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28 January 2014

Mr James Hammill
Lend Lease
30 The Bond,
30 Hickson Road,
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NSW 2000

Our Ref: 140128PDASSDA4

Darling Harbour Live – The Haymarket Stage 2 Stage Significant Development Applications (SSDA 4) – Hyder Consulting response to City of Sydney recommendations, Transport for NSW letter and the Department of Planning and Infrastructure comments.

Dear James,

Hyder Consulting has reviewed the comments, recommendations and key issues provided by:-

- The City of Sydney Council (CoS) in its submission to NSW Department of Planning and Infrastructure "SICEEP Southern Precinct, "The Haymarket", SSD 6010, SSD 6011 & SSD 6013, Mixed use development and student accommodation, dated 5 August 2013.
- Transport for NSW (TfNSW) in the letter to Department of Planning and Infrastructure "Three State Significant Development Applications for the Sydney International Convention, Exhibition and Entertainment Precinct (SICEEP) - 'The Haymarket'" reference CD13/11589.
- The Department of Planning and Infrastructure via their submission titled "State Significant Development Application for the Sydney International Convention, Exhibition Entertainment Precinct (SICEEP), The Haymarket North West Plot (NW Plot) – SSD 6013 dated 25 Nov 2013.

Through the preparation of the initial Stage 1 DA concept proposal (SSDA2) and the subsequent submission of the Stage 2 DAs (SSDA3, 4 & 5) for the Darling Harbour Live project, Hyder has considered many of the issues raised by the stakeholders including City of Sydney, Sydney Water, Transport for NSW and Department of Planning and Infrastructure in their responses to the Stage 1 application and the Stage 2 DAs to ensure robust and considered applications. A schedule of the relevant issues raised by City of Sydney, Transport for NSW and the Department of Planning and Infrastructure follows with clarification and/or responses provided.

We trust that these responses adequately address the issues that have been raised. Should there be any further questions please do not hesitate to contact Michael Kurtz.

Yours sincerely

Michael Kurtz

02 8907 9065

City of Sydney Council Issue	Hyder Response
Recommendation 32: Bicycle parking should be provided at a rate consistent with the City of Sydney DCP 2012. This equates to 167 bicycle parking spaces for employees and 63 for customers/visitors to the site.	SSDA4 currently has allowed for the following regarding bicycle parking to meet an overall Green Star rating for the office component of 5 Stars: • 97 spaces provided in bike store; and • 32 visitor spaces provided adjacent to entry plaza. In addition to the above, as part of the Response to Submissions, Lend Lease will provide an additional 49 bicycle parking spaces within SSDA4, increasing the total number of spaces in the bike store to 146 spaces. Furthermore, a total of 160 lockers and 16 (8 female and 8 male) showers plus 1 accessible shower will be provided within the change room amenities. The above provisions meet an overall Green Star rating for the office component of 5 Stars. The above provisions are in compliance with the Planning Guidelines for Walking and Cycling. and meet the prescribed bike parking rates stipulated as follows: • 3-5% of Staff – for staff use • 5-10% of Staff – for customer/visitor use Based on a GFA of approximately 23,000 sqm and a corresponding employee density of 1095 employees, the above provision exceeds the upper limit of 15% noted above for the bike parking rates. Refer also to the supplementary Architectural design report prepared by Lend Lease Design.
Recommendation 33: Review the connections between the bicycle parking and end trip facilities to make it easier for cyclists to access. Consider relocating the end trip facilities to the ground floor as part of the changes which will result from the increase to the bicycle parking area.	Architectural design changes to the building have located the bicycle parking and end of trip facilities on level P1 of the carpark. Access is provided via stairs with bicycle wheel ramps from the northern face of the building (similar to that proposed for the Barangaroo development) as well as internal access to the carpark, lifts and stairs.
Recommendation 34: The detailed design of the “Access Road” is to be in accordance with the City’s Sydney Streets Technical Specification and Austroads standards.	The access road is part of the PPP Core Facilities works and therefore is the subject of a separate DA. Hyder’s designs consider the relevant authority, guidelines, codes and standards. The access road is designed to satisfy a combination of standards including RMS, Austroads and City of Sydney. The detailed design process will occur within the controls of the relevant standards

Transport for NSW Issue	Hyder Response
Car Park Design The applicant must ensure that the car park entries/exits are designed in such a manner as to ensure that the future queuing areas and capacity requirements comply with Appendix D of AS 2890.1-2004	All designs will be prepared in accordance with reference to relevant authority guidelines, codes, standards, specifications and manuals.
The layout of the proposed car parking areas associated with the subject development (including, driveways, grades, turn paths, sight distance requirements, aisle widths, aisle lengths, and parking bay dimensions) should be in accordance with AS2890.1 - 2004 and AS2890.2 - 2002 for heavy vehicles where applicable	All designs will be prepared in accordance with reference to relevant authority guidelines, codes, standards, specifications and manuals.
Pedestrian and Cyclist Connections Information of the proposed pedestrian connections to the surrounding area including west to ultimo and east to the CBD have not been provided. Pedestrian routes have been shown on a broad level, but details on these routes specific to the development are needed to ensure they are appropriate. High quality and direct connections are required to assist in achieving the proposal's objective in encouraging active transport and reducing private vehicle dependency. Connections to public transport nodes including future light rail on George Street and associated way finding also require consideration	The design layout for the Southern Precinct of Darling Harbour Live provides new east-west and north-south pedestrian linkages to connect with the existing pedestrian pathways to the Sydney CBD to the east and Ultimo to the west. (Refer to Figure 2). These linkages provide enhanced access to George St for improved access to bus services, rail stations and to the future light rail. Refer also to the Public Domain Report submitted with the development application and as updated in this response to submissions.
The future cycle network shown for SSDA 2 (the Haymarket precinct (concept) has been superseded and the proposed cycle connections should be based on the current regional bike route map. The proposed cycle connections should be reviewed to ensure consistency	The proposed cycle connections have been reviewed and are consistent with the current regional bike route plan and broadly align with the City Centre Access Strategy of Dec 2013. The enhanced north south connections along Darling Drive and via a through route along the Boulevard, improves connectivity in the precinct as do the east-west cycle routes aligning with the western regional route via Liverpool Street.
Sustainable transport measures Details on end of trip facilities such as showers and changing rooms are required to assist in encouraging active transport is required	End of trip facilities are provided within the North West Plot. Separate Male/Female Showers, Lockers and change rooms are provided on carpark level 1
Ensure that there is at grade pedestrian and cycle access which follows the desire line from central station, along Quay Street and then through the SICEEP site to Darling Harbour	At grade pedestrian and cyclist access from central station via Quay Street is provided via existing pedestrian crossings (signalised and informal) along this route as well as the shared zone that is Hay street at the interface of Quay Street and the Southern Precinct. The proposed Boulevard through the Southern Precinct will provide continuous pedestrian and cycle access to Darling Harbour.

Transport for NSW Issue	Hyder Response
Construction traffic management plan An individual traffic management plan (TMP) shall be prepared for each construction site in consultation with RMS, TMC, Council and other agencies, prior to the commencement of substantial demolition/construction on each site. The TMPs would be forwarded to RMS/TMC for review and approval. Where council is the roads authority approval of the TMP shall be sought from council, in consultation with the RMS/TMC. All TMPs shall be certified by the contractor's traffic manager and subject to road safety audits by the contractor. Details for what the TMPs must include are provided within annexure a.	Noted - Individual traffic management plans will be prepared for each construction site during detail design
Conditions of approval during DAs Comments and recommended conditions of approval for the DAs remain as per our comments on the concept proposal. In particular, TfNSW requests that: The proponent prepares an urban design and stop access plan for the light rail stops, to be developed in consultation with TfNSW and approved by TfNSW and others prior to works commencing.	There are no light rail stops within the Southern Precinct site boundary.
The proponent engages in on-going consultation with TfNSW throughout the detailed design and construction of the project and that relevant designs and management plans be submitted to TfNSW for approval prior to works commencing	The proponent has advised that they agree with this proposal. Regular consultation with Transport for NSW has occurred to date and is on-going. Design and construction approval will be through the relevant authorities.
Utility adjustments The proponent shall be responsible for all public utility adjustment/relocation works necessitated by the development and as required by the various public utility authorities and/or their agents	Noted.
Cost of works and signage All works/regulatory signage associated with the proposed development are to be at no cost to TfNSW/RMS	Noted.

Transport for NSW Issue	Hyder Response
Protection of RailCorp's land. Easements or infrastructure Prior to the issuing of a construction certificate or the commencement of works (whichever occurs first) the proponent shall liaise with RailCorp to ascertain its requirements in relation to the protection of RailCorp's land, easements or infrastructure. The proponent is to submit to RailCorp all relevant documentation as requested by RailCorp and obtain RailCorp's written endorsement prior to the issuing of the construction certificate or commencement of works, as the case may be.	Noted.
Road safety The proponent must satisfactorily address issues highlighted within the "Darling Drive, Hay Street to Harbourside roundabout, Darling Harbour - preliminary design road safety audit" which forms part of the SSD 5752 submission that directly affects SSDA4.	Hyder has provided the designer's response to the Preliminary Road Safety Audit issued on the 19 June 2013. The designer's response identifies those items which need to be developed during detailed design. Refer to Appendix A for Hyders design response to the Road Safety Audit.

Transport for NSW Issue	Hyder Response
Parking • It is understood that the Sydney Entertainment Centre (SEC) will remain in operation until December 2015. With the demolition of the SEC car park, the car parking requirements associated with the SEC will need to be serviced by other public car parking facilities / stations in the locality. Therefore, prior to the issue of a construction certificate, the proponent is to submit an event car parking management strategy to TfNSW / RMS and council for approval (for this time period up until the closure of the SEC). This management strategy should consider the following key aspects: - How patrons attending SEC functions will be appropriately informed of the most suitable alternative public car parking locations. - The possible potential to install temporary signage visible to drivers along Pier Street and Darling Drive informing them of nearby suitable alternative public car parking locations. • To minimise the potential for vehicles accessing the site to cause localised traffic queuing along the surrounding roads and to ensure that the public parking area is managed effectively, the applicant is required to install the following, prior to the issue of any occupation certificate for the site: - External signage which advises the number of car spaces available, which is visible to drivers along Pier Street, Darling Drive and the theatre access road. - Install a dynamic parking assist system which includes parking bay sensors indicating whether a space is available or occupied. • The proposal contains no specific provision for car share spaces within allocated parking that would assist in achieving the proposal's objective in reducing private vehicle dependency. • Justification of the level of motorcycle parking is required on top of the normal car parking provided. • Consideration should be given to the dual use of the proposed 50 spaces allocated for the commercial / office parking for public parking after 6pm on weekdays and all day on weekends	Section 10 of the transport and traffic impact assessments prepared to support the SSDA4 submission addresses the “construction traffic impact and management”. Particular reference is made to the SSDA5 report which includes details of the staged demolition of Sydney Entertainment Centre and Sydney Entertainment Centre Carpark. We note that the car parking needs of the SEC may be serviced by the public carparking facilities beneath Darling Walk and other public car parking stations within the vicinity of the development. Further detailed assessment will be undertaken during detailed design and will include appropriate temporary signage to inform patrons of alternate parking areas. The configuration of the proposed carpark and measures to minimise the potential for disruption caused by queuing has been considered so as to effectively manage the public carpark. It is noted that entry to the public carpark will be via the loop road from the Pier Street/Darling Drive roundabout. The modelling undertaken to date does not show any significant queuing that will impact on the Pier Street/Darling Drive roundabout. The loop road will accommodate the vehicles entering the public carpark. Proposed measures to manage access to the public carpark may include dynamic signage both internal and external to the building along with static directional signage on external routes leading to the carpark. Types of internal dynamic signage and parking assist systems will be explored with the carpark operator and external signage may utilise existing RMS static and dynamic signage if acceptable to the RMS. A car share space is provided on level 4a of the proposed carpark. The public carpark (400 spaces) in the NW plot provides an additional 75 motorcycle parking spaces distributed across five levels of parking. The City of Sydney DCP 2012 stipulates 1 motorcycle parking space for every 50 spaces. The proposal is compliant with DCP 2012. There are four accessible parking bays proposed on each level (16 total) located at the lift lobbies. The proposed 50 spaces reserved for the commercial / office parking is intended to be allocated to tenants as part of their lease agreement. Consideration has been given to the dual use of these spaces however it has been determined that these spaces will remain dedicated to tenant use only as is typical under commercial leases.

Transport for NSW Issue	Hyder Response
Sustainable transport measures Justification of the level of bicycle parking is required to ensure it will adequately meet the needs of the future employees and visitors	The following provisions have been proposed for SSDA4: - 97 spaces provided in bike store; and - 32 visitor spaces provided adjacent to entry plaza. In addition to the above, as part of the Response to Submissions, Lend Lease will provide an additional 49 bicycle parking spaces within SDDA4, increasing the total number of spaces in the bike store to 146 spaces. Furthermore, a total of 160 lockers and 16 (8 female and 8 male) showers plus 1 accessible shower will be provided within the change room amenities. The above provisions meet an overall Green Star rating for the office component of 5 Stars. The above provisions are in compliance with the Planning Guidelines for Walking and Cycling. and meet the prescribed bike parking rates stipulated as follows: • 3-5% of Staff – for staff use • 5-10% of Staff – for customer/visitor use Based on a GFA of approximately 23,000 sqm and a corresponding employee density of 1095 employees, the above provision exceeds the upper limit of 15% noted above for the bike parking rates.

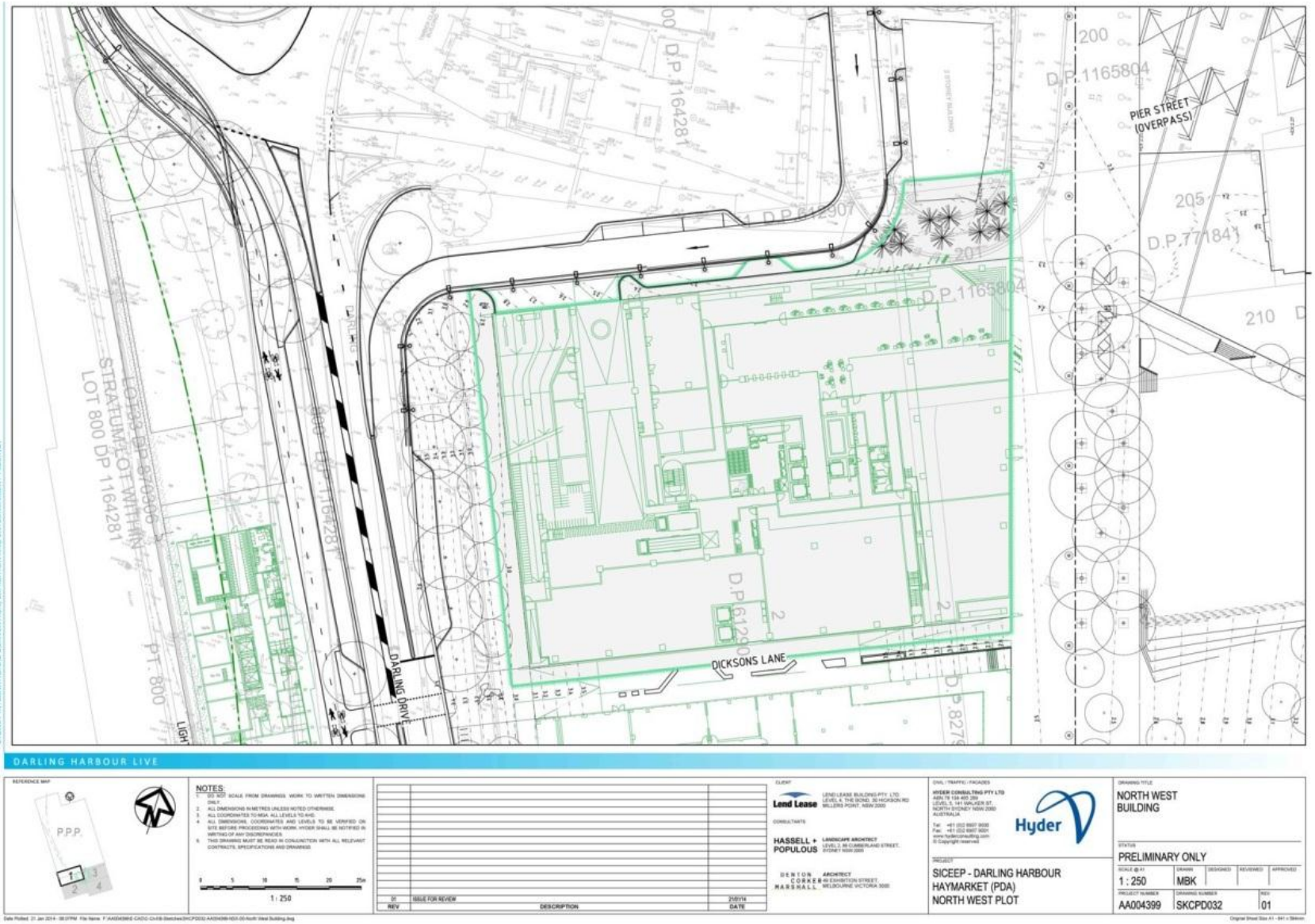
Department of Planning and Infrastructure	Hyder Response
Traffic and Transportation 2. Having regard to traffic safety, further details of the proposed billboard are required including: a) photomontage from a driver's perspective; b) further justification for a changeable as opposed to static message billboard; and c) consideration of impact/conflicts with existing RMS variable signage.	c) Hyder has assessed the location and placement of the proposed billboard in the context of the RMS technical directions TDT 2002/11b and TDT 2005/02bi. We have also reviewed North West Plot wall advertisement - SSDA 4 Impact study advertisement prepared by Aspect Studios and conclude from this that the placement of the billboard will have a low or negligible impact on vehicle operations on the adjacent roads. It is not anticipated to impede sight lines or distract motorists. The billboard will display still images that will change approximately every hour. The level of illumination of the LED screen will comply with external wall advertisement requirements. The existing RMS variable signage is anticipated to remain prominent within the line of sight of the driver. We also note that there are two existing billboards affixed to the existing entertainment centre carpark which will be removed as part of the building works and replaced with this proposed billboard. The proposed billboard will have less of a visual impact than the two existing wall advertisements. In this context Hyder supports the proposed location, scale and placement of the billboard

Department of Planning and Infrastructure	Hyder Response
3. The proposed cycle routes should be reviewed for consistency with the current regional bike route network	The proposed cycle route is broadly consistent with the proposed City Centre Strategic Cycleway Network and provides linkages to the regional bike route network.
4. Consideration should be given to meeting the City of Sydney's bicycle parking rates (DCP 2012).	Refer to response provided on 'Sustainable transport measures' above. Bike parking has been increased from 97 spaces provided in the bike store to a total of 146 bikes within the building and 32 visitor spaces within the public realm. We also confirm that additional male and female showers within the change room amenities have been provided.
5. Consideration should be given to improving the access between the bicycle storage area and end of trip facilities, which are currently located on separate floors.	Architectural design changes to the building have located the bicycle parking and end of trip facilities on level P1 of the carpark. Access is provided via stairs with bicycle wheel ramps from the northern face of the building (similar to that proposed for the Barangaroo development) as well as internal access to the carpark, lifts and stairs
6. Consideration should be given to providing car-sharing space(s).	A car share space is provided on level 4a of the proposed carpark.
7. Justification is required for the level of motorcycle parking provision.	75 motorcycle parking spaces are proposed to be distributed across five levels of parking which exceeds the City of Sydney DCP 2012 requirement of 1 motorcycle parking space for every 50 spaces. These spaces utilise areas where a standard parking space cannot be located and building structure is not required, not possible or not desirable.

Development Consent for SSDA2 – Conditions of Consent	Hyder Response
Construction B32 Future Development Applications shall analyse and address the impacts of construction and include: a) Construction Transport Management Plan, addressing traffic and transport impacts during construction; b) Cumulative Construction Impact Assessment (i.e. arising from concurrent construction activity); c) Noise and Vibration Impact Assessments, addressing noise and vibration impacts during construction; d) Community Consultation and Engagement Plans, addressing complaints during construction; e) Construction Waste Management Plan, addressing waste during construction; f) Air Quality Management Plan, addressing air quality during construction; g) Water Quality Impact Assessments and an Erosion and Sediment Control Plan (including water discharge considerations) in accordance with 'Managing urban stormwater, soils and construction (Landcom 2005)'; and h) Acid Sulphate Soil Assessment and Management Plan.	Subsections a) & b): Section 10 of the SSDA3, 4 and 5 Transport and Traffic impact assessments considers construction traffic impact and management which allows for cumulative construction traffic for the whole SICEEP development. Further traffic assessment will be undertaken during detailed design to respond to design development and construction staging across the whole SICEEP development. Subsection c) Refer to SSDA4 Noise and Vibration Assessment - Part B Subsection d) Refer to SSDA4 Stakeholder and Community Engagement Addendum Subsection e) Refer to Waste Management Plan, Appendix B to the SSDA4 Construction Management Plan Building Subsection f) Refer to SSDA4 Construction Management Plan Building – Part 5 Subsection g) Refer to Stormwater & Sediment Control Plan, Appendix D to the SSDA4 Construction Management Plan Building Subsection h) Refer SSDA4 Remediation Action Plan
B33 Future Development Applications shall include detailed investigations and assessment of the impact on utilities.	Non-destructive utilities investigations in the form of authority drawings and survey have been undertaken to progress the design to this stage. Additional investigations in the form of lifting service manholes / covers, site investigations and potholing are being carried out to more accurately locate services to better inform the design of the proposed development and any service adjustments required.

FIGURE

SKCPD032



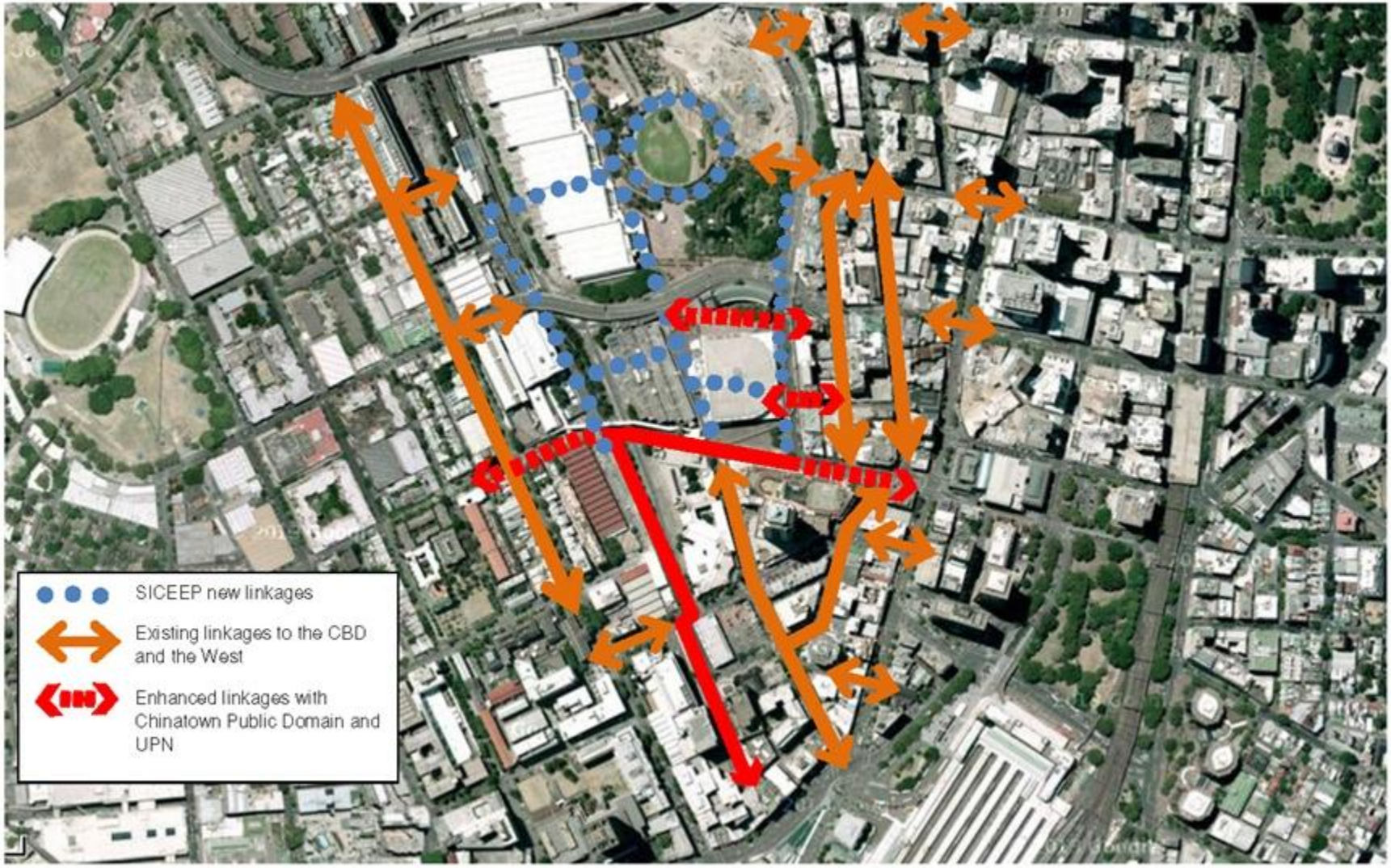

SICEEP new linkages
Existing linkages to the CBD and the West
Enhanced linkages with Chinatown Public Domain and UPN

FIGURE 2

APPENDIX A

DESIGNERS RESPONSE TO PRELIMINARY ROAD SAFETY AUDIT

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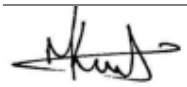
DARLING HARBOUR LIVE

SYDNEY INTERNATIONAL CONVENTION EXHIBITION & ENTERTAINMENT PRECINCT

DESIGNERS RESPONSE -

PRELIMINARY ROAD SAFETY AUDIT

Author	Joe Heydon	
Checker	Michael Kurtz	
Approver	Greg ives	

Report No

Date 24th June 2013

CONTENTS

1 INTRODUCTION

1.1 PROJECT AND AUDIT DETAILS

This Report forms a designer's response to the preliminary road safety audit undertaken on the 13th of June 2013, for the proposed upgrades to Darling Drive between Hay Street and Harbourside Roundabout, Darling Harbour. The road safety audit report document number is F0001-AA004399-11-02-03-AAR-02.

It is noted that there have been some design changes since this road safety audit was undertaken, around the access and egress movements to the proposed Theatre building. Additional comments are contained after the designer's response, provided by the road safety auditor on this design change.

2 DESIGNER'S RESPONSE

The designer's response to the road safety audit findings have been documented in Table 2.

2.1 CHECKLIST

The Road Safety Audit is undertaken by an independent assessor, not part of the design team. The Road Safety Auditor uses the checklist found in Append A of the audit report, as a prompt only to assist the road safety audit process, to demonstrate that consideration was given to each safety risk. We believe that the key safety risks are outlined in the Road Safety Audit.

The designer's response only addresses the safety risks identified within the Road Safety Audit, and not the checklist, as the safety audit has already considered the auditor's comments outlined in the checklist.

No	Location	Safety findings	Designer's response
1	Darling Drive/ Hay Street intersection.	At the southern entrance to the *Haymarket Precinct SW Plot*, the section of Hay Street leading to Darling Drive is very short, which could result in westbound traffic queuing back into the development. Additionally, eastbound (inbound) traffic may queue into the control area of the Darling Drive/ Hay Street intersection due to potential delays at gates in the driveway. This may lead to queued vehicles becoming trapped in the control area of the intersection	30m of vehicle queue containment has been provided between the control point and the property boundary, with a further 8m provided between the property boundaries to Hay Street. Should additional queue containment be required, this will be addressed during the detailed design stage, to ensure that queue containment is contained within the property boundary and access road.
2	Hay Street.	At the interface between Darling Drive and Hay Street, the eastbound departure lane in Hay Street is narrow. The swept path envelope of a right-turning vehicle from Darling Drive may encroach over the centreline of Hay Street and increase *head-on* crash risk. This is also an issue for the southbound left turn movement from Darling Drive	The width of the access road provided to the SW plot car park is 6.0m. If required, design changes to the road width will be made during the detailed design stage, and vehicle swept path analysis will be undertaken to confirm sufficient road width, to reduce risk of head-on crashes. Vehicle classification movements into the SW development are limited.

No	Location	Safety findings	Designer's response
3	Darling Drive/ Hay Street intersection.	The following observation was made regarding a current issue at the Darling Drive/ Hay Street intersection which would also affect safety of drivers egressing from the *Haymarket Precinct SW Plot*. Vehicles turning left from Hay Street to Darling Drive (Car A) would not see the red left turn arrow aspect (at B) due to a tram blocking their view. This driver would only see the full green aspect at the signals at C. As such, there is a potential tram-vehicle conflict as the left turning vehicle may believe they have right-of-way.	This intersection currently operates in this fashion with the exit from the existing car park. There is effectively no change proposed for this intersection from what currently operates. Changes will be required to the existing signals on the junction of Darling Drive and Hay Street, to accommodate the Haymarket development. Visibility to traffic signals for traffic egressing from Hay Street will be considered during the design of the traffic signals for this junction.
4	New signalised midblock crossing on Darling Drive between Hay Street and Pier Street.	The existing midblock between the Pier Street roundabout and the Hay Street signals is approximately 140m long. The proposed signalised midblock crossing will create four short midblocks including (i) northbound carriageway between Pier Street and the crossing, (ii) northbound carriageway between the crossing and Hay Street, (iii) southbound carriageway between Hay Street and the crossing, and (iv) southbound carriageway between the crossing and Pier Street. There is a risk of queues from either of these three control points (i.e. Pier Street roundabout, midblock signalised crossing, and Hay Street intersection) spilling back and straddling the upstream facility. In the case of upstream intersections, queued vehicles may become stranded in the control area of the intersection. Alternatively, the departure speeds may be significantly reduced such that a rear-end conflict arises between a vehicle departing an intersection (and hence accelerating) and a slowed or stationary vehicle on the departure side of the intersection. In the northbound direction, if queues spill back across the tram line, this could result in a potentially catastrophic crash between a tram and a queued vehicle. The added problem is that as a non-signalised facility, the Pier Street roundabout cannot be coordinated with the signalised midblock crossing or Hay Street intersection which would be both signal controlled and presumably SCATS linked.	The proposed signalised pedestrian crossing will be assessed during the detailed design stage to ensure that the signal phasings do not disrupt the operation of adjacent intersections. NSW road rule "128 Entering blocked intersections", states that A driver must not enter an intersection if the driver cannot drive through the intersection because the intersection, or a road beyond the intersection, is blocked.

No	Location	Safety findings	Designer's response
5	Darling Drive between Hay Street and Pier Street.	Pedestrians waiting to cross Darling Drive from the western side of the proposed signalised midblock crossing between Hay Street and Pier Street may be vulnerable to impacts from cyclists on the shared path.	The crossing will be designed to ensure adequate sight lines are maintained for pedestrians, cyclists and motorists. Consideration will be given to the provision of adequate standing room for pedestrians waiting to cross the proposed signalized mid-block crossing, to protect them from impacts from cyclists, during the detailed design stage.
6	Loading Zone on the western side of Darling Drive – south of the Pier Street roundabout	The truck loading / refuse collection zone on the western side of Darling Drive also presents a bicycle-pedestrian crash conflict. People boarding/ alighting from vehicles in this zone will be at risk of impacts from cyclists on the shared path	This zone is intended for use by refuse vehicles collecting refuse from the student accommodation plot, seasonal loading/unloading into the student accommodation by students and taxi drop-off to this plot. It is not anticipated that a high turnover of vehicles movements will occur in this zone, on a daily basis. A 1.0m clearance zone has been provided between the face of kerb of the loading zone along Darling Drive, opposite the proposed student accommodation plot, and the edge of the proposed shared cycle way, in accordance with design guidelines to protect cyclists from the impact of vehicle door openings, and people alighting from vehicles.
7	Southbound carriageway of Darling Drive between Pier Street and Hay Street.	There is a possible weaving crash conflict in the midblock between Pier Street and Hay Street. Vehicles travelling in the southbound *through* lane of Darling Drive and intending to turn left into Hay Street will need to move from right to left. Vehicles egressing from the *Exhibition Place loop road* and intending to turn right into Ultimo Road would need to move from the left to the right. These weaving conflicts would occur over a 100-120m length of road (depending on the extent of queuing in the southbound approach to Hay Street). These crash conflicts are also likely to occur near the proposed signalised midblock pedestrian crossing, which creates additional risks of pedestrian-vehicle impacts.	The location of the crossing has been assessed for weaving and merging movements for through traffic on Darling Drive west of the crossing intending to turn left at Hay Street access lane. Vehicles exiting from Exhibition Place have approximately 335m to change lanes prior to the junction of Ultimo Road with Darling Drive. Only vehicles requiring access to the SW residential plot will require changing lanes to gain access to Hay Street, and there is approximately 88m of travel lane available to undertake this movement. Drivers making this movement will be predominately residents aware of this movement from continued use.

No	Location	Safety findings	Designer's response
8	Loading Zone on Darling Drive between Pier Street and Hay Street	To accommodate the loading zone, there is a kink in the alignment of the shared path. On the southbound approach, this kink closely follows a corner, which could lead to *loss-of-control* events for cyclists. Furthermore, southbound cyclists may have poor visibility to the loading zone due to the curvature of the road and possible retaining walls. This could increase the risks of bicycle-pedestrian impacts.	The kink in the shared cycle way alignment will addressed in the detailed design stage.
9	Exhibition Place loop road.	There is a potential vertical clearance risk along the proposed egress point from the *Exhibition Place loop road*. This is due to the westbound off-ramp from Pier Street.	Vertical clearance for vehicles anticipated to use the Exhibition Place loop road has been assessed, and can be accommodated. This area is currently used by semi-trailers to allow access to / from the entertainment centre.
10	Exhibition Place loop road – driveway from Haymarket Precinct NW Plot.	In the egress lane of the Exhibition Place loop road, there is a driveway from Haymarket Precinct NW Plot. Vehicles egressing from this driveway into Darling Drive may experience difficulties in negotiating the hairpin curve without hitting structures adjacent to the road.	Swept path movements of vehicles exiting the NW plot of the Haymarket development have been assessed and considered acceptable.
11	Exhibition Place loop road - driveway from Haymarket Precinct NW Plot.	There are two exit lanes proposed from the *Haymarket Precinct NW Plot* to the *Exhibition Place loop road*. Given that the loop road is a one-way (clockwise) road; both lanes will be required to turn left. This will present a *side-swipe* crash conflict if two vehicle from adjacent egress lanes attempt to enter the loop road at the same time. Generally, dual turn lanes are not acceptable when the turning movement is not controlled.	The exit movement from this car park will be controlled by boom gates and is not dissimilar to the exit from the existing car park. Consideration of only one egress lane from the NW plot car park will be considered during the detailed design or greater spacing of the egress lanes to reduce the risk of side swipe impacts.
12	Eastern portion of the Exhibition Place loop road.	There is poor *stopping sight distance* for traffic circulating along this loop road due to the Darling Harbour Operations Centre building. This is the case at both the approach and departure curves leading into this portion of the loop.	The Exhibition Place loop road is a one way access road. Consideration has been given to conflicts with pedestrians using the existing pedestrian ramp by relocated the bottom of the ramp away from the bend in the road, and by providing a pedestrian crossing. Sightlines and visibility will be considered further during the detailed design stage.

No	Location	Safety findings	Designer's response
13	Whole scheme	There are long lengths of single lane carriageways bounded by kerbs and medians. This may not provide sufficient passing clearance in the event of broken down vehicle. This could result in extensive queuing/ congestion and associated *rear-end* crashes.	Where possible, in the absence of dual lanes along Darling Drive, breakdown lanes and on-street parking such as taxi holding zones etc. have been provided to assist broken down vehicles. Mountable kerbs will be provided for the central median where this cannot be achieved.
14	Proposed zebra crossing at light rail station.	The proposed zebra crossing near the entrance to the light-rail station requires pedestrians to cross three lanes of Darling Drive in one stage, rather than in two separate stages which is currently provided (as shown in the photo below). The single stage crossing presents a more complicated crossing arrangement where pedestrians need to judge gaps in three lanes of traffic.	This pedestrian crossing is now proposed as a signalised crossing, following recent design changes to the Theatre.
15	New light rail access point. Ramp on the western side of the zebra crossing at Tumbalong Shared Zone.	Pedestrians emerging from the proposed new exit point for the light rail station may be hidden from the view of cyclists on the shared path, leading to possible bicycle-pedestrian collisions.	Adequate visibility to pedestrians emerging from the light rail stop will be provided to cyclists using the shared cycle way. There is a level difference which will improve visibility between cyclists and pedestrians at this junction.
16	Exhibition Centre loading dock exit.	There is a kink in the alignment of the southbound travel lane, immediately upstream of the added lane from the loading dock. Southbound drivers may misjudge the alignment and encroach into the loading dock exit lane. This could increase the risk of *side-swipe* crashes.	This will be addressed in the detailed stage e.g. a physical median may be extended from the loading dock ramp egress, along the delineation line to prevent vehicles from impact of side swipe. Trucks egressing at this location will generally be in off-peak hours.

No	Location	Safety findings	Designer's response
17	RL5.8m Exhibition Centre loading dock exit	The driver of a truck leaving the Exhibition Centre lower loading dock will need to look towards the north to judge gaps to enter Darling Drive. Whether the approaching vehicle is proceeding straight or turning left into Tumbalong Place makes little difference. The truck driver still needs to judge the approaching vehicle's speed and hence how much gap is available. The egressing truck would be commencing the turn from rest or a very low speed. By the time the driver has selected a gap, he/she is no longer looking north, but rather starts to look south to the road environment ahead. From this position he/she can see both sides of the pedestrian crossing and hence any pedestrians crossing at this location.	Swept path analysis of trucks leaving the lower Exhibition loading dock will be undertaken during the detailed design stage to ensure adequate protection to pedestrians in the vicinity of this loading dock egress location.
18	Exhibition Centre car park egress.	Drivers turning right from the car park would need to judge gaps in three lanes of traffic including the southbound through travel lane, the southbound loading dock exit lane, and the northbound lane. This is considered a complex entering movement and may lead to poor gap acceptance and associated crash risks with Darling Drive traffic. Furthermore, visibility to the loading dock exit lane may be restricted due to the curvature of that lane. Vehicles in the loading dock exit lane may block visibility to other southbound vehicles.	The proposed egress from the Exhibition Centre car park is similar to existing conditions, barring the loading dock movement. However, it not anticipated that movements from the car park and the loading dock will occur concurrently that often. Visibility and sightlines for traffic movements at this junction have been considered and will be considered further during the detailed stage.
19	Exhibition Centre car park egress.	There are two egress lanes marked. The northern lane is marked as a shared right-left turn lane. The provision of two adjacent lanes allowing left turns may result in *side-swipe* crashes. Generally, dual turn lanes are not acceptable when the turning movement is not controlled.	The exit movement from this car park will be controlled by boom gates and is not dissimilar to the exit from the existing car park. Consideration of only one egress lane from the Exhibition Centre car park will be considered during the detailed design, or greater spacing of the egress lanes, or provision of medians to reduce the risk of side swipe impacts.
20	South of the Harbourside roundabout.	The proposed on-street parking spaces on the western side of Darling Drive may result in the northbound lane becoming blocked when vehicles manoeuvre into and out of parking spaces. This may lead to queue spillback and associated *rear-end* crashes.	This area is proposed as a taxi holding area only, with taxis driving forward into a space and moving forward within the taxi holding zone, prior to egress.

No	Location	Safety findings	Designer's response
21	South of the Harbourside roundabout.	A southbound only cycle lane is provided adjacent to the southbound travel lane. However, this terminates at the zebra crossing outside the *Tumbalong Shared Zone*. Cyclists are required to cross the road and use the two-way cycleway from this point going southward. This has a number of safety and operational risks including: • Cyclists crossing at this point may impact pedestrians using the crossing. • Many cyclists would choose to continue southbound in the general travel lane. This could put them at risk of being impacted by other vehicles. It is also noted that this location also has a diverge to the Exhibition Centre loading dock and would cater for a high volume of heavy vehicles.	It is necessary to link cyclists on the southbound lane with the existing southbound cycle network. It is not possible to safely link them north of the Harbourside roundabout, due to the existing grade separated road configuration. It was therefore thought best to safely connect them at the proposed pedestrian crossing. Consideration will be taken during the detailed design stage for conflict with pedestrians and cyclists at this crossing.
22	Tumbalong Shared zone	The zebra crossing has driveways on either side of it leading into the Tumbalong Shared Zone. As an environment with a potentially high volume of pedestrians, this is not considered an appropriate arrangement. The vehicles turning into and out of the driveways would increase the likelihood of pedestrians being impacted. This is especially since in most cases the driver's attention would be focussed on other conflicting traffic streams. Pedestrians using the zebra crossing are led to an "island" between a number of driveways where they would be forced to walk on the roadway. This is also unconventional as a shared zone as it mixes the functions of off-road/ kerb-protected pedestrian space with those of a true shared zone where pedestrians can move freely in road-vehicular space. Right-turning egress movements from *Tumbalong Shared Zone* are permitted through the gap in the median. This will allow egressing vehicles to turn across the path of pedestrians using the crossing. Again, drivers would be focussing their attention on traffic from the north and south, rather than any pedestrians crossing at this location.	The arrangement of the Tumablong Place shared zone will be considered during the detailed design stage to consider pedestrian and vehicle movements. It is only anticipated that very low vehicle movements will occur on a daily basis in this area, and any high volumes during event mode will be addressed by event management and operational measurements e.g. stewards and traffic marshals. Shared zones are proving to improve pedestrian safety as drivers and pedestrians alike are more cautious.
23	Southbound bus stop on Darling Drive to the south of Harbourside roundabout.	Buses moving into and out of this bus stop would compromise the safety of cyclists in the southbound only cycleway. This is likely to increase the risk of bus-bicycle crashes.	Consideration will be given to cyclist movements during the detailed design stage, to reduce/avoid potential conflicts with bus movements.

3 POST AUDIT DESIGN CHANGES

3.1 THE THEATRE

Since the road safety audit was undertaken, there has been a design change in the vicinity of the proposed Theatre car park access and egress. Previously, access for vehicles entering and exiting the Theatre car park, was provided on Exhibition Place. There was a proposed taxi holing zone to the west of the Theatre building, linked to Darling Drive. The pedestrian crossing linking Tumbalong Place and the light rail stop was proposed as either a zebra crossing or a staggered crossing.

Following the change to the Theatre building, access and egress will now be provided to the Theatre car park from Darling Drive. The taxi holing area has been replaced by an indented bus stop and the proposed pedestrian crossing is now proposed as a signalised crossing. Please see Figure 1 below:

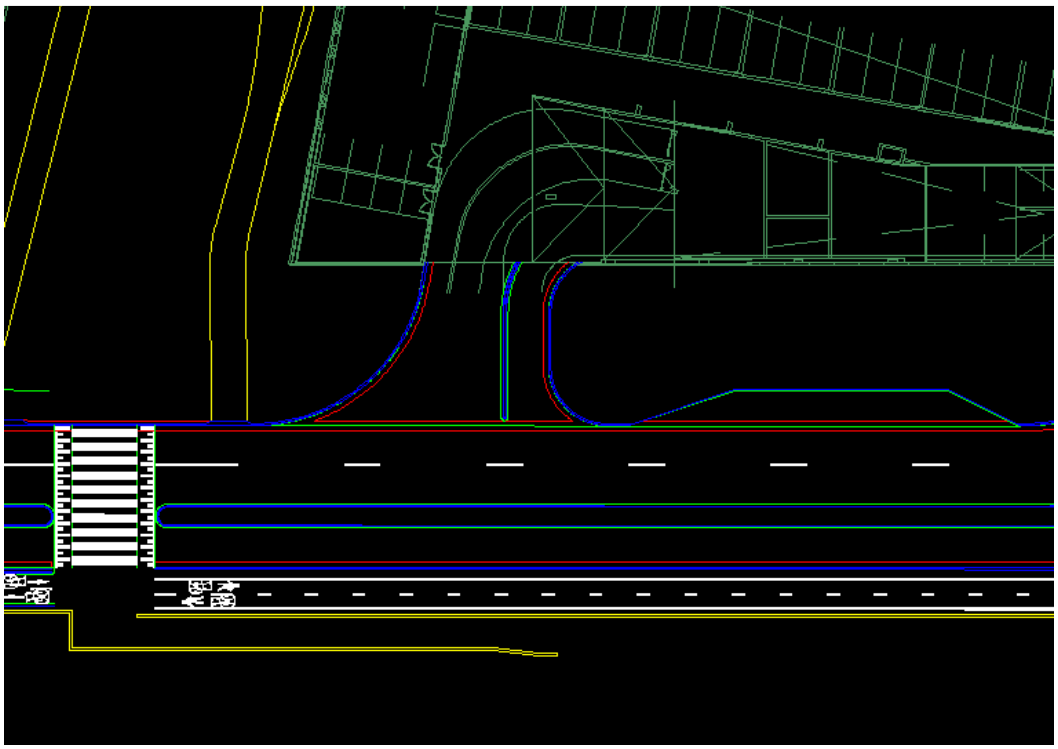


Figure1: Revised Theatre layout design

Road safety audit commentary on this revised access has been provided by the auditor and is found as Appendix A to this Report.

APPENDIX A

Joe Heydon

From: Damien Chee
Sent: 19 June 2013 7:54 PM
To: Greg Ives; Joe Heydon; Sally Manahan; AA004399
Subject: RE: Theatre car park entry/egress

Hi Greg

We have now reviewed the left-in-left-out access/egress associated with the Theatre car park. We regard this to be a similar set of circumstances as the previously proposed taxi rank as the taxi rank is essentially a left-in-left-out arrangement. As per the audit report we had no issue with the taxi rank. As such, we also have no issue with the current proposal to have a left-in-left-out arrangement for the Theatre car park.

Kind regards

Damien

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