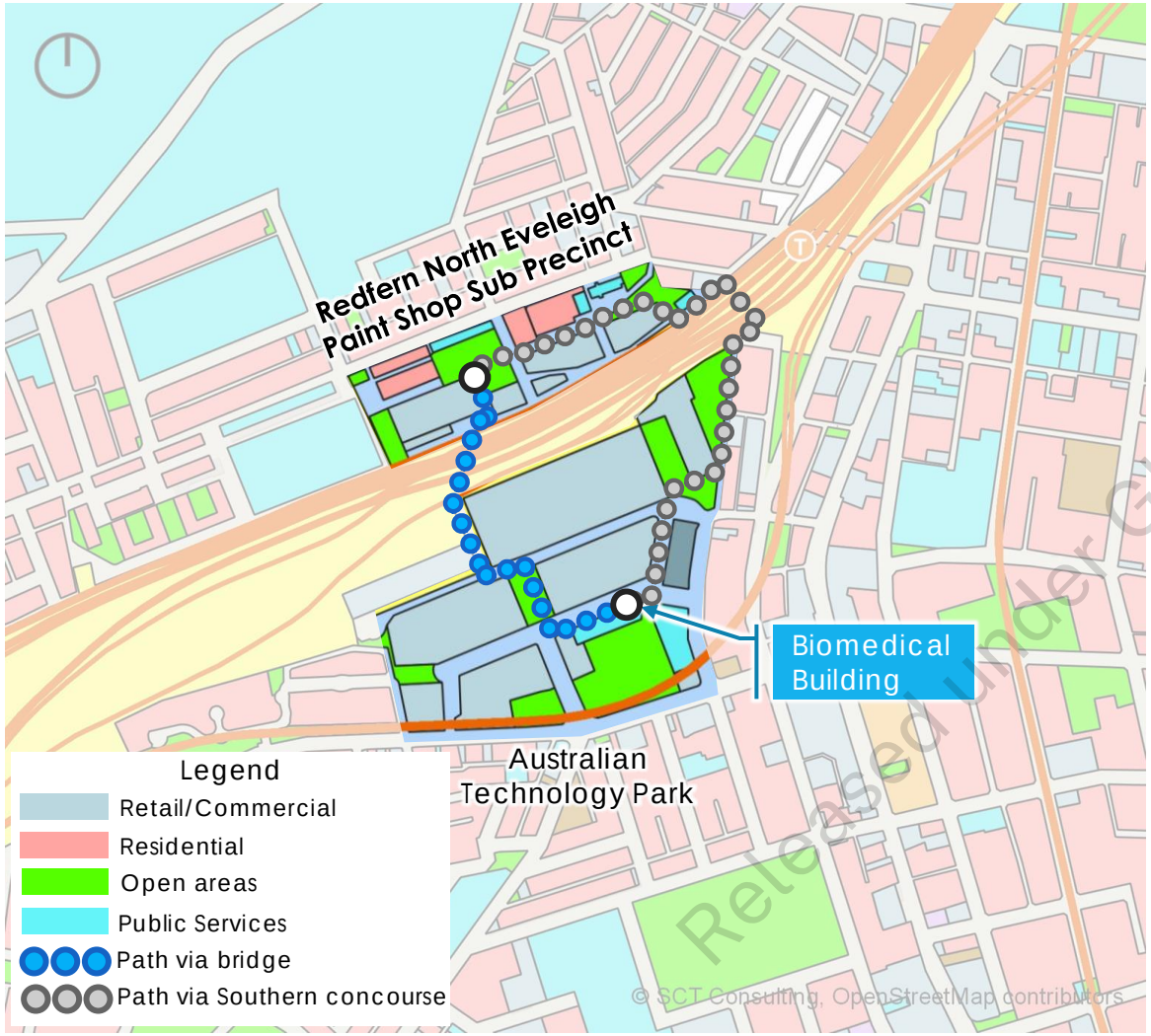
Commonwealth Bank (Foundry)

- Land use:
  - Commercial/ office premises – 54,593 m2 GFA
  - Retail – 2,095 m2 GFA
- Number of employees – 3,093
- Travel time to RNE retail cluster
  - via southern concourse – 13 minutes 27 seconds
  - via proposed bridge – 6 minutes 59 seconds
- Number of daily trips via bridge – 108 to 216 trips

Key outcomes

Travel time saving due to proposed bridge – 6 minutes 28 seconds
Number of daily trips via bridge – 108 to 216 trips

Biomedical Building to RNE retail cluster



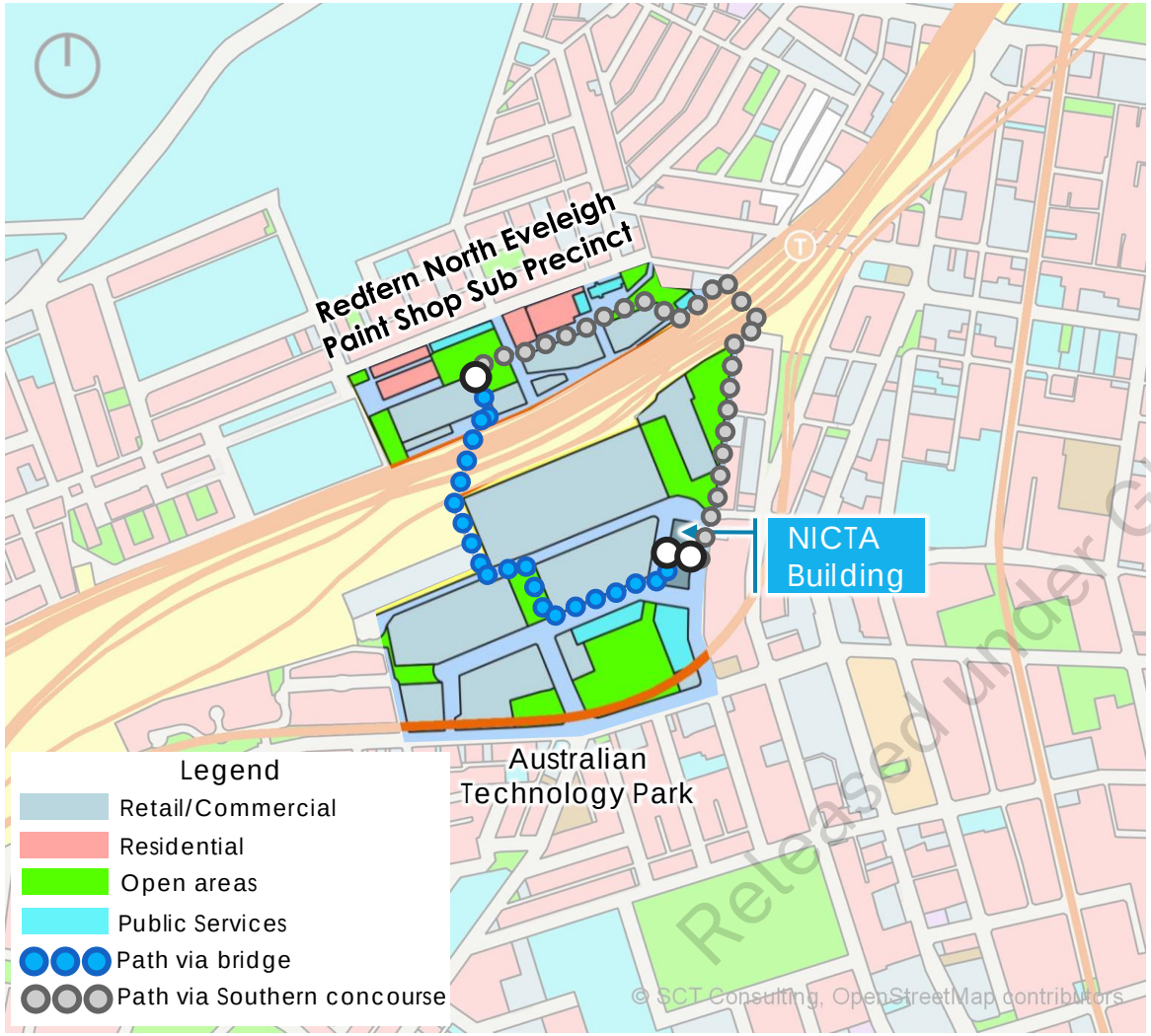
Biomedical Building

- Land use:
  - Commercial/ office premises – 7,600 m2 GFA
- Number of employees – 422
- Travel time to RNE retail cluster
  - via southern concourse – 12 minutes 25 seconds
  - via proposed bridge – 8 minutes 34 seconds
- Number of daily trips via bridge – 15 to 30 trips

Key outcomes

Travel time saving due to proposed bridge – 3 minutes 51 seconds
Number of daily trips via bridge – 15 to 30 trips

NICTA Building to RNE retail cluster



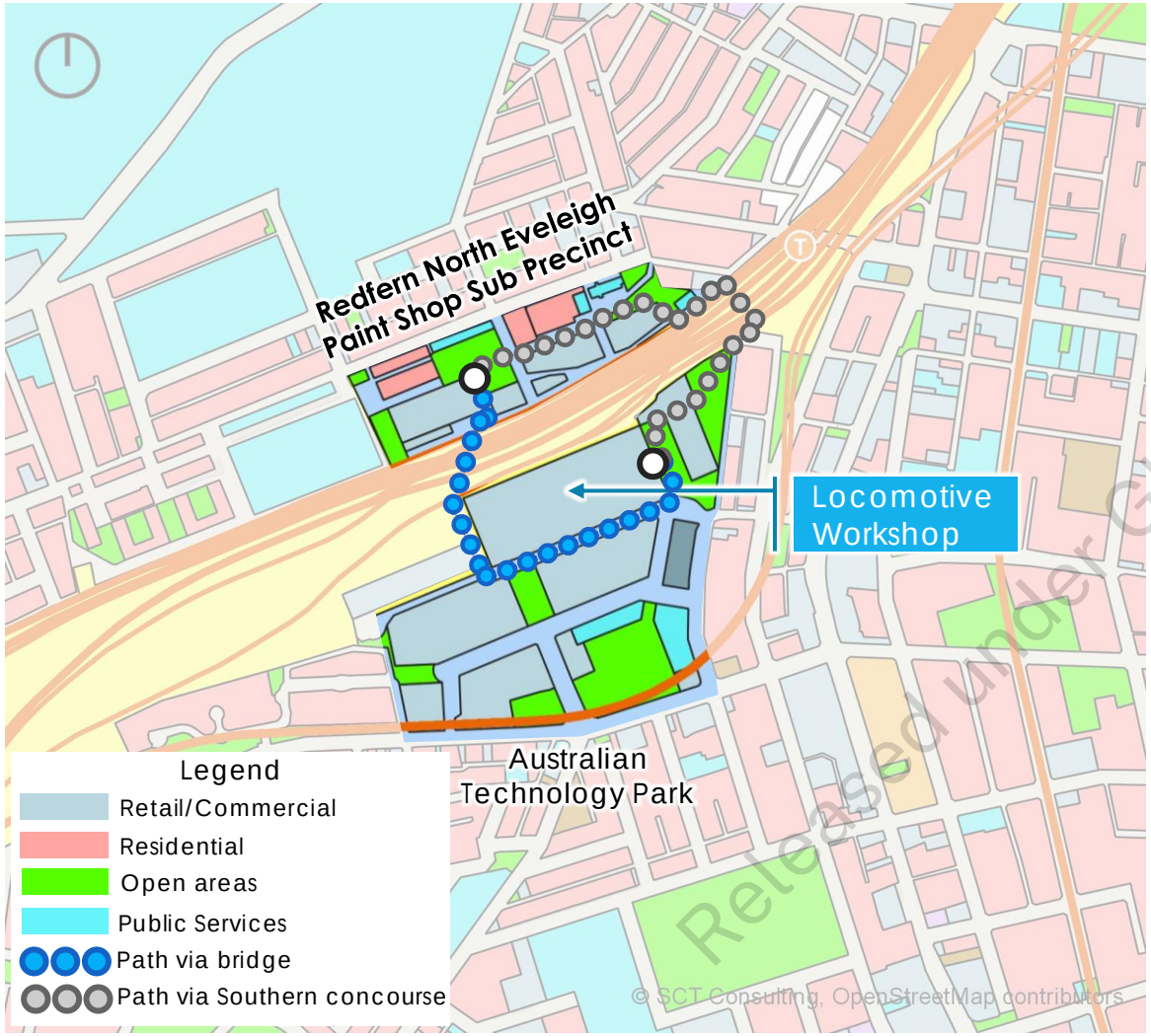
NICTA Building

- Land use:
  - Commercial/ office premises – 11,200 m2 GFA
- Number of employees – 622
- Travel time to RNE retail cluster
  - via southern concourse – 10 minutes 46 seconds
  - via proposed bridge – 9 minutes 33 seconds
- Number of daily trips via bridge – 22 to 44 trips

Key outcomes

Travel time saving due to proposed bridge – 1 minute 12 seconds
Number of daily trips via bridge – 22 to 44 trips

Locomotive Workshop to RNE retail cluster



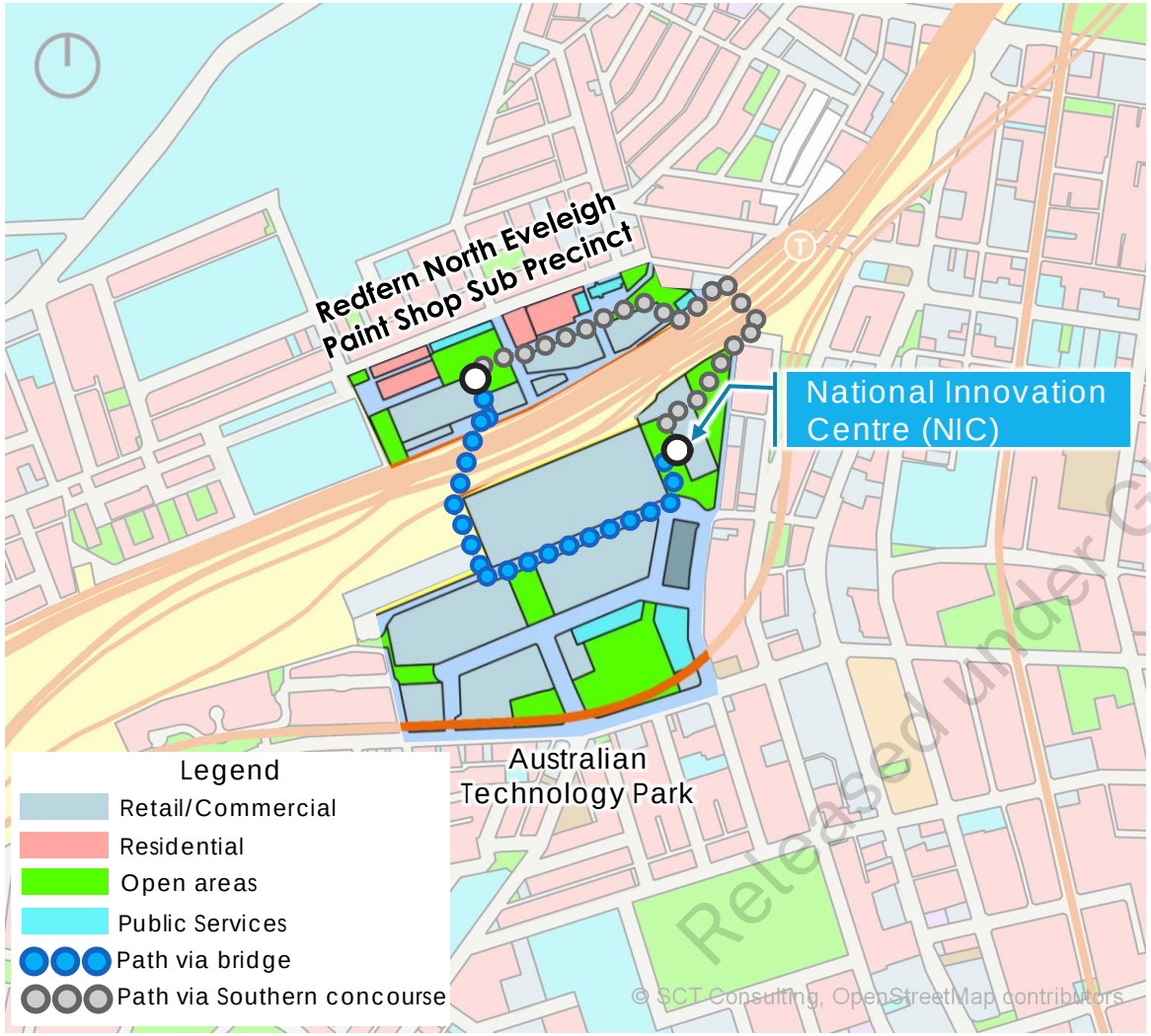
Locomotive Workshop

- Land use:
  - Commercial/ office premises – 25,000 m2 GFA
- Number of employees – 1,388
- Travel time to RNE retail cluster
  - via southern concourse – 9 minutes 49 seconds
  - via proposed bridge – 9 minutes 12 seconds
- Number of daily trips via bridge – 49 to 97 trips

Key outcomes

Travel time saving due to proposed bridge – 38 seconds
Number of daily trips via bridge – 49 to 97 trips

National Innovation Centre (NIC) to RNE retail cluster



National Innovation Centre (NIC)

Land use:

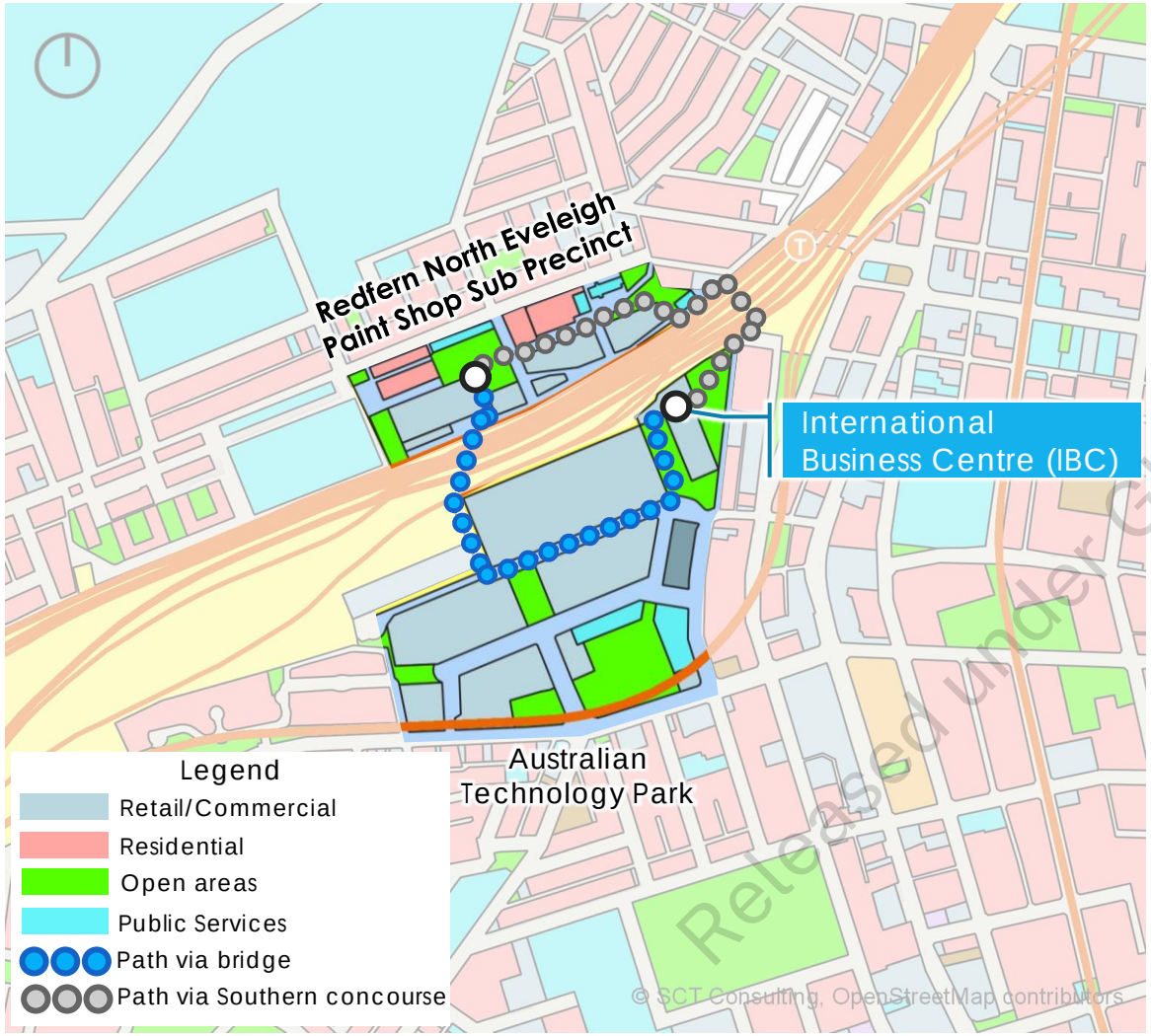
- Commercial/ office premises – 7,000 m2 GFA

- Number of employees – 388
- Travel time to RNE retail cluster
  - via southern concourse – 9 minutes 22 seconds
  - via proposed bridge – 9 minutes 22 seconds
- It is assumed that the path via the southern concourse will be unattractive even when the travel times are similar due to station pedestrian traffic and associated congestion.
- Number of daily trips via bridge – 14 to 27 trips

Key outcomes

Equal travel time via the proposed bridge and via the southern concourse
Number of daily trips via bridge – 14 to 27 trips

International Business Centre (IBC) to RNE retail cluster



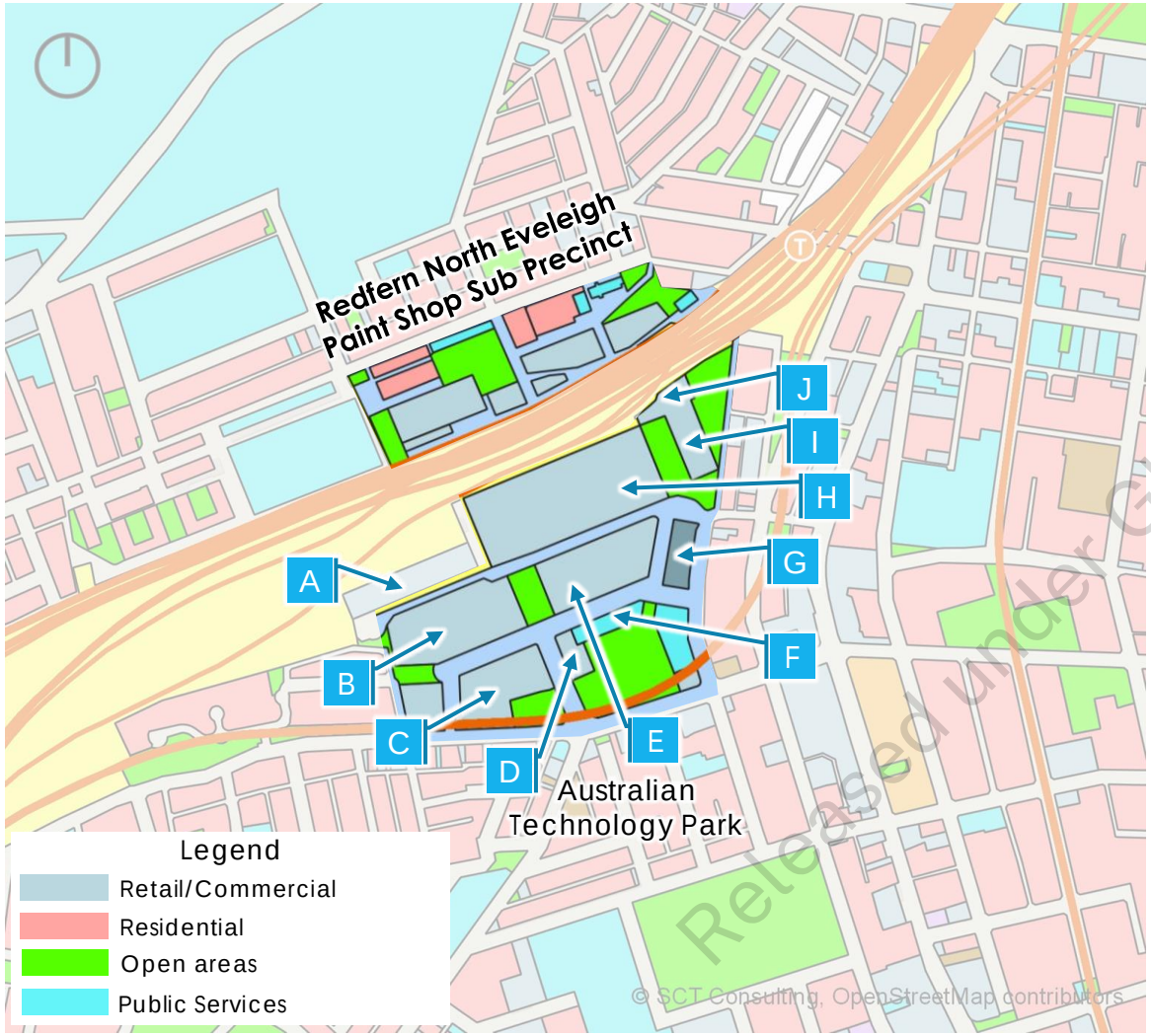
International Business Centre (IBC)

- Land use:
  - Commercial/ office premises – 950 m2 GFA
- Number of employees – 52
- Travel time to RNE retail cluster
  - via southern concourse – 8 minutes 32 seconds
  - via proposed bridge – 10 minutes 09 seconds
- No trips via the proposed bridge as the travel time via the southern concourse is lower
- Number of daily trips via southern concourse – 2 to 4 trips

Key outcomes

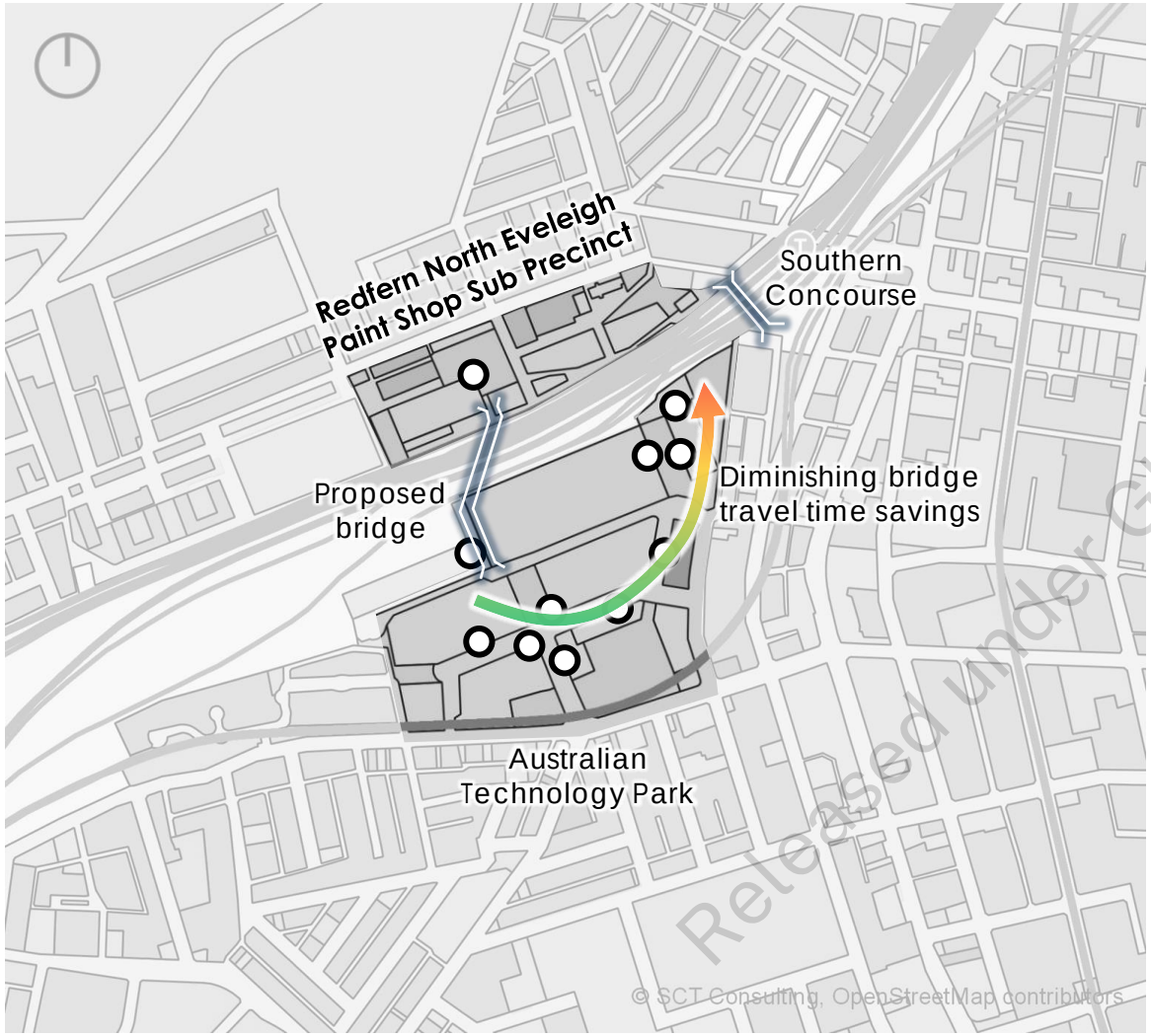
Travel time saving due to Southern concourse – 1 minute 37 seconds
No trips via the proposed bridge

Travel time from all buildings to RNE retail cluster



Key	Building	GFA (m2)	Number of Employees	Daily Trips via bridge	TT via southern concourse (mm:ss)	TT via proposed bridge (mm:ss)	TT savings due to proposed bridge
A	Large Erecting Shop (LES)	15,000	833	29-58	14:00	05:17	08:43
B	Media Centre Building	40,000	2,222	78-156	14:43	08:00	06:43
C	Commonwealth Bank (Axle)	46,832	2,570	90-180	14:11	07:33	06:37
D	Community Building	3,911	161	6-11	14:15	07:42	06:34
E	Commonwealth Bank (Foundry)	56,688	3,093	108-216	13:27	06:59	06:28
F	Biomedical Building	7,600	422	15-30	12:25	08:34	03:51
G	NICTA Building	11,200	622	22-44	10:46	09:33	01:12
H	Locomotive Workshop	25,000	1,388	49-97	09:49	09:12	00:38
I	National Innovation Centre (NIC)	7,000	388	14-27	09:22	09:22	-
J	International Business Centre (IBC)	950	52	-	08:32	10:09	-
	Total	214,181	11,751	409-819	-	-	-

Benefits due to proposed bridge



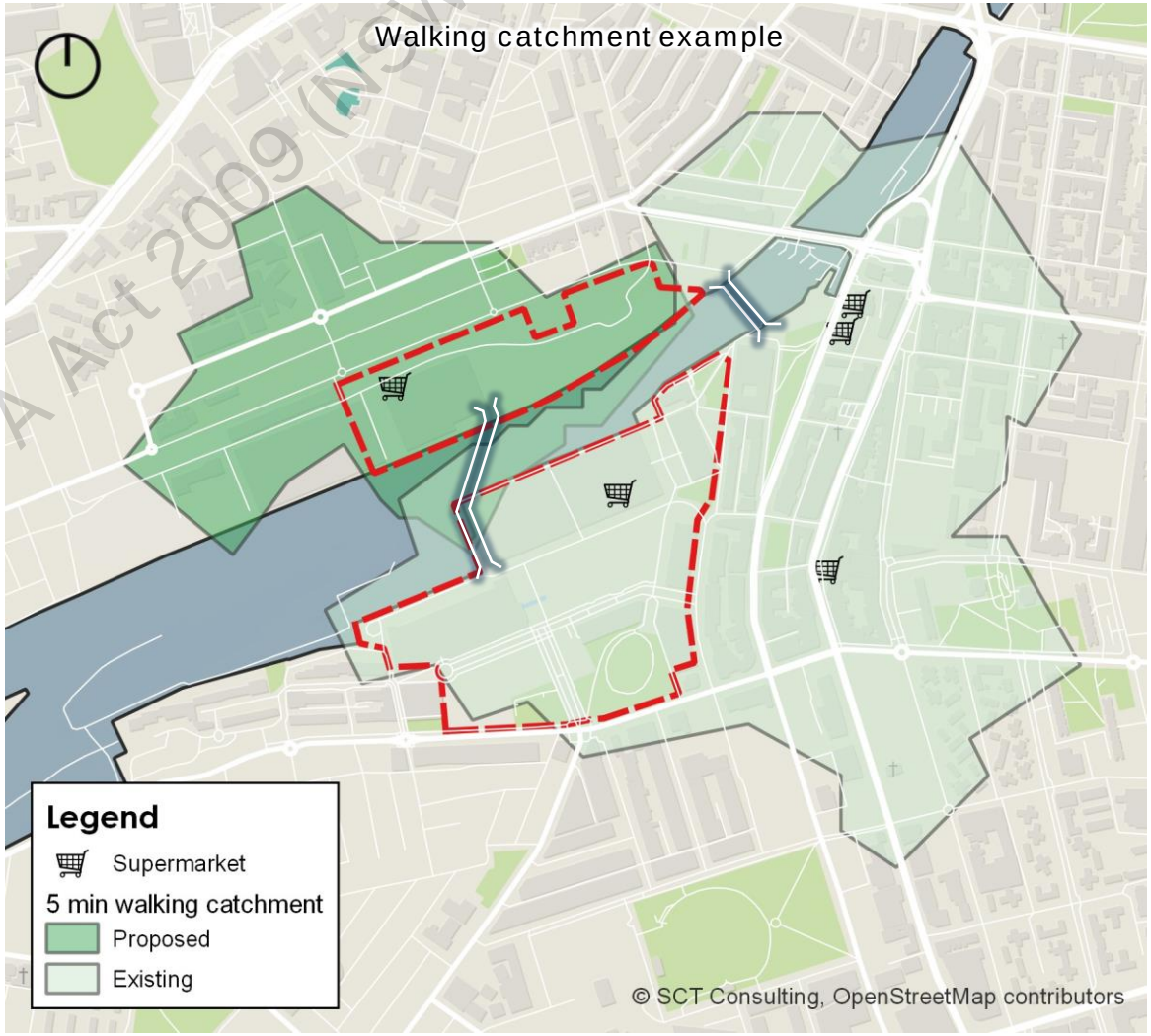
- Maximum travel time savings due to the proposed bridge were observed for the buildings near the proposed bridge.
- Commonwealth Bank buildings (Axle and Foundry), Media Centre Building and Large Erecting Shop(LES) get the highest travel time savings of up to seven minutes. Most employees (approximately 76%) work in one of these buildings.
- Southern Concourse at Redfern Train Station is closer to the buildings at the north-eastern end of the ATP. Hence, access to the Paint Shop sub-precinct retail cluster via the Southern Concourse is more attractive for trips originating from/destined to these buildings.
- Travel time benefits due to the proposed bridge diminish towards the north-eastern part of the ATP.

Key outcomes

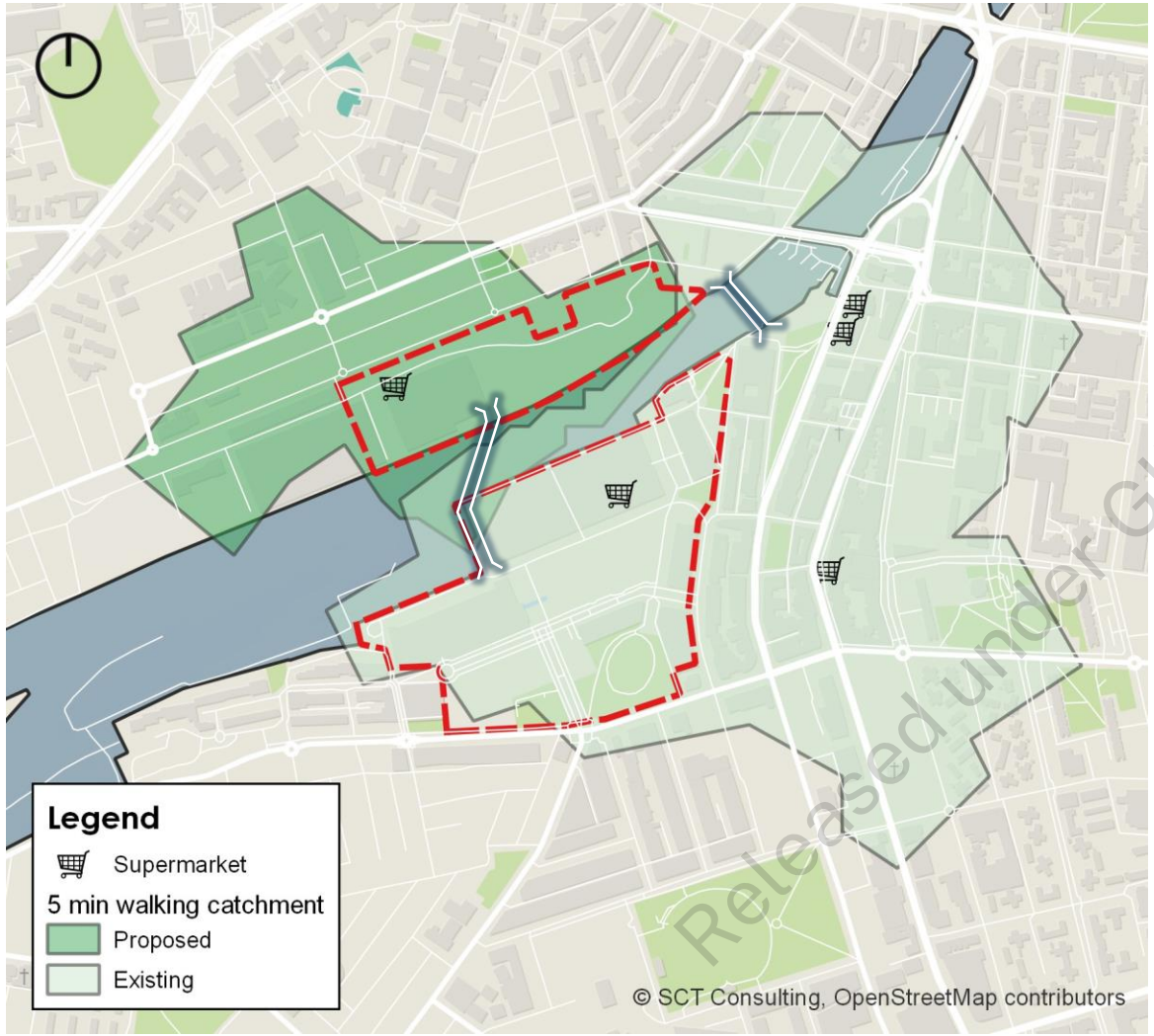
The highest travel time savings of up to 7 minutes are possible for the majority (76%) of the employees in the Australian Technology Park

Catchment analysis

- Key destinations were selected for the walking catchment analysis. Destinations included:
  - Cafes/ restaurants/ bars
  - Supermarkets
  - Medical centre/ pharmacy
  - Gym/ other retail
- Separate walking catchments were calculated for the existing destinations in and around ATP and proposed facilities in the RNE precinct. The attractiveness of the new retail cluster in the RNE precinct would be identified from the catchment area across the rail corridor.
- This has been used as a proxy to determine how likely the proportion of employees and/or residents are likely to cross the rail corridor via the proposed bridge to access these destinations
- For each trip, it is assumed that there is a return trip via the same route.
  - indicate walking catchment of the existing facilities
  - indicate the walking catchment of the proposed new facilities in RNE precinct

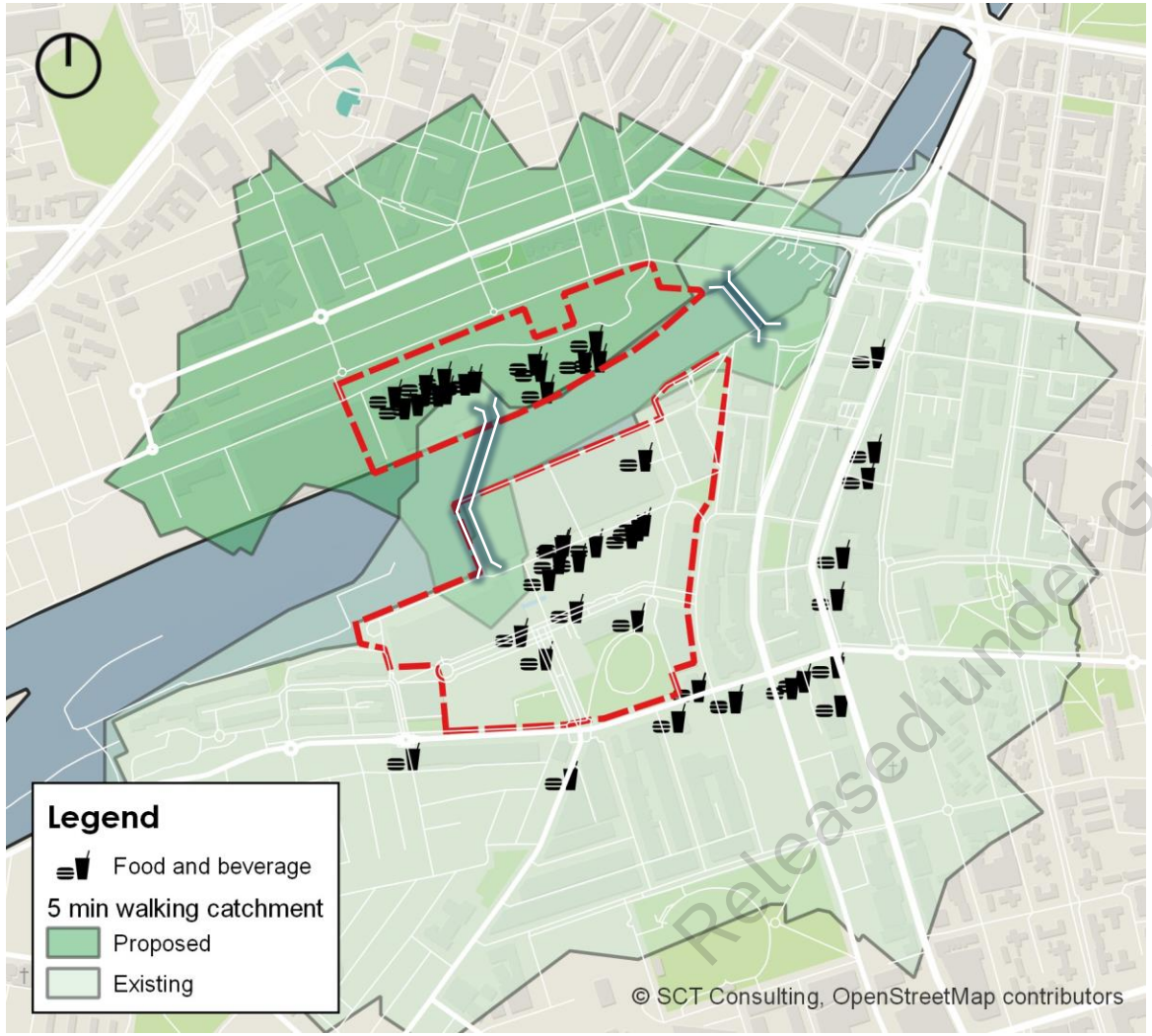


Key destinations and catchments – Supermarkets



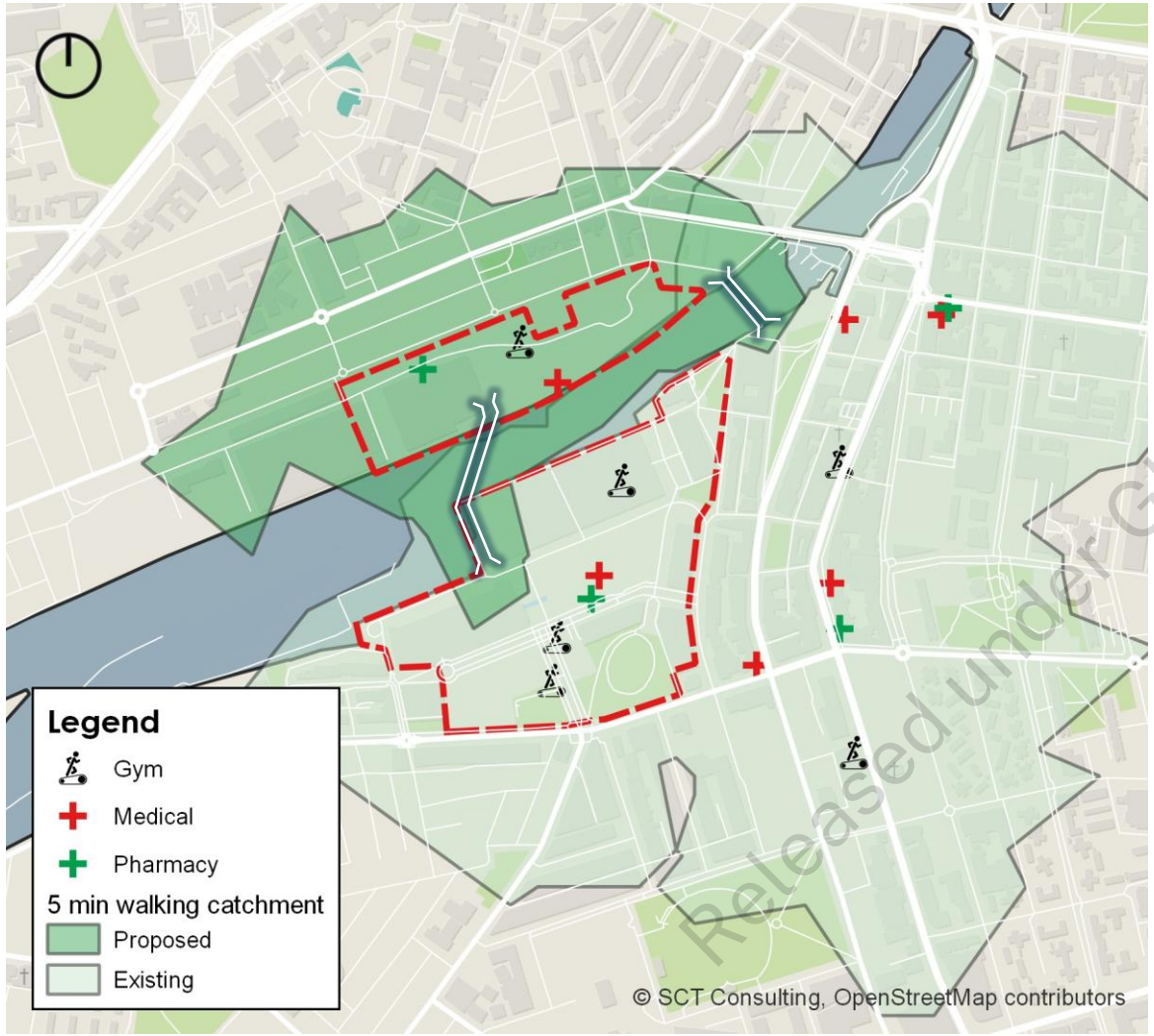
- Supermarkets are available in both ATP and Paint shop precinct
- It is unlikely to observe customers undertaking shopping trips between ATP and Paint Shop sub-precinct since an equal facility is available within the respective precincts.
- The exception would be if there is a customer preference regarding the supermarket chain/tenant. Though it is likely, this would represent a small proportion of trips and hence has not been considered.

Key destinations and catchments – Food and beverage



- Both ATP and RNE Paint shop precinct contain multiple food and beverage facilities. Therefore, most trips would be self-contained within the respective precincts.
- Based on the five-minute walking catchment of the new retail cluster RNE Paint shop precinct, the cluster is still within a reasonable walking distance of the four key commercial lots within ATP. Consequently, some customers may elect to cross the rail corridor to access a different selection of retail (and the associated open space of Fan of tracks).
- It is estimated that up to 10% of the total ATP demand (8,225 daily trips for all retail purposes) may access RNE retail and facilities via the proposed bridge on a typical day.

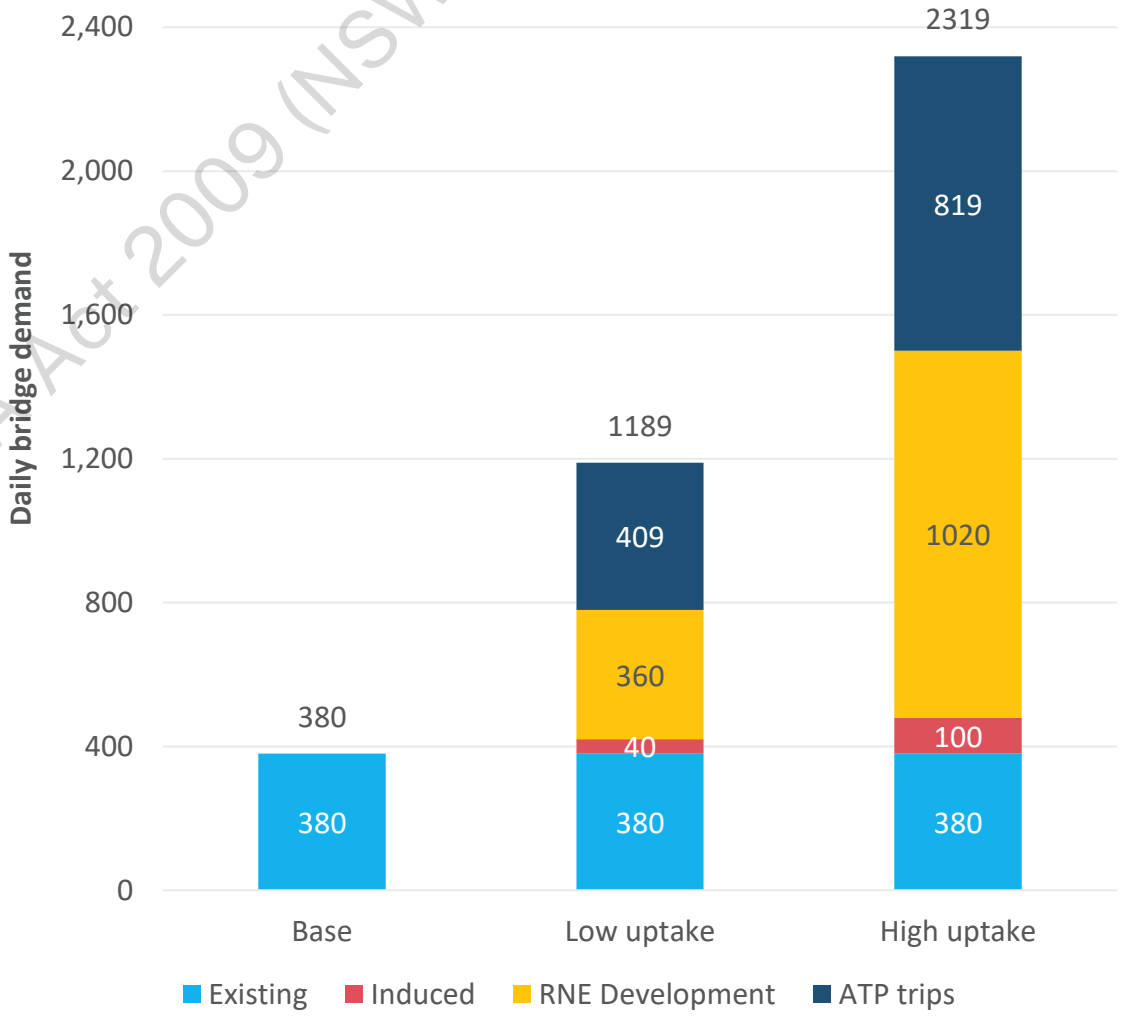
Key destinations and catchments – Other retail



- Other retail facilities such as a gym, pharmacy, and medical centre are available in ATP neighbourhood areas and the RNE precinct.
- The destinations of this type are mostly based on the individual's choice, and hence trips are likely between ATP and RNE precinct.
- ~5-10% of the total ATP demand (8,225 daily trips for all retail purposes) will likely use the proposed bridge.

Typical bridge usage from ATP

- ~400 – 820 additional trips from the ATP, using the proposed bridge, are likely due to retail, food and beverage facilities in the RNE paint shop precinct. Individuals within the ATP are unlikely to view the RNE retail as desirable given similar retail offerings within and surrounding the ATP.
- It is assumed that 10% of residents visit a retail facility on a given day – though these are all in RNE, hence not likely to cross to ATP.
- Overall, based on the retail sensitivity test, total daily trip numbers are forecast to increase to approximately 1,190 – 2,320 trips under either a low or high uptake scenario.



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