Proposed Onion Dehydration Facility
Portion 26 of Farm 817
Malmesbury

Civil & Electrical Engineering Services Report, Process and Traffic Statement

Prepared for:

Development Services
Swartland Municipality

On behalf of:

Du Toit Invest / CBI Global

Prepared by:

OLCKERS CONSULTING
ELECTRICAL ENGINEERING

MH&A

Consulting Civil & Structural Engineers

TvD Projects cc
Consulting Refrigeration Engineers

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1 INTRODUCTION

1.1 Terms of Reference

M. Hurworth & Associates (MH&A), Olckers Consulting and TvD Projects are the appointed engineers for the proposed onion dehydration facility for the Du Toit Agri / CBI Invest group on Portion 26 of Farm 817, Skaapkraal, Malmesbury.

For the purposes of SDP submission to the Swartland Municipality development control office, this report outlines the following:

- Brief description of onion dehydration process
- Sewer reticulation, treatment and management
- Stormwater management and outfall
- Water reticulation and borehole extraction
- Traffic statement
- The electrical engineering report

2 SITE DESCRIPTION

2.1 Locality

Portion 26 is a triangular parcel of land of approximately 50Ha, situated on the west side of the N7 national road, approximately 9km south west of Malmesbury.

Portion 26 is adjacent to the Du Toit Agri farm Skaapkraal, producing onions, potatoes and sweet potatoes, and is presently accessed via the Skaapkraal farm entrance directly off the N7.

The site is zoned agricultural
The site is presently un-utilised
The site has no formal services connections at present other than 2 boreholes

The three alternative locations are indicated on the site layout plan appended, with 'Alternative 3' being the preferred location.

Refer also to the locality schematic Appendix A attached to this report.

2.2 Nature of the Development

The proposed onion processing facility will be a steel framed structure of approximately 6300 m^2, with an additional 7 395 ^{2} of paving and concrete loading and circulation hardstanding. The building will comprise a main process shed, cold stores, finished product storage and dispatch as well as office, staff and plant facilities.

3 ONION DEHYDRATION PROCESS

The proposed onion processing facility is designed to dehydrate 15 000 tons of fresh onions per annum. This translates to 3 000 kg of fresh onions per hour. Incoming onions have a moisture content of approximately 80 to 85%% and final dehydrated product will have a moisture content of 5%. The intent is to process 100% of the incoming onions. The factory will produce dehydrated onion in three formats – granulated, minced and powdered.

The raw materials consist of onions only. The onions will be delivered in wooded crates containing about 420kg of onions. The onions will be delivered by truck which are offloaded by forklifts.
The onions will be dumped from the bins into a receiving hopper where they will be elevated into a cleaning and washing process. The cleaning process will remove stones, sticks and other debris that was collected during harvesting. The washing process will remove other items that might cling to the onions.

After washing the onions are inspected from quality – poor quality onions are manually removed and collected in waste bins for disposal. After inspection the onions are conveyed to the top and tail section where the root and stem sections of the onions are removed. The tops and tails are collected for further processing later in the plant.

The rest of the onion is then conveyed to the peeler. Peels are also collected for further processing. The peeled onions pass through a slicer to reduce the overall particle size to facilitate the drying process.

The drying process consists of heated air being passed through a layer of sliced onions – the heat removing the moisture by evaporation. The dryer comprises three stages; each subsequent stage having a lower temperature to prevent damage to the onions as the moisture content decreases. Three metal conveyor belts slowly transport the onion layer through the length of the dryer The air is heated by passing steam though a heat exchanger on the air circulation loop. The air temperature, the belt speed, the layer thickness and other factors can be controlled to provide optimum drying to achieve the desired final moisture content.

Fresh air is continuously feed into the dryer and an equal amount of air is discharged through a filtration system to remove any dust particles.

After dehydration, the onion particles are conveyed to size reduction machines to produce three products. The size reduction machines use either a method of automated cutting or milling to achieve the required particle sizes. The particles are sieved to remove oversized or undersized particles. Both under- and oversized particles are reused. When a particular product is produced, the tops and tails and the skins which were previously collected are introduced to the dryer.

The final particles of correct dimension are packed into either 1 ton bulk bags or 25 kg bags. Final products are stored in the finished goods store. Due to the loss of water, final plant output is approximately 500 kg per hour.

Waste water is directed to a water treatment plant where any solids are removed, pH is corrected and any other contaminants are removed.

The plant is designed to operate on three shifts over 24 hours per day.
The factory will be designed to meet food production GMP standards and all building finishes and materials of construction are selected to be compliant with good food production standards.

4 SERVICES

4.1 Stormwater Management

All stormwater run-off from the roofs of the buildings and the proposed new hard surfaces will be collected via a minor system of piped stormwater reticulation and directed to the new stormwater detention pond.

The detention pond will be adequately sized to cope with a 1:50 year recurrence interval storm event and to attenuate the post-development inflow and release outflow at a pre-development rate.

The stored volume in the detention facility will also be utilised for re-irrigation of the landscaped zones around and within the new facility.

Overflow from the pond will be managed via a suitably graded and profiled vegetated swale, which will discharge into the existing box culvert below the N7.

Above is indicated on the services schematics attached for reference.

4.2 Foul Sewer Reticulation and Treatment

There will be two foul sewer systems, one for black/grey sewage and one for process effluent.

Black and grey sewer from the staff ablutions, kitchens etc., will be reticulated via an underground piped system to a Scarab package treatment plant situated on the southern boundary.

This plant will process the raw sewerage into a state that is suitable for irrigation. The purified outflow from the package plant will be conveyed through a dedicated open vegetated swale into the detention pond. The vegetated swale will further purify and aerate the treated outflow.

The internal wash-down water and the liquid extracted from the dehydration process will discharge via an underground piped system to a small aeration pond. This effluent will be aerated by a pump and fountain to provide a degree of purification before passing through the vegetated open swale into the detention pond.

A schematic of this system is attached for reference.

The anticipated flow of treated effluent water into the detention pond from the abovementioned systems will be in the order of 1200 litres per hour.

4.3 Potable Water

There is no mains supply of potable water to the site. However, the site has two boreholes currently in use, both of which are producing groundwater for irrigation purposes.

This groundwater will be filtered and harvested to a series of storage tanks. The stored groundwater will be treated with either a UV system or RO system to ensure that the water is suitable for human consumption.

The water will be used for consumption as well as fresh product washing prior to dehydration.

A schematic of the system is attached for reference.

4.4 General Comment

At this conceptual stage, the stormwater, sewer, potable water services design for the new dehydration facility is intended to be independent of any bulk servicing requirements from Swartland Municipality.

The internal services will all be designed in such a way that recycling and re-use of generated stormwater and sewer flows will be implemented as far as possible.

No undesirable product or effluent will be discharged onto the landscape or discharged into the open channel stormwater system. Outflow will be continuously monitored to acceptable quality standards.

5 TRAFFIC STATEMENT

5.1 Terms of Reference

This traffic statement has been compiled for submission to the Swartland Municipality development control office as an element of the services reporting required for the proposed development of an onion dehydration facility on Portion 26 of Farm 817, Skaapkraal, approximately 9km south west of Malmesbury.

5.2 Existing N7 Access Arrangements

As indicated earlier in this report, the existing access to the Du Toit onion farm 'Skaapkraal' is directly off the N7 (refer appended locality plan), approximately 900m south of the new N7 access presently being constructed as part of the N7 dual carriageway upgrade for SANRAL.

It is anticipated that the existing N7 access will be closed and abandoned once the new access is available.

5.3 Future N7 Access

The new access to the du Toit farm "Skaapkraal" off the N7 will be relocated to the grade separated intersection presently being constructed. At this intersection, access will be provided off the N7 overpass to both the Du Toit farm (west side of N7) and the Rainbow Chicken facility (east side of N7), with on/off ramps and an underpass link.

5.4 Proposed Site Access

The access to the Onion Dehydration Facility on Portion 26 will be taken northwards off the new Du Toit farm entrance, within the farm property, and the access road will be aligned northwards and then westwards around existing onion plantations to the proposed site, approximately 900m from the main entrance.

5.5 Capacity of New N7 Access

The additional capacity of the N7 offered by the dual carriageway upgrade, and the limited traffic volumes exiting or entering the N7 to the Du Toit farm and Rainbow Chicken facility, are not expected to have any capacity consequence at this intersection.

For the purposes of this traffic statement, a traffic count has not been undertaken to assess the present traffic patterns that would utilise the access.

5.6 Trip Generation

The new Onion Dehydration Facility is designed to process 15 000 tons of fresh onion product per annum. The dehydration process reduces the weight of the fresh product by approximately 85%.

The bulk of this fresh product, approximately 30% will be delivered internally from onion plantations within the farm. This traffic will remain within the farm boundary and will have no effect on N7 traffic.

Approximately 70%of fresh produce will be delivered to the facility via the N7. This fresh product, and the distribution of the dehydrated product, will generate on average a maximum of 3 truck movements per day. These trucks do not necessarily deliver during peak N7 traffic hours. These trucks would be either articulated or interlink.

Arrival of fresh product will be from both the north and south approach off the N7, but delivery of dehydrated product will predominantly enter N7 traffic in a southbound direction.

There is not expected to be any significant growth in trip generation unless the onion facility is expanded.

5.7 Stacking

It is recommended that 20m of stacking distance is provided at the du Toit main entrance to allow the processing of one waiting vehicle without affecting movements on the northbound on/off ramp and underpass.

5.8 Internal Access Road

The internal access road to the facility is anticipated to be an 8m wide road, either paved or surfaced, and vehicles would circulate through the new facility before exiting via the same internal access.

6. ELECTRICAL

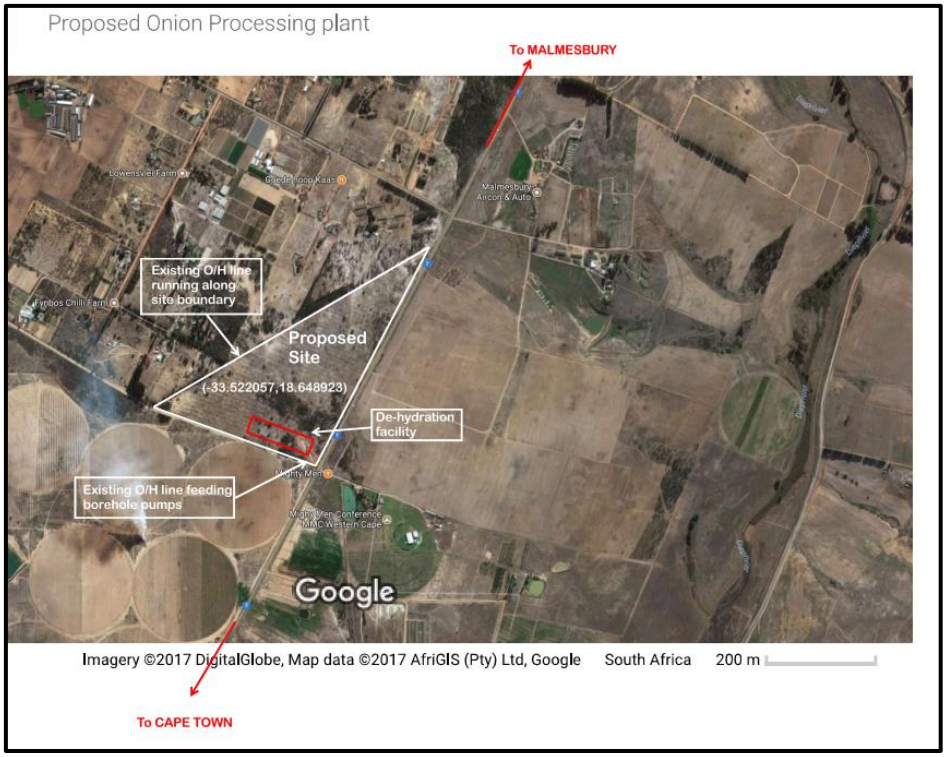
6.1 INTRODUCTION

Olckers Consulting has been appointed to investigate the availability of power from Eskom for the Proposed New Onion Dehydration Plant on Portion 26 of Farm 817, Malmesbury.

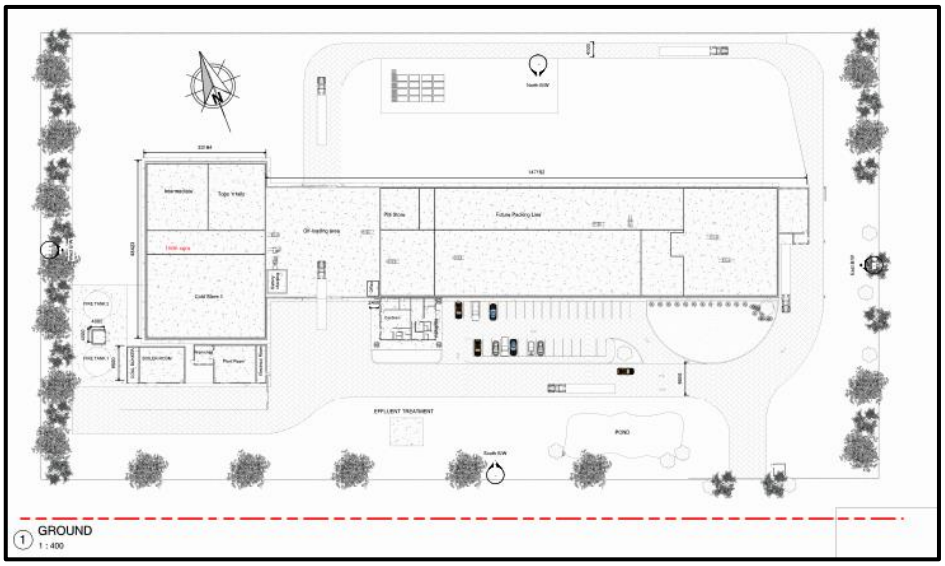
Please note that the load estimates are preliminary and are based on information supplied to Olckers Consulting by others. A comprehensive load estimate will be undertaken in the detailed design phase of the project.

6.2 SITE LOCALITY AND BUILDING LOCATION

The proposed site is approximately 10km south-west of Malmesbury on the N7 freeway.

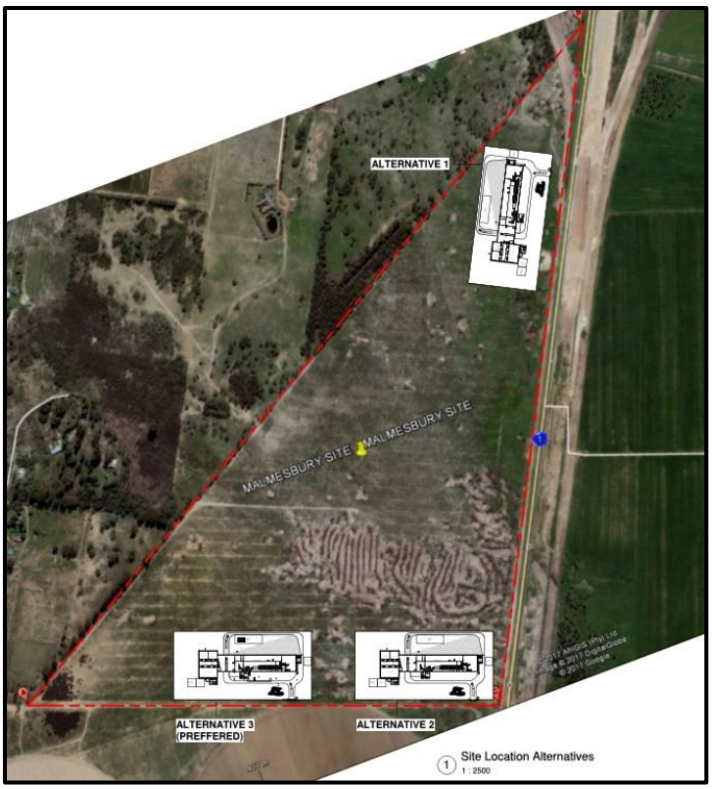


The proposed onion dehydration plant will be a large, single storey warehouse structure measuring approximately 6 300 m^2 (excluding plant rooms).



There are three (3) alternative locations for the dehydration plant on the site, with Alternative 3 being the preferred location.

From an electrical supply perspective, the Alternative 2 and 3 locations are preferable, because they are both closer to the existing overhead power supply on the site and to the Eskom substation at Kalbaskraal.



6.3 ESTIMATED ELECTRICAL LOAD

We were asked to investigate the availability of both a 0,5MVA and a 1,0MVA power supply to the site.

6.4 ESKOM INFRASTRUCTURE

The main Eskom substation in the area is situated at Kalbaskraal, approximately 6,0km to the south-east of the site.

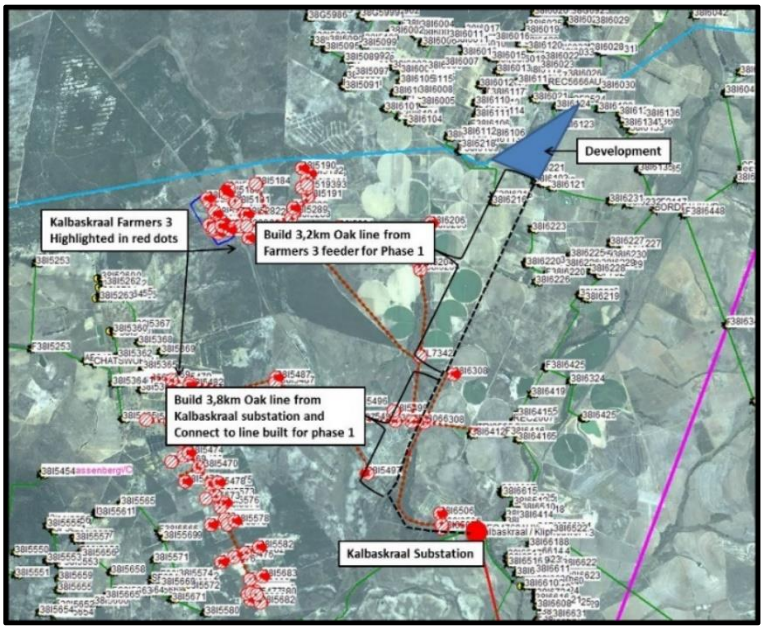
An 11kV feeder known as “Kalbaskraal Farmers 1” originates from Kalbaskraal Substation and provides power to the irrigation pumps on the south-east corner of the site.

We are pleased to report that the existing “Kalbaskraal Farmers 1”- feeder can provide a maximum 550kVA (0,55MVA) power supply without any upgrade of the overhead line. The cost of the transformer, 11kV switchgear, and metering equipment will be to our client’s account.

To upgrade the power supply to 1,0MVA (or larger) a new 3,2km section of “Oak” overhead line will have to be built along the N7 by an Eskom-approved sub-contractor, to link the site to the “Kalbaskraal Farmers 3” – feeder.

For both the 0,5MVA and the 1,0MVA supplies, an auto-recloser and a pole mounted CT/VT metering unit will need to be installed to make supply available.

The following screenshot, received from Eskom, shows the geographical positions of the various substations and the section of new overhead line required to upgrade to 1,0MVA and beyond.



7. ESTIMATED COST

7.1 OPTION 1 – 500kVA

Our preliminary estimate for the above supply is as follows:-

No.	Description	Amount
1	500kVA transformer	R350,000.00
2	11 kV switchgear	R200,000.00
3	Eskom Metering switch	R150,000.00
	Total (excluding VAT & Eskom connection fee)	**R700,000.00**

7.2 OPTION 2 – 1000kVA (1,0MVA)

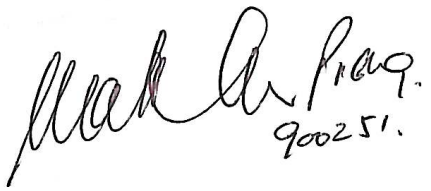
Our preliminary estimate for the overhead line, 1,0MVA transformer and switchgear is as follows:-

No.	Description	Amount
1	3,2km 11kV Oak overhead line c/w poles and installation (1,0MVA)	R3,520,000.00
2	1000kVA transformer	R650,000.00
3	11 kV switchgear	R200,000.00
4	Eskom Metering switch	R150,000.00
	Total (excluding VAT & Eskom connection fee)	**R4,520,000.00**

Please note that the above estimate does not include any Eskom connection fee, LV reticulation on the site, contingency allowance or professional fees.

8. CONCLUSION

Please do not hesitate to request additional information from us, as required.



M A HURWORTH **Pr Eng 900251**
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Stephen Olckers PrTechEng
Director
Olckers Consulting (Pty) Ltd
082 578 4742