

**MODIFICATION REQUEST:
CBD and South East Light Rail
Various Design Modifications (MOD 1)**



Secretary's
Environmental Assessment Report
Section 115ZI(2) of the
Environmental Planning and Assessment Act 1979

February 2015

Cover Photo — CBD and South East Light Rail in the George Street pedestrianised zone adjacent to Martin Place (Source: Transport for NSW)

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Published February 2015
NSW Planning & Infrastructure
www.planning.nsw.gov.au

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EXECUTIVE SUMMARY

The Proposal

The CBD and South East Light Rail was declared Critical State Significant Infrastructure on 25 June 2013 and the project was approved by the Minister for Planning on 4 June 2014. Transport for New South Wales proposes a suite of modifications to the approved CBD and South East Light Rail project, including:

- removal of the light rail stop at World Square;
- increasing the length of the light rail vehicles and stop platforms;
- realigning the track along Alison Road and relocating the Royal Randwick stop;
- revising the construction methodology for the tunnel under Anzac Parade;
- realigning the track at the Anzac Parade and Alison Road intersection;
- reducing the scale and visual impact of the Moore Park stop and constructing an underground subway to improve the management of special events;
- providing wire-free infrastructure within the CBD;
- increasing the height of components within the Randwick stabling facility;
- amending the Grosvenor Street stop from two side platforms to an island platform; and
- revising the location of substations by relocating the Surry Hills substation underground;

The Department publicly exhibited the proposal from 3 December 2014 to 17 December 2014 (14 days) on its website and at a number of locations and received a total of 118 submissions from the public, public authorities and public entities.

Department's Consideration

The Department assessed each proposed modification as a discrete project as most were unrelated to each other. The Department's assessment identified potential impacts relating to additional properties subject to increased noise, reduced frequency of services, loss of some traffic movements and encroachments into Centennial Park. Despite these impacts, the Department considers these impacts acceptable and concluded that the modifications are expected to deliver improvements to the approved project including:

- increasing the capacity of services through the provision of longer vehicles;
- improved operation with the removal of the World Square stop;
- resolution of potential conflicts with Randwick Racecourse operations; and
- improvements to visual amenity in the CBD with the implementation of wire free technology;
- benefits to Centennial Park of improved access, increased activation of the public domain and improved public surveillance.

The Department considers that any residual impacts can be managed to acceptable levels subject to modified conditions; including:

- limiting construction within Centennial Park and requiring rectification where required;
- the reassessment of noise when service frequencies exceed those modelled;
- limiting the number of trees impacted from the construction;
- revised arrangements at the Alison Road/Anzac Parade intersection; and
- ensuring safe access for schoolchildren to the Moore Park stop.

Conclusion and Recommendations

Overall, the Department accepts that the proposed modifications will provide benefits to the project, future patrons and the community. The Department considers that identified impacts are outweighed by the public benefit of the project or can be managed through revised conditions.

1. BACKGROUND

The CBD and South East Light Rail (CSELR) project was approved by the Minister for Planning on 4 June 2014. The project was identified as a key priority transport infrastructure project in the Government's *Long Term Transport Master Plan* and declared critical State Significant Infrastructure by the former Minister for Planning and Infrastructure in June 2013.

The CSELR comprises a new light rail service on land generally between Circular Quay and Randwick and Kingsford via Surry Hills and Moore Park. The approval also includes land required for the construction and operation of a stabling facility near the corner of Doncaster Avenue and Alison Road and a maintenance facility within the Rozelle Goods line corridor immediately east of Catherine Street and adjacent to the Lilyfield light rail stop. The approved project location is shown on **Figure 1**.

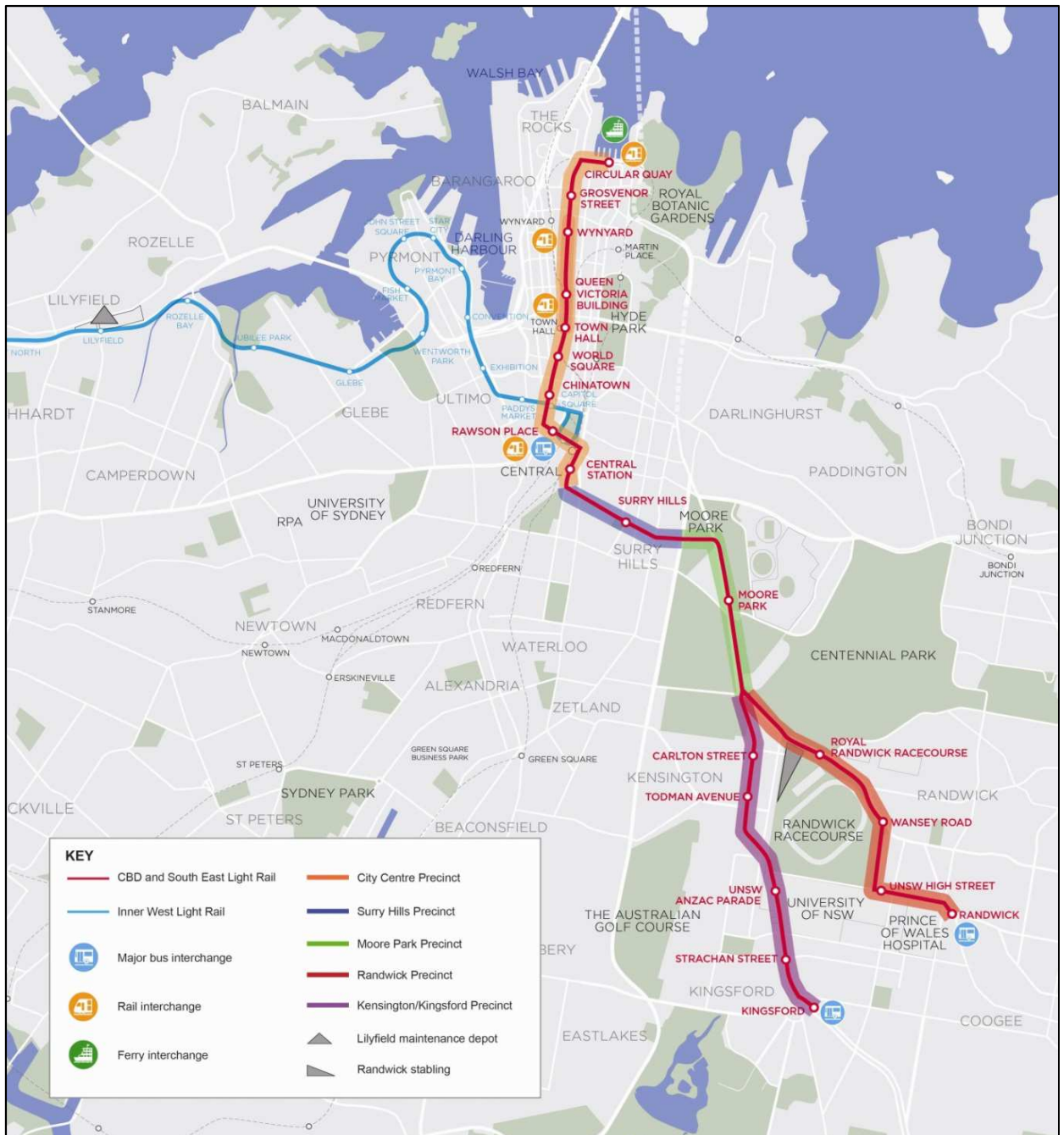


Figure 1: Project Location

As approved, the CSELR project consists of approximately 12 kilometres of new light rail track and 20 light rail stops between Circular Quay and Randwick / Kensington. The key components of the approved project include:

- early works consisting of:
 - installation of safety barriers around worksites;
 - relocation or protection of major utilities;
 - establishment of 13 construction compounds;
 - implementation of local bus diversions at Chalmers Street, Eddy Avenue, Rawson Place and the Park Street/Druitt Street/George Street intersection and the implementation of road configuration changes;
 - early demolition works;
 - potential remediation works; and
 - early light rail works, such as track slab construction preparation works;
- main construction works consisting of:
 - site establishment;
 - stop and platform construction;
 - service diversions;
 - civil engineering works;
 - rail installation;
 - communications and electrical installations;
 - catenary power installation; and
 - public domain works;
- commissioning works consisting of the trial running of the route.

The CSELR project is currently in the pre-construction phase with service investigation works being undertaken in the Sydney Central Business District since November 2014. On 17 December 2014, the Minister for Transport announced that the contract to design, construct, operate and maintain the light rail project had been awarded to the ALTRAC Light Rail consortium. The Capital Investment Value of the CSELR project is \$2,100,000,000.

2. PROPOSED MODIFICATION

2.1 Introduction

Transport for NSW (TfNSW) has submitted a modification request (SSI 6042 MOD 1) under section 115ZI of the *Environmental Planning and Assessment Act, 1979* (the Act) to modify the Minister's approval for the CSELR. The Proponent has indicated that these modifications are required in response to further design investigations and ongoing consultation with stakeholders. The following design modifications are proposed:

- removal of the light rail stop at World Square, due to the need for substantial engineering measures to meet the requirements of the *Disability Discrimination Act 1992*;
- increasing the length of the light rail vehicles and stop platforms, to provide greater flexibility to respond to future capacity demands;
- realigning the track along Alison Road and relocating the Royal Randwick stop to the northern side of Alison Road, to minimise potential impacts on access to Royal Randwick and to the bus interchange. This also includes flood mitigation works at Centennial Park to decrease potential flooding frequency of the Randwick stabling facility site;
- revising the construction methodology for the tunnel under Anzac Parade, reducing the construction period and reducing construction cost;
- realigning the track at the Anzac Parade and Alison Road intersection, to improve light rail vehicle operations and reduce impacts on right hand turning traffic from Alison Road into Anzac Parade;
- reducing the scale and visual impact of the Moore Park stop and constructing an underground subway to improve the management of special events;
- providing wire-free infrastructure within the CBD, to minimise visual impacts of the proposed overhead charging units at stops;

- increasing the height of components within the Randwick stabling facility to accommodate the height of the required sand silo;
- amending the Grosvenor Street stop from two side platforms to an island platform to retain a dedicated left hand turning lane from George Street into Grosvenor Street; and
- revising the location of substations by relocating the Surry Hills substation underground in Moore Park and removing the need to construct the Royal Randwick Racecourse substation.

The Proponent has provided a justification for each of the design modifications in Table S.1 of the Modification Report. A description of each of the proposed design modifications is provided in **Chapter 5**.

3. STATUTORY CONTEXT

3.1 Modification of the Minister's Approval

Pursuant to Section 115ZI of the *Environmental Planning & Assessment Act 1979*, TfNSW is seeking formal approval from the Minister for Planning for the modification of the SSI (SSI-6042) approval granted on 4 June 2014. A Section 115ZI modification request is appropriate as the proposed modification is not consistent with the SSI approval, but does not represent a radical transformation of the project.

3.2 Delegated Authority

On 10 November 2014, the Minister for Planning delegated her powers and functions under section 115ZI of the *Environmental Planning & Assessment Act 1979* to senior executive officers in cases where:

- there are less than 25 public submissions in the nature of an objection;
- the relevant council has not made an objection; or
- a political donation disclosure statement has not been made.

This modification request received more than 25 public submissions in the nature of an objection and does not meet the terms of the above delegation, therefore the modification will be determined by the Minister for Planning.

4. CONSULTATION AND SUBMISSIONS

4.1 Modification of the Minister's Approval

Under Section 115ZL of the Act, the Secretary is required to make the modification request publicly available. The Department publicly exhibited the CSELR Modification proposal from 3 December 2014 to 17 December 2014 (14 days) on the Department's website and at the following exhibition locations:

- Department of Planning & Environment, Information Centre;
- City of Sydney Council, One Stop Shop;
- Randwick City Council, Customer Service Centre;
- Leichhardt Municipal Council, Customer Service Centre;
- Transport for NSW, Information Centre;
- Randwick TAFE; and
- Nature Conservation Council of NSW.

The Department also advertised the public exhibition in the Sydney Morning Herald and the Wentworth Courier on 26 November 2014 and the Southern Courier and Inner West Courier on 25 November 2014, and notified State and local government authorities directly in writing.

The Department received 118 submissions during the exhibition period. A total of six were received from public authorities during the exhibition period. A summary of the issues raised in submissions received is provided below. A number of submissions were also received after the conclusion of the exhibition period. The Department has considered the issues raised in the submissions in its assessment of the proposed modification.

4.2 Public Authority and Public Entity Submissions

A total of six submissions were received from key public authorities and public entities. No public authority objected to the proposed modification, however each raised key issues for consideration. The key issues raised in public authority submissions are listed in **Table 1**.

Table 1: Key issues raised by public authorities or entities

Authority/Entity	Key Issues Raised
<i>City of Sydney</i>	<ul style="list-style-type: none"> • potential widening of footpaths in the vicinity of the removed World Square stop; • impact of longer light rail vehicles on the design of the public domain; • seeks clarification regarding changes to Anzac Parade stop; • seeks clarification regarding vertical alignment of light rail corridor; • requests relocation of Moore Park East Substation; • supports the removal of the World Square stop; and • does not support new platform arrangement for the Grosvenor Street stop
<i>Randwick City Council</i>	<ul style="list-style-type: none"> • supports the increased capacity of the light rail system and the changes to alignment opposite Robertson Road; • concern raised about capacity and safety of light rail stops; • recommends Royal Randwick Racecourse stop be moved further to the east; • concerns remain regarding the loss of High Cross Park and the design of the Randwick stabling area; • does not support increased loss of trees and impacts on Centennial Park; and • recommends suitable mitigation measures to address increased noise impacts from longer light rail vehicles on residential properties.
<i>Environment Protection Authority (EPA)</i>	<ul style="list-style-type: none"> • requests that permitted construction hours be limited to standard construction hours.
<i>Sydney Water</i>	<ul style="list-style-type: none"> • notes that modifications may impact water infrastructure; and • advises that a geotechnical and structural assessment will be required to determine the impact of the revised alignment along Alison Road on water infrastructure
<i>NSW Office of Water (NOW)</i>	<ul style="list-style-type: none"> • notes that no information has been provided about short-term or long-term volumetric takes as a result of the revised construction method of the Moore Park tunnel; • notes concern that the dewatering of the Moore Park area, may cause structural damage to neighbouring buildings; and • advises that a fully sealed tunnel design is preferred for the protection and management of the Botany Sands Groundwater Source.
<i>Centennial Park and Moore Park Trust</i>	<ul style="list-style-type: none"> • request that the relocated Surry Hills substation to be located underground, with access and ventilation provided from within the Moore Park tunnel; • request that the design of the stairs from the bridge over the Eastern Distributor be of sufficient capacity to accommodate peak crowds; • concern over the impact on trees from construction of the Moore Park tunnel, realignment of light rail track at end of Martin Road, and the removal of two trees adjacent to the Alison Road/Darley Road intersection; • concern over visual impact of Moore Park stop and safe access to subway underneath stop; • request that further environmental and flood modelling be undertaken; • concern over visual impact of retaining wall along Alison Road; and • impacts to traffic and separated pedestrian path and cycleway.

4.3 Public Submissions

A total of 112 submissions were received from the public, including submissions from the following special interest groups or organisations:

- University of NSW;
- Centennial Park Residents' Association;
- People Unite Surry Hills;
- Paddington/Darlinghurst Community Working Group;
- BIKEsydney;
- Bicycle NSW;
- BIKEast;
- Kensington & West Kingsford Precinct;
- Centennial Parklands Community Consultative Committee;
- Sydney Girls High School;
- Kingsford South Precinct Committee;
- Action for Public Transport;
- Sydney Boys High School Council; and
- Amalgamated Holdings Limited.

Of the 112 public submissions received, 87 (77%) objected to the proposal, four (3%) provided support and 20 (20%) raised concerns or provided comment. The key issues raised in public submissions are listed in **Table 2**.

Table 2: Key issues raised in public submissions

<i>Issue</i>	<i>Proportion of submissions (%)</i>
Removal of trees along Anzac Parade, Alison Road and High Cross Park	45
Pedestrian safety including impacts to schools and Randwick Racecourse patrons	41
Loss of public open space including impacts to Centennial Park	36
Traffic concerns including impacts to Alison Road, Anzac Parade and the Sydney CBD	35
Length of light rail vehicles including increased size of stops	30
Access including access to light rail, Centennial Park, and private property	27
Lack of consultation and limited time to review Modification report	25
Visual impacts including Centennial Park, Anzac Parade, and the stabling facility	23
Potential flooding to Centennial Park and residents adjacent to the stabling facility	22
Cyclist safety including safety around Alison Road and Centennial Park	20

The Department has considered these issues in its assessment of the proposal as provided in the following sections of this report.

4.4 Proponent's Response to Submissions

TfNSW provided a response to the issues raised in submissions in a document titled 'Submissions Report to Project Modification'. The Department forwarded a copy of the report to agencies and key stakeholders that made submissions during the exhibition of the modification EIS. Randwick City Council, the City of Sydney and UNSW provided further submissions on the report. Key issues raised are summarised in **Table 3**.

Table 3: Issues raised in Submissions Report to Project Modification

Council/key stakeholder	Key Issues Raised
<i>City of Sydney</i>	<ul style="list-style-type: none"> concern regarding the level of consultation with the City, requests additional consultation regarding urban design solutions in addition to capacity as member of Urban Design Reference Group; reiterates that it considers retention of two lanes north on George Street at Grosvenor Street is unnecessary; advises that it prefers side platforms to an island platform for the Grosvenor Street stop; concern regarding the impact on public open space resulting from increased platform length; and advises that it does not consider it acceptable to remove additional trees next to Anzac Parade and south of Gregory Avenue because of short term construction requirements.
<i>Randwick City Council</i>	<ul style="list-style-type: none"> supports the refinements of retaining wall at Centennial Park, however still holds concerns regarding view loss and adverse visual impact from Alison Road; requests flood mitigation works to be undertaken prior to raising the ground level of the stabling facility; and requests the elaboration of existing condition of approval B36 to guarantee the establishment and ongoing maintenance of mature screening between the stabling facility and adjacent residents.
<i>UNSW</i>	<ul style="list-style-type: none"> concern regarding lack of meaningful consultation; requests that Transport for NSW consider the design submitted by UNSW for the High Street stop; and concern regarding stop safety.

The Department has considered these issues in its assessment of the modification application as provided in the following sections.

5. ASSESSMENT

Ten design modifications are proposed to the approved CSELR project. For the purposes of this assessment these design modifications are generally unrelated and therefore have been addressed as discrete components in this section.

5.1 Removal of the light rail stop at World Square Issue

Investigations undertaken by TfNSW following approval indicate that the World Square stop would generate a lower patronage than the closest stops to the north and south (i.e. Town Hall and Chinatown). In addition, the gradient along George Street at the World Square location would require substantial regrading and retaining walls to be constructed. This results in level changes of up to 300 millimetres between the kerb and the stop making compliance with the *Disability Discrimination Act 1992* difficult. For these reasons, TfNSW proposes to remove the stop from the approved the project.

Department's Consideration

Key issues raised in submissions relate to the increased distance between stops in the CBD and impacts to customers and residents of the World Square precinct.

The Department notes that further patronage assessments have determined that the World Square stop would not be a key trip generator for origin or destination trips due to its proximity to stops at Town Hall and Chinatown. With the removal of the stop, the Chinatown and Town Hall stops would be located approximately 525 metres apart or a maximum walk of 250 metres. However, the assessment suggests that the redistribution of passengers from the World Square stop would be predominantly catered for by the Chinatown stop, which the Department notes is located approximately 60 metres from the closest entry to the World Square Shopping Centre.

Multiple community submissions raised the issue of impacts to commercial customers and residents of the World Square precinct, noting reduced access to retail and entertainment-based services within the area. Light rail patrons that would otherwise have used the World Square stop would now have to walk distances of approximately 250 metres in order to access World Square from either the Chinatown or Town Hall stops. Concerns are held that this may result in a reduction in trade that would otherwise occur.

Further assessment by the Proponent found that the benefits of constructing the World Square stop would not justify the required cost and other impacts it would entail. Increased costs associated with substantial engineering works in order to comply with disability requirements are considered prohibitive. This is due to the relatively steep gradient of George Street south of Bathurst Street requiring extensive excavations to the north of the George Street/Liverpool Street intersection in order to accommodate the stop at an appropriate grade. The Department accepts this assessment and notes that the necessary excavations would result in the need for excessively high retaining walls along George Street, increasing disconnection and creating a high visual impact.

The Department acknowledges the key concerns raised in submissions regarding the removal of the World Square stop. However, it is considered that the excessive engineering costs and reduced patronage forecasts outweigh the benefits that the stop would have provided. The Department also notes that the approximate 250 metre walk to access the precinct from the Chinatown or Town Hall stops is up to 50 per cent less than the average light rail spacing in global CBD environments of 400-600 metres.

The Department concludes that the removal of the World Square stop is justified.

5.2 Increase the length of light rail vehicles and stop platforms

Issue

The modified design would provide larger light rail stops to cater for an increase in the size of the light rail vehicles. The light rail vehicles are to increase in length from 45 metres to approximately 67 metres (two 33 metre vehicles joined together) allowing for an increased vehicle capacity from 300 people to around 466 people.

TfNSW has stated that the longer stop platforms would remain within the approved footprint and the general design of the stops would remain unchanged. The Moore Park and Central Station stops were approved at 90 metres to enable two light rail vehicles to be coupled for special events. These stops would be reduced to approximately 75 metres as the increased capacity means that coupling of longer vehicles for special events is no longer required.

Service frequency would change to four minutes (up from three minutes) in the CBD and eight minutes on each of the branch lines (up from six minutes) between 7.00 am and 7.00 pm at opening. Future operations (i.e. 10 years after opening) could result in the movement of 8,620 passengers per hour during normal operations (based on a vehicle every 3.25 minutes between 7.00 am and 7.00 pm). TfNSW has stated that these frequencies do not include special events where up to 10,800 passengers per hour could be transported.

Operationally, longer vehicles would require altered intersection arrangements at the George Street/Ultimo Road intersection and associated pedestrian crossing, along with a re-adjustment of the signal phasing in the vicinity of the Chinatown, Surry Hills and Grosvenor Street stops. In addition, the increased length of the stop on Devonshire Street, Surry Hills would restrict access to Little Riley Street. TfNSW proposed removing the existing access from Devonshire Street into Little Riley Street but further investigations show that closure would result in functional access constraints. TfNSW has committed to investigating an alternative proposal to retain this access. Given this, the Department has not assessed the removal of access to Little Riley Street.

Maximum noise levels (L_{max}) would increase marginally and average noise energy levels (L_{Aeq}) would increase due to a longer passby (from five seconds to six seconds). There would be additional light rail services during the night-time period (10pm to 7am). As a result, noise trigger levels would be exceeded at an additional 101 groups of receptors (in comparison with the 15 groups identified for the approved project).

Impacts to the visual environment (apart from one additional tree required to be removed at Surry Hills) would remain unchanged. No additional impacts are predicted for property or other land uses or indigenous and non-indigenous heritage.

Department's Consideration

The Department considers that there are a number of benefits as well as impacts to providing longer light rail vehicles as part of the project.

The benefits include increased up-front capacity from opening which will ensure that the light rail service can cater for increased levels of demand from its commencement rather than relying on timetabling and service changes as patronage grows. The Department also considers that the reduced platform requirements at Moore Park and Central Station (reducing platform length from 90 metres to 75 metres) will result in marginally less visual incursion.

Adverse impacts of providing longer platforms and vehicles would include decreased pedestrian amenity within the George Street pedestrianised zone, increased operational noise across the project, and potential traffic disruptions from required network changes and signal phasing. While other issues were raised in the submissions (i.e. safety of longer vehicles, navigation of longer vehicles in narrow streets, impacts to stopping distances), the Department considers that these were adequately addressed by the Proponent in its Submissions Report to the Project Modification and therefore they have not been assessed any further. The Proponent provided further information and clarification and stated that the 67 metre light rail vehicles would ensure the same stopping, acceleration and crash-worthiness performance as the shorter vehicles proposed for the approved project. Longer light rail vehicles would need to meet the same requirements for road and rail safety.

Pedestrian Amenity and Safety

Specific comments on the longer light rail vehicles and platforms were made in many of the submissions including those received from the City of Sydney Council, Randwick City Council and the local community. City of Sydney Council is concerned that the longer stops would impact on the future pedestrian area in George Street and result in the loss of public space. However, the Department considers that the benefits of providing increased capacity within the system from opening outweigh the slightly increased area of the platforms and associated impacts. Furthermore, services would be marginally less frequent providing additional time for crossing the pedestrian zone. The pedestrian zone is not intended to be a space where members of the public would linger or participate in recreational activities.

Randwick City Council raised capacity issues such as overcrowding of platforms and footpaths and the restriction of pedestrian movements due to the reduced service frequency on the Randwick branch line, the capacity of the Kingsford interchange, the stopping distance of longer light rail vehicles and the impact that physical barriers may have to pedestrian flows. The Department considers that the Proponent adequately addressed each of these issues in its Submissions Report to the Project Modification and notes that many other issues raised by Council (objection to an interchange in High Cross Park and the proposed extension of the line to Maroubra) were previously addressed in the Environmental Impact Statement and Secretary's Environmental Assessment Report and are not relevant to the assessment of the proposed modification. In relation to the increased wait time from the reduced service frequency, the Department understands that this will be approximately

1 minute on the branch lines and is not considered to result in significant adverse commuter impacts.

The Department also considers that there are existing conditions in the project approval that specifically address design and access to stops, protection of access and pedestrian facilities such that no further modifications to these conditions are considered necessary. These conditions require the Proponent to ensure that the project is designed to maintain access to all properties during construction and operation; consider impacts to key intersections and provide mitigation measures as appropriate to manage traffic impacts to the road network; ensure all light rail stops are designed to ensure safety, connectivity, efficiency and convenience to commuters and facilitate the provision of seamless, coherent, visible and safe pedestrian and cyclist access in the vicinity of the light rail corridor.

Similarly, the University of NSW raised a number of concerns with the longer light rail vehicles, increased platform sizes, reduced service frequency and potential overcrowding on platforms. The University raised similar issues in relation to the original project which were addressed by the Proponent in its Preferred Infrastructure Report and the Department as part of the Secretary's Environmental Assessment Report. These acknowledged that there were different methods to calculate platform space requirements that would account for the different results from each organisation. Specific conditions were formulated to adequately manage these matters and required the preparation of Stop Access and Design Plans (condition B27) and a Pedestrian and Cyclist Network and Facilities Strategy (condition B33) as well as Urban Design and Landscape Plans (condition B51) which would inform the final design of the stops and associated infrastructure.

The Department considers that the existing conditions, particularly condition B27, will address the current issues that have been raised in relation to the modification such that each stop is designed in consultation with the relevant Reference Groups and ensures that safety, connectivity and efficiency is prioritised. The requirement to undertake an independent safety audit as part of condition B27 will also ensure that platforms are appropriately designed to meet safety standards. This will take into consideration more passengers on the platform between services.

Traffic

Service frequency has been reduced to approximately every four minutes in the CBD (from three minutes) and every eight minutes on the branch lines (from six minutes). The light rail vehicles will therefore travel through the road network less often leading to less disruption to traffic when compared to the approved project.

The George Street/Ultimo Road intersection would need to be reconfigured to provide a left-in/left-out operation and the right turn movement from Ultimo Road into George Street would be restricted. The pedestrian crossing on the northern side of George Street and Ultimo Road will need to be relocated to the southern side of the intersection to provide clearance for the longer light rail vehicles. The Department also understands that the signal phasing of some intersections along George Street (Hunter/Margaret and Bond/Jamieson) may need to be changed to allow the longer light rail vehicles to clear these intersections in one movement without stopping and not potentially overhang intersections and disrupt east-west traffic flow. This would be a particular issue if a vehicle had to stop at the Hunter/George Street intersection as this would block traffic flow between Margaret and Hunter Streets.

The project approval includes specific conditions to manage traffic impacts and these conditions would continue to apply to the modified project. In relation to condition B28, the Department considers that while appropriate management measures are available as part of the Network Management Plan, it is recommended that the intersection of George Street and Ultimo Road be specifically included. The Department has also recommended that the intersections of Alison Road/Darley Road, Alison Road/Robertson Road and Alison

Road/Doncaster Avenue be specifically included in this condition as a result of the changes that are proposed in these areas (refer Sections 5.3 and 5.5 of this report). This condition also requires the Network Management Plan to be prepared to the satisfaction of RMS providing further assurance that potential traffic disruptions would be identified for key intersections and management measures implemented as appropriate to minimise traffic impacts.

Operational Noise

Many public submissions raised noise as an issue in relation to the longer light rail vehicles including more services during the night-time period compared to the approved project. While TfNSW maintains that the maximum noise levels from the longer vehicles will be the same as the shorter vehicles, the duration of impact will be marginally longer as it will take an extra second for the vehicles to pass a single point. The Department has reviewed the assessment undertaken by TfNSW and acknowledges that additional impacts will occur to properties not previously identified, particularly along Devonshire Street in Surry Hills, Wansey Road, Randwick and Anzac Parade, Kensington.

The Department notes that while TfNSW has identified additional receivers as groups of receptors (i.e. 86 receptors) which could include multiple individual properties, additional impacts could be expected to occur to over 200 individual properties as rows of terraces and units blocks have been grouped together. The approved project stated that 15 groups of receptors could be impacted by operational noise and therefore the proposed modification would result in greater operational noise impacts than the approved project. While the assessment has concluded that more properties will exceed the trigger levels, the quantum of noise increases at these receivers was not specified.

The assessment undertaken by TfNSW based the capacity of the light rail service on the provision of up to 8,620 passengers per hour as part of normal operations in future years (up to 10 years after opening) and up to 10,800 passengers during special events. The special events scenario represents the worst-case for noise impact assessment as required by the *Rail Infrastructure Noise Guideline* (EPA, 2012). Notwithstanding that rail services would cater to future demands as required, any changes made to the service frequency such that additional receivers are impacted by noise from operations would need to be re-assessed at the time and additional mitigation or management measures implemented to address any additional impacts. To ensure that this occurs, the Department has recommended that an additional condition be included in the project approval in schedule B to address possible future capacity increases in the service over and above what has already been assessed in order to protect residential noise amenity. The Department recommends reinforcement of the requirement that operational noise be reassessed if the frequency of the light rail service changes from the worst-case assessed as part of the modification report (i.e. if there is more than one service every 3.25 minutes in the CBD and every 6.5 minutes along the branch lines respectively within ten years of commencement of operations). The recommended condition also requires that additional mitigation measures be implemented if required and that noise and vibration compliance monitoring be undertaken at that time.

The Department also considers that there are existing safeguards in the project approval to manage operational noise impacts from the project. This includes condition B11 which requires operational noise treatments to be implemented within Surry Hills (where required) prior to the commencement of construction thereby protecting these properties from construction and operational noise and condition C1 which requires that the Proponent design and operate the service with the objective of not exceeding the light rail noise trigger levels as outlined in the *Rail Infrastructure Noise Guideline* (EPA, 2012). In addition, an Operational Environmental Management Plan must be prepared; an Operational Noise and Vibration Review undertaken and Operational Noise and Vibration Monitoring and Compliance Report submitted to the Department. The Department considers that while additional receivers will be impacted by the modification, the existing conditions are

sufficiently robust to manage noise to acceptable levels and would apply to all newly identified affected receivers.

The Department is satisfied that with the modification to the project approval, additional operational noise from longer light rail vehicles can be adequately managed.

5.3 Realignment of the track along Alison Road and associated works

Issue

TfNSW is seeking to modify the light rail alignment along Alison Road. A plan showing the proposed modified design in this area is provided in **Figure 2**.

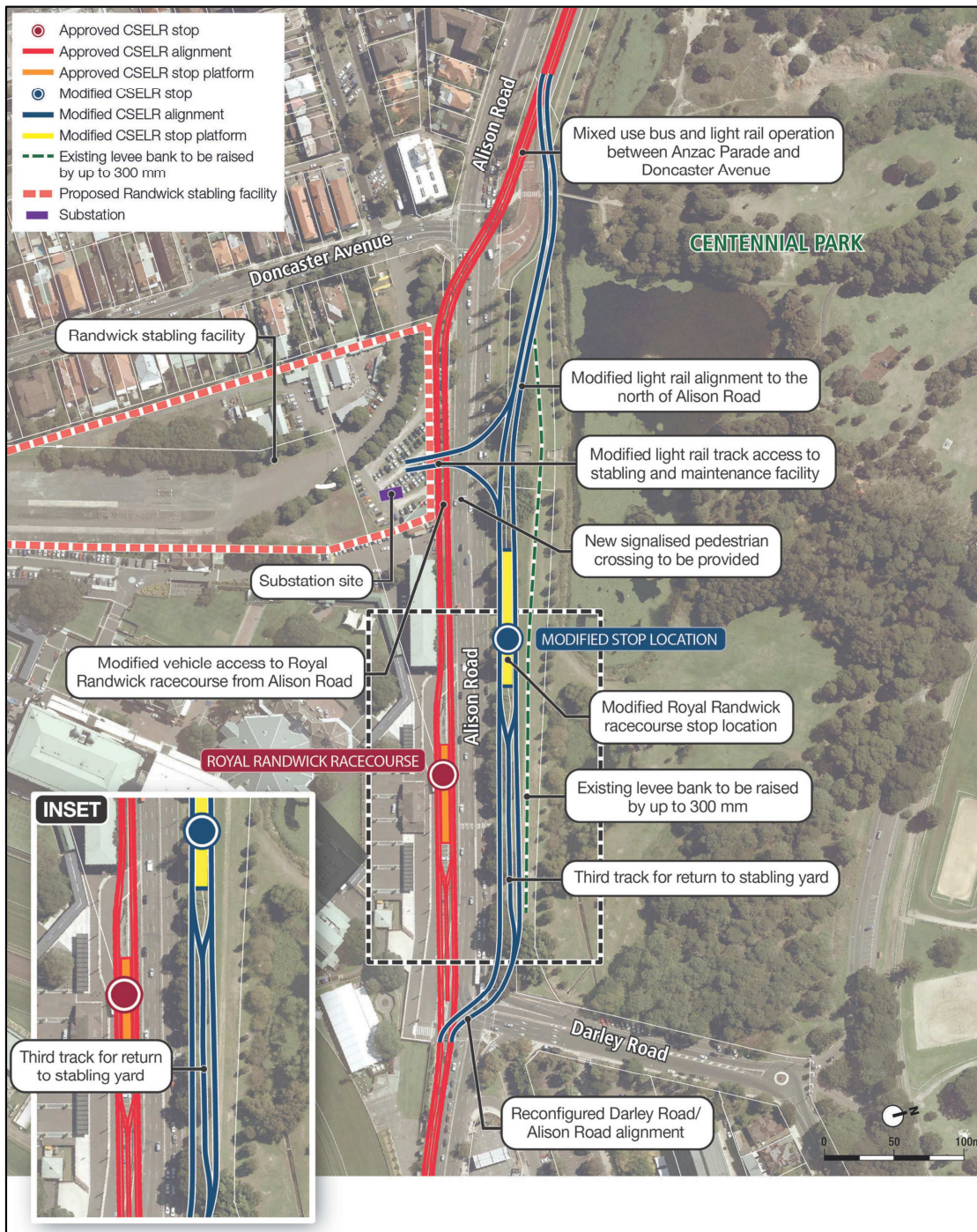


Figure 2: Realignment of Light Rail and Proposed Royal Randwick Stop

Source: Figure 6.1 from TfNSW's Submissions Report to Project Modification. January 2015

The revised alignment would follow the northern side of Alison Road from its point of diversion approximately 100 metres east of Doncaster Avenue. The alignment then crosses to the southern side of Alison Road at the Darley Road intersection before continuing along the approved alignment to Randwick.

The previously approved Randwick Racecourse stop would be relocated to the northern side of Alison Road, halfway between Doncaster Avenue and Darley Road and immediately to the east of the access to the Randwick Stabling Facility. New footpaths to the east and west of the relocated stop would lead to crossings of Darley Road and Alison Road respectively. A third track to enable turnback for special events would be included to the east of the stop. Existing fencing on the southern side of Alison Road and in the median will be maintained for safety and to direct pedestrians to the crossing for safe access to the relocated stop platform.

Portions of the modified alignment, including the Randwick Racecourse stop location will cross into land managed by the Centennial Park and Moore Park Trust.

An existing 1,100 metre flood levee adjacent to the realigned route would be raised by up to 300 millimetres along its length to reduce flood frequency to the stabling facility. This would reduce the flood mitigation works on the stabling facility site. A new retaining wall approximately 200 metres long and up to three metres high would be required along the central portion of the modified alignment.

Department's Consideration

Key issues of the proposed realignment of the track along Alison Road as raised in submissions relate to operational traffic, pedestrian access and safety, use of Centennial Park and flooding. The Department's consideration of these issues follows.

Traffic

The Department acknowledges that construction traffic impacts are likely to be no worse than for the approved project in this location due to:

- the footprint of the alignment being out of the existing road reserve; and
- construction impacts of the Alison Road crossover being transferred from the Doncaster Avenue intersection to Darley Road.

Levels of service at the Darley Road intersection once light rail services commence with the modified alignment are predicted to be C and B in the morning and evening peaks respectively. The Department accepts that this is comparable to that predicted for the approved alignment as the traffic approaching this intersection is predominantly controlled by the Anzac Parade/Alison Road intersection to the west.

TfNSW also proposes to remove the right hand turn lane (and movement) from Alison Road westbound into Darley Road to minimise the impacts of the light rail operation at this intersection. The Department accepts that during weekday morning peaks this movement is used by only 50 vehicles per hour and these largely "rat-run" through Centennial Park as an alternative route to the CBD and Bondi. This movement would be more heavily used on the weekends to access the park from the south-east. Alternative access to the park is provided from Avoca Street or Darley Road via Clovelly Road or Avoca Street, the direction from which traffic that would otherwise use the right hand turn originates.

It is noted that Randwick City Council has requested the inclusion/retention of a right turn bay on Alison Road westbound into Darley Road and 12 submissions objected to its removal. The Department considers removal of the right turn unlikely to have a significant effect on weekday traffic movements and a positive effect on park amenity during peak traffic periods. It would also likely minimise impacts to or optimise the operation of the Alison/Darley Road intersection and light rail services. The Department is cognisant that this route is an important access point to the parklands for traffic from the south east on the weekends when

the park is most heavily used. It is recommended that in finalising the traffic management arrangements and operation of the light rail through this intersection, that consideration be given to providing the right turn into Darley Road on weekends only and out of peak periods. This is consistent with the commitment made by TfNSW to consider its reinstatement during detailed design.

In addition, TfNSW proposes to remove the left turn slip lane from Alison Road eastbound into Darley Road. This is consistent with a recommendation of the recently completed *Centennial Park Master Plan 2040*. The left turn movement, however, will be retained with the inclusion of two left turn lanes. The Proponent has stated that two truncated left turn lanes are required to maintain capacity for this movement which were previously provided by a single extended lane. This will ensure that capacity will not be affected for those park patrons wanting to access Centennial Park from the west as this is a key access point.

Randwick City Council has also suggested retaining the approved light rail alignment on the southern side of Alison Road and to realign the traffic lanes to the north adjacent to the embankment. TfNSW has stated that the revised alignment is sought in part to deliver operational improvements and to separate the light rail from congestion around the racecourse entrance and bus layover. The Department concludes that the revised alignment would provide better access to those patrons likely to use the light rail on a regular basis.

Pedestrian Access and Safety Across Alison Road

TfNSW has argued that the proposed realignment and relocation of the Randwick Racecourse stop on Alison Road provides improved pedestrian access to Centennial Park, Randwick TAFE/University of NSW campus and the residential area between Alison and Darley Roads. The previous stop location catered primarily for Randwick Racecourse. The Department considers that the revised location midway between Doncaster Avenue and Darley Road is a more appropriate location which would likely cater for the more regular users of the service identified as well as racegoers.

The Department, Randwick City Council and University of NSW queried if it would be beneficial to move the stop further east on the revised alignment and closer to Darley Road. TfNSW advised that this was not possible as a third track/turnback is required in this area to enable services to return to Central during special event services. The Department accepts this response.

The Department raised concerns for the safety of light rail users from the racecourse crossing Alison Road directly from the racecourse gates opposite the revised stop location and not the designated crossing approximately 200 metres towards Doncaster Avenue. Additionally, concern was raised regarding the capacity of the platform to safely accommodate a significant influx of passengers following special events.

Natural instinct would be for racegoers to exit the Alison Road gates and take the most direct route across Alison Road to the stop rather than via the pedestrian crossing. TfNSW advised that existing fencing at the racecourse gates and on the Alison Road median would be retained to provide a deterrent to this behaviour by directing pedestrians towards the designated crossing points. The new footpaths leading to the stop would provide for queuing while passengers wait for the next services. It is acknowledged that the existing fencing, as well as the bus facility outside the gates, would provide a significant barrier or deterrent. Whilst the Department accepts that these measures are in place, it is noted that there has been no obvious destination on the northern side of the road to attract users to cross at that point.

The Department remains concerned about patron safety with crowds potentially surging onto Alison Road. It is accepted that a new crossing of Alison Road to the west of the racecourse gates will be provided and the existing crossing to the east of the Darley Road intersection

will remain. This will necessitate a multi-leg crossing of both Alison Road and Darley Road. Neither provides direct access to the stop platform, instead requiring back-tracking from each crossing location. Despite this, the Department accepts that this is likely to only be an issue during special events. TfNSW has advised during these events, Alison Road is generally closed to traffic. Condition C11(g) of the approved project requires preparation of a Special Events Management Plan including consideration of how light rail patrons will be managed to and from the racecourse and the need for crowd marshals at the stop. The Department is satisfied that access to the stop for racegoers would be considered in meeting the requirements of that condition.

Randwick City Council has sought a pedestrian crossing on the western side of the Darley Road/Alison Road intersection to facilitate access between the racecourse and the light rail. The Department concurs with TfNSW that a crossing on this leg is likely to have an adverse effect on the operation of this intersection, which would only be exacerbated with the relocation of the light rail crossover. This proposal is not supported.

Centennial Park and Moore Park Trust has identified proposed entry to the park from Alison Road opposite Doncaster Avenue as providing the most practical access from the residential precinct which will become increasingly important as development densities increase over time. This is outlined in the recently completed *Centennial Park Master Plan 2040*. This issue is discussed in more detail in the following section.

Impacts on Centennial Park

Works including the proposed stop location, the rail alignment, the shared pathway and the potential flood levee raising will partially be constructed within the Centennial Park boundary and as a result the Department is concerned that dedicated parkland will instead be used for infrastructure purposes. Increased flooding of the park to accommodate the Randwick Stabling Facility is also a key consideration and is further discussed in the following section.

Any lease or licence for the use of Centennial Park for the purposes of light rail would need to be obtained by the proponent. Under the *Centennial Park and Moore Park Trust Act 1983*, the Centennial Park and Moore Park Trust may grant leases or licences of specified parts of Centennial Park for purposes related to light rail and bus services and as approved by the Minister for the Environment. The Department is satisfied that a lease or licence could be obtained for the purposes of the project as outlined in this modification.

The proposed works along Alison Road will change the way the area of Centennial Park between Anzac Parade and Darley Road currently functions. The new light rail stop will increase public transport access to the park by facilitating additional active travel opportunities for new and existing park users. Improved public transport access could also reduce parking demand within and adjacent the Park and vehicle movements within the Park. As well as improved accessibility, the new light rail stop will promote activation of this area and improve both active and passive surveillance. Although the works will impact on the park boundary, the Department is satisfied that the works will provide greater benefit to the park through improved access to this section of the park, more activation of the public domain in this area and improved public surveillance.

The Department considers that two new conditions be imposed which:

- require the works in the park to be consistent with the *Centennial Parkland Master Plan 2040* as publicly available and where this cannot be achieved, that TfNSW be required to fund any revisions required to the master plan and pay for any costs of works that are to be carried out under the revised master plan;
- detailed design of the light rail infrastructure between Anzac Parade and Darley Road within Centennial Park must meet specified design criteria as stipulated in recommended Condition B39A. If the design criteria cannot be met, the design must be

submitted to the Secretary for approval with a justification for any changes and evidence of consultation with relevant parties.

Further, the Department considers that existing condition B23 will ensure that the existing condition of footpaths, parks and other open space areas, and existing boundary infrastructure (including but not limited to gates, retaining walls and fences) will be documented prior to construction. The Department also requires the Proponent to outline measures to rectify any likely damage identified and any actual damage aside from normal wear and tear and to rectify any damage at the cost of the Proponent.

TfNSW has also identified the need to construct a retaining wall adjacent to the southern side of the existing flood levee. The final height of the retaining wall will be between 1.5 and 2.5 metres including the additional 300 millimetres for flood alleviation and that views into the park would not be significantly altered from the existing levee. The greater visual impact would be to the views of the boundary where the vegetated mound will be replaced with an engineered wall, however this will be largely indiscernible from the racecourse stop infrastructure. Notwithstanding, the Department remains concerned that the Proponent has not considered other options for flood mitigation that do not affect park land. To address this, it is recommended that condition B65 be amended to require the Proponent to further justify construction of the levee for flood mitigation. If an alternative flood mitigation option is selected, it is likely that the existing levee height (incorporating the retaining wall) will remain unchanged.

As well as the additional physical infrastructure against the parkland backdrop, the light rail construction and flood levee raising will require removing 32 trees, seven more than the approved project. However, refinement of the design has enabled retention of the Maidens Row tree planting along Alison Road which will soften the visual impact of the retaining wall. The removal of 32 trees from the Centennial Parkland interface is considered significant and the resulting landscape will change from a largely parkland setting to an urban landscape with hard surfaces and significant infrastructure. Both Randwick City Council and the Centennial Park and Moore Park Trust raised this as a matter of concern. The Department has recommended that existing condition B48 be revised to require the independent arborist to assess whether trees that must be removed can be transplanted and if this is the case that the final location must be determined in consultation with the relevant Council and/or Centennial Park and Moore Park Trust.

The *Centennial Park Master Plan 2040* provides a vision and blueprint for the next 25 years. The master plan seeks to integrate the light rail and future development in the locality, including a new entrance off Alison Road near Doncaster Avenue to service light rail patrons and visitors from the Doncaster Avenue residential precinct; and a bridge across the Kensington Ponds. An extract of the master plan is shown in **Figure 3**.

The Centennial Park and Moore Park Trust stated that this entry is critical and provides the most logical and practical access from the Doncaster Avenue residential precinct and will increase in importance over time with the proposed increase in residential densities planned for the Randwick/Kensington area. Notwithstanding the efforts to integrate with the proposed light rail, the master plan would have been completed prior to the modification. Centennial Park and Moore Park Trust has requested that TfNSW provide funding and resources as required to revise the master plan and provide a replacement entrance to the park.

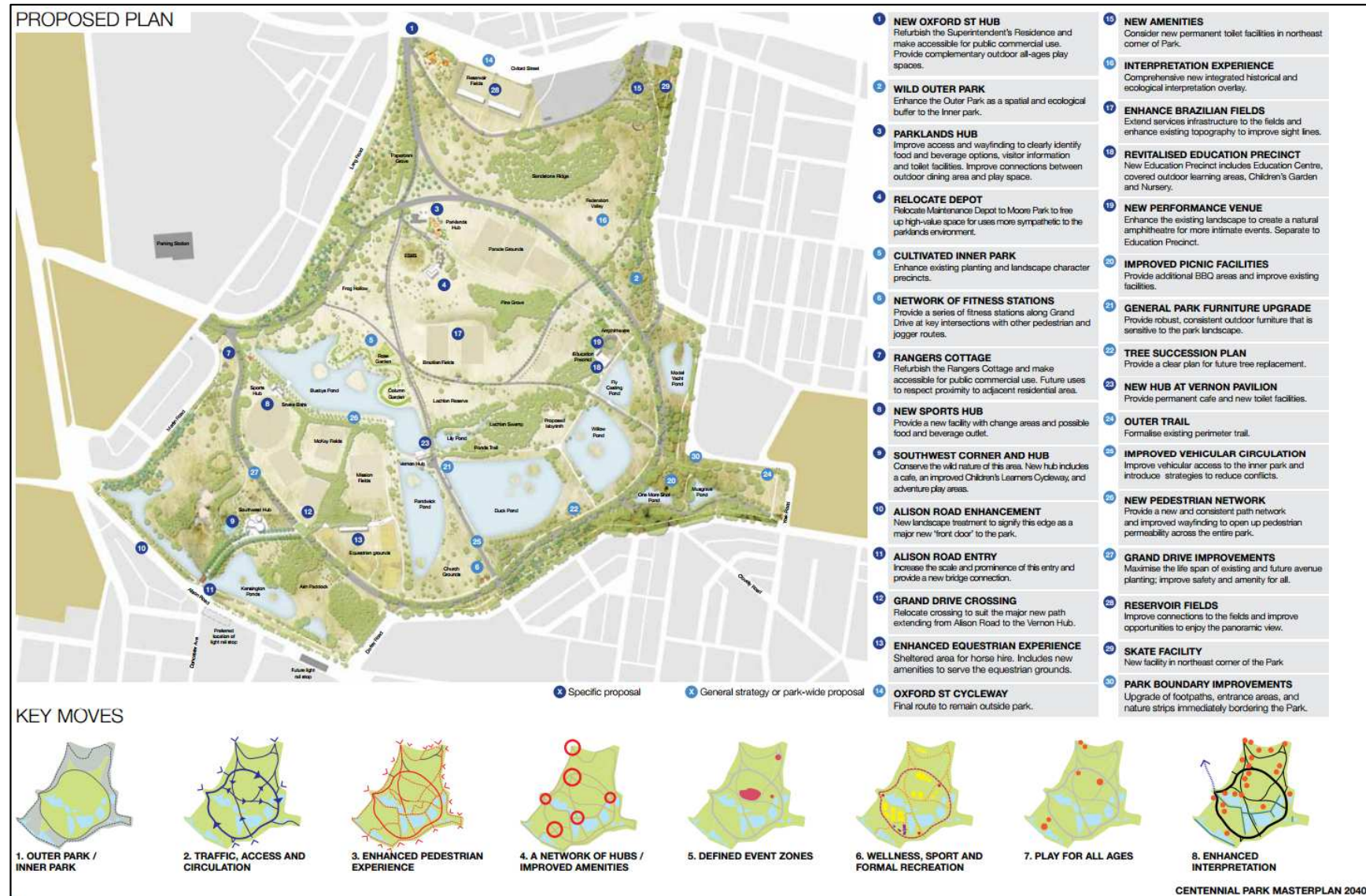


Figure 3: Centennial Park Master Plan 2040 (November 2013)

The Department accepts that the modified alignment may impact on the proposed Alison Road entrance to require relocating or the Alison Road entrance, particularly due to access for pedestrians accessing from the Doncaster Road crossing that will now have to cross the existing busway, light rail alignment and shared path. However, the modified stop location could benefit the park to a significant degree and further reinforce the location of this entrance as it is located at the western end of the relocated stop and passengers would have direct access to it.

The Department concurs that TfNSW should provide funding or resources, to an amount agreed with Centennial Park and Moore Park Trust, to review the master plan and identify those components that will require revision as a result of the modified light rail alignment along Alison Road. Where these can be clearly attributable to the modified alignment, TfNSW should bear costs for construction or implementation of those items to the extent of its liability. The Department has recommended that a condition be inserted into the project approval to this effect.

It should also be acknowledged that the modified alignment includes removal of the left turn slip lane into Darley Road which was identified as a project in the master plan with an associated cost of \$150,000 to be completed between 2020 and 2030. This cost could be offset against any additional cost incurred for gateway landscaping, entrance relocation or any other items requiring revision, should these be required.

Randwick City Council has proposed a number of recommendations relating to tree retention or replacement where this is not possible. The Department has recommended a condition which requires the Proponent to use construction techniques that minimise impacts to tree root zones at all times along Anzac Parade (to its intersection with Alison Road), Alison Road and Wansey Road. This is proposed to address those trees which would otherwise only need to be removed because of potential root disturbance or damage. The Department considers that other tree replacement matters were addressed in the original project approval and are likely to be included in development agreements between Councils and TfNSW such that no further modifications are required.

The Department acknowledges that the number of trees to be removed from this location has been reduced from 50 identified in the modification assessment to 32 in the Submissions Report to Project Modification as the Maiden's Row trees will no longer be affected. Notwithstanding, there is a significant change in the landscape in this location and the Department recommends that the Proponent be required to work co-operatively with the relevant stakeholders. These include the Centennial Park and Moore Park Trust, Randwick City Council and the Australian Turf Club to ensure that the urban design outcomes integrate to the greatest extent practicable with the interface between the parkland and the racecourse. Existing condition B51 is considered appropriate to address this matter.

Flooding

TfNSW wishes to further modify the approved project by increasing the height of an existing flood levee on the southern boundary of Centennial Park adjacent to the route realignment. This would benefit the Randwick Stabling Facility and private residences on Doncaster Avenue by reducing flooding impacts in events up to the 100 year average recurrence interval (ARI) event. This would result in increased flood storage capacity in Centennial Park, increasing the area and possibly the period of inundation. Detail on the extent of flooding in terms of additional area subject to inundation, the increased period of that inundation or the effects on the use of that area of the park or on the landscape (the existing pond and surrounding trees and vegetation) has not been provided.

This modification is largely unrelated to the route realignment in this location, other than the need to truncate the levee on its southern side to enable the light rail to be constructed. The raising of the wall would reduce flooding of the stabling facility on the corner of Doncaster

Avenue and Alison Road. The Department accepts that flooding of the facility was an issue raised in the original assessment and there was a need for further investigation but is concerned that the impacts will be transferred to a public and iconic parkland, albeit for a project with significant public benefit.

The approved project identified that flood mitigation for the stabling facility would be necessary. The effect of this proposed modification compared to alternative flood mitigation options, including on-site detention, has not been considered at this stage. The Department remains concerned that, although the area behind the flood levee is already a flood storage area, other alternative flood mitigation options should be investigated before flooding of public land is permitted as the preferred solution.

The City of Sydney raised the issue of flooding more generally and the existing condition B65 as being fundamental and needing to be maintained, including the maximum increase of flood levels in the 100 year ARI event. Similarly, Randwick City Council stated that any flood mitigation works should not result in the transfer of floodwaters, or increased flood levels on adjacent properties or properties downstream. TfNSW has acknowledged that it is unlikely to be able to comply with the criteria in condition B65 for the Centennial Parklands behind the flood levee.

The Department does not support modifying the condition to provide an exemption in this case. The original approval required the Proponent to design and construct the SSI and to not worsen existing flooding characteristics in the vicinity. Criteria to define worsen was provided as part of the condition. TfNSW has indicated it needs to further investigate flooding impacts in this area and therefore additional information may be forthcoming. The Department does not consider that flooding public land is a justifiable position at this time and therefore seeks the Proponent to exhaust all alternatives for flood management before flooding of the park would be considered. The Department has therefore recommended that condition B65 only be modified to this extent and that any reasonable and feasible measures to allow a worsening of flooding need to be agreed to by the Secretary.

Randwick City Council also recommended that the amount by which the existing levee is raised include a 500 millimetre freeboard to ensure that overtopping does not occur. The Department notes that the levee height increase proposed is up to 300 millimetres along its length. To provide a 500 millimetre freeboard would require substantially greater raising of the levee height which would have significant visual and amenity impacts, and would be contrary to Council's other concerns regarding the retaining wall creating a strong visual barrier and loss of views into Centennial Park. Further, the Department considers that a 500 millimetre freeboard is not necessary. The levee would be designed to hold additional floodwater in the 100 year ARI which is the planning level adopted. The Department recommends that the proposed levee height be optimised during detailed design to take into consideration the objectives of the project and the need to minimise visual, urban design and landscaping impacts in this location.

Centennial Park and Moore Park Trust has requested that further environmental and flooding work be undertaken to define the impacts on the park lands and park facilities, particularly as they relate to works which are currently being implemented such as the new café and bike hire facility near the Children's Learners' Cycleway. The Department considers this to be a reasonable request and has recommended a condition which requires that TfNSW work with Centennial Park and Moore Park Trust to further refine the impacts of the increased flood levee on the south western corner of the park. TfNSW should also provide funding and/or resources to redress any changes required to those facilities resulting from increased flooding (extent, depth or duration) following construction of the levee.

Other Issues

Seven public submissions also raised graffiti on the retaining wall and the loss of the bike track. TfNSW has committed to consider the potential impacts of graffiti and would aim to provide graffiti-resistant finishes. A shared path would also be provided on the park side of the levee. The Department is satisfied that existing conditions, specifically B33 and B50, will address any residual concerns regarding these matters.

5.4 Revised construction methodology for the tunnel under Anzac Parade

Issue

TfNSW has proposed a different construction method for the Moore Park tunnel under Anzac Parade which involves a top-down cut and cover style tunnel instead of driving the tunnel under the road, similar to the approved construction of the tunnel through Moore Park between South Dowling Street and Anzac Parade.

In order to maintain traffic flow along Anzac Parade, it is proposed to stage the construction of the tunnel such that three lanes are maintained in each direction. This will require Anzac Parade and associated footpaths to be temporarily realigned for a distance of approximately 100 metres either side of the tunnel crossing location. TfNSW has stated that the vertical alignment of the tunnel would be raised by between one and three metres and that the refined design would avoid identified utilities in the vicinity of the tunnel and optimise its construction.

The proposed construction method would require the removal of additional Moreton Bay Figs in addition to the nine trees approved for removal on the eastern side of Anzac Parade and the two on the western side. This would result in up to four additional significant trees requiring removal and potentially an additional five to six trees as a result of impacts to root zones from temporary paving works. This would result in adverse visual impacts in this locality. This impact would also be exacerbated by large construction machinery required to work close to the roadway and from temporary hoarding and fencing around the construction site. TfNSW has advised that one significant tree on the eastern side of Anzac Parade would no longer be impacted and therefore the overall impact from the proposed modification would be an additional eight to nine significant trees required to be removed over and above the approved project.

The Proponent has stated that it needs to maintain existing traffic operations along Anzac Parade during the construction works with three northbound and three southbound traffic lanes. The existing school zone speed limit would be maintained and at other times during construction, the speed limit would be restricted to a 60 km/hr road work limit.

Department's Consideration

The proposed construction of the light rail tunnel and the temporary diversion of Anzac Parade will result in the removal of a large number of mature Moreton Bay Figs along Anzac Parade and the Department is concerned that the impact will be permanent even though the construction work is of a temporary nature. The avenue of mature and semi-mature figs along Anzac Parade is a distinct landscape element in the locality and the planted boulevard has both visual and heritage value which, in the opinion of the Department, should be protected and preserved to the extent possible.

The existing approval included the construction of either a jack box or canopy tube driven tunnel under Anzac Parade which would have resulted in a total of eleven trees being directly impacted. While the Department understands that the proposed change to the tunnelling method under Anzac Parade would present a more efficient construction method, reduced overall construction duration and reduced cost, it does not agree that additional significant trees should be removed resulting in significantly greater visual impacts over and above the approved project.

The impact to trees was the issue raised most frequently in the submissions to the modification. Submissions from City of Sydney Council, Centennial Park and Moore Park Trust and a multitude of community submissions all strongly objected to the greater impacts proposed to the significant trees in this locality, particularly referencing the fact that the approved project had already resulted in adverse visual impacts from tree removal in this area and increasing impacts further was not acceptable. In its submission, the City of Sydney Council stated that there is a width of approximately 36 metres between the eastern and western footpaths (inclusive of the footpaths) and that the eastern shared footpath could be moved next to the busway and the western footpath moved into the park to provide the additional space required for traffic lanes along Anzac Parade without directly impacting on the trees. In addition the Council suggested an alternative where a tidal flow arrangement could be implemented with three inbound traffic lanes and two outbound lanes available in the AM peak and the reverse for the PM peak.

Based on the submissions received, the assessment undertaken by the Proponent, and the iconic nature of Anzac Parade (i.e. being a distinct and well known landscaped boulevard), the Department cannot support any additional removal of trees (both mature and semi-mature fig trees) in this area and has recommended a condition of approval to limit the removal of significant trees (both mature and semi-mature trees). It has also recommended that the Proponent be required to demonstrate that it has investigated options to further reduce the impacts to trees. The Department has also recommended that condition B48 be revised to require that the independent arborist identify whether trees to be removed can be transplanted and if so, the location shall be determined in consultation with the relevant Council and/or the Centennial Park and Moore Park Trust.

The Department also understands that there are a number of mitigation measures that could be implemented as part of construction works, particularly in relation to the diversion of traffic lanes along Anzac Parade to protect the tree root zones of significant trees and therefore allow them to be retained. The recommended condition also requires that these construction techniques be utilised to minimise impacts to tree root zones and that these measures should be employed not just along Anzac Parade but also along Alison Road and Wansey Road to minimise impacts to planted trees from the project in these areas.

While the Department understands that Anzac Parade is to be kept operational during the construction period, the Department considers that given its function as a major arterial road, it is imperative that peak traffic flows be maintained along this route at all times. In order to further limit the impact of the construction of the cut and cover tunnel across Anzac Parade, the Department agrees with the City of Sydney Council's suggestion to require the Proponent to investigate whether five traffic lanes could be maintained and a tidal flow arrangement implemented or whether the footpaths can be temporarily relocated to ensure that three traffic lanes would be available to cater for peak traffic in both directions, as required. The Department has recommended that this be included as a condition of approval or justification provided to the Secretary where it cannot be undertaken based on detailed RMS information. The Office of Water raised concerns with the modified construction methodology of the Moore Park tunnel in relation to impacts on groundwater. While the Proponent has not undertaken detailed groundwater investigations in relation to the impacts of the SSI, the Department considers that existing conditions in the project approval would ensure that potential impacts on groundwater are addressed and managed as appropriate. Specifically, conditions B67 to B70 inclusive address groundwater and would apply to the modified design.

5.5 Realignment of light rail track - Anzac Parade & Alison Road intersection Issue

Investigations undertaken by TfNSW indicate that longer light rail vehicles heading south on the Kingsford branch line may block other light rail vehicles heading to Randwick when they are required to stop at traffic signals at the Anzac Parade/Alison Road intersection. To eliminate this potential disruption, TfNSW proposes to modify the alignment such that the light rail would branch into its separate alignments (i.e. Kingsford branch line and Randwick branch line) just north of Robertson Road.

The Kingsford branch line would deviate from the approved alignment approximately 300 metres north of the Anzac Parade and Alison Road intersection before continuing along the centre of Anzac Parade, thereby avoiding previously identified impacts to Tay Reserve. The busway and the Randwick branch line are proposed to be located along separate alignments between Robertson Road and Alison Road and then share an alignment along the northern side of Alison Road. In this location, the alignment of the light rail is proposed to be straightened moving it closer to Martin Road than the approved project and requiring the removal of at least four mature trees and associated established shrub planting that currently provide visual screening in this area.

Department's Consideration

The Department considers that the proposed configuration of the Kingsford branch line would provide both traffic and visual benefits to the locality. As stated in TfNSW's assessment, the modified alignment in this area will result in traffic improvements and provide Level of Service (LoS) C intersection performance in the project's opening year compared to LoS F for the approved project. While TfNSW has stated that northbound traffic may experience some delays as a result of the light rail having to stop at both the Anzac Parade/Alison Road and Anzac Parade/Robertson Road intersections, the Department notes that it has committed to undertake further modelling during detailed design to optimise the light rail operation through these intersections and to maintain an improved traffic outcome. The Department supports this commitment.

The Department also supports the avoidance of Tay Reserve. Retaining the established trees in the reserve will continue to contribute to the visual amenity of the locality and reduce the impact of removing two mature fig trees near the north-eastern corner in order to construct the required left turn slip lanes into Alison Road.

Despite overall support for this modification, the Department is concerned by the need to remove additional mature vegetation and associated shrub plantings alongside Martin Road/Robertson Road resulting from the proposed straightening of the light rail alignment in this location. The Department does not consider that the busway and the light rail need to be in two separate corridors between Robertson Road and Alison Road as they share the same alignment from the corner of Alison Road eastward. Building two separate alignments, one for the busway and one for the Randwick branch line in this area will have an adverse visual impact for Martin Road/Robertson Road residents, as well as on the visual amenity of the area generally and is not considered to be justified. The Department is not satisfied that the Proponent has undertaken sufficient and rigorous design investigations to avoid this additional vegetation removal.

The Department received multiple community submissions that raised the issue of additional impacts to planted trees generally; submissions from Centennial Park and Moore Park Trust and City of Sydney Council; and a petition from the residents of Martin and Robertson Roads. The impact to trees was the most raised issue from all the submissions received on the proposed modification which indicates that the community is genuinely and understandably concerned about the additional impacts proposed to mature and significant vegetation.

There are a number of conditions in the project approval to address minimising vegetation removal and compensatory measures (conditions B47, B48, B51 and B52), however the Department recommends including an additional condition to require that in the first instance, the Proponent shall avoid the removal of trees that provide visual screening for Martin Road/Robertson Road residents. The new condition allows for trees to be removed if this is required for operational reasons, however the Proponent must demonstrate this to the satisfaction of the Secretary why sharing of the busway and the Randwick branch line between Robertson Road and Alison Road is not feasible. In addition, the Department has also recommended that condition B48 be revised to require that the independent arborist identify whether trees to be removed can be transplanted and if so, the location shall be determined in consultation with the relevant Council and/or the Centennial Park and Moore Park Trust.

5.6 Moore Park stop arrangement

Issue

TfNSW proposes to reduce the scale and visual impact of the Moore Park stop by removing the overhead concourse structure and building an underground subway for use during special events, as shown in **Figure 4** and **Figure 5**.

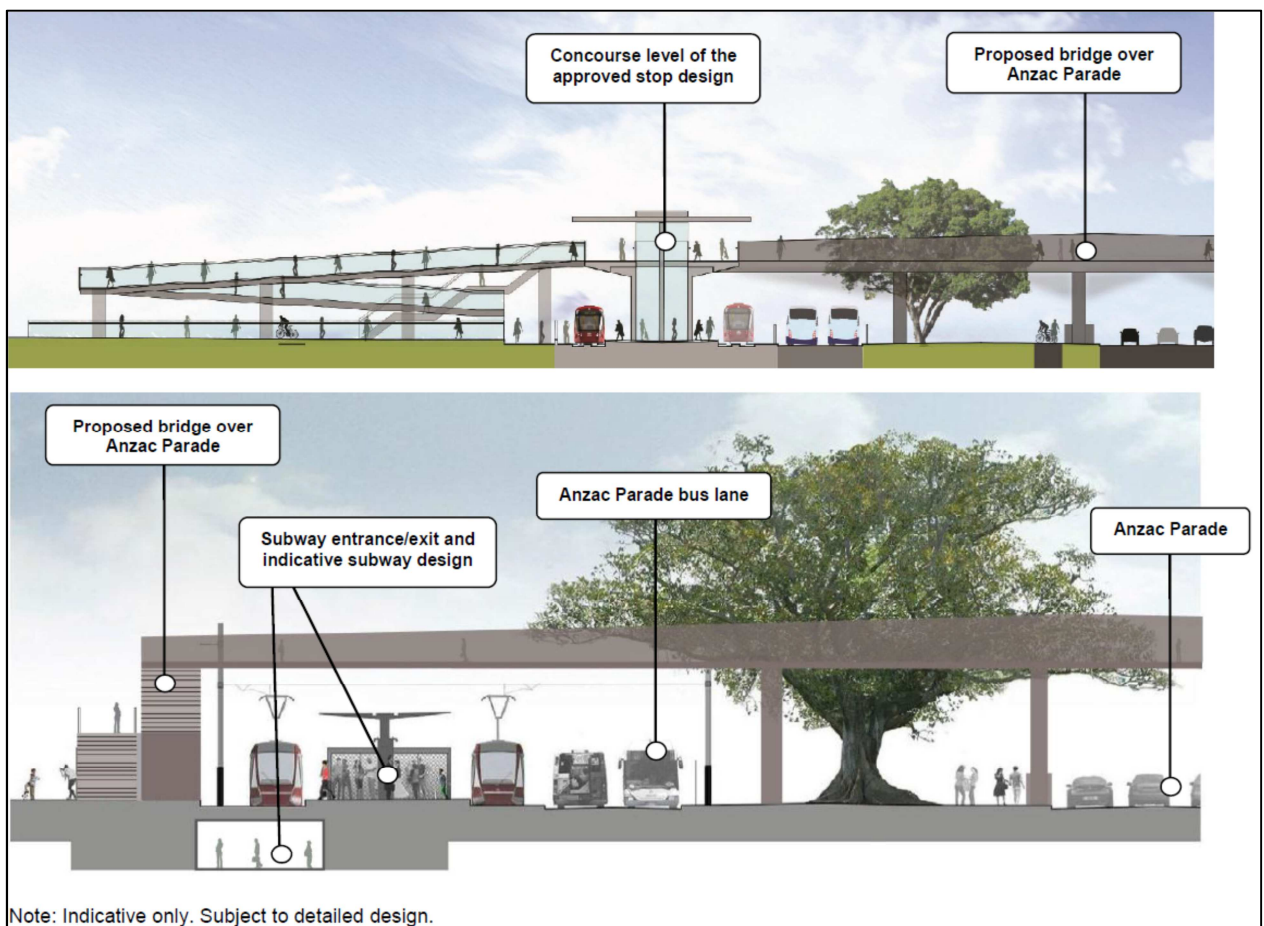


Figure 4: Proposed modification to Moore Park stop

Source: Figure 3.5 of TfNSW's Modification Report, December 2014

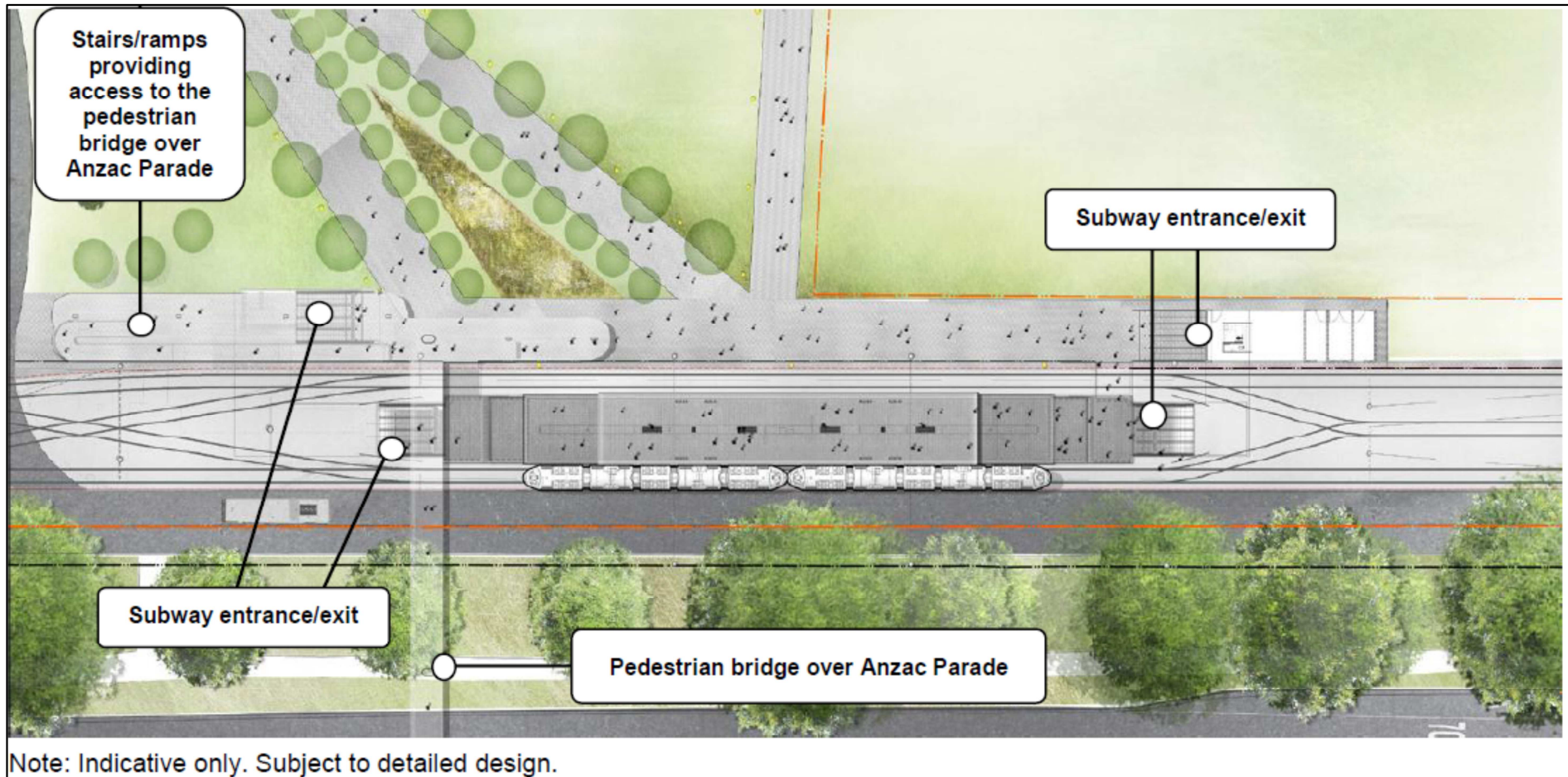


Figure 5: Plan of modified Moore Park stop arrangement

Source: Figure 3.4 of TfNSW's Modification Report, December 2014

As such, access to the approved pedestrian bridge over Anzac Parade would be modified to include new ramps and stairs at the eastern end of the bridge. These ramps and stairs were previously included in the design of the approved Moore Park stop but now form part of the bridge structure.

Under normal operations, the stop would be accessed via pedestrian crossings over the light rail tracks and access ramps. Mobility impaired access would cross the light rail tracks at all times which would be managed by staff during special events.

Staffed guard rails and gates would control access during special events to direct passengers to the centre of the stop. An indicative plan showing the proposed passenger circulation patterns are shown on **Figure 6**.

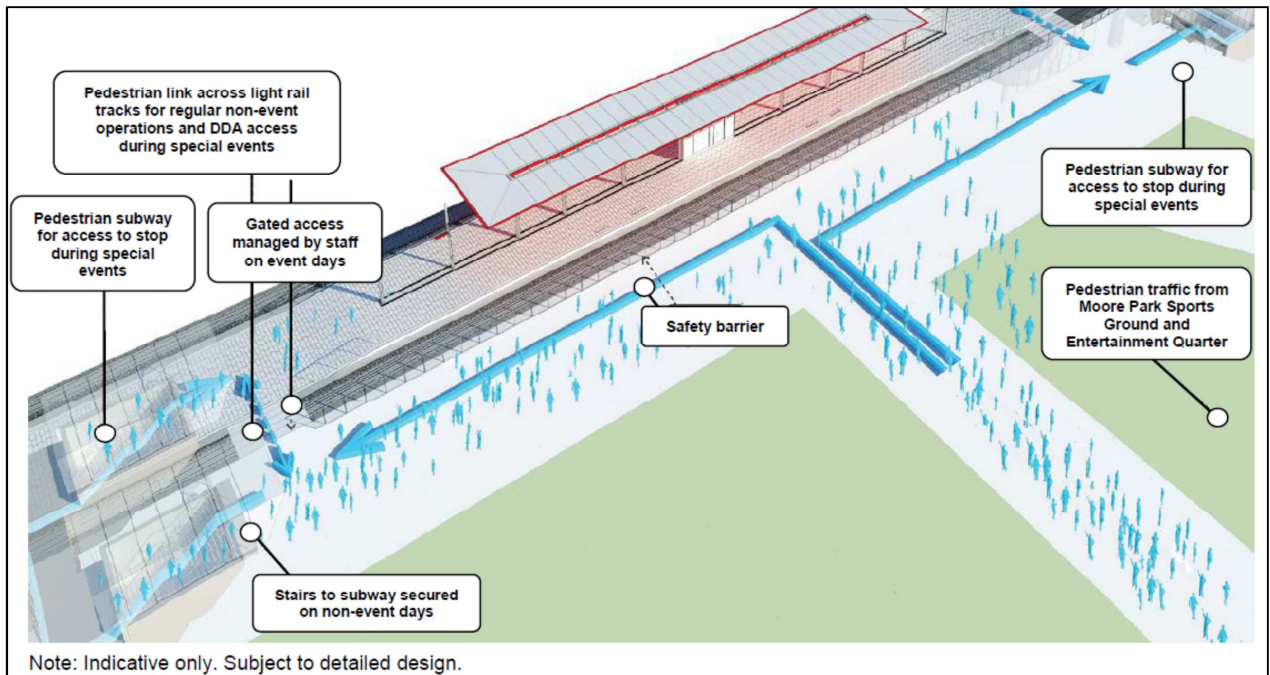


Figure 6: Proposed circulation of passengers at the Moore Park stop

Source: Figure 3.6 of TfNSW's Modification Report, December 2014

The Submissions Report to Project Modification confirmed that a special event staff facilities block and supporting control centre is part of the proposed modification of the Moore Park stop. The block design would be completed in detailed design.

Department's Consideration

The Department considers that the modified design of the Moore Park stop would provide visual benefits when compared to the approved project as the bulk and scale of the structure has been reduced by eliminating the concourse level. Safety is a key issue for the Department and government overall wants to ensure that the project is safe for all users, including commuters or students accessing Sydney Girls and Sydney Boys High Schools.

A number of submissions raised safety as an issue of concern, particularly as a result of students having to cross the light rail tracks to access the platforms unsupervised. Sydney Boys High School has confirmed that teachers will not be supervising students at the light rail stop. A number of submissions stated that in the morning and afternoon peak period there could be approximately 2000 children that may need to access the light rail service in a very short space of time, including approximately 1500 students coming to and from Central Railway Station. In its Submissions Report to Project Modification, TfNSW has committed to reviewing potential options during detailed design to enhance the safe crossing of the light rail tracks by students. This would include use of the proposed subway in the morning and

afternoon school peaks and other operational measures as suggested by the School Council for Sydney Boys High School and the School Community of Sydney Girls High School. The Department is supportive of this approach and the proponent's commitment to ensure safety at this location.

Existing condition B27 requires stop access and design plans to be prepared and implemented to ensure safety, connectivity, efficiency and convenience is maximised. The added requirement to undertake independent safety audits as part of this condition will ensure that student safety is paramount. While the Department is confident that this can be achieved with the existing conditions and the Proponent's additional commitment, it has recommended inserting another condition that the Proponent be required to prepare a safety case which demonstrates to the satisfaction of the National Rail Safety Regulator, that children can safely access the Moore Park stop during peak start and finish times where direct access from the Anzac Parade pedestrian bridge to the Moore Park stop cannot be provided.

Randwick City Council raised concerns regarding the underground connection from Moore Park to the stop platform. Specifically, Council suggested that the subway access should be extended as an underpass beneath Anzac Parade to avoid the visual impacts of the overbridge, particularly given the proximity to the Tibby Cotter walkway and the impact that would result. The Department understands that the Proponent has considered this option and does not favour it due to constructability requirements and Crime Prevention Through Environmental Design concerns that could not be fully mitigated. The Department accepts the argument presented by the Proponent in its Submissions Report to Project Modification on this matter and notes that the modified design of the bridge would reduce its scale and result in less visual impacts than the approved project.

The Proponent provided limited information regarding the proposed special event staff facilities and supporting control centre. The Submissions Report to Project Modification stated that this building would comprise a kitchenette, bathroom facilities and storage for use by special event service staff. A back-up control and communications room would also be included. The building location was not specified however the Proponent stated that it would be located within the approved footprint. While the Department understands the need for such infrastructure, no detail on the appearance, height and scale of the building has been provided and therefore the Department has recommended an additional condition be inserted into the project approval to require that detailed design plans for the new building be developed in consultation with the Reference Groups as well as the Centennial Park and Moore Park Trust and City of Sydney Council and that the plans be submitted to the Secretary for approval prior to the commencement of construction. The Department has also requested that the Proponent consider locating the building underground adjacent to the subway.

5.7 Provision of third rail wire-free infrastructure within the CBD

Issue

The approved project provided wire-free operation between the Circular Quay and Town Hall stops, negating the need for overhead wires and poles for the power supply between these stops. As part of the design, overhead charging units for part of the length of the platforms were necessary to charge on-board power storage on each light rail vehicle. The modification seeks to change the power system to Alstom's Aesthetic Power Solution (APS), a ground level power supply system.

The APS system consists of an electrical feeder 'rail' embedded in the track surface. Light rail vehicles would be continuously supplied with energy from the in-ground feeding rail that has the appearance of a third rail in the centre of the two rails on which the vehicle's wheels sit. The proposed modification therefore removes the need for overhead charging conductors

at Circular Quay, Grosvenor Street, Wynyard and Queen Victoria Building stops. At Town Hall, an overlap of overhead wires and APS would facilitate transition from one system to the other. **Figure 7** provides an example of a 'third rail' track power arrangement in Bordeaux, France.

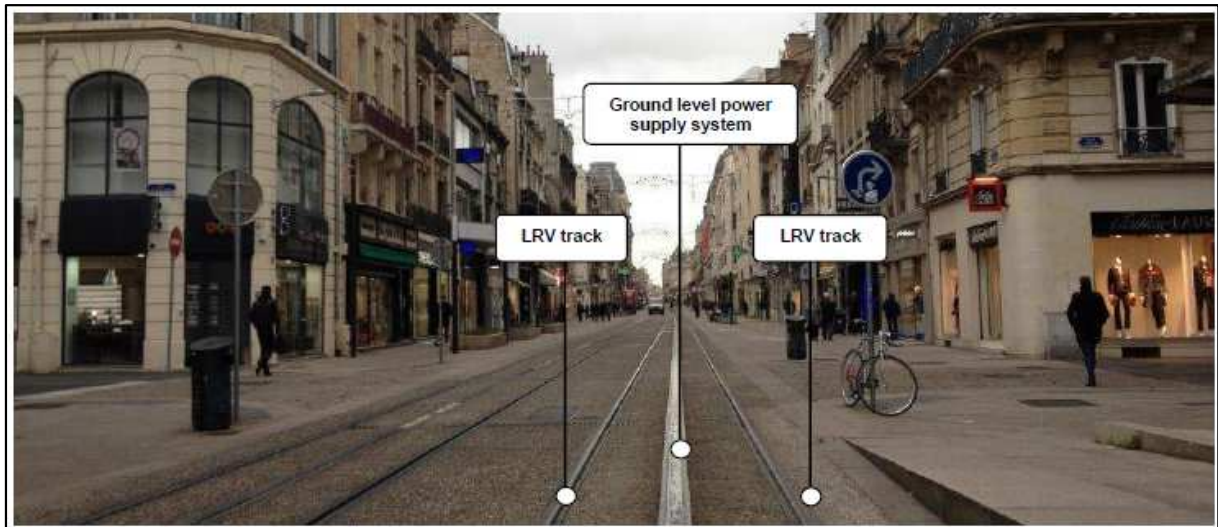


Figure 7: The 'third' track power arrangement as seen in Bordeaux

Source: Modification Environmental Impact Statement

Department's Consideration

The Department acknowledges that the proposed APS power supply has been installed in a number of light rail systems within Europe to minimise visual impacts within historic precincts. The removal of visible charging infrastructure at each stop would reduce the overall visual impact at the stops, resulting in minor beneficial outcomes for the streetscapes of George Street and Alfred Street. Additionally, the proposed power supply would reduce the visual impact to various State and locally significant heritage items along the corridor, including the Queen Victoria Building. It is also noted that the proposed 'third track' would be constructed within the same rail track form base depth as the rail track slab, therefore avoiding additional impacts to historical archaeology as a result of further excavation works.

The proposed APS system was the subject of multiple community submissions, including a number that raised safety related concerns, reliability during heavy rain and the high cost of the technology. The Department notes that the APS system is in service in a number of locations across the world, running over 12 million kilometres with an availability rate of over 99 per cent. It is also acknowledged that the design of the APS system enables it to drain and evacuate water away from the contact zone during heavy rain events. Additionally, a dedicated on-board battery may be used in the uncommon event that the APS system cuts the ground power supply as a result of local water accumulation. The Department is satisfied that the proposed use of the APS system will reduce visual impacts on the surrounding streetscape whilst not affecting the efficiency of the light rail network.

5.8 Height increase to the Randwick stabling facility

Issue

The original project approval included a requirement that the maximum height of any building in the Randwick Stabling Facility not exceed 10.5 metres above existing ground level.

The Proponent has identified that the site will need to be raised by up to two metres to mitigate potential flooding impacts and maintain a contiguous ground level with Alison Road for vehicle access and egress. The facility will also require construction of a sand silo used to store sand for topping up sand boxes on light rail vehicles for use on wet/slippery tracks. A single silo with a height above the finished ground level of 9.5 metres is proposed. Due to the

need to raise the existing ground level by approximately two metres, this would bring the finished height of the sand silo to 11.5 metres above the existing ground level which would not comply with the Minister's approval.

Department's Consideration

The Department acknowledges the need to undertake flood mitigation works on site and the need to provide at grade access for light rail vehicles to the stabling facility from Alison Road. The Department raised concerns that alternatives to reduce the height of the silo above the stipulated maximum did not appear to have been considered.

The Proponent subsequently advised that alternatives were considered but that the main driver for the silo height is the clearance required over the light rail vehicle and committed to further investigation during detailed design to reduce the height and design of the silo or have two smaller silos. The Department is satisfied that this is an issue that can be resolved through detailed design.

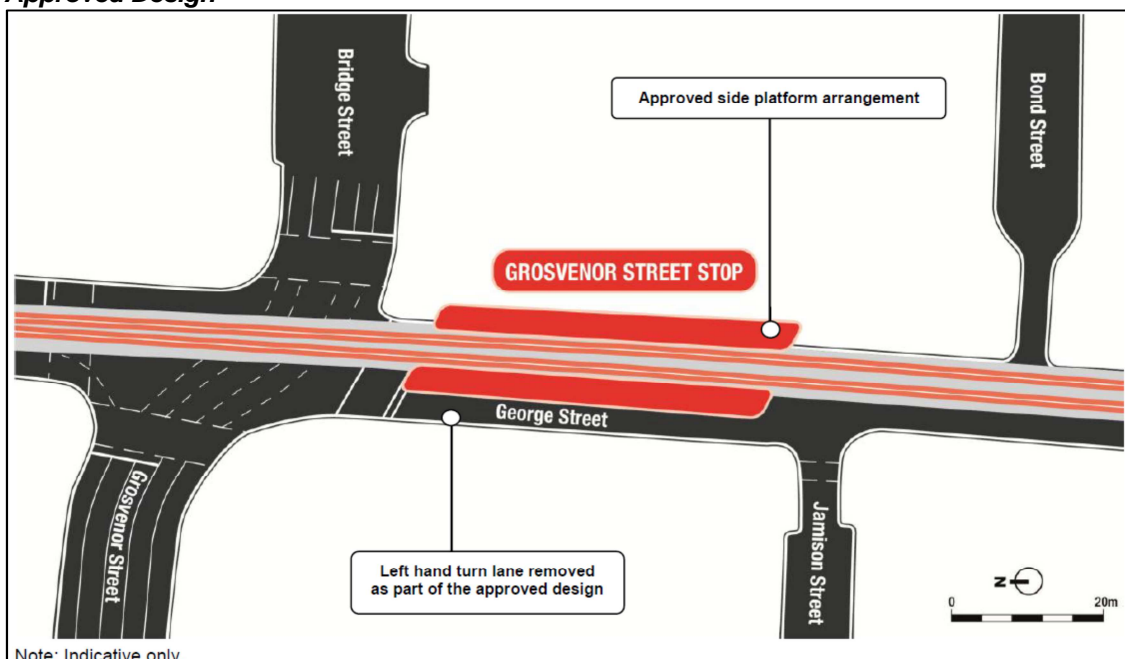
Despite the above assessment, it is considered that the maximum height of 10.5 metres above the existing ground level for all buildings and structures within the facility be maintained with the exception of the sand silo where it can be demonstrated, to the satisfaction of the Secretary, that the sand silo cannot be redesigned to meet that restriction. An amendment to this effect is recommended. It is important to note that the Department has only permitted the height of the sand silo to be increased (where it can meet the modified requirements of the condition) and not all structures so as to limit the visual impact of the facility and maintain the existing requirements of the approved project.

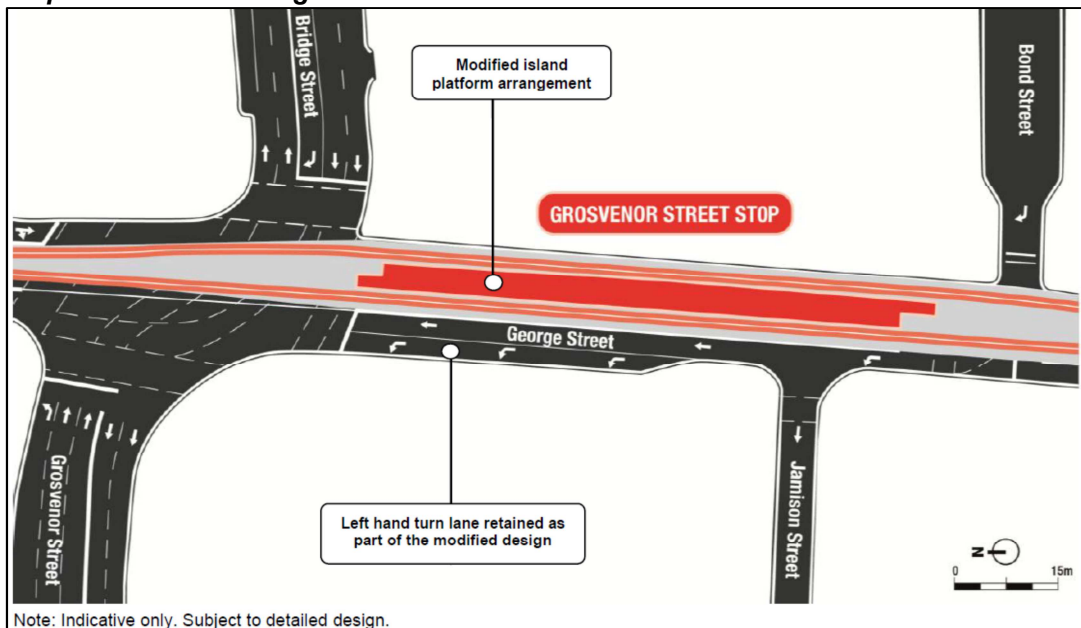
5.9 Grosvenor Street stop

Issue

The approved Grosvenor Street stop comprised two, partially split side platforms. The western side platform provided a traffic-facing platform adjacent to a single northbound traffic lane along George Street. The modification seeks to change the design from two side platforms to an offset island platform. The modified design would allow for the retention of the dedicated left turn lane from George Street to Grosvenor Street in addition to a northbound traffic lane, as shown in **Figure 8**.

Approved Design



Proposed Modified Design**Figure 8: Proposed modification to the Grosvenor Street stop**

Source: Figures 3.2 and 3.3 of TfNSW's Modification Report, December 2014

Department's Consideration

The Department agrees that construction impacts of the modified proposal compared to the approved project are likely to be negligible and that a more compact light rail corridor could be achieved.

The Department concurs that the revised platform configuration would improve the traffic lane alignment through the Jamison Street intersection. Notwithstanding, there is an existing left turn lane from George Street northbound into Grosvenor Street westbound which was removed as part of the approved project. The Department is not satisfied of the need to reinstate this movement as demand information has not been provided. City of Sydney Council considers the reinstatement of the left turn lane unnecessary and has expressed a desire to retain the existing platform configuration.

Anecdotal evidence suggests that the left turn movement to Grosvenor Street is currently under-utilised in the morning peak. It is not clear if demand is greater in the afternoon peak, however modelling undertaken for the Environmental Impact Statement for the approved project stated that the level of service through this intersection would be improved with the project. This provided the basis for reconfiguring the intersection. The Department is not aware of any other changes, either to the project or other developments that would necessitate a change to the approved project.

The objectives of the project and the City Centre Access Strategy include increasing the use of sustainable transport and improving public amenity in the CBD. These objectives can be achieved by the project with the reduction in traffic through the George Street corridor. It is accepted that traffic on George Street will significantly reduce from the current situation once the project is operational with only a single northbound lane being provided between Hunter Street and Bridge Street. The pedestrian zone commences south of Hunter Street and therefore only traffic from Margaret or Bond Streets is likely to access this intersection as traffic from Hunter Street will be required to use Margaret Street. This is consistent with the issue raised by City of Sydney in its submission.

TfNSW provided further justification for the reinstatement of the left turn lane stating that further intersection modelling suggests that when a vehicle turning left is delayed, this could

block northbound traffic from moving through the intersection. This situation could occur when pedestrians take longer than the allocated crossing phase. Whilst the Department accepts that this may eventuate in a small number of cases, the low use of the movement and the significant geometry of the intersection suggests that sufficient space is available for a left turning vehicle to clear the intersection, even if delayed by pedestrians, to enable northbound traffic to proceed. The Department is of the opinion that the information available at this time is not sufficient to demonstrate that reinstatement of the lane is required with or without an increase in the public domain.

Subsequently, the Department recommends a condition that prohibits the removal of the left turn lane from George Street into Grosvenor Street unless it can be demonstrated to the satisfaction of the Secretary that either demand for that movement requires a separate lane or that the left turn movement impedes northbound traffic due to intersection geometry.

City of Sydney requested that the side platforms be retained as they provide a number of benefits over the proposed island platform including:

- good accessibility to the east platform as access is directly from the footpath;
- access to the west platform only needs to cross traffic rather than both traffic and light rail;
- the corridor could be centralised to remove the pinch point at Bond Street; and
- the western pavement could be widened as well as small sections of the east pavement at each end of the stop.

In response, TfNSW noted that there are efficiencies in the adoption of an island platform and that light rail vehicle speeds through this section will be low. This, in conjunction with the pedestrian crossings at each end of the platform should ensure that patrons can access the stop safely.

TfNSW has stated that widening the western pavement was not included as part of the approved project. It is noted that this advice is not consistent with **Figure 8** showing the approved project above. Further, the Department understands that the Development Agreement between TfNSW and the City of Sydney includes clauses relating to pavement widths and notes that both condition B27 (Stop Access and Design) and B51 (Urban Design and Landscape Plan) require that matters relating to safe access and amenity be addressed. Notwithstanding, pending the outcomes of the further modelling of the George Street/Grosvenor Street left turn lane, this may not be possible.

Resolution of the Bond Street pinch point is included as part of the proposed modification, however this is on the basis that the island platform provides additional roadspace. The Department considers that the issues raised by council regarding the island stop can be addressed by existing conditions of approval as stated above.

5.10 Revised location of substations

Issue

The approved project provided for the construction of an underground Surry Hills substation in the new Wimbo Park, in addition to an above ground High Street substation located within the Royal Randwick Racecourse to the north of the intersection of High Street and Anzac Parade. As a result of design refinements, the Surry Hills substation is now proposed to be relocated underground and incorporated within the western portal of the Moore Park tunnel, with access provided by doors from within the entrance to the tunnel. The location of the approved substation and proposed new location are shown in **Figure 9**.

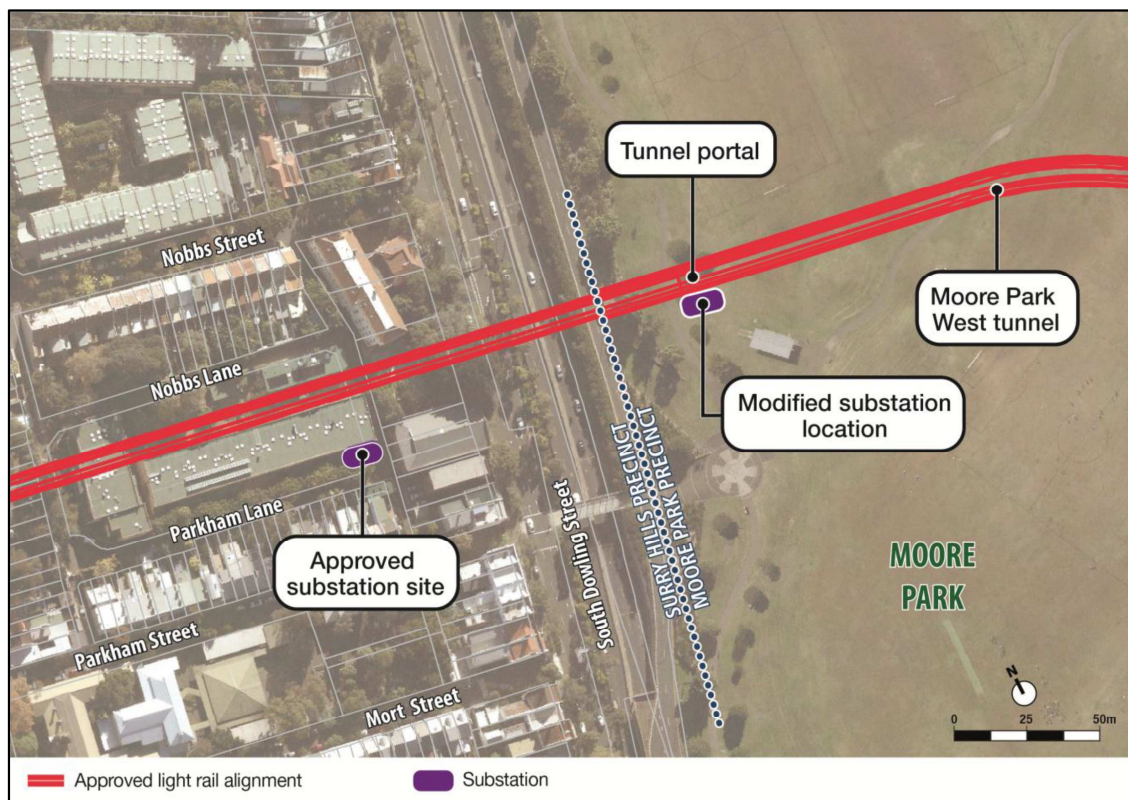


Figure 9: Location of approved substation and proposed modified location of Surry Hills substation

Source: Figure 3.28 of TfNSW's Modification Report, December 2014.

In addition, TfNSW proposes to remove the High Street substation as part of the construction and operation of the project, as it is no longer required to provide a power supply for the operation of the light rail network.

Department's Consideration

The Department considers that the relocation of the Surry Hills substation and removal of the High Street substation comprises a minor impact to the approved project. It is noted that the revised location of the Surry Hills substation would provide no further operational visual and landscape impacts or result in the loss of any additional trees. The Department also considers that the removal of the High Street substation would eliminate any visual impacts resulting from the approved project as originally proposed.

The Department also notes that the relocation of the Surry Hills substation would result in the elimination of substation construction noise impacts for residents surrounding the new Wimbo Park. Construction noise impacts to Moore Park West would be minimised, as the substation would be constructed as part of the overall construction of the Moore Park tunnel. The Department acknowledges that the modified location of the Surry Hills substation would cause negligible or no further impacts to the built heritage, Aboriginal heritage or historical archaeology of Surry Hills or Moore Park West.

The submission received from the Centennial Park and Moore Park Trust noted a request that the substation be placed entirely underground with access and ventilation being provided from within the tunnel portal, so as to not be visible from the park. In response to this, the Department recommends modifying condition B39 to require that access to the substation be provided from within the Moore Park Tunnel portal, and that ventilation facilities be integrated with those of the tunnel itself. This would result in no additional visual and amenity impacts on Moore Park West. The Department is satisfied that the relocation of the

Surry Hills substation and the removal of the High Street substation would result in similar or improved noise and visual outcomes, and therefore recommends that it be modified.

5.11 Adjustment to Project Boundary

The Department notes that extensions sought to the project boundary are required for road tie-in works and possibly some utility relocation. The Department is satisfied that this request is appropriate.

5.12 Additional Consultation

The City of Sydney raised the issue of increased consultation and recommends closer collaboration with TfNSW regarding the design and implementation of the project in addition to its representation through the Reference Groups. The Department agrees that the conditions of the project approval provide for consultation with councils and the Centennial Park and Moore Park Trust only through the four Reference Groups.

Given the significance of the project and that one representative to address all likely issues through the Reference Groups may not be sufficient, the Department recommends that the approval be modified such that each Council (City of Sydney, Randwick and Leichhardt) and the Centennial Park and Moore Park Trust is consulted in addition to the Reference Groups, as applicable to the component of the project, to ensure that all issues can be appropriately raised and resolved. The Department does not consider that this will result in an additional burden on TfNSW or its contractor or unreasonably increase the time required to complete consultation about specific aspects of the project.

6. CONCLUSION AND RECOMMENDATIONS

The proposed modifications to the approved CBD and South East Light Rail project have been made in response to further design investigations subsequent to project approval to a project which has been identified as a city shaper through numerous government policies and strategies, including the *NSW Long Term Transport Master Plan*, *Sydney's Light Rail Future* and the *City Centre Access Strategy*.

Several discrete elements of the project have been further refined, including the location, design and viability of stop locations, improved operation and future-proofing the system from the time of opening. The benefits to the community of these as a suite of modifications include greater capacity for each service and of the system overall, improved running times, traffic management, accessibility and visual amenity.

While there will be additional impacts of these changes when compared with the approved project, the Department is satisfied that most of these can be managed with revised and additional mitigation. It is considered that components of two proposed modifications: the impacts of flooding as a result of raising the Alison Road flood levee; and reinstatement of the left turn lane from George Street to Grosvenor Street, require further resolution before the Department could support these. Conditions have been included or amended requiring that further analysis to demonstrate their need and justification be provided to the Secretary before approval to proceed will be considered.

The Department considers that the residual impacts of other modifications can be managed with existing, amended or new conditions of approval, management and mitigation measures. The proposed changes would comply with the objects of the *Environmental Planning and Assessment Act 1979* and the principles of Ecologically Sustainable Development.

Endorsed by


Karen Jones 17.2.15
Director
Infrastructure Projects


Marcus Ray
Deputy Secretary
Planning Services 17/02/2015

APPENDIX A MODIFICATION REQUEST

See the Department's website at

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6853

APPENDIX B SUBMISSIONS

See the Department's website at

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6853

APPENDIX C RESPONSE TO SUBMISSIONS

See the Department's website at

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6853

APPENDIX D RECOMMENDED MODIFYING INSTRUMENT
