8	**SUBJECT:**	Falcon Local Area Traffic Management Investigation: Outcomes and Recommendations
	DIRECTOR:	Director Works and Services
	MEETING:	Council Meeting
	MEETING DATE:	26 May 2020

Summary

Over the past twelve months, the City has been contacted by a number of residents requesting traffic management measures be installed in streets within the Falcon locality. Officers were also referred to the outcomes of a previous study.

In response, a review of the Falcon locality was undertaken and an assessment made using the 2006 study as a baseline for vehicle traffic speeds and patterns that may have occurred over the intervening years.

Council is requested to receive this report and note the recommendations resulting from the study. Such recommendations would be considered in the preparation of future capital works programs.

Disclosure of Interest

N/A

Location

The location of the study encompassed the suburb of Falcon focussing on roads on the western side of Old Coast Road within the boundary highlighted below.

Previous Relevant Documentation

- The Worley Parson's Falcon Traffic Study – 11 May 2006

Background

In 2006, the City engaged Worley Parsons to conduct a Traffic Study (the 'Study') across the suburb of Falcon. The intent of the Study was to understand traffic conditions throughout Falcon following resident concerns regarding vehicle speeds and road safety. The outcomes of the Study were then used to identify potential infrastructure upgrades to improve road safety and amenity within the suburb.

The Study considered anecdotal evidence received from residents of the Falcon community, a review of historical traffic count data and crash data, as well as assessment of the existing road infrastructure.

The Study reviewed areas where vehicle speeds were considered to be excessive to identify appropriate engineering and/or other controls (e.g. driver behaviour strategies) to promote an appropriate speed environment.

A series of recommendations were made as part of the Study, a number of which were actioned by the City, while others were not pursued due to a lack of data or evidence to warrant their implementation.

During 2019, City Officers revisited the Study and conducted a Falcon Local Area Traffic Management (LATM) Investigation. This involved the undertaking of extensive traffic counts throughout the original Falcon Study Area for comparison with the 2006 data and also included analysis and consideration of more recent crash data. City Officers have used the new traffic count data to assess any changes in traffic conditions that may now warrant implementation of the recommended actions from the initial Study as well as identifying new actions and recommendations based on current conditions. This report to Council outlines the key findings of the Falcon LATM Investigation and recommended actions moving forward.

Comment

Overview

The suburb of Falcon, in regard to development, has remained relatively unchanged during the time between the original Study in 2006, and the recent review conducted in 2019. Outside of the Study Area however, significant development has occurred on both the northern and southern boundaries with Halls Head and Wannanup respectively. This is reflected through analysis of historical traffic count data throughout the suburb. While traffic volumes have increased overall in this 13 year period, the changes are not significant. The most notable increases in traffic volumes are all on roads providing access to the coast, particularly the areas of Falcon Bay and Avalon Beach.

Over this period, there has been a significant reduction in the operating speed of most roads within the Study Area. This is largely due to a broader shift in driver behaviour and compliance with the default Built Up Area (BUA) speed limit of 50 km/h. Due to the age of the suburb, there are still a number of roads that both geometrically and topographically lend themselves to higher vehicle speeds. These higher speeds appear to be a combination of both driver ignorance and hooning behaviour.

Crash History

Over the five year period between January 2014 and December 2018, there has been a total of 44 crashes on City managed roads within the Study Area. Of these 44 crashes, 37 (84%) were low impact crashes resulting in property damage only. There were seven (16%) casualty crashes resulting in medical attention or hospital treatment, five of which involved vulnerable road users (motorbike or bicycle).

Out of the 44 crashes, 13 (30%) were off-path or off-carriageway crashes that could potentially be associated with speeding, however, crash data analysis does not allow the City to confirm this. Comparatively, there has been a total of 28 crashes at the intersection of Mercedes Avenue and Old Coast Road in this same period alone.

Given the low crash history throughout the suburb, it is unlikely that any infrastructure upgrades will qualify for external funding opportunities (e.g. State and Federal Black Spot programs). Any recommended actions from the outcome of this investigation will therefore need to be funded solely by the City.

LATM Investigation Analysis

The suburb was broken into five catchments from north to south for analysis of traffic conditions within each catchment. A summary has been formed for each of the catchments including recommendations where there is the potential to improve road safety and traffic conditions within each catchment.

Merlin Street Catchment - Traffic Count Analysis

Merlin Street has seen a significant increase in traffic volumes over the 13 years since the original traffic data was captured. This increase was not unforeseen given the development that has occurred within Halls Head, the connection of Merlin Street through to Peelwood Parade and the access to two primary schools on Karon Vista. Nevertheless, traffic volumes on all roads within the catchment are appropriate for their function.

The most notable concerns in regard to vehicle speeds were observed on Eldora Crescent, Vanessa Road and Mistral Street. Geometrically and topographically, Mistral Street lends itself to high vehicle speeds, in particular hooning. A number of vehicle speeds on Mistral Street were captured in the range of 120 – 130 km/h and there is a significant history of resident concern at this location.

While the use of mobile speed radars at this location has shown a reduction in the overall operating speed of the road, a series of horizontal slow points throughout the length of Mistral Street to break up the long straights will likely resolve some of the concerns around hooning and excessive speeding at this location.

A recommendation of the original traffic study was to install a roundabout at the intersection of Merlin Street and Mistral Street to act as both a traffic calming measure and threshold treatment for vehicles entering a built-up environment after exiting Old Coast Road. With the intersection identified to require a renewal due to the condition of the pavement, there is an opportunity to upgrade the intersection including the installation of a roundabout to improve both road safety and pedestrian safety through upgraded pedestrian links.

Philante Street Catchment - Traffic Count Analysis

Traffic volumes on all roads within the catchment are appropriate for their function with daily traffic volumes not exceeding 1,000 vehicles per day at any locations. Generally, roads built in submission have a vehicle capacity of 2,000 vehicles per day.

The most notable concern in regard to vehicle speeds was captured on Leander Street which geometrically, lends itself to high vehicle speeds. These speeds do not necessarily appear to be hooning related and rather reflect a wider issue of drivers exceeding the speed limit by 10-30 km/h.

Whilst the use of mobile speed radars at this location has shown a reduction in the overall operating speed of the road, a series of horizontal slow points along the straight sections of Leander Street would likely reduce the operating speed of the road to be closer in line with the default BUA speed limit of 50 km/h.

Mercedes Avenue Catchment - Traffic Count Analysis

The most notable increases in traffic volumes have occurred on both Mercedes Avenue and Spinaway Parade with vehicles accessing the coast and the Falcon Bay foreshore. Traffic volumes on all roads within the catchment are appropriate for their function.

The most concerning vehicle speeds were captured on Baroy Street which is the second most prominent east west link between Old Coast Road and Spinaway Parade within the catchment. Geometrically and topographically, Baroy Street lends itself to high vehicle speeds as it is long and straight with steep uphill and downhill grades. These speeds do not necessarily appear to be hooning related and rather reflect a wider issue of drivers exceeding the speed limit by 10-30 km/h. A solution to control vehicle speeds on Baroy Street would be to install one or more horizontal slow points to break up the straight and force drivers to slow down. The initial traffic study recommended roundabouts at two intersections on Baroy Street. Crash analysis for Baroy Street returns one crash at the intersection of Cooranga Road, one crash at the intersection of Galatea Road and two crashes at the intersection of Spinaway Parade. Given the traffic volumes and the crash history of Baroy Street and intersecting roads, roundabouts are not considered to be warranted and Baroy Street should retain priority.

There is a resident perception that vehicle speeds on Mercedes Avenue are excessive. This is not supported by the data captured during multiple traffic counts. The most recent traffic counts that were conducted on Mercedes Avenue over a ten day period in November 2019 only recorded a total of 29 vehicles exceeding the speed limit by more than 20 km/h for a daily average of less than three vehicles per day. The use of mobile speed radars at this location has shown a slight reduction in the overall operating speed of the road. The current operating speed of the road combined with existing traffic volumes is not considered to warrant any permanent traffic calming measures at this point in time.

To complement the redevelopment of the Falcon Bay foreshore precinct, there is an opportunity to incorporate permanent traffic calming measures at this location to protect pedestrian and vehicle movements. A raised threshold treatment at the intersection of Mercedes Avenue and Spinaway Parade along with a raised pedestrian crossing/plateau to the west of Thera Street is recommended. Based on adjacent land uses, pedestrian volumes and on-street parking, there may be the potential to implement a 40 km/h speed zone through this location as per Main Roads Western Australia's (MRWA) new speed zoning policy.

Thera Street Catchment - Traffic Count Analysis

The most notable increases in traffic volumes have occurred on Panamuna Drive with vehicles accessing the coast and the Falcon Bay foreshore. Traffic volumes on all roads within the catchment are appropriate for their function.

There are no specific areas or roads of concern within the catchment that would be considered for permanent traffic calming measures at this point in time.

There is evidence of hooning and antisocial behaviour in the form of burnout marks on roads within the catchment. Some of this evidence is more notable on Koolinda Street. These issues will not be resolved through any traffic calming measures and residents are urged to contact the WA Police in regard to hooning and antisocial behaviour.

Yeedong Road Catchment - Traffic Count Analysis

The most notable increases in traffic volumes have occurred on Avalon Parade, Panamuna Drive, and Yeedong Road with vehicles accessing the coast and Avalon Beach. Traffic volumes on all roads within the catchment are appropriate for their function.

There are no specific areas or roads of concern within the catchment that would be considered for permanent traffic calming measures at this point in time. Vehicle speeds captured on Yeedong Road between Pepper Street and Ivanhoe Crescent are of concern. A contributing factor to these speeds is the location of the traffic counts at the base of steep downgrades in both directions of travel. Yeedong Road currently has traffic calming in the form of a number of modified T intersections and blister islands to control vehicle speeds.

Baloo Crescent provides north/south access to Falcon Primary School via Yeedong Road and is heavily utilised by both vehicles and pedestrians during the morning and afternoon peaks which are aligned with the school start and finish times. Approximately 36% of Baloo Crescent's daily traffic volumes occur during the hour before and the hour after school. Yeedong Road and Baloo Crescent are also heavily used by pedestrians and students accessing Falcon Primary School. To improve road safety by separating vehicles and to improve pedestrian safety, the City is proposing to install a splitter island that will also act as a pedestrian refuge island at the intersection of Baloo Crescent and Yeedong Road. The pedestrian refuge will allow path users to concentrate on, and cross only one lane of traffic at a time. This greatly increases pedestrian safety when there are a high number of conflicting vehicle movements occurring at the intersection during peak times.

Cycling and Pedestrian Infrastructure

A recommendation of the 2006 Study was to promote a 'shared environment' and encourage the use of alternative modes of transport along beachside roads within the suburb.

Avalon Parade, Panamuna Drive and Spinaway Parade all run adjacent to the coast and attract high volumes of both pedestrian and cyclist activity for recreational purposes and for access to coastal facilities within the suburb. These roads also attract the highest traffic volumes throughout the suburb of Falcon. The majority of the existing path infrastructure on these roads was originally constructed on the eastern side of the road. These roads can be made safer, particularly for pedestrians and cyclists, through the installation of an uninterrupted shared path on the coastal side of all roads running adjacent to the coast. These paths will eliminate the requirement for pedestrians and cyclists to cross any intersecting roads and will eliminate the interface between manoeuvring vehicles at driveways and path users. These links have all been identified and are listed as priority links in the City's Long Term Cycle Network and the Peel-Harvey Estuary Trails 'The Island Shared Use Trail'. Through the installation of these paths, there will also be an opportunity to reduce the pavement widths of these roads which should act as a traffic calming measure to reduce vehicle speeds while also reducing traffic volumes by creating safe access to the coast for pedestrians and cyclists as an alternative to driving. The extents of these roads where shared path infrastructure is required on the western side of the road are listed below.

- Avalon Parade (Cesia Lane to Yeedong Road)
- Panamuna Drive (Sandra Street to Falcon Bay)
- Spinaway Parade (Falcon Bay to Rakoa Reserve)
- Spinaway Parade (Rakoa Reserve to Philante Street)

Driver Behaviour Strategies

A recommendation of the 2006 Study was also to explore and promote 'driver behaviour strategies' to promote road safety and to discourage anti-social driving behaviours. In recent years, the City has rolled out the use of mobile speed radars on local roads to reinforce the default BUA speed limit of 50 km/h. These radars have been, and will continue to be used on distributor roads and coastal roads within the suburb or Falcon.

Initial follow up traffic counts on roads within the suburb of Falcon where the mobile speed radars have been used in recent years show reductions in the operating speeds of all of the roads, some by up to 10%.

Recommended Treatments

The treatments within each individual catchment are listed in the table below along with the intended outcome from the treatment. The table also provides details on whether the identified treatments are consistent with recommendations from the initial Study or if they have been amended, or are new, based on the outcomes of this investigation.

Merlin Street Catchment		
Proposed Treatment	**Intent**	**Consistent with 2006 Study Recommendation?**
Install a series of mid-block slow points on Mistral Street	Limit distance where full speed can be attained to discourage hooning and excessive speeding.	Yes
Install roundabout at the intersection of Merlin Street and Mistral Street	Act as traffic calming measure and threshold treatment to define change in road environment and entry to built-up urban environment.	Yes

Philante Street Catchment		
Proposed Treatment	**Intent**	**Consistent with 2006 Study Recommendation?**
Install a mid-block blister island on Leander Street	Limit distance where full speed can be attained to reduce overall operating speed of road.	Amended recommendation *Replaces 2006 recommendation for a roundabout at the intersection of Leander Street and Rotohine Crescent. Traffic volumes indicate that priority should remain with Leander Street.*
Mercedes Avenue Catchment		
Proposed Treatment	**Intent**	**Consistent with 2006 Study Recommendation?**
Install a series of mid-block slow points on Baroy Street	Limit distance where full speed can be attained to reduce overall operating speed of road.	Amended Recommendation *Replaces 2006 recommendation for roundabouts at the intersection of Lynda Street and Baroy Street as well as Cooranga Road and Baroy Street. Traffic volumes indicate that priority should remain with Baroy Street.*
Install a raised plateau and threshold treatment at the intersection of Mercedes Avenue and Spinaway Parade	Act as traffic calming measure and threshold treatment to define northern boundary of the Falcon Bay Foreshore zone.	Amended Recommendation *Replaces 2006 recommendation for roundabouts at the intersection of Mercedes Avenue and Spinaway Parade. Land constraints would not allow this treatment.*
Install a raised plateau and improved pedestrian crossing facilities across Spinaway Parade to the west of Thera Street	Act as traffic calming measure to improve pedestrian safety and to protect vehicle movements in to and out of on-street parking bays adjacent to the Falcon Bay Foreshore.	New recommendation.
Apply to MRWA for a 40 km/h linear speed zone through the Falcon Bay Foreshore precinct in line with MRWA speed zone policy.	Reduce enforceable speed limit on Spinaway Parade to 40 km/h in line with MRWA updated speed zone policy based on adjacent land use.	Yes *Formalise recommendation from 2006 Study for advisory 40km/h speed signs along Spinaway Parade adjacent to Falcon Bay Foreshore.*
Yeedong Road Catchment		
Proposed Treatment	**Intent**	**Consistent with 2006 Study Recommendation?**
Install a splitter island at the intersection of Yeedong Road and Baloo Crescent.	Separate vehicle turning movements and reduce the potential for head on collisions during peak periods due to vehicles cutting the corner on approach from Sandra Street due to the staggered intersection configuration.	Yes.

Coastal Shared Path - All Catchments		
Proposed Treatment	**Intent**	**Consistent with 2006 Recommendation?**
Provide a high-quality shared path on the western side of all coastal roads within the suburb of Falcon to create a continuous, uninterrupted coastal path linking existing coastal paths in the suburbs of Wannanup and Halls Head.	Significantly improve pedestrian and cyclist safety by providing uninterrupted shared path facilities along the coast of Falcon in line with the City's Cycle Plan and Department of Transport's Long-Term Cycle Network. Potentially reduce traffic volumes and vehicle speeds by constraining coastal roads and promoting alternative modes of transport to access coastal facilities.	Yes. *Consistent with 2006 Study recommendation to promote a 'shared environment' and promote other modes of transport along beachside roads.*

Consultation

N/A

Statutory Environment

Nil

Policy Implications

Nil

Economic Implications

The recommendations in this report will be prioritised and included in the City's Ten Year Capital Works Program in line with the program expenditures within the City's Ten Year Long Term Financial Plan (LTFP). This means that these projects will be completed without additional funding outside that already included in the LTFP for these types of works.

At this stage it is anticipated that with the following annual budget estimates we will be able to complete the recommended projects within five years, although the project order and budget allocations will be dependent upon other projects committed in that year.

Year	Budget Estimate
2020/2021	$250,000
2021/2022	$150,000
2022/2023	$150,000
2023/2024	$150,000
2024/2025	$100,000
Total:	$800,000

Risk Analysis

There are currently no identifiable risks in this report. Proposals to ameliorate identified traffic management issues in Falcon have been identified and are proposed to be included in Council's 10 Year Capital Works Program. This program is identified for funding through the adopted Long Term Financial Plan.

Strategic Implications

The following strategies from the *City of Mandurah Strategic Community Plan 2020 – 2040* are relevant to this report:

Social:
- Facilitate safe neighbourhoods and lifestyles by influencing the built form through urban design.

Organisational Excellence:
- Listen to and engage with our community in the decision-making process.

Conclusion

A number of treatments to enhance road safety have been identified as a result of this report. The specific intent of these treatments varies for each identified site with an underlying goal of improving road safety for all modes of transport and improving public amenity throughout the suburb.

NOTE:

- Refer ***Attachment 8.1 Falcon Local Area Traffic Management Report 2019***
  Attachment 8.2 Falcon Area Traffic Study: Traffic and Transport Report 2006

RECOMMENDATION

That Council:

1. **Supports the recommendations for new traffic management infrastructure identified within the Falcon Local Area Traffic Management Report 2019 for inclusion in the City's Ten Year Capital Works Program.**

2. **Supports an application to Main Roads Western Australia (MRWA) for a 40 km/h linear speed zone through the Falcon Bay Foreshore precinct in line with MRWA speed zone policy.**

FALCON
LOCAL AREA TRAFFIC MANAGEMENT REPORT 2019

City of MANDURAH

VERSION:	DATE:	AUTHOR:	AUTHORISED:
1	23rd April, 2020	Tom Carroll (Engineer Traffic & Transport)	Damien Slack (Coordinator Engineering Services)
	Issued for review and comment.		
2	4th May, 2020	Tom Carroll (Engineer Traffic & Transport)	Damien Slack (Coordinator Engineering Services)
	Issued for review and comment.		

Introduction

Throughout the duration of 2019, traffic counts have been conducted across the suburb of Falcon to analyse traffic conditions. The intent of these traffic counts was to analyse how conditions had changed across the suburb in comparison to a traffic study that was completed in 2006 to address resident concerns around traffic speeds and road safety.

This File Note provides an overview of the historical and current traffic count data, the 5 year crash history and recommendations for improving road safety and public amenity within the suburb of Falcon.

The location of the study encompassed the suburb of Falcon focussing on roads only on the western side of Old Coast Rd within the boundary highlighted below.

Background

In 2006, the City of Mandurah engaged Worley Parson to conduct a traffic study across the suburb of Falcon **(Attachment 1 – Falcon LATM Report May 2006).** The intent of the study was to provide a response sufficient for the City of Mandurah to respond formally to traffic issues raised by the Falcon community, to understand traffic movements through the suburb of Falcon and to identify potential infrastructure upgrades within the suburb to improve road safety and amenity within the suburb.

The report considered anecdotal evidence received from residents of the Falcon community, a review of traffic count data and crash data as well as assessment of the existing road infrastructure.

The report reviewed the anecdotal evidence received by residents to identify areas where vehicle speeds were considered to be excessive and to identify appropriate engineering and / or other controls to promote an appropriate speed environment.

A series of recommendations were made as part of the report, a number of which were actioned by the City while others were not pursued due to a lack of data or evidence to warrant their implementation.

During the back half of 2019, City Officers revisited the report and conducted extensive traffic counts throughout the suburb of Falcon for comparison to the 2006 data. This review included analyses of crash data throughout the suburb and also reviewed the recommended actions from the initial report to determine if they were now warranted given the changes in traffic conditions over time.

Due to the long, narrow geography of the suburb, it was separated in to 5 separate catchments for the purpose of data capture and analysis. These catchments in order from north to south are listed below with a map of their extents.

Merlin St Catchment

Philante St Catchment

Mercedes Ave Catchment

Thera St Catchment

Yeedong Rd Catchment

Traffic Counts

Traffic counts were carried out across the suburb of Falcon with the intent of matching the traffic count locations with those from the 2006 study. This was not possible at all locations due to changes in infrastructure within the verge that would not allow the traffic counters to be locked off at their original sites.

The traffic count data was assessed against the original data from the 2006 study which was compared to look at changes in both traffic volumes and vehicle speeds. Tables comparing the traffic count data for each of the 5 catchments can be seen below. Some traffic count locations are represented in more than 1 catchment as per the original traffic study.

Attachment 2 – Falcon Traffic Count Data 85th Percentile Speeds & Attachment 3 - Falcon Traffic Count Data Daily Volumes display the locations and results of the 2019 traffic counts throughout the suburb of Falcon in regards to 85th percentile speeds and daily traffic volumes as seen in the tables below.

Merlin St Catchment Traffic Data					
Traffic Count Location	Date From	Date To	Avg Weekday Volume (vpd)	85th Percentile Speed	% Vehicles Exceeding
Adante St - 10m South of Casilda	2/05/2003	8/05/2003	140.4	51.1	18.40%
	4/11/2019	13/11/2019	208.7	52.6	21.39%
	Difference		68.3	1.5	3.0%
Eldora Cr - 100m North of Teal	2/05/2003	8/05/2003	114.4	52.6	26.10%
	31/07/2019	12/08/2019	331.7	59.04	59.00%
	Difference		217.3	6.44	32.9%
Cobblers Rd - 200m South of Merlin St	13/06/2003	19/06/2003	174.6	62.3	57.00%
	31/07/2019	12/08/2019	224.6	59.85	48.87%
	Difference		50	-2.45	-8.1%
Merlin St - 10m East of Mistral St	5/12/2003	11/12/2003	1364.2	39.6	0.30%
	31/07/2019	12/08/2019	2724	54.27	35.15%
	Difference		1359.8	14.67	34.9%
Mistral St - Between Clio and Vega St	6/09/2002	12/09/2002	369.3	61.6	58.10%
	5/06/2019	17/06/2019	448.3	57.69	46.51%
	Difference		79	-3.91	-11.6%
Vanessa Rd - 20m West of Adante St	16/05/2003	5/06/2003	294.1	58.7	43.70%
Vanessa Rd - 100m West of Merlin St	31/07/2019	12/08/2019	584.6	52.92	26.57%
Vanessa Rd - 300m West of Merlin St	2/05/2003	8/05/2003	311.5	59.4	52.20%
	31/07/2019	12/08/2019	543.4	58.95	54.09%
	Difference		231.9	-0.45	1.9%

Philante St Catchment Traffic Data					
Traffic Count Location	Date From	Date To	Avg Weekday Volume (vpd)	85th Percentile Speed	% Vehicles Exceeding
Cooranga Rd - 50m North of Rakoa	14/03/2003	20/03/2003	317.8	46.1	5.8%
New Traffic Counts Unavailable					
Cobblers Rd - 100m South of Winya	10/02/2006	24/02/2006	338	64.1	65.1%
	22/08/2019	4/09/2019	216.1	56.34	53.1%
	Difference		-121.9	-7.76	-12.0%
Galatea Rd - 50m North of Argosy	5/12/2003	11/12/2003	171.9	42.5	1.7%
	19/11/2019	27/11/2019	526.2	51.48	20.7%
	Difference		354.3	8.98	19.0%
Leander St - 50m North of Rowena	8/05/2003	15/05/2003	240.1	63.7	55.7%
	22/08/2019	4/09/2019	400.5	58.29	48.8%
	Difference		160.4	-5.41	-7.0%
Leander St - 100m North of Wanui	8/05/2003	15/05/2003	282.6	56.5	42.4%
	22/08/2019	4/09/2019	373.1	48.15	9.3%
	Difference		90.5	-8.35	-33.1%
Lynda St - 50m South of Argosy	8/05/2003	15/05/2003	164	42.5	2.3%
	19/11/2019	27/11/2019	174.5	46.35	6.5%
	Difference		10.5	3.85	4.2%
Lynda St - 100m North of Mercedes	8/05/2003	15/05/2003	167.4	53.6	27.8%
	22/08/2019	4/09/2019	406.1	52.47	25.3%
	Difference		238.7	-1.13	-2.6%
Philante St - 10m East of Leander	5/12/2003	11/12/2003	17.1	67.3	53.3%
	11/04/2019	23/04/2019	355.5	51.9	19.5%
	Difference		338.4	-15.4	-33.8%
Philante St - 50m West of Miluna	7/02/2003	13/02/2003	463.5	59.4	45.7%
	11/04/2019	23/04/2019	480.1	56	38.7%
	Difference		16.6	-3.4	-7.0%
Rakoa St - 10m West of Galatea	14/03/2003	20/03/2003	274.3	42.8	4.5%
	22/08/2019	4/09/2019	219.4	45.36	6.3%
	Difference		-54.9	2.56	1.8%
Rakoa St - 50m South of Cooranga	14/03/2003	20/03/2003	372.3	47.5	8.6%
	19/11/2019	27/11/2019	607.1	43.11	2.7%
	Difference		234.8	-4.39	-5.9%
Scenic Dr - 10m West of Cobblers	5/12/2003	11/12/2003	1398.5	37.1	0.3%
New Traffic Counts Unavailable					
Scenic Dr - 150m West of Philante St	9/07/2019	22/07/2019	347.9	49.05	13.1%
Scenic Dr - 10m West of Winya	5/12/2003	11/12/2003	413.8	54.4	30.2%
	9/07/2019	22/07/2019	351	47.82	9.5%
	Difference		-62.8	-6.58	-20.7%
Spinaway Pde - 100m South of Rakoa	14/03/2003	20/03/2003	303.4	59	44.2%
	23/09/2019	3/10/2019	576.1	55.62	39.0%
	Difference		272.7	-3.38	-5.2%
Spinaway Pde - 100m South of Rowena	7/02/2003	13/02/2003	150.9	53.6	23.5%
	23/09/2019	3/10/2019	251.6	52.74	25.4%
	Difference		100.7	-0.86	1.9%

Mercedes Ave Catchment Traffic Data					
Traffic Count Location	Date From	Date To	Avg Weekday Volume (vpd)	85th Percentile Speed	% Vehicles Exceeding
Baroy St - 50m East of Spinaway	16/01/2003	23/01/2003	387.6	45.7	6.9%
	23/09/2019	3/10/2019	440.5	34.74	0.2%
	Difference		52.9	-10.96	-6.7%
Baroy St - 80m East of Spinaway	10/02/2006	17/02/2006	505.3	51.1	18.6%
Baroy St - 10m East of Nerrima	16/01/2003	23/01/2003	1020	56.5	38.9%
Baroy St - 20m East of Nerrima	10/02/2006	17/02/2006	1319	58	44.3%
	23/09/2019	3/10/2019	1256.8	52.02	22.6%
	Difference		-62.2	-5.98	-21.7%
Baroy St - 50m West of Lynda	16/01/2003	23/01/2003	786.8	58.7	47.3%
	10/02/2006	17/02/2006	853.2	59	48.9%
Baroy St - 30m East of Lynda St	23/09/2019	3/10/2019	934.8	59.58	55.2%
	Difference		81.6	0.58	6.3%
Carthage Rd - 100m North of Deb	27/02/2003	13/03/2003	76.4	52.2	21.7%
	23/09/2019	3/10/2019	98.3	50.58	16.1%
	Difference		21.9	-1.62	-5.6%
Cooranga Rd - 100m North of Baroy	27/02/2003	13/03/2003	183.7	59.4	49.2%
	23/09/2019	3/10/2019	264	54.27	33.3%
	Difference		80.3	-5.13	-15.9%
Galatea Rd - 100m North of Baroy	27/02/2003	13/03/2003	220.5	55.8	35.7%
	23/09/2019	3/10/2019	50.5	53.01	26.9%
	Difference		-170	-2.79	-8.8%
Lynda St - 50m South of Argosy	8/05/2003	15/05/2003	164	42.5	2.3%
	19/11/2019	27/11/2019	174.5	46.35	6.5%
	Difference		10.5	3.85	4.2%
Lynda St - 100m North of Mercedes	8/05/2003	15/05/2003	167.4	53.6	27.8%
	22/08/2019	4/09/2019	406.1	52.47	25.3%
	Difference		238.7	-1.13	-2.6%
Mercedes Ave - 50m East of Nerrima	24/01/2003	30/01/2003	1355.9	58.3	56.5%
	10/02/2006	24/02/2006	1122.1	57.2	50.0%
	9/07/2019	22/07/2019	1766.8	54.09	35.6%
	Difference		644.7	-3.11	-14.4%
Mercedes Ave - 50m East of Spinaway	24/01/2003	30/01/2003	548.4	54	29.9%
	10/02/2006	24/02/2006	499.7	41.4	1.9%
Mercedes Ave - 50m West of Lynda	16/01/2003	23/01/2003	1026.9	58.7	51.3%
	10/02/2006	24/02/2006	805.9	58.7	46.3%
Mercedes Ave - 30m West of Galatea	9/07/2019	22/07/2019	821.9	54.45	33.6%
	Difference		16	-4.25	-12.7%
Spinaway Pde - 70m North of Mercedes	21/07/2005	28/07/2005	676.3	61.9	63.5%
	17/10/2019	28/10/2019	1085	53.46	29.8%
	Difference		408.7	-8.44	-33.7%
Spinway Pde - 50m South of Mercedes	24/01/2003	30/01/2003	1359.9	50.4	16.0%
	21/07/2005	28/07/2005	895.8	54.7	31.6%
	17/10/2019	28/10/2019	1508.6	43.65	3.3%
	Difference		612.8	-11.05	-28.4%

Thera St Catchment Traffic Data					
Traffic Count Location	Date From	Date To	Avg Weekday Volume (vpd)	85th Percentile Speed	% Vehicles Exceeding
Carthage Rd - 100m North of Deb	27/02/2003	13/03/2003	76.4	52.2	21.7%
	23/09/2019	3/10/2019	98.3	50.58	16.1%
	Difference		21.9	-1.62	-5.6%
Corfu St - 100m South of Mercedes	27/02/2003	13/03/2003	231	57.6	43.3%
New Traffic Counts Unavailable					
Crusader St - 100m North of Thera	4/04/2003	10/04/2003	180.2	58	42.1%
	17/10/2019	28/10/2019	235.9	50.94	17.3%
	Difference		55.7	-7.06	-24.8%
Koolinda St - 50m East of Scud	11/04/2003	1/05/2003	192.1	56.2	33.5%
	11/04/2019	23/04/2019	233.4	52.39	12.8%
	Difference		41.3	-3.81	-20.7%
Koolinda St - 100m West of Thera St	11/04/2003	1/05/2003	277.4	55.4	35.7%
	11/04/2019	23/04/2019	341.8	56.97	42.0%
	Difference		64.4	1.57	6.3%
Koolinda St - 150m East of Thera St	11/04/2003	1/05/2003	346.1	60.5	53.7%
New Traffic Counts Unavailable					
Panamuna Dr - 50m North of Yuna St	21/03/2003	3/04/2003	719.1	59.8	54.5%
	17/10/2019	28/10/2019	1095	55.44	40.2%
	Difference		375.9	-4.36	-14.3%
Serena St 100m West of Kybra	4/04/2003	10/04/2003	79.4	54.4	22.7%
	17/10/2019	28/10/2019	80.4	48.15	11.7%
	Difference		1	-6.25	-11.0%
Spinaway Pde - 100m West of Thera St	21/07/2005	28/07/2005	677.8	47.5	8.2%
New Traffic Counts Unavailable - Traffic Calming Since Installed					
Thera St - 50m North of Flight St	21/03/2003	3/04/2003	265.5	52.9	25.2%
	17/10/2019	28/10/2019	372.4	52.56	24.6%
	Difference		106.9	-0.34	-0.7%
Thera St - 10m South of Crusader	4/04/2003	10/04/2003	359.9	46.8	6.2%
Thera St - 10m North of Crusader	17/10/2019	28/10/2019	405.3	45.27	4.2%
	Difference		45.4	-1.53	-2.0%

Yeedong Rd Catchment Traffic Data					
Traffic Count Location	Date From	Date To	Avg Weekday Volume (vpd)	85th Percentile Speed	% Vehicles Exceeding
Avalon Pde - 50m North of Burna St	20/06/2003	3/07/2003	454.7	56.9	38.7%
	4/11/2019	13/11/2019	1078.1	54.45	32.5%
	Difference		623.4	-2.45	-6.2%
Avalon Pde - 50m South of Burna St	20/06/2003	3/07/2003	379.8	59.8	51.1%
	4/11/2019	13/11/2019	944.1	58.18	52.8%
	Difference		564.3	-1.62	1.7%
Avalon Pde - 50m South of Pepper St	20/06/2003	3/07/2003	397.3	50	15.2%
	4/11/2019	13/11/2019	945.3	49.5	13.0%
	Difference		548	-0.5	-2.2%
Baloo Cr - 200m South of Yeedong Rd	13/06/2003	19/06/2019	760.8	54	33.6%
	4/11/2019	13/11/2019	937.4	50.58	17.3%
	Difference		176.6	-3.42	-16.3%
Baloo Cr - Opposite School	13/06/2003	19/06/2019	359.3	49.3	14.3%
	19/11/2019	27/11/2019	513.1	44.28	4%
	Difference		153.8	-5.02	-10.4%
Cobblers Rd - 200m North of Windsor Way	10/02/2006	24/02/2006	388.3	59.8	55.7%
	4/11/2019	13/11/2019	930	51.66	22.4%
	Difference		541.7	-8.14	-33.3%
Cobblers Rd - 200m South of Flavia St	10/02/2006	24/02/2006	571.2	37.8	0.7%
	4/11/2019	13/11/2019	510.1	50.94	18.2%
	Difference		-61.1	13.14	17.5%
Dewar St - Mid Block	6/06/2003	12/06/2003	274.9	61.6	59.3%
	6/05/2019	20/05/2019	576.3	54.09	29.3%
	Difference		301.4	-7.51	-30.0%
Dewar St - 50m South of Sandalwood Ct	6/06/2003	12/06/2003	113.9	42.8	1.1%
New Traffic Counts Unavailable					
Kybra St - 50m North of Yeedong Rd	11/04/2003	1/05/2003	77.6	41.4	0.8%
	4/11/2019	13/11/2019	93.1	43.19	2.1%
	Difference		15.5	1.79	1.3%
Linville St - 50m South of Stepmoon St	10/02/2006	24/02/2006	302.8	47.9	10.1%
Linville St - 50m North of Stepmoon St	19/11/2019	27/11/2019	396	48.6	10.5%
	Difference		93.2	0.7	0.4%
Linville St - 100m East of Windsor Way	17/02/2006	24/02/2006	583.4	57.2	48.9%
	19/11/2019	27/11/2019	567.1	55.5	40.2%
	Difference		-16.3	-1.7	-8.7%
Panamuna Dr - 100m South of Kabbarli	21/03/2003	3/04/2003	732.8	59	50.6%
	28/02/2019	11/03/2019	1069.8	54.99	39.8%
	Difference		337	-4.01	-10.9%
Sandra St - 150m North of Yeedong Rd	17/02/2006	24/02/2006	856.4	53.6	30.1%
	19/11/2019	27/11/2019	1033.5	50.31	16.1%
	Difference		177.1	-3.29	-14.0%
Yeedong Rd - 50m West of Dalby St	31/01/2003	6/02/2003	1596.8	54.7	35.1%
	19/11/2019	27/11/2019	1859.8	51.48	22.2%
	Difference		263	-3.22	-12.9%
Yeedong Rd - 50m East of Pepper St	31/01/2003	6/02/2003	840.9	63.7	70.3%
	19/11/2019	27/11/2019	1286.2	59.22	61.4%
	Difference		445.3	-4.48	-8.9%

5 Year Crash History

Over the 5 year period between January 2014 and December 2018, there has been a total of 44 crashes on City owned roads within the suburb of Falcon. Of these 44 crashes, 37 (84%) were low impact crashes resulting in property damage only. There were 7 (16%) casualty crashes resulting in medical attention/hospital treatment. Of these 7 casualty crashes, 5 of them involved vulnerable road users (motorbike or bicycle) and 13 (30%) crashes were off path or off carriageway crashes that could possibly be associated with speeding. Comparatively, there has been a total of 28 crashes at the intersection of Mercedes Ave and Old Coast Rd in this same period alone.

The locations, crash types, crash severities and vehicle types involved are documented in **Attachment 4 – Falcon Crash Data** This attachment also includes a series of maps to display this data.

The crashes are sporadic across the suburb and do not point to any underlying safety issues within the road network. The low crash numbers throughout the suburb can also be attributed to the low traffic volumes observed on the majority of roads within the suburb. The highest density of crashes can be seen on Merlin Street between Old Coast Rd and Peelwood Pde. There is no repetitive crash pattern of any type through this section of road and the crash rate is directly correlated to the traffic volumes on Merlin St with vehicles accessing the suburbs of Halls Head and Falcon.

Conclusion & Catchment Recommendations

The suburb of Falcon, in regards to development, has remained relatively unchanged since the original study was conducted in 2006. Significant development has occurred on both the northern and southern boundaries with Halls Head and Wannanup respectively. This is reflected through analysis of traffic count data throughout the suburb. While traffic volumes have increased overall in this 15 year period, the changes are not significant. The most notable increases in traffic volumes are all on roads providing access to the coast, particularly the areas of Falcon Bay and Avalon Beach.

Over this period, there has been a significant reduction in the operating speed of most roads within the suburb. This is largely be due to a broader shift in driver behaviour and compliance with the default BUA speed limit of 50 km/h. Due to the age of the suburb, there are still a number of roads that both geometrically and topographically lend themselves to high vehicle speeds. These higher speeds appear to be a combination of both driver ignorance and hooning. Given the crash history throughout the suburb, it is likely that all treatments adopted would need to be funded solely by the City.

Merlin St Catchment

Analysis of the traffic count data throughout the Merlin St catchment shows a general increase in traffic volumes, most notably on Merlin St over the 15 years since the original traffic data was captured. This increase is not unforeseen given the development that has occurred within Seascapes, the connection of Merlin St through to Peelwood Pde and the access to 2 primary schools on Karon Vista. Traffic volumes on all roads within the catchment are appropriate for their function.

The most notable concerns in regard to vehicle speeds were observed on Eldora Cr, Vanessa Rd and Mistral St. Geometrically and topographically, Mistral St lends itself to high vehicle speeds, in particular, hooning. Numerous vehicle speeds on Mistral St were captured in the range of 120 – 130 km/h and there is a significant history of resident concern at this location. While the use of mobile speed radars at this location has shown a reduction in the overall operating speed of the road, further traffic calming could be implemented on this road to deter drivers from actively seeking this road to drive their vehicles at excessive speeds.

A recommendation of the original traffic study was to install a roundabout at the intersection of Merlin St and Mistral St to act as both a traffic calming measure and threshold treatment for vehicles entering a built-up environment after exiting Old Coast Rd. With the intersection identified to require a renewal due to the condition of the pavement, there is an opportunity to upgrade the infrastructure through the installation of a roundabout to improve both road safety and pedestrian safety through upgraded pedestrian links.

Recommendations

- Install a series of horizontal slow points along the length of Mistral St to break up the straight and discourage unsafe and antisocial driving behaviours.
- Install a roundabout at the intersection of Merlin St and Mistral St to act as both a traffic calming measure and threshold treatment for vehicles entering a built-up environment after exiting Old Coast Rd. Concept as per **Attachment 5 – Merlin St and Mistral St Roundabout Concept**

Philante St Catchment

Analysis of the traffic count data throughout the Philante St catchment shows a general increase in traffic volumes over the 15 years since the original traffic data was captured. Traffic volumes on all roads within the catchment are appropriate for their function with daily traffic volumes not exceeding 1,000 vpd at any locations.

In general, there has been a significant decrease in the operating speed of roads within the catchment over this period. The most notable concern in regard to vehicle speeds were captured on Leander St which geometrically, can lend itself to higher vehicle speeds. These speeds do not necessarily appear to be hooning related and rather reflect a wider issue of drivers ignorantly exceeding the speed limit by 10-30 km/h.

While the use of mobile speed radars at this location has shown a reduction in the overall operating speed of the road, a mid-block horizontal slow point along the straight of Leander St would likely reduce the operating speed of the road to be closer to the default BUA speed limit of 50 km/h. It should also be noted that Leander St is a bus route and the design of any traffic calming measures at this location would need to consider this.

Recommendations

- Install a mid-block horizontal slow point on Leander St to bring vehicle speeds closer in line with the default BUA speed limit of 50 km/h.

Mercedes Ave Catchment

Analysis of the traffic count data throughout the Mercedes Ave catchment shows a general increase in traffic volumes over the 15 years since the original traffic data was captured. Generally, these increases are insignificant. The most notable increases have occurred on both Mercedes Ave and Spinaway Pde with vehicles accessing the coast and the Falcon Bay foreshore. Traffic volumes on all roads within the catchment are appropriate for their function.

In general, there has been a significant decrease in the operating speed of roads within the catchment over this period. The most concerning vehicle speeds were captured on Baroy St which provides an east west link between Old Coast Rd and Spinaway Pde. Geometrically and topographically, Baroy St lends itself to high vehicle speeds as it is long and straight with steep uphill and downhill grades. These speeds do not necessarily appear to be hooning related and rather reflect a wider issue of drivers ignorantly exceeding the speed limit by 10-30 km/h. A potential solution to control vehicle speeds on Baroy St would be to install one or more horizontal slow points to break up the straight and force drivers to slow down. The initial traffic study recommended roundabouts at 2 intersections on Baroy St. Crash analysis for Baroy St

returns 1 crash at the intersection of Cooranga Rd, 1 crash at the intersection of Galatea Rd and 2 crashes at the intersection of Spinaway Pde. Given the traffic volumes and the crash history of Baroy St and intersecting roads, any roundabouts are not considered to be warranted.

There is a resident perception that vehicle speeds on Mercedes Ave are excessive. This is not supported by the data captured during multiple traffic counts. The most recent traffic counts that were conducted on Mercedes Ave over a 10-day period in November of 2019 only recorded a total of 29 vehicles exceeding the speed limit by more than 20 km/h for a daily average of less than 3 vehicles per day. The initial report made a recommendation for a roundabout at the intersection of Corfu St and Galatea Rd. Based on the traffic volumes and speeds observed on Mercedes Ave and the intersecting roads along with analysis of crash data for the entire length of Mercedes Ave, this treatment is not considered to be warranted. The use of mobile speed radars at this location has shown a slight reduction in the overall operating speed of the road.

To complement the redevelopment of the Falcon Bay foreshore precinct, there is an opportunity to incorporate permanent traffic calming measures through this location to protect pedestrian and vehicle movements. A raised threshold treatment at the intersection of Mercedes Ave and Spinaway Pde along with a raised pedestrian crossing/plateau to the west of Thera St would be ideal. Based on adjacent land uses, pedestrian volumes and on street parking, there may be the potential to implement a 40 km/h speed zone through this location as per MRWA new speed zoning policy.

Recommendations

- Install a series of mid-block horizontal slow point on Baroy St to bring vehicle speeds closer in line with the default BUA speed limit of 50 km/h.
- Install a raised plateau/threshold treatment at the intersection of Mercedes Ave and Spinaway Pde to delineate the northern boundary of the Falcon Bay Foreshore.
- Install a raised plateau at the existing pedestrian crossing on Spinaway Pde to the west of Thera St to protect pedestrian crossing movements.
- Apply to MRWA for a 40 km/h speed zone for the portion of Spinaway Pde adjacent to the Falcon Bay Foreshore

Thera St Catchment

Analysis of the traffic count data throughout the Thera St catchment shows a general increase in traffic volumes over the 15 years since the original traffic data was captured. Generally, these increases are insignificant. The most notable increases have occurred on Panamuna Dr with vehicles accessing the coast and the Falcon Bay foreshore. Traffic volumes on all roads within the catchment are appropriate for their function.

In general, there has been a significant decrease in the operating speed of roads within the catchment over this period. There are no specific areas of concern within the catchment but based on traffic volumes and the geometry of Panamuna Dr, there is the potential to further reduce vehicle speeds along this route with traffic calming. Ideally, when the LTCN is adopted and prioritised, a grade separated shared path will be installed on the western side of Panamuna Dr to minimise the number of intersection crossings with the existing footpath on the eastern side of the road.

The use of mobile speed radars at this location has shown a notable reduction in the overall operating speed of the road.

There is evidence of hooning and antisocial behaviour in the form of burnout marks on roads within the catchment. Some of this evidence is more notable on Koolinda St. These issues will not be resolved through any traffic calming measures and residents are urged to contact the WA Police in regard to hooning and antisocial behaviour.

Recommendations

- Prioritise a principal shared path for construction on the western side of Panamuna Dr to improve pedestrian safety and link existing sections of coastal path infrastructure.

Yeedong Rd Catchment

Analysis of the traffic count data throughout the Thera St catchment shows a general increase in traffic volumes over the 15 years since the original traffic data was captured. The most notable increases have occurred on Avalon Pde, Panamuna Dr, and Yeedong Rd with vehicles accessing the coast and Avalon Beach. Traffic volumes on all roads within the catchment are appropriate for their function.

In general, there has been a significant decrease in the operating speed of roads within the catchment over this period. The most concerning vehicle speeds were captured on Avalon Pde and at the western end of Yeedong Rd. These locations also see the highest pedestrian volumes. Similarly, to Panamuna Dr, when the LTCN is adopted and prioritised, a grade separated shared path will be installed on the western side of Avalon Pde to minimise the number of intersection crossings with the existing footpath on the eastern side of the road. Geometrically, Avalon Pde lends itself to high vehicle speeds and would potentially benefit from traffic calming in the future, particularly at the northern end of the road. This could be achieved through narrowing the existing pavement width to facilitate the installation of the grade separated shared path. These speeds do not necessarily appear to be hooning related and rather reflect a wider issue of drivers ignorantly exceeding the speed limit by 10-30 km/h. Having said this, traffic counts did capture vehicles travelling up to 120 km/h at this location. Vehicle speeds captured on Yeedong Rd between Pepper St and Ivanhoe Cr are also of concern. A contributing factor to these speeds is the location of the traffic counts at the base of steep downgrades in both directions of travel. Yeedong Rd currently has traffic calming in the form of a number of modified T intersections and blister islands to control vehicle speeds.

Baloo Cr provides north/south access to Falcon Primary School via Yeedong Rd and is heavily utilised by both vehicles and pedestrians during them AM and PM peaks which are aligned with the school start and finish times. Approximately 36% of Baloo Cr daily traffic volumes occur during the hour before and the hour after school. Yeedong Rd and Baloo Cr are also heavily used by pedestrians and students accessing Falcon Primary School. To improve road safety by separating vehicles and to improve pedestrian safety, the City is proposing to install a splitter island that will also act as a pedestrian refuge island at the intersection of Baloo Cr and Yeedong Rd. The pedestrian refuge will allow path users to concentrate on and cross only one lane of traffic at a time which greatly increases pedestrian safety when there are a high number of conflicting vehicle movement's occurring at the intersection during peak times.

Recommendations

- Prioritise a principal shared path for construction on the western side of Panamuna Dr to improve pedestrian safety and link existing sections of coastal path infrastructure.

Driver Behaviour Strategies

A recommendation of the 2006 report was also to explore and promote 'driver behaviour strategies' to promote road safety and to discourage anti-social driving behaviours. In recent years, the City has rolled out the use of mobile speed radars on local roads to reinforce the default built-up area speed limit of 50 km/h. These radars have been, and will continue to be used on distributor roads and coastal roads within the suburb or Falcon.

Initial follow up traffic counts on roads within the suburb of Falcon where the mobile speed radars have been used in recent years show reductions in the operating speeds of all of the roads, some by up to 10%.

Cycling and Pedestrian Infrastructure

A recommendation of the 2006 report was to promote a 'shared environment' and encourage the use of alternative modes of transport along beachside roads within the suburb.

Avalon Pde, Panamuna Dr and Spinaway Pde all run adjacent to the coast and attract high volumes of both pedestrian and cyclist activity for recreational purposes and for access to coastal facilities within the suburb. These roads also attract the highest traffic volumes throughout the suburb of Falcon. The majority of the existing path infrastructure on these roads was originally constructed on the eastern side of the road. These roads can be made safer, particularly for pedestrians and cyclists, through the installation of an uninterrupted shared path on the coastal side of all roads running adjacent to the coast. These paths will eliminate the requirement for pedestrians and cyclists to cross any intersecting roads and will eliminate the interface between manoeuvring vehicles at driveways and path users. These links have all been identified and are listed as priority links in the City's Long-Term Cycle Network and the Peel-Harvey Estuary Trails 'The Island Shared Use Trail'. Through the installation of these paths, there will also be an opportunity to reduce the pavement widths of these roads which should act as a traffic calming measure to reduce vehicle speeds while also reducing traffic volumes by creating safe access to the coast for pedestrians and cyclists as an alternative to driving. The extents of these roads where shared path infrastructure is required on the western side of the road are listed below.

- Avalon Pde (Cesia Lane to Yeedong Rd)
- Panamuna Dr (Sandra St to Falcon Bay)
- Spinaway Pde (Falcon Bay to Rakoa Reserve)
- Spinaway Pde (Rakoa Reserve to Philante St)

Attachments:

1. Falcon LATM Report May 2006
2. Falcon Traffic Count Data – 85th Percentile Speeds
3. Falcon Traffic Count Data – Daily Traffic Volumes
4. Falcon Crash Data
5. Merlin St and Mistral St Roundabout Concept

WorleyParsons

CITY OF MANDURAH

Falcon Area Traffic Study

Traffic and Transport Report

300/09696 CTR003

11-May-06

Infrastructure
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
WorleyParsons Services Pty Ltd
ABN 61 001 279 812

SYNOPSIS

Insert a Disclaimer

PROJECT 300/09696 CTR003 - FALCON AREA TRAFFIC STUDY

REV	DESCRIPTION	ORIG	REVIEW	WORLEY APPROVAL	DATE	CLIENT APPROVAL	DATE
0	Issued for Review	C R Kleyweg	G Mason	N/A	8/12/2005	N/A	
1	Issued for Approval	C R Kleyweg	G Mason		20/02/2006		
2	Final Comments Added	C R Kleyweg	G Mason		14/03/2006		
3	Additional Traffic Counts Added	C R Kleyweg	G Mason		21/03/2006		

CONTENTS

Tables

Figures

Appendices

1. INTRODUCTION

WorleyParsons have been engaged by the City of Mandurah to conduct a traffic study across the suburb of Falcon.

The purpose of the project is threefold and includes the following important components: -

- To provide a response sufficient for the City of Mandurah to respond formally to the traffic issues raised in the Falcon Community Survey;
- To develop an understanding of actual traffic movements through the suburb of Falcon and to understand the seasonal variations in traffic volumes and the potential issues for residents; and
- To outline potential infrastructure improvements to improve any intersections or roadways whilst accommodating alternative transport modal use such as cycling, walking and public transport uses.

1.1 Background

The City of Mandurah is undergoing rapid urban growth in a number of areas, particularly along the coastline. The suburb of Falcon has historically been a holiday destination / outer-lying community of the metropolitan area, with a mixture of senior and retired residents. Expanding urban development both adjacent to Falcon in areas like Port Bouvard and more generally throughout Mandurah has delivered strong growth in land valuations throughout Falcon, therefore impacting the composition of the suburb. Anecdotal evidence received from residents suggests growing issues regarding traffic volumes, pedestrian and road user safety.

To follow up on the resident feedback, the City of Mandurah have conducted a number of traffic counts through the region, the latest being between July 2003 and June 2005 and have collated resident responses to a community survey of road safety issues throughout the Falcon Region, with a focus on the western side of the Old Coast Road.

This report will seek to collate information received by the City of Mandurah, provide a preliminary assessment of road safety in the area and note potential road improvements through the region to improve the safety and amenity of the suburb.

1.2 Layout of the Report

The breakdown of tasks for this project is as follows: -

- Assessment of the Falcon Community Survey and summary of issues (Section 2);
- Review of existing traffic data (Section 3);
- Review of existing traffic crash data (Section 4);
- Assessment of existing roadway facilities (Section 5); and

- Conclusions and recommendations (Section 6).

1.3 Aim of the Report

The aim of the report is to review the resident responses to the City of Mandurah's Community Survey, to identify areas where vehicle speeds are considered excessive and to identify appropriate engineering and / or other controls to promote an appropriate speed environment within the Falcon Area.

The City of Mandurah have requested that a minimum of fifteen traffic control devices are shown conceptually to accompany the findings of the report with an order of cost estimate for the proposed works to enable the City to develop a forward program.

2. ASSESSMENT OF THE FALCON COMMUNITY SURVEY

The first phase of the project involves analysing the communities' response to the City of Mandurah's community consultation survey into roadway issues in the City of Mandurah. The residents were asked to respond as to whether the following items were an issue either in their street or in the area in general: -

- Speed;
- Visibility;
- Pedestrians;
- Driveways; and
- Traffic Volumes.

Where any of the above issues were answered with a "true" response, the respondent was then asked to quantify the response.

The following provides a summary of responses to the survey: -

- There were a total of 554 responses to the survey;
- 447 respondents (**or 80%**) felt that speeding was an issue;
- 284 respondents (**or 51%**) felt that pedestrian safety was an issue;
- 204 respondents (**or 36%**) felt that visibility and sight lines for drivers was an issue;
- 95 respondents (**or 17%**) felt that visibility and sight lines from driveways was an issue; and
- 232 respondents (**or 41%**) felt that traffic volumes in the peak holiday periods were far greater than during the rest of the year.

Respondents to the survey were drawn from the western side of the Old Coast Road. For the purposes of this report we have separated the responses into the following catchments based on access to a road with 'flow priority': -

Merlin Street Catchment

- There may be vehicle speed issues in Mistral Street and Vanessa Road;
- There may be general visibility issues in Cobblers Road, Eldora Crescent, Mistral Street and Vanessa Road;
- There may be pedestrian safety issues along Mistral Street and Cobblers Road; and
- There may be safety and visibility issues associated with some driveways in Cobblers Road.

Philante Street Catchment

- There may be vehicle speed issues in Cooranga Road, Galatea Road, Leander Street and Spinaway Parade;
- There may be general visibility issues in Cobblers Road, Cooranga Road, Galatea Road, Leander Street and Spinaway Parade;
- There may be pedestrian safety issues along Cobblers Road, Cooranga Road, Galatea Road, Leander Street and Spinaway Parade; and
- There may be safety and visibility issues associated with some driveways in Cobblers Road, Cooranga Road, Galatea Road, Leander Street and Spinaway Parade.

Mercedes Avenue Catchment

- There may be vehicle speed issues in Baroy Street, Charon Street, Cooranga Road, Galatea Road, Mercedes Avenue, Old Coast Road and Spinaway Parade;
- There may be general visibility issues in Baroy Street, Charon Street, Cooranga Road, Galatea Road, Mercedes Avenue and Spinaway Parade;
- There may be pedestrian safety issues along Cobblers Road, Baroy Street, Charon Street, Cooranga Road, Galatea Road, Mercedes Avenue, Old Coast Road and Spinaway Parade;
- There may be safety and visibility issues associated with some driveways in Cobblers Road, Baroy Street, Charon Street, Cooranga Road, Galatea Road, Mercedes Avenue and Spinaway Parade.

Thera Street Catchment

- There may be vehicle speed issues in Charon Street, Crusader Street, Panamuna Drive, Sandra Street and Thera Street;
- There may be general visibility issues in Charon Street, Crusader Street, Panamuna Drive, Sandra Street, Serena Street and Thera Street;
- There may be pedestrian safety issues along Charon Street, Crusader Street, Panamuna Drive, Sandra Street, Serena Street and Thera Street; and
- There may be safety and visibility issues associated with some driveways in Charon Street.

Yeedong Road Catchment

From the above information it can be concluded that anecdotally: -

- There may be vehicle speed issues in Avalon Parade, Baloo Crescent, Linville Street, Panamuna Drive, Pepper Street, Thera Street and Yeedong Road;
- There may be general visibility issues in Avalon Parade, Linville Street, Panamuna Drive, Pepper Street, Thera Street and Yeedong Road

- There may be pedestrian safety issues along Avalon Parade, Baloo Crescent, Linville Street, Panamuna Drive, Pepper Street, Thera Street and Yeedong Road; and
- There may be safety and visibility issues associated with some driveways in Yeedong Road.

The resident responses will be highlighted in Section 3 and compared to traffic data received from the City of Mandurah.

3. REVIEW OF EXISTING TRAFFIC DATA

The purpose of this section is to collate and review existing traffic data provided by the City of Mandurah within the Falcon Area. The following data will be collated at each nominated site from the information provided: -

- The location of the data collected;
- The dates between which data was collected;
- The average weekday (Monday to Friday) traffic volume;
- The average daily traffic inclusive of weekday and weekend day traffic volumes;
- The 85th percentile speed of vehicles as captured during the survey period; and
- The percentage of vehicles which are travelling over the posted speed limit during the survey period.

The information will be analysed according to the catchments as designated in Section 2. Data highlighted in bold font shows roads where the community expressed a reasonable level of concern regarding speed.

Data highlighted in red indicates a road with an 85th percentile speed of approximately 60kph, or around 20% greater than the statutory 50kph speed limit.

3.1 Merlin Street Catchment

Traffic data for the Merlin Street catchment is provided below: -

Table 1 - Merlin Street Catchment Traffic Data

Road Name	Date	Avg weekday	Avg Daily	85th Percentile Speed	% Vehicles Exceeding 50 kph
Andante St – 10 metres south of Casilda	2/5/2003 to 8/5/2003	140.4	140.6	51.1 kph	18.4%
Eldora Cres – 100 metres north of Teal	**2/5/2003 to 8/5/2003**	**114.4**	**122.0**	**52.6 kph**	**26.1%**
Cobblers Rd – 200 metres south of Merlin	**13/6/2003 to 19/6/2003**	**174.6**	**163.6**	**62.3 kph**	**57.0%**
Merlin St – 10 metres east of Mistral	5/12/2003 to 11/12/2003	1364.2	1418.7	39.6 kph	0.3%
Mistral Street – Between Clio and Vega St	**6/9/2002 to 12/9/2002**	**369.3**	**359.9**	**61.6 kph**	**58.1%**
Vanessa Rd – 20 metres west of Andante St	**16/5/2003 to 5/6/2003**	**294.1**	**318.6**	**58.7 kph**	**43.7%**
Vanessa Rd – 300 metres west of Merlin	**2/5/2003 to 8/5/2003**	**311.5**	**328.4**	**59.4 kph**	**52.2%**

The data collected in the above surveys shows a 50% correlation to the feedback from residents taken in the community consultation. The following roads exhibit an 85th percentile speed which may require further attention: -

- Cobblers Road (200 metres south of Merlin Street);
- Mistral Street (between Clio and Vega Streets);
- Vanessa Road (20 metres west of Andante Street); and
- Vanessa Road (300 metres west of Merlin Street)

The perception for Eldora Crescent appears to be based on a minority of occurrences with the 85th percentile speed closer to 50kph.

Figure 1 - Merlin Street Catchment, Locations with Excessive 85th Percentile Vehicle Speeds

3.2 Philante Street Catchment

Traffic data for the Philante Street catchment is provided below: -

Table 2 - Philante Street Catchment Traffic Data

Road Name	Date	Avg weekday	Avg Daily	85th Percentile Speed	% Vehicles Exceeding 50 kph
Cooranga Rd – 50 metres north of Rakoa	14/3/2003 to 20/3/2003	317.8	398.3	46.1 kph	5.8%
Cobblers Rd – 100 metres south of Winya	10/2/2006 to 24/2/2006	338.0	331.2	64.1 kph	65.1%
Galatea Rd – 50 metres north of Argosy	5/12/2003 to 11/12/2003	171.9	166.7	42.5 kph	1.7%
Leander St – 50 metres north of Rowena	8/5/2003 to 15/5/2003	240.1	236.7	63.7 kph	55.7%
Leander St – 100 metres north of Wanui	8/5/2003 to 15/5/2003	282.6	289.6	56.5 kph	42.4%
Lynda St – 50 metres south of Argosy St	8/5/2003 to 15/5/2003	164.0	177.3	42.5 kph	2.3%
Lynda St – 100 metres north of Mercedes Ave	8/5/2003 to 15/5/2003	167.4	171.1	53.6 kph	27.8%
Philante St – 10 metres east of Leander	5/12/2003 to 11/12/2003	17.1	25.2	67.3 kph	53.3%
Philante St – 50 metres west of Milluna St	7/2/2003 to 13/2/2003	463.5	485.6	59.4 kph	45.7%
Rakoa St – 10 metres west of Galatea	14/3/2003 to 20/3/2003	274.3	277.3	42.8 kph	4.5%
Rakoa St – 50 metres south of Cooranga	14/3/2003 to 20/3/2003	372.3	432.1	47.5 kph	8.6%
Scenic Drive – 10 metres west of Cobblers Road	5/12/2003 to 11/12/2003	1398.5	1396.5	37.1 kph	0.3%
Scenic Drive – 10 metres west of Winya Way	5/12/2003 to 11/12/2003	413.8	413.6	54.4 kph	30.2%
Spinaway Pde – 100	14/3/2003 to	303.4	384.3	59.0 kph	44.2%

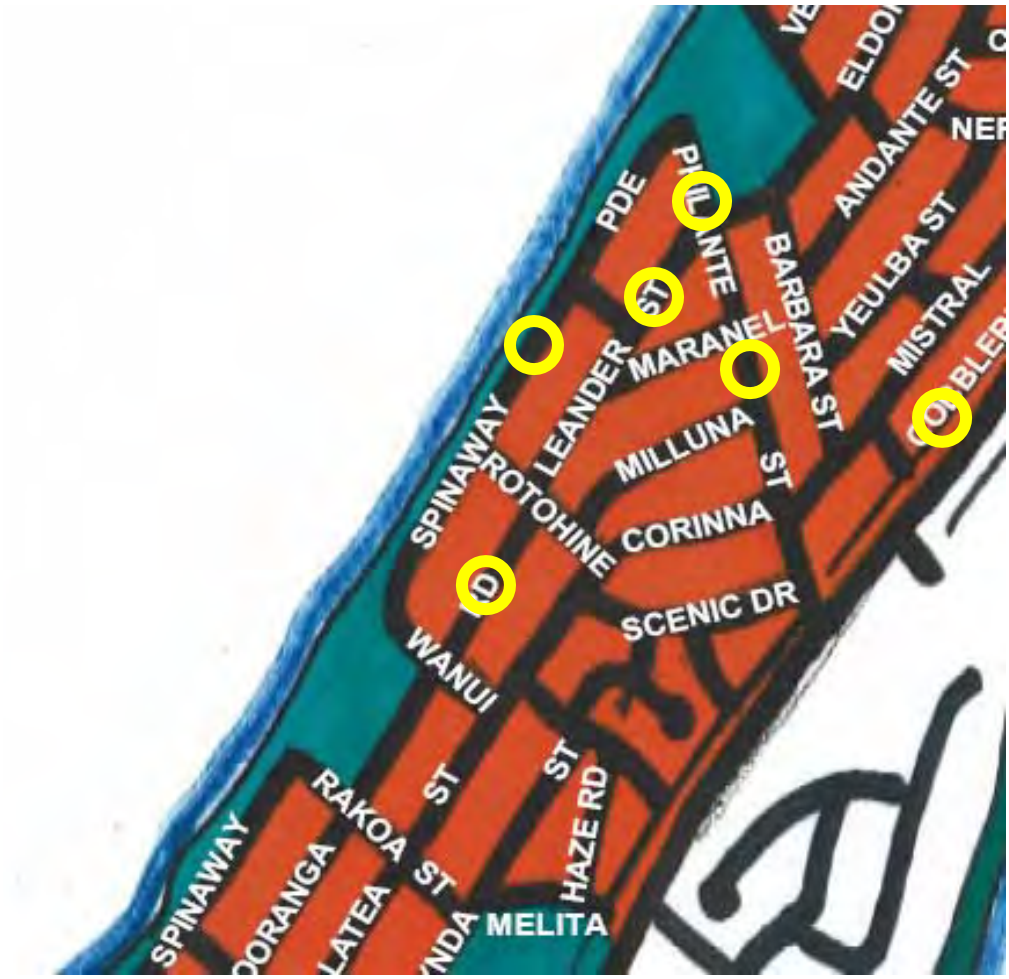
metres south of Rakoa	**20/3/2003**				
Spinaway Pde – 100 metres south of Rowena	**7/2/2003 to 13/2/2003**	**150.9**	**188.9**	**53.6 kph**	**23.5%**

The data collected in the above surveys shows a 50% correlation to the feedback from residents taken in the community consultation. The following roads exhibit an 85th percentile speed and / or an excessive percentage of vehicles exceeding the speed limit which may require further attention: -

- Cobblers Road (100 metres south of Winya Way);
- Leander Street (50 metres north of Rowena and 100 metres north of Wanui Street);
- Philante Street (10 metres east of Leander Street and 50 metres west of Milluna Street); and
- Spinaway Parade (100 metres south of Rowena Street)

Resident perception of vehicle speed issues were not matched by traffic results in Cooranga Road (50 metres north of Rakoa Street) and in Galatea Road (50 metres north of Wanui Street). 85th percentile speeds in Spinaway Parade 100 metres south of Rowena Street were marginally over 50kph, however nearly 1 in 4 drivers were found to be exceeding the speed limit.

Figure 2 - Philante Street Catchment, Locations with Excessive 85th Percentile Vehicle Speeds



3.3 Mercedes Avenue Catchment

Traffic data for the Mercedes Avenue catchment is provided below: -

Table 3 - Mercedes Avenue Catchment Traffic Data

Road Name	Date	Avg weekday	Avg Daily	85th Percentile Speed	% Vehicles Exceeding 50 kph
Baroy St – 50 metres east of Spinaway	16/1/2003 to 23/1/2003	387.6	419.4	45.7 kph	6.9%
Baroy St – 80 metres east of Spinaway	10/2/2006 to 17/2/2006	505.3	532.5	51.1 kph	18.6%
Baroy St – 10 metres east of Nerrima	16/1/2003 to 23/1/2003	1020.0	1143.9	56.5 kph	38.9%
Baroy St – 20 metres east of Nerrima	10/2/2006 to 17/2/2006	1319.0	1400.1	58.0 kph	44.3%
Baroy St – 50 metres west of Linda	16/1/2003 to 23/1/2003	786.8	843.1	58.7 kph	47.3%
	10/2/2006 to 17/2/2006	853.2	912.1	59.0 kph	48.9%
Carthage Rd – 100 metres north of Deb	27/2/2003 to 13/3/2003	76.4	89.9	52.2 kph	21.7%
Cooranga Rd – 100 metres north of Baroy	27/2/2003 to 13/3/2003	183.7	210.3	59.4 kph	49.2%
Galatea Rd – 100 metres north of Baroy	27/2/2003 to 13/3/2003	220.5	246.7	55.8 kph	35.7%
Lynda St – 50 metres south of Argosy St	8/5/2003 to 15/5/2003	164.0	177.3	42.5 kph	2.3%
Lynda St – 100 metres north of Mercedes Ave	8/5/2003 to 15/5/2003	167.4	171.1	53.6 kph	27.8%
Mercedes Ave – 50 metres east of Nerrima	24/1/2003 to 30/1/2003	1355.9	1541.7	58.3 kph	56.5%
	10/2/2006 to 24/2/2006	1122.1	1230.4	57.2 kph	50.0%
Mercedes Ave – 50	24/1/2003 to	548.4	668.7	54.0 kph	29.9%

metres east of Spinaway	**30/1/2003**				
	10/2/2006 to 24/2/2006	499.7	586.8	41.4 kph	1.9%
Mercedes Ave – 50 metres west of Linda	**16/1/2003 to 23/1/2003**	**1026.9**	**1083.4**	**58.7 kph**	**51.3%**
	10/2/2006 to 24/2/2006	**805.9**	**918.1**	**58.7 kph**	**46.3%**
Spinaway Pde – 70 metres north of Mercedes	**21/7/2005 to 28/7/2005**	**676.3**	**688.2**	**61.9 kph**	**63.5%**
Spinaway Pde – 100 metres north of Mercedes	**24/1/2003 to 30/1/2003**	**847.9**	**988.4**	**52.9 kph**	**25.8%**
Spinaway Pde – 50 metres south of Mercedes	**21/7/2005 to 28/7/2005**	**895.8**	**914.1**	**54.7 kph**	**31.6%**
Spinaway Pde – 50 metres south of Mercedes	**24/1/2003 to 30/1/2003**	**1359.9**	**1577.4**	**50.4 kph**	**16.0%**

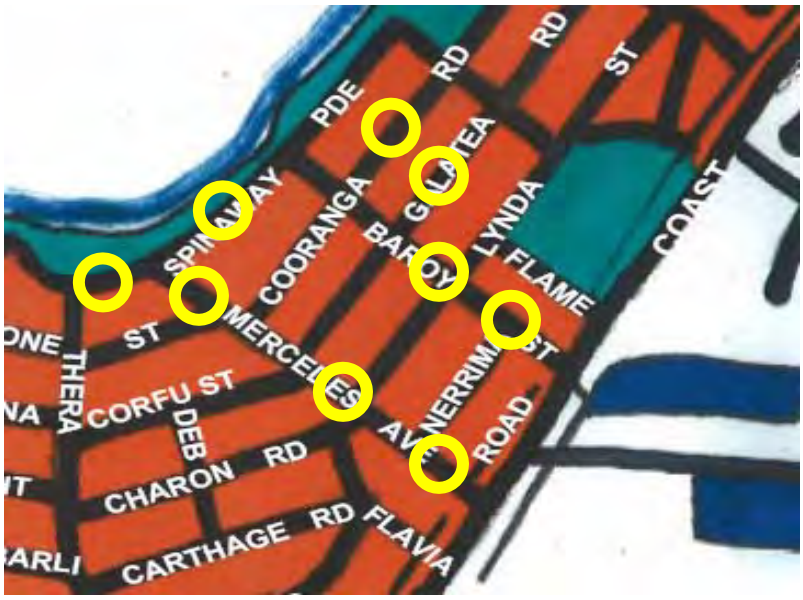
The data collected in the above surveys shows a strong correlation to the feedback from residents taken in the community consultation. The following roads exhibit an 85th percentile speed and / or an excessive percentage of vehicles exceeding the speed limit which may require further attention: -

- Baroy Street (10 metres east of Nerrima Street and 50 metres west of Lynda Street);
- Cooranga Road (100 metres north of Baroy Street);
- Galatea Road (100 metres north of Baroy Street);
- Mercedes Avenue (50 metres east of Nerrima Street, 50 metres east of Spinaway Parade and 50 metres west of Lynda Street); and
- Spinaway Parade (70 metres north and 50 metres south of Mercedes Avenue).

Additional counts were undertaken in Mercedes Avenue in February 2006 with results at 2 of the 3 locations similar to previous results. However the 85th percentile speed near the intersection of Spinaway Parade has reduced between the two surveys. For the purposes of this report, both surveys are included in the table.

Spinaway Parade, near Mercedes Avenue showed increased vehicle speeds in the 2005 data sample compared to the 2003 sample. Resident perception of vehicle speed issues were not matched by traffic results in Baroy Street near Spinaway Parade.

Figure 3 – Mercedes Ave Catchment, Locations with Excessive 85th Percentile Vehicle Speed



3.4 Thera Street Catchment

Traffic data for the Thera Street catchment is provided below: -

Table 4 - Thera Street Catchment Traffic Data

Road Name	Date	Avg weekday	Avg Daily	85th Percentile Speed	% Vehicles Exceeding 50 kph
Carthage Rd – 100 metres north of Deb	27/2/2003 to 13/3/2003	76.4	89.9	52.2 kph	21.7%
Corfu St – 100 metres south of Mercedes	27/2/2003 to 13/3/2003	231.0	250.0	57.6 kph	43.3%
Crusader St – 100 metres north of Thera	**4/4/2003 to 10/4/2003**	**180.2**	**182.2**	**58.0 kph**	**42.1%**
Koolinda St – 50 metres east of Scud St	11/4/2003 to 1/5/2003	192.1	201.2	56.2 kph	33.5%
Koolinda St – 100 metres west of Thera St	11/4/2003 to 1/5/2003	277.4	286.1	55.4 kph	35.7%
Koolinda St – 150 metres east of Thera St	11/4/2003 to 1/5/2003	346.1	356.9	60.5 kph	53.7 %
Panamuna Dr – 50 metres north of Yuna St	**21/3/2003 to 3/4/2003**	**719.1**	**728.4**	**59.8 kph**	**54.5%**
Serena St – 100 metres west of Kybra	4/4/2003 to 10/4/2003	79.4	78.9	54.4 kph	22.7%
Spinaway Pde – 100 metres west of Thera	**21/7/2005 to 28/7/2005**	**677.8**	**693.6**	**47.5 kph**	**8.2%**
Thera St – 50 metres north of Flight	**21/3/2003 to 3/4/2003**	**265.5**	**294.7**	**52.9 kph**	**25.2%**
Thera St – 10 metres south of Crusader	**4/4/2003 to 10/4/2003**	**359.9**	**381.2**	**46.8 kph**	**6.2%**

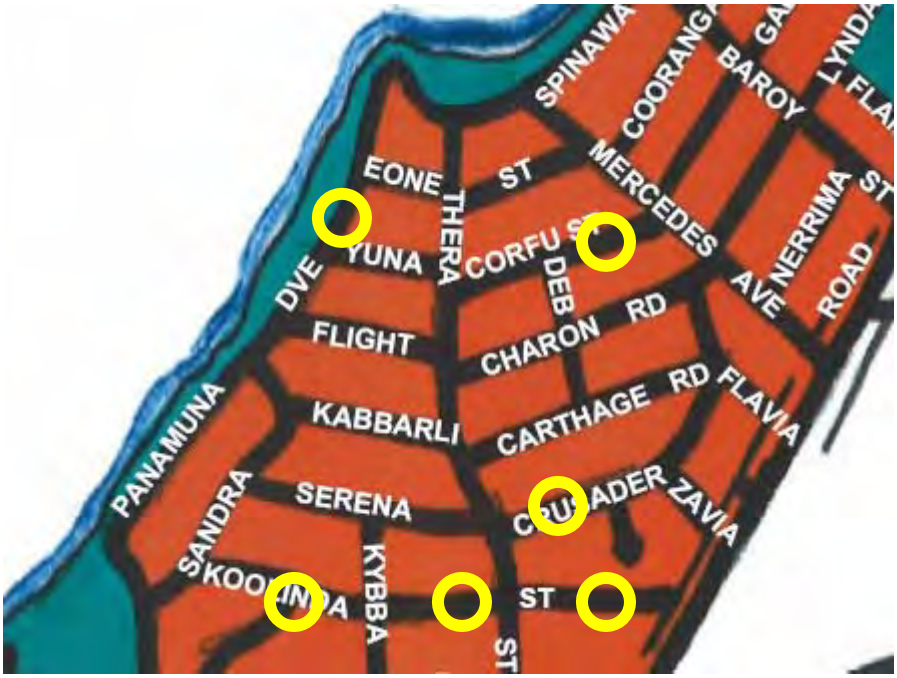
The data collected in the above surveys shows a weak correlation to the feedback from residents taken in the community consultation. The following roads exhibit an 85th percentile speed and / or an excessive percentage of vehicles exceeding the speed limit which may require further attention: -

- Corfu Street (100 metres south of Mercedes Street);
- Crusader Street (100 metres north of Thera Street);

- Koolinda Street (50 metres east of Scud Street);
- Koolinda Street (100 metres west of Thera Street);
- Koolinda Street (150 metres east of Thera Street); and
- Panamuna Drive (50 metres north of Yuna Street).

Resident perception of vehicle speed issues were not matched by traffic results in Spinaway Parade near Thera Street or in Thera Street near Flight Street and Crusader Street.

Figure 4 – Thera Street Catchment, Locations with Excessive 85th Percentile Vehicle Speed



3.5 Yeedong Road Catchment

Traffic data for the Yeedong Road catchment is provided below: -

Table 5 - Yeedong Road Catchment Traffic Data

Road Name	Date	Avg weekday	Avg Daily	85th Percentile Speed	% Vehicles Exceeding 50 kph
Avalon Pde – 50 metres north of Burna St	**20/6/2003 to 3/7/2003**	**454.7**	**484.2**	**56.9 kph**	**38.7%**
Avalon Pde – 50 metres south of Burna St	**20/6/2003 to 3/7/2003**	**379.8**	**405.5**	**59.8 kph**	**51.1%**
Avalon Pde – 50 metres south of Pepper St	**20/6/2003 to 3/7/2003**	**397.3**	**419.1**	**50.0 kph**	**15.2%**
Baloo Cres – 200m south of Yeedong Rd	**13/6/2003 to 19/6/2003**	**760.8**	**609.4**	**54.0 kph**	**33.6%**
Baloo Cres – opp school	**13/6/2003 to 19/6/2003**	**359.3**	**293.7**	**49.3 kph**	**14.3%**
Cobblers Road – 200 metres north of Windsor Way	**10/2/2006 to 24/2/2006**	**388.3**	**386.9**	**59.8 kph**	**55.7%**
Cobblers Road – 200 metres south of Flavia Street	10/2/2006 to 24/2/2006	571.2	565.3	37.8 kph	0.7%
Dewar St – mid block	6/6/2003 to 12/6/2003	274.9	279.0	61.6 kph	59.3%
Dewar St – 50m south of Sandalwood Ct	6/6/2003 to 12/6/2003	113.9	114.7	42.8 kph	1.1%
Kybra St – 50 metres north of Yeedong Rd	11/4/2003 to 1/5/2003	77.6	78.9	41.4 kph	0.8%
Linville St – 50 metres south of Stepmoon St	10/2/2006 to 24/2/2006	302.8	286.8	47.9 kph	10.1%
Linville St – 100 metres east of Windsor Way	**17/2/2006 to 24/2/2006**	**583.4**	**558.2**	**57.2 kph**	**48.9%**
Panamuna Dr – 100 metres south of	**21/3/2003 to 3/4/2003**	**732.8**	**725.4**	**59.0 kph**	**50.6%**

Kabbarli					
Sandra St – 150 metres north of Yeedong Road	**17/2/2006 to 24/2/2006**	**856.4**	**1138.0**	**53.6 kph**	**30.1%**
Yeedong Rd – 50 metres west of Dalby St	**11/12/2003 to 18/12/2003**	**2471.5**	**2296.6**	**44.6 kph**	**3.3%**
Yeedong Rd- 50 metres east of Pepper St	**31/01/2003 to 6/2/2003**	**840.9**	**883.7**	**63.7 kph**	**70.3%**
Yeedong Rd – 50 metres west of Dalby St	**31/01/2003 to 6/2/2003**	**1596.8**	**1449.3**	**54.7 kph**	**35.1%**

The data collected in the above surveys shows a weak correlation to the feedback from residents taken in the community consultation. The following roads exhibit an 85th percentile speed and / or an excessive percentage of vehicles exceeding the speed limit which may require further attention: -

- Avalon Parade (50 metres north of Burna Street);
- Avalon Parade (50 metres south of Burna Street);
- Baloo Crescent (200 metres south of Yeedong Road);
- Baloo Crescent (opposite Primary School);
- Cobblers Road (200 metres north of Windsor Way);
- Dewar Street (mid block);
- Linville Street (100 metres east of Windsor Way);
- Panamuna Drive (100 metres south of Kabbarli Street);
- Sandra Street (150 metres north of Yeedong Road);
- Yeedong Road (50 metres east of Pepper Street); and
- Yeedong Road (50 metres west of Dalby Street) – prior to construction of traffic calming structure.

Resident perception of vehicle speed issues were not matched by traffic results in Avalon Parade near Pepper Street or in Yeedong Road near Dalby Street after the construction of a nearby traffic calming structure.

Figure 5 - Yeedong Road Catchment, Locations with Excessive 85th Percentile Vehicle Speed

4. TRAFFIC CRASH DATA

This section details traffic accident data provided by the City of Mandurah across the Falcon Area between January 2000 and January 2005. The section is divided into the respective catchments with figures shown highlighting the locations of accidents and to determine any correlation in the data.

4.1 Merlin Street Catchment

Table 6 - Merlin Street Traffic Accident Data

Road Name	Date	Severity	Road Feature	MRWA Nature Code	Colliding Vehicle Movement Code
Corner Vanessa Road and Merlin Street	23 Sep 01	PDO Major	T Junction	Hit Obj (tree)	Out of Control
Andante Street (mid block)	23 May 04	Hospital	Straight	Hit Obj (tree)	Out of Control
Merlin Street (mid block)	29 Aug 03	Medical	Curve	Head On	Out of Control
Merlin Street (mid block)	1 Jun 00	PDO Major	Curve	Hit Obj (fence)	Out of Control
Merlin Street (mid block)	14 Jun 02	PDO Minor	Straight	Hit Obj (kerb)	Swerving to Avoid Vehicle
Lyelta Street (mid block)	13 Jun 04	PDO Major	Straight	Right Angle	Reversing
Cobblers Road (mid block)	4 Sep 04	Medical	Straight	Right Angle	Straight Ahead
Cobblers Road (mid block)	8 Jan 03	Medical	Straight	Right Angle	Straight Ahead

Figure 6 – Merlin Street Catchment, Traffic Accident Locations

The Figure and Table above shows a concentration of accidents along Merlin Street, particularly at the intersection with Old Coast Road, (details provided in Appendix 3 – Main Roads

4.2 Philante Street Catchment

Table 7 - Philante Street Catchment Traffic Accident Data

Road Name	Date	Severity	Road Feature	MRWA Nature Code	Colliding Vehicle Movement Code
Corner Philante Street and Scenic Drive	3 Sep 00	Medical	T Junction	Rear End	Straight Ahead
Corner Mistrel Street and Oderna Street	28 Nov 02	PDO Major	T Junction	Hit Obj (fence)	Loss of Control
Cobblers Road (mid block)	13 Apr 01	PDO Major	Straight	Head On	Out of Control
Cobblers Road (mid block)	9 Apr 00	PDO Major	Curve	Hit Obj (kerb)	Out of Control
Spinaway Parade (mid block)	23 Mar 02	PDO Minor	Straight	Hit Pedestrian	Straight Ahead
Spinaway Parade (mid block)	6 Jun 04	PDO Minor	Straight		Driverless Vehicle
Leander Street (mid block)	7 Jan 00	PDO Minor	Straight	Right Angle	Reversing from driveway
Scenic Drive (mid block)	29 Dec 03	PDO Minor	Straight		Out of Control
Scenic Drive (mid block)	11 Jul 03	PDO Major	Straight	Right Angle	Reversing from driveway
Melita Street (mid block)	5 Apr 02	PDO Major	Straight		Reversing from driveway

Figure 7 - Philante Street Catchment, Traffic Accident Locations

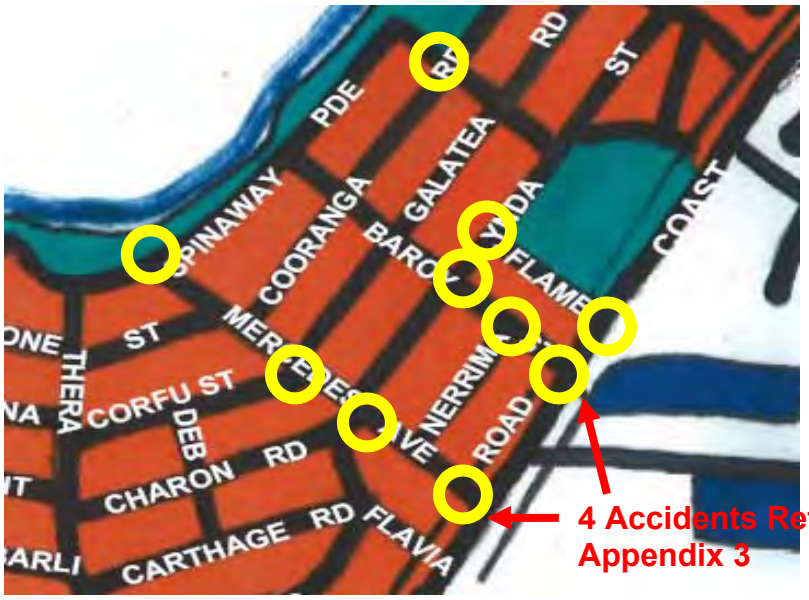
The Figure and Table above shows a broader spread of accidents across the Philante Street catchment, however the greatest concentration is at the intersection of Scenic Drive and Old Coast Road and along Philante Street.

4.3 Mercedes Avenue Catchment

Table 8 - Mercedes Avenue Catchment Traffic Accident Data

Road Name	Date	Severity	Road Feature	MRWA Nature Code	Colliding Vehicle Movement Code
Corner Mercedes Avenue and Spinaway Parade	5 Mar 00	PDO Major	T Junction	Hit Obj	Out of Control
Corner Cooranga Road and Rakoa Street	27 Jun 00	PDO Minor	4 way Intersection	Right Angle	Straight Ahead
Corner Flame Street and Lynda Street	11 Sep 03	PDO Major	T Junction	Hit Obj	Out of Control
Corner Baroy Street and Nerrima Street	3 Oct 03	Medical	T Junction	Hit Obj	Out of Control
Corner Lynda Street and Baroy Street	7 Apr 03	PDO Major	4 Way Intersection	Right Angle	Straight Ahead
Corner Corfu Street, Mercedes Avenue and Galatea Road	13 Jun 02	PDO Minor	4 Way Intersection	Hit Obj	Out of Control
Corner Charon Road and Mercedes Avenue	27 Dec 04	PDO Major	T Junction	Non collision	Out of Control
Cobblers Road (mid block)	18 Feb 01	PDO Major	Curve	Right Angle	Straight Ahead
Lynda Street (mid block)	9 Sep 04	PDO Minor	Straight	Right Angle	Making Right Turn

Figure 8 – Mercedes Avenue Catchment, Traffic Accident Locations



The Figure and Table above shows a spread of accidents at intersections throughout the catchment, particularly on Mercedes Avenue, Baroy Street, Lynda Street and Flame Street. The largest volume of accidents occurred at the intersection of Mercedes Avenue and Old Coast Road (Refer Appendix 3 for details on intersections under the jurisdiction of Main Roads WA) and the intersection of Baroy Street and Old Coast Road. Recent signalisation at the intersection of Mercedes Avenue and Old Coast Road will provide a main entry into the Falcon Area.

4.4 Thera Street Catchment

Table 9 - Thera Street Catchment Traffic Accident Data

Road Name	Date	Severity	Road Feature	MRWA Nature Code	Colliding Vehicle Movement Code
Corner Thera Street and Serena Street	23 Jan 04	Medical	T Junction	Hit Obj (pole)	Out of Control
Corner Panamuna Drive and Spinaway Parade	3 Dec 01	PDO Major	90 Degree Bend	Hit Obj (kerb)	Out of Control (road)
Corner Panamuna Drive and Spinaway Parade	29 Nov 04	PDO Major	90 Degree Bend	Hit Obj (kerb)	Out of Control
Panamuna Drive (mid block)	19 Mar 00	PDO Major	Straight	Non Collision	Swerving to avoid
Panamuna Drive (mid block)	14 Apr 01	PDO Minor	Straight	Hit Obj (tree)	Out of Control

Figure 9 – Thera Street Catchment, Traffic Accident Locations

The Figure and Table above shows a concentration of accidents along Panamuna Drive near Spinaway Parade. The volume of accidents is low over the period surveyed.

4.5 Yeedong Road Catchment

Table 10 - Yeedong Road Catchment Traffic Accident Data

Road Name	Date	Severity	Road Feature	MRWA Nature Code	Colliding Vehicle Movement Code
Corner Yeedong Road and Thera Street	31 Oct 00	PDO Major	T Junction	Rear End	Straight Ahead
Corner Yeedong Road and Sandra Street	21 Aug 02	PDO Major	T Junction	Right Angle	Straight Ahead
Corner Baloo Crescent and Ferguson Street	12 Jun 03	PDO Major	T Junction	Right Turn Thru	Straight Ahead
Corner Yeedong Road and Linville Street	7 Feb 02	Hospital	T Junction	Right Angle	Making Right Turn
Corner Yeedong Road and Cobblers Street	18 Apr 01	PDO Major	T Junction	Hit Obj (kerb and pole)	Making Right Turn (Wide)
Corner Yeedong Road and Baloo Crescent	17 Jun 04	PDO Major	T Junction	Rear End	Straight Ahead
Yeedong Road (mid block)	14 Jun 03	PDO Major	Straight	Hit Obj (kerb, parked car and wall)	Out of Control
Yeedong Road (mid block)	17 Jun 04	PDO Major	Straight	Right Turn Thru	Straight Ahead
Yeedong Road (mid block)	17 Jun 04	PDO Major	Straight	Rear End	Straight Ahead
Baloo Crescent (mid block)	30 Sep 01	PDO Major	Straight	Hit Obj (tree and pole)	Out of Control
Ferguson Street (mid block)	22 Nov 00	PDO Minor	Straight		Reversing

Figure 10 – Yeedong Road Catchment, Traffic Accident Locations

The Figure and Table above shows high concentrations of events along Yeedong Road near intersections with two events adjacent to the Primary School.

5. ASSESSMENT OF EXISTING ROADWAY FACILITIES

Road Layout and Access

The Falcon Area is a series of neighbourhood streets with four primary access points from Old Coast Road: -

- Merlin Street;
- Philante Street / Scenic Drive;
- Mercedes Avenue / Baroy Street / Flame Street; and
- Yeedong Road.

These access points to Old Coast Road are augmented by internal 'connector' roads including Thera Street, Avalon Parade, Baloo Crescent, Spinaway Parade and Panamuna Drive.

As expected, the greatest volume of traffic accidents has occurred on roads with a greater traffic count and at intersections with the Old Coast Road.

Road and Intersection Geometry

The road environment in the Falcon Area is typically 8 metre wide pavements for all roadways. The suburb is laid out in a grid pattern with long, straight and wide sections of road promoting excessive speeds. Most roads in the Falcon Area are kerbed, however some roads, particularly in the Thera Street catchment are unkerbed.

The Falcon Area comprises the following intersection types: -

- Perpendicular T Junctions;
- Non-perpendicular T Junctions;
- Four way intersections; and
- Staggered T-Junctions.

During the study, we noted the following intersections where vehicles cut corners due to non-perpendicular t-junctions or staggered t-junction intersection geometry: -

- Mistral Street and Casilda Street;
- Mistral Street and Nerine Street;
- Philante Street, Leander Street and Eldora Crescent;
- All intersections with Barbara Street;
- All intersections with Thera Street; and
- Cooranga Road, Galatea Street / Corfu Street and Lynda Street / Charon Road with Mercedes Avenue.

The general road environment in Falcon makes it prone to vehicles speeding and some roads with volumes greater than 300 vpd may not be friendly to other modes of traffic. Staggered t-junctions and non-perpendicular t-junctions promote excessive corner cutting.

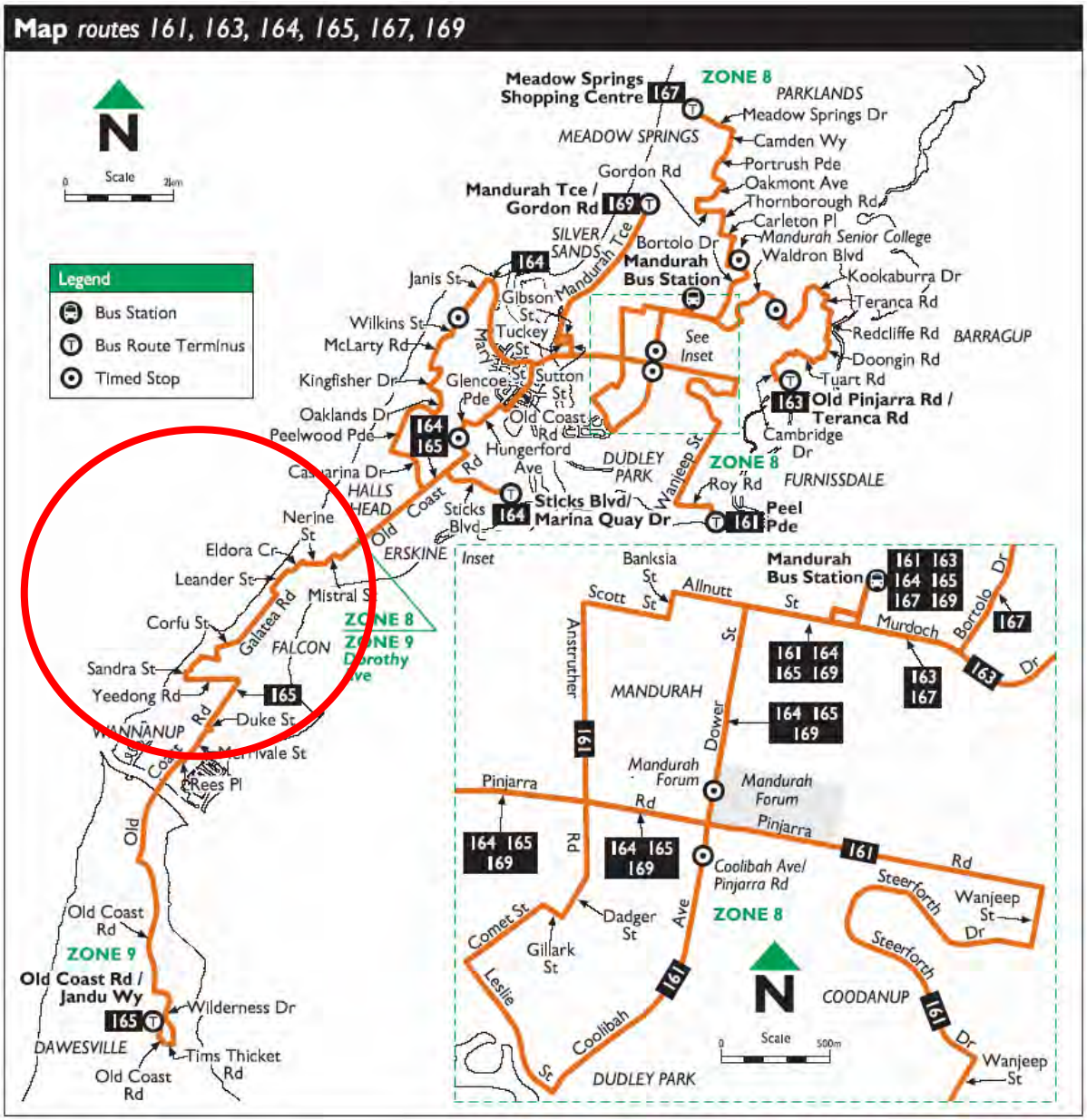
Alternative Modes of Transport

The provision of viable alternative transport is a key to the development of a sustainable community. Transperth operates route 165 through the Falcon Area. The service is an infrequent service, running every 30 minutes in the peak and every hour off-peak. On the weekends there are minimal services provided.

After discussion with Col Davison from Transperth, there is potential for two routes to service the Falcon Area, with the existing route 165 to Dawesville to be re-routed along Old Coast Road through Falcon. A new service terminating in Wannanup north of the Dawesville Cut will replace the Route 165 and operate through the existing beachside route in Falcon. Figure 11 overleaf shows the existing Transperth bus route 165, which services the Falcon Area.

Intersections where the route 165 bus operates have been noted and future traffic calming treatments will need to take into account bus turning circle requirements. Of particular note is the staggered t-junction intersection at Philante Street with Eldora Crescent and Leander Street.

Figure 11 – Transperth Bus Route 165



Footpaths and Cyclist Facilities

The following locations have been noted as providing footpath and cyclist facilities: -

- Gretel Drive (southern side of road, linking through parkland to Spinaway Parade);
- Philante Street (northern side of road from Spinaway Parade to Eldora Crescent);
- Spinaway Parade (eastern side of road from Philante Street to Wanui Street);
- Wanui Street (southern side of road from Spinaway Parade to Cooranga Road);
- Cooranga Road (western side of road from Wanui Street to Rakoa Street);
- Rakoa Street (northern side of road);
- Flame Street (northern side of road);
- Lynda Street (eastern side of road from Melita Street to Baroy Street);
- Lynda Street (western side of road from Baroy Street to Mercedes Avenue);
- Spinaway Parade (eastern side of road from Baroy Street to Panamuna Drive);
- Mercedes Avenue (northern side of road);
- Panamuna Drive (eastern side of road);
- Thera Street (western side of road (Serena Street to Yeedong Road);
- Yeedong Road (southern side of road);
- Baloo Crescent (both sides of road Kyrean to Ferguson);
- Baloo Crescent (western side of road from Yeedong Road to Kyrean Street);
- Ivanhoe Crescent (western side of road);
- Avalon Parade (eastern side of road from Yeedong Road to Ferguson Street).

Cycle Routes are on the following roads in Falcon, all traffic management devices on the following streets are to be cycle conscious.

- Perth to Bunbury Highway / Cobblers Road;
- Merlin Street;
- Philante Street;
- Spinaway Parade;
- Rakoa Road;
- Melita Street;
- Lynda Street (from Melita Street to Mercedes Avenue);

- Baroy Street;
- Mercedes Avenue;
- Flavia Street (from Cobblers Road to Carthage Road);
- Carthage Road;
- Thera Street;
- Kabbarli Street;
- Panamuna Drive;
- Sandra Street;
- Yeedong Road;
- Avalon Street;
- Ivanhoe Street;
- Barloo Street;
- Stepmoon Street;
- Linville Street (Dewar Street to Stepmoon Street); and
- Dewar Street.

Existing Traffic Calming Devices

The following locations have traffic calming devices installed as part of previous work undertaken by the City of Mandurah: -

- Yeedong Road (mid block east of Stepmoon Street);
- Yeedong Road and Kybba Street intersection;
- Yeedong Road (mid block east of Dalby Street)
- Spinaway Parade and Thera Street intersection;
- Baroy Street (median installed between Cooranga Road and Spinaway Parade);
- Cooranga Road, Wanui Street and Leander Street intersection.

6. CONCLUSIONS AND RECOMMENDATIONS

This section details the conclusions from the data and information received and provides recommendations which will allow the City of Mandurah to develop a forward works program for the Falcon Area.

6.1 Conclusions

The conclusions are presented under headings as follows: -

Resident Perception and Traffic Count Data

The results of the resident survey showed a strong correlation to traffic data received from the City of Mandurah. Roads with greater traffic volumes and roads which connect to Old Coast Road or the beach tended to exhibit greater 85th percentile vehicle speeds.

Additional vehicle counts and speed data should be collated in all roads highlighted in red in the tables in Section 3 and where residents have expressed a concern relating to excessive vehicle speeds.

Intersection Geometry and Accident Data

A high percentage of the accidents in the Falcon Area have been at intersections onto the Old Coast Road. This is expected due to the higher traffic volumes.

The volume of reported accidents is low over the 5-year timeframe due to low traffic volumes in the area. The provision of a signalised intersection at Mercedes Avenue / Old Coast Road should improve safety in this catchment, however intersections at Merlin Street and Scenic Drive may require additional tightening of geometry. Coordination with Main Roads is required to improve the intersection geometry at Merlin Street and Scenic Drive intersections.

Designate Flow Priority to Cater for Future Vehicle Growth

For the purposes of this study, the Falcon Area has been broken into catchments based on the apparent flow priority of the neighbourhood roads. The flow priority has also taken into account future land use planning requirements which have been provided by the City of Mandurah. The following roads are nominated as having flow priority, with a potential solution shown in brackets: -

- Merlin Street (Entry boulevard – median treatment, tighten geometry);
- Mistral Street (Tighten geometry);
- Philante Street (Entry boulevard – median treatment, tighten geometry);
- Scenic Drive (Tighten geometry);
- Leander Street (Tighten geometry);
- Baroy Street (Tighten geometry / restrict vehicle movement);
- Mercedes Avenue (Entry boulevard – median treatment, tighten geometry);

- Spinaway Parade (Provide delineated parking, tighten geometry, increased surveillance);
- Panamuna Drive (Provide delineated parking, tighten geometry, increased surveillance);
- Thera Street (Tighten geometry);
- Yeedong Road (Entry boulevard – median treatment, tighten geometry);
- Avalon Parade (Tighten geometry, increased surveillance); and
- Baloo Crescent (Increased surveillance, particularly during school periods).

Goals of Traffic Calming Devices

The following points reflect the goals of the proposed treatments specified in Section 6.2: -

- Reduce 85th percentile vehicle speeds on roads noted with high speeds
- Improve safety for all road users
- Improve intersection geometry and lane delineation
- Enhance the overall visual environment
- Align the road environment to suit adjacent users
- Promote alternative transport modal use
- Improve grid structure to minimise 'rat-running' through adjacent unmodified roads.
- To consider traffic improvements in the context of the Falcon Area and not just on a localised basis.

6.2 Recommendations

The following recommendations have been provided as a result of the data collection and conclusions offered in this report.

- Most roads are 8 metres wide from kerb to kerb – this is too wide for the desired speed environment: -
    - Option 1 (Tighten Geometry) – Mark cycle lanes / edge lines on road to visually constrain the geometry;
    - Option 2 (Entry Boulevard) – Paint medians and provide tree planting where desired;
    - Option 3 – Provide kerbside parking along beach routes.
- Long lengths of straight roads promote excessive speeds
    - Option 1 – Provide roundabouts at some intersections to slow through traffic;
    - Option 2 – Provide mid-block treatments; or
    - Option 3 – Promote alternative uses such as cycling through provision of cycle lanes / edge lines which constrain the visual geometry and may deter excessive speed.

- Crests on roads such as Scenic Drive, Vanessa Road promote excessive speed on downhill run: -
    - Option 1 – Provide mid-block treatments on downhill sides of crest to limit distance where “full speed” can be attained on downhill run; or
    - Option 2 – Examine road closures where vehicle volumes are low and alternative routes are accessible.
- Grid nature of road layout promotes use of a number of roads and may negate the benefit of traffic calming devices placed on some roads through re-assignment of vehicle volumes: -
    - Option 1 - Examine road closures to promote vehicular traffic onto designated connectors and provide full treatments on connectors as opposed to some treatment on all roads;
- Lack of delineation at t-intersections causes buses and motor vehicles to cut corners: -
    - Option 1 - Provide splitter islands within existing roadway to prevent vehicles from cutting corners;
    - Option 2 – Re-align intersections to intersect at perpendicular angles; or
    - Option 3 - Provide yield delineation, linemarking and signage to remind road users of mandatory requirements.
- Identify cause of excessive speed and provide solutions to address the cause: -
    - Option 1 – Promote ‘driver behaviour’ strategies along beachside roads during summer periods such as Spinaway Parade, Avalon Parade and Panamuna Drive where anti-social behaviour appears to be the dominant factor. This includes promoting the area as a ‘shared environment’ and promoting other modes of transport. Where measured vehicle speeds greater than 75kph have been recorded, police enforcement may also assist;
    - Option 2 – Provide tightened intersection and roadway geometries along ‘flow priority’ roads with changes in visual amenity to act as a queue to drivers that they are entering a varied roadside environment; and
    - Option 3 – Restrict movement into other roads within the network through mid block treatments and road closures.

It is important to note that traffic calming measures should be deployed across the Falcon Area as the grid-like nature of the suburb provides access and egress from the suburb via a number of routes, therefore isolated improvements can be bypassed and therefore shift problem areas to other locations within Falcon.

6.2.1 Merlin Street Catchment

Table 11 - Merlin Street Catchment, Recommended Treatments

Location	Priority	Notes
Merlin Street and Vanessa Road	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Vanessa Road (no adjustment to kerb radii).
Merlin Street and Mistral Street	Primary	Provide roundabout suitable for bus turning circle movement (min 6 metre radius annulus with 6.1 metre pavement and minimum 2 metre offset to adjacent property boundaries.)
Merlin Street and Cobblers Road / Old Coast Road	Primary	Provide additional linemarking and signage to delineate driver requirements.
Mistral Street and Casilda Street	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Casilda Street (no adjustment to kerb radii).
Mistral Street and Nerrine Street	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Nerrine Street (no adjustment to kerb radii).
Andante Street and Vanessa Road	Secondary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Andante Street (no adjustment to kerb radii).
Gretel Drive, Vanessa Road and Verona Crescent	Secondary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Gretel Drive (no adjustment to kerb radii).
Andante Street and Teal Street	Secondary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Teal Street (no adjustment to kerb radii).
Lyelta Street, Casilda Street and Andante Street	Tertiary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island
Teal Street and Eldora Crescent	Secondary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Teal Street (no adjustment to kerb radii).

Merlin Street	Primary	Flow Priority – Boulevard Treatment. Provide painted median with optional street trees and / or landscaping at 20 metre centres.
Vanessa Road	Secondary	Mid block treatments near crest – Angled slow point, or blister island.
Mistral Street	Primary	Mid block treatment between Clio Street and Vega Street – Angled slow point, or blister island. Tighten geometry to 6 m metre max.
Cobblers Road	Secondary	Provide signage, linemarking and mid block treatments between Clio Street and Merlin Street and south of Clio Street.
Lyelta Street	Secondary	Close road near Andante Street intersection or mid block.
Gretel Drive	Tertiary	Provide marked car parking bays on western side of road within existing formed pavement and provide linemarking and signage.
Clio Street	Tertiary	Close road and cul-de-sac. Tighten geometry to 5.5 metre max.
Casilda Street	Tertiary	Provide midblock treatment.

6.2.2 Philante Street Catchment

Table 12 - Philante Street Catchment Recommended Treatments

Location	Priority	Notes
Scenic Drive and Old Coast Road	Primary	Provide additional linemarking and signage to delineate driver requirements.
Philante Street and Scenic Drive	Primary	Roundabout – 9 metre diameter minimum annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection.
Philante Street and Corinna Street	Secondary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Corinna Street (no adjustment to kerb radii).
Philante Street and Milluna Street	Tertiary	Provide approved chevron signage opposite Milluna Street intersection
Philante Street and Leander Street / Eldora Crescent	Primary	Roundabout – may require purchase of land in parkland (min 6 metre radius annulus with 6.1 metre pavement and minimum 2 metre offset to adjacent property boundaries.)
Philante Street and Spinaway Parade	Primary	Provide median island, linemarking and signage.
Corinna Street, Rotohine Street and Galatea Street	Secondary	Provide roundabout – should be able to fit with minimal impact on pavement and property boundaries.
Leander Street, and Rotohine Street	Secondary	Roundabout – 9 metre diameter minimum annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection.
Rakoa Street and Cooranga Street	Secondary	Roundabout – 9 metre diameter minimum annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection.
Philante Street	Primary	Flow Priority – Boulevard Treatment. Provide painted median with optional street trees and / or landscaping at 20 metre centres with shared footpath facility. Provide footpath for full length of Philante Street.
Spinaway Parade	Primary	Flow Priority – Boulevard Treatment. Provide painted median with

		optional street trees and / or landscaping at 20 metre centres.
Cooranga Road	Secondary	Restriction of flow – Constrain geometry to 6 metre wide maximum through provision of edge lines / cycle lanes and lane lines or painted medians with street trees.
Galatea Road	Secondary	Restriction of flow – Constrain geometry to 6 metre wide maximum through provision of edge lines / cycle lanes and lane lines or painted medians with street trees.
Milluna Street	Secondary	Provide mid block treatment.
Maranel Street	Secondary	Provide mid block treatment.
Merinder Meander	Secondary	Road closure near Argosy Street intersection – cul de sac

6.2.3 Mercedes Avenue Catchment

Table 13 - Mercedes Avenue Catchment Recommended Treatments

Location	Priority	Notes
Lynda Street and Melita Street	Tertiary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Melita Street (no adjustment to kerb radii).
Rakoa Street and Lynda Street	Secondary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Rakoa Street (no adjustment to kerb radii).
Rakoa Street and Galatea Road	Secondary	Roundabout – 9 metre diameter minimum annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection.
Rakoa Street and Cooranga Road	Secondary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on both sides of Rakoa Street (no adjustment to kerb radii).
Rakoa Street and Spinaway Parade	Primary	Provide 1.2 metre wide median island, linemarking and signage.
Baroy Street and Lynda Street	Primary	Roundabout – 9 metre diameter minimum annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection.
Baroy Street and Galatea Road	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on both sides of Baroy Street (no adjustment to kerb radii).
Baroy Street and Cooranga Road	Primary	Roundabout – 9 metre diameter minimum annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection.
Baroy Street and Spinaway Parade	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Baroy Street (no adjustment to kerb radii).
Mercedes Avenue and Charon Road	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Charon Road (no adjustment to kerb radii).
Mercedes Avenue and Lynda Street	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Lynda Street (no adjustment to kerb radii).

Mercedes Avenue and Galatea Road / Corfu Street	Primary	Roundabout – 9 metre diameter minimum annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection..
Mercedes Avenue and Cooranga Road	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on both sides of Cooranga Road (no adjustment to kerb radii).
Mercedes Avenue and Spinaway Parade	Primary	Roundabout – 9 metre diameter minimum annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection. Annulus in roundabout can provide a focal point for street-scaping and signify entry to Falcon Beach Zone.
Spinaway Parade	Primary	Flow Priority – Boulevard Treatment. Provide painted median with optional street trees and / or landscaping at 20 metre centres. Provide coloured pavement in Falcon Beach zone between Panamuna Drive and Mercedes Avenue with 2.7 metre wide trafficable lanes and 40 kph advisory speed limit.
Mercedes Avenue	Primary	Flow Priority – Boulevard Treatment. Provide painted median with optional street trees and / or landscaping at 20 metre centres.
Baroy Street	Primary	Restriction of flow – Constrain geometry to 6 metre wide maximum through provision of edge lines / cycle lanes and lane lines or painted medians with street trees.
Rakoa Street	Secondary	Restriction of flow – Constrain geometry to 6 metre wide maximum through provision of edge lines / cycle lanes and lane lines or painted medians with street trees.
Cooranga Road	Secondary	Restriction of flow – Constrain geometry to 6 metre wide maximum through provision of edge lines / cycle lanes and lane lines or painted medians with street trees.
Galatea Road	Secondary	Restriction of flow – Constrain geometry to 6 metre wide maximum through provision of edge lines / cycle lanes and lane lines or painted medians with street trees.
Lynda Street	Secondary	Restriction of flow – Constrain geometry to 6 metre wide maximum through provision of edge lines / cycle lanes and lane lines or painted medians with street trees.
Nerrima Street	Tertiary	Tighten geometry to 5.5 metre wide maximum – Consider relocating kerb and removing excess asphalt

6.2.4 Thera Street Catchment

Location	Priority	Notes
Thera Street and Spinaway Parade	Primary	Improve alignment and deflection at Thera Street entry. Remove parking spaces adjacent to Commercial premises and provide maximum 3.0 metre wide lanes at Thera Street. Provide coloured asphalt commencing approximately 100 metres from intersection with 40kph advisory signage to signify entry to Falcon Beach Zone and consider streetscaping and construction of footpath.
Spinaway Parade and Panamuna Drive	Primary	Provide 1.2 metre wide median island, linemarking and signage.
Thera Street and Eone Street / Cooranga Road	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Cooranga Road and Eone Street (no adjustment to kerb radii).
Thera Street and Yuna Street / Corfu Street	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Corfu Street and Yuna Street (no adjustment to kerb radii).
Thera Street and Flight Street / Charon Road	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Flight Street and Charon Road (no adjustment to kerb radii).
Thera Street and Kabbarli Street / Carthage Street	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Kabbarli Street and Carthage Street (no adjustment to kerb radii).
Thera Street and Serena Street / Crusader Street	Primary	Provide bow tie roundabout.
Thera Street and Koolinda Street	Primary	Roundabout – 12.1 metre radius with 6 metre radius annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection.
Sandra Street and Kabbarli Street	Tertiary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Sandra Street (no adjustment to kerb radii).
Sandra Street and Koolinda Street	Tertiary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Sandra Street (no adjustment to kerb radii). Tighten intersection geometry.

Kybba Street and Koolinda Street	Secondary	Roundabout – 12.1 metre radius with 6 metre radius annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection.
Sandra Street and Panamuna Drive	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Panamuna Drive. Provide improved intersection alignment with through priority to traffic on Sandra Street.
Thera Street	Primary	Flow Priority – Boulevard Treatment. Provide painted median with optional street trees and / or landscaping at 20 metre centres.
Panamuna Drive	Primary	Flow Priority – Boulevard Treatment. Provide painted median with optional street trees and / or landscaping at 20 metre centres.
Deb Street	Tertiary	Consider road closures (cul de sac) near Corfu Street and Carthage Street.
All other roads	Tertiary	Restriction of flow – Constrain geometry to 6 metre wide maximum through provision of edge lines / cycle lanes and lane lines or painted medians with street trees.

6.2.5 Yeedong Road Catchment

Location	Priority	Notes
Yeedong Road and Linville Street	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Linville Street.
Yeedong Road and Thera Street	Primary	Roundabout – 12.1 metre radius with 6 metre radius annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection.
Yeedong Road and Dalby Street	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Dalby Street.
Yeedong Road and Kybba Street	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Kybba Street.
Yeedong Road and Baloo Crescent	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Baloo Crescent.
Yeedong Road and Sandra Street	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Sandra Street. Provide additional deflection to Yeedong Road to slow traffic.
Yeedong Road and Ivanhoe Crescent	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Ivanhoe Crescent.
Yeedong Road and Pepper Street	Primary	Add 1.2m wide, 6m long splitter island, keep left signage, stop sign and yield linemarking and barrier lines to island on Pepper Street. Provide additional deflection to Yeedong Road to slow traffic.
Yeedong Road and Avalon Parade	Primary	Provide 1.2 metre wide median island, linemarking and signage.
Avalon Parade and Burna Street / Entry to Carpark	Secondary	Roundabout – 12.1 metre radius with 6 metre radius annulus. Constrain road geometry leading into roundabout from each entry point with kerbing to provide appropriate alignment and deflection.
Banjuna Street and Ivanhoe	Tertiary	Roundabout – 12.1 metre radius with 6 metre radius annulus. Constrain road geometry leading into roundabout from each entry

Crescent		point with kerbing to provide appropriate alignment and deflection.
Yeedong Road	Primary	Flow Priority – Boulevard Treatment. Provide painted median with optional street trees and / or landscaping at 20 metre centres.
Avalon Parade	Primary	Flow Priority – Boulevard Treatment. Provide painted median with optional street trees and / or landscaping at 20 metre centres.

Appendix 1 – Resident Responses to City of Mandurah Community Survey

Table 14 - Merlin Street Catchment Responses to Resident Survey

Road Name	No of Respondents	Speed	Visibility	Pedestrian	Driveways	Volume
Andante Street	9	6	2	2	0	3
Casilda Street	1	2	1	0	0	0
Cobblers Road	**14**	**5**	**6**	**9**	**6**	**5**
Eldora Crescent	**14**	**9**	**8**	**4**	**3**	**5**
Gretel Drive	5	7	2	3	1	1
Lyelta Street	7	4	2	1	1	3
Merlin Street	1	8	11	0	2	1
Mistral Street	**26**	**34**	**10**	**14**	**1**	**5**
Vanessa Road	**18**	**19**	**13**	**2**	**1**	**2**
Verona Crescent	6	6	4	3	1	1
Yeulba Street	3	2	0	0	0	1

Table 15 - Philante Street Catchment Responses to Resident Survey

Road Name	No of Respondents	Speed	Visibility	Pedestrian	Driveways	Volume
Cobblers Road	14	5	6	9	6	5
Cooranga Road	**28**	**19**	**10**	**16**	**3**	**16**
Corinna Street	7	6	4	2	1	2
Galatea Road	**17**	**13**	**7**	**6**	**3**	**1**
Haze Road	1	0	0	0	0	0
Leander Street	**11**	**11**	**7**	**4**	**4**	**3**
Lynda Street	4	3	2	0	0	2
Melita Street	0	1	0	0	0	0
Rakoa Street	4	5	4	3	0	2
Rotohine Street	3	1	1	0	0	0
Scenic Drive	4	5	3	4	0	3
Spinaway Parade	**33**	**57**	**18**	**39**	**4**	**23**
Wanui Street	2	1	3	1	1	1

Table 16 – Mercedes Avenue Catchment Responses to Resident Survey

Road Name	No of Respondents	Speed	Visibility	Pedestrian	Driveways	Volume
Baroy Street	**3**	**22**	**7**	**11**	**8**	**0**
Carthage Road	9	2	1	0	0	0
Charon Street	**20**	**20**	**8**	**9**	**10**	**15**
Cobblers Road	14	5	6	9	6	5
Cooranga Road	**28**	**19**	**10**	**16**	**3**	**16**
Flame Street	0	1	0	0	0	0
Galatea Road	**17**	**13**	**7**	**6**	**3**	**1**
Lynda Street	4	3	2	0	0	2
Mercedes Avenue	**13**	**19**	**14**	**7**	**5**	**9**
Nerrima Street	2	1	0	0	0	0
Old Coast Road	**0**	**47**	**4**	**42**	**0**	**32**
Spinaway Parade	**33**	**57**	**18**	**39**	**4**	**23**

Table 17 – Thera Street Catchment Responses to Resident Survey

Road Name	No of Respondents	Speed	Visibility	Pedestrian	Driveways	Volume
Carthage Road	9	2	1	0	0	0
Charon Street	**20**	**20**	**8**	**9**	**10**	**15**
Corfu Street	11	6	3	4	0	6
Crusader Street	**6**	**10**	**6**	**3**	**2**	**2**
Eone Street	8	0	0	0	0	0
Flight Street	7	3	0	1	0	0
Kabbarli Street	7	2	0	0	0	0
Koolinda Street	8	6	3	5	2	0
Kybra Street	6	4	2	2	1	2
Panamuna Drive	**17**	**42**	**20**	**14**	**1**	**7**
Sandra Street	**16**	**11**	**7**	**4**	**2**	**0**
Serena Street	12	6	8	3	0	0
Thera Street	**16**	**23**	**11**	**6**	**1**	**7**
Yuna Street	8	3	1	2	1	5
Zavia Street	1	2	1	0	0	0

Table 18 - Yeedong Road Catchment, Responses to Resident Survey

Road Name	No of Respondents	Speed	Visibility	Pedestrian	Driveways	Volume
Avalon Parade	**9**	**31**	**12**	**22**	**4**	**5**
Baloo Cres	**5**	**10**	**2**	**5**	**2**	**3**
Bannister Court	2	0	0	0	0	0
Banjuna Street	5	3	0	1	0	1
Burna Street	3	0	0	2	0	0
Dalby Street	0	1	0	0	1	0
Dewar Street	9	6	0	2	0	0
Edinburgh Close	3	0	0	1	0	0
Ivanhoe Crescent	7	5	0	1	0	4
Koolinda Street	8	6	3	5	2	0
Kybra Street	6	4	2	2	1	2
Kyrean Street	3	0	0	0	1	0
Linville Street	**18**	**17**	**6**	**7**	**3**	**3**
Panamuna Drive	**17**	**42**	**20**	**14**	**1**	**7**
Pepper Street	**13**	**13**	**17**	**12**	**2**	**0**
Stepmoon Street	5	0	2	1	0	3
Tansey Way	3	0	0	0	0	1
Thera Street	**16**	**23**	**11**	**6**	**1**	**7**
Yeedong Road	**29**	**51**	**25**	**19**	**9**	**17**

Appendix 2 – Recommended Treatments at 15 Selected Locations

Appendix 3 – Main Roads WA Issues Highlighted in Report

From Section 5 Road Layout and Access

The Falcon Area is a series of neighbourhood streets with four primary access points from Old Coast Road: -

- Merlin Street;
- Philante Street / Scenic Drive;
- Mercedes Avenue / Baroy Street / Flame Street; and
- Yeedong Road.

These access points to Old Coast Road are augmented by internal 'connector' roads including Thera Street, Avalon Parade, Baloo Crescent, Spinaway Parade and Panamuna Drive.

As expected, the greatest volume of traffic accidents has occurred on roads with a greater traffic count and at intersections with the Old Coast Road.

Table 19 – Traffic Accident Data at Intersecting Roads with Old Coast Road within the Falcon Area (Compiled from Section 4)

Road Name	Date	Severity	Road Feature	MRWA Nature Code	Colliding Vehicle Movement Code
Corner Merlin Street and Old Coast Road	13 Dec 02	PDO Major	T Junction	Hit Obj (pole)	Straight Ahead
Corner Merlin Street and Old Coast Road	24 Jul 04	PDO Minor	T Junction	Rear End	Straight Ahead
Corner Merlin Street and Old Coast Road	29 Apr 00	PDO Major	T Junction	Rear End	Straight Ahead
Corner Merlin Street and Old Coast Road	20 Feb 02	PDO Major	T Junction	Right Angle	Turning (left turn)
Corner Merlin Street and Old Coast Road	13 Dec 02	Medical	T Junction	Hit Obj (pole)	Out of Control
Corner Merlin Street and Old Coast Road	25 Dec 04	Hospital	T Junction	Rear End	Straight Ahead
Corner Old Coast Road and Scenic Drive	5 Mar 00	PDO Major	T Junction	Right Angle	Straight Ahead

Corner Old Coast Road and Scenic Drive	29 Nov 00	Medical	T Junction	Hit Obj (Island & ditch)	Swerving to Avoid Vehicle
Corner Old Coast Road and Scenic Drive	15 Dec 00	Medical	T Junction	Rear End	Straight Ahead
Corner Old Coast Road and Scenic Drive	27 Dec 00	PDO Major	T Junction	Hit Obj (Island & sign)	Out of Control
Corner Old Coast Road and Scenic Drive	1 Apr 02	PDO Major	T Junction	Right Angle	Straight Ahead
Corner Old Coast Road and Scenic Drive	12 Oct 03	PDO Major	T Junction	Hit Obj (2 Poles)	Out of Control
Corner Old Coast Road and Scenic Drive	17 Dec 03	Hospital	T Junction	Right Angle	Straight Ahead
Corner Old Coast Road and Scenic Drive	1 May 04	Medical	T Junction	Right Angle	Straight Ahead
Corner Flame Street and Old Coast Road	12 Feb 01	PDO Major	T Junction	Right Angle	Making Right Turn
Corner Baroy Street and Old Coast Road	28 Oct 01	Hospital	T Junction	Right Angle	Straight Ahead
Corner Baroy Street and Old Coast Road	24 Nov 02	Medical	T Junction	Right Turn Thru	Making Right Turn
Corner Baroy Street and Old Coast Road	26 Dec 03	PDO Major	Median Opening	Rear End	Straight Ahead
Corner Baroy Street and Old Coast Road	12 May 04	PDO Minor	T Junction	Right Turn Thru	Straight Ahead
Corner Mercedes Avenue and Old Coast Road	15 Jan 00	PDO Major	T Junction		Reversing
Corner Mercedes Avenue and Old Coast Road	15 Jan 03	PDO Major	T Junction	Right Turn Thru	Straight Ahead
Corner Mercedes Avenue and Old Coast Road	23 Jul 03	Medical	T Junction	Right Turn Thru	Straight Ahead
Corner Mercedes Avenue and Old Coast Road	13 Feb 04	PDO Major	T Junction	Hit Obj	Out of Control

Corner Yeedong Road and Old Coast Road	15 Apr 03	PDO Major	T Junction		Reversing
Corner Yeedong Road and Old Coast Road	11 Apr 04	PDO Major	T Junction	Rear End	Straight Ahead
Corner Yeedong Road and Old Coast Road	10 Dec 04	PDO Minor	T Junction	Rear End	Straight Ahead

From Section 6 - Intersection Geometry and Accident Data

A high percentage of the accidents in the Falcon Area have been at intersections onto the Old Coast Road. This is expected due to the higher traffic volumes.

The volume of reported accidents is low over the 5-year timeframe due to low traffic volumes in the area. The provision of a signalised intersection at Mercedes Avenue / Old Coast Road should improve safety in this catchment, however intersections at Merlin Street and Scenic Drive may require additional tightening of geometry. Coordination with Main Roads is required to improve the intersection geometry at Merlin Street and Scenic Drive intersections.

Table 20 – Recommended Treatments – Intersection of Old Coast Road

Location	Priority	Notes
Merlin Street and Cobblers Road / Old Coast Road	Primary	Provide additional linemarking and signage to delineate driver requirements.
Scenic Drive and Old Coast Road	Primary	Provide additional linemarking and signage to delineate driver requirements.

WorleyParsons resources & energy Infrastructure	APPROVED	DES	AMW
		DRN	AMW
	DATE	CKD	
	SCALE NTS	A4	
	300-09696-301	REV	A

CITY OF MANDURAH
FALCON AREA STUDY
MISTRAL STREET & MERLIN STREET

WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

WorleyParsons
resources & energy
Infrastructure

WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED		DES	AMW
		DRN	AMW
DATE		CKD	
SCALE	NTS		A4
300-09696-302			REV A

CITY OF MANDURAH
FALCON AREA STUDY
NERRINE STREET & MISTRAL STREET

WorleyParsons
resources & energy
Infrastructure
WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED		DES	AMW
		DRN	AMW
DATE		CKD	
SCALE	NTS		A4
300-09696-303			REV A

CITY OF MANDURAH
FALCON AREA STUDY
LEANDER STREET, PHILANTE STREET & ELDORA CRESCENT

WorleyParsons
resources & energy
Infrastructure
WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

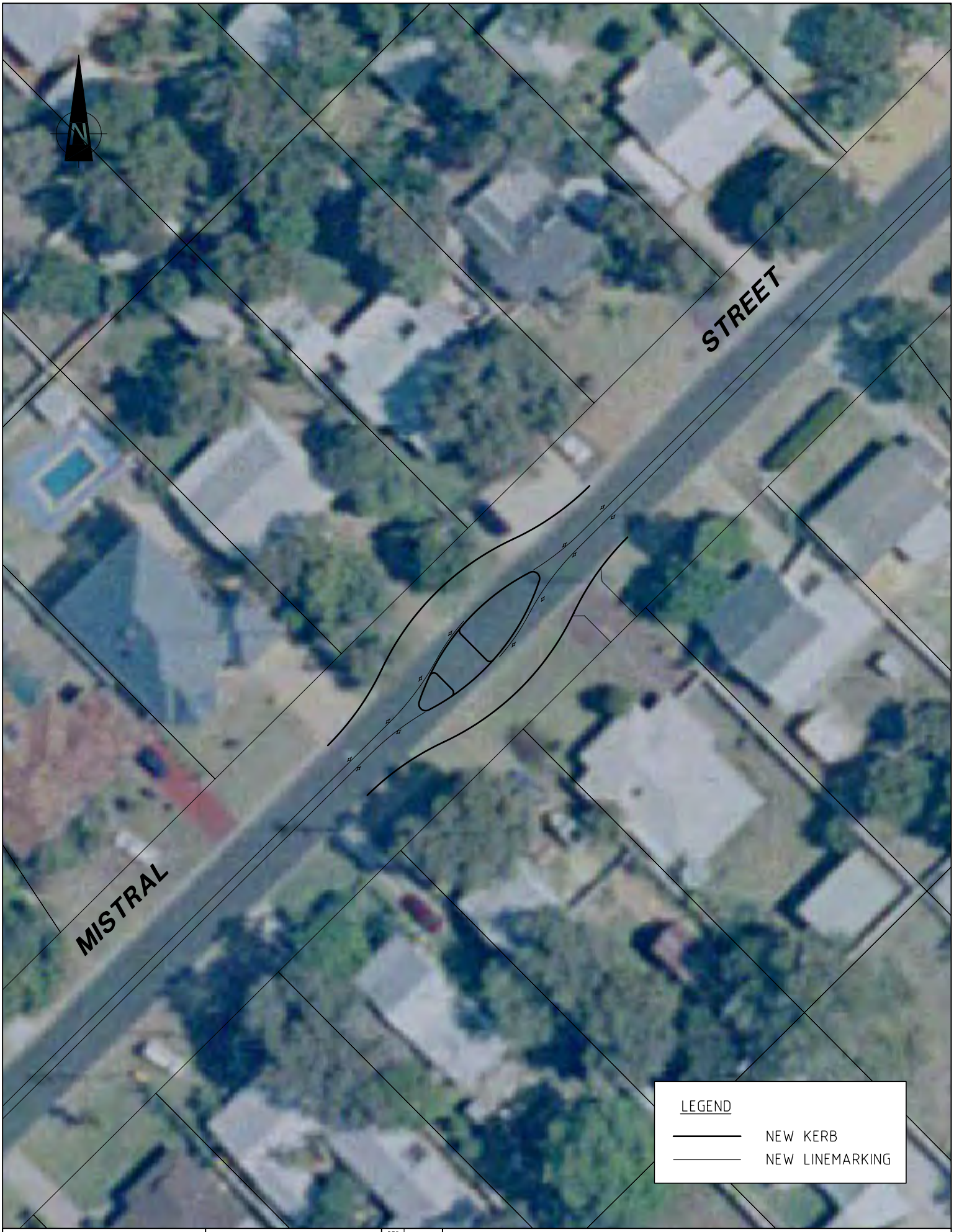
APPROVED	DES	AMW
	DRN	AMW
DATE	CKD	
SCALE NTS	A4	
300-09696-304	REV	A

CITY OF MANDURAH
FALCON AREA STUDY
YEEDONG ROAD & BALOO CRESCENT

WorleyParsons
resources & energy
Infrastructure
WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED		DES	AMW
		DRN	AMW
DATE		CKD	
SCALE	NTS		A4
300-09696-305			REV A

CITY OF MANDURAH
FALCON AREA STUDY
THERA STREET, FLIGHT STREET
& CHARON ROAD



WorleyParsons
resources & energy
Infrastructure
WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED		DES	AMW
		DRN	AMW
DATE		CKD	
SCALE	NTS		A4
300-09696-306			REV A

CITY OF MANDURAH
FALCON AREA STUDY
MISTRAL STREET

WorleyParsons
resources & energy
Infrastructure
WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED		DES	AMW
		DRN	AMW
DATE		CKD	
SCALE 1:500		A4	
300-09696-307		REV	A

CITY OF MANDURAH
FALCON AREA STUDY
RAKOA STREET & SPINAWAY PARADE

WorleyParsons
resources & energy
Infrastructure
WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED		DES	AMW
		DRN	AMW
DATE		CKD	
SCALE	NTS		A4
300-09696-308			REV A

CITY OF MANDURAH
FALCON AREA STUDY
YEEDONG ROAD & AVALON PARADE

WorleyParsons
resources & energy
Infrastructure

WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED	DES	AMW
	DRN	AMW
DATE	CKD	
SCALE NTS	A4	
300-09696-309	REV	A

CITY OF MANDURAH
FALCON AREA STUDY
SPINAWAY PARADE & PHILANTE STREET

WorleyParsons
resources & energy
Infrastructure
WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED		DES	AMW
		DRN	AMW
DATE		CKD	
SCALE	NTS		A4
300-09696-310			REV A

CITY OF MANDURAH
FALCON AREA STUDY
BAROY STREET & COORANGA ROAD

WorleyParsons resources & energy Infrastructure	APPROVED	DES	AMW
		DRN	AMW
	DATE	CKD	
	SCALE NTS	A4	
	300-09696-311	REV	A

CITY OF MANDURAH
FALCON AREA STUDY
BAROY STREET & LYNDA STREET

WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

WorleyParsons
resources & energy
Infrastructure
WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED		DES	AMW
		DRN	AMW
DATE		CKD	
SCALE	NTS		A4
300-09696-312			REV A

CITY OF MANDURAH
FALCON AREA STUDY
MERCEDES AVENUE, GALATEA ROAD
& CORFU STREET

WorleyParsons
resources & energy
Infrastructure
WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED		DES	AMW
		DRN	AMW
DATE		CKD	
SCALE	NTS		A4
300-09696-313		REV	A

CITY OF MANDURAH
FALCON AREA STUDY
MERINDER MEANDER

WorleyParsons
resources & energy
Infrastructure

WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED	DES	AMW
	DRN	AMW
DATE	CKD	
SCALE NTS	A4	
302-09696-314	REV	A

CITY OF MANDURAH
FALCON AREA STUDY
THERA STREET, SERENA STREET & CRUSADER STREET

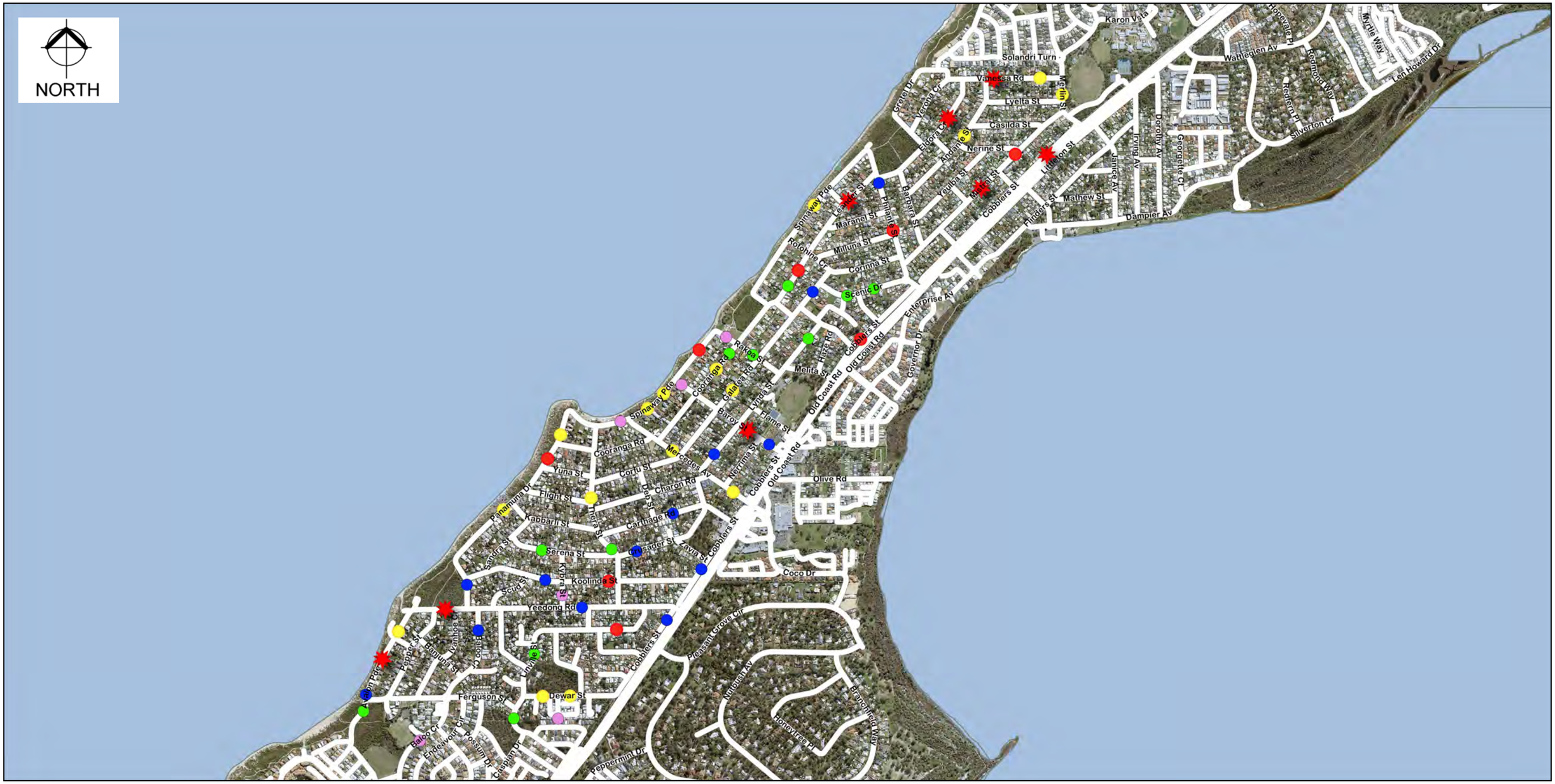
WorleyParsons
resources & energy
Infrastructure

WorleyParsons Services Pty Ltd
Level 6, QV1 Building
250 St Georges Terrace
Perth WA 6000 Australia
Tel: +61 8 9278 8111
Fax: +61 8 9278 8110
www.worleyparsons.com
ABN 61 001 279 812

APPROVED	DES	AMW
	DRN	AMW
DATE	CKD	
SCALE NTS	A4	
302-09696-315	REV	A

CITY OF MANDURAH
FALCON AREA STUDY
PHILANTE STREET & SCENIC DRIVE

NORTH



FALCON TRAFFIC COUNT DATA 2019 - 85th PERCENTILE SPEEDS

85th PERCENTILE SPEED RANGE

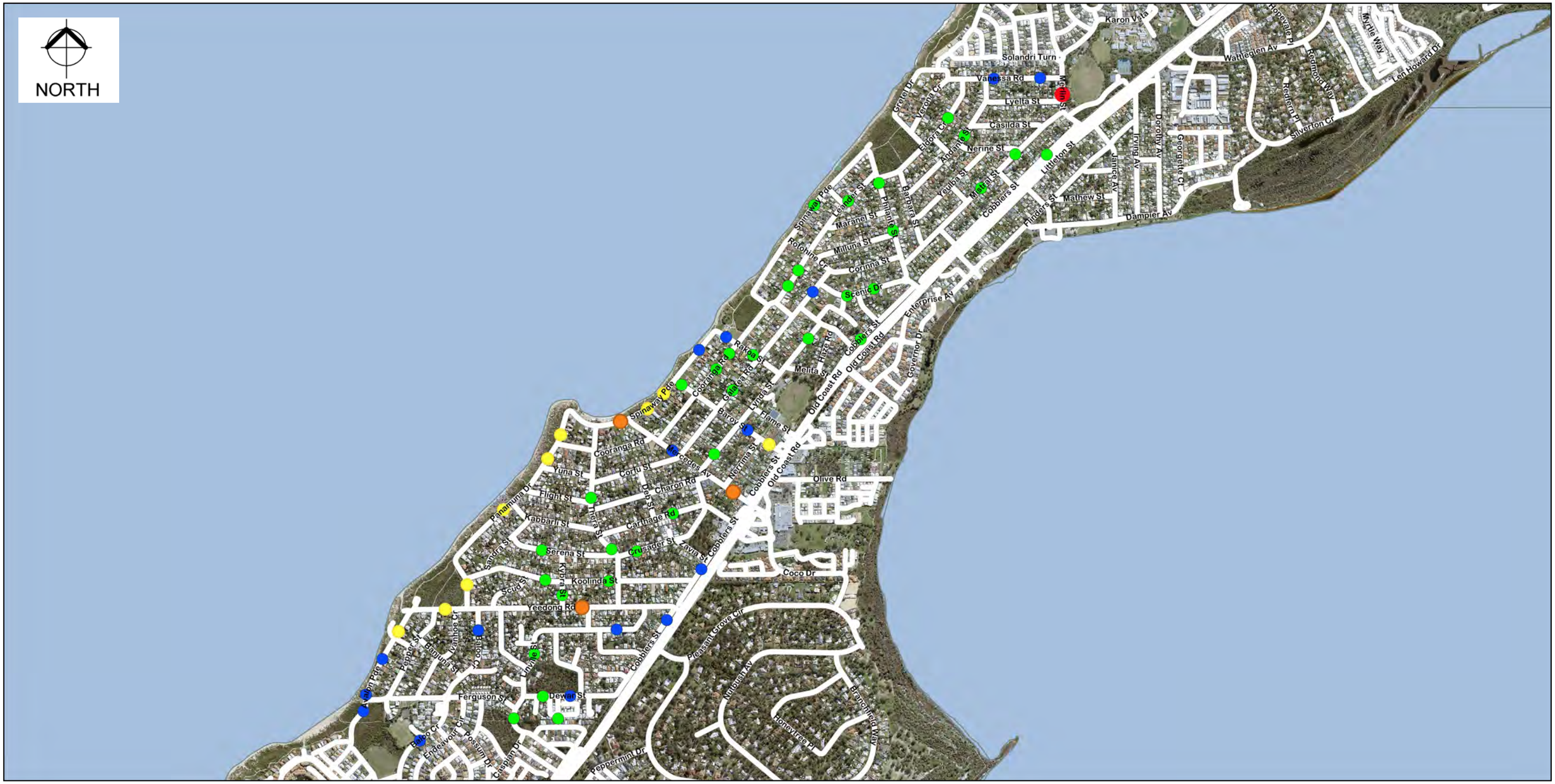
- 57.5-60
- 55-57.5
- 52.5-55
- 50 - 52.5 km/h
- 45-50 km/h
- Less Than 45 km/h

NOTES:

1. REFER TO SERVICE AUTHORITY PLANS BEFORE COMMENCING WORKS
2. ALL REINSTATEMENT MATERIALS TO BE OF THE SAME TYPE PRIOR TO COMMENCEMENT OF WORKS

City of MANDURAH

NORTH



FALCON TRAFFIC COUNT DATA 2019 - DAILY TRAFFIC VOLUMES

DAILY TRAFFIC VOLUME RANGES

- More than 2000 VPD
- 1500 - 2000 VPD
- 1000 - 1500 VPD
- 500 - 1000 VPD
- Less than 500 VPD

NOTES:

1. REFER TO TRAFFIC COUNT DATA TABLE FOR SPECIFIC 85th PERCENTILE SPEEDS.
2. ALL TRAFFIC COUNTS COMPLETED THROUGHOUT DURATION OF 2019.

City of MANDURAH

MERLIN ST CATCHMENT

ROAD NAME	CRASH LOCATION	INTERSECTING ROAD	CRASH SEVERITY	INTERSECTION TYPE	CRASH TYPE	EVENT TYPE	MRWA CRASH CODE	VEHICLE TYPE	VEHICLE MOTION
Merlin St	Intersection	KARON VSTA & PEELWOOD PDE & SOLANDRI TURN	PDO Major	Roundabout	Non Collision	On Cway	85:Off Path On Curve: Lost Control On Cway	Motor Cycle	Out Of Control: Other
Merlin St	Intersection	KARON VSTA & PEELWOOD PDE & SOLANDRI TURN	PDO Minor	Roundabout	Non Collision	On Cway	77:Loss Of Control: Right Turn - Intx	Motor Cycle	Swerving: To Avoid Veh
Merlin St	Intersection	KARON VSTA & PEELWOOD PDE & SOLANDRI TURN	PDO Minor	Roundabout	Rear End	On Cway	31:Same Dirn: Same Lane Rear End	Panel Van	Stopped: By Traffic Control
Merlin St	Intersection	COBBLERS ST	PDO Major	3-way Intx (T-junction)	Right Angle	On Cway	14:Intx: Thru - Right	Car	Turning: To Make Right Turn
Merlin St	Intersection	LYELTA ST	PDO Major	3-way Intx (T-junction)	Right Angle	On Cway	13:Intx: Left - Thru	Car	Swing Wide: Left Turn At Intx
Karon Vsta	Midblock		PDO Major	Driveway	Right Turn Thru	On Cway	22:Opposite Dirn: Thru - Right	Car	Turning: To Make Right Turn
Vanessa Rd	Midblock		PDO Minor		Hit Object	On Right Verge After Leaving Cway	74:Off Path On Straight: Off Right Cway Obj		Out Of Control: Other
Lyelta St	Midblock		PDO Major		Right Angle	On Cway	47:Manoeuv: Leaving Driveway	Car	Reversing Or Rolling Back: Straight
Gretel Dr	Midblock		PDO Major	Driveway	Right Angle	On Cway	47:Manoeuv: Leaving Driveway	Utility	Stopped: Parked On Cway
Cobblers St	Midblock		PDO Minor	Driveway	Right Angle	On Cway	47:Manoeuv: Leaving Driveway	Car	Straight Ahead: Not Out Of Control
Cobblers St	Midblock		PDO Minor		Non Collision	On Cway	75:Off Path On Straight: Lost Control On Cway	Motor Cycle	Out Of Control: Reason Unknown

PHILANTE ST CATCHMENT

ROAD NAME	CRASH LOCATION	INTERSECTING ROAD	CRASH SEVERITY	INTERSECTION TYPE	CRASH TYPE	EVENT TYPE	MRWA CRASH CODE	VEHICLE TYPE	VEHICLE MOTION
Milluna St	Midblock		PDO Major	Driveway	Right Angle	On Cway	47:Manoeuv: Leaving Driveway	Car	Stopped: Parked On Cway
Leander St	Intersection	MARANEL ST	Medical	3-way Intx (T-junction)	Hit Object	On Right Verge After Leaving Cway	76:Loss Of Control: Left Turn - Intx	Car	Out Of Control: Other

MERCEDES AVE & THERA ST CATCHMENT

ROAD NAME	CRASH LOCATION	INTERSECTING ROAD	CRASH SEVERITY	INTERSECTION TYPE	CRASH TYPE	EVENT TYPE	MRWA CRASH CODE	VEHICLE TYPE	VEHICLE MOTION
Cooranga Rd	Intersection	BAROY ST	PDO Major	4-way Intx	Right Angle	On Cway	11:Intx: Thru - Thru	Car	Straight Ahead: Not Out Of Control
Cooranga Rd	Intersection	RAKOA ST	PDO Minor	4-way Intx	Right Angle	On Cway	10:Intx: Other	Car	Straight Ahead: Not Out Of Control
Cooranga Rd	Midblock		PDO Major			On Cway	60:On Path: Other		Out Of Control: Reason Unknown
Cooranga Rd	Midblock		PDO Minor			On Cway	45:Manoeuv: Reversing In Traffic	Four Wheel Drive (Not Car Design)	Stopped: To Avoid Veh
Spinaway Pde	Intersection	BAROY ST	Hospital	3-way Intx (T-junction)	Hit Object	On Cway	70:Off Path On Straight: Other	Trail Bike	Out Of Control: Other
Spinaway Pde	Intersection	BAROY ST	PDO Minor	3-way Intx (T-junction)	Rear End	On Cway	33:Same Dirn: Same Lane Right Rear	Motor Cycle	Straight Ahead: Not Out Of Control
Panamuna Dr	Intersection	SPINAWAY PDE	PDO Major		Hit Object	On Right Verge After Leaving Cway	84:Off Path On Curve: Off Left Bend In Obj	Car	Out Of Control: Other
Galatea Rd	Intersection	BAROY ST	PDO Major	4-way Intx	Right Angle	On Cway	11:Intx: Thru - Thru	Car	Straight Ahead: Not Out Of Control
Galatea Rd	Midblock		PDO Minor			On Cway	67:On Path: Temp Obj On Cway		Straight Ahead: Not Out Of Control
Sandra St	Intersection	KABBARLI ST	PDO Minor	3-way Intx (T-junction)	Right Angle	On Cway	14:Intx: Thru - Right	Car	Turning: To Make Right Turn
Serena St	Midblock		PDO Minor		Rear End	On Cway	61:On Path: Parked	Motor Cycle	Straight Ahead: Not Out Of Control
Serena St	Midblock		PDO Major	Driveway	Right Angle	On Cway	47:Manoeuv: Leaving Driveway	Car	Straight Ahead: Not Out Of Control
Cobblers St	Intersection	COBBLERS ST	Hospital	3-way Intx (T-junction)	Right Turn Thru	On Cway	22:Opposite Dirn: Thru - Right	Bicycle	Straight Ahead: Not Out Of Control
Cobblers St	Midblock		Medical		Non Collision	On Cway	75:Off Path On Straight: Lost Control On Cway	Motor Cycle	Out Of Control: Other

YEEDONG RD CATCHMENT

ROAD NAME	CRASH LOCATION	INTERSECTING ROAD	CRASH SEVERITY	INTERSECTION TYPE	CRASH TYPE	EVENT TYPE	MRWA CRASH CODE	VEHICLE TYPE	VEHICLE MOTION
Yeedong Rd	Intersection	AVALON PDE	PDO Minor		Head On	On Cway	21:Opposite Dirn: Head On	Utility	Straight Ahead: Not Out Of Control
Yeedong Rd	Intersection	COBBLERS ST	PDO Minor	3-way Intx (T-junction)	Right Angle	On Cway	10:Intx: Other	Car	Straight Ahead: Not Out Of Control
Koolinda St	Intersection	THERA ST	PDO Major	4-way Intx	Right Angle	On Cway	11:Intx: Thru - Thru	Car	Straight Ahead: Not Out Of Control
Koolinda St	Intersection	THERA ST	PDO Major	4-way Intx	Right Angle	On Cway	11:Intx: Thru - Thru	Car	Straight Ahead: Not Out Of Control
Linville St	Intersection	DALBY ST	PDO Major	3-way Intx (T-junction)	Right Angle	On Cway	12:Intx: Right - Thru	Car	Turning: To Make Right Turn
Linville St	Midblock		Medical	Driveway	Right Angle	On Cway	47:Manoeuv: Leaving Driveway	Car	Straight Ahead: Not Out Of Control
Paperbark Wy	Intersection	BALOO CR	Hospital	3-way Intx (T-junction)	Right Angle	On Cway	10:Intx: Other	Bicycle	Straight Ahead: Not Out Of Control
Rubus Vsta	Midblock		PDO Minor		Hit Object	On Left Verge After Leaving Cway	72:Off Path On Straight: Off Left Cway Obj		Out Of Control: Reason Unknown
Vanessa Rd	Intersection	MERLIN ST	PDO Minor	3-way Intx (T-junction)	Right Angle	On Cway	19:Intx: Left - Left	Car	Out Of Control: Other
Avalon Pde	Midblock		PDO Major		Hit Object	On Left Verge After Leaving Cway	72:Off Path On Straight: Off Left Cway Obj	Car	Out Of Control: Other
Beachview Ct	Intersection	AVALON PDE	PDO Major	4-way Intx	Right Angle	On Cway	14:Intx: Thru - Right	Car	Turning: To Make Right Turn
Brassii Link	Intersection	SOLANDRI TURN	PDO Major	3-way Intx (T-junction)	Right Angle	On Cway	16:Intx: Left - Right	Car	Stopped: Prepared To Turn Left
Bush View	Midblock		PDO Minor	Driveway	Right Angle	On Cway	47:Manoeuv: Leaving Driveway	Car	Reversing Or Rolling Back: Straight
Cobblers St	Midblock		PDO Minor		Hit Object	On Left Verge After Leaving Cway	84:Off Path On Curve: Off Left Bend In Obj		Out Of Control: Other
Cobblers St	Midblock		PDO Major			On Right Verge After Leaving Cway	96:Misc: Parked Car Ran Away	Motor Cycle	Driverless Veh
Ferguson St	Midblock		PDO Minor		Hit Object	On Left Verge After Leaving Cway	72:Off Path On Straight: Off Left Cway Obj		Out Of Control: Reason Unknown
Ivanhoe Cr	Intersection	BANJUNA ST	PDO Minor	4-way Intx	Right Angle	On Cway	12:Intx: Right - Thru	Car	Turning: To Make Right Turn

Crash Factor Matrix

ROAD USE MOVEMENT (RUM) CODES

	0	1	2	3	4	5	6	7	8	9
	PEDESTRIAN on foot, in toy/pram	INTERSECTION vehicles from adjacent approaches	VEHICLES FROM OPPOSING DIRECTIONS	VEHICLES FROM ONE DIRECTION	MANOEUVRING	OVERTAKING	ON PATH	OFF STRAIGHT, ON STRAIGHT	OFF PATH, ON CURVE	PASSENGERS AND MISCELLANEOUS
1	NEAR SIDE 1	THRU-THRU 11	SIDE SWIPE HEAD ON 21	Vehicles in same lanes REAR END 31		HEAD ON 51	PARKED 61	OFF CARRIAGEWAY TO LEFT 71	OFF CARRIAGEWAY RIGHT BEND 81	FELL IN/FROM VEHICLE 91
2	EMERGING 2	RIGHT-THRU 12	THRU-RIGHT 22	LEFT REAR 32	LEAVING PARKING 42	OUT OF CONTROL 52	DOUBLE PARKED 62	LEFT OFF CARRIAGEWAY INTO OBJECT/VEHICLE 72	OFF RIGHT BEND INTO OBJECT/VEHICLE 82	LOAD STRUCK VEHICLE 92
3	FAR SIDE 3	LEFT-THRU 13	RIGHT LEFT 23	RIGHT REAR 33	PARKING 43	PULLING OUT 53	ACCIDENT OR BROKEN DOWN 63	OFF CARRIAGEWAY TO RIGHT 73	OFF CARRIAGEWAY LEFT BEND 83	STRUCK TRAIN 93
4	PLAYING, WORKING LYING, STANDING ON CARRIAGEWAY 4	THRU-RIGHT 14	RIGHT RIGHT 24	U TURN 34	PARKING VEHICLES ONLY 44	CUTTING IN 54	CAR DOOR 64	RIGHT OFF CARRIAGEWAY INTO OBJECT/VEHICLE 74	OFF LEFT BEND INTO OBJECT/VEHICLE 84	STRUCK RAILWAY XING FURNITURE 94
5	WALKING WITH TRAFFIC 5	RIGHT-RIGHT 15	THRU LEFT 25	Vehicles in parallel lanes LANE SIDE SWIPE 35	REVERSING 45	PULLING OUT REAR END 55	PERMANENT OBSTRUCTION 65	OUT OF CONTROL ON CARRIAGEWAY 75	OUT OF CONTROL ON CARRIAGEWAY 85	ANIMAL OFF CARRIAGEWAY 95
6	FACING TRAFFIC 6	LEFT-RIGHT 16	LEFT LEFT 26	LANE CHANGE RIGHT 36	REVERSING INTO FIXED OBJECT 46	O.T.-RT 56	TEMPORARY ROADWORKS 66	LEFT TURN 76		PARKED CAR RAN AWAY 96
7	DRIVEWAY 7	THRU-LEFT 17	U TURN 27	LANE CHANGE LEFT 37	LEAVING DRIVEWAY 47		TEMPORARY OBJECT ON CARRIAGEWAY 67	RIGHT TURN 77		VEHICLE MOVEMENTS NOT KNOWN 97
8	ON FOOTWAY 8	RIGHT-LEFT 18		RIGHT TURN S/S 38	LOADING BAY 48					
9	STRUCK WHILE BOARDING OR ALIGHTING 9	LEFT-LEFT 19		LEFT TURN S/S 39	FROM FOOTWAY 49		ON CARRIAGEWAY 69			
	OTHER 98	OTHER 10	OTHER 20	OTHER 30	OTHER 40	OTHER 50	OTHER 60 (MISSILE/ FLYING OBJECT)	OTHER 70	OTHER 80	OTHER 90

FALCON CRASH DATA BY CRASH TYPE - MERLIN ST AND PHILANTE ST CATCHMENTS

CRASH TYPE

- Right Angle
- Hit Object
- Rear End
- Head On
- Other

NOTES:

1. CRASH STATISTICS FROM 5 YEAR PERIOD BETWEEN JANUARY 2014 AND DECEMBER 2019.
2. CRASH STATISTICS SUPPLIED BY MRWA CRASH ANALYSIS REPORTING SYSTEM.

City of MANDURAH

FALCON CRASH DATA BY VEHICLE TYPE - MERLIN ST AND PHILANTE ST CATCHMENTS

VEHICLE CRASH TYPES

- Car or Utility
- Motorbike
- Bicycle
- Not Stated

NOTES:

1. CRASH STATISTICS FROM 5 YEAR PERIOD BETWEEN JANUARY 2014 AND DECEMBER 2019.
2. CRASH STATISTICS SUPPLIED BY MRWA CRASH ANALYSIS REPORTING SYSTEM.

City of MANDURAH

FALCON CRASH DATA BY CRASH TYPE - MERCEDES AVE CATCHMENT

CRASH TYPE

- Right Angle
- Hit Object
- Rear End
- Head On
- Other

NOTES:

1. CRASH STATISTICS FROM 5 YEAR PERIOD BETWEEN JANUARY 2014 AND DECEMBER 2019.
2. CRASH STATISTICS SUPPLIED BY MRWA CRASH ANALYSIS REPORTING SYSTEM.

City of MANDURAH

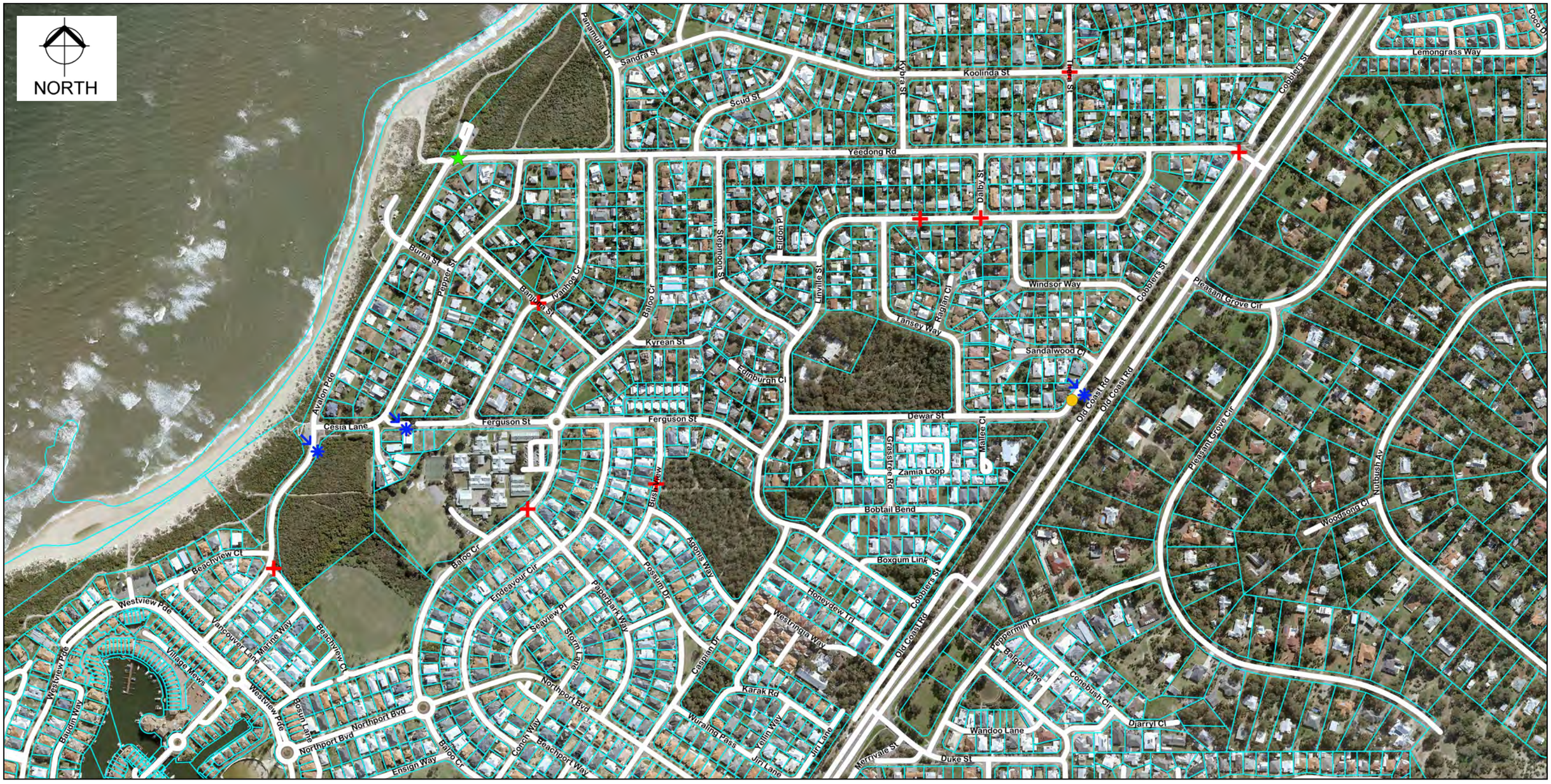
FALCON CRASH DATA BY VEHICLE TYPE - MERCEDES AVE CATCHMENT

VEHICLE CRASH TYPES

- Car or Utility
- Motorbike
- Bicycle
- Not Stated

NOTES:

1. CRASH STATISTICS FROM 5 YEAR PERIOD BETWEEN JANUARY 2014 AND DECEMBER 2019.
2. CRASH STATISTICS SUPPLIED BY MRWA CRASH ANALYSIS REPORTING SYSTEM.



FALCON CRASH DATA BY CRASH TYPE - YEEDONG RD CATCHMENT

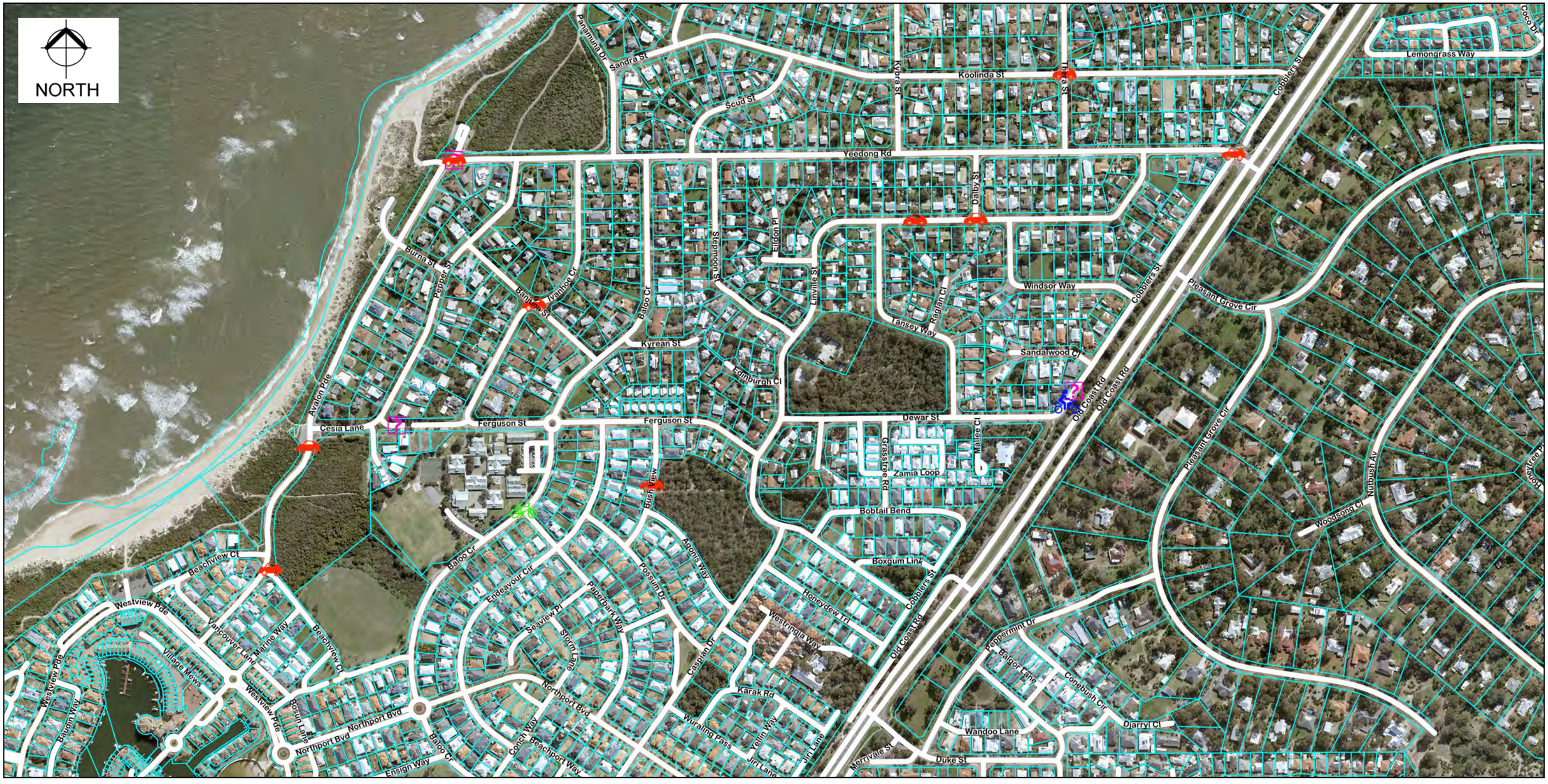
CRASH TYPE

- Right Angle
- Hit Object
- Rear End
- Head On
- Other

NOTES:

1. CRASH STATISTICS FROM 5 YEAR PERIOD BETWEEN JANUARY 2014 AND DECEMBER 2019.
2. CRASH STATISTICS SUPPLIED BY MRWA CRASH ANALYSIS REPORTING SYSTEM.

City of MANDURAH



FALCON CRASH DATA BY VEHICLE TYPE - YEEDONG RD CATCHMENT

VEHICLE CRASH TYPES

- Car or Utility
- Motorbike
- Bicycle
- Not Stated

NOTES:

1. CRASH STATISTICS FROM 5 YEAR PERIOD BETWEEN JANUARY 2014 AND DECEMBER 2019.
2. CRASH STATISTICS SUPPLIED BY MRWA CRASH ANALYSIS REPORTING SYSTEM.

FALCON CRASH DATA - SEVERITY AND CONTRIBUTING FACTORS

CRASH SEVERITY & CONTRIBUTING FACTORS

- ✚ Casualty Crash - Hospital or Medical Attention Required
- ● Off Path or Loss of Control - Potentialy Speed Related
- ◆ On Path or Carriageway - Contributing Factors Unknown

NOTES:

1. CRASH STATISTICS FROM 5 YEAR PERIOD BETWEEN JANUARY 2014 AND DECEMBER 2019.
2. CRASH STATISTICS SUPPLIED BY MRWA CRASH ANALYSIS REPORTING SYSTEM.
3. NON CASUALTY CRASHES ALL RESULTED IN PROPERTY DAMAGE ONLY.
4. LOSS OF CONTROL AND OFF PATH CRASHES MAY BE ASSOCIATED WITH EXCESSIVE SPEEDS.

City of MANDURAH

NOTES:

1. SERVICES LOCATIONS & DEPTHS ARE INDICATIVE ONLY. THE SITE AND SURROUNDINGS ARE TO BE INSPECTED AND ALL SERVICES PUBLIC AND PRIVATE , ABOVE AND BELOW GROUND ARE TO BE IDENTIFIED PRIOR TO COMMENCEMENT OF WORKS.

2. ALL VERGE AND CROSSOVER REINSTATEMENT MATERIALS TO BE OF THE SAME TYPE PRIOR TO COMMENCEMENT OF WORKS

3. STD ### REFERS TO CITY OF MANDURAH STANDARD DETAIL DRAWING NUMBER.
   - TRENCHES TO BE BACKFILLED TO STD DR06.
   - MANHOLE CONSTRUCTION TO STD DR01.
   - GULLY CONSTRUCTION TO STD DR04.

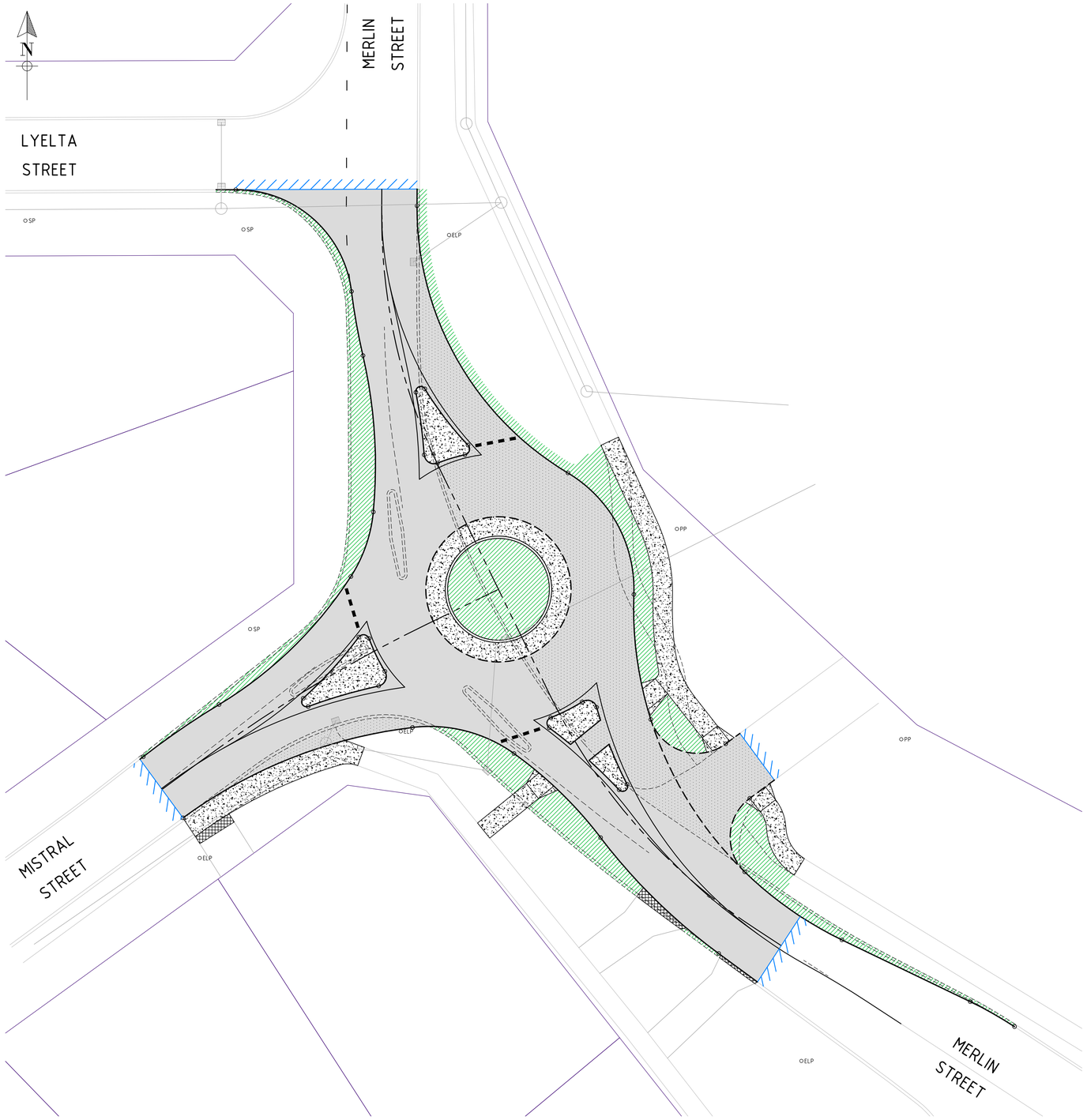
LEGEND:

- SMK — NEW SEMI-MOUNTABLE KERBING (TYPE 3)
- MK — NEW MOUNTABLE KERBING (TYPE 3)
- BK — NEW MOUNTABLE KERBING (TYPE 3)
- EXISTING KERB REMAIN/REMOVE
- EXISTING LINE MARKING REMAIN/REMOVE
- EXISTING FOOTPATH REMAIN/REMOVE
- EXISTING DRAINAGE GULLY/ PIPE/MANHOLE TO REMAIN
- EXISTING DRAINAGE GULLY/ PIPE/MANHOLE TO REMOVE
- NEW 120mm WHITE SINGLE BARRIER/EDGE LINE
- NEW 80mm WHITE BROKEN LANE LINE
- NEW 120mm WHITE CONTINUITY LINE
- NEW 300mm WHITE THERMO PLASTIC GIVE WAY LINE
- NEW 300mm WHITE THERMO PLASTIC STOP LINE
- NEW DRAINAGE PIPE
- NEW MANHOLE/GULLY PIT/SEP/ COMBINATION GULLY/GULLY TANK
- 150mm LIMESTONE @95% MMD
150mm ROAD BASE @ 98% MMD
30mm BLACK ASPHALT AC10
50 BLOW, GRADE 170
- 30mm BLACK ASPHALT AC10, 50 BLOW, GRADE 170
- NEW 100mm GREY CONCRETE FOOTPATH AS PER C.O.M. STD DWG FP04/B & FP05/B
- REINSTATE CROSSOVER TO MATCH EXISTING CROSSOVER FINISH
- LANDSCAPING INFILL
- OLP OPP OSP OELP OSW — EXISTING LIGHT POLE/POWER POLE/STAY POLE/ELECTRICAL LIGHT POLE/STAY WIRE
- EXISTING SIGN
- EXISTING TREES
- EXTENT OF WORKS

SERVICES:

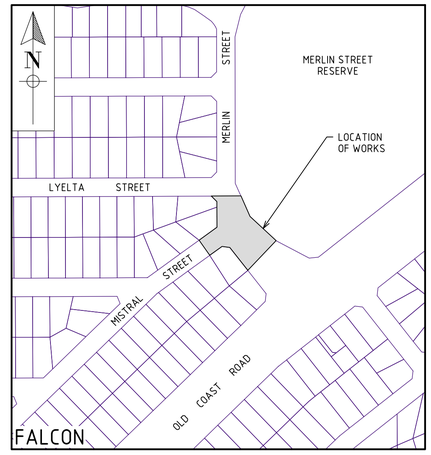
- E-LV — ELECTRICITY - LOW VOLTAGE
- E-HV — ELECTRICITY - HIGH VOLTAGE
- G — GAS
- S — SEWERAGE
- T — TELSTRA
- T-OF — TELSTRA - OPTIC FIBRE
- W — WATER

DIAL BEFORE YOU DIG www.1100.com.au



PLAN
SCALE: 1:250

SCALE: 0 10 20 5 15 25 (1:250)



LOCATION PLAN
N.T.S.

ROADS ☑

BOX OUT
LENGTH = 130m
WIDTH = 5m
AREA = 650m²

RESEAL
LENGTH = 150m
WIDTH = 6m
AREA = 900m²

BASE & SURFACE REPLACE ONLY
LENGTH = ____
WIDTH = ____
AREA = ____

MILL AND FILL
LENGTH = ____
WIDTH = ____
AREA = ____

KERB ☑
LENGTH = 450m

DRAINAGE ☑
REMOVE
PITS = 6
PIPE = ____

INSTALL
PITS = 4
PIPE = ____

PATHS ☑
LENGTH = 150m
WIDTH = 2m
AREA = 300m²

LANDSCAPE ☑

ASSET MANAGEMENT DATA

NO.	REVISION	BY	APPR	DATE
A	ISSUED FOR COMMENT AND COSTING	GM		

AMENDMENTS

METADATA

HORIZONTAL DATUM : PCG 94
VERTICAL DATUM : AHD
FILE LOCATION :

W:\WS19-20\G - CONCEPTS\MISTRAL STREET\DWGS\MISTRAL STREET RAB - REV 2.DWG

City of MANDURAH
3 Peel Street PO Box 210
Mandurah WA 6210
T (08) 9550 3777
F (08) 9550 3888

	BY	DATE
SURVEYED	PW	XX/XX/2020
DRAWN/DESIGNED	GM	25/02/2020
DRAFT CHECK		
DESIGN ENGINEER/VERIFIED		
APPROVED		
ACCOUNT NUMBER	XXXX.XXXXXX	
CLIENT	CITY OF MANDURAH	

MISTRAL ST/MERLIN ST - ROUNDABOUT
MISTRAL ST/MERLIN ST - FALCON
LAYOUT AND LOCATION PLAN
SHEET - 01 OF 01

FOR INFORMATION ONLY

A1 | DWG NO. TM 2619 01 | REVISION A