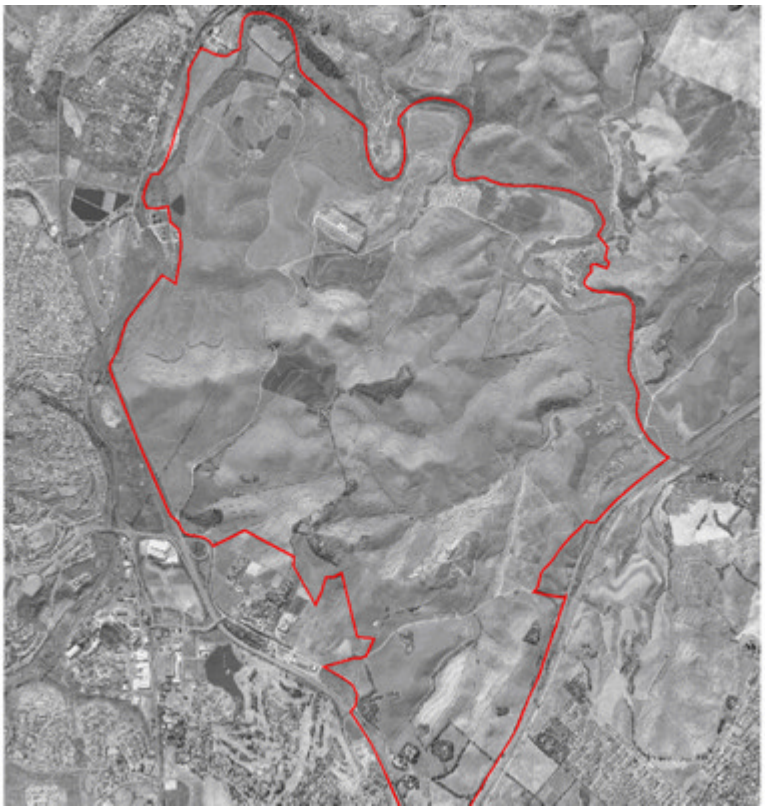
AGRICULTURAL POTENTIAL STUDY
OF
CORNUBIA
Report 2/2007



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1 INTRODUCTION

Cornubia was formerly part of Blackburn Estate, which in turn was part of the Natal Sugar Estates. This property has been producing sugarcane for decades and is regarded as one of the better sugar estates in the industry.

Cornubia as illustrated on cover page, is situated north of Mt Edgecombe, and west of the N2 highway. The centre line of this property is immediately above and adjoining the world renowned South African Sugar Association Experiment Station.

Cornubia comprises of a reported 1200ha (Moreland Developments), which has 888.39 ha under dryland sugarcane production at this time, of undulating ground, the slopes of which face in varying directions and vary from gentle to relatively steep.

This property is owned by the Tongaat Hulett Group and through its property operation, Moreland, wish to realise certain objectives that include:

- Make a contribution to building, consolidating and integrating the social and economic base of the northern portion of the eThekwini Municipality
- Ensure a sustainable mixed use, inclusionary mixed income development that maximises economic opportunities for future residents and investment
- Create value by maximising the potential of the land through public-private partnerships so that the development of the land delivers a positive and a balanced economic, environmental and social return that is both financially sustainable and contributes to redressing inequalities
- Position eThekwini as a leader, innovator and promoter of integrated visionary planning and development, and
- Use the opportunity for creating substantial black empowerment opportunities in property development ownership and urban management

The developers, Moreland, requested a report on the agricultural potential of this area of land, in order that it might be compared to the sustainability and viability of a development that meets their objectives.

In assessing the agricultural potential of these areas of land, a study of the climate, soils, terrain, aspect, suitable crops, utilities available, market, spatial development, labour and management was carried out.

This report serves to summarise such a study and present the relevant results.

Site visits were carried out to assess the past and current agricultural practices being carried out, assess the physical properties of the soils, infrastructure and water resources.

Mr Stuart Armour, Department of Agriculture and Environment Affairs (DAEA) has been contacted with respect to the requirements of DAEA from developers. Where necessary an agricultural management plan is drafted for the remainder of the agricultural land. However Moreland and/or Tongaat Hullett appear to have no intention of keeping any land back on this Estate for agricultural production.

During site visits and discussions with farm management, apart from the fact that good crop producing lands were being taken out, there did not appear to be any other fatal flaws, from an agricultural perspective.

The Environmental Impact Assessment deals with natural bush, wetlands and streams.

2 MAPPING AND AERIAL PHOTOGRAPHY

Suitable mapping was obtained from Moreland offices in Umhlanga Rocks and Rob Wooding and Associates in Hillcrest.

The Moreland maps were useful to orientate the reader but did not provide the agricultural data that is obtained from ortho-photographs.
The Digital Terrain Model (DTM) map data obtained from Rob Wooding and Associates was suitable for this report.
The photograph on the cover page illustrates this type of photography, and in this instant the boundaries of Cornubia are depicted by the red line along the boundaries.
Photograph 2 illustrates the sugarcane fields and their reference/field numbers.

Photograph 2 The sugarcane production lands on Cornubia/Blackburn Esate

This photograph illustrates the individual fields their field numbers and the contours. The latter illustrating to undulating terrain which is typical of this Bio Resource Unit Ya14.

3 CLIMATE

The Estate is coastal with a summer rainfall and a warm humid climate throughout the year.
No frost occurs in these areas. The climate is ideal for most crops including sub-tropical crops.

Table 1 Rainfall Statistics of Blackburn Estate

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	AVERAGE
JANUARY	74.0	117.0	82.0	94.0	44.0	254.0	221.0	58.9	54.5	198.5	119.8
FEBRUARY	110.3	56.0	67.5	11.5	20.0	198.5	103.0	190.7	220.0	213.7	119.1
MARCH	151.0	43.5	51.0	215.5	252.5	104.5	71.0	52.5	30.0	52.8	102.4
APRIL	8.0	0.0	55.5	21.5	173.5	33.5	87.5	66.1	17.0	48.0	51.1
MAY	101.0	0.0	27.0	4.0	46.5	16.0	36.5	31.0	42.0	166.0	47.0
JUNE	38.0	0.0	0.0	12.0	61.0	10.5	62.0	0.0	50.0	5.5	23.9
JULY	25.0	0.0	2.0	31.5	14.0	229.5	91.0	6.0	0.0	7.5	40.7
AUGUST	7.5	6.0	31.5	39.5	4.5	11.5	33.5	104.5	27.5	11.5	27.8
SEPTEMBER	265.5	27.0	65.0	2.5	5.0	8.5	55.2	23.7	69.5	46.5	56.8
OCTOBER	100.0	64.5	151.0	170.5	82.6	90.5	145.0	50.0	378.5	38.8	127.1
NOVEMBER	137.0	42.5	69.0	22.0	77.5	54.5	249.5	74.0	102.5	143.4	97.2
DECEMBER	37.5	32.0	125.5	112.6	237.0	49.0	55.3	146.0	316.5	148.8	126.0
TOTAL	**1054.8**	**388.5**	**727.0**	**737.1**	**1018.1**	**1060.5**	**1210.5**	**803.4**	**1308.0**	**1081.0**	**938.9**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2110	AVERAGE
JANUARY	94.0	158.0	107.5	189.5	146.0	91.0					131.0
FEBRUARY	70.6	86.8	13.7	77.5	50.0	99.5					66.4
MARCH	22.9	56.4	74.0	106.5	80.0	53.7					65.6
APRIL	113.0	140.5	18.5	24.5	17.5	57.5					61.9
MAY	34.5	4.0	23.0	0.0	5.0	137.0					33.9
JUNE	0.0	19.1	40.0	2.5	20.5	2.0					14.0
JULY	16.5	200.8	1.5	100.5	1.0	0.0					53.4
AUGUST	7.0	68.2	19.0	29.5	27.0	82.5					38.9
SEPTEMBER	142.7	34.5	98.5	36.0	27.0	74.5					68.9
OCTOBER	112.6	27.7	21.0	50.5	54.5	99.5					61.0
NOVEMBER	101.3	48.7	101.0	98.0	72.0						84.2
DECEMBER	226.5	82.6	75.5	36.0	88.5						101.8
TOTAL	**941.6**	**927.3**	**593.2**	**751.0**	**589.0**	**697.2**	**0.0**	**0.0**	**0.0**	**0.0**	**449.9**

Table 1 presents the rainfall statistics of data manually recorded on Blackburn Estate.

Table 2 presents the climatic data recorded by the South African Sugar Association Experiment Station, which is located on the Estate's southern border.

Table 2 Climatic Data from SASA Experiment Station, Mount Edgecombe

	TMX oC	TMN oC	DBA oC	WBA oC	RHA %	DBP oC	WBP oC	RHP %	SUN h	RAIN mm	EVP mm/d	WND km/d
January	27.3	19.7	23.8	21.0	77.3	26.2	22.2	69.9	6.0	126.7	5.6	163.9
February	27.5	19.9	23.7	21.2	79.5	26.6	22.6	69.9	6.4	122.0	5.4	152.0
March	27.0	19.3	22.7	20.5	80.9	26.0	22.0	69.4	6.6	105.1	4.6	136.9
April	25.6	16.7	20.3	18.2	80.8	24.6	20.3	66.2	7.0	67.1	3.7	114.7
May	24.2	13.7	17.3	14.9	75.9	23.2	18.2	60.6	7.3	50.7	2.9	94.9
June	22.7	11.4	14.4	11.6	69.8	21.7	16.0	53.6	7.4	30.9	2.5	90.7
July	22.4	11.1	14.2	11.4	70.6	21.4	15.7	53.8	7.5	31.5	2.7	101.4
August	22.8	12.3	16.0	13.4	74.1	21.7	16.6	58.6	7.0	40.2	3.2	128.9
September	23.3	14.4	18.4	15.7	74.8	22.0	17.7	64.4	6.0	65.8	3.8	156.7
October	24.1	16.2	20.2	17.3	74.1	22.6	18.6	67.7	5.6	93.5	4.4	178.0
November	25.2	17.7	21.9	18.8	74.0	23.7	19.9	69.8	5.6	107.6	4.9	177.6
December	26.6	19.1	23.3	20.3	75.1	25.2	21.3	70.0	5.9	115.0	5.5	170.3
Mean	24.9	16.0	19.7	17.0	75.6	23.7	19.3	64.5	6.5	79.7	4.1	138.8

TMX	Maximum temperature
TMN	Minimum temperature
DBA	Dry bulb 8:00
WBA	Wet bulb 8:00
RHA	Relative humidity 8:00
DBP	Dry bulb 14:00
WBP	Wet bulb 14:00
RHP	Relative humidity 14:00
SUN	Sunshine hours
RIAN	Rainfall
EVAP	A-pan evaporation
WND	Wind run

This Bio Resource Unit (BRU) has a climatic capability rating of C1, with little or no limitations for crop production.

For the purpose of determining crop water requirements, effective rainfall is taken as 80% of the total rainfall.

The rainfall distribution and the corresponding temperatures verify the area experiencing a summer rainfall and warm humid conditions through all seasons.

Crop evaporation is significantly less than evaporation measured from a Class-A evaporation pan, so for planning purposes subtracting 20% will provide a practical estimate.

No frost has been recorded in these areas thus the climate is suitable for the majority of crops including sub-tropical crops.

If perennial crops are to be produced under optimum conditions then supplementary irrigation is essential.

Due to the terrain and proximity to the coast these areas experience windy conditions, predominantly from the NE and SE.

4 WATER RESOURCES

There exists a small river, Ohlanga River, on the Estate. Although perennial, this stream has probably sufficient water for domestic and stock watering use, and currently the water therein is certainly insufficient for any irrigation unless an off channel or on stream storage facility is constructed.

Photograph 3 Ohlanga River on Blackburn Estate

Photograph 3 shows the Ohlanga River on Blackburn Estate where it passes under the N2 highway. This picture was taken during the dry period when flow was minimal.

Marshall Dam, Photograph 4, has a substantial amount of water therein and could be used for supplementary irrigation.

Photograph 4 Marshall Dam on Blackburn Estate

The concrete structures in the dam were utilised in the past for water abstraction to the 'villages' of Mount Edgecombe and Umhlanga Rocks. Currently the water therein is used for recreation purposes.

On the western boundary there exists a wastewater treatment works and the final effluent from this works flows back into the river system.

Some years back it was used for irrigation on the Estate. This use ceased at the decision of Durban Metro.

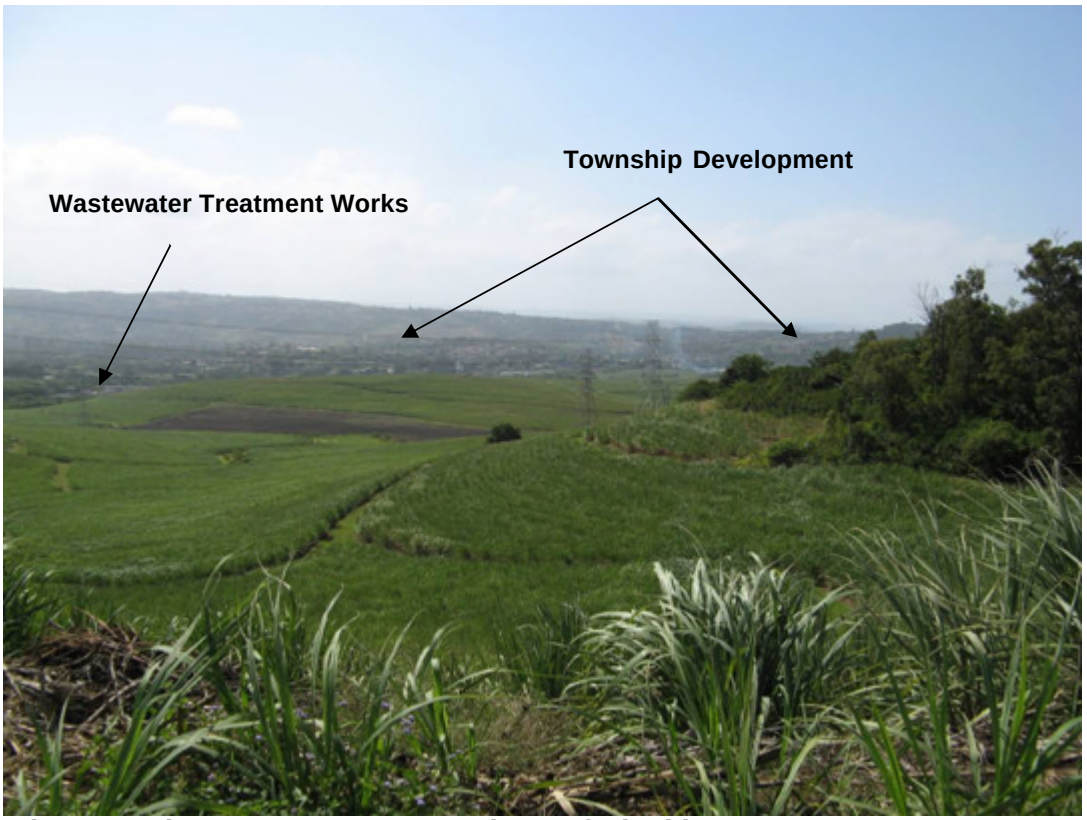
The quality of this effluent is suitable for distribution to land and is beneficial to plant growth. The current sugarcane yields could be significantly increased by irrigating with this effluent, as would yields of other suitable crops.

It is pertinent to note that with all the developments, and especially on the North Coast of KwaZulu Natal, disposal of final effluent into the relatively small rivers is a problem. One only has to examine the status of Umhlanga Lagoon, which often exhibits algal bloom.

Disposal of final effluent to land is a realistic solution to this increasing problem facing developers and town planners.

5 TERRAIN

The entire area varies from gentle slopes on the top areas of the Estate to steeper slopes leading down to the Ohlanga River. There are a few 'river lands' as illustrated in the photographs.
The upper areas are exposed with respect to wind, whereas the lower areas will have some protection from northerly 'berg' winds and from the coastal easterly and south easterly winds.



Photograph 6 Western sections of Blackburn Estate

Photograph 6 illustrates the undulating terrain, contour system in place and the township development that exists and is expanding on its western and northern boundaries.

The drainage lines on the Estate run in all directions. However the Estate has a good road and contour layout as is seen in photographs 6 and 7.

Photograph 7 Typical production areas on Blackburn Estate

Photograph 7 is facing south on the Estate and illustrates the varying topography that exists.

Due to the well maintained contours and road layout there is little erosion on the Estate even though the terrain tends toward erosion capability.

6 SOILS

Soils data was collected from various sources, including the Estate and SASA Experiment Station.
In-field verification of these different soils was verified using a soil auger and visual identification. The soils listed in the Table 2 below were all verified as being correct.

Table 2 Fields, Areas and Soils on Blackburn Estate (Cornubia)

Field No	Field Name	Area	Soil Series	Area	Soil Series	% of
		ha		ha		Area
111	Cowley A	20.15	Shortlands			
112	Cowley B	8.06	Shortlands			
121	Stones	40.55	Shortlands	394.73	Shortlands	32
131	Barracks Dam A1	14.56	Milkwood			
132	Barracks Dam A2	19.65	Milkwood	491.4	Milkwood	40
133	Barracks Dam B	34.68	Milkwood			
141	New Saners A1	11	Milkwood	231.8	Mispah	19
142	New Saners A2	6.32	Milkwood			
143	New Saners B	16.37	Shortlands	64.1	Clansthal	5
151	Pudumela Hill B	19.6	Shortlands			
152	Pudumela Hill B	9.83	Shortlands	51.75	Dundee	4
161	Manager A	15.13	Milkwood			
171	Pumpkin	13.97	Milkwood	9.97	Fernwood	1
181	Flanders A	33.64	Milkwood			
182	Flanders B1	28.93	Shortlands			
191	Two Hundred A1	23.42	Shortlands	**1243.75**		
192	Two Hundred A2	28.69	Shortlands			
193	Two Hundred B	18.76	Shortlands			
211	Railway	9.18	Mispah			
221	Main Canal A	32.67	Milkwood			
222	Main Canal B1	10.08	Milkwood			
223	Main Canal B2	28.77	Mispah			
231	Junction	12.79	Milkwood			
241	Mackay A	20.97	Milkwood			
242	Mackay B	7.44	Milkwood			
251	Pudumela A	9.3	Shortlands			
252	Pudumela B	15.93	Shortlands			
261	Saners A1	13.51	Shortlands			
262	Saners A2	10.65	Shortlands			
263	Saners B	18.92	Shortlands			
264	Saners C	129.25	Milkwood			
272	Sisal B	9.81	Milkwood			
281	B B Road	22.57	Milkwood			
291	Tank	17.99	Shortlands			
301	Barracks	22.41	Mispah			
311	Swamp	12.49	Dundee			
321	Pig Flat	19.6	Shortlands			
331	Southburn	22.35	Mispah			
341	River Flat	6.35	Dundee			
351	Dales A	6.43	Dundee			
352	Dales B	18.39	Dundee			
361	Bamboo	16.41	Shortlands			

371	Sand Flat	8.09	Dundee
391	Rosslyn A	12.53	Milkwood
392	Rosslyn B	22.48	Milkwood
401	Reunion	3.69	Clansthal
411	Manager A	10.2	Shortlands
412	Manager B	18.56	Shortlands
421	Hussey	22.9	Shortlands
431	Bamboo	19.98	Milkwood
441	Gobles	14.25	Clansthal
451	Red Hill	14.55	Clansthal
461	Outspan	9.67	Milkwood
471	Canteen	4.21	Milkwood
481	Ginger	9.97	Fernwood
591	New Road A	10.35	Clansthal
592	New Road B	13.26	Clansthal
601	Snells A	2.34	Milkwood
611	Snells B1	11.71	Milkwood
612	Snells B2	13.95	Milkwood
681	Pump House A1	8	Clansthal
682	Pump House B2/1	18.36	Mispah
683	Pump House C	12.18	Mispah
684	Pump House D	14.92	Mispah
691	Blackridge A	9.38	Mispah
692	Blackridge B	8.15	Mispah
693	Blackridge C	10.05	Mispah
701	Springvale	6.4	Shortlands
711	Glen Anil	10.78	Mispah
721	Factory	6.61	Mispah
731	Rose Hill A	14.94	Mispah
732	Rose Hill B	9.26	Mispah
733	Rose Hill C	2.82	Mispah
741	Munro A	7.14	Mispah
742	Munro B	7.26	Mispah
751	Beans A	11.81	Mispah
752	Beans B	5.43	Mispah
		1243.75	

The dominant soil types are Shortlands and Milkwood Forms, accounting for 72% of the Forms found on the Estate.

6.1 Milkwood Form

This soil form is derived from the Coastal Lowlands System with varying parent material, viz. Amphibolite, Pietermaritzburg shales, Vryheid sediments and Tarkastad sediments.

The Coastal Lowlands System (formerly referred to as Umzinto Coast Lowlands) has a strong maritime influence and is found from sea level to 300m altitude

inland. They are shallow soils and less than 18 000 years old showing great variability as geologically complex.
Their topsoils are Melanic, which comprises of dark greyish-black blocky clay sometimes with fragments of shale.
This topsoil depth varies on the Estate but in most cases there is sufficient depth to support good plant growth.
The underlying subsoil is hard rock, and sometimes shale.

This soil is reasonably well drained with a medium infiltration rate (8 -10 mm h^{-1}) and a low to moderate erosion hazard. It should not be tilled when too wet or too dry.
As it has a high upper soil water holding limit and a correspondingly high lower limit, the sugarcane thereon does exhibit wilt in dry conditions. More often than not this is temporary wilt and does not significantly reduce cane yields in normal seasons.

6.2 Shortlands Form

This soil form in this area is also derived from Coastal Lowlands System but with Tugela schist and Dolerite basalt being the parent materials.

Their topsoils are Orthic A horizons overlying red structured (pedal) B horizons. The Orthic A is dark reddish-brown clay loam to clay, and the red pedal B being reddish-brown blocky clay.

These soils are well drained with good infiltration rates (8 to 12 mm h^{-1}) and a very low erosion hazard. They should not be tilled when too wet or too dry.
These soils have a high potential and are well supplied with calcium and magnesium. They mineralise substantial quantities of nitrogen with little leaching and denitrification problems.
These soils have good soil water characteristics and are regarded as high potential crop production soils.

6.3 Mispah Form

This soil form is derived from any system except Coastal Sands, with parent materials varying from Cave sandstone to Tarkastad sediments to Swaziland quartzites to Vryheid sediments.

Their topsoils are Orthic A overlying hard rock. Normally shallow soils with poor soil water characteristics. Their erosion hazard is high due mainly to their shallowness and impermeable substrata.

6.4 Clansthal Series

These soils are derived from the Coastal Sands System (formerly referred to as Berea System), with Recent Sands being their parent material.
The Coastal Sands System includes all soils derived from cretaceous sediments raised above sea level 2 million years ago. It is associated with a young land surface and occurs at low altitude in a maritime climate.
Many of the soils are derived from wind blown sand dunes which are < 4 000 years old.

Their topsoils are Orthic A overlying red apedal (no structure) B horizon. The Orthic A is dark reddish-brown loamy sand as is the B horizon, but the latter can overly porous non-blocky clay.

They are very well drained soils with high infiltration rates (>15 mm h^{-1}) and a moderate to high erosion hazard.
Excellent irrigation soils with high production potential under these conditions.

6.5 Dundee Form

These soils are derived from all Systems with recent alluvium being their parent material.
They comprise of Orthic A horizon overlying stratified alluvium, which are alternating layers of sand and clay sometimes merging into heavy gley material.

Their physical and chemical properties are good. Their inherent fertility arises from nutrient brought down by rivers in flood. These soils are well suited to high potential crops, and have a good infiltration rate (>15 mm h^{-1}), are well drained and have a moderate erosion hazard.

6.6 Fernwood Form

These soils are derived from all systems but in the main, Coastal Sands, with Grey Recent sands and Recent alluvium being the parent materials.
They comprise of an Orthic A horizon overlying an E horizon. The Orthic A is grey to dark grey sand, and the E horizon is deep light grey to white loose sand sometimes with clay lamellae. In low lying areas the subsoils exhibits mottling and yellow staining.

These soils are highly erodible with excessive drainage and high infiltration rates. They require a high level of management under production and can respond well.

7 CURRENT SITUATION

Most of the arable land is under sugarcane production. With the exception of 35ha under overhead irrigation, all production is under dryland (rainfed) conditions.
Blackburn Estate management reports that 924.73ha could be placed under irrigation with water from the Mdhloti River. This area is registered with the Department of Water Affairs and Forestry (DWAF)

Three sugarcane varieties are being cultivated, viz. 376, N27 and N12.
The mean 14 month yield being achieved is 84 tonnes cane per hectare with an RV of 11.4. The annual yield being 72 t ha^{-1}.

The irrigated yields being achieved are >120 t cane ha^{-1} with sucrose contents above 13.6%.

Whilst the mill was operating 120ha was being irrigated with mill effluent.

During site visits this area was experiencing extremely dry conditions as a result of El Nino and effects of cyclones off Mozambique and Madagascar. This accounted for the poor looking sugarcane as illustrated in some of the photographs.

There exists a very good infrastructure on the Estate with respect to buildings, roads, equipment and staff.

Photograph 8 Transport and Haulage Equipment on Blackburn Estate

All equipment appears in a good well maintained condition, which is indicative of good motivated management.

Photograph 9 **Part of Accommodation, Administration and Workshop area at Blackburn Estate**

8 CROPS

The following crops could be grown in the area and each are discussed with respect to the estates with their advantages and disadvantages:

- Sugarcane
- Bananas
- Macadamia nuts
- Grasses for instant lawn, including pastures
- Vegetable crops
- Commercial timber
- Medicinal plants and trees
- Cut flowers and potted plants, including indigenous trees

8.1 Sugarcane

Sugarcane is being produced on the Estate with reasonable success. It is apparent that budgets have been cut with respect to agronomic inputs, which has resulted in lower yields being obtained.

As mentioned above, this Estate was part of the industry's top producing areas.

Expected yields every 12 months could be 75 t ha^{-1} with an RV of 12%, valued at R1 650 t^{-1} RV. Assuming a production area of 1 200ha this equates to a possible gross income of R 17 820 000 per annum.
Production costs for maximising yield under dryland conditions are approximately R 85 to R 90 per tonne of cane. This amounts to R 8 100 000 $annum^{-1}$ on 1200ha. This yields a profit before other deductions of R 9 720 000 $annum^{-1}$.

Irrigation could be introduced on the production area, and yields of 102 t ha^{-1} $annum^{-1}$ could be attained.
Irrigation capital costs would be approximately R10 100 ha^{-1} on the Estate and production costs of R 100 per tonne cane.
Thus the expected profit on 924 ha, with irrigation system being paid off over 5 years, and before other deductions, could be R 7 388 304 $annum^{-1}$ for the first 5 years and then greater than R 9 236 304 $annum^{-1}$ thereafter.
This added to the dryland production area of 276ha could yield an expected profit before other deductions of R 11 471 904.

This provides a significant indication of the profitability of irrigated and dryland production of sugarcane in this area.

8.2 Bananas

Bananas require a well drained soil with a good water retention capacity. They have a high water requirement and water is required throughout the year. Thus supplementary irrigation is essential on the Estate as the rainfall is not well distributed. The growing sites must be protected from cold and wind, thus wind breaks would be required on the estate.
The banana plant is a perennial herb with an extensive lateral root system. The majority of the soils (>80%) would be suitable. This amounts to some 960ha which could be irrigated. Same volume of water registered with WARMS data base for cane could be used more efficiently with micro irrigation than with overhead sprinklers.
However due to aspect and terrain possibly only half this area would be suitable, viz. say 450ha.

Yields that are obtained in the area vary from 30 t ha^{-1} to 60 t ha^{-1} $annum^{-1}$.
Due to the nature of the majority of the soils and the aspect, yields on the Estate could attain 50 t ha^{-1}.
Assuming an average selling price of R55 per 18kg carton, an income of
R 152 778ha^{-1} could be realised.
Thus expected income could be R 68 750 000 $annum^{-1}$ for 450ha. Excluding capital costs of equipment, facilities, etc. the production costs on 450ha would amount to R 18 550 801.
Irrigation costs for a microjet system on these slopes is approximately R21 000 ha^{-1}. Thus assuming that no irrigation system was present and that the scheme was paid off over 5 years, the annual cost would be R 1 890 000.

Thus expected profit before other deductions would be R 48 309 299 for first 5 years.
Providing diseases are controlled, the Estate has a high potential for banana production under supplementary irrigation.

8.3 Macadamia Nuts

Macadamias are ideally suited to a mild frost free climate with high rainfall distributed throughout the year. Although once mature they are hardy trees, they are susceptible to wind damage when young and, wind also affects pollination and fruit set. Flowers are borne on long narrow racemes and the most effective pollination is carried out by bees. Thus wind breaks are essential.
They require a well drained soil. Their dense clusters of short lateral rootlets are well defined in rows around the parent root axis. They will penetrate stony soils providing there is sufficient water and drainage.

Trees mature in approximately 8 years, although under good growing conditions some fruit may be expected from the 2nd year onward.
Assuming a plant population of 312 trees ha^{-1}, a 'dry in shell' yield of 24 kg tree^{-1}, a Style = 3, and a 30% recovery of sound kernel, one can expect a gross income from 450 ha of macadamias to be approximately R 42 120 000. The cost of production on this same area would be approximately R 1 156 500, including establishment and capital costs over 10 years.
Thus expected profit before other deductions per annum could be R 40 963 500.

The Estate would not be suitable for the economic production of Macadamia nuts unless irrigation was installed. Extensive windbreaks would have to be established.

8.4 Grasses

Most grass species will do well in this climate and on these aspects. Instant lawn is considered as with all the development in the area there is a market in the short and medium term.
Instant lawn could be cultivated on some of the lower lands, approximately 200 ha.
Current production cost of 'instant lawn' grass is R 100 000 ha^{-1}, and the selling price is R 150 000 ha^{-1} laid. Thus excluding capital costs to purchase equipment, and two crops per year, one could expect R 20 000 000 from 200 ha of land.

8.5 Vegetable crops

Vegetable crops could be grown on the Estate providing there were irrigation, secure fencing, and wind breaks.

These crops are reasonably labour intensive and would provide employment to the local populace. It is estimated that 2 labourers would be required for each hectare planted.

8.6 Commercial timber

All the current sugarcane areas could be planted to commercial timber. A permit is required from DWAF to plant timber and currently they are reluctant to issue such permits.

The yields of say *Eucalypt spp.* on Estate 1 would be in the region of 120 t ha^{-1} and this would be possibly realised every 9 years. This is not economically viable and thus not deemed a good option, especially when this land area could be more profitably utilised.

8.7 Medicinal plants and trees

The Durban Metropolitan Area is the main regional trading area in addition to a possible small local market. The current demand for the numerous species used in indigenous medicines exceeds supply and as a result several species, e.g. wild ginger and pepper-bark tree have become extinct outside KZN. It is pertinent to note that the Estate has successfully cultivated ginger and tumeric, albeit for the culinary market.

Little cultivation is carried out due mainly to lack of knowledge of indigenous plant cultivation and the economics of associated markets.

From current experience, it will be necessary to have irrigation to establish a small nursery of the selected medicinal plants and to ensure that transplants survive in the ground. Many medicinal plants grow in afforested areas, thus the choice on this Estate is minimal. The growing areas and handling facilities would also have to be secure.

Experience has shown to-date that a grower needs to involve at least a herbalist in the operation, to ensure a market. The presentation and marketing of traditional medicine has its own culture and *modus operandi.*

This industry of cultivated medicinal plants is in relative infancy and one would need to build up a stock in a nursery. This facet will be dealt with in the following paragraph.

8.8 Cut flowers and potted plants, including indigenous trees

If one has access to land and finance, then the option of growth houses can be utilised on land that is not necessarily suited for open-air cultivation.

As this Estate is not wholly not situated in lower lying areas, selected areas would have to be chosen.

A high level of management will be required for production, sanitation, harvesting, packing and marketing.

In addition to the growth house structures one would require cold room facilities, pack house facilities, secure chemical storage facilities and an efficient transport system with either insulated or refrigerated vehicles.

The Estate is situated reasonably close to Durban airport and will be ideally situated for the new iShaka airport.
Although the local market in Umhlanga is seasonal, viz. holiday periods, the greater Durban area provides a sustainable local market.
Together with the export facilities available and projected, a large portion of this Estate could be utilised for such a sustainable and viable enterprise.

9 SUMMARY

This Estate falls in BRG Ya 14, which comprises of Moist Coastal Forest, Thorn and Palm veld. The BRG Sub-group is 1.3
The vegetation pattern is Bushed Grassland and Bushland Thicket.
The indicator species are:

> *Acacia karroo, Acacia mearnsii, Acacia nilotica, Acacia robusta, Acacia siberiana, Albizia adianthifolia, Aristida junciformis, Combretum spp., Digitaria eriantha, Hyphaene natalensis, Lantana camara, Panicum maximum, Phoenix reclinata, Pteridium acqualinum, Sclerocarya birrea, Strelitzia nicolae, Syzygium cordatum*

The terrain is rolling with steep slopes with an altitude range of 4 to 120m above sea level, and a 3.9 potential erosion hazard rating.
The climate capability rating is C1, where the local climate is favourable for a wide range of adapted crops and an all year growing season. Moisture stress can be a factor on the Estate.

There are minimal limiting factors to sustain agriculture and the land has high potential.
Most of the areas are exposed to the elements, especially wind. Wind breaks would have to be established for subtropical fruit production and growth houses.

The climate is suitable for the production of subtropical fruits provided rainfall is supplemented with irrigation.
The water resources are not limiting and the catchment would yield sufficient stored water for irrigation of the preferred arable areas.
Municipal water is available on site. Should it be available for agriculture it would not be cost effective for most of the options considered.

There is electricity supply on the Estate. The road infrastructure to and from the Estate is excellent.
The Estate is close to townships and rural communities, thus availability of labour should not be a restraint.
The Estate is close to local and soon to international markets for all that can be produced thereon.

The Estate is close to existing wastewater treatment works and if their final effluent could be taken on a regular basis, at no cost, then it would solve their problem of polluting the streams and rivers.

There exist excellent crop production soils on the Estate and it would be irresponsible to allow these to all go to development.

10 CONCLUSIONS

After considering all the cropping and land use options, the development of this Estate into medium density residential and light industrial areas, could:

- Significantly improve the socio-economic situation of the local communities nearby, and in time that of the other communities
- Create sustainable employment to a larger group of people
- Indirectly improve trade in nearby shopping areas

In the scenario of proposed, and apparently accepted, development of the North Coast, it could be more important to create such an infrastructure that runs parallel to the low density high income residential areas on the east side of the N2 highway, than continue with only sugarcane production.
This would improve the socio-economic situation of the local and nearby communities.
The flora of the natural bush areas would be protected but the fauna will be negatively affected.

The impact of such a development on the immediate surrounding township areas and agricultural estates would be beneficial in that:

- The value of the surrounding estates could rise, depending upon their individual potentials with respect to agriculture
- Wages and salaries should not be negatively affected, but rather stabilised
- Indirectly the market for their current produce, other than sugarcane, will expand, especially perishable crops
- Families of their current labour forces could be gainfully employed at the development, thus improving their standard of living and education

However, the agricultural potential of this Estate is deemed high and developers must answer the question of 'how do they intend replacing such agricultural potential?' Statements are made of encouraging or placing agricultural development west of the old main north coast road. There is currently little or no agricultural development in these areas and the potential for such is much lower. Furthermore, a large section of this land is tribal land.

It is recommended that in order to create a balance and not lose the benefit of the climate and soil, that high potential areas are selected for intensive agriculture within the proposed development.
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If such land selection was left for intensive agricultural production then final effluent generated by this development could be disposed of on these lands and communal garden areas. This would integrate with the wastewater treatment works dilemma of where to dispose of the final effluent.

The creation of an international agricultural product export facility could well have been included in Moreland's proposal. If not, it should be considered.

Dr Roy Mottram
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