APPLICABILITY OF RICE GROWING ON THE PILOT FARMS

Potential for rice growing on the Marrakai bulldust plains between the Adelaide and Mary Rivers under irrigation.

SUMMARY

An engineering investigation has been made of areas of bulldust plain between the Adelaide and Mary Rivers based on the C.S.I.R.O. 4 mile map. Investigation was also made of the natural and potential water supply for irrigation of rice in the areas. Subject to the qualifications and the criteria used as a basis for the survey and the limitations of time and data the following is an attempt to assess the position.

Firstly none of the streams have sufficiently reliable flow to ensure supplies without some form of regulation. The need for and cost of this regulation could be reduced if later establishment of the crop were possible with a shorter growing period.

NUMBER OF FARMS AND AREA SUITABLE FOR DEVELOPMENT OF IRRIGATION TO RICE

(a) Suitable If Water Were Available In All Cases

<table>
<thead>
<tr>
<th></th>
<th>No. Farms</th>
<th>Area Sq. Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adelaide River</td>
<td>11</td>
<td>17.2</td>
</tr>
<tr>
<td>Burrell Creek</td>
<td>3</td>
<td>4.7</td>
</tr>
<tr>
<td>Howley Creek</td>
<td>6</td>
<td>9.4</td>
</tr>
<tr>
<td>Margaret River</td>
<td>7</td>
<td>10.9</td>
</tr>
<tr>
<td>McKinlay</td>
<td>17</td>
<td>26.6</td>
</tr>
<tr>
<td>Eckerbone W.E. Plain</td>
<td>5</td>
<td>8.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>49</strong></td>
<td><strong>77.2</strong></td>
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</tbody>
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* Adelaide River includes two pilot farms.

Of these the Margaret has no suitable storage site, Howley Creek has a dam site but distribution would be difficult and it may or may not be possible to water Eckerbone waterhole plain from the McKinlay. Writing off seven farms on the Margaret, one on the Adelaide, and either the six on Howley Creek or the five on Eckerbone plain as unsuitable for supply (i.e. assuming one of these two is not possible) the following estimate is arrived at:

(b) Likely Practical Development

35 Farms or 55 square miles.

Rough estimates of costs of regulation of supply to farms (excluding Margaret River) range from $35,000 (£20,000) per farm up to $204,000 (£142,000) per farm with an average of $150,000 (£95,000) over all schemes, but not too much should be made of these estimates. The cheapest and most accessible of these schemes is development of the Adelaide by storage on the two tributaries, Stapleton Creek and Coomalie Creek, rather than on the main stream.

Note that this is merely an assessment of combined rice and grazing propositions. It is clear that large numbers of farms for purely grazing under improved pasture, as in Pilot Farm 3, are available in the area.
BASIS OF SURVEY AND ESTIMATE

(a) Lands

The basic information is the four mile land system map prepared by C.S.I.R.O. The areas there marked under classifications Fb, Fw and Mac were inspected by helicopter on 3rd and 4th March. The suitability for rice growing was assessed on two counts.

(i) Suitability of particular plains for the engineering layout and design of rice farms of practical size and sub-division design taking account of broken ground and other disabilities.  

(ii) Availability of water or potential for supply under stream regulation.

The net areas are considerably less than the gross area where the ground is steep, broken or inadequate for a farm unit or when water supply is difficult.

(b) Farms

For the purposes of the study a unit of gross irrigable area of 1,000 acres of plains was taken as a rice farm. It was assumed that 300 acres would be under rice each year in a one-in-three rotation requiring development of a net 900 acres. At the same time the availability of adequate back country for improved pasture (on the No.1 and No.2 pilot farm scale) was considered. In places this means that areas suitable for rice would be included in pasture areas to get a mixed farm sub-division. This was in practice not a severe limitation although obviously additional rice farms could be obtained if the sub-division were purely to rice farms.

(c) Storages

Inspections were made of river storage sites and estimates made of storage requirements based on available run-off figures. Suitability of river channels for distribution of water for pumping and lines for channel reticulation were assessed.

River gauging figures were available for the Adelaide, Burrell Creek, Stapleton Creek, Coomalie Creek, McKinley and Mary. This gave good data for correlation and estimates for the particular catchment areas at possible dam sites.

Water requirements for the crop is an important factor in the estimate of storage requirement and consequently cost. This depends on the date of planting and the length of growing season. It was assumed that planting would be in early December and varieties similar to Pilot Farm No.2. Water requirements were based on assessments made earlier for the Tortilla Flats farms. This showed that for the Adelaide it would be hazardous to develop rice irrigation beyond the two pilot farms without some form of regulation. Natural flows in the other streams are generally not as good as the Adelaide.

For Tortilla, in six out of the twelve years studied there would be a deficiency in river flow for the purpose of weed control in the early part of the season. There are only three years in twelve in which river flow is sufficient at all required times to supply the pilot farms. On average 20% of the time there would be inadequate flow to supply both pumps except on a roster. In the worst years the flow would be inadequate for 40 to 50% of the season. One year in twelve there would be deficient water supply in the generation growth stage of Hickerie (critical for yields) and two years in twelve in the generative growth stage of Sirna (planted early December). Reduced yields could be expected in these periods if in practice it is not possible to maintain water in the bays.
Similarly reductions in yield may result through difficulties in weed control one year in two.

Based on the Tortilla study a supplementary irrigation of 1 acre foot/acre would be required in critical years and 0.5 acre foot in the best, with an average of 2.2 acre feet.

Storage was based on the need to supply 1 acre foot in a critical year with sufficient carry-over storage to provide one acre foot at the beginning of the next wet season with allowances for evaporation and river or channel losses.

Storage requirements would be much reduced if shorter term varieties were used allowing of later planting. This would greatly reduce costs.

It should also be noted that the number of farms would be increased if the rotation assumed were one in two.

(d) Cost Estimates

Cost estimates of storages are based on simplified hydrologic study of storage behaviour and on scanty survey data at times. They are intended as "order of" cost only and not too much should be read into them in view of the time available.

**ADAREBRA RIVER**

The area of bulldust plain suitable along the river down to Marrakai Crossing is fairly limited and would of itself hardly justify the cost of a dam at the available good site above the township.

It is estimated that an additional eight farms could be located on the Adelaide between Adelaide River Township and the Marrakai Crossing. A further farm on the lower end of Burrell Creek could probably be supplied from the Adelaide. This makes a total of nine farms or eleven including the present pilot farms.

Possible Regulation -

1. There is the damsite on the Adelaide River above the township. Here a dam of capacity 300,000 acre feet is possible and has been estimated to give a draft of about 100,000 acre feet. This would be suited to the supply of the wider area of the sub-coastal plain but if constructed would also supply the available Marrakai type plains. A detailed estimate has not been made yet for this site as surveys are incomplete. A rough preliminary estimate would put the dam at $8,000,000 (£4,000,000). There may not be sufficient total coastal land available to use this draft but, if it were so, the capital cost per farm would be $107,000 (£53,500) assuming 75 farms. For the coastal plains farms there would be additional capital cost of a diversion and reticulation but for the Marrakai area mainly pump installation and a short channel, say a capital cost of $112,000 (£56,000) at farm boundary.

   As an exercise this smaller dam would need to have a storage in the vicinity of 25,000 acre feet and it is estimated to cost in the vicinity of $3,000,000 (£1.5 million). This would be a capital cost of $270,000 (£135,000) per farm.

2. A smaller storage to supply solely the eleven farms could be built at the Adelaide River site. This would be an uneconomic use of the site and it would seem desirable to reserve it for a larger scale use.

3. Stapleton Creek and Coomalie Creek: Instead of using the Adelaide River damsite, for such a small scale development, storage could be provided on tributaries. A possible site on Snake Creek is marred by the cost of relocation of the railway. Two dams, one on Stapleton Creek and one on Coomalie Creek would provide sufficient regulation for probably ten farms and allow irrigation along Coomalie and Stapleton Creeks themselves.
Coomalie Creek, storage 8,000 acre feet - Capital cost $350,000 (£175,000)

Stapleton Creek, storage 15,000 acre feet - Capital cost $500,000 (£250,000)

Total storage 23,000 acre feet

Total capital cost $850,000 (£425,000)

Number of farms served: 10

Capital cost per farm $85,000 (£42,500)

This is less than either alternative (1) or (2) above.

The Stapleton dam site would require relocation of several miles of the Stuart Highway. This would be no disadvantage as the road needs realignment in this area. The road could be taken across the crest of the dam.

The Coomalie Creek site would involve deviation of a length of the Batchelor road or up-grading the alternative road and resumption of small farms in the storage.

BURRELL CREEK

As previously mentioned one farm could probably be watered from the Adelaide.

Although there are considerable areas of plains on Burrell Creek it is thought that only three additional farms on it could be obtained in practice on the criteria used.

Although there is a good gorge for a dam site the storage is limited by the narrow valley upstream. A dam to regulate the supply for three farms allowing for use of the creek channel to supply them by pumping would require a storage of 4,000 acre feet.

It is estimated that this would cost $850,000 (£425,000).

A short deviation of the Stuart Highway and a raised bridge would be required.

The capital cost per farm would be $284,000 (£142,000).

Access is readily available from both road and rail.

HOTLEY CREEK

It is estimated that about six farms could be obtained and watered on the criteria used.

A good dam site is available but the river channel is very broken and braided and poorly defined. Losses of water in use of the creek channel to supply water would be high, and can not difficult. Separate channels to supply to six scattered farm areas would be expensive.

A dam to regulate the supply on the creek for six farms would require a storage of 10,000 acre feet at an estimated cost of $300,000 (£150,000).

Capital cost per farm $50,000 (£25,000). On the face of it this is the cheapest available scheme but does not include possible costs of stream channel improvement or of channels if required. This could be high because of the broken ground and difficult cross drainage works. No attempt has been made to estimate this.
Access would be by road to Adelaide River township or by road, to the nearest railway siding, up the lowley Valley.

MARGARET RIVER

There are considerable areas of buildist plains on this stream. Near the junction of the Adelaide the areas could be supplied from that river and have been included in the estimate for the Adelaide. It is thought that an additional seven farms could be obtained in practice if water were available.

There is no suitable dam site on the Margaret other than shallow storages with long low dams having heavy evaporation losses and high cost. The channel is not well defined and there would be high losses in supplying water down it for pumping. (There is plenty of water if a storage were available but the flow irregular).

It would be theoretically possible to supply water by diversion from the Adelaide, if it were regulated by a dam but this would require a diversion weir with possibly 40 to 50 miles of channel with numerous cross drainage works (syphons, subways, flumes) over broken ground and would be too expensive to contemplate for a small number of farms. Pumping might also be required.

The Margaret is too unreliable in its natural flow to supply without regulation.

For the purposes of this assessment then the Margaret could be written off for any rice development requiring reliable supplementary irrigation. (This is not to say that rice could not be grown in the better seasons).

McKINLEY RIVER

There are excellent plains along this river having the best potential for development of all the valleys investigated. It is estimated that about 17 farms could be obtained and possibly a further five farms could be served in the Eokerbone waterhole plain from the McKinley by channel. Along the McKinley itself possibly a further five farms could be obtained if the sub-division were to rice farms alone.

A dam site in the vicinity of Mt. Douglas is available with a large storage but the length of dam required means that the capital cost would be high.

For a storage of 75,000 acres feet the estimated capital cost is $6,000,000 (£3,000,000).

Capital cost per farm (assuming 22) $272,000 (£136,000).

Cost of any reticulation would have to be added. Most of the farms could be served by pumping from the river channel but the five farms on Eokerbone waterhole plain might have a high channel cost to carry and some farms near the left bank of the Ever.

A surveyed section was available for the dam but the storage capacity had to be estimated roughly. It is possible that the cost estimated may be on the high side as this was conservative.

Direct access to the railway siding at Burrundie would be available by a road down the McKinley valley via Mt. Wells.

This plain appears the best for development of a group of farms and would not be scattered as on the other streams. In spite of the high cost in this first estimate, closer study of the dam storage and site appears desirable.
MARY RIVER

There are considerable areas on the East Bank of the Mary. These were not investigated because of the limited time available and the fact that access would be difficult. The catchment area is large and unregulated flows are greater than the Adelaide. A small number of farms could probably be supplied from unregulated river flow.

It is estimated that five farms could be supplied by unregulated flow in critical periods and ten farms with a small pondage weir.

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