



Proposed Garden Centre, 720 Welshpool Road East, Wattle Grove

Preliminary Design Stage (Stage 2) Road Safety Audit

Audit Team

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PREPARED FOR:
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TABLE OF CONTENTS

1	INTRODUCTION.....	2
2	BACKGROUND DETAILS.....	4
2.1	SITE DETAILS.....	4
2.2	TRAFFIC DATA.....	5
2.3	CRASH HISTORY	6
2.4	ROAD SAFETY AUDIT.....	6
2.5	SAFE SYSTEM FINDINGS.....	6
2.6	AUDIT PROCESS.....	7
3	AUDIT FINDINGS AND RECOMMENDATIONS	8
3.1	FINDING – DRAINAGE.....	8
3.2	FINDING – HEIGHT CLEARANCES	8
3.3	FINDING – CROSSOVER DESIGN (LARGE VEHICLES).....	8
3.4	FINDING – CROSSOVER DESIGN	9
3.5	FINDING – INTERNAL SITE DESIGN	9
3.6	FINDING – LEFT TURN DECELERATION LANE.....	10
3.7	FINDING – BUS STOP WITHIN LEFT TURN DECELERATION LANE.....	10
3.8	FINDING – PEDESTRIAN SAFETY	11
3.9	FINDING – SHARED PATH INTEGRATION	12
4	ROAD SAFETY AUDIT CONCLUSIONS.....	13
5	CORRECTIVE ACTION REPORT	14
3.1	FINDING – DRAINAGE.....	15
3.2	FINDING – HEIGHT CLEARANCES	15
3.3	FINDING – CROSSOVER DESIGN (LARGE VEHICLES).....	16
3.4	FINDING – CROSSOVER DESIGN	16
3.5	INTERNAL SITE DESIGN	17
3.6	FINDING – LEFT TURN DECELERATION LANE.....	17
3.7	FINDING – BUS STOP WITHIN LEFT TURN DECELERATION LANE.....	18
3.8	FINDING – PEDESTRIAN SAFETY	18
3.9	FINDING – SHARED PATH INTEGRATION	19

APPENDIX A: AUDITED PLANS



1 INTRODUCTION

This Road Safety Audit Report has been prepared by Transcore on behalf of Peritas Group.

The report contains a Stage 2 (Preliminary Design) Road Safety Audit based on the *Austrroads Guide to Road Safety Part 6: Road Safety Audit* and in accordance with the requirements contained in the *Main Roads WA Policy and Guidelines for Road Safety Audit*.

This report results from a Stage 2 – Preliminary Design Road Safety Audit carried out on the proposed garden centre at Lot 150 (No.720) Welshpool Road East, Wattle Grove in the Shire of Kalamunda (refer **Figure 1** for site details).



Figure 1: Aerial view of the subject site (currently under construction)

The proposed garden centre comprises the following components:

- Pots and water features display buildings;
- Limestone blocks and slabs sales and display area;
- Pots and nursery sales area;
- A storage shed;
- Product sales areas;



- A lunchroom/sales office;
- A checkout office;
- Landscape supplies storage bins in multiple locations;
- Internal roadways;
- A car parking area including (approximately) 50 car parking bays located along the Welshpool Road frontage of the site; and,
- An internal car parking area including 10 parking bays located adjacent to the sales office.

Audits for this project were previously undertaken in June 2017 and subsequently in October 2020 and July 2021. The site plans have since been modified to include internal site modifications, site crossover modifications including modifications to the Welshpool Road East median break kerbing and median itself. The latest site plan however indicates downgrade of the proposed site crossover on Welshpool Road East to a left-in/left-out only format.

Accordingly, and in line with the City of Kalamunda request, an update to the original Road Safety Audits is now prepared.

The subject site currently gains access via a left-in/left-out crossover on Welshpool Road East which is proposed to be relocated to the easternmost end of the subject site. The proposed new location for the crossover is directly opposite the existing median break on Welshpool Road East and a crossover to an existing development on the other side of Welshpool Road East.

This Stage 2 Road Safety Audit is therefore carried out on the design plans made available to Transcore in November 2022 which are listed below and attached in **Appendix A:**

- 20843-01L DA;
- 20843-01L DA_Part; and,
- 20843-03E Landscape Plan 1.

The audit team has examined and reported only on the road safety implications of the project as presented and has not examined or verified the compliance of the design to any other criteria, however reference to relevant standards and guidelines are made where appropriate.

Recommendations arising from the Road Safety Audit are detailed in **Section 3** of this report. Also, the resulting Corrective Action Report is contained in **Section 5** of this report.



2 BACKGROUND DETAILS

2.1 Site Details

The subject of this Audit is the preliminary design of the proposed garden centre at 720 Welshpool East Road, in Wattle Grove, City of Kalamunda.

The subject site is located at the north side of Welshpool Road East approximately 220m east of the signalised intersection of Tonkin Highway and Welshpool Road East. The site is located within a predominantly rural setting. It is presently occupied by a single residential dwelling and a horse stable.

Welshpool Road East in the vicinity of the subject site is a four-lane dual carriageway road with a kerbed and landscaped central median. Each carriageway is approximately 7.4m wide and the median varies in width from approximately 4.5m near the western property boundary to approximately 8.5m wide near the eastern property boundary. Median breaks and turn pockets are provided at multiple locations in this vicinity. These turn pockets are not compliant with respect to the requirements of Austroads Guidelines as it relates to deceleration length requirements. A pedestrian footpath on the southern and a shared path on the northern side of Welshpool Road East is in place in the vicinity of the subject site.

According to the Main Roads WA *Metropolitan Functional Road Hierarchy* document, Welshpool Road East is classified as a *Distributor A* road. Refer **Figure 2** and **Figure 3** for more details.



Figure 2: Westbound view along Welshpool Road East in the vicinity of the subject site



Figure 3: Eastbound view along Welshpool Road East in the vicinity of the subject site

Welshpool Road East is under care and control of the local authority (vested by WAPC as it is covered by *Other Regional Road* reservation).

Power poles are in place along the northern side of Welshpool Road East with two of the power poles located adjacent to the proposed new site crossover. A bus embayment is also located at the north side of Welshpool Road East between the existing and the proposed new location for the site crossover.

Substantial vegetation is also in place along the northern side of Welshpool Road East at the location of the proposed new crossover as is within the Welshpool Road East median.

2.2 Traffic Data

A summary of available traffic data for Welshpool Road East (East of Tonkin Highway) is provided below.

Table 1: Traffic Data

Location	VPD (HV%)	Date	Source
Welshpool Road East (East of Tonkin highway) SLK 0.24	17,652 (12.8%)	2020/21	MRWA

Welshpool Road East operates under a sign-posted speed limit regime of 80km/h in the vicinity of the subject site.



2.3 Crash History

According to the Main Roads WA Crash Map tool, there has been a total of six crashes (one hospital admission) along the 200m-long section of Welshpool Road East in the immediate vicinity of the site over the 5-year period ending 31 December 2021. The information obtained from Main Roads WA indicates that three of the six crashes were "rear end" types, two were recorded as "sideswipe same direction" and one was "off path - hit object in verge" type.

All of the crashes occurred during daylight of which one was during the wet conditions. No crashes involved pedestrians.

2.4 Road Safety Audit

A Road Safety Audit is a formal examination of a future road or traffic project or an existing road, in which an independent, qualified team reports on the project's crash potential and safety performance. The Audit Team must be independent of the designer, so that the design is viewed with "fresh eyes". The purpose of the report is not to rate the design, but rather to address any road safety concerns.

In reviewing the safety aspects of a road project, the reporting procedure is not intended as a redesigning process, but to outline potential or existing road safety issues and establish a basis upon which a design could produce an acceptable solution to the safety problem. The recommendations will indicate the nature or direction of a solution, rather than specify the details of how to solve the problem.

The objectives of a Road Safety Audit are:

- To review the designs and background information and form conclusions about safety performance and accident potential of the redesigned road;
- To evaluate the proposal in terms of interaction with its surrounds and nearby roads, and to visualise potential impediments and conflicts for road users; and,
- To report on the conclusions drawn and to make recommendations regarding aspects which involve unnecessary or unreasonable hazards.

It is intended that the recommendations for corrective action be discussed with the designer/client to determine whether the recommendations should be implemented, and where it is decided otherwise, to give reasons in writing for the decision.

2.5 Safe System Findings

The aim of *Safe System Findings* is to focus the Road Safety Audit process on considering safe speeds and by providing forgiving roads and roadsides. This is to be delivered through the Road Safety Audit process by accepting that people will always



make mistakes and by considering the known limits to crash forces the human body can tolerate. This is to be achieved by focusing the Road Safety Audit on particular crash types that are known to result in higher severity outcomes at relatively lower speed environments to reduce the risk of fatal and serious injury crashes.

The additional annotation “IMPORTANT” shall be used to provide emphasis to any road safety audit finding that has the potential to result in fatal or serious injury or findings that are likely to result in the following crash types above the related speed environment: head-on (>70 km/h), right angle (>50 km/h), run off road impact object (>40 km/h), and crashes involving vulnerable road users (>30 km/h), as these crash types are known to result in higher severity outcomes at relatively lower speed environments.

The exposure and likelihood of crash occurrence shall then be considered for all findings deemed “IMPORTANT” and evaluated based on an auditor’s professional judgement.

Auditors should consider factors such as, traffic volumes and movements, speed environment, crash history and the road environment, and apply road safety engineering and crash investigation experience to determine the likelihood of crash occurrence.

The likelihood of crash occurrence shall be considered either “VERY HIGH”, “HIGH”, “MODERATE” or “LOW” and this additional annotation shall be displayed following the “IMPORTANT” annotation on applicable findings.

2.6 Audit Process

This report details a Stage 2 (Preliminary Design) Road Safety Audit of the proposed garden centre on Welshpool Road East in Wattle Grove.

The Audit Team consisted of:

- Team Leader Behnam Bordbar (3 S) Transcore
- Team Member Vladimir Baltic (244 A) Transcore

The Auditors were briefed and drawings subject of this Audit were made available to the Audit Team in November 2022. A site visit was originally undertaken on 15 October 2020. As no changes to the local road network has occurred since, no new site visit was warranted.

All members of the Audit Team participated in the audit process using the relevant Austroads checklist.



3 AUDIT FINDINGS AND RECOMMENDATIONS

3.1 Finding – Drainage

The supplied drawings do not provide detailed drainage design for the proposed garden centre crossover on Welshpool Road East, adjacent private property crossover or the section of Welshpool Road East fronting the subject site.

Justification:

Appropriate drainage needs to be considered, designed and implemented in order to secure that all surface water is drained from the scheme area and no ponding occurs as a result of weather conditions. Ponds and puddles may conceal pavement marking or potholes which in return can result in creation of unsafe situations.

Recommendation:

Ensure appropriate drainage design with due regard to local climatic conditions is prepared for the proposed garden centre crossover, adjacent private property crossover and the section of Welshpool Road East fronting the subject site to ensure appropriate drainage of all surface water and to minimise the risk of ponding.

[LOW]

3.2 Finding – Height Clearances

Overhead power lines and power poles are currently in place along the northern side (subject site side) of Welshpool Road East at this location. The proposed new crossover to the subject site is located under the power lines.

Justification:

It is important to ensure that there is sufficient height clearance between the FFL of future crossover and existing overhead power lines to ensure no impact on everyday traffic including service and construction-related traffic operations.

Recommendation:

Ensure that there is sufficient height clearance between the existing overhead power lines and the FFL of the crossover for the highest vehicle expected to use this site.

[HIGH]

3.3 Finding – Crossover Design (Large Vehicles)

It is understood that service vehicles of up to 19m in size (i.e., semi-trailers) will be used to deliver material to the site. However, no turn path plans illustrating 19m semi-trailer (service vehicle) entry and exit movements via the proposed Welshpool Road



East crossover demonstrating the suitability of the proposed crossover design. Additionally, the proposed splitter island would further restrict the available clearance for the 19m semi-trailer path risking island mounting.

Justification:

All ingress and egress movements in and out of the site should be confined within the site's crossover envelope so that vehicles entering or exiting the site do not cross over to adjacent crossovers or mount splitter island/kerb as such manoeuvres may lead to hazardous situations.

Similarly, all vehicles egressing the site onto the adjacent road should do so by staying within the trafficable portion of the crossover and adjacent road and not mount the kerb as such incidents may lead to vehicles overturning or losing control.

Recommendation:

Ensure the proposed site's Welshpool Road West crossover is designed to fully accommodate all ingress and egress movements for all types of passenger vehicles and in particular service vehicles.

[VERY HIGH]

3.4 Finding – Crossover Design

The proposed new crossover to the garden centre appears to be overlaying the existing crossover for the adjacent property. Ensure that the design of the garden centre crossover maintains adequate accessibility for the adjacent property and that two adjacent crossovers have matching grades in order to ensure seamless ingress/egress operations for users of both crossovers.

Justification:

It is important to ensure that the functionality of the proposed garden centre crossover and the existing adjacent private property crossover are maintained so to avoid any accessibility issues or potential for vehicle crash or loss of control.

Recommendation:

Ensure that the design for the proposed garden centre crossover maintains adequate accessibility for the adjacent property crossover.

[HIGH]

3.5 Finding – Internal Site Design

The internal garden centre driveways need to be designed to accommodate a safe and unobstructed movement of largest vehicles expected to access the site.

Justification:

Access, egress and internal site driveways need to be designed to ensure that the 19m semi-trailer can easily navigate the site so to ensure safe, easy and efficient delivery of



goods and safety of patrons moving within the site and avoid potential traffic congestion.

Recommendation:

Ensure that the internal garden centre driveway system is designed to accommodate the largest design vehicle expected to service the site, which in this case is a 19m semi-trailer.

[MODERATE]

3.6 Finding – Left Turn Deceleration Lane

The existing bus stop/embayment on the north side of Welshpool Road East and immediately in front of the subject site is proposed to be incorporated in the design of the proposed left-turn pocket associated with the new site's crossover. According to the Austroads *AGRD Part 4a Unsignalised and Signalised Intersections* guidelines, a crossover on 80km/h sign-posted speed limit road (i.e., 90km/h design speed) would require a 120m-long deceleration lane (inclusive of taper) to achieve a 20km/h exit curve speed.

Justification:

The substandard length of the deceleration lane may result in drivers starting to break/slow-down within through lane of the road before turning into the deceleration lane causing rear end crashes or overshooting the crossover due to insufficient breaking length within the deceleration lane.

Recommendation:

It is recommended that, if feasible and practical, the 120m-long left-turn deceleration lane (inclusive of the bus bay and taper) be provided for the proposed new site's crossover on Welshpool Road East.

[IMPORTANT | HIGH]

3.7 Finding – Bus Stop within Left Turn Deceleration Lane

The proposed left-turn deceleration facility for the new garden centre crossover incorporates an existing bus stop embayment. A bus parked within the embayment may impact on the sightlines to the Welshpool Road East traffic incoming from the west. Refer **Figure 4** for illustration.

Justification:

This situation is potentially undesirable and can lead to drivers undertaking unsafe egress movements from the site as a result of restricted/inhibited sightlines.



Recommendation:

Investigate sight lines at the proposed crossover when a bus is parked within the turn lane in accordance with AS2890.1 for a crossover/driveway. If the sight line is not adequate investigate the feasibility of relocation of the existing bus stop further east and downstream of the existing location or deeper within the verge through liaison with PTA in order to avoid impact on sightlines at the proposed garden centre crossover.

[IMPORTANT | HIGH]



Figure 4: Westbound view along Welshpool Road East in the vicinity of the future garden centre crossover

3.8 Finding – Pedestrian Safety

The internal garden centre driveway system would be shared by pedestrians and vehicles. In order to secure safe environment for pedestrians it is recommended that the speed limit on internal site's driveways be limited to 10km/h and sign-posted.

Justification:

Unregulated and uncontrolled movement of vehicles within the zone where vehicles will share space with pedestrians may pose a serious safety issue to pedestrians running a risk of being hit by a vehicle.



Recommendation:

It is recommended that speed-limit of 10km/h be introduced for internal garden centre driveway system which should be communicated to all patrons by appropriate signage at the entry and throughout the subject site.

[MODERATE]

3.9 Finding – Shared Path Integration

The proposed scheme proposes realignment of section of existing shared path along the northern side of Welshpool Road East which is intended to interface with the existing section of shared path at this location. It is important to maintain shared path consistency with seamless integration of existing and new sections.

Justification:

Any path inconsistency relating to path width, surface colour, path grade, alignment and similar within a shared path route may lead to users misreading the path alignment and potential loss of control for cyclists potentially resulting in serious injuries.

Recommendation:

Ensure consistency in path width, colour, alignment and gradient between the existing and new sections of the shared path at the northern side of Welshpool Road East is maintained throughout the scheme.

Recommendation:

Provide appropriate drop kerb on the western shared path approach to the site's crossover to match the proposed drop kerb on the eastern side, as shown in relevant plans.

[MODERATE]



4 ROAD SAFETY AUDIT CONCLUSIONS

This final report contains the findings, opinions and recommendations of the audit team based on an examination of the site. As a consequence, the report may not identify all deficiencies that may have existed at the time of the audit.

Recommendations stemming from the Road Safety Audit process is shown summarised in Section 5 - Corrective Action Report.

Notwithstanding that this report may contain statements in relation to technical matters, both of a general nature and in relation to specific issues; in no way should readers of the report rely solely on its contents. Readers must seek appropriate expert advice on their own particular circumstances and rely on such advice.



Behnam Bordbar - Transcore

(Audit Team Leader)



5 CORRECTIVE ACTION REPORT

The following Corrective Action Report (CAR) provides a summary of the audit recommendations. The CAR needs to be reviewed and signed off by the project manager/designer and the asset owner following the submission of the final audit report.

It is suggested that the CAR needs to be signed off and any issues must be resolved before the project is progressed to the next stage.

CAR REPORT

Ref	Finding	Recommendation	Agree/ Disagree	Comment
	3.1 Finding – Drainage The supplied drawings do not provide detailed drainage design for the proposed garden centre crossover on Welshpool Road East, adjacent private property crossover or the section of Welshpool Road East fronting the subject site.	Ensure appropriate drainage design with due regard to local climatic conditions is prepared for the proposed garden centre crossover, adjacent private property crossover and the section of Welshpool Road East fronting the subject site to ensure appropriate drainage of all surface water and to minimise the risk of ponding.	<input type="checkbox"/> / <input type="checkbox"/>	
	3.2 Finding – Height Clearances Overhead power lines and power poles are currently in place along the northern side (subject site side) of Welshpool Road East at this location. The proposed new crossover to the subject site is located under the power lines.	Ensure that there is sufficient height clearance between the existing overhead power lines and the FFL of the crossover for the highest vehicle expected to use this site.	<input type="checkbox"/> / <input type="checkbox"/>	



	<p>3.3 Finding – Crossover Design (Large Vehicles)</p> <p>It is understood that service vehicles of up to 19m in size (i.e., semi-trailers) will be used to deliver material to the site. However, no turn path plans illustrating 19m semi-trailer (service vehicle) entry and exit movements via the proposed Welshpool Road East crossover demonstrating the suitability of the proposed crossover design. Additionally, the proposed splitter island would further restrict the available clearance for the 19m semi-trailer path risking island mounting.</p>	<p>Ensure the proposed site's Welshpool Road West crossover is designed to fully accommodate all ingress and egress movements for all types of passenger vehicles and in particular service vehicles.</p>	<p>□/□</p>	
	<p>3.4 Finding – Crossover Design</p> <p>The proposed new crossover to the garden centre appears to be overlaying the existing crossover for the adjacent property. Ensure that the design of the garden centre crossover maintains adequate accessibility for the adjacent property and that two adjacent crossovers have matching grades in order to ensure seamless ingress/egress operations for users of both crossovers.</p>	<p>Ensure that the design for the proposed garden centre crossover maintains adequate accessibility for the adjacent property crossover.</p>	<p>□/□</p>	



	<p>3.5 Internal Site Design</p> <p>The internal garden centre driveways need to be designed to accommodate a safe and unobstructed movement of largest vehicles expected to access the site.</p>	<p>Investigate sight lines at the proposed crossover when a bus is parked within the turn lane in accordance with AS2890.1 for a crossover/driveway. If the sight line is not adequate investigate the feasibility of relocation of the existing bus stop further east and downstream of the existing location or deeper within the verge through liaison with PTA in order to avoid impact on sightlines at the proposed garden centre crossover.</p>	<p>□/□</p>	
	<p>3.6 Finding – Left Turn Deceleration Lane</p> <p>The existing bus stop/embayment on the north side of Welshpool Road East and immediately in front of the subject site is proposed to be incorporated in the design of the proposed left-turn pocket associated with the new site's crossover. According to the Austroads <i>AGRD Part 4a Unsignalised and Signalised Intersections</i> guidelines, a crossover on 80km/h sign-posted speed limit road (i.e., 90km/h design speed) would require a 120m-long deceleration lane (inclusive of taper) to achieve a 20km/h exit curve speed.</p>	<p>It is recommended that, if feasible and practical, the 120m-long left-turn deceleration lane (inclusive of the bus bay and taper) be provided for the proposed new site's crossover on Welshpool Road East.</p>	<p>□/□</p>	



	<p>3.7 Finding – Bus Stop within Left Turn Deceleration Lane</p> <p>The proposed left-turn deceleration facility for the new garden centre crossover incorporates an existing bus stop embayment. A bus parked within the embayment may impact on the sightlines to the Welshpool Road East traffic incoming from the west.</p>	<p>Investigate sight lines at the proposed crossover when a bus is parked within the turn lane in accordance with AS2890.1 for a crossover/driveway. If the sight line is not adequate investigate the feasibility of relocation of the existing bus stop further east and downstream of the existing location or deeper within the verge through liaison with PTA in order to avoid impact on sightlines at the proposed garden centre crossover.</p>	<p>□/□</p>	
	<p>3.8 Finding – Pedestrian Safety</p> <p>The internal garden centre driveway system would be shared by pedestrians and vehicles. In order to secure safe environment for pedestrians it is recommended that the speed limit on internal site's driveways be limited to 10km/h and sign-posted.</p>	<p>It is recommended that speed-limit of 10km/h be introduced for internal garden centre driveway system which should be communicated to all patrons by appropriate signage at the entry and throughout the subject site.</p>	<p>□/□</p>	



	<p>3.9 Finding – Shared Path Integration</p> <p>The proposed scheme proposes realignment of section of existing shared path along the northern side of Welshpool Road East which is intended to interface with the existing section of shared path at this location. It is important to maintain shared path consistency with seamless integration of existing and new sections.</p>	<p>Ensure consistency in path width, colour, alignment and gradient between the existing and new sections of the shared path at the northern side of Welshpool Road East is maintained throughout the scheme.</p> <p>Provide appropriate drop kerb on the western shared path approach to the site's crossover to match the proposed drop kerb on the eastern side, as shown in relevant plans.</p>	<p><input type="checkbox"/>/ <input type="checkbox"/></p> <p><input type="checkbox"/>/ <input type="checkbox"/></p>	
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- This CAR must be read in conjunction with the full Road Safety Audit Report.
- The asset owner(s) must be notified of the findings and recommendations of this report.

Project Manager/Designer _____ Date _____

Asset Owner _____ Date _____

(if different from above)



Appendix A

AUDITED PLANS





