

Transport Impact Assessment

Green Valley Housing Development

Wittedrift, Western Cape

August 2019

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SUMMARY SHEET

Report Type	Transport Impact Assessment
Title	Green Valley Housing Development
Location	Wittedrift, Western Cape
Client	Bitou Municipality
Reference Number	ITS 3972
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Contact Details	Tel: 021 914 6211
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Abbreviations

AMG	Access Management Guidelines
CM	Critical Movement
COTO	Committee of Transport Officials
DR	Divisional Road
GLA	Gross Leasable Area
Ha	Hectare
LOS	Level of Service
MBT	Minibus-Taxi
MR	Provincial Main Road
NMT	Non-motorised Transport
PT	Public Transport
PTP	Public Transport Plan
RDE	Roadside Development Environment
SDP	Sight Development Plan
SQM	Square Meters (m ²)
TIA	Transport Impact Assessment
V/C	Volume to Capacity Ratio

Transport Impact Assessment

Green Valley Housing Development, Wittedrift

1 Purpose of Study	<p>The purpose of this study is to determine the transport impact of the proposed Green Valley Housing Development in Wittedrift.</p>
2 Locality <i>Refer to Figure A1 (Annexure A)</i>	<p>Green Valley Housing Development will be situated on Farm 306 Portion 28 in Wittedrift</p> <p>Wittedrift is situated north east of Plettenberg Bay. The proposed site is bordered by a residential area to the north and west.</p>
3 Land Use <i>Refer to Figure A2 (Annexure A)</i>	<p>The site is currently undeveloped and will consist of 730 residential dwelling units. Refer to the Site Development Plan provided in Annexure A (WM De Kock Associates, 2019).</p> <p>The 730 units will consist of the following types:</p> <ul style="list-style-type: none"> • Type A: 560 units (12.1 ha Single storey) • Type B: 170 units (1.6 ha High density row housing)
4 Existing Roadways in Site Vicinity	<p>The existing roadways in the site vicinity are summarised below:</p> <p><u>National Route 2 (NR208)</u>: A national road (N2) with a cross-section consisting of a single carriageway with one lane per direction section, a posted speed limit between 60km/h and 80km/h and no on-street parking. Some intersections have local widening to accommodate turning lanes and/or additional through lanes.</p> <p><u>R340 (MR390)</u>: A provincial main road with a cross-section consisting of one lane per direction, a speed limit of 100km/h, no shoulder lanes and no on-street parking.</p> <p><u>Main Road (MR395)</u>: A provincial main road with cross-section consisting of one lane per direction, a speed limit of 60km/h and no sidewalks.</p> <p><u>Pine Street</u>: A local residential street with cross-section consisting of lane per direction, a speed limit of 60km/h and no sidewalks.</p> <p><u>High Street</u>: A local residential street with cross-section consisting of lane per direction, a speed limit of 60km/h and no sidewalks.</p> <p><u>Lemon Street</u>: A local residential street with cross-section consisting of lane per direction, a speed limit of 60km/h and no sidewalks.</p>
5 Analyses Hours	<p>The traffic analyses are based on weekday AM and PM peak hours. The following peak hours are representative of the study area:</p> <ul style="list-style-type: none"> • Weekday AM peak hour: 07:00 to 08:00 • Weekday PM peak hour: 17:00 to 18:00

<p>6 Scenarios Analysed</p>	<p>The following scenarios were analysed to determine the transport impact of the proposed development:</p> <ul style="list-style-type: none"> • 2018 Existing conditions • 2023 Background traffic conditions (2018 existing traffic conditions plus expected traffic growth based on a 5-year traffic horizon) • 2023 Total traffic conditions (2023 Background traffic conditions plus development trips) <p>The traffic growth assumptions used to analyse future scenarios are discussed in Section 9.</p>															
<p>7 Study Intersections (existing control) Refer to Figure A3 (Annexure A)</p>	<p>The scope of the analyses for the TIA included the intersections listed below. Refer to Figure A3 in Annexure A for the lane configurations and intersection controls.</p> <p><i>Table 1: Study Intersections</i></p> <table border="1" data-bbox="501 696 1426 853"> <thead> <tr> <th>No.</th> <th>Name</th> <th>Existing Control</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N2/R304</td> <td>Priority controlled</td> </tr> <tr> <td>2</td> <td>R304/Main Road</td> <td>Priority controlled</td> </tr> <tr> <td>3</td> <td>Main Road/Pine Street</td> <td>Priority controlled</td> </tr> <tr> <td>4</td> <td>Pine Street/Proposed Development route</td> <td>Future intersection</td> </tr> </tbody> </table>	No.	Name	Existing Control	1	N2/R304	Priority controlled	2	R304/Main Road	Priority controlled	3	Main Road/Pine Street	Priority controlled	4	Pine Street/Proposed Development route	Future intersection
No.	Name	Existing Control														
1	N2/R304	Priority controlled														
2	R304/Main Road	Priority controlled														
3	Main Road/Pine Street	Priority controlled														
4	Pine Street/Proposed Development route	Future intersection														
<p>8 Existing Intersection Operations Refer to Figures A3 (Annexure A)</p>	<p>Traffic surveys were conducted to determine the peak hour traffic volumes at the intersections in the study area. The surveys for the study intersections situated in Wittedrift were conducted on Thursday, 19 April 2018. The R304/Main Road and N2/R304 intersection traffic volumes were obtained from the Western Cape Government Road Network Information System (RNIS, 2018) and projected accordingly to obtain 2018 traffic counts.</p> <p>Intersections in the study area were analysed to determine the level of service (LOS), delay per vehicle (in seconds) and volume per capacity (V/C) for each intersection in the peak hour. Refer to Figure A3 in Annexure A for the respective weekday AM and PM peak hour traffic operation for the existing traffic conditions.</p> <p>Based on the results of the analyses, all the intersections are operating satisfactorily with no capacity conditions being experienced.</p>															
<p>9 Approved Developments/Latent Rights</p>	<p>No specific approved/latent developments have been incorporated in the analyses.</p>															
<p>10 Traffic Growth</p>	<p>Traffic growth rates are used to estimate the future traffic. A historical traffic growth of approximately 1% per annum on average has been experienced along the R340 and Main Road and a growth rate of approximately 2.5% per annum along the N2. Both these growth rates were experienced between the years 2004 and 2016. This is based on traffic data managed by the Western Cape Government (WCG), (RNIS, 2018). It is expected that a similar growth may be realised over the short to medium term. Accordingly, these growth rates are applied to the existing traffic counts to estimate the traffic for the future scenario.</p>															

<p>11 Background Traffic Conditions <i>Refer to Figure A4 (Annexure A)</i></p>	<p>The 2023 background traffic conditions scenario analyses the existing traffic after applying a 1% per annum traffic growth rate on the R340 and Main Road and a 2.5% per annum traffic growth rate on the N2 over five years.</p> <p>Similarly to the analyses results for the existing conditions, none of the study intersections experience capacity constraints during the weekday AM and PM peak hours. Refer to Figure A4 in Annexure A for the respective peak hour background intersection operation results.</p>																											
<p>12 Site Access <i>Refer to Figure A7 (Annexure A)</i></p>	<p>There are two proposed access roads to the development. Refer to Figure A7 in Appendix A for the proposed access roads.</p> <ul style="list-style-type: none"> • Access Road 1: High Street is extended and connects with a local street in the Green Valley Development. • Access Road 2: This street will connect to Pine Street via a proposed street extending from the north western side of the development. 																											
<p>13 Trip Generation Rates and Development Trips</p>	<p>All trip generation rates and adjustment factors used to determine the expected development trips are from the South African Trip Data Manual (COTO TMH17, 2013).</p> <p>The same trip generation characteristics were assumed for both single dwelling and row housing. These trip generation rates were used for determining the expected development trips for the weekday AM and PM peak hours. The COTO trip generation rates and In/ Out splits are summarised as follows:</p> <ul style="list-style-type: none"> • AM peak hour: 1 trip per dwelling unit (25% in/75% out) • PM peak hour: 1 trip per dwelling unit (30% in/70% out) <p>The COTO Manual also provides guidelines for a reduction in trip generation rates due to various factors. These factors and the recommended reduction in trip generation rates for single dwelling units (COTO 210) are as follows:</p> <ul style="list-style-type: none"> • Mixed-use development: 10% • Low vehicle ownership: 40% • Very low vehicle ownership: 70% • Transit nodes or corridors: 15% <p>A reduction for a mixed-use environment of 10% and a very low vehicle ownership reduction of 70%, were deemed applicable for the development and was therefore applied to the standard trip generation rate of 1 trip per dwelling unit. A nett trip generation rate of 0.27 trips/ du was calculated and used to determine the development trips. The resultant expected development trips for the development is summarised in Table 2.</p> <p><i>Table 2: Trip Generation and Development Trips</i></p> <table border="1" data-bbox="501 1697 1417 1839"> <thead> <tr> <th rowspan="2">Development Phase</th> <th colspan="3">Weekday AM Peak Hour</th> <th colspan="3">Weekday PM Peak Hour</th> </tr> <tr> <th>In</th> <th>Out</th> <th>Total</th> <th>In</th> <th>Out</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Single Dwelling Units</td> <td>38</td> <td>113</td> <td>151</td> <td>106</td> <td>45</td> <td>151</td> </tr> <tr> <td>High Density Row Housing</td> <td>12</td> <td>35</td> <td>46</td> <td>32</td> <td>14</td> <td>46</td> </tr> </tbody> </table> <p>Based on the trip generation rates and adjustment factors provided in the COTO Manual, approximately 200 total trips are expected to be generated by the development during the respective AM and PM weekday peak hours. These trips were assigned through the road network to determine the impact of the development on the operations of the external road network.</p>	Development Phase	Weekday AM Peak Hour			Weekday PM Peak Hour			In	Out	Total	In	Out	Total	Single Dwelling Units	38	113	151	106	45	151	High Density Row Housing	12	35	46	32	14	46
Development Phase	Weekday AM Peak Hour			Weekday PM Peak Hour																								
	In	Out	Total	In	Out	Total																						
Single Dwelling Units	38	113	151	106	45	151																						
High Density Row Housing	12	35	46	32	14	46																						

<p>14 Trip Distribution <i>Refer to Figure A5 (Annexure A)</i></p>	<p>All trips generated by the development were assigned through Main Road/Pine Street intersection (intersection 2) as part of the traffic modelling. The expected trip distribution used in the traffic model for the development during the AM and PM peak hours was as follows:</p> <ul style="list-style-type: none"> • 5% to/from Plettenberg Bay via Main Road • 20% to/from Uniondale • 30% to/from Port Elizabeth • 45% to/from Plettenberg Bay via R340 <p>The above distribution, as well as the assignment of the development trips through the study intersections, are illustrated in Figure A5 in Annexure A for the respective peak hours.</p>
<p>15 Total Traffic Conditions <i>Refer to Figures A6 (Annexure A)</i></p>	<p>The 2023 total traffic conditions scenario analyses the background traffic conditions plus the development trips assigned and distributed through the road network.</p> <p>Based on the intersection capacity analyses, all of the study intersections can expect to operate satisfactorily during the respective weekday AM and PM peak hours. No capacity road improvements are thus required to accommodate the additional development trips. However, the intersection layouts are currently sub-standard and requires improvement. This is further discussed in Section 16 below.</p> <p>Refer to Figure A6 in Annexure A for the respective peak hour total intersection operation results.</p>
<p>16 Geometric Improvements</p>	<p>Main Road/ Lemon Street Intersection:</p> <p>Site observations confirmed that the current intersection geometry at Main Road/ Lemon Street is sub-standard with Watson Street intersecting with Lemon Street in the intersection. As part of future road network improvement, Watson Street intersection has to be re-aligned to either intersect directly with Main Road or with Lemon Street. Refer to the figure below for the intersection geometry of Main Road/Lemon Street intersection.</p> <div data-bbox="501 1319 1412 1590" data-label="Image"> </div> <p style="text-align: center;">Existing Main Road/Lemon Street intersection</p> <p>Main Road/ Pine Street Intersection:</p> <p>No capacity improvements are proposed for this intersection. However, it is recommended that the existing bellmouth be formalised, taking the proposed pedestrian crossing and public transport embayment (refer to Section 17 and 18 below) at the Green Valley Community Hall into consideration.</p>

<p>17 Non-motorised Transport (NMT) <i>Refer to Figures A7 & A8 (Annexure A)</i></p>	<p>Refer to Figure A7 in Appendix A for the existing and future NMT desire lines. Significant desire lines include the following:</p> <ul style="list-style-type: none"> • From the local community along the Main Road to the CBD areas. • Across the Main Road to the civic centre with sports fields and the Community Hall. • Learner movement along Heuwel Street and Monument Street. <p>Future pedestrian desire lines were also identified and these include the following:</p> <ul style="list-style-type: none"> • From the Green Valley development northwards along informal routes to connect to the CBD environments and school via Heuwel Street. • Informal NMT movement is expected from the Green Valley development to connect to the existing Wittedrift Community. <p>Improvement proposals include the following:</p> <ul style="list-style-type: none"> • Sidewalks are proposed along the following roads: <ul style="list-style-type: none"> ○ The residential streets of the proposed Green Valley Development ○ Along Access Road 1 ○ Along Access Road 2 ○ Along Main Road from the existing sidewalks and extending to Lemon Street • A pedestrian crossing is proposed along the Main Road, close to the Main Road/Pine Street intersection. The exact location must be determined during a detail design process. • Three exclusive NMT paths must be provided along the future pedestrian desire lines. Refer to Figure A8 for NMT Path Layout Examples which take into consideration the steep gradients of the paths. • As soon as the land use proposals are more defined, traffic calming elements should be introduced in the development to ensure that speeding does not become an issue, especially with the steep gradients. Pedestrian crossing facilities should also be identified, if required and where appropriate. <p>It should also be noted that Bitou Municipality is considering the constructions of a sidewalk all along Main Road up to the Stofpad School. However, this has not yet been confirmed.</p>
<p>18 Public Transport</p>	<p>Public transport is a main source of transport in the Wittedrift area, transporting passengers to and from the surrounding towns where people work. It is expected that minibus taxis will travel to and from the new development along High Street. Care should be taken that minibus taxis can operate along the Access Road 2 and Access Road 1.</p> <p>Once the proposed land use is more defined, public transport embayments should also be provided at appropriate locations. A public transport embayment is proposed along the Main Road, close to the Main Road/Pine Street intersection.</p>
<p>19 Parking</p>	<p>Provision for at least one vehicle per dwelling unit to park off-street will be provided as part of the development. This is in accordance with the Bitou Municipality zoning regulations. As all required parking is provided on each individual erf, no additional on-street parking is required.</p>

<p>20 Conclusion & Recommendations</p>	<p>Road Network</p> <p><u>Existing (2018) and Background (2023) Traffic Conditions</u></p> <p>All the intersections currently operate and will operate in the future at acceptable conditions from an intersection capacity point-of-view. No mitigation measures are recommended as part of these analyses scenarios.</p> <p>However, the intersections of Main/ Lemon and Main/ Pine are geometrically sub-standard. It is proposed that it be intersections be improved:</p> <ul style="list-style-type: none"> • Main Road/Lemon Street Intersection <ul style="list-style-type: none"> ○ Watson Street intersection has to be re-aligned to either intersect directly with Main Road or with Lemon Street. • Main Road/Pine Street Intersection <ul style="list-style-type: none"> ○ No capacity improvements are proposed for this intersection. However, it is recommended that the existing bellmouth be formalised. <p><u>Access</u></p> <p>There are two proposed access roads to the development.</p> <ul style="list-style-type: none"> • High Street is extended and connects with a local street in the Green Valley Development • Access Road 2: This street will connect to Pine Street via a proposed street extending from the north western side of the development. <p><u>Development Trips</u></p> <p>The expected development trips are as follows:</p> <ul style="list-style-type: none"> • Weekday AM peak hour: 197 trips (50 in/148 out) • Weekday PM peak hour: 197 trips (138 in/59 out) <p><u>2023 Total Traffic Conditions</u></p> <p>All the study intersections will operate at acceptable traffic conditions from an intersection capacity point-of-view with the addition of the development trips on the external road network. No mitigation measure are thus recommended as part of these analyses scenarios.</p> <p>NMT</p> <p>Significant desire lines were identified along with future pedestrian desire lines expected once Green Valley is completed. Improvement proposals include the following:</p> <ul style="list-style-type: none"> • Sidewalks are proposed along the following roads: <ul style="list-style-type: none"> ○ The residential streets of the proposed Green Valley Development ○ Along Access Road 1 ○ Along Access Road 2 ○ Along Main Road from the existing sidewalks and extending to Lemon Street • A pedestrian crossing is proposed along the Main Road, close to the Main Road/Pine Street intersection. The exact location must be determined during a detail design process
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- Three exclusive NMT paths must be provided along the future pedestrian desire lines. Refer to Figure A8 for NMT Path Layout Examples which take into consideration the steep gradients of the paths.
- As soon as the land use proposals are more defined, traffic calming elements should be introduced in the development to ensure that speeding does not become an issue, especially with the steep gradients.
- Pedestrian crossing facilities should also be identified, if required and where appropriate.

Public Transport

Once the proposed land use is more defined, public transport embayments should also be provided at appropriate locations. A public transport embayment is proposed along the Main Road, close to the Main Road/Pine Street intersection.

Parking

Provision for at least one vehicle per dwelling unit to park off-street will be provided as part of the development, no additional on-street parking is required.

Conclusion

It is concluded that the expected development traffic will have a marginal impact on the external road network and no road improvements are required from an intersection capacity point-of-view. However, geometric improvements at Main/ Lemon and Main/ Pine are required, and NMT, traffic calming and public transport facilities should be provided as recommended in the report.

It is therefore concluded and recommended that the development can be approved from a transport perspective.

REFERENCES

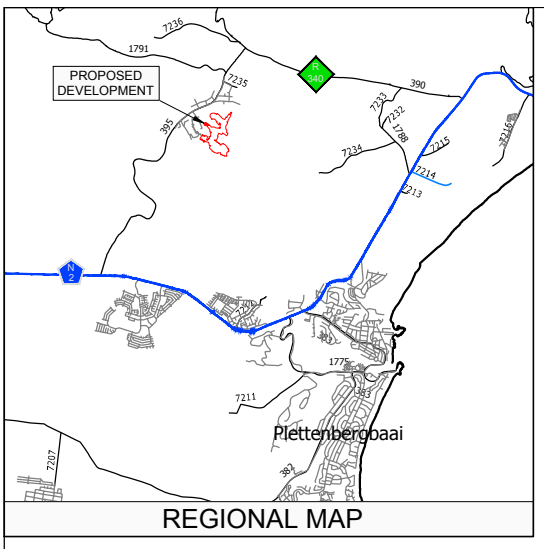
1. Cape Farm Mapper, <http://gis.elsenburg.com/apps/cfm>, September 2018
2. WM De Kock Associated, Green Valley, Preliminary Framework & Rezoning, 21 June 2019.
3. South African Trip Data Manual, TMH17, Version 1.1, COTO, September 2013
4. Western Cape Government, Road Network Information System (RNIS), http://rnis.westerncape.gov.za/rnis/rnis_web_reports.main, August 2018

Annexure A

Figures

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Figure A7	Access Roads & Proposed Transport Improvements
Figure A8	NMT Path Layout Examples



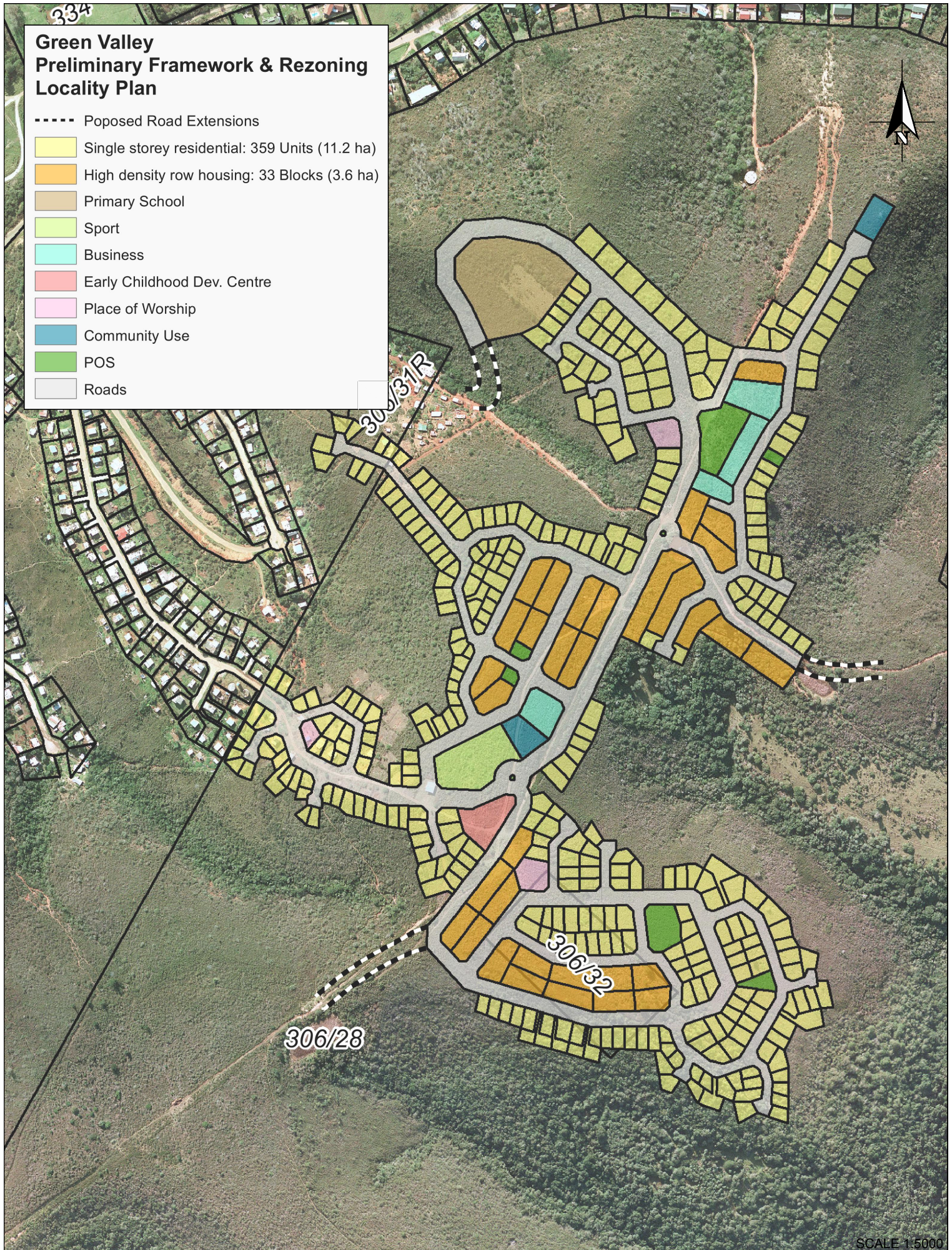
PROJECT:
 Green Valley Housing Development, Wittedrift Plettenberg Bay

FIGURE:
 Locality Plan

NUMBER:
 A1

Green Valley Preliminary Framework & Rezoning Locality Plan

- Poposed Road Extensions
- Single storey residential: 359 Units (11.2 ha)
- High density row housing: 33 Blocks (3.6 ha)
- Primary School
- Sport
- Business
- Early Childhood Dev. Centre
- Place of Worship
- Community Use
- POS
- Roads



SCALE 1:5000



PROJECT: Green Valley Housing Development, Wittedrift Plettenberg Bay	FIGURE: Site Development Plan	NUMBER: A2
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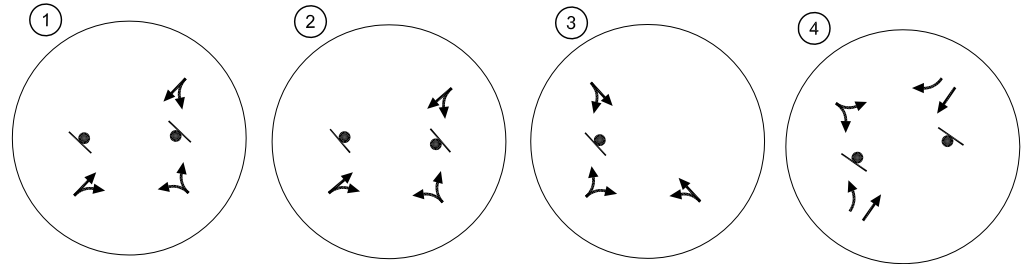
LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALISED)
 LOS = INTERSECTION LEVEL OF SERVICE (SIGNALISED) /
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 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

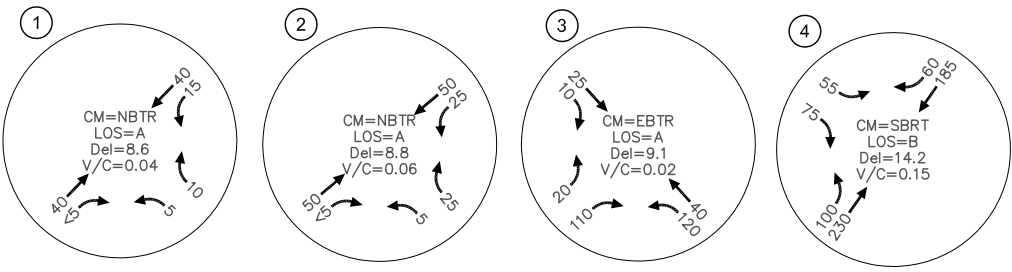
CONTROL TYPE LEGEND

○ ROUNDABOUT
 ● STOP / YIELD CONTROL
 🚦 TRAFFIC SIGNAL

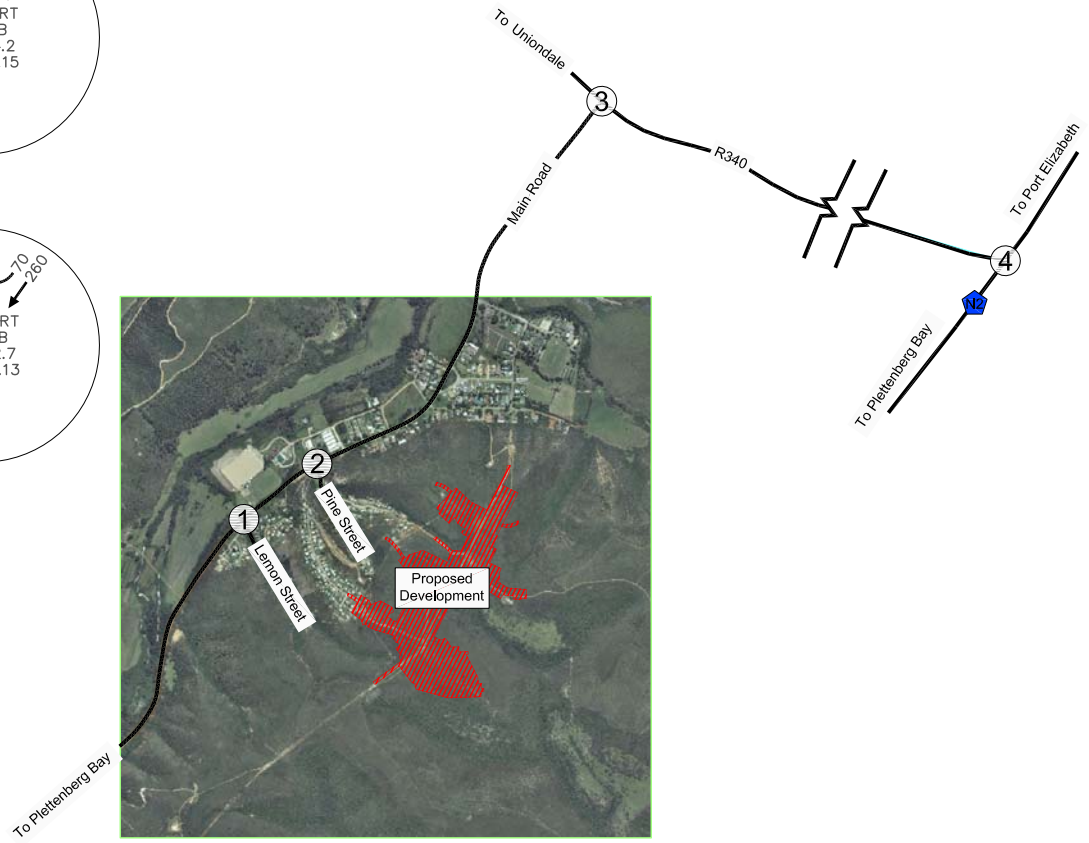
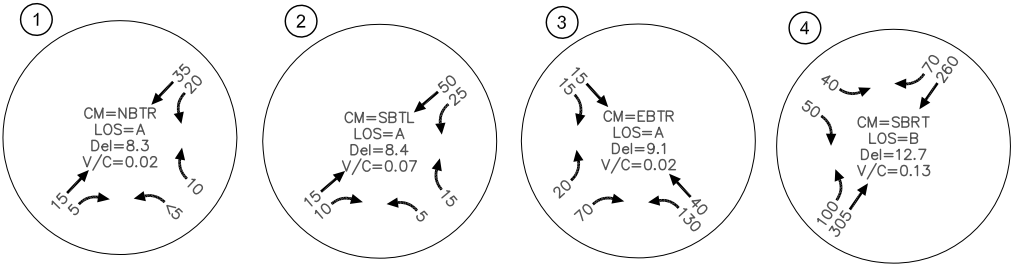
LANE CONFIGURATION



AM PEAK HOUR
07:00-08:00



PM PEAK HOUR
17:00-18:00



PROJECT: GREEN VALLEY HOUSING DEVELOPMENT, WITTEDRIFT

FIGURE: 2018 EXISTING LANE CONFIGURATION AND WEEKDAY AM AND PM PEAK HOUR TRAFFIC CONDITIONS

NUMBER: A3

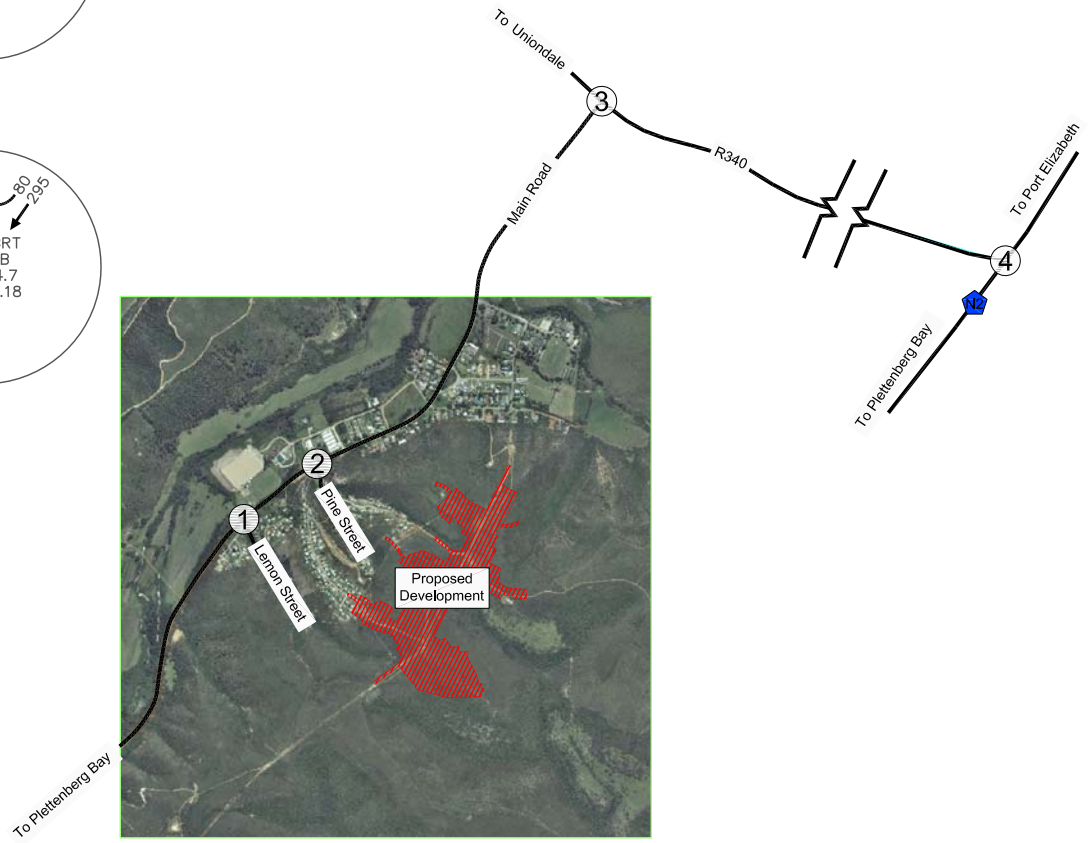
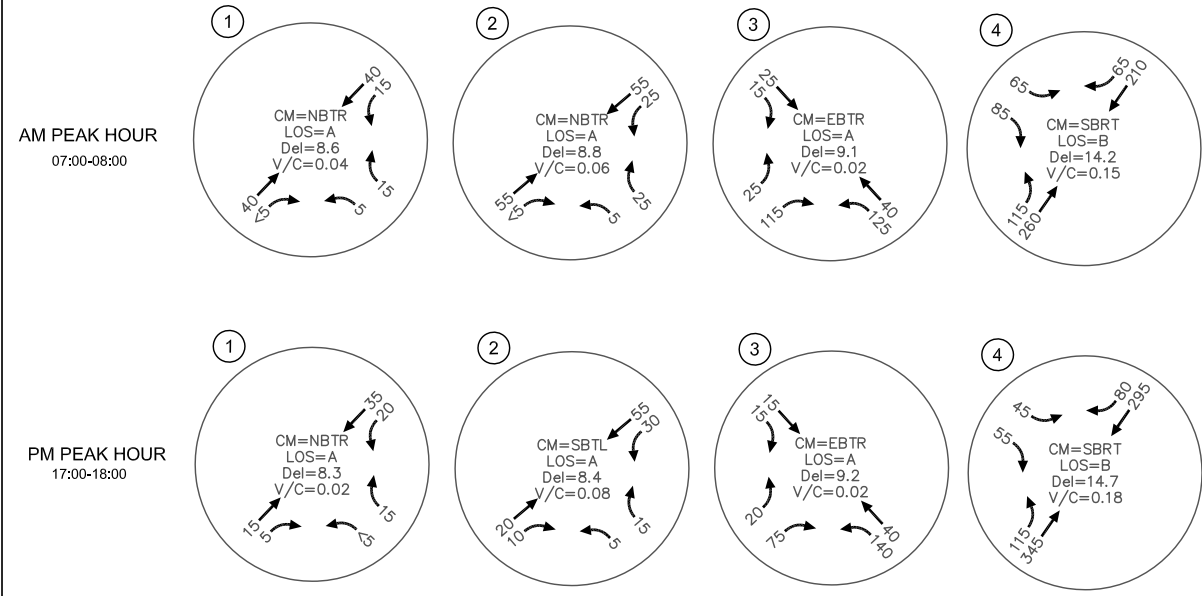


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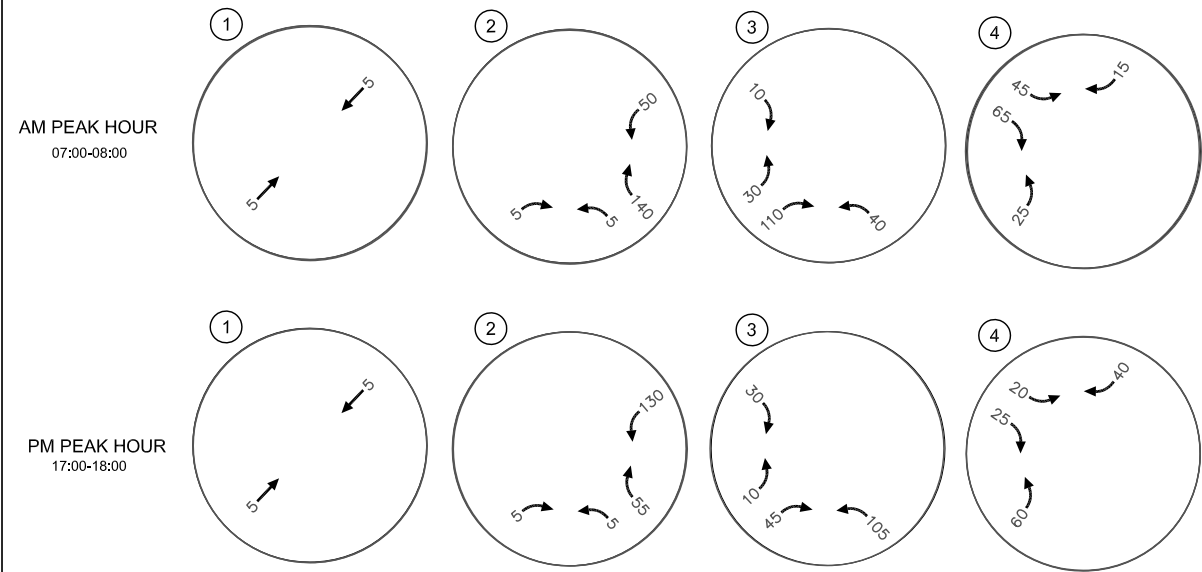
PROJECT: GREEN VALLEY HOUSING DEVELOPMENT, WITTEDRIFT

FIGURE: 2023 BACKGROUND WEEKDAY AM AND PM PEAK HOUR TRAFFIC CONDITIONS

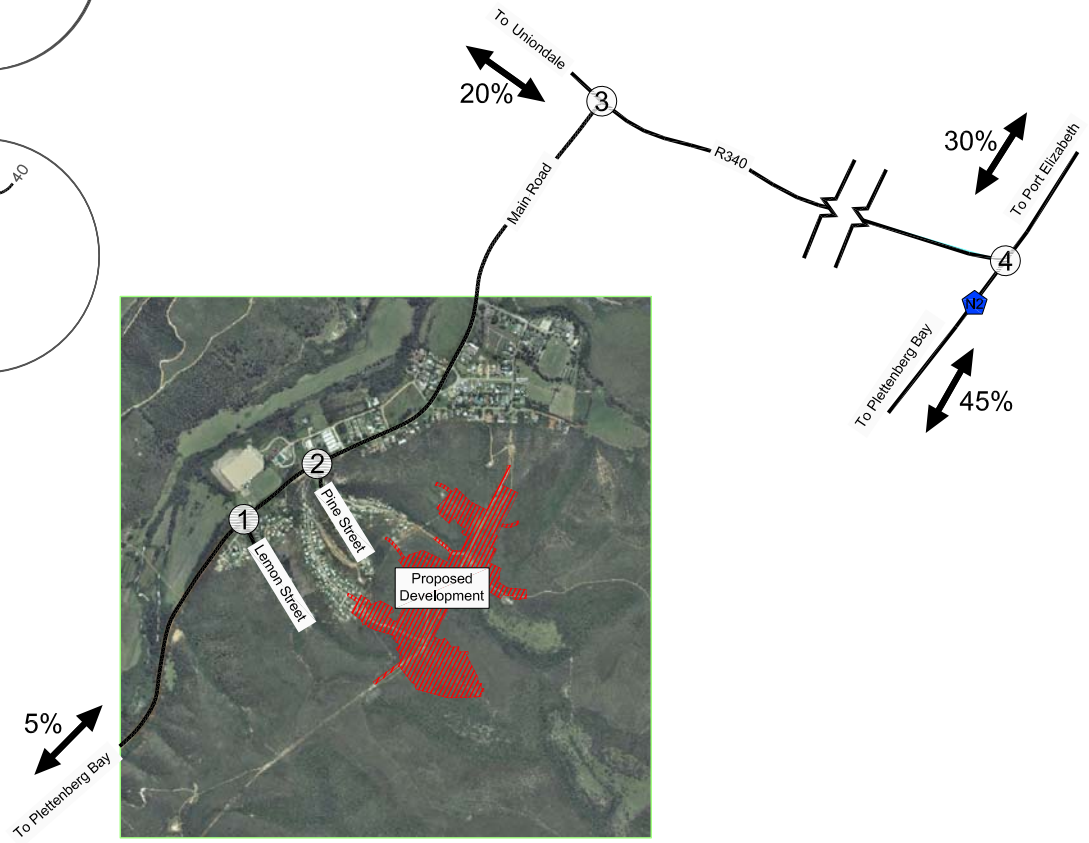
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 Del = INTERSECTION AVERAGE DELAY (SIGNALISED) /
 CRITICAL MOVEMENT DELAY UNSIGNALED
 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO




CONTROL TYPE LEGEND
 ROUNDABOUT
 STOP / YIELD CONTROL
 TRAFFIC SIGNAL



PEAK HOUR	IN	OUT	TOTAL
AM	50	148	197
PM	138	59	197

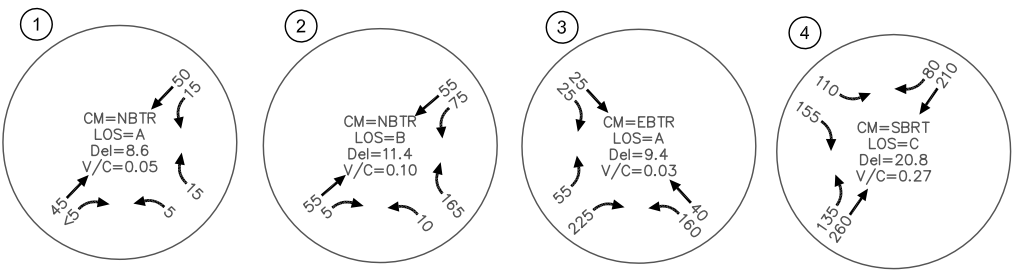


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 V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

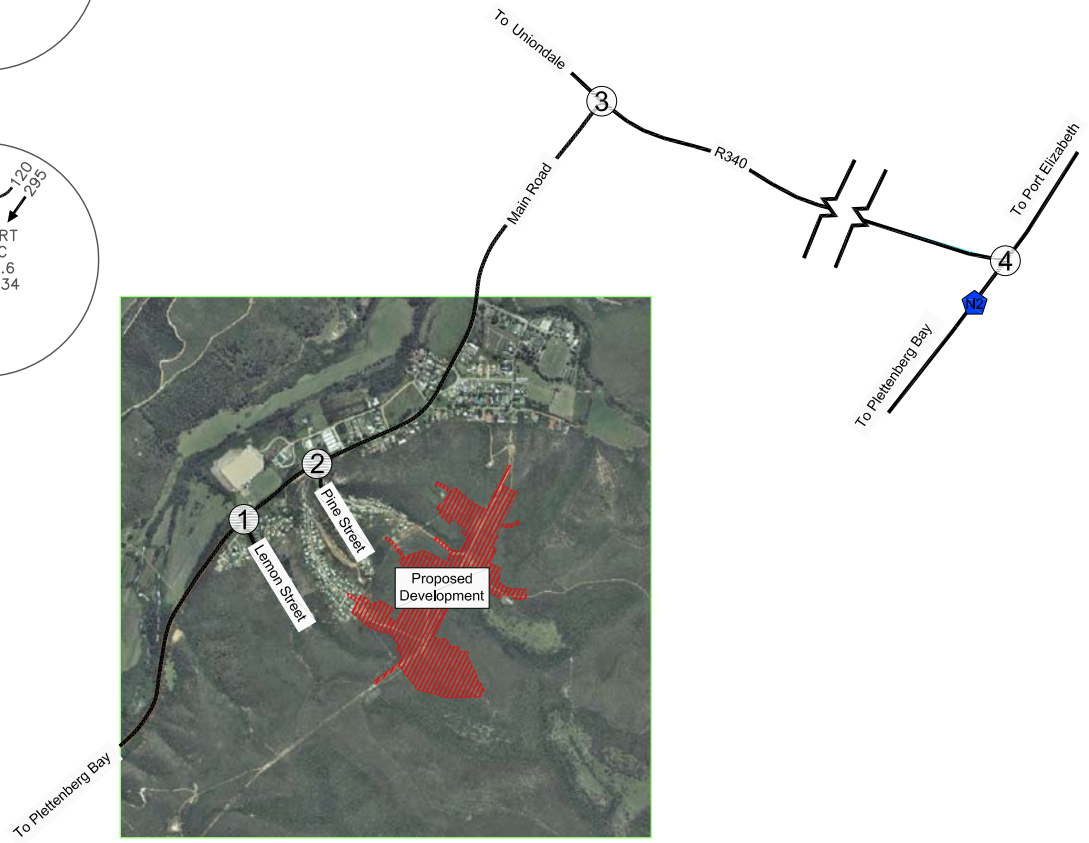
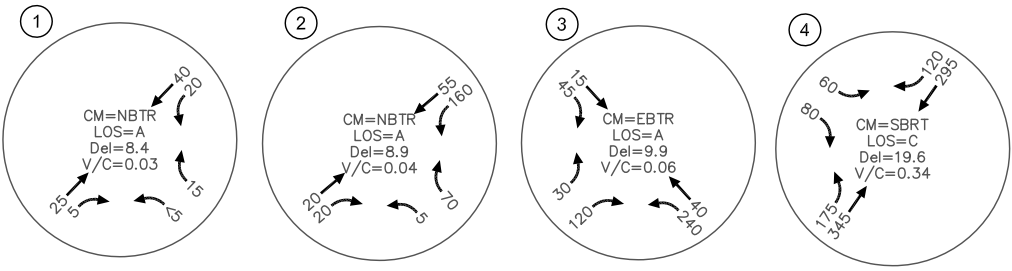
CONTROL TYPE LEGEND
 ROUNDABOUT
 STOP / YIELD CONTROL
 TRAFFIC SIGNAL



AM PEAK HOUR
 07:00-08:00



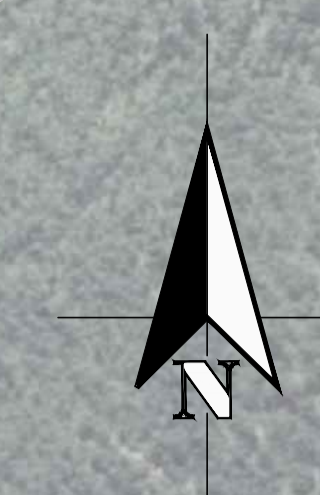
PM PEAK HOUR
 17:00-18:00



PROJECT: GREEN VALLEY HOUSING DEVELOPMENT, WITTEDRIFT

FIGURE: 2023 TOTAL WEEKDAY AM AND PM PEAK HOUR TRAFFIC CONDITIONS

NUMBER: A6



LEGEND

Proposed Road Layout	
Existing Desire Lines	
Future Desire Lines	

NOTE:
Existing pedestrian desire lines identified by Bitou Municipality from Wittedrift up to Stofpad School. Bitou Municipality is considering the construction of sidewalks up to Stofpad School - this has not yet been confirmed

its INNOVATIVE TRANSPORT SOLUTIONS

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westerncape@itsglobal.co.za
www.itsglobal.co.za

CLIENT:	APPROVED - AS BUILT	APPROVED - CONSTRUCTION	DESIGNED: -	NAME:	SIGNED:	DATE:	PROJECT:	TIA Green Valley Housing Wittedrift Plettenberg Bay	SCALE:	REV: -
	Name: -	Name: -	DRAWN: -				DRAWING TITLE:	Access Roads & Proposed Transport Improvements	1:2500 @ A1	DATE:
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