MU GROUP
TRANSPORT AND INFRASTRUCTURE

MU GROUP CONSULTING PTY LTD

Road Safety Audit Report

Mixed-Use Development,
Hills Showground Station Precinct

Issue 2: June 2021

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DOCUMENT CONTROL

Revision History

Revision	Date	Prepared by	Reviewed by	Approval for issue by
1	13/05/2021	Damien Chee	Steven Ludenia	*Draft*
2	30/06/2021	Damien Chee	Steven Ludenia	Steven Ludenia
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1 Client Details

Table 1: Client Details

Client	Deicorp Projects Showground Pty Ltd
Client address	3 Mandala Parade, Castle Hill NSW 2154
Project Manager / Sponsor	Poonam Chauhan
Phone	(02) 8665 4100

2 Audit Statement

We, the undersigned, declare that we have reviewed the material and data listed in this report and identified the risks to road safety described in Section 5. The auditors listed are independent to the project.

Reasons are given to explain why an identified item is considered a risk to road safety including crash type. Design deficiencies that do not cause a safety problem are not listed. It should be noted that while every effort has been made to identify potential risks to road safety, no guarantee can be made that every problem or deficiency has been identified.

It is recommended that identified risks to road safety be investigated and corrective actions implemented by the Project Manager as deemed appropriate.

Table 2: Audit Team Members

Role	Name	Auditor Level	ID Number	Signature	Date
Lead Road Safety Auditor	Damien Chee	3	RSA-02-0094		30/6/2021
Road Safety Audit Team Member	Steven Ludenia	2	RSA-02-0803		30/6/2021

3 Audit Details

3.1 Description of Project

Deicorp Projects Showground Pty Ltd are delivering a mixed-use development on the parcel of land bounded by Doran Drive, De Clambe Drive, Andalusian Way and Mandala Parade, in the Showground Station Precinct (Castle Hill). This consists of the following:

- 431 apartment units comprised of 77 one-bedroom units, 311 two-bedroom units and 43 three-bedroom units.
- 10,935m^2 of retail/ commercial floor space including a supermarket.
- Approximately 790 basement car parking spaces compromised of one space per every apartment unit, and one space for every 30m^2 of retail/ commercial floor space. The car park will be accessed off De Clambe Drive.
- A loading dock and waste collection area off Andalusian Way.

A *detailed design* road safety audit was required to identify potential road safety risks associated with the proposed development.

3.2 Scope of Audit

A *detailed design* road safety audit was required of the proposed development to identify potential safety issues. These would be considered by the project team for close-out action, as appropriate, prior to the construction stage. As a design-based road safety audit, the design plans listed in Section 3.7 were issued to the audit team and were considered to be the scope of the audit.

Further to the above, the scope was limited to road safety issues in external and publicly accessible areas. This includes the four road frontages and any likely road vehicle, bicycle and pedestrian interactions with these, as well as the footpaths and pedestrian/ bicycle facilities surrounding the buildings and within the public domain (ie. not including internal pedestrian facilities or operation of the carpark and dock).

3.3 Considerations

As noted above, the audit was restricted to external road/ bicycle/ pedestrian facilities only. The audit was also solely focussed on the potential road safety impacts of the proposed development. It did not consider pre-existing road safety hazards that are likely to remain unchanged as a result of the proposed development.

3.4 Audit Process

This road safety audit was carried out generally in accordance with Transport for NSW 'Guidelines for Road Safety Audit Practices' in conjunction with the Austroads 'Guide to Road Safety Part 6: Managing Road Safety Audits', and 'Part 6A: Implementing Road Safety Audits'.

Road Safety Audits are aimed at proactively identifying road safety issues and are a fundamental component of the Safe System approach. The findings of this audit have been prepared in consideration of Safe System requirements, particularly in relation to vulnerable road users such as pedestrians.

3.5 Audit Program

Table 3: Audit Program

Activity	Date
Commencement meeting	27/4/2021
Supporting site inspection	4/5/2021
Draft report issued	13/5/2021
Completion meeting	2/6/2021
Final report issued	30/6/2021

3.6 Information Supplied

Table 4: Information Supplied

Documentation	Date	Document Title
Design drawings prepared by Turner Studio	1/4/2021	Drawings listed as follows: DA-110-003_ Basement 05 DA-110-004_ Basement 04 DA-110-005_ Basement 03 DA-110-006_ Basement 02 DA-110-007_ Basement 01 DA-110-008_ Ground Level DA-110-009_ Upper Level DA-110-010_ Level 01 DA-110-020_ Level 02 DA-110-030_ Level 03 DA-110-040_ Level 04 DA-110-050_ Level 05 DA-110-060_ Level 06 DA-110-070_ Level 07 DA-110-080_ Level 08 DA-110-090_ Level 09 DA-110-100_ Level 10 DA-110-110_ Level 11 DA-110-120_ Level 12 DA-110-130_ Level 13 DA-110-140_ Level 14 DA-110-150_ Level 15 DA-110-160_ Level 16 DA-110-170_ Level 17 DA-110-180_ Level 18 DA-110-190_ Level 19 DA-110-200_ Level 20 DA-110-210_ Level 21

Documentation	Date	Document Title
Swept Path Drawing prepared by Varga Traffic Planning	15/09/2020	- 12.5m HRV truck turning path entering De Clambe Drive - 17.2m semi-trailer turning path entering De Clambe Drive (see note) - 17.2m semi-trailer turning path existing loading dock area (see note) - B99 vehicle turning path – Basement 1, 2 and 3. **Note:** The design vehicle for the dock was reduced from the 17.2m semi-trailer to a 12.5m single unit truck in response to the safety audit finding Ref 4.
Design reports		Not issue and not required.
Previous road safety audit reports		Not issued.

3.7 Site Inspections

A supporting site inspection was conducted on 4/5/2021 between 1330-1430h. The weather was raining and overcast. Site photographs were taken as necessary. It should be noted that this site inspection was only for familiarisation purposes. Whilst the site in its existing state would be considered, the primary focus of the audit was the likely "final build" conditions once the development is fully completed, and respective land uses are at full occupancy.

3.8 Completion Meeting

A completion meeting was held on 2 June 2021. MU Group present the road safety audit report and findings and a discussion of potential mitigation measures was discussed. Refer to Appendix A.

4 Risk Assessment

Table 5: Risk Matrix

Severity **Probability**	**Minor or property damage** A person who suffers no injury or only requires minor first aid treatment.	**Moderate** A person who attends an emergency department on the same day or on the day after a crash but was not killed or subsequently admitted to hospital.	**Serious** A person who is admitted to hospital on the same day or the day after a crash and did not die within 30 days of the crash.	**Fatal** A person who dies within 30 days from injuries received in a road traffic crash.
Weekly Is expected to occur in most circumstances.	**Medium**	**High**	**Extreme**	**Extreme**
Monthly Will probably occur.	**Medium**	**Medium**	**High**	**Extreme**
6 Monthly Might occur at some time.	**Low**	**Medium**	**High**	**Extreme**
Yearly Might occur but doubtful.	**Negligible**	**Low**	**Medium**	**High**
Every 5 years or less May occur but only in exceptional circumstances.	**Negligible**	**Negligible**	**Medium**	**High**

Table 6: Level of Prioritisation Based on Risk Rating

Risk Rating	Level of prioritisation
Extreme	Should be corrected immediately
High	Should be corrected in the very near future, even if costs are high. Temporary mitigation measures should be considered until final correction action taken.
Medium	Should be corrected in the very near future, even if costs are moderate. A delay until the routine maintenance should be justified. Temporary mitigation measures should be considered until final correction action taken.
Low	Should be corrected at a suitable time, if cost is low.
Negligible	Should be corrected at a suitable time, if cost is low.

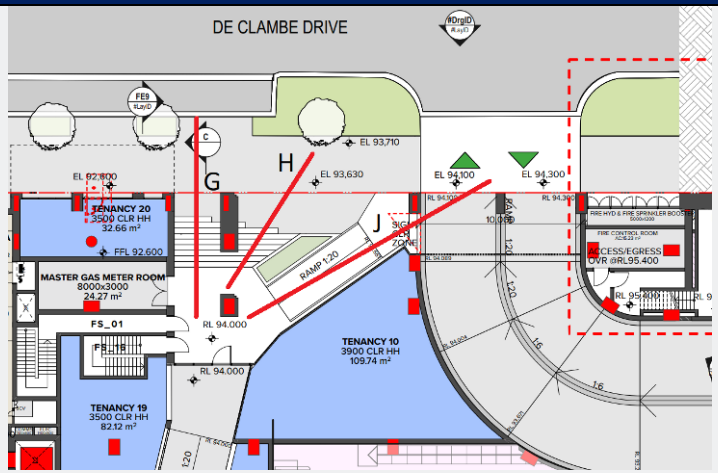
5 Road Safety Risks

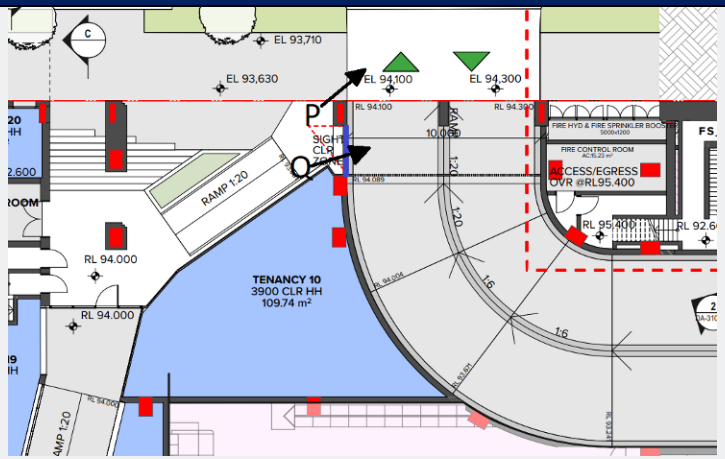
The Road Safety Audit findings are documented in this section

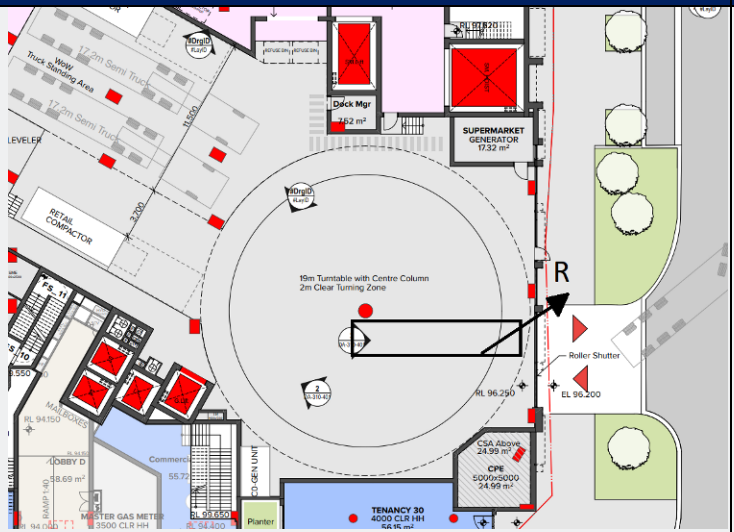
The identified risks are assigned road safety categories to assist in the management of corrective actions by the Project Manager (also known as Project Sponsor). Each risk is assessed with a rating as Extreme, High, Medium, Low or Negligible, derived as a function of Probability and Severity, as outlined in the tables of Section 4.

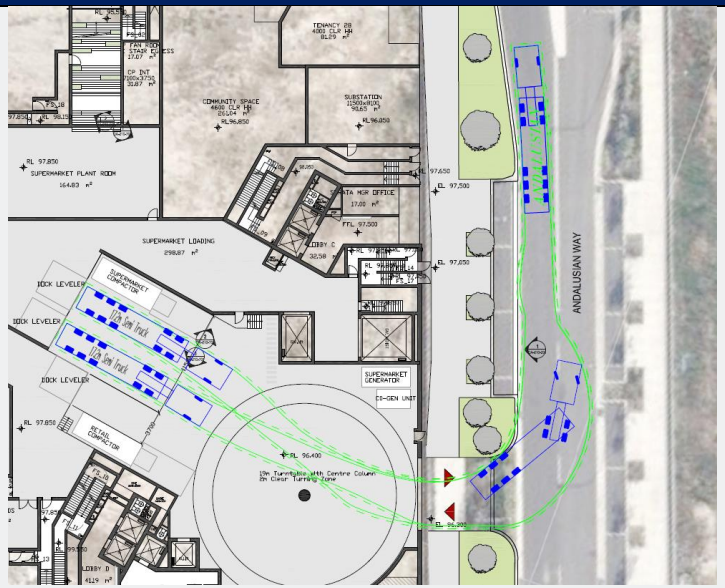
Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue)	Road Safety Audit Category	Probability	Severity	Risk Rating
1a	 ***Above:*** *Extract from the ground level plan showing the various pedestrian access-egress points from the mixed-use development.*	The mixed-use development will have several access-egress points for pedestrians. These may influence pedestrian-decisions on road crossing movements, including whether they conform and use designated zebra crossings, or resort to jaywalking. Jaywalking movements introduce the risk of *vehicle-pedestrian* crashes. They may also involve pedestrians emerging into moving traffic from obscured locations such as from behind sight-obstructing trees or stopped/parked vehicles and buses. Examples of pedestrian crossing decisions are discussed as follows (following page) with respect to the design extract (ground floor level) to the left.	Pedestrian infrastructure	Yearly	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue)	Road Safety Audit Category	Probability	Severity	Risk Rating
1a (cont)	 ***Above:*** *Extract from the ground level plan showing the various pedestrian access-egress points from the mixed use development.*	• The main north-south walkway at the western end of the site offers good connections to the zebra crossings at A, D and E and as such, the zebra crossing layout and the walkway are complementary. • By contrast, the walkway leading to the Doran Drive/ De Clambe Drive intersection (point B) leads pedestrians to a point which is quite distant from any marked foot crossing. Pedestrians may resort to uncontrolled crossing movements over this intersection. • The walkway to point C would be advantageous for pedestrians moving to or from buses at this bus stop. However, there are no other convenient onward journeys from this point. • Similarly, the staircase at F leads pedestrians to the indented parking bay, but is quite distant from the zebra crossing at E. Pedestrians emerging at this point may resort to jaywalking. This includes those moving to the railway station on the southern side of Mandala Parade.	Pedestrian infrastructure	Yearly	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue)	Road Safety Audit Category	Probability	Severity	Risk Rating
1b	 ***Above:*** *Extract from the upper-level plan showing the various pedestrian access-egress points from the mixed use development to De Clambe Drive.*	Further to item 1a, there are also pedestrian access-egress points from the upper level. Examples of pedestrian crossing decisions are discussed as follows with respects to the design extract (upper floor level) to the left. • The 1:20 ramp from RL 94.000 to the southern footpath of De Clambe Drive leads pedestrians directly into the outbound lane from the basement car park. If the clear sight triangle/ zone is unobstructed (ie. clear space), this may even allow pedestrians to emerge suddenly into the path of the outbound vehicle. The pedestrian may also resort to a diagonal and prolonged crossing path over the driveway ramp. This would have increased exposure to *vehicle-pedestrian* crashes. • Further to the above point, even if the pedestrian enters the footpath first before crossing the driveway, they may emerge from behind the sight-obstructing column (red rectangle). The column may obscure them from the visibility of outbound drivers.	Pedestrian infrastructure	Yearly	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue)	Road Safety Audit Category	Probability	Severity	Risk Rating
2	 ***Above:*** *Pedestrians emerging into the car park ramp at point Q would emerge into the ramp from behind a concealed wall.*	The design for the upper-level shows that a sight clear zone (triangle) will be provided at the end of the ramp from the basement car park. This sight triangle is intended to improve advanced visibility from outbound drivers and pedestrians that emerge in front of the ramp as per walk-path "P". With this advanced visibility, the outbound driver can adjust their speed accordingly. However, the sight triangle does not provide the same advanced visibility to pedestrians that emerge along the walk-path "Q". These pedestrians would be effectively entering from a concealed location ("blind corner"). This could increase the risk of *vehicle-pedestrian* crashes. Ideally, the gap between P and Q should be see-through to achieve the sight triangle, but it should not be penetrable. This suggests that the gap P-Q should be treated with Perspex or a see-through fence.	Pedestrian infrastructure	Yearly	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue)	Road Safety Audit Category	Probability	Severity	Risk Rating
3	 ***Above:*** *An egressing driver at the loading dock (off Andalusian Way) may have limited visibility to pedestrians on the footpath due to the sight-obstructing walls either side.*	The image to the left is an extract of the design for Level 1 including the loading dock access-egress via Andalusian Way. There appears to be a sight-obstructing wall adjacent to the access-egress driveway. This may obstruct the sight line from an egressing driver to a pedestrian on the footpath. Any pedestrian at point R, moving towards the driveway could be exposed to impacts by the egressing vehicle. Also, as most of the vehicles using this facility would be trucks, these vehicles often have poor driver sightlines to the sides and rear of the vehicle. Pedestrians standing close to or moving towards or around the vehicle could be exposed to impacts. The audit team is uncertain of whether any additional safeguards or warning devices will be used, such as boom arms, flashing lights and beacons. The risk to pedestrians is exacerbated since most egressing truck drivers would be required to stop at the kerbline to assess for gaps in Andalusian Way. This prolongs their presence in the area between the turn table and the trafficable area of Andalusian Way.	Pedestrian infrastructure	Yearly	Serious	Medium

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue)	Road Safety Audit Category	Probability	Severity	Risk Rating
4	 ***Above:*** *An egressing semi-trailer from the loading dock is required to track over the southbound lane in Andalusian Way.*	The extract to the left shows the egressing semi-trailer from the loading dock on Andalusian Way. The exiting vehicle must utilise the entire driveway width and cross onto the opposite side of the road (southbound lane in Andalusian Way) in order to make this manoeuvre without mounting the kerb return. This exiting vehicle has potential to collide with southbound vehicles in Andalusian Way as well as cause reversing manoeuvres should a truck also be attempting to access the dock at the same time. As mentioned in Ref No. 3, the audit team is uncertain of whether any additional safeguards or warning devices will be used at the dock, such as boom arms, flashing lights and beacons.	Heavy vehicle infrastructure	Yearly	Moderate	Low

Ref No.	Photos / Site Description / Safety Issue	Description of risk to road safety (Reason why this is a safety issue)	Road Safety Audit Category	Probability	Severity	Risk Rating
5	 ***Above:*** *Extract from the design showing various vehicles (black rectangles) and where the sight lines from their drivers to pedestrians at the zebra crossing could be obscured by trees.*  ***Above:*** *Looking northbound along De Clambe Drive under pre-existing conditions where the existing trees would pose as a sightline obstruction to pedestrians entering from this side of the road.*	There are several pre-existing zebra crossings around the mixed development site that will be retained in the *final build* conditions. These are marked "E" in the image to the left. There are also two proposed zebra crossings on De Clambe Drive (marked "P") as part of the build scope. These five zebra crossings will be of significant benefit in connecting pedestrian movements (generated by the new land use) to neighbouring land uses. This includes bus stops and the railway station. Many of these zebra crossings will have trees positioned immediately adjacent to the kerb ramps. These trees may obstruct the mutual sight lines from drivers to pedestrians. If drivers fail to see the pedestrian, this could increase the risk of *vehicle-pedestrian* collisions. The site inspection confirmed that many of these trees already exist and are quite large in size and canopy/ crown. The large footprint of the tree crown could obstruct pedestrians standing adjacent to the road. The trees may also block other supporting features such as pedestrian crossing signs.	Pedestrian infrastructure	Yearly	Serious	Medium

6 Completing the Road Safety Audit

The project manager / sponsor is recommended to take the following steps to complete the road safety audit process:

- Attend the completion meeting (if necessary or if clarification on issues is required)
- Review the report
- Accept the Road Safety Audit report
- Produce a corrective action program (Template attached as Appendix A)
- Implement corrective actions
- Close the corrective action program.

Further details are available in the Guidelines for Road Safety Audit Practices[1].

7 Confidentiality and Copyright

The information in this Road Safety Audit report is confidential and copyrighted. This document does not form part of a contract.

[1] NSW Centre for Road Safety, Roads and Traffic Authority of New South Wales (2011), *Guidelines for Road Safety Audit Practices*, Sydney.

Appendix A – Corrective Action Response Form

Project Name: Mixed use development on parcel of land bounded by Doran Drive, De Clambe Drive, Andalusian Way and Madala Parade, in the Showground Station Precinct			
Audit No	P_21_11_VTP_RSA_REP_01	**Audit stage**	Detailed design

Ref No.	Corrective Action Response (CAR)	Priority for action (To be completed by Project Manager)	Residual risk (if any)
1	Publicly accessible plaza has been redesigned to conduct the pedestrians to the safe crossing points.	Immediate	N/A
2	Pedestrian sight lines and car sightlines have been incorporated.	Immediate	N/A
3	Mirrors and flashlights have been provided.	Immediate	N/A
4	Truck size has been decreased to 12.5m from 17.5m. This has a positive result on the swept path of the trucks existing the loading dock.	Immediate	N/A
5	Trees will be regularly maintained to ensure sightlines are not interrupted.	Immediate	N/A

Project Manager / Sponsor Name	Poonam Chauhan	Signature	
Concurring Client Name	Greg Colbran	Signature	