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Your ref: Shell Wood Drive Parklands TIA

Our ref: iCE/B/978 **Date:** 25 February 2013

Consulting Services

- Civil Engineering
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City of Cape Town
Transport, Roads and Stormwater
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For attention: Mr. Johan Massyn

Sir

PRELIMINARY TRAFFIC IMPACT ASSESSMENT FOR PROPOSED FILLING STATION ON THE CORNER OF SANDOWN ROAD AND WOOD DRIVE, PARKLANDS

1. Background

Environmental Resources Management (Southern Africa) Pty Ltd (ERM) appointed iCE Group (Boland) to conduct a traffic impact assessment for the proposed development on Erf 3604, Parklands.

Erf 3604 is situated on the corner of Sandown Road and Wood Drive in Parklands, as indicated on the attached **Locality Plan**.

2. Proposed development

Erf 3604 is currently vacant. Erf 3603, just to the east of Erf 3604, is also vacant. The owners propose to develop a filling station with an associated convenience store with a 170m² retail area and a 100m² fast food restaurant on the property. A tyre-fitment centre is proposed by other developers on the adjacent Erf 3603.

Please see the attached **Site Development Plan**.

3. Access proposals

A left-in access has already been constructed on Sandown Road, approximately 120m east of the Sandown Road / Wood Drive intersection (kerb face to kerb face). This left-in access will give access off Sandown Road to the proposed tyre fitment centre on Erf 3603 as well as the proposed filling station on Erf 3604, supposedly via a servitude right of way.

The environment in which Erf 3604 is situated can be described as intermediate. The Provincial Road Access Guidelines document gives the following description to an intermediate road environment: The typical intermediate roadside development is relatively dense within the range 3000 to 10 000m² Gross Floor Area/ha. This may be found within activity nodes

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(e.g. regional shopping centres, industrial areas, high density residential areas) or along activity spines. Driveway access demands are lower, on-street parking is less pervasive and pedestrian activity is not as great as that in dense urban development environments. The road grid pattern can be coarser than in the urban development environment since access seeking traffic volumes are lower.

The City of Cape Town's Road Network Hierarchical Classification drawing of 2010 indicates that Wood Drive is classified as a secondary arterial (Class 3 road). The Provincial Road Access Guidelines Document describes a Class 3 Road as a District Distributor, which distribute traffic between the principle residential, industrial and business districts of the town and form the links between the primary network and roads within residential areas.

The Provincial Road Access Guidelines document indicates that normal side street spacing on a Class 3 Road in an intermediate environment should be a minimum of 120m for full accesses and 90m for left-only accesses. The section of Wood Drive between the Sandown Road / Wood Drive intersection and the Wood Drive / Thetford Road intersection, on which another access to the filling station is proposed, is approximately 180m in length (kerb face to kerb face). A left-in left-out access to the proposed development can thus be accommodated on this section of road approximately halfway between the Wood Drive / Thetford intersection and the Sandown Road / Wood Drive intersection. Shoulder sight distance at the position of the proposed access is sufficient in both directions. The **Site Development Plan** shows a left-in left- and right-out access on this position, but cannot be allowed according to the Provincial Road Access Guidelines document.

All vehicles exiting the site will have to do so at the proposed left-in left-out access on Wood Drive. This will be problematic as many vehicles on Sandown Road will want to call at the filling station and will not be able to return to Sandown Road without having to make a long detour. A roundabout is therefore proposed for the Wood Drive / Thetford intersection to allow these vehicles to safely make a U-turn and return to Sandown Road after calling at the proposed development. Please refer to the attached **Proposed Wood Drive Layout** drawing (conceptual design).

4. Year 2014 traffic impact

It is expected that the development will be completed by the year 2014. This was used as the base year to determine the traffic impact of the development.

4.1 Existing traffic

Traffic counts were done at the Sandown Road / Wood Drive, Sandown Road / Wandsworth Road and Wood Drive / Thetford Road intersections on Thursday the 17th of January 2014 from 06:00 to 10:00 and from 15:00 to 19:00. The AM peak hour was determined between 07:00 and 08:00 and the PM peak hour between 17:15 and 18:15.

The intersections mentioned above were analysed by means of the SIDRA INTERSECTION 5.1 computer software. SIDRA INTERSECTION is an advanced micro-analytical traffic evaluation tool that employs lane-by-lane and vehicle drive-cycle models coupled with an iterative approximation method to provide estimates of capacity and performance statistics (e.g. levels of service).

The performance of the different movements (left turn, through, right turn) on each approach of an intersection is measured by the extent of the delay experienced by vehicles performing these movements. Short delays result in a good service level (delays of 5 seconds or less per vehicle corresponds to a level of service A), whereas long delays result in poor service levels (40 s per vehicle corresponds to a level of

service D). A level of service D is generally taken as the lowest acceptable standard, but the City of Cape Town has, in recent times, accepted a level of service E as the lowest standard.

Sandown Road / Wood Drive Intersection: This is currently a four-way stop controlled intersection, but will be upgraded to a signalised controlled intersection in the near future according to Mr Sean Glass, head of Transport, Roads & Major Projects, City of Cape Town.

The SIDRA analysis of this intersection with the existing four way stop control indicates that most movements operate at unacceptable levels of service during the AM and PM peak hours. With signalised control, this intersection will operate at a level of service C during the AM peak hour and a level of service B during the PM peak hour, with all movements operating at a level of service C or better.

Wood Drive / Thetford Road Intersection: This is currently a stop controlled intersection with stop control on Thetford Road. The SIDRA analysis of this intersection indicates that all movements at this intersection operate at a level of service C or better during both the AM and PM peak hours. The proposed roundabout at this intersection will operate at a level of service A during both the AM and PM peak hours.

Sandown Road / Wandsworth Road Intersection: This is a stop controlled intersection with stop control on Wandsworth Road. The SIDRA analysis of this intersection indicates that all movements at this intersection operate at a level of service C or better during both the AM and PM peak hours.

Please refer to **Figure 1** for available 2013 traffic volumes and levels of service.

4.2 Background 2014 traffic

Existing traffic volumes on Sandown Road and Wood Drive were increased by 3% per annum to obtain expected background 2014 traffic volumes.

The intersections mentioned in paragraph 4.1 were again analysed by means of the SIDRA computer program to determine the levels of service at which they will operate without the impact of the proposed development.

Sandown Road / Wood Drive Intersection: The existing four-way stop controlled intersection will operate at a level of service F during both the AM and PM peak hours.

With signalised control, this intersection will operate at a level of service C during the AM peak hour and a level of service B during the PM peak hour, with all movements operating at a level of service C or better.

Wood Drive / Thetford Road Intersection: All movements at the existing stop controlled intersection will operate at a level of service C or better during both the AM and PM peak hours.

The proposed roundabout at this intersection will operate at a level of service A during both the AM and PM peak hours.

Sandown Road / Wandsworth Road Intersection: All movements at this stop controlled intersection will continue to operate at a level of service C or better during both the AM and PM peak hours.

Please refer to **Figure 2** for estimated background 2014 background traffic volumes and levels of service.

4.3 Trip generation

Without the proposed roundabout at the Wood Drive / Thetford Road intersection, the amount of vehicles calling at the filling station will decrease dramatically as explained in paragraph 3. Calling trips at the filling station will decrease from 47 trips to approximately 17 trips during the AM peak hour and from 61 trips to approximately 21 trips during the PM peak hour. The following trip generation potential and trip distribution of Erf 3604 was thus based on the fact that the roundabout at the Wood Drive / Thetford Road intersection will be in place by the completion of the proposed development.

The site will have three trip generating components: a filling station, a convenience store and a fast food restaurant. The South African Trip Generation Rates document indicates that 4% of passing traffic typically calls at filling stations. Four per cent (4%) of traffic passing through the Sandown Road / Wood Drive intersection was therefore diverted to the new filling station.

A trip generation rate of 2.83 trips per 100m² gross lettable area (GLA) was used for the AM peak hour for the convenience store and a trip generation rate of 20 trips per 100m² was calculated for the PM peak hour. It is expected that 30% of these trips will be dual purpose trips i.e. filling station customers which is also convenience store customers. Approximately 25% of the trips generated by the convenience store will be pass-by trips i.e. trips that were diverted from their original route.

The South African Trip Generation Rates document recommends a PM peak hour trip generation rate of 59 trips per 100m² GLA for fast food restaurants. These restaurants are not typically open during the AM peak hour. Surveys were done at three KFC fast-food restaurants in order to compare the recommended trip rate with actual trips generated.

These surveys were done on Friday the 4th of March 2011 at the Gordon's Bay Road (Strand), Waterstone Village (Somerset West) and Brackenfell KFC's. The average hourly number of vehicles counted was 95, which accounts for 190 trips per peak hour. This means that the surveyed rate per 100m² GLA is approximately 70 trips compared to the recommended 59 trips per 100m² GLA. The surveyed rate was used in the calculations for Erf 3604. It is expected that 10% of the trips generated by the fast-food restaurant will be dual purpose trips and that approximately 10% will be pass-by trips.

The trip generation potential for Erf 3604 is summarised in **Table 1**.

Table 1: Erf 3604 trip generation potential for the year 2014

Land Use	AM				PM			
	Passing Traffic / GLA	TGR	In	Out	Passing Traffic / GLA	TGR	In	Out
Filling Station	1183	4%	47	47	1534	4%	61	61
Retail	170	2.83	2	2	170	20	17	17
Restaurant - Fast Food	100	0	0	0	100	70	35	35
Total			50	50			113	113

4.4 Trip distribution

Trips attracted to the filling station were treated as diverted trips. The distribution of trips generated by the convenience store and restaurant was based on the existing flow

of traffic on the surrounding road network. Please refer to **Figure 3** for the distribution of year 2014 trips generated by the development on Erf 3604 with the left-in left-out access on Wood Drive and roundabout at the Wood Drive / Thetford intersection in place. Please note that these trips include the diverted trips generated by the filling station (pass-by trips).

4.5 First year traffic impact

Potential calling traffic volumes were diverted from the background 2014 traffic volumes to the filling station and trips generated by the proposed convenience store and fast-food restaurant were added to these traffic volumes to obtain expected total 2014 traffic volumes. The affected intersections were again analysed to determine the impact of the proposed development.

Sandown Road / Wood Drive Intersection: The existing four-way stop controlled intersection will continue to operate at a level of service F during both the AM and PM peak hours.

With signalised control, this intersection will continue to operate at a level of service C during the AM peak hour and a level of service B during the PM peak hour, with all movements operating at a level of service C or better.

Wood Drive / Thetford Road Intersection: The proposed roundabout at this intersection will continue to operate at a level of service A during both the AM and PM peak hours.

Sandown Road / Wandsworth Road Intersection: All movements at this stop controlled intersection will continue to operate at a level of service C or better during both the AM and PM peak hours.

Sandown Road / Left-in Access: Through movements on Sandown Road will operate at a level of service A during both the Am and PM peak hours.

Wood Drive / Left-in Left-out Access: Through movements on Wood Drive as well as the left-out movement from the proposed development will operate at a level of service A during the AM and PM peak hours.

Please refer to **Figure 4** for estimated total 2014 background traffic volumes and levels of service.

5. **Year 2020 traffic impact**

Trips attracted to the proposed filling station, especially, will increase with increasing traffic volumes on Sandown Road and Wood Drive. It is expected that most developments in the Northern Parklands area will be completed by 2020 and this year was thus chosen to determine the future impact of the proposed development on Erf 3604.

5.1 Background traffic

Traffic volumes on Sandown Road and Wood Drive were further increased by 3% per annum to obtain expected background 2020 traffic volumes. The affected intersections were again analysed with the SIDRA computer program to obtain the expected levels of service at which these intersections will operate without the impact of the proposed development.

Sandown Road / Wood Drive Intersection: The existing four-way stop controlled intersection will continue to operate at a level of service F during both the AM and PM peak hours.

With signalised control, this intersection will continue to operate at a level of service C during the AM peak hour and a level of service B during the PM peak hour, with all movements operating at a level of service D or better.

Wood Drive / Thetford Road Intersection: The SIDRA analysis of this intersection with background 2020 traffic volumes indicates that all movements at this intersection will operate at a level of service D or better during both the AM and PM peak hours.

The proposed roundabout at this intersection will operate at a level of service A during both the AM and PM peak hours.

Sandown Road / Wandsworth Road Intersection: All movements at this stop controlled intersection will continue to operate at a level of service C or better during both the AM and PM peak hours.

Please refer to **Figure 5** for estimated 2020 background traffic volumes and levels of service.

5.2 Trip generation and distribution

The number of trips generated by the filling station will increase during both the AM and PM peak hours as a result of increased traffic volumes on the surrounding roads.

Traffic growth rates of 2% per annum was assumed for the convenience store and fast food restaurant, as trip generation by these two components is a factor of passing traffic.

The expected 2020 trip generation potential is summarised in **Table 2**.

Generated trips were distributed in the same way as 2014 trips. Please refer to **Figure 6**.

Table 2: Erf 3604 trip generation potential for the year 2020

Land Use	AM				PM			
	Passing Traffic / GLA	TGR	In	Out	Passing Traffic / GLA	TGR	In	Out
Filling Station	1413	4%	57	57	1831	4%	73	73
Retail	170	3.19	4	4	170	22	18	18
Restaurant - Fast Food	100	0	0	0	100	79	38	38
Total			60	60			129	129

5.3 Year 2020 traffic impact

Potential calling traffic volumes were diverted from the background 2020 traffic volumes to the filling station and trips generated by the proposed convenience store and fast-food restaurant were added to these traffic volumes to obtain expected total 2020 traffic volumes. The affected intersections were again analysed to determine the impact of the proposed development.

Sandown Road / Wood Drive Intersection: The existing four-way stop controlled intersection will continue to operate at a level of service F during both the AM and PM peak hours.

With signalised control, this intersection will continue to operate at a level of service C during the AM peak hour and a level of service B during the PM peak hour, with all movements operating at a level of service D or better.

Wood Drive / Thetford Road Intersection: The proposed roundabout at this intersection will continue to operate at a level of service A during both the AM and PM peak hours.

Sandown Road / Wandsworth Road Intersection: All movements at this stop controlled intersection will continue to operate at a level of service C or better during both the AM and PM peak hours.

Sandown Road / Left-in Access: Through movements on Sandown Road will operate at a level of service A during both the AM and PM peak hours.

Wood Drive / Left-in Left-out Access: Through movements on Wood Drive as well as the left-out movement from the proposed development will operate at a level of service B or better during both the AM and PM peak hours.

Please refer to **Figure 7** for expected 2020 traffic volumes and levels of service.

6. Geometry

6.1 Loading

A preliminary design of the proposed roundabout at the Wood Drive / Thetford Road intersection indicated that a roundabout with inscribed diameter of 29m may be constructed. This will allow enough room in the road reserve for a 2m wide pedestrian walkway to be constructed on both sides of all four legs of the roundabout. Further analysis will be necessary to determine the central island diameter and turning roadway width by means of swept paths to enable heavy vehicles (delivering fuel trucks to the filling station) to be able to make use of the roundabout.

The left-in left-out access on Wood Drive should also be able to accommodate delivering fuel trucks as this will be the only access for heavy vehicles to the proposed development. With 15m bellmouth radii, turning roadways should have a minimum width of 7.9m.

The movement of delivering fuel trucks was taken into account in the design of the site as indicated on the attached **Site Development Plan**.

6.2 Parking

Parking will be provided at 9.4 bays per 100m² GLA for the convenience store and at 15 bays per 100m² for the fast food restaurant.

The parking provision is summarised in **Table 3**.

Table 3: Erf 3604 parking provision

Land use	GLA	Parking required (bays / 100m ²)	Required	Provided
Retail	170m ²	6	10	16
Fast food	100m ²	4	4	15
Total			26	35

Measurements taken from the **Site Development Plan** indicates that all parking bay dimensions confirm to National Standards.

7. Public and non-motorised transport

It is proposed that a bus / mini-bus embayment should be investigated near the Sandown Road / Wood Drive intersection as no public transport facilities are observed in the near vicinity of the development on Sandown Road or Wood Drive. This is also a very rapidly developing area with a need for public transport facilities.

A paved sidewalk stretches along the western side of Wood Drive from Sandown Road and extends southwards past Thetford Road. Sandown Road also has paved sidewalks on both sides of the road west of Wood Drive and on the southern side stretching east of Wood Drive. With the realisation of the proposed left-in left-out access on Wood Drive and roundabout at the Wood Drive / Thetford Road intersection, the existing paved sidewalks should be incorporated into these elements. It is also proposed that a paved sidewalk be constructed from the proposed roundabout northward to link up with the existing sidewalk stretching eastward on the southern side of Sandown Road with a crossing at the proposed left-in left-out access. Please refer to the attached **Proposed Wood Drive Layout** drawing (conceptual design).

8. Conclusions

The following conclusions can be drawn from the preliminary traffic impact investigation for Erf 3604 Parklands:

- The property is located on the south-eastern corner of the Sandown Road / Wood Drive intersection;
- Access will be obtained off Sandown Road with an existing left-in access approximately 120m east of Wood Drive (kerb-face to kerb-face). This access will be shared with another future development on the adjacent Erf 3603. A proposed left-in left-out access will be situated approximately half-way between the Sandown Road / Wood Drive intersection and the Wood Drive / Thetford Road intersection; this will be the only exit point for vehicles from Erven 3604 and 3603
- A roundabout with maximum inscribed diameter of 29m is proposed for the Wood Drive / Thetford Road intersection to allow vehicles exiting Erven 3604 and 3603 to make a U-turn and return to Sandown Road without having to make a long detour;
- The Sandown Road / Wood Drive intersection is currently four-way stop controlled and operates at unacceptable levels of service; This intersection will however be signalised in the near future and will operate at acceptable levels of service during the AM and PM peak hours with growing traffic volumes as well as the development's generated peak hour trips up to 2020;

- The stop controlled Wood Drive / Thetford Road intersection operates at acceptable levels of service during both AM and PM peak hours. The proposed roundabout at this intersection will operate at excellent levels of service up to 2020 with growing background traffic volumes and the development's peak hour generated trips;
- All movements at the Sandown Road / Wandsworth Road intersection will operate at acceptable levels of service up to 2020 with growing background traffic volumes and the development's peak hour generated trips;
- No formal public transport facilities are visible in the near vicinity of the proposed development. A bus / mini-bus embayment should be investigated on Sandown Road or Wood Drive near the Sandown Road / Wood Drive intersection;
- Adequate paved sidewalks are located along Sandown Road, Wood Drive and Thetford Road; it is proposed that with the realisation of the left-in left-out access and roundabout on Wood Drive, a paved sidewalk should be constructed along the eastern side of Wood Drive to link up with existing sidewalks.

8. Recommendations

Recommendations made in the preliminary traffic impact investigation for Erf 3604 Parklands can be summarised as follow:

- That the Sandown Road / Wood Drive intersection be signalised;
- That a left-in left-out access be constructed on Wood Drive halfway between Sandown Road and Thetford Road which can accommodate heavy vehicles (delivering fuel trucks);
- That a roundabout be constructed at the Wood Drive / Thetford Road intersection to allow U-turns and accommodate heavy vehicles;
- That a bus / mini-bus embayment be investigated on Sandown Road or Wood Drive in close proximity to the proposed development;
- That the existing paved sidewalks be incorporated into the design of the roundabout and that a paved sidewalk be constructed on the eastern side of Wood Drive to link up with existing sidewalks.

We trust that you will find this traffic statement in order. Kindly contact the undersigned should you have any queries.

Yours truly



Douw Louwrens (B. Eng)
On behalf of: **iCE Group (Boland)**