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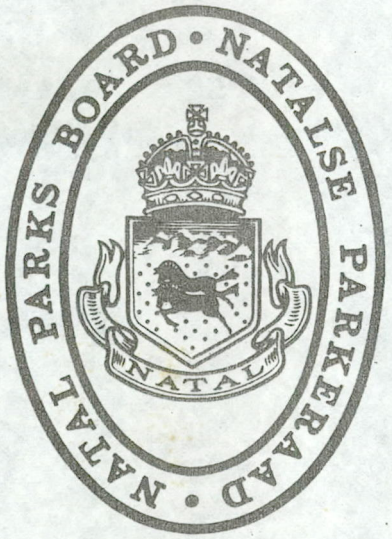

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Title MEMORANDUM REGARDING THE DRAINAGE AND RECLAIMATION OF A LARGE TRACT OF SWAMP LANDS BELONING TO THE CROWN, SITUATED NEAR THE MOUTH OF THE UMFOLOZI AND UMSINDUZI RIVERS - ZULULAND

Source 1959 UNPUBLISHED, APRIL 1959

Keywords SUGAR-FARMING*UMFOLOZI-RIVER*UMSUNDUSI-RIVER*
UMFOLOZI-SWAMPS*

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MEMORANDUM REGARDING THE DRAINAGE AND RECLAMATION OF A LARGE TRACT OF SWAMP LANDS BELONGING TO THE CROWN, SITUATED NEAR THE MOUTH OF THE UMFOLOSI AND UMSINDUSI RIVERS – ZULULAND

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W. G. VAN LIENDEN

DURBAN

APRIL 1959

INTRODUCTION

The undersigned is a professional civil engineer, and probably one of the few in South Africa familiar with and experienced in the domain of polders.

As a result of this experience I have been consulted by several farmers and Co-operatives in the Umfolosi district, and am therefore conversant with the prevailing conditions in that area.

In my opinion this district could be further developed.

OBJECT OF MEMORANDUM

This Memorandum has been written with the object of presenting my views on the drainage and reclamation of a large tract of swamp lands belonging to the Crown, situated near the mouth of the Umfolosi and Umsindusi Rivers, for consideration by the Departments of Lands and Water Affairs, as to the desirability of reclaiming and developing this land for allocation to settlers.

In view of the expected shortage in sugar production in the near future, ways and means will have to be found to either increase the production per acre, or to bring new areas under cultivation.

One of the larger areas in the Natal Sugar Belt which could be economically brought under cultivation is the swamp area described in this Memorandum.

ACCOMPANYING PLANS

A general plan A is attached showing the proposed drainage and reclamation works in relation to the existing cultivated areas and the settlement areas.

A layout plan B is attached showing the proposed scheme in more detail.

LOCATION AND DESCRIPTION OF SWAMP CONCERNED

Approximately 8½ miles east from Mtubatuba there is a large tract of swamp lands enclosed by the Umfolosi and Umsindusi Rivers on three sides and No. 4 Drain of the Monzi Farms on the western side.

This swamp is in parts periodically flooded by the Umfolosi and Umsindusi Rivers, and the lower parts are occasionally affected by high tides from the sea.

The larger part of the swamp is above Mean Sea Level, and is covered mainly by reeds, grass, papyrus growth and scattered trees.

The area is not inhabited by human beings, and is a paradise for waterbirds and crocodiles.

DESCRIPTION OF PROPOSED DRAINAGE AND RECLAMATION SCHEME

In order to make use of this swamp land for agricultural purposes it is proposed to drain and reclaim this area, safeguarding it against various adverse influences such as flooding, high tides, excessive rainfall, etc., by means of the construction of an enclosing embankment or *dike* of sufficient strength and height, thus forming an enclosed area or *polder*.

This encircling embankment or dike would exclude external dangers to the area, and a system of canals and sluits, which discharge by means of suitable sluicegates and/or pumps into the Umfolosi or Umsindusi Rivers, would provide the necessary control in respect of rainfall, water-table, etc., inside the newly-created polders.

WATER MANAGEMENT

The topographical and climatic data, as far as is available, point to a solution whereby the area is divided into several polders, each with its own water level in its canals and sluits. Control could thus be maintained over surplus water discharge, seepage through dikes, and, if required, surface irrigation and infiltration, facilitating general drainage control and water management.

For the discharge of the surplus drainage water, through the main dike on the Umfolosi and Umsindusi Rivers, sluices with automatic flap gates are required at both ends of Main Canal 2, serving the polders 1a, 1b and 2. Polder 2 discharges via Pumping Station P2 on Main Canal 2; polder 3 discharges via Pumping Station P3 direct on the Umsindusi.

The sluicegates Q, S, T, U and V provide flexible water management between the various polder departments in times of high rainfall and in times of drought (infiltration).

Additional areas which should be incorporated in the scope of the works to be undertaken, in order to provide an economical milling unit, are the areas marked 4, 5, and 6, of respectively 1,000, 260, and 275 acres, all belonging to the Crown.

The area 4 can also be enclosed as a polder, with a dike along the Umfolosi River, and with a main canal draining the polder area and some higher grounds north of this polder area. A pumping station at P4 would control the water management besides an outfall sluice.

The areas 5 and 6 are lying outside the enclosing dike of polder 1. Access to the tramline system, etc., is, however, provided via the coupures R and Z, as shown on plan B.

Both these areas 5 and 6 drain via the existing No. 4 Drain on the Umsindusi at Y.

Summarizing, the polders 1a and 1b are assumed to have natural drainage, while polders 2 and 3 (and 4) will have to be assisted by pumping for their water control.

All polders can infiltrate water from the Umfolosi River in times of drought, via the inlet sluice at V.

The tentative polder areas and levels are as follows:—

Polder	Approximate gross area in acres	Preliminary suggested polder level at outlet
1a	4,960	+ 13
1b	2,070	+ 13
2	1,380	+ 9
3	2,160	+ 9
Total gross area polders 1, 2 & 3	10,570	
Less area canals, dikes, etc.	470	
Less area tramline and roads	120	
Total net area polders 1, 2 & 3	9,980 acres	
or say	10,000 acres	
Add areas 4, 5 & 6:		
4	1,000	+ 18
5	260	
6	275	
Approx. Total Net Area	11,535 acres.	

The datum used is the same as on Plans Nos. 17419/17420/43 of the Irrigation Department which is found to be deviating approximately 10 ft. from the observed M.S.L. in the area.

(+ 10 = approx. M.S.L.)

This subdivision of the enclosed polder area determines the capacities and dimensions of the various sluices and canals, and pumping stations in this preliminary layout.

It might be necessary to alter the internal boundaries of the various polders at a later stage in the light of future data regarding ground and water levels which would become available when a survey has been completed of some now inaccessible parts of the swamp areas.

It will then also be possible to decide if, even for polder 1 or part thereof, a pumping station would be required.

As sufficient data is not available at present, it has been assumed that polder 1 can be made to drain into the Umfolosi River at M in a natural way.

PARCELIZATION AND FARM SIZE

In determining the rational shapes and sizes of the farm lots the tendency to intensely mechanize the working of the land has been taken into consideration.

It has been found in general that rectangular lots are preferable to lots with non-parallel sides.

Furthermore, the determination of the dimensions of the lots is related to the cost of laying roads and watercourses, and the cost of running and administering the farms.

The size of the farm as a whole is advantageously or disadvantageously affected by the number of lots which constitute a farm, i.e. one single lot or more lots.

No effort has been made to cut the lots in equal shapes and sizes, as the farm size depends on many factors, such as water management and accessibility. Also social, economical and political factors have influence, such as standard of education and financial capacity of the new land owners, the social structure of the district, labour supply, etc.

In general the aim has been to choose a size of farm which, under normal conditions for the district and with proper management, will afford a decent living.

A maximum parcel width of 750 feet has been maintained right through all polder compartments, in connection with future highly-mechanized farming methods and with optimum technical requirements regarding drainage and possible required infiltration.

A maximum parcel length of about 2,500 feet is adopted, keeping in mind that investigations in Holland and elsewhere have shown that the disadvantages of inferior cultivation of the most distant portion of farms could generally first be observed in the case of parcel lengths over 4,000 feet.

Thus the location of the main canals and the shape of the polder compartments and the topography, coupled with the parcel width of 750 feet, provide mainly parcels of 40 to 43 acres, and the farm size could consequently be multiples of 40–43 acres, viz. 80–83, 120–130 acres, etc.: giving a reasonable range of farm sizes.

SETTLEMENT

Non-European Workers

Depending on the size of the farm allocations, the number of new farms will be of the order of 120–150 farms.

Assuming 20 Non-European workers per farm, the Non-European population required for the new polders would comprise some 3,000 workers, or say 15,000 men, women and children.

At 25 persons per acre this would absorb an area of 600 acres for the housing of these 15,000 Non-Europeans.

For their educational and recreational needs an area of, say, 150 acres would be set aside, for the provision of sportsgrounds, school-cum-community hall, church sites and commercial sites.

This Non-European centre would also include a fire control centre, a police station, and a first aid station or policlinic.

Even small secondary or even tertiary industries might spring up here, and could be encouraged, which could absorb surplus female and juvenile labour.

A total area of about 750 acres (or 5 acres per farm) would be required, for which a tentative area B will be set aside, between the suggested European settlement area A and the Umfolosi River, and close to the new polders.

Europeans

For the European farm-owners a system of concentrated settlement is considered to be preferable.

Not far from the already established Monzi Settlement, a new settlement area A could be developed, on land at present belonging to the Crown (Dept. of Lands).

This tentative area A could provide 5 acre lots to all settlers and officials and others necessary for the usual business and social services.

As at full development the number of new European families will be greater than that at the existing Monzi Settlement, the centre of gravity will move towards this new settlement, and after an initial period this new centre will absorb the smaller group.

The new settlement could still fall under Mtubatuba for its administrative centre, but should combine with the existing Monzi Settlement in respect of recreation, health, education, etc., in the initial stages of development.

SITES FOR NEW MILL AND HOUSING FOR EMPLOYEES

A site for a new mill, complete with all ancillary buildings, and all European and Non-European housing for employees, would absorb at least 200 acres, preferably 250–300 acres. For this requirement area C is proposed, close to the river and the new polder areas, with ample space for expansion.

A few sites would have to be set aside in this area C for business such as fertilizer firms, a mechanical workshop, and should include the Polder Technical and Administrative Offices, and all business and technical services related to farming and sugar production.

The total area available for settlement and general development—with as approximate boundaries the swamp edge, the Umfolosi River, lot U 178, the Monzi-Mtubatuba road as far as the junction with the Mtuba–St. Lucia road, and from there again eastwards—is approximately 7,000 acres, of which say 1,800 acres would be required for the areas A, B, and C, as mentioned above.

This leaves an area of say 5,000 acres (D) for future development and expansion. A part might be required to increase the cane-growing acreage in order to produce an ultimate mill capacity of 750,000 tons per annum.

TRANSPORT

It would be technically possible to adapt the main canals and the canals for the bulk transport of sugar cane, fertilizers, etc., in the various polders.

This bulk cane transport, however, would have to go over a part of the Umfolosi River in that case in order to reach the new projected mill.

As the water level in the Umfolosi is not constant and is unreliable it is considered not economical to rely on water transport for bulk cane transport, but to use tramlines and roads.

I have endeavoured to provide all farms with rail access from a main tramline, and to provide major watercourses in such a manner that all farms are equally favoured from the point of access, water control and drainage.

The tramlines and watercourses are so situated that a minimum number of canal or sluit crossings are required, thus avoiding expensive bridgings or culverts, without, on the other hand, sacrificing flexibility or accessibility.

The projected mill site C requires a direct tramline and road link over the Umfolosi River with the polders 1, 2, 3 and the small areas 5 and 6 which are connected to the tramline system via coupures R and Z.

An excellent bridge site is available at X which would bring the polder centre within 4 miles from the mill site.

Areas 4 and D have a direct link with the mill, without crossing the Umfolosi.

The new polder areas 1, 2 and 3, and 5 and 6, are also connected with the "old" land by means of existing roads from the existing Uloa bridge over the Umfolosi, via coupures R and Z, providing an alternative route to the settlement area A.

Especially in the initial stages of the development of this scheme this route will provide the main means of access.

It would also be necessary to build a new private railway siding, which would serve the new mill from Mtubatuba.

In the polders all roads and farmtracks are alongside the tramlines, thus reducing to a minimum the loss of cultivable land.

As the new polder areas will eventually attract considerable business in the way of agricultural equipment, fertilizers, fuel, etc., and there will be much coming and going of officials, businessmen, agents, and, of course, the local farmers, I suggest that a landing strip of generous dimensions should be set aside, and in close proximity to the new mill site, in order to cope with future development regarding air transport and communications.

MILLING FACILITIES

The cane growing in the total suggested area (say 15,000 acres ultimately) would produce some 750,000 tons of cane per annum, which would be milled by a co-operative mill erected for the new settlement, or could possibly be milled by the existing Umfolosi Co-operative Sugar Planters' mill at Riverview.

In the case of a new co-operative mill, the finances will culminate in the following, allowing for an initial development of 12,500 acres, or say 600,000 tons cane per annum:—

Cost of complete development of polders, inclusive surveys, fees, supervision, tramlines, clearing, draining, housing, planting, bridge over Umfolosi, etc.	£750,000
Cost of 75,000 ton new modern factory, including housing, rail siding linking Mtubatuba, plus all construction and ancilliaries	£2,500,000
Contribution to the State, allow 12,500 acres land at £40	£500,000
Allow for interest till first crop milled plus reserve for unforeseen items of expenditure	£250,000
Total:	£4,000,000

LIABILITY

Say 150 farms, complete, developed, housed, compounded, etc., including first year's cutting and milling: $\frac{£4,000,000}{150}$ = say £27,000 each member's liability.

SECURITY

One mill complete	£2,500,000
150 farm lots at £20,000	£3,000,000
Total:	£5,500,000

REDEMPTION

Redemption at 4% on £4,000,000	£160,000 p.a.
Interest at 6% on £4,000,000	£240,000 p.a.
	£400,000 p.a.

Therefore per farmer an average of $\frac{£400,000}{150}$ = £2,700 p.a.

that means per ton cane (at 4,000 tons per farm per annum):

$\frac{£2,700}{4,000}$ = 13/6 per ton cane.

This is when the mill does not make a profit, but the mill should show a profit of 3/6 on a ton of cane.

Balance of cost of cane produced by settler .... 10/– per ton p.a.

ECONOMICS OF SCHEME

Value of cane, not including milling profit	35/– per ton
Cost of farming, cutting, transport	15/– per ton
Add balance from above	10/– per ton
This leaves balance profit:	10/– per ton p.a.

With an average cut of 4,000 tons at 10/–: **£2,000 net profit to settler per annum.**

This is all based on a minimum milling capacity of 600,000 tons of cane per annum.

SUMMARY

1. 12,500 acres of excellent sugar land can be made absolutely safe for production at a cost of approximately £500,000.
2. If milling facilities are not available under reasonable terms at a sister co-operative next door, then a mill could be had, completely erected and tested, for £2,500,000.
3. For £500,000 all the necessary can be done to develop the area and provide the necessary housing, etc., to settle 150 farmers on the land, in full production.
4. The Government could add a contribution for the land, from the settlers, providing £500,000.
5. It is abundantly clear that this new Co-operative could pay 6% interest, 4% redemption on the full £4,000,000, pay their farming expenditure and transport, and have a profit of approximately £2,000 per annum for each member, which is considered a very good net income.
6. The whole project in full swing could be completed by 1962.
7. This is so important and urgent a matter that I suggest that the Minister appoint a Committee of competent persons, to whom the writer is prepared to give evidence on the subject matter of this Memorandum.

W. G. VAN LIENDEN,
Netherlands Professional Engineer,
M.I.R.E., Assoc. I.I.L.R.

Durban.

April, 1959.