

Savannah Environmental Pty (Ltd)

CONSTRUCTION OF THE PROPOSED WATERBERG PHOTOVOLTAIC PLANT

ROAD IMPACT ASSESSMENT REPORT

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1. GENERAL

The above-mentioned project is located in the Modimolle Local Municipality, situated in the south-eastern of the Waterberg District Municipality, Limpopo Province. The project will be established on degraded pasture land on Portion 2 of the Farm Goedgevonden KR 104, located 24 km north east of Vaalwater. The roads under investigation are gravel roads D2416, D973 and D2747. Both roads D2416 and D973 have intersections with surfaced road D972 (R33). Road D2747 is the north-south link road between roads D973, to the south, and D2416, to the north. Access to Farm Goedgevonden KR 104 is off road D2416.

2. BACKGROUND

The work performed in this assessment consists of the following:

- » An assessment of the required transport modes and trip frequencies on routes;
- » Existing geometric layout and identification of shortcomings;
- » Desktop and visual inspection of prevailing road conditions.

As part of the assessment a site inspection was carried out on 18 October 2010. This was used to determine and evaluated the transportation routes and usage, and the existing road conditions.

3. FINDINGS

3.1. Road Users

3.1.1. Transportation modes and trip frequencies

The transport modes and frequency to the proposed site during the operational phase is estimated as follows:

- » 1 Small vehicle transporting security personnel, 3 trips/day, from Vaalwater to Goedgevonden and back;
- » 1 Security patrol vehicle on site.

- » Bus 1 - 2 trips/ day (22 people/bus), from Boschdraai village to Goedgevonden and back;
- » Bus 2 - 2 trips/day, from Vaalwater to Goedgevonden and back;

3.1.2. Transportation routes

The routes for the busses will be as follows (see Figure 1 – Route Layout Plan):

- » Bus 1 - Boschdraai Village to Goedgevonden will be on 4 km gravel farm road, to the east, through Bellevue to D2747 gravel road. Turn left and travel north on D2747 for 3.3km to Goedgevonden Gate on the right. Total distance 7.3km.
- » Bus 2 and Security Vehicle - Vaalwater to Goedgevonden. There are two possible routes to Goedgevonden as is described below:
 - * Alternative 1: From Vaalwater, travel 24.1km northeast on D972 tar road. Turn right and travel east for 9km on D2416 gravel road (Sterkstroom turnoff). Turn right and travel south for 2km on D2747 gravel road to Goedgevonden entrance on the left. The total distance is 35.1km with a 24.1km paved section of road and 11km gravel section.
 - * Alternative 2: From Vaalwater, travel 9.6km northeast on the D972 tar road. Turn right and travel east for 8.3km on the D973 gravel road (24 Rivers turnoff). Turn left and travel north for 10.5km on the D2747 gravel road to Goedgevonden entrance on the right. The total distance is 28.4km with a 9.6km paved section and 18.8 km gravel section.

3.2. Geometric Layout

The geometric layout appears to be within the standards. The only issues identified were localised flat spots which promote the ponding of water on the road. These flat spots are due to two factors. Firstly the vertical profile of the road may be at the bottom of sag curve or where the road is flat. In the later scenario, it is often the case that the road has been worn and/or graded to such a degree that there is no longer a centreline crown present to drain water to the sides of the road.

No further issues could be identified with the visual inspection. A detailed topographical survey will be required to identify any further geometric issues.

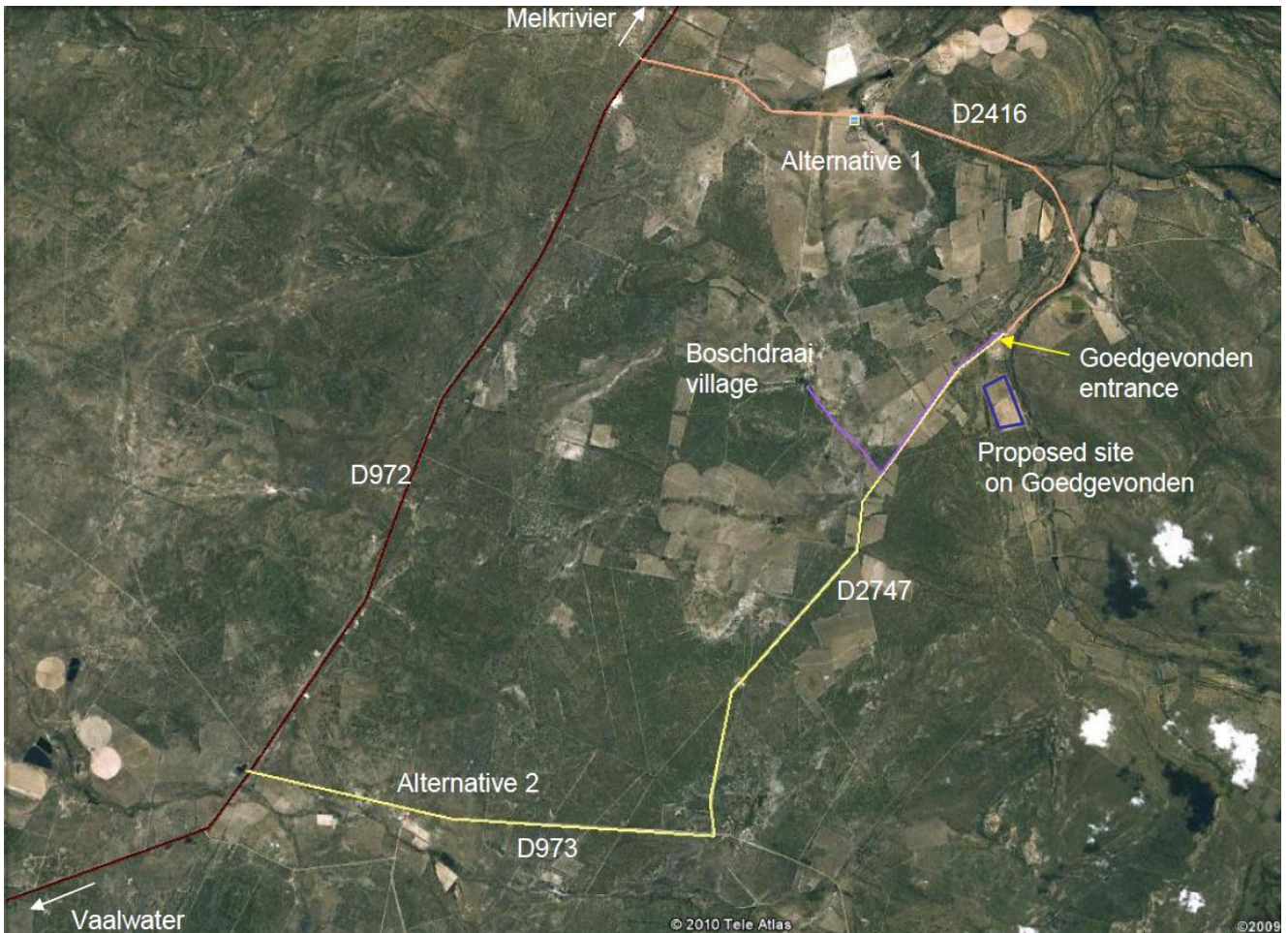


Figure 1 – Route Layout Plan

3.3. Prevailing Road Conditions

During the site visit it was observed that there is corrugation along the gravel roads of both the alternative routes from Vaalwater. A portion of Road D 2747 had recently been graded and therefore appeared in a fair condition. The remainder of Road D2747, Road D973 and Road D2416 are in a poor condition due to the lack of maintenance, with sections of the roads having extensive corrugation and isolated potholes.

See



Table 3.1 ROADS D2416 AND D2747 (Alternative 1) and



Table 3.2 ROADS D973 AND D2747 (Alternative 2) for the visual findings and status of the roads:

Table 3.1 ROADS D2416 AND D2747

Km distance from D 972 (Sterkstroom turnoff to Goedgevonden entrance)	Defects
1 – D2416	Loose silt and gravel, Excessive Corrugation Deg5, Ext 5
2 – D2416	Drainage problems, Loose silt and gravel, Corrugation Deg5, Ext 5
3 – D2416	Same as km 2 But Corrugation Deg4, Ext 5
4 – D2416	Loose silt and gravel, potholes, corrugation Deg 5, Ext 5, drainage problems
4-6 – D2416	Loose sand and gravel, corrugation
7-8 – D2416	Corrugation Deg 5, Ext 5, the condition is worse, pothole, Km 7.4 – 8.0 sight distance bad
8-10 – D2416/2747	Corrugation reduced Deg 3, Ext 5 Dust Reduced, Loose sandy gravel. T Junction at km 10.1
10 – 11 – D2747	Just being graded, riding quality is sound, No Corrugation, dust reduced Deg3, Ext 5



Photo 1 – Gravel on Road D2747



Photo 2 – Intersection D972 and D2747

Table 3.2 ROADS D973 AND D2747

Km distance from D 972 (R33) (from Goedgevonden entrance to 24 Rivers turnoff)	Defects
1 – D973	Loose silt sand, drainage not adequate, potholes on the road, road camber not good Deg 5, Ext 5
1-3 – D973	Loose silt sand, drainage not adequate, isolated potholes on the road, road camber not good on isolated section, Boschdraai entrance at km 3.4
4-5 – D973	Corrugation Deg3, Ext5, Loose sand, @ km 4.1 – 4.2 curve, corrugation at curve Deg 5, Ext 5
5-8 – D973	The road is looking sound, minor corrugation Deg2 Ext 5, isolated potholes Deg 3, Ext 3, Dust is sound
8-9 – D2747	Silt sand, Deg 5 Ext 4 Dust Severe
9-10.6 – D2747	T Junction, silt Deg 5, Ext 5, Potholes severe D5 Ext 4 Dust is severe, Riding quality bad, T Junction is at KM 10.6
10.6-17 – D2747	Silt and corrugation, Deg5, Ext5 Riding quality bad, dust is severe.
17-18 – D2747	Corrugation Deg5, Ext 5, Riding quality bad,
18-19.1 – D2747	Corrugation Deg5, Ext 5, Riding quality bad



Photo 3 – Silt on Road D2747

Photo 4 – Corrugation on Road D2747

Table 3.3

DEGREE	DESCRIPTION	CONDITION
1	Slight unevenness, still smooth and comfortable	Sound
3	Visible, effect on riding quality	warning
5	Uncomfortable and unsafe	severe

Table 3.4

Extent.	Extent is how long or how wide the condition is.
1	For a short section
3	Half section
5	Full section

4. ASSESSMENT OF IMPACTS

From the above information and evaluations it is expected that the nature of the impact of the additional vehicles will be to add to the wear and tear of the gravel roads. This will increase the severity of the corrugation and occurrence of potholes.

Due to the short period over which busses and trucks will be carting workers and materials to and from the construction site, the impact it will have on these isolated local gravel roads is estimated to be low in magnitude. Be that as it may, without the correct attention to the prevailing conditions, and similar future issues with the gravel roads, it is highly probable that the impact of these vehicles will add the further deterioration of the road conditions.

If the correct remedial and maintenance measures are applied over the construction period it is highly likely that all of the above issues can be negated.

The Significance of the impact is calculated as follows:

$$S=(E+D+M)P$$

S = Significance weighting

E = Extent (1)

D = Duration (2)

M = Magnitude (4)

P = Probability (4)

$$S=24$$

This is below 30 thereby indicating that the effect of the impact will have no influence on the decision to continue with the development.

Assessment of impacts during construction is summarised in the following table format.

Table 4.1

Nature: Impact of the Construction Vehicles will be to add to the wear and tear to the gravel roads		
	Without mitigation	With mitigation
Extent	Low (1)	Low (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Minor (2)
Probability	Probable (4)	Probable (2)
Significance	28 (Low)	10 (Low)
Status (positive or negative)	Neutral	Positive
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: Immediate blading of road, repairing of potholes, adding extra gravel materials were indicated by engineer and cutting of drainage furrows. Planning a maintenance schedule for the period during construction.		
Cumulative impacts: Vehicles will worsen existing conditions of road thereby making it unsafe for large vehicles (busses) to transport passengers and goods.		
Residual Impacts: Farms and local businesses can not operate effectively and added wear and tear to vehicles using roads		

It is foreseen that during the operation phase of the facility the effect of the daily traffic will be negligible. If required, contributions will be made in so far as the maintenance policy that is already in place. This may be a agreement between the local residents, farmers and businesses using the road or the local roads authority.

5. ENVIRONMENTAL MANAGEMENT PLAN

Project component/s	Gravel Roads D973, D2416, and D2747
Potential Impact	Contribute to the prevailing sub-standard road conditions
Activity/risk source	If the present conditions are left untreated the road will be unsafe for the transportation of people and materials. Delays will also be experienced in the delivery processes.
Mitigation: Target/Objective	The roads need immediate remedial measure to repair and improve their riding conditions. Furthermore a maintenance programme needs to be implemented to mitigate the recurrence of these conditions.

Mitigation: Action/control	Responsibility	Timeframe
Remedial: Improve road drainage, blade roads to remove corrugation, add gravel wearing course. Maintenance: implement maintenance programme for period of construction	Modimolle Local Municipality and Waterberg District Municipality	Remedial measures prior to construction. Maintenance programme during construction

Performance Indicator	Transportation and Delivery schedules and reported delays, Road riding quality reports/feedback, Vehicle and pedestrian incident reports, Visible water ponding on roads, Visible failures in road structure.
Monitoring	Visual inspection of road surface and drainage corrective measures, wearing course material quality tests, visual inspections during construction, geotechnical material tests during construction of wearing course. Visual inspections of road during construction of facility.

6. IMPACT STATEMENT

There will be a low negative impact on the existing gravel roads discussed above due to the large vehicles using these roads daily in the construction phase. Prevailing conditions will deteriorate further, thereby affecting the road safety for the local community and businesses. It will also have a financial impact by increasing the delivery times and vehicles wear and tear.

7. RECOMMENDATION

Even though Alternative 1 (D2416 and D2747) is longer in total distance, the gravel roads have fewer defects and require less attention and maintenance. The distance travelled on the gravel roads is also shorter, thereby reducing initial road works costs and increasing the overall travel speed of the route. It is therefore recommended that Alternative 1 be used as the preferred transportation route during construction of the Waterberg Photovoltaic Plant on Portion 2 of the Farm Goedgevonden KR 104.

Regardless of the route chosen from Vaalwater to Farm Goedgevonden, it is recommended that the following remedial measures be applied to the gravel roads:

- » Apply a NEW 200mm wearing course to the existing road structure after the roads have been bladed and water mixed in;
- » Cut diagonal drainage furrows (mitre drains) from road shoulder, to drain water away from road edge, at regular intervals and at critical points;
- » Prepare a maintenance schedule for the gravel roads during construction. It is recommended that all the gravel roads used be bladed and watered once a month.

These roads are district roads which fall under the authority of either the Modimolle Local Municipality or Waterberg District Municipality. These local authorities should be informed of these recommendations for them to include in their maintenance programmes and road upgrade planning. It is ultimately the responsibility of the local roads authorities to ensure that there is safe passage for local residents and businesses using these roads. It should be highlighted that it will be essential to remedy these roads to further encourage economic development of the area.