

KENN BEER

PRINCIPAL ENGINEER

| SAFE SYSTEM SOLUTIONS PTY LTD

[www.SafeSystemSolutions.com.au](http://www.SafeSystemSolutions.com.au)

# Improving Road Safety With Safe System Assessments



ROAD SAFETY

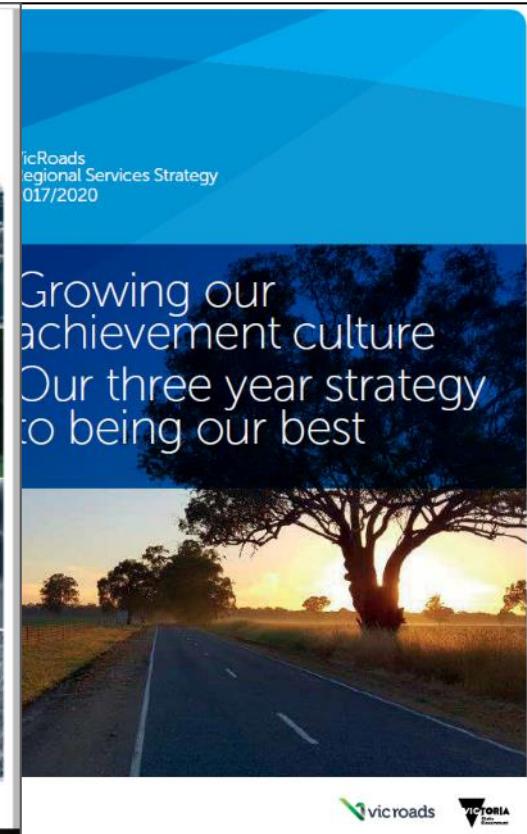
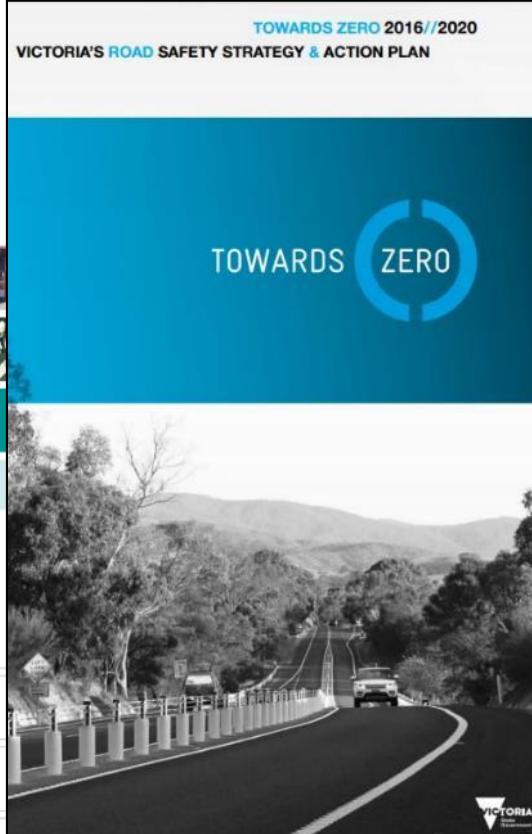
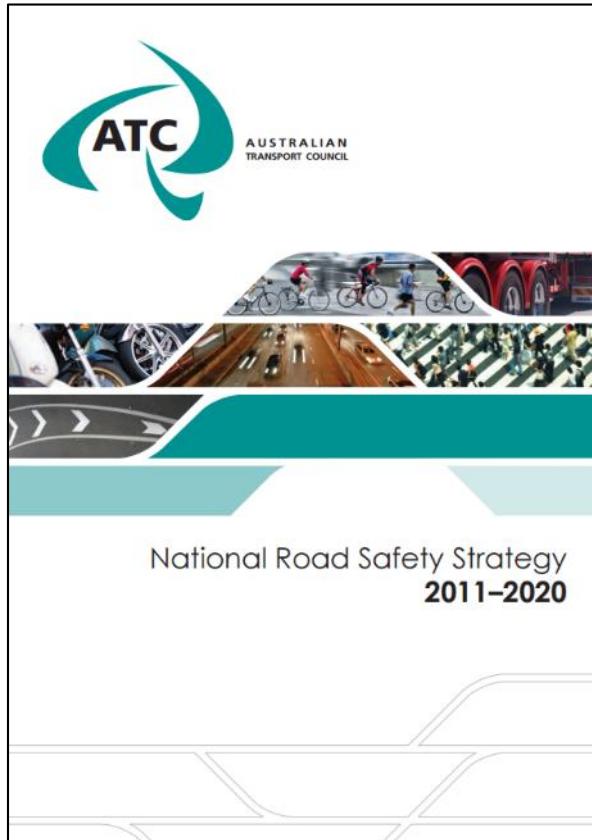
| ENGINEERING AND DESIGN

| AUDITS AND ASSESSMENTS

| FACILITATION AND TRAINING

**SAFE  
SYSTEM  
SOLUTIONS** 

ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT





*It needs to be used on all road infrastructure projects at all levels of government and within the private sector. While road safety audits can pick up specific design deficiencies, Safe System Assessments are still required to ensure that a harm elimination agenda is being pursued.*

*Ideally, an assessment would be conducted at the planning stage of a project and again towards the end of the project to counter the possibility of de-specification and diminishing safety effectiveness against delivery pressures.*

p. 68

### **Key Action:**

*All Commonwealth infrastructure funding to include star rating and safety performance criteria with Safe System Assessments to be used at the planning and completion stages on all projects.*

p. 65

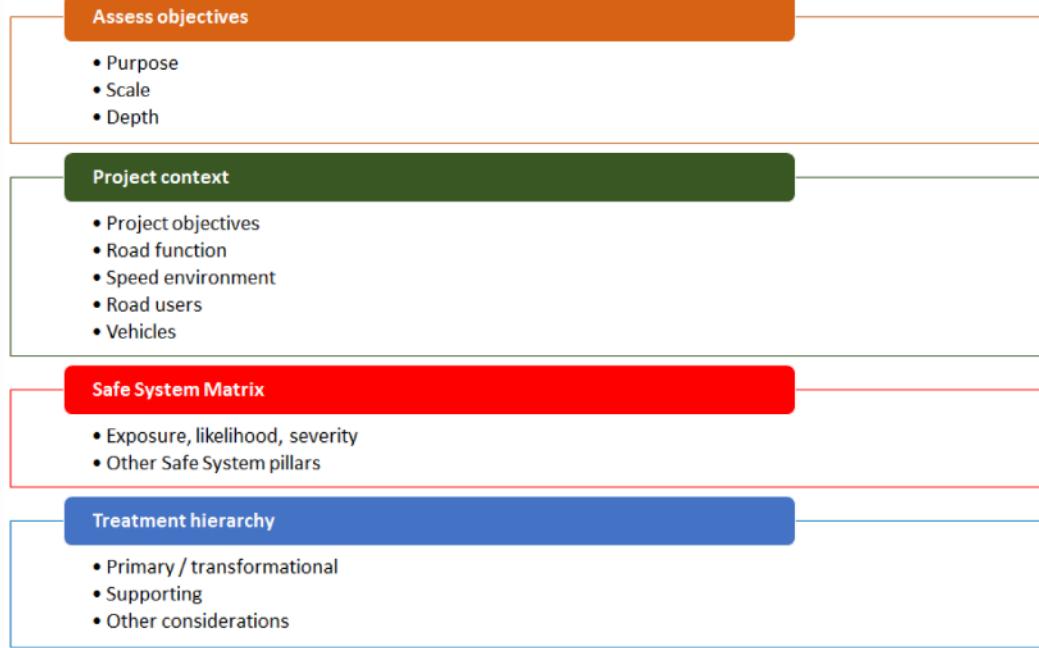
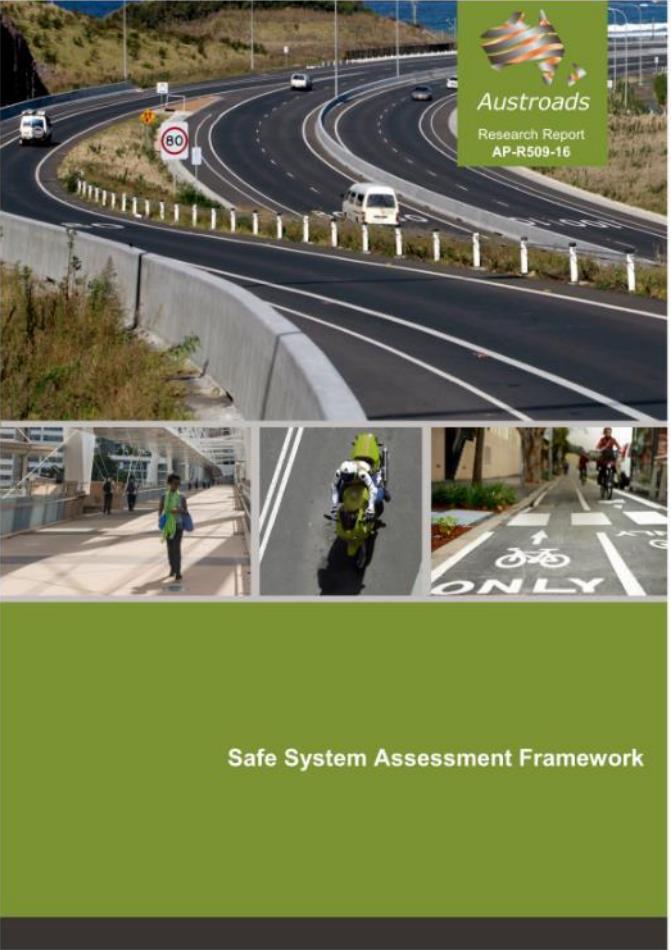
## What is a Safe System Assessment?

Safe System Assessments examine a road related program, project or initiative's alignment with Safe System principles. The Safe System Assessment can comprehensively assess and contribute to the safety of:

- an existing road, intersection or length
- a road investment project, whether at feasibility, design or pre-opening stage
- an infrastructure program or funding application
- a developer funded proposal/project
- a road transport policy or strategy.

Guidance on conducting Safe System Assessments can be found in Austroads AP-R509-16 - Safe System Assessment Framework.

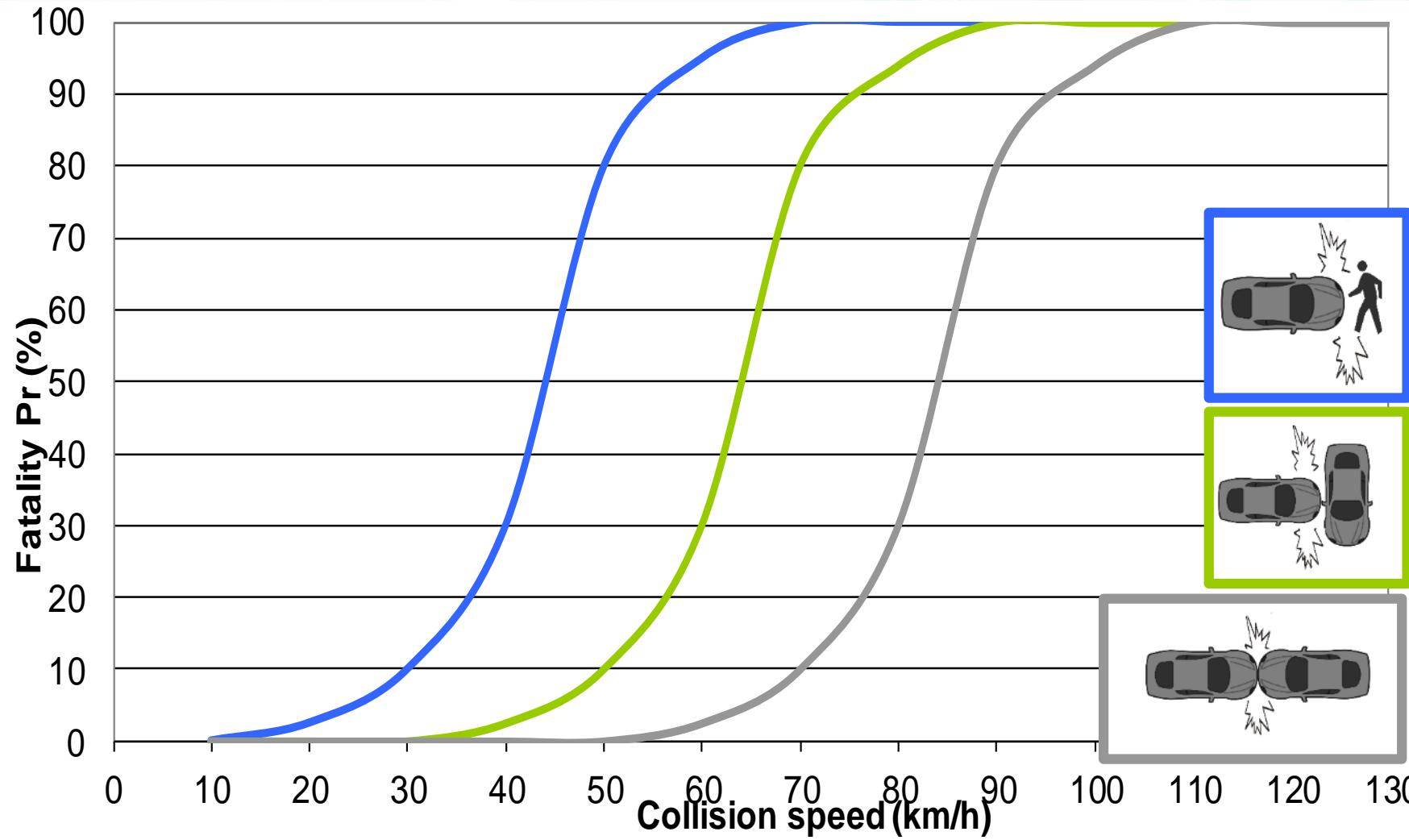






# Safe System Matrix

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	AADT; length of road segment	AADT; length of road segment	AADT for each approach; intersection size	AADT; length of road segment	AADT; pedestrian numbers; crossing width; length of road segment	AADT; cyclist numbers; pedestrians	AADT; motorcycle numbers; length of road segment
Likelihood	Speed; geometry; shoulders; barriers; hazard offset; guidance and delineation	Geometry; separation; guidance and delineation; speed	Type of control; speed; design, visibility; conflict points	Speed; sight distance; number of lanes; surface friction	Design of facilities; separation; number of conflicting directions; speed	Design of facilities; separation; speed	Design of facilities; separation; speed
Severity	Speed; roadside features and design (e.g. flexible barriers)	Speed	Impact angles; speed	Speed	Speed	Speed	Speed





## ROAD SAFETY

ENGINEERING AND DESIGN  
AUDITS AND ASSESSMENTS  
FACILITATION AND TRAINING



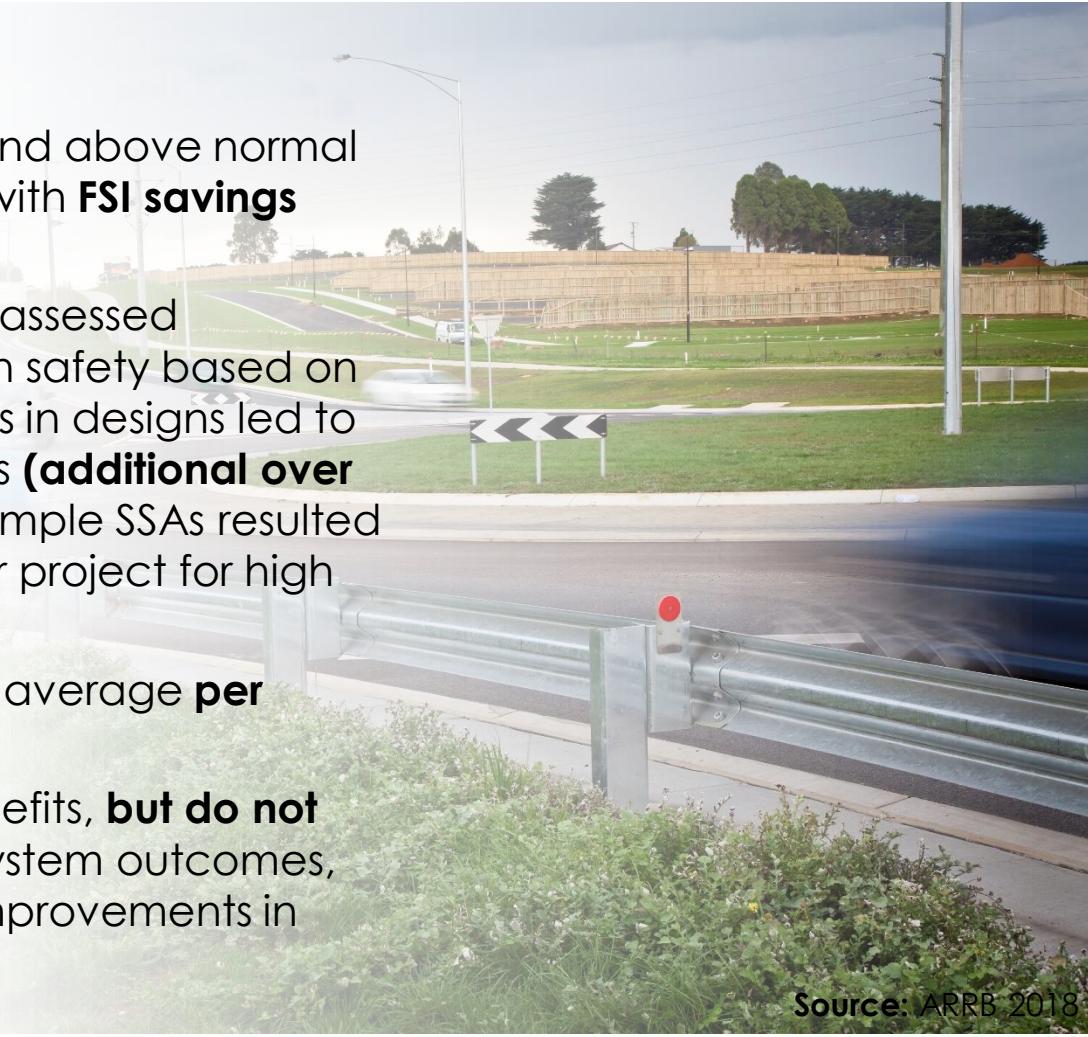
Evaluation of Safe System Assessments

Project No: PRS18020  
Author: Blair Turner and Farhana Ahmed  
Client: VicRoads

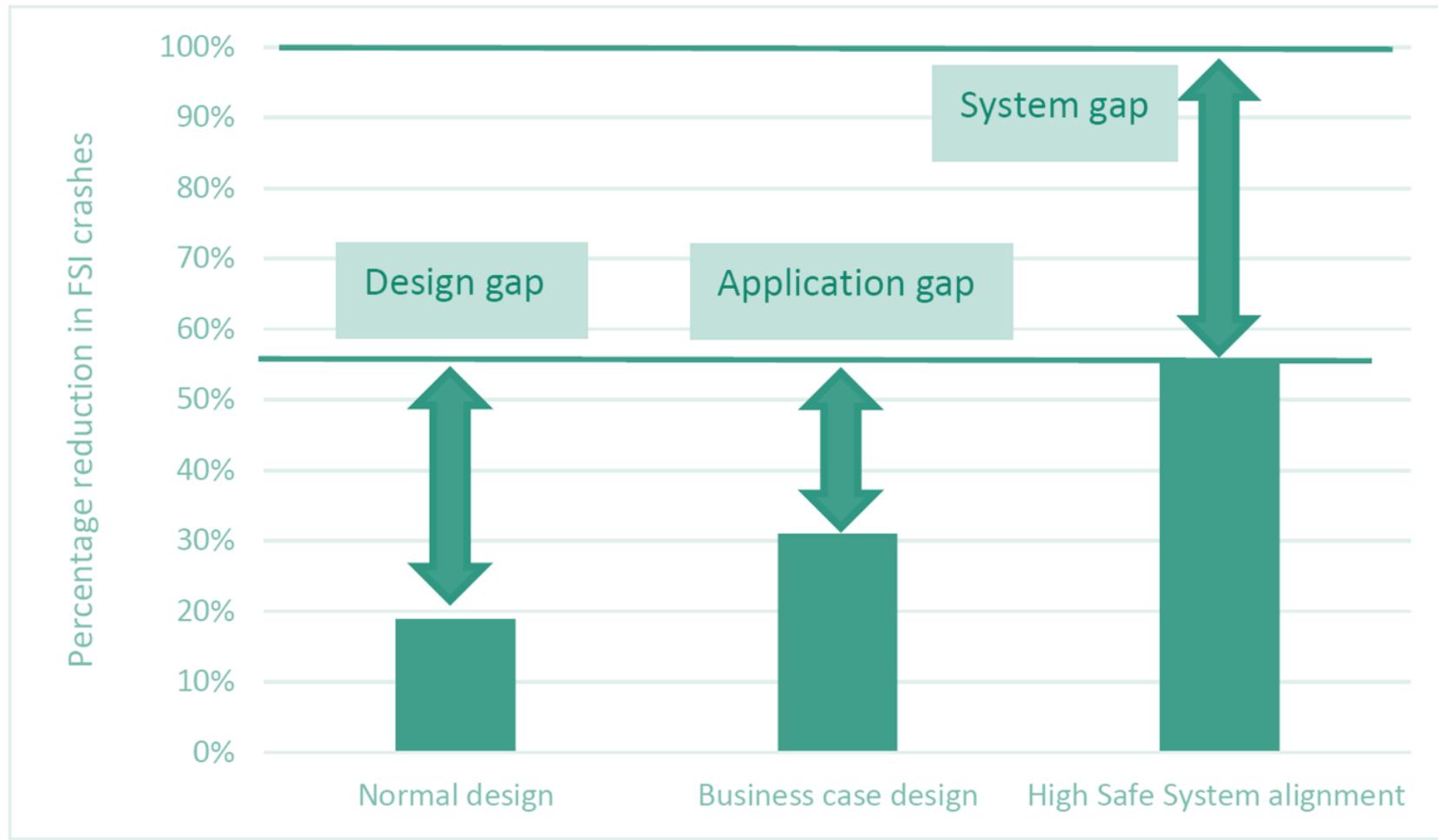
Date: 19 March 2018

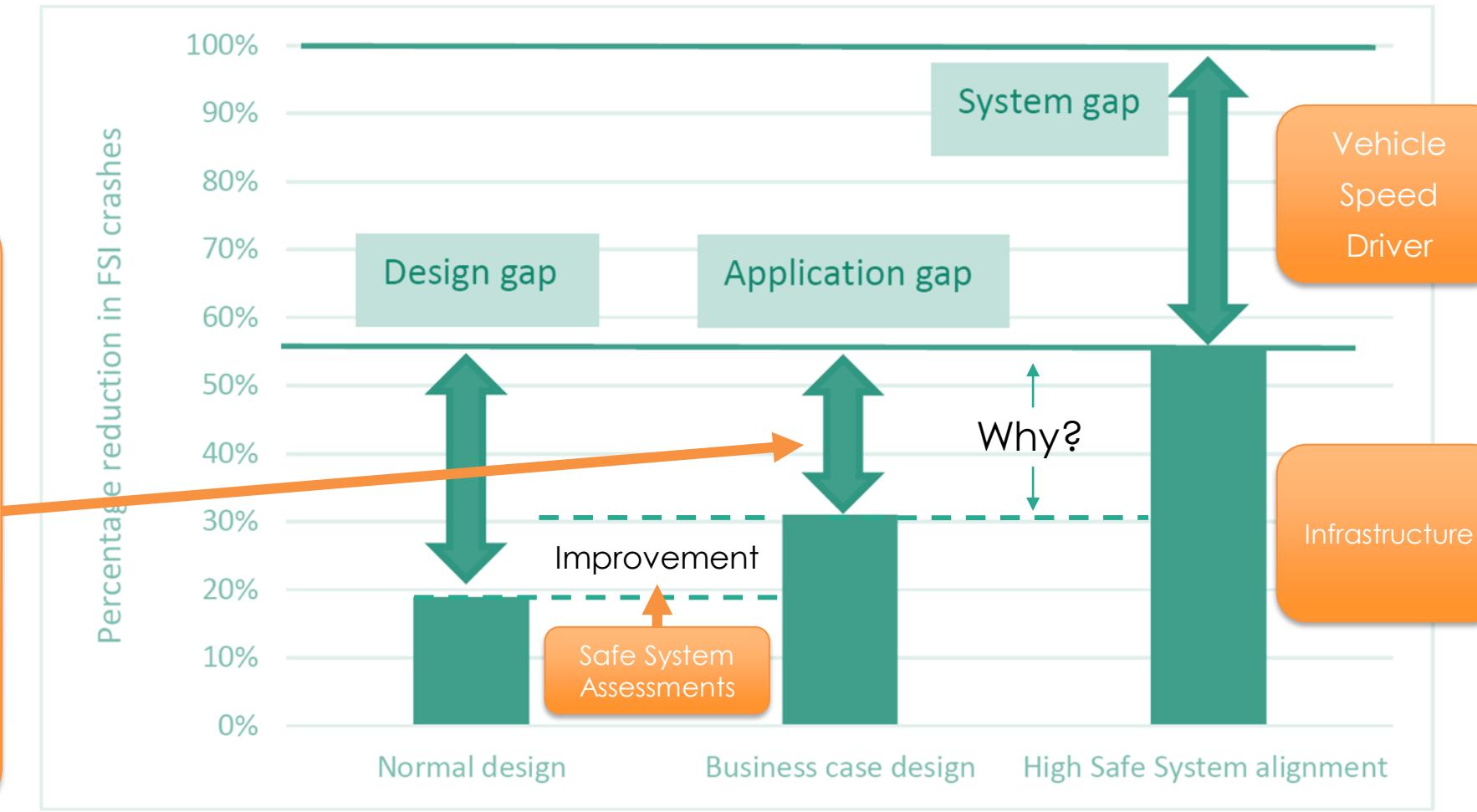
## Key results from the assessment include that:

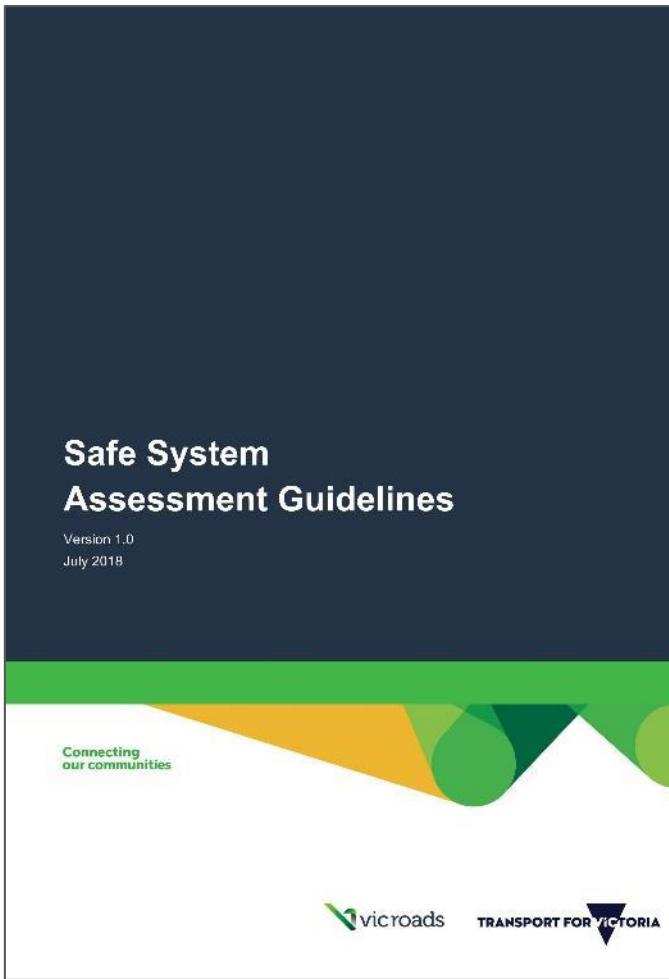
- there is still a substantial additional benefit (additional over and above normal design) for business case designs following the SSA process, with **FSI savings between 60% and 100% that of the normal designs**
- there were an estimated 2221 FSI crashes in the case studies assessed projected over a 20 year period assuming no improvement in safety based on a very **conservative estimate**, applying Safe System principles in designs led to an additional **268 FSI crashes saved** for business case designs (**additional over normal design**) over a 20 year period for all projects in this sample SSAs resulted in a reduction of an additional 16 FSI crashes on average per project for high Safe System alignment designs over a 20 year project life
- SSAs resulted in a **reduction of an additional 8 FSI crashes** on average **per project** for business cases **when compared to original design**
- High Safe System alignment designs produce substantial benefits, **but do not eliminate FSIs**. Greater efforts are needed to achieve Safe System outcomes, including more substantive design, further innovation, and improvements in vehicle design and safety features



Source: ARRB 2018









# Top 10

## opportunities to improve alignment with Safe System principles

As identified in Safe System Assessments



10

ROAD SAFETY  
| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

SAFE  
SYSTEM  
SOLUTIONS  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



9

ROAD SAFETY  
| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

**SAFE  
SYSTEM  
SOLUTIONS**  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT

## Pedestrian



ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

**SAFE  
SYSTEM  
SOLUTIONS**  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

**SAFE  
SYSTEM  
SOLUTIONS**  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT

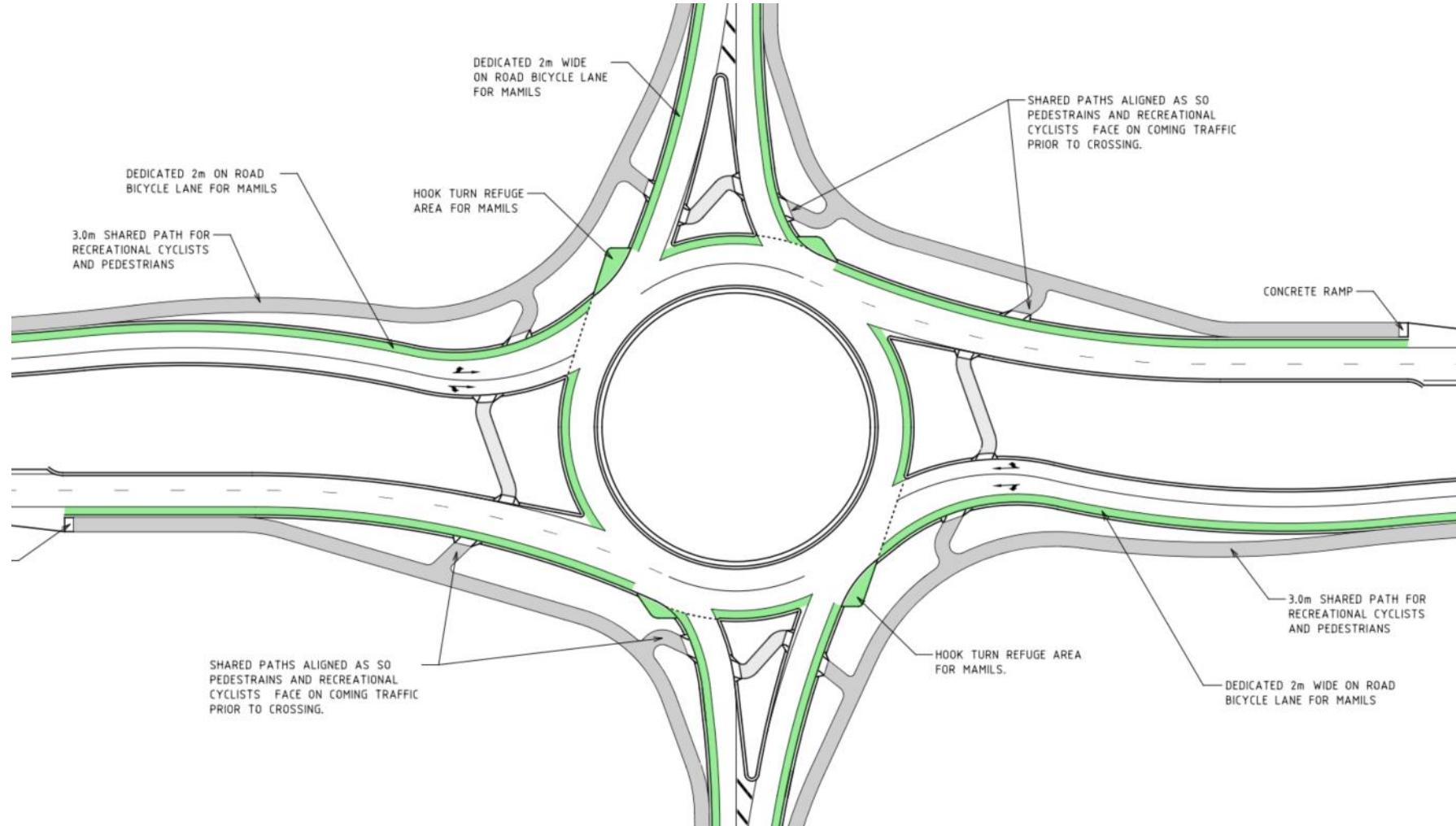


ROAD SAFETY  
| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

**SAFE  
SYSTEM  
SOLUTIONS**  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT

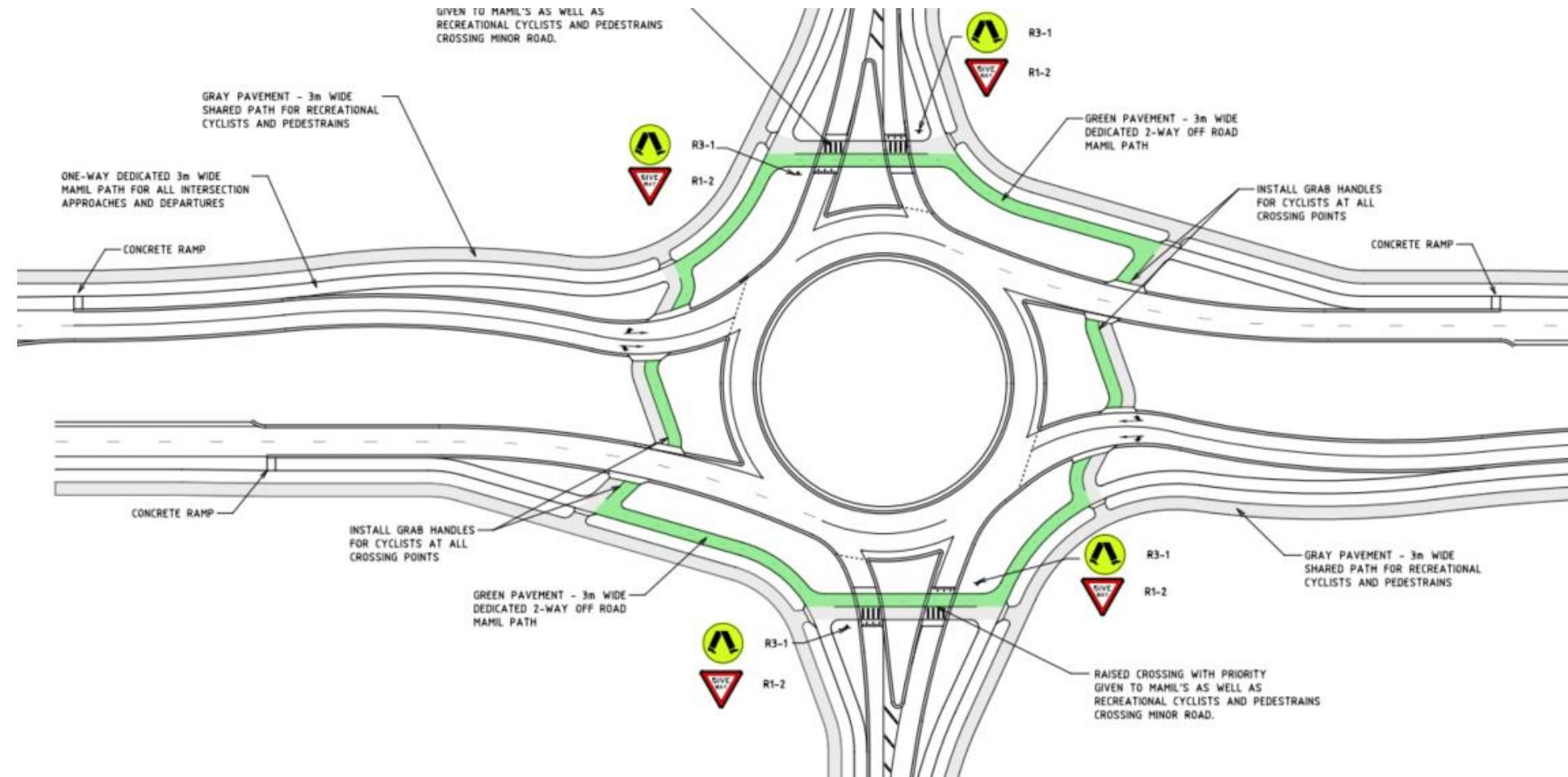
Source: Toowoomba BUG





## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



ROAD SAFETY  
| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

**SAFE  
SYSTEM  
SOLUTIONS**  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



Source: CASR

## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



Source: CASR

## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

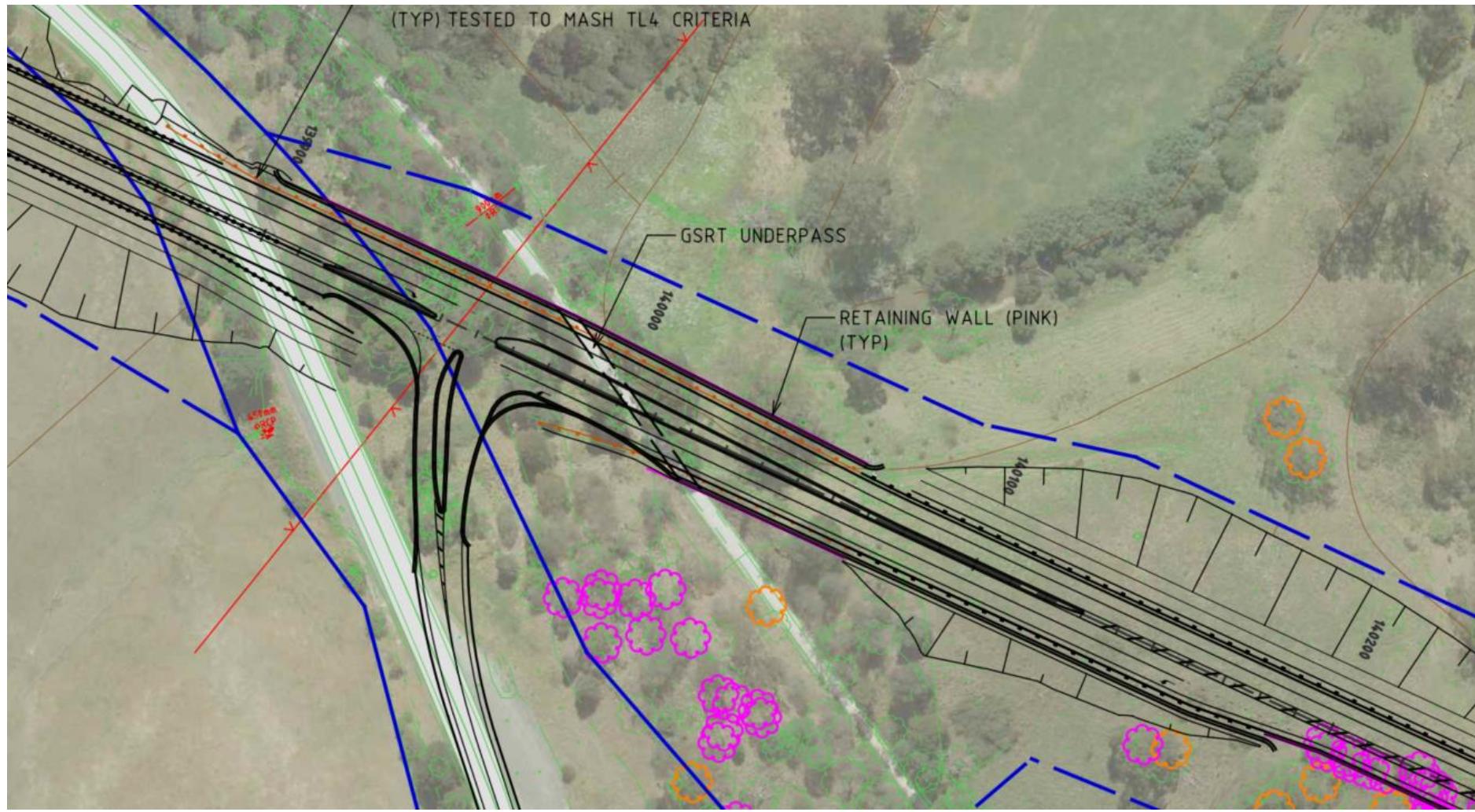


Source: CASR



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



ROAD SAFETY

## Engineering and Design Audits and Assessments Facilitation and Training

# SAFE SYSTEM SOLUTIONS



# 6

---

ROAD SAFETY  
| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

**SAFE  
SYSTEM  
SOLUTIONS**  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



5

ROAD SAFETY  
| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

**SAFE  
SYSTEM  
SOLUTIONS**  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



4

ROAD SAFETY  
| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

**SAFE  
SYSTEM  
SOLUTIONS**  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



3



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

**SAFE  
SYSTEM  
SOLUTIONS**  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT



2

ROAD SAFETY  
| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

SAFE  
SYSTEM  
SOLUTIONS  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



## ROAD SAFETY

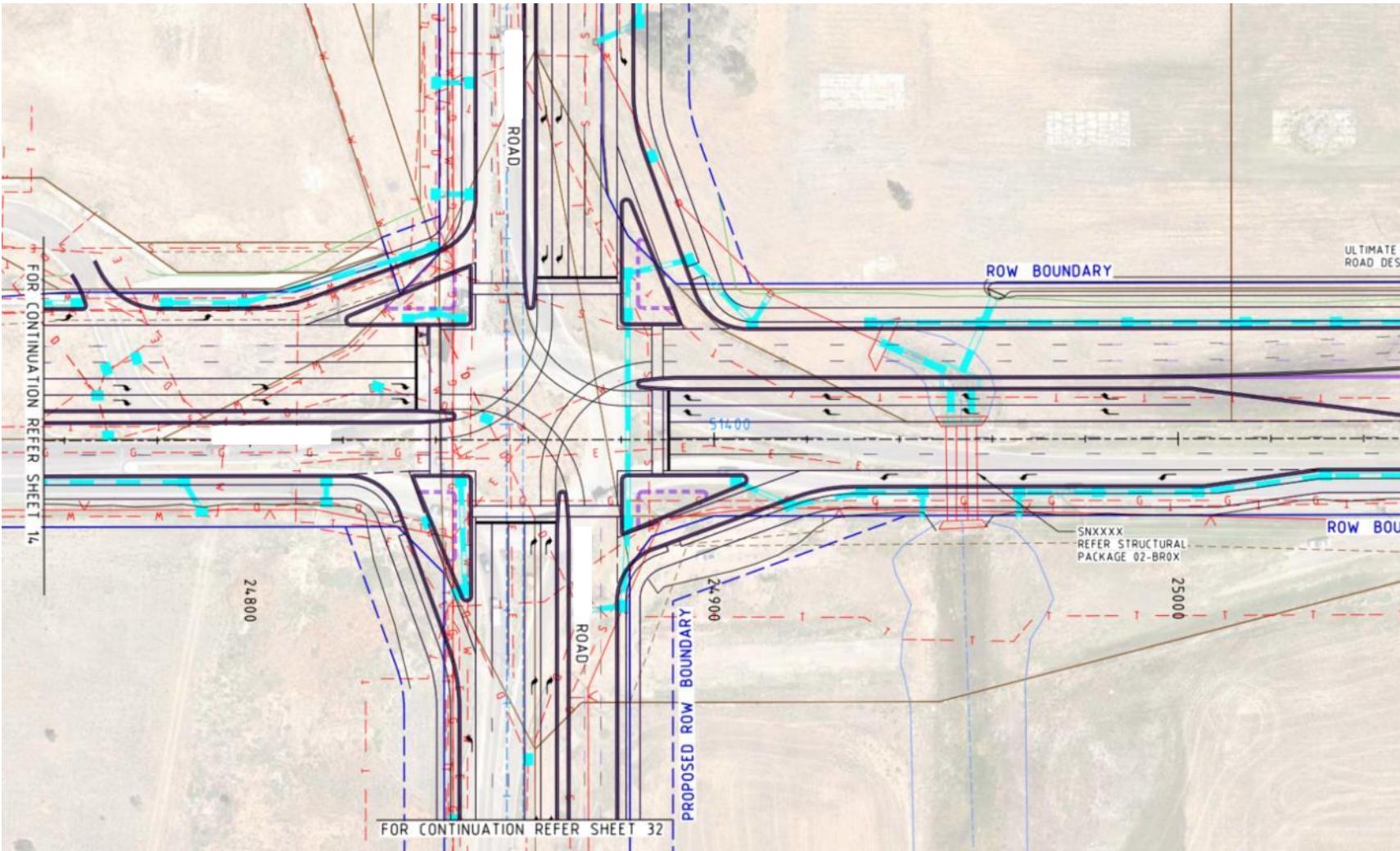
| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



1

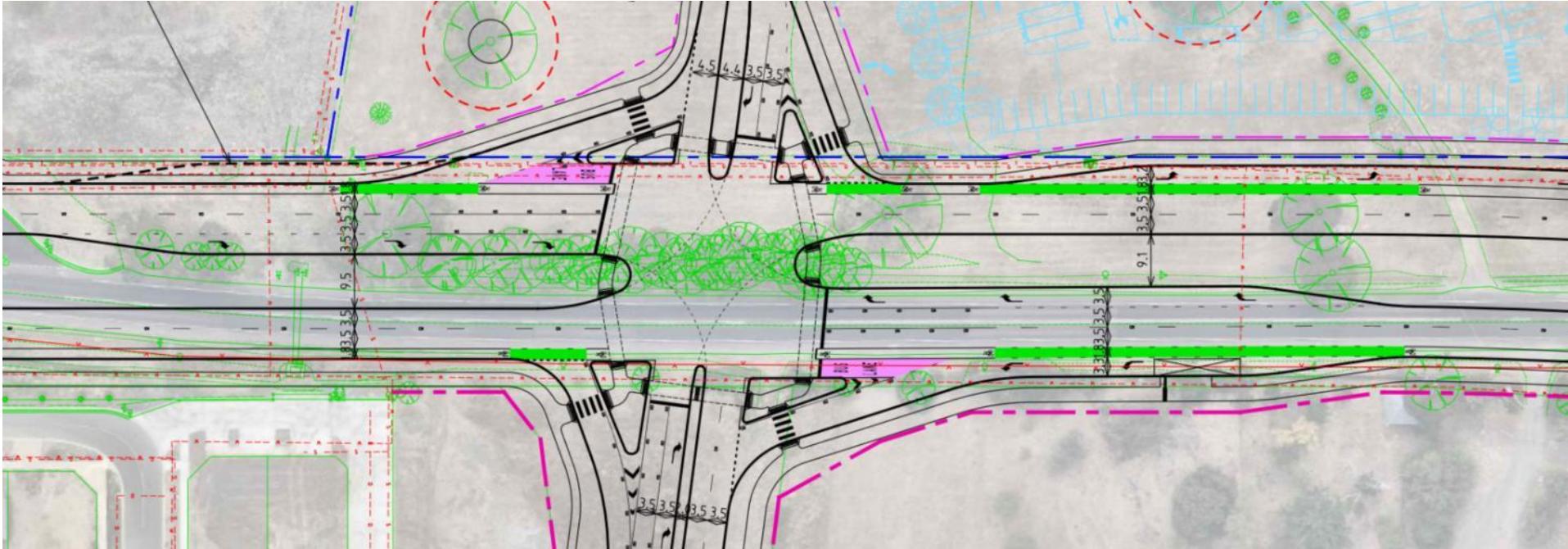
ROAD SAFETY  
| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING

**SAFE  
SYSTEM  
SOLUTIONS**  
ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



ROAD SAFETY

**ENGINEERING AND DESIGN**  
**AUDITS AND ASSESSMENTS**  
**FACILITATION AND TRAINING**

# SAFE SYSTEM SOLUTIONS



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



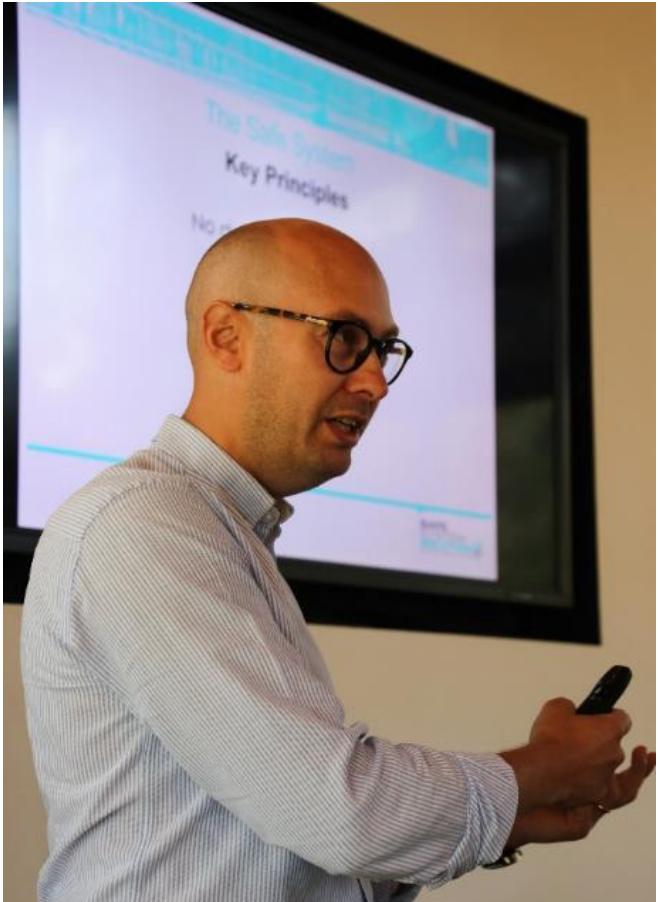
## ROAD SAFETY

| ENGINEERING AND DESIGN  
| AUDITS AND ASSESSMENTS  
| FACILITATION AND TRAINING



# Safe System Assessment Capability and Capacity Building

Developing and mobilising an industry  
of Safe System Assessors





## KENN BEER

| PRINCIPAL ENGINEER

| SAFE SYSTEM SOLUTIONS PTY LTD

| +61 401 345 461

| Kenn.Beer@SafeSystemSolutions.com.au

| www.SafeSystemSolutions.com.au



**SAFE  
SYSTEM  
SOLUTIONS**

ROAD SAFETY · AUDITING · ENGINEERING · PROJECT DEVELOPMENT