AN IASER REPORT

SOCIO-ECONOMIC DEVELOPMENT PROPOSALS FOR THE ARONA VALLEY

VOLUME II


AUGUST 1986
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FIGURE SUGGESTED STRUCTURE FOR ARONA VALLEY DEVELOPMENT AUTHORITY

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PERSONS CONSULTED
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1. Creation of an Administrative Authority

Advise on the nature and membership of such an authority to supervise and control the Arona Valley socio-economic development programme. In particular, the relationship between this authority and the management and ownership of the large-scale cash crop project proposed should be clarified.

2. Management of the large-scale cash crop (tea) project proposed

Advise on the most suitable form of management for this project.

3. Ownership of the large-scale cash crop (tea) project proposed

Advise on the most suitable basis of ownership for this project.
EXECUTIVE SUMMARY

1. Reasons for the Study on the Proposed Arona Valley Development Authority

The Papua New Guinea Government and the Papua New Guinea Electricity Commission (Elcom) have approved the construction of the next stage of the Yonki Dam Project (Yonki III). The total cost of the project is estimated to be over K140 million, to be funded by international as well as domestic sources.

The major concern of the government and Elcom is to ensure that the Arona Valley people are the major beneficiaries of the expected spin-off benefits from the construction of the dam and flooding of Arona Valley. There are two major ethnic groups in Arona Valley, the Agarabi and the Gadsup, with a total population of 24,880 people. These people have been led to expect that when the dam is constructed, they will benefit from greater economic and social opportunities such as increased employment opportunities, business opportunities in agriculture, commerce and tourism and better health and education services.

In its attempt to ensure such opportunities are realised in a planned and orderly manner, Elcom has sought to establish and co-ordinate appropriate policies and programmes, as well as the institutions to administer them, through the commissioning of the Social Impact Study undertaken by the Institute of Applied Social and Economic Research.

2. The Proposed Arona Valley Development Authority and its Structure and Functions

This report discusses the desirability of establishing an administrative authority to oversee the implementation of the 'Master Plan' of development for Arona Valley. It argues for a realistic approach in setting up the proposed authority in respect of financing the establishment costs, and its administration of the programmes of development.
The report discusses the desirability of a broad cross-section of representation, in order to ensure the views of existing national, provincial and district agencies are accounted for and co-ordinated with the views of the Arona Valley people through their elected representatives in the various levels of government. The proposed authority is structured in such a way that staff of the authority have a day-to-day monitoring role with the various developmental activities that may from time to time be undertaken by the authority.

The proposed authority is modelled on some precedents of similar institutions in Papua New Guinea, such as the Kiunga and Lake Murray Districts Planning and Development Committee and the Pomio District Development Committee.

Funding arrangements for the authority could be drawn from some existing provincial and district funds for activities directly relating to Arona Valley area, to allow the proposed authority a semi-autonomous status. The proposed authority should seek to further relationships with the existing government agencies in the delivery of goods and services to the Arona Valley people.

3. The Proposed Major Agricultural Project

As a token of how serious the government (and Elcom) feel about developing tangible benefits for the Arona Valley people, the terms of reference for this report also require the consultant to recommend an appropriate structure of ownership and management of a proposed major agricultural project, and its relationship to the proposed development authority.

Once again, the report advises a prudent approach to investment projects such as the agricultural project - in this case, the development of coffee on a smallholder and nucleus estate-type venture.

The report considers the relatively scarce data on the merits and demerits of three major crops - citrus, tea and coffee - as candidates for the major agricultural
cash crop in the Arona Valley. All crops seem eminently suitable for the area. However, a major constraint seems to be funding. While recommending coffee, the report does not preclude the other crops from further detailed studies for future consideration.

The cost of the coffee nucleus estate project is estimated at K3.7 million, and subject to final equity structuring, the proposed authority may need approximately K1.8 million for its equity. The project should be a limited liability company to be known as Arona Valley Coffee Development Company, and owned by the proposed authority as the major shareholder, with some existing investors such as Kainantu Kaunsel Bisnis, Angco and Taiga Development Corporation, as possible owners. The management of the company should preferably be limited to the existing management companies in the Kainantu area.

The relationship between the proposed agricultural project and the proposed authority should strictly be on business terms, with minimal or no interference from the board members of other equity holders unless it concerns matters of policy and company viability.
RECOMMENDATIONS

PROPOSED CREATION OF ARONA VALLEY DEVELOPMENT AUTHORITY

1. That the Arona Valley Development Authority be established.

2. That the funding of its establishment should initially be sourced from the total Yonki III funding sources.

3. That funding of future development projects and investments be sourced from existing Eastern Highlands Provincial Government funds, Kainantu Council grants, as well as loan funds from lending agencies.

4. That members of the controlling board should be drawn from the six elected representatives of Arona Valley people, the Secretary of the Eastern Highlands Provincial Government, Elcom, Finance Department, the executive director of the proposed authority and chaired by the Minister of Provincial Affairs.

5. That functions of the proposed AVDA should include financial control, investments and administration, with the possibility of management of Yonki township included when Yonki assumes urban (town) status.

6. That the proposed AVDA co-ordinate all development policies and programmes for Arona Valley. That initially in all its investments, the AVDA seek the co-financing and investment of other existing investors in the EHP and in particular in Kainantu District.

7. While a majority shareholder in all its investments in Arona Valley, the board members must refrain from interference of the day-to-day management of the investment companies.
3. **THE MAJOR AGRICULTURAL PROJECT**

1. That the crop for the major agricultural project be coffee, the variety being catura. Citrus and tea should not be excluded. The government should pursue further funding arrangements and technical feasibility studies should be continued.

2. That the majority ownership of the project be vested on the proposed Arona Valley Development Authority of at least 50% equity.

3. That owners be limited to local business houses such as Kainantu Kaunsel Bisnis, Angco and Taiga Development Corporation.

4. That the selection of management of the project be limited to a shortlist of National Plantation Management Agency (NPMA) and Angco Development.

5. That board members be composed of the appointees of shareholders of the investing companies as well as a representative of a financing institution involved in lending funds for the project.

6. That the project be incorporated as a limited liability company known as the Arona Valley Coffee Development Company.

7. That in respect of AVDA dividends from the coffee company, all dividends be directed towards the development of the Arona Valley and its people.
1.0 INTRODUCTION

1.1 BACKGROUND

The IASER Social Impact Study of the Yonki Dam Project seeks to address the socio-political issue of the effects of the Yonki hydro scheme, and the next stage of the dam construction, on the expectations of the Arona Valley people, whose land would be flooded by the dam. In this respect, the study canvassed, inter alia, a broad spectrum of agricultural, commercial and special projects, to be further studied in order to establish a supportive case for a long-term solution to the concern of the Arona Valley people for 'unfulfilled promises' made by Elcom at the time the land was acquired for the project in 1970-71.

Accordingly, terms of reference were drawn up for a study to be made of the feasibility of creating an authority to:

...oversee the implementation of the components of the master plan, to co-ordinate goals, and generally to see that the overall aim of raising the standard of life of the Arona Valley people and creating a healthy self-sufficient community is not lost sight of. This would be the body to which personnel of the different components would report on progress in order that an on-going evaluation could be maintained. [Walter & Sumanop 1985:7.1]

As a 'prestige' public relations-type scheme, a major commercial agricultural project was recommended to be established in order to generate cash flow for the authority to fund further development projects for the benefit of the Arona Valley people. The terms of reference for this report also include a study of the appropriate ownership and management structure of the proposed major agricultural project, and the nature of its relationship to the proposed development authority.

1.2 THE STUDY AREA

The study area covers Arona Valley of the Eastern Highlands Province. Arona Valley comes under the Kainantu District administration of the Easter Highlands Provincial Government, one of six districts in the province. The Kainantu Council has representation from the Arona Valley people. The physical
boundaries of the study area are defined in Map 1 of the IASER report.

There are two distinct ethnic groups in the Arona Valley, namely the Agarabi and the Gadsup. These ethnic groups form the census divisions, which in turn are the constituencies for the Kainantu Council and the Eastern Highlands Provincial Government elections. The Social Impact Study provides adequate coverage and exposition of the two groups, their cultures and social forms of organisation, and their socio-economic activities.

The total population of Arona Valley is 24,885 with the Agarabi people numbering 12,797 and the Gadsup people numbering 12,088. Arona Valley people represent 39 per cent of the total district population of 64,369 people, and 9 per cent of the total provincial population of 276,725 (figures from the 1980 census).

Per capita actual expenditure figures for the year 1981 are shown in Table 1.

<table>
<thead>
<tr>
<th>District</th>
<th>Population 1980 Census</th>
<th>New &amp; Ongoing Project Allocations</th>
<th>Per Capita Actual Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goroka</td>
<td>87,794</td>
<td>K 999,597</td>
<td>12.91</td>
</tr>
<tr>
<td>Kainantu</td>
<td>64,369</td>
<td>779,864</td>
<td>14.76</td>
</tr>
<tr>
<td>Okapa</td>
<td>45,224</td>
<td>509,654</td>
<td>15.05</td>
</tr>
<tr>
<td>Henganofi</td>
<td>37,296</td>
<td>524,729</td>
<td>14.05</td>
</tr>
<tr>
<td>Lufa</td>
<td>32,409</td>
<td>515,482</td>
<td>15.89</td>
</tr>
<tr>
<td>Marakawa</td>
<td>10,137</td>
<td>109,909</td>
<td>19.72</td>
</tr>
<tr>
<td>Headquarters</td>
<td>-</td>
<td>562,520</td>
<td>-</td>
</tr>
<tr>
<td>(Shared costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>grants &amp; projects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4,001,755</td>
<td>15.40 (average)</td>
</tr>
</tbody>
</table>

Source: Eastern Highlands Provincial Government Budget 1982, p.3
No similar tables were released in the subsequent budgets to 1985.
The significance of the above data lies in the context of policy. Care must be taken to view the issue of the Arona Valley development and the coverage of the beneficiaries, the Arona Valley people, in the context of district, provincial and national government resource constraints relative to expenditure on other areas and people.

The IASER Social Impact Study also outlines the historical developments of the study area since the purchase of the land for the Upper Ramu Hydro-Electric Project was effected in 1970-71. It is noted in the report that 4,080 hectares of land was purchased, which consisted of 1,875 hectares belonging to the local people, 2,205 hectares owned by expatriates and some 770 hectares of customary land purchased for anticipated ancillary works such as quarries. The total price for all land purchased amounted to $A520,805 with the value of improvements for plantation land included to compensate the expatriate owners.

1.3 SOCIO-POLITICAL SIGNIFICANCE OF RAISED EXPECTATIONS

The IASER Social Impact Study discusses in some detail the promise of developments that would emanate as a result of the Upper Ramu Hydro scheme. These expected spin-off developments include a large township at Yonki Dam, light industries, a greater market for rural produce for the Arona Valley people and further spread effects to Kainantu and Goroka. Other expected spin-offs from the dam project include fishing, tourism development and recreational facilities such as boating. There was to be the availability of cheap electricity and employment opportunities for the local people.

The immediate effect of the lump sum payment of $A150,000 to the local people, and the associated promises of improved economic and social infrastructure and opportunities, pose a real dilemma for the government, and in particular for Elcom, to come to terms with the potential dangers of not resolving or fulfilling these promises.

Apart from the construction of Yonki Dam Stage 1, Elcom's other efforts directly related to maintaining goodwill with the Arona Valley people were the setting up of a cattle ranch and the establishment of a coffee nursery for seedling distribution to the local people. The cattle ranch was also meant to deter people from encroaching upon land already acquired for the dam project.

In this regard, a further consideration raised by the IASER study is that:
...within Melanesian land tenure systems generally, the convention was firmly established that a person requesting use of land to which he held no customary right was obliged to use that land for the purposes he had stated in his original request. [ibid.:4.4]

Should land be used for purposes other than what was originally intended by the 'lessee', and for which was approved by the 'lessor', then the lessor has the right to withdraw his approval unless further compensation is negotiated and paid. In Section 4.4.2 of the IASER study, it is recorded that the landowners see that 'Elcom had used the land purchased, not for the dam, but for a cattle ranch. The land and ranch should be forfeit to the customary land owners'.

These general rules of land tenure may have given rise to the concern by Elcom to initiate further moves to provide tangible benefits that may affect the Arona Valley people directly, to sustain their goodwill. The issue of how directly Elcom involves itself in matters outside its function as a electricity-generating body in the government is also critical when project funding and local involvement in providing services are considered.

The proposed creation of the Arona Valley Development Authority may, in the long run, assist Elcom and the national government in understanding the wishes and expectations of the Arona Valley people. It could also serve to focus the diverse government institutional efforts, at both national agency and provincial levels, towards resolving issues and problems emanating from the development of Stage 2 of the Upper Ramu Hydro-Electric Scheme, and its impacts on the lives of the Arona Valley people.
2.0

ISSUES RELATING TO THE PROPOSED AUTHORITY

2.1 DISCUSSION

Essentially, administrative or development authorities as such are forms of semi-autonomous administrative/political units established to take cognizance of political and developmental needs of areas and people long considered to be neglected. More often than not, political agitation leading to threats of secession, or violent acts against major resource development projects located in the respective areas and that affect the lives of the immediate communities, have resulted in the establishment of development authorities by the national government as concessions to 'appease' the communities. The Bougainville copper mining project and the Ok Tedi copper and gold mining project are both cases wherein large projects of significant impact on the nation's economy have been held to ransom from time to time in order that landowners and surrounding communities can press home their demands.

The form and structure of the proposed authority depends largely on its objectives, its environment and the different development projects and programmes to be undertaken by the authority. The issue of implementation and management of the different projects depends largely on the nature of the projects themselves.

For instance, for basically social programmes of health care and education, requiring direct participation between the target groups and programme managers and administrators, a decentralised participatory system of management and use of discretion may be a more appropriate management approach. On the other hand, in an infrastructural programme or a commercial agricultural project concerned with the development of physical facilities such as roads or factories, a control structure and the use of pecuniary incentives may be prerequisites to good management and performance.

Furthermore, in a regulatory type of programme requiring close collaboration among several public agencies, political processes and bargaining may play a more significant role.

It is argued here that the selection of the controlling board or committee members, and the staffing of the authority be made with the proposed three operational methods of management in mind. The structure of the organisation should also encompass a synthesis of these management approaches.
There are two further issues to be noted briefly at this stage. First, while the terms of reference do not include a consideration of the nature of the relationship between the authority and the provincial and district levels of government, this consultant views it as a key dimension in the future success of the proposed authority to include some discussion in respect of this relationship.

Secondly, the proposed authority may be reduced to another administrative 'white elephant', without some autonomy allowed in its decision-making powers. A brief discussion of the level of this autonomy and its exercise would be necessary.

2.2 BRIEF SURVEY OF SOME PRECEDENTS

There are precedents in Papua New Guinea for bodies such a proposed development authority. These include the Kiunga and Lake Murray Districts Planning and Development Committee and the Pomio District Development Committee.

2.2.1 Kiunga and Lake Murray Planning and Development Committee

Under the terms of the Kiunga and Lake Murray Districts Development Agreement, it is stated that:

...the State shall use its best endeavours to ensure that customary landowners in and other people originating from the Kiunga and Lake Murray districts, together with companies the majority of whose shareholders are customary landowners in or other people originating from the Kiunga and Lake Murray districts, who make reasonable applications for blocks of state-owned land within Kiunga and Lake Murray districts, are allocated such land in preference to other people or companies.

The functions of the committee within the Kiunga and Lake Murray districts include advising on strategic planning and proposing to a Minister, to be determined by the National Executive Council, the NPEP projects for funding under this agreement. Other functions require the committee to nominate a few non-voting members of the Land Board to advise the board of the views of the Kiunga-Lake Murray residents, and to nominate to the Minister for Lands non-elected members (politicians) to the Lands Board.

The membership of the Kiunga-Lake Murray Planning and Development Committee consists of members of the Fly River
Provincial Assembly, from time to time representing constituencies within the Kiunga and Lake Murray districts.

Among the funding arrangements between the national government and the Fly River Provincial Government for the Kiunga–Lake Murray Planning and Development Committee are the provisions that:

- The State shall make available for the purpose of NPEP projects in the Kiunga and Lake Murray districts, the sum of one million kina per annum for the fiscal years 1982 to 1986 inclusive.

- Any sums made available pursuant to paragraph (a) which have not been allocated to NPEP projects by the end of each of the specified years shall not be available for carry over to the next fiscal year.

2.2.2 Pomio District Development Committee

Pomio District has been generally regarded as an underdeveloped district of the East New Britain Province. Therefore, a district development committee was established as a co-ordinating body to put together development proposals for the community governments of the Pomio District, and to submit them to the provincial government for funding approval, as well as to ensure that harmonious relationships exist between politicians and public servants.

In this case, the executive officer of the committee is the district rural development officer from the Primary Industry Division of the East New Britain Provincial Government. Membership of the committee is drawn from the elected members of the provincial government representing the Pomio District, the six presidents of the community governments in the district and the national member of the Pomio electorate, as well as the district heads of extension services.

There is also a district management team which consists of six district divisional heads, or their representatives, and five assistant co-ordinators, under the chairmanship of the district manager. Its roles and functions are:

- to co-ordinate the administration of the district;
- to implement national, provincial and community government policies;
to promote an effective administrative machinery;

to co-ordinate government services and resources;

to be responsible for staff matters;

to provide regular reports to the secretary through FAS administration;

to be accountable to the secretary through FAS administration.

The two bodies are representative of the political and administrative policy and co-ordinative efforts at the district level, although ultimate sanction lies with the provincial executive of the East New Britain Provincial Government.

The organisational forms described above have been utilised to cater for district-level management and administration of types of programmes and projects directed at improving the economic and social well-being of the communities and distinct ethnic groups of people, who have either been neglected in past development efforts or who claim to be major beneficiaries of resource and infrastructural projects because they forgo the benefits of land and natural resources traditionally used to sustain their livelihood.
3.0
THE PROPOSED ARONA VALLEY DEVELOPMENT AUTHORITY

3.1 NATURE OF THE BODY

The proposed Arona Valley Development Authority could be deemed to be mainly a regulatory co-ordinating body on matters directly affecting the lives of the Arona Valley people. The first section of the terms of reference seeks to establish an organisation or an administrative structure which would encompass decision-making processes and procedures, and the composition of the membership of the organisation. The nature of the organisation will be governed in the main by the role and functions it is expected to perform and by the sourcing of funds to support its operations.

The view of the IASER Social Impact Study suggests that the proposed authority would be mainly a co-ordinating body putting together inputs from the target groups, agencies of the provincial and national governments, the district and council and the political representatives. However, if the authority is then to represent the Arona Valley people in articulating their interests and views, it should also be empowered with some degree of autonomy in formulating development policies and programmes for the Arona Valley people, whose needs in relation to the hydro scheme development distinguishes them as a category or target group for special focus.

3.2 FUNDING

It is in the area of funding that a clear definition and understanding of the relationship between the proposed authority and the existing political and administrative levels of government at the national, provincial and district levels, would be critical. The funding choices pertaining to the establishment and operating costs of the proposed authority are not as clear as the IASER study assumes. The study assumes that '...all funding would come via the Department of Finance' (Walter & Sumanop 1985:7.1). A clear understanding is needed for various reasons.

The issue of financing looms larger in terms of institutional diversity of views as to respective responsibilities. In Decision No. 195/83, taken on 1 December 1983, the National Executive Council:
approved that the land owned by the Electricity Commission for the Yonki Dam Reservoir be used by the Commission for water storage purposes;

directed that the Yonki Dam Project must be continued for next developmental stages as the project is most economically viable; and

directed the Electricity Commission to immediately fulfill its promises made to the landowners where the Yonki Dam was built and villages that are situated along or near the Yonki power transmission line.

On 22 January 1985, a meeting was chaired by the then Minister for National Planning and Development, Sir Barry Holloway, which 'determined that a program of development for the Arona Valley people should be an integral part of the Ramu 2 Project' (ibid.:6.1).

The meeting was convened in response to 'representations made to Mr Tanao (Member for Kainantu) by his constituents, expressing their concern over Elcom's plans for Yonki Dam' and also because 'Elcom are concerned about the possibility of disruption of the Yonki Dam project by the local people' (Minutes of 22 January 1985 meeting, ibid.: b.1).

The level of representation at the January 22 meeting is significant enough to warrant policy weight on its decisions. Key absentees or omissions were the representatives of the Department of Finance and the Eastern Highlands Provincial Government.

Could it then be claimed that the gravity of the issue, as indicated by the apparent mutual distrust between Elcom and the people of Arona Valley, commands sufficient weight for decisions at this meeting to bind all national and provincial government agencies in their funding commitments? This is a critical question that requires resolution before attempts are made to further raise the expectations of the Arona Valley people with regard to the expected spin-off benefits of the Yonki Dam project.

Due to lack of official sanction or explicit statement of views held by the various government agencies, this consultant is forced to assume and ascribe the following positions of each of the institutions that are and may be involved in financing the development authority and its investments in the various agricultural and commercial projects associated with the Yonki Dam project.
Electricity Commission. Elcom views its role as primarily an electric power-generating agency and not an agricultural or rural development agency. Its funding responsibilities for the proposed authority are accordingly inclined.

Department of Finance and Planning. This department views the project in two ways. Firstly, the Yonki Dam is a marginal electricity-generating project in terms of pay-back benefits when compared to auxiliary diesel generation. Therefore, capital and long-term maintenance costs should not be excessively overcommitted to Yonki Dam and its associated rural development costs, given the nation's potentially high level of external debt-servicing problems and present budget constraints.

Secondly, large budget expenditures on a specific group, such as the Arona Valley people, would distort the per capita expenditure allocations in favour of the Arona Valley people at the expense of the rest of the nation.

Eastern Highlands Provincial Government. The EHP government budget has been declining in real terms over the last four years. Representatives have expressed their support for the concept of the Arona Valley Development Authority, but refrain from committing funds. Nevertheless, certain funding options could be considered. Elcom, through project loan funding, could be fully responsible for the establishment costs of the proposed authority. Secondly, the national and provincial governments could come to some arrangement, perhaps similar to the arrangement for the Kiunga-Lake Murray Planning and Development Committee. This arrangement is structured in such a way that the Fly River Provincial Government agrees to forgo the annual budget allocations from the national budget through the Provincial Affairs Department. Those allocations that directly fund the extension functions are already decentralised to the provincial government, but in this case, further decentralised to the Kiunga-Lake Murray Planning and Development Committee. In addition, a capital works allocation of K1 million is provided to the committee with a six-year period of agreement.

A further funding arrangement could involve a combination of the above two arrangements. The Eastern Highlands Provincial Government has already appointed a committee, the Working Committee on Yonki Development, consisting of two elected members of the provincial
government from Agarabi and Gadsup electorates, one representative from the Kainantu Council, the Provincial Secretary, the Provincial Minister for Agriculture and the Assistant Secretary for Agriculture Division. The committee is to look at ways whereby the provincial government can assist the Arona Valley people. The provincial government is very concerned with ensuring that the interests of the Arona Valley people are protected as the Upper Ramu Hydro Scheme enters its next stage of development.

The provincial government intends to base one of the proposed new assistant secretaries at Kainantu, and the officer would be a likely candidate representing the Secretary of the provincial government on the board of the proposed authority. The provincial government is amenable to proposals that the authority have some autonomy in its operations.

The Kainantu Council sees no major problems to 'decentralising' some of its works responsibilities to the authority. Funding arrangements could involve some grants from the Kainantu Council and from the provincial government, with the level of funding calculated on the basis of existing funding levels for various extension services and works and maintenance services directly applying to Arona Valley. This arrangement would allow the proposed authority to enjoy semi-autonomous standing in decision making.

<table>
<thead>
<tr>
<th>Year</th>
<th>Kainantu Total</th>
<th>Provincial RIP Appropriation</th>
<th>20% Estimated Appropriation to Arona Valley</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>71,000</td>
<td>375,000</td>
<td>K 14,200</td>
</tr>
<tr>
<td>1984</td>
<td>112,000</td>
<td>625,000</td>
<td>22,400</td>
</tr>
<tr>
<td>1985</td>
<td>118,000</td>
<td>665,000</td>
<td>25,600</td>
</tr>
</tbody>
</table>


Notes: 1. Kainantu Council has other sources of income such as dividend payments from its investments in Kainantu Kaunsil Bisms, its business arm, and revenues from services such as water and sewerage.

2. RIP appropriations include untied, tied and maintenance grants to the district councils.

3. In the 1986 Budget, it is estimated that out of the total budget of K350,000 for Kainantu Council, K80,000 is expected to be paid into the Council's consolidated revenue as dividends from KNS.
3.3 ORGANISATION STRUCTURE OF PROPOSED AUTHORITY

The organisational structure of the Arona Valley Development Authority would consist of the policy and regulatory level of decision making as well as the administrative and management level, which would be directly related to the various agricultural, commercial and social projects and ventures. The structure of the authority would resemble the following organisational chart:

![Organisational Chart]

**Notes:**
1. Yonki township and its management may be handed over to the authority as it develops its own entity as an urban centre.
2. At earlier stages of the AVDA's development, the Financial Controller could oversee investment functions, but as the authority enters into more investments, a separate manager may need to be recruited.

Figure 1. Suggested Structure for Arona Valley Development Authority
3.4 SELECTION OF BOARD MEMBERS

The membership of the board of the proposed Arona Valley Development Authority, given the nature of the development programmes and the political issues involved, must be necessarily drawn from as wide a spectrum of involved agencies as possible, including representatives of the Arona Valley people, without sacrificing efficient operations and decision-making processes. Because the authority is expected to formulate development goals and policies as well as oversee their implementation, if it is to effectively represent the Arona Valley people, the political environment and administrative processes have implications for the management and running of the programmes and projects.

In considering membership of the board of the authority, several caveats should be pointed out at this stage:

- Unless sustained interest and participation by representatives of the Arona Valley people on the board is forthcoming, the work of the authority will not be meaningful to the client group. Dependence on the leadership of individuals could be subject to the vicissitudes of political winds. This may not, in the long run, be to the benefit of the Arona Valley people, unless there lies the undercurrent of cohesive political participation and aggregation of interest by the people themselves.

- Government agencies and business representatives need to be aware of their competing interests and priorities in the overall scheme of the authority's programmes of development and objectives and priorities. Their interests have to be integrated or subsumed within the authority's objectives, priorities and programmes. Resource allocation for programme and project implementation for the Arona Valley Development Authority may very easily be distorted due to conflicts of interest among individual representatives.

- Financial constraints and long-term funding arrangements need to be initially recognised and included in the proposed authority's planning and budgetary processes. Inevitably, such organisations and their underlying political, economic and social objectives, become in the end the responsibility of the national government with its associated funding problems. It is, therefore, prudent to initially recognise the national and provincial government inputs in the planning processes of the proposed authority.
The policy body of the proposed authority would be the board, chaired by the Minister for Provincial Affairs, or his delegate, and comprised of:

- a representative of the Finance and Planning Ministry;
- a representative from Elcom, preferably the manager of the Yonki Dam Project;
- the Provincial Secretary of the Eastern Highlands Province or his delegate; and
- representatives from the Arona Valley.

The Arona Valley representatives need to be carefully selected. As in both the Kiunga-Lake Murray Planning and Development Committee and the Pomio District Development Committee, the elected provincial and national representatives are included in the policy-making body. However, the community or council-level representation may be somewhat complex in the case of the Arona Valley Development Authority.

The present representatives of the Arona Valley people on the Kainantu Council have allegedly lost touch with their constituency. It is, however, crucial that the proposed authority should seek to establish a co-operative relationship with the council and the provincial government. In order to accommodate the myriad representational needs of the Arona Valley people, it is suggested that an advisory committee of both Gadsup and Agarabi people be elected to advise members of the board of the proposed authority on matters of direct concern to the two ethnic groups.

The Kainantu Council members representing the Arona Valley people, and the elected members of the Arona Valley constituency in the National Parliament and the Provincial Assembly, should comprise the Arona Valley representation on the board of the proposed authority, thus providing a majority representation of six members.

The Executive Director of the proposed authority would complete the membership of the board, making a total of eleven members altogether.

3.5 ADMINISTRATION OF THE PROPOSED AUTHORITY

The staffing of the proposed Arona Valley Development Authority should consist of the executive director, a financial
controller, administrative officer, investments manager, and three project officers responsible for agriculture, commercial and social/environmental aspects of the development programmes. These operational units, or functions, are to be directly related to the projects or business ventures etc. of the authority, in monitoring and representing the authority on the respective boards of these individual projects. The extent and strength of the representation would depend on the proposed authority's volume of investments and policy involvement.

The management of the Yonki township and the provision of services such as water, sewerage and garbage disposal could also be included in the authority's array of functions. Collection of these service charges would also be a revenue-raising activity for the proposed authority.

The staffing of the proposed Arora Valley Development Authority should be limited to the basic tasks of providing monitoring information to the executive director for the day-to-day management of the authority and the policy decisions of the board. Detailed discussion of levels of skills and remuneration are left to the board's discretion.

The administrative costs of the authority should be constrained and where expansion of staff, office, transport etc. is necessary, requirements should be carefully examined by the board in terms of the authority's programmes for development. Hiring of ancillary clerical and secretarial support staff should be under strict control of the administrative officer.
4.0

MAJOR AGRICULTURAL PROJECT

4.1 TECHNICAL AND FUNDING CONSIDERATIONS

The second part of the terms of reference calls for the consultant to make recommendations in respect of the ownership of a proposed large-scale agricultural project, and the nature of the management suitable for the project. It is the view of the consultant that this aspect of the terms of reference presents technical and funding difficulties in respect of the proposed Arona Valley Development Authority investment options.

Once again, a brief survey of the potential shareholders or investors, and sources of funding for the project and their financing capabilities, may be required.

(a) The Agriculture Bank and the Department of Primary Industry, or even the Investment Corporation, would in due course most likely be drawn in for technical and financial advice on questions of the project viability of the various crop options discussed in the IASER Social Impact Study. It could be assumed that their views would at least be supportive of a prudent approach to funding the projects.

(b) The Eastern Highlands Provincial Government business arm (Nokondi), the Kainantu Council business arm (KKB) and the management companies and agencies in the province may favour participation either through management or investment or both, but with minimum risk or exposure. The investor/manager companies seem amenable to participating in the project either as investors or managers or both. One management company has already had discussions with Elcom representatives at Yonki. This company has a minimum condition for joint venture participation, requiring a minimum of 50% shareholding as well as management fees.

The next issue is directly related to the financing issue. As yet, there has not been a thorough feasibility study of any of the proposed crops on which this consultant could make recommendations as to management and ownership. Funding and technical agencies are reluctant to commit themselves, and be held to ransom, to projects which have not been carefully assessed on their technical and commercial viabilities. Therefore, an attempt should be made to review the various crop options mooted in the IASER study.
4.2 REVIEW OF CROP OPTIONS FOR MAJOR AGRICULTURAL PROJECT

The IASER Social Impact Study suggested tea and citrus as the two possible candidates as cash crops for the major agricultural project. It seems that tea is favoured for two reasons. First, the world prices for tea are predicted to be buoyant over the next few years. Second, and a more significant factor favouring tea over citrus, is that tea has a shorter pay-back period of only five years, compared to citrus, which has a pay-back period of fifteen years or more.

However, a fully mechanised tea estate cost around K7.8 million without loan interest payments over a five- to six-year period, compared to citrus, which has an initial investment cost of approximately K1 million for a factory, excluding cost of research. A further attraction of citrus is that its funding may not be as problematic as other possible crops, as the Department of Primary Industry and the national government are presently negotiating a funding arrangement.

Other informed views suggest that tea has an advantage over coffee as an alternative crop, due to the possibility of a major coffee disease outbreak, which may destroy existing plantings and leave the Highlands region without an alternative export commodity.

It is suggested that in order to partly account for the high costs of initial investment in factory, tea production should be staged at 50 hectares in the first year, then 100 hectares in subsequent years, utilising the 600 hectares of flat land near the am site. Once maturity of the tea crop is reached in the fourth year, the factory could then be established at the estimated cost of K7.8 million. The staging approach similar to the approach recommended for citrus production will enable careful evaluation of the crop in its development in Arona Valley.

4.2.1 Citrus Production

A pre-feasibility study on the establishment of a citrus industry in Papua New Guinea was commissioned by the New Zealand Ministry of Foreign Affairs after requests had been made by the Papua New Guinea Government. The consulting team identified the Arona Valley as the most suitable site for a large-scale citrus industry development, outlining the following favourable aspects:
(a) Climate

(b) Power and water availability

(c) Close proximity to the lowlands, enabling a potential extension of the orange season

(d) Relatively large amount of suitably contoured Government controlled land

(e) Good all weather road access and good proximity to Lae.


In summary, the prefeasibility study concluded that:

Citrus is potentially a viable crop for the Eastern Highlands Province. Firstly, on smallholder, high quality fresh fruit basis, and secondly, provided yields and fruit quality are high, there may be an opportunity to develop a large scale juicing industry...The Arona Valley offers considerable opportunity for the development of a large scale citrus industry. However, the quantity and quality of available land would have to be further investigated. [ibid.:20]

In discussing possible funding arrangements, the consultants noted that:

A World Bank Appraisal Team is to arrive in PNG on August 22nd 1985, and it would be very appropriate if this report was available to them by that time. It is possible that the World Bank could be interested in funding the project as a subsidiary activity to the dam construction itself. [ibid.:28]

It appears from past experience and knowledge gained with tea and coffee production in Papua New Guinea, and from what the New Zealand consultants say about citrus production, that smallholder production and participation by Arona Valley people in all three of the proposed crops require greater care in management and marketing, as well as production.

There are those who are well-informed on tea production who feel that the nucleus estate concept is viable in Arona Valley (600 hectares) if, as one of the conditions of the viability, a smallholder tea production can be managed by an experienced person recruited by the Department of Primary Industry. This
view could also be extended to hold true for small-scale coffee production, and even more so for citrus.

Both tea and coffee have an added advantage over citrus in that they are proven quality products (exports) of Papua New Guinea on the world market, whereas citrus would have to undergo this hurdle of market acceptability.

The IASER study did not recommend coffee as a candidate for a major crop in Arona Valley, on the ground of funding difficulties and a world scenario of excess production. However, coffee is seen by some experts as having desirable features, one of which is that the local community is used to coffee as a crop, and its production on plantation and smallholder scales would suit the existing scheme of things.

Coffee would not require a major investment in initial infrastructure, as marketing and management infrastructure already exist in Kainantu. Furthermore, the recent round of talks between officials from the Department of Finance and Agriculture Bank and representatives of the World Bank, held in Washington, D.C. in August 1985, indicated a softening of attitudes by the World Bank on funding extensions in coffee production.

The issues of ownership and management of the proposed major agricultural project are directly related to the type of crop being considered. This is especially so when considering such cost differentials as those indicated for tea and citrus, as well as differences in marketing and management requirements. The consultant is constrained to recommending ownership and management structure for the crop which presents the 'least risk', that being coffee. This does not preclude further studies being carried out on tea and citrus propositions, however. Furthermore, due to possible independent funding arrangements, citrus production should continue to be pursued as a complementary agricultural crop in Arona Valley.

4.3 PROPOSED ARONA VALLEY COFFEE DEVELOPMENT COMPANY

The participation of the Arona Valley people in the proposed coffee development company could be arranged in two different ways. The Arona Valley Development Authority should hold 50 per cent of the company. Smallholder coffee holdings now being promoted by Elcom through the distribution of seedlings could allow village people to participate by selling their coffee beans to the company factory. While it is best to allow the smallholders themselves to decide how best to structure their ownership, discussions with those involved in coffee business
regard a family-based holding as having a better success rate than a community or clan-based ownership structure. The experience in smallholder crop businesses has shown that difficulties could arise from land disputes and management problems.

4.3.1 Estimates of Investment Costs

The investment cost for a dry- and wet-processing factory catering for a 600- to 1,000-hectare coffee plantation has been estimated to be K1 million. Development costs per hectare are estimated variously to be from K4,000 to K5,000 at present prices. The specific type of coffee crop recommended by some experts is the catura dwarf coffee which takes two years to reach production and which yields 3.2 to 3.5 tonnes per hectare. Because it is densely planted, it tends to crowd out weeds thus reducing operating costs.

In assessing the potential number of smallholder coffee producers, this consultant believes that there could be difficulties in establishing a large group of smallholders. One reason for this view is that those able to form small businesses may not necessarily regard cash cropping as an attractive way of investing their land, labour and capital. Of the estimated fifty business groups registered in the Arona Valley area, approximately one third may be able and willing to invest in cash crop production, according to informed industry and local sources.

Therefore, in assessing a total initial investment cost for Arona Valley coffee development and production, including K1 million for factory and equipment, the total funding requirements stand at around K5.5 million, broken down as follows:

<table>
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<tr>
<th>Description</th>
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<tr>
<td>400 hectares smallholder coffee</td>
<td>K1,800,000</td>
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<tr>
<td>@ K4,500/hectare development cost</td>
<td></td>
</tr>
<tr>
<td>600 hectares plantation</td>
<td>2,700,000</td>
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<tr>
<td>(nucleus estate)</td>
<td></td>
</tr>
<tr>
<td>Dry- &amp; wet-processing factory</td>
<td>1,000,000</td>
</tr>
<tr>
<td><strong>Total estimated capital cost</strong></td>
<td><strong>K5,500,000</strong></td>
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</table>

**Note:** Assumes 20 hectares smallholder blocks with up to 20 smallholders.
4.3.2 Sources of Funds

Excluding estimated smallholder investment costs of K1,800,00, the proposed Arona Valley Development Authority would be required to contribute an initial capital of approximately K1.85 million to the nucleus estate and factory costs, as equity capital. As discussed above, possible sources of funds for the proposed authority's equity capital could include loan funds from Agriculture Bank, Elcom's project finance, small agriculture development funds and even perhaps the Investment Corporation.

4.3.3 Company Structure, Legal Entity and Board Membership

The proposed Arona Valley Coffee Development Company could be a limited liability company. Under normal circumstances, the board of the company would consist of the shareholders. However, as equity for the proposed Arona Valley Development Authority is most likely to come from government finance institutions, a director of the board could be drawn from the lending institution. The board membership could therefore include one representative from the investor/manager company, one or two representatives from the lending institutions, and the executive director of the proposed authority, who could serve as chairman.

4.3.4 Ownership of Proposed Company

The proposed Arona Valley Development Authority should decide on the issue of shareholding and ownership of the proposed coffee company at their earliest meeting. If it chooses to allow only one other investor, then a 50-50 ownership proposition would meet the minimum shareholding requirement of a manager/investor company such as Angco Development. However, if the board decides for the Arona Valley Development Authority to be a majority shareholder, then any range of options for ownership are possible.

This consultant advises minimum exposure at the earlier stages of the project's development, with options to gradually gain majority shareholding as the financial base of the proposed authority improves. Of course, majority shareholding by the authority is still possible if it retains 50 per cent or more of the ownership and allots the remainder to other investors.

4.3.5 Management of Proposed Company

There are possibly four resident management companies in the Eastern Highlands that could well manage the proposed coffee
company. These include Angco Development, the National Plantation Management Agency, Gouna and Collins Leahy. However, serious thought should be given to a shortlist of NPMA and Angco Development, in view of their 'local knowledge' in the Kainantu area; in this regard, NPMA seems to be the frontrunner. The critical factors for management are competence and proven ability.
5.0

RELATIONSHIP BETWEEN THE ARONA VALLEY DEVELOPMENT AUTHORITY AND THE ARONA VALLEY COFFEE DEVELOPMENT COMPANY

The relationship between the proposed bodies (AVDA and AVCDC) should be strictly a business one. The IASER Social Impact Study envisages a relationship whereby 'ultimately the income from the [company owning the large-scale project] will be the major source of development funding' (Walter & Sumanop 1985:7.2).

Care must be taken to understand the operative word in this relationship: 'ultimately'. The view held by the IASER report that the agricultural project would provide cash flow for the development authority to utilise in funding further social and economic development projects could run the risk of exacerbating the problem of 'raised expectations'.

Firstly, it may take a few more successful investments by the proposed development authority, as well as a few more years of consolidation for the coffee project, before a sound base in investment funds is established to enter into expenditures on a wider array of social projects and subsidised business ventures for the Arona Valley people.

Secondly, a realistic scenario may involve the first five years for loan and interest repayments, the second five years for further investments in other commercially viable projects, and possibly the following five years for expansion in developmental-type activities.

A distinction has to be made by those on the board of AVDA between social infrastructure-type projects, whose funding could be initially sourced from the various government agencies responsible for such activities, and investment in income-earning ventures for the AVDA's future cash flow. In other words, total reliance on the major agricultural project to initially implement the development authority's master plan for Arona Valley may also spell its doom.

The Arona Valley Development Authority project officer for agriculture could usefully occupy his time by performing the duties of a monitor of the day-to-day operations of the coffee company, and reporting to the Executive Director of the AVDA. With the manager of the coffee company, the project officer could also liaise with rural smallholder coffee producers and ensure that problems relating to their marketing and production are attended to, or are referred to someone who may resolve the situation.
The level of communications and reporting should be between the Executive Director of AVDA, the board of the company and the board of AVDA. Individual board members of AVDA should refrain from involving themselves in the management and operations of the company, unless otherwise decided by the entire board.

The above views need no elaboration in respect of sound business management and inter-organisation relations.
6.0

CONCLUSION

In fulfilling the requirements of the terms of reference for the study, this consultant has attempted to highlight the concern for existing and future constraints on funds. In this respect, the proposed creation of the Arona Valley Development Authority should not burden the national or provincial governments with demands on financial resources that compete with other existing institutions and agencies already providing similar services in the Arona Valley.

Furthermore, the proposed development authority should not commit itself to new expenditures that it may not be able to sustain in the coming years, thereby offloading the cost burden to other agencies.

Closely related to the prudent planning of the development activities of the proposed authority is the necessity for close collaboration with established business institutions and levels of administrative authorities. This would allow for exchange of views and co-operative approach to resolving the specific problem that may arise with the development of Stage 2 of the Upper Ramu Hydro-Electric Scheme.

The legal framework for the proposed development authority needs to be carefully worded to ensure that the authority can borrow funds for investments.

The major agricultural project could provide the basis for an independent revenue source for the proposed authority. It should be regarded as having a separate legal entity by the authority. The lessons of many provincial development corporations with undefined political and commercial boundaries in their management are only too obvious to put forward as warning.

The prospects of increased economic opportunities for Arona Valley are bright. The creation of the Arona Valley Development Authority, with the caveats mentioned above, could go a long way in ensuring that the opportunities are directed first to the benefit of the Arona Valley people, who stand to lose the most in terms of their traditional resources.
Honourable Lennie Aparima, MP for Abura-Waninara
Barry Corrin, General Manager, Kainantu Kaunsel Bisnis, Kainantu
Mike Gedde, Assistant Manager, Agriculture Bank, Waigani
Philip George, First Assistant Secretary (Budgets), Department of Finance and Planning, Waigani.
Grant Hoffmeister, Generation Planning Engineer and Elcom Officer co-ordinating Ramu 2 Feasibility Study, Elcom, Hohola.
Sir Barry Holloway, Regional MP, Eastern Highlands
Russel Ikosi, Legal and Corporate Services, Department of Provincial Affairs, Waigani.
Andrew Kealaua, Yonki Dam Field Co-ordinator
Bill Lloyd, Angco Development, Goroka.
Ian Morris, Assistant Secretary (Loans), Department of Finance and Planning, Waigani.
Rex Naug, General Manager, National Plantation Management Agency (NMPA), Goroka.
Honourable Avusi Tanoa, MP for Kainantu Open
Yangau Uyassi, Provincial Secretary, Eastern Highlands Provincial Government, Gorka, and Chairman, Nokondi Investments Pty Ltd.
Udai (Vahnu) Vaansingh, Senior Staff, NMPA, Kainantu
Michael Walter, IASER, Waigani.
Tom Watson, Manager, Kainantu Council, Kainantu
Alan Whitworth, Department of Finance and Planning, Waigani.
John Wilkinson, Branch Manager, NMPA, Kainantu.
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Department of Primary Industry (Port Moresby) and the Department of Foreign Affairs (Wellington), 1985. 'Citrus Industry Establishment in Papua New Guinea: A Prefeasibility Study', Port Moresby.


A TEA PROJECT FOR THE ARONA VALLEY

By

J.F.A. Rigby
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MAP ELCOM'S LAND PURCHASE AREA IN THE ARONA VALLEY
The purpose of this prefeasibility study is to determine the practicality of establishing a large-scale tea project in the Arona Valley following suggestions detailed in para 6.2 and 6.3 in the IASER Social Impact Study of the Yonki Dam. The following areas should be covered:

- Commentary on the present world tea market or likely directions in the future short, mid-, and long-term.
- Commentary on the present situation of the Papua New Guinea tea industry and its prospects.
- Description of the possible options for a new large-scale tea venture (including consideration of estate and/or smallholding, different types of harvesting, nature of planting material).

The consultant should, after consideration of the different options, state his own recommendation giving his detailed reasons.

- Requirements of the consultant's recommendations in terms of climate, soil, minimum land area, infrastructures, labour, and marketing.
- Extent to which the Arona Valley situation can meet these requirements - all specific advantages and disadvantages should be stated.
- Total funding requirements of establishing the consultant's recommendation in the Arona Valley. A cash flow should be provided based on three projected average prices for tea (pessimistic, realistic, optimistic).
- Recommendations for the nature of management.
- State any particular problem areas known for tea (a) generally, (b) likely to occur in the Arona Valley.
The consultant should make clear his overall recommendation on the practicability and advisability of setting up a large-scale tea project in the Arona Valley.

Note: If the consultant perceives any ambiguities in the above terms of reference or has any other queries regarding what is required of him by them, he should immediately resolve them with the IASER action officers for the project.
SUMMARY AND OVERALL RECOMMENDATION

I take as reference for this study Elcom's consideration of the possible provision of a form of compensation for the displaced landowners of the Arona Valley should the Yonki Dam Project go ahead.

It is thought that maximum benefit should be given to the people, not only to the previous generation who lost the land to Elcom in the form of purchased leasehold areas, but to the present and future generations of younger people. Such compensation, if given in the form of cash or goods, would rapidly dissipate and in a few years' time, no doubt the government would be approached with renewed claims for compensation from younger generations claiming that either their families had not received any of the original benefits, or that at that time, the land was valued at much less than at the time of this new claim; and that the government should pay up the difference or the dam would be closed by them, or whatever.

It is envisaged that such benefits could best be given by setting up some form of self-perpetuating compensation, with indirect but long-lasting and accruing benefits to everybody, with spin-off support for other agricultural efforts in the area and also in the surrounding district, and of course, a great enhancement in foreign exchange earnings also, from the agriculture sector.

No one could disagree that this type of idea far outweighs any other scheme which might be mooted for the compensation of these people, knowing their cultural background and propensity for disposing of money or goods in quick order. Support for large-scale agricultural projects to be run commercially, and for the eventual benefit of not only a single community but the country as a whole, can only elicit support and acclaim from organisations such as the World Bank and IMF which are critical about the way in which international money is spent within the country.

The question is: will tea be the best and most suitable agricultural crop for this task?
Tea is a long-term crop. Once planted and looked after properly, it will last for generations, and continue to crop prolifically.

On current indications, it would not appear that tea will return to the terrible doldrums in prices that affected the industry in the past. Current indications are that prices will be maintained at a reasonable level for good-quality tea. Whether these tea crops are produced at a price which allows for sufficient profit is the responsibility of management and the technology available to them. It also requires the support and encouragement of the government of the day, who will benefit from foreign exchange earnings.

Tea in the Arona Valley will provide good training facilities for young managers and supply the management infrastructure for the setting up of smaller local industries such as citrus orchards, other fruit and vegetables.

It would give an industry which would not be controlled by political bodies or be subject to abuse or influence by persons without knowledge of the industry. It would be a self-controlled, self-run business reporting to the board of the Arona Valley Development Trust, but not run by it, and thus free from resource draining financial or other requests until in a position to be the main support of the Trust in future years.

In this respect, in its eventual role as the Trust's main source of revenue, it will become a powerful and dependable resource, far more so than any other comparable industry. By encouraging smallholder and other satellite tea production, and eventually extending its facilities, it will not only enlarge its support for the Trust, but will also bring a great deal of benefit to other local clans in the Kainantu District.

Kainantu, of which Yonki is a part, is noted as a coffee town. Should anything happen to the coffee industry in the Highlands at any time in the future, the establishment of tea as a ready-made alternative would render enormous aid to the economy of the area, and of course, because of this, alleviate a great deal of pressure on future governments.

As already discussed, the Yonki area would provide a good site for a major tea development project, being close to the highway
yet sufficiently removed to give less problems from migrating elements, and close to the nearest port at Lae which will reduce transport costs and associated problems.

The climate required is there, with sufficient rainfall, and there should be no problems in this regard.

The soil is slightly alkaline but this can be easily remedied, and natural plant indicators are widespread in the area. Soil would in any case require rejuvenation for whatever crop was to be put out - long-term running of cattle on ground does not help prepare it for other agricultural crops, as has sometimes been maintained.

Should there be a long period of drought an adequate source of water would be available, offtake of which would in no way prejudice the dam requirements.

Suitable management is available within the country, indeed already virtually on the spot, involved in allied developmental work aimed at the same populace.

There is a deep and as yet apparently unrecognised need for an alternative to coffee within the Highlands. This would provide such an alternative, not as an untried newcomer, but as an extension of an already established industry which has unhappily in the past had to suffer the vagaries in prices which future developments of the right nature do not seem destined to experience. It is a crop which is largely mechanised and run by modern technology, which, with the rises in labour costs in this country, is needed, but at the same time can give expanded rural employment through dedicated rural development officers setting up smallholder projects.

Tea is a crop which is wholly processed and sold as a finished product of quality renowned worldwide, as opposed to other crops which may require being sold partly finished or which may have to be the subject of long working-up periods or experimentation, and will need costly inputs of major capital amounts.

It is recommended that a primary 50-hectare block of tea be put up, as I have shown in the Work Progression Section, with a dual purpose. Firstly, this block will make the project self-sufficient in the production of VP material for the
nurseries, and continue to produce such material if required. FOC for smallholders, and secondly, will provide an adequate indication of results to be expected overall on the project, before large capital amounts have to be committed in the fourth year.

The overall recommendation of the writer is that of all alternative crops available, tea would appear to be the best suited to such a large-scale project. Given the detailed reports in the various sections of this document, I feel that tea would be a viable and productive crop capable of fulfilling the requirements of such a project as outlined – I believe correctly – at the beginning of this section.
1.0

WORLD MARKET TRENDS

The world pattern for tea production and consumption has undergone considerable change within the past decade or so. It can be anticipated that further changes will occur. The image of tea as an everyman's everyday drink which has risen in price negligibly over the years, has increasingly come under pressure in world market terms. The beverage market has and continues to be ever more competitive.

For tea to compete, its image has had to be revamped to fit consumers' modern lifestyles within the traditional consumption countries such as the UK. It will be necessary for tea to keep pace with other beverages such as coffee in order to preserve and enhance its attractive 'trendy' image in such countries. While consumption has declined slightly in countries such as the UK where competition is fierce in the beverage market, there has been a corresponding increase in the popularity of tea in countries such as Kuwait, USSR and Saudi Arabia, whose populations are rather more conservative.

For many years the price of tea to the consumer remained at an almost stagnant level, and it is only comparatively recently that the price on the average supermarket shelf has started to rise as inflation hits other everyday food products. This has had a healthy effect on the world market generally, and whilst there is an indication that previous rises and falls in profitability have sometimes had an extremely bad effect on producers, this more recent trend, together with other factors, will have the effect of maintaining the profitability at an acceptable average level in years to come, with certain provisos.

One of the main influences on future profitability will be the exporting policies of countries such as India and China. These two countries alone account for approximately 50 per cent of world tea production (1983 Statistics) and 47 per cent of world population (1982 UN Monthly Bulletin of Statistics).

Major changes have occurred in the statistics covering the major importing and exporting countries over the past decade.

Tea production needs to increase at approximately 6 per cent per annum to keep pace with world population growth, given that an equal share of the current beverage market can be maintained in favour of tea.
Many plantations and countries with aggressive development plans will fail in their attempts to expand their productions, due to unfavourable financial lending climates, poor planning, unsophisticated technology, and other reasons. Those who will survive will be producers of quality tea, that can always be sold at a fair and reasonable pricing level.

This has been illustrated by the fact that despite declining demands from traditional markets such as Australia and the United Kingdom, Papua New Guinea teas have so far enjoyed good popularity.

There are many direct and indirect factors that can affect market trends. These can range from war, through natural disasters such as drought, to government export policies, such as recently seen in India.

CTC production is expanding. Ceylon and China, until now producers of mainly orthodox tea, are expanding their CTC production programmes. This, coupled with Kenya's massive increase in production of this more popular type of tea will have quite an effect on future trends.

Nevertheless, this does not necessarily suggest that the market for CTC teas in future will be limited rather the reverse, in fact.

All the above points highlight the fact that an individual estate's profitability depends entirely upon the success of quality production suited to the demands and requirements of the market at which their production is aimed. This alone will control it's viability and profit levels.
2.0

EXISTING PAPUA NEW GUINEA TEA INDUSTRY

It is not thought relevant to give a complete rundown of the origin and conception of the tea industry within the country. I have therefore confined my comments to the situation presently prevailing, particularly with reference to returns.

The tea industry is confined mainly to the Western Highlands, where profitable operations are centred on the plantations in the tea industry referred to as (usually 'estates'), run by W.R. Carpenters, and more recently by Warrens, in the vicinity of Mount Hagen.

Some activity was started in the Southern Highlands, but even though wages paid to the large numbers of labour employed were less than half of the existing minimum wage at the time, due to the unprofessional approach taken in the setting up of the project and the lack of technical expertise, it has yet to prove itself.

These latter points are very relevant when considering any involvement in an industry such as tea. There is absolutely no room for amateurism or general enterpreneurial approaches. There is no room for cutting costs by using less advanced technology or layouts. Any such approaches can lead to the most drastic losses in a crop which is both highly competitive and subject to sudden fluctuations in general demands which require that the highest possible economic standards be maintained. One would not, for instance, dream of starting a computer service industry using even five-year-old computer models as a base.

Table 1 shows details of the country's annual crop since 1966/67 to 1983, and in Table 2, the percentage export details of one of the country's largest producers, to their various export markets, shown in terms of FCLs'. From these it may be seen that the preponderance of exports has favoured Australia. Although in general decline for consumption per capita of population, Papua New Guinea teas continue to gain popularity there.

Certain recent and future factors may, however, affect this. Two of the biggest buyers of Papua New Guinea teas are Bushells and Liptons, which have now merged under Unilever, and this may have a depressant effect on the market. Nerada Tea is now upgrading their facilities, and it is expected that by the
early 1990s this could reach as much as 10 per cent of the internal market. Additionally, 'filler' teas imported to blend with Australian production for direct sales in the internal market will be at the expense of Papua New Guinea teas imported by the established blenders.

The effect of Warren's expansion and takeover of the Kurumul plantations in the Western Highlands, will mean an increase of productivity and quality in all probability, and this will add further competition with Papua New Guinea. However, there is evidence of increasing popularity of tea within this country, and the expected rapid rise in population over the next ten to twenty years will have a great effect on the tea industry as a whole, opening up a gap for further production to meet increasing consumers without affecting the existing export market.

There is, without doubt, room for a dramatic expansion on the export market into areas such as Eastern Europe and the Middle East. Kuwait is the highest consumer of tea in the world in terms of cups per head of population. Eastern Europe offers possibilities of cheaper fertilisers amongst other things in return for tea imports.

The key to the profitability of the world tea industry, and to a great extent tea in Papua New Guinea, lies with the world supply and demand situation. This is controlled mainly by India, and to a lesser extent by China. If India holds to its restriction on exports designed to safeguard supplies to the ever-expanding Indian domestic market and retention within that country remains at 6 per cent per annum, the world tea market prices must respond upwards, as they have done over the last two years. Growth in world demand must be driven by the expansion in world populations, and this is, to producers' good fortune, centred in those countries that are major tea producers, and this will help to safeguard relatively minor new projects in countries such as Papua New Guinea.

There is, on the international beverage market, great competition amongst the producers of tea and coffee. Tea remains extremely good value in relation to coffee as most people will be aware - the price of a cup of coffee is generally at least twice that of a cup of tea in most catering establishments.

Another consideration is that expansion of existing tea acreages in high-producing countries is largely limited by lack of availability of suitable land. With rapidly burgeoning populations, land of any sort is at a premium. This point lies in our favour.
Overall, it is felt that whilst there might be some rise and fall in market prices over the next few years, which is a traditional feature of tea sales over the decades, there is little likelihood that the industry will suffer such a glut as that which has affected it in the past, particularly when considering quality teas which, regardless of general market conditions, can always be sold. Due to rising world populations and increased domestic consumptions in many high-density countries, due in part to increased per capita incomes (although variations in prices from year to year will continue), the likelihood of a drop into uneconomic levels for long periods is very unlikely.

Table 1

Total Annual PNG Crop (Made Tea) 1966/67-1983/84

<table>
<thead>
<tr>
<th>Year</th>
<th>Metric tonnes</th>
<th>US$ value*</th>
<th>US$/tonne†</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966/67</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1967/68</td>
<td>39</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1968/69</td>
<td>289</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1969/70</td>
<td>692</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1970/71</td>
<td>1,169</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1971/72</td>
<td>1,803</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1972/73</td>
<td>2,792</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1973/74</td>
<td>3,966</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1974/75</td>
<td>4,465</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1975/76</td>
<td>4,836</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1976/77</td>
<td>6,057</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1978</td>
<td>6,979</td>
<td>11,050,000</td>
<td>1,564</td>
</tr>
<tr>
<td>1979</td>
<td>6,978</td>
<td>11,217,000</td>
<td>1,607</td>
</tr>
<tr>
<td>1980</td>
<td>7,914</td>
<td>12,690,000</td>
<td>1,603</td>
</tr>
<tr>
<td>1981</td>
<td>5,959</td>
<td>10,605,000</td>
<td>1,524</td>
</tr>
<tr>
<td>1982</td>
<td>6,475</td>
<td>9,061,000</td>
<td>1,399</td>
</tr>
<tr>
<td>1983</td>
<td>7,234</td>
<td>12,458,000</td>
<td>1,722</td>
</tr>
<tr>
<td>1984</td>
<td>n/avail.</td>
<td>n/avail.</td>
<td>1,883</td>
</tr>
</tbody>
</table>

* data not available

† Future prices: it is difficult to estimate price trends, but if taken at three levels, i.e. poor, medium and the optimum, it is anticipated that to 1990, the figures would approximate as follows:

Poor - US$1,450 per metric tonne
Medium - US$1,600 per metric tonne
Optimum - US$1,750 per metric tonne
Table 2

AREAS OF SALES/EXPORTS

<table>
<thead>
<tr>
<th></th>
<th>FLCs per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>30</td>
</tr>
<tr>
<td>New Zealand</td>
<td>4</td>
</tr>
<tr>
<td>Pakistan</td>
<td>3</td>
</tr>
<tr>
<td>Middle East</td>
<td>2</td>
</tr>
<tr>
<td>UK &amp; USA</td>
<td>2</td>
</tr>
</tbody>
</table>

Note: PNC teas comprise 65 per cent of all teas used for tea-bag production within Australia.
3.0 OPTIONS FOR A NEW LARGE-SCALE TEA VENTURE

3.1 INFLUENCING FACTORS

The options that present themselves concern mainly the way in which the proposal is approached.

The three main factors that most influence the results of such a project are as follows:

(a) (i) type of field lay-out;

(ii) planting material used;

(b) Type of harvesting;

(c) Type of manufacture.

We will deal with each of these points, numerating their merits and disadvantages, with the options available.

3.2 FIELD LAYOUT

This can take three forms (i.e. options):

(a) full nucleus estate;

(b) combination of full estate with some smallholdings;

(c) smallholder blocks, with simply a factory as the nucleus processing unit.

In order that the merits or otherwise of each of these proposals may be assessed, it is essential to ascertain what the requirement actually is for the area, and to obtain some background on the socio-economic structure already existing.

From study of the research already undertaken by IASER, it would appear that the density of population for the area is comparatively low. In addition, it would seem that much of the able-bodied workforce will be absorbed in due course into work associated with the dam construction and various other projects.

I would appear, therefore, that the accent should rest on maximising the mechanisation of the project.
At the same time, the whole nature of the project would appear orientated towards provision of a secure income to assist the cash flow in the future years of the Arona Valley Department Trust Pty. Ltd., which will in effect be safeguarding the futures of the valley's present younger generations. It appears in fact to be an admirable method of providing an alternative to the undesirable cash compensation system which is causing such a number of problems in the country at present.

The full nucleus estate would operate as an independent unit, professionally managed from inception to production and marketing. There would be no chance of political or other influence which would damage its chances of success, should a large number of smallholders be involved in day-to-day management. However, it would not give any opportunity to smallholders to participate in the industry, and whilst it would inevitably be an excellent supportive arm of the Trust, it would virtually be closed to the local population.

The option of having a series of smallholder blocks within the valley leasehold area may at first seem attractive. There would be complete participation by local villagers who would be given the option of farming blocks on leasehold land formerly owned by them, working under central management from the factory.

In practice this would not work. Firstly, there would be too few family units available to maintain upkeep of the blocks due to demand for labour from other dam-related work. Secondly, from what I have learnt recently, it would appear that any attempt to settle local villagers on the leasehold land would inevitably bring on land disputes between the two local clans as to who should have how much of the available space.

There is another option - that the nucleus factory only should be on leasehold land, the smallholder blocks be on traditional land, and the large portion of lease land left be devoted to another crop. This, however, would not be a practical solution, as the minimum required acreage for the set-up envisaged could not be met from the land I sighted in the vicinity of the project.

The last option of having a full estate with extension later to suitable smallholdings would appear to be the best for the area.

This would ensure proper adherence to the high discipline necessary in the state-of-the art project that will be required to produce the type of teas for which a market should be readily available at all times.
It would simply not be possible to enforce such discipline on a totally smallholder project.

A full estate scheme would operate within the strict management parameters required, over which full control of crop output could be registered. It is very difficult to force smallholders to pick the crop if they simply do not feel like doing so, and the future of any such project would be dependent not only on quality, but also upon a steady outflow of crop that can be reliably estimated.

Where smallholders could feature is in peripheral developments as the project progresses. There is no reason why cash purchases could not be made from smallholders. The smallholdings could be operated in a number of different ways. Either they could be a sub-operation of the main project with management by the full estate, or as a casual cash crop (not desirable); or probably the best option would be for suitable areas of land to be identified, assistance to some extent given by the main project, the day-to-day supervision taken over by a manager to be specially employed by, say, the DPI. Such a scheme worked quite successfully in the Kindeng Blocks at Mount Hagen.

The situation would be rather different at Yonki, but the scheme could be adapted. After examining the whole area of Kainantu, I am impressed with the amount of land that appears at first sight to be eminently suitable for tea cultivation. There would appear to be no reason why large areas of land could not be converted to tea cash cropping and the factory at Yonki enlarged to cope with this in the future. I understand that tea leases were granted in one or two areas of the Kainantu District, but were never taken up seriously.

This combined option would ensure that not only would the central project run smoothly, but also, any family unit in the area not involved in working on other projects would have the option of limited participation in the overall scheme of things.

Also, if the smallholdings were enlarged to cover areas other than the land encompassed by the two clan boundaries, it would benefit those clans by purchasing tea and converting it into cash which would enter the main Arona Valley Development Trust's cash flow. It would also benefit other clans in the Kainantu District, and last but not least, it would provide an alternative crop to coffee, on which the area seems very dependent upon.
3.3 PLANTING MATERIAL

There are two methods of utilising planting materials:

- seed
- vegetative

Seed nurseries have been the norm in the past in many countries, and still continue to be so in those that are relatively unenlightened or do not have access to either modern technology or management skills. They are in a minority.

The establishment of seed nurseries, or establishment of plantations by planting out seed at stake, is relatively fast but without selection of planting material quality.

Vegetative propagation has been refined over a number of years to produce clonal teas of specific qualities. There are a number of such teas internationally categorised and recognised for the production of teas for both quality and quantity (yield). It has been irrevocably proved that such teas give superior yield of proven quality with resistance to disease, pests and drought, according to their varieties.

The obvious option would be to establish an initial clonal vegetative production area, using clonal material from sources such as Southern Highlands and the Kuk Tea Research Station in the Western Highlands. From this area would be harvested vegetative material sufficient to provide plants to cover the project area at the rate of, say, 100 hectares per year.

Seed is genetically weak, being markedly heterogenous (diverse in character) with respect to such important characteristics as potential yield, disease resistance and manufacturing quality.

3.4 HARVESTING

Once again, three options present themselves:

- labour
- mechanical
- combined labour/mechanical
Labour harvesting is obviously labour-intensive. The current labour usage on plantations in the Western Highlands average 8.5 man-days per hectare for manual harvesting.

This would necessitate a resident labour force of some 2,000 persons for harvesting alone. Not only would the local population be unable to provide such numbers, but the management of such a force with the associated problems of absenteeism etc. would be a continual problem.

Were the labour to be drawn from outside the area, there would be a serious imbalance among the local population, particularly with regard to wantoks which the police seem unable nowadays to control, resulting in major social problems for the whole area.

Mechanical harvesting has been found to be the most practical solution in other tea-producing areas in this country as well as elsewhere in the world. It does however, require flat or gently sloping ground for the larger and more economical machinery. From my inspection of the proposed project site areas, it would appear that they comply with this requirement. There will inevitably be small areas along the edges of the main project which may need 'finishing off' by a small manual labour force, but these areas could also be converted to mechanical harvesting using two-men hand-held harvestors.

Mechanical harvesting is economic, efficient and cheap compared to full manual harvesting. Labour is erratic and absenteeism would result in crop losses with harvesting rounds not being correctly maintained. In the past, the inability to keep up regular picking rounds has resulted in varying standards of harvested crop which in turn has affected the outturn and quality of manufactured leaf.

\[
\text{Cost of mechanical harvesting} = 0.010 \text{ toea/kg leaf} \\
\text{Cost of manual harvesting} = 0.040 \text{ toea/kg leaf}
\]

This sort of disparity can mean the difference between a viable operation and a loss, given the quantities being harvested.

A combined labour/mechanical situation would arise only if it was decided to bring in smallholders as a peripheral operation, apart from a small amount of 'finishing' on the major project areas.

The amount of hand-picked leaf would also vary according to the size of individual smallholdings, and the type of management opted for.
If an overall management of smallholdings were adopted, with responsible persons supervising operations, then it should be possible to use two-men harvesters, cropping from each smallholding on a rotation basis, with the supervisory unit operating from a central base. Leaf picked on each smallholding would be recorded in a ledger, and upon sale at the factory door, each smallholder would be reimbursed for his crop by their management unit. This would ensure that the crop harvested from such blocks would be of an acceptable quality, although obviously in any situation, the factory manager would be the judge of this and would reserve the right to reject leaf of an unsuitable quality.

Whether management of the smallholders would be an integral part of the main project or be the responsibility of, say, the Department of Primary Industry, would be a matter to be decided later.

Let it be said at this point, as I have mentioned briefly earlier, that from my inspection of the whole of the Kainantu District, it would appear that there are many thousands of hectares of eminently suitable land which could be brought under tea production, and linked to the main project, to its benefit.

These areas could be brought in as peripheral smallholdings on traditional land, larger areas could be alienated, and leased to the traditional owners with a shareholding by the Trust.
This has been requested in terms of recommendations for:

- climate
- soil
- minimum land area
- infrastructure
- labour
- marketing.

4.1 CLIMATE

Except in very general terms, it is difficult to specify the ideal or the average climate that tea requires, especially in respect of rainfall distribution.

The type of rainfall distribution is an important factor in assessing rainfall requirements and prevailing temperatures are an additional conditioning factor. Here, too, the elevation is an important characteristic in modifying transpiration losses.

Tea requires a minimum of 1,000mm of rainfall per annum regardless of all other factors, with a ceiling of between 4,500 - 5,000mm.

Rainfall records available from Kainantu and Aiyura, which have been kept for a number of years, show the average rainfall per annum would fall within the required range.

Temperatures range from 20 degrees centigrade to 30 degrees and tea therefore is suitable as a crop in regions having moderate to high rainfall patterns in excess of evaporation and which maintain equable temperatures linked with higher humidity ranges throughout the greater part of the season. These then will be equatorial regions at high or low altitudes and semi-tropical areas with summer rains to modify excessive temperatures.

The Yonki area would appear to meet these requirements.
4.2 SOIL

The tea plant thrives on soil of practically any texture, apart from limestone soils or on soils which have recently been flooded with largely alkaline matter.

Having said this, the tea plant, without doubt, does best on light or medium loams. Tea prefers soils with a low lime content and a higher acidity, providing this does not fall below 4.5 on the Ph scale, with an optimum of between 5 and 6 Ph.

The Ph value of a soil denotes the concentration of hydrogen-ion in the soil solution. This ion, if present beyond a certain concentration, produces acidity. A Ph value of 7 denotes neutrality, and the lower the Ph value, the less the alkalinity and the greater the acidity.

Therefore it can be said that of the chemical characteristics of the soils, the one of dominant importance is that of reaction. Beyond 6.5 Ph, tea will not grow with any success.

Where such high alkalinity is met, it is possible to chemically treat soils to reduce their alkalinity, or to engage in fertiliser programmes which will adjust acidity levels successfully over a period of time.

There has been some speculation in the past with regard to the methods of assessing Ph values. It has been noted that there was a drop in Ph values when soils were suspended in neutral salt solutions when compared to those in water solutions.

It has also been noted by past work that tea has a high proportion of calcium in its analysis, and that the available aluminium status of the soil is a diagnostic characteristic of a good tea soil. In this regard, clay fractions of acid soils are usually aluminium clays and not hydrogen clays.

While soil analyses are desirable and indeed essential, past experience in many countries has shown that there are a number of natural field indicators that can be used to assess suitability quite accurately. Of the many different plant varieties, two which occur in this country are Albizias and Bracken, which are an example each of ground growth and tree growth. Both of these plant indicators grow abundantly in the areas under consideration in Yonki.

Were it to be decided that soils on the proposed site needed acidic adjustment, a programme could quite easily be instituted. In the early stages of the project, it will take a
year and a half before any planting could take place on a major scale, and this time factor would allow for any adjustments necessary, as in any case, there will have to be a working-up period of land preparation, particularly in view of the fact that the whole lease area has been run with cattle for a considerable period of time.

Obviously, during the progress of the project, applications of required fertilisers such as sulphate of ammonia will itself adjust soil acidity to a great extent.

4.3 MINIMUM LAND AREA

The optimum area for a project such as that in mind would be 500 hectares, and this is available in the Land Purchase Area (see Map 1). With very little adjustment to the management and manufacturing infrastructure, additional acreage from sources such as smallholder production could be catered for. Volume is necessary to keep unit prices low.

It would appear that there would be considerable scope for further development in the Kainantu area amongst both smallholdings and larger, managed acreages, as already pointed out. Care would need to be taken in the case of such development that a situation does not arise, such as in the Western Highlands, in which large areas of smallholder tea (outside the main nucleus estate) later suffer from neglect due to lack of follow-up management by those responsible.

4.4 INFRASTRUCTURE

The main infrastructure would be split between field operations and the factory.

The overall specification is for a 500-hectare VP clonal estate (smallholder contributions have not been included at this stage). There would be full mechanical harvesting supported by a factory capable of processing the peak ultimate average daily crop within two shifts. It will therefore be necessary to machine and equip to this level.

Progress would be in stages, mainly dictated by, in the field, the maximum feasible acreage to be planted annually after a trial period; and in the factory, not only by acreages in production, but the machinery feed requirements and building economics.
These various stages I have decided to show in a separate section below under the heading 'Work Progression', as I feel it is necessary to go into considerable detail, particularly in the factory which will require major capital inputs.

4.5 LABOUR

The project would not be labour-intensive once the area has been planted out and all nursery work completed.

An average daily labour force of a hundred or so with support artisans and management would suffice. The accent would be on semi-skilled operators and technicians and there would be scope for employment of these grades and for training, although of course, the basic labour requirement would always remain.

During the developmental stages, a considerable labour force would be required for the setting up and care of the specialist clonal nurseries, and for planting out the material when ready. Some nine and a half million seedlings would have to be prepared by hand cultivation.

It is considered that for the regular force after completion of the development stage, there would be ample persons locally available. Whether they would be willing to work is another matter. In any case, all labour would have to be resident (in order to exercise adequate control), in labour housing to be constructed for this purpose.

During the development stages, labour could be brought in by constructors from other provinces, given temporary housing on the lease, and returned to their homes on a seasonal basis. It is important that they not be allowed to drift in an uncontrolled manner, which would cause social problems.

4.6 MARKETING

The main opportunities initially for marketing the project's crop will be in Australia primarily, with New Zealand, the UK, Pakistan, the Middle East, and later such areas as Eastern Europe.

The eventual crop would amount to an average made tea outturn of 180 tonnes per month which means 20 FCLs a month available for overseas shipment.

The factory would be ideally suited in that it will be situated within easy reach of the Highlands Highway, and only some two and a half hours from Lae port.
A policy of total containerisation at the factory must be adopted. Teas should be packed in multiwall foil-lined paper sacks, shrink-wrapped onto pallets.

This would involve very considerable savings over the traditional tea chests which are costly to make, require large numbers of labour to construct, take up an enormous amount of room during the storage and manufacturing stages, and present problems to buyers. The major market in Australia finds these bags acceptable, and no doubt other major buying centres will follow.

Should Australia become the main buying centre for teas from the project, then it is important to retain an agent to sell the teas, as consistent market representation with major buyers is all-important.
Map 1. Elcom's Land Purchase Area in the Arona Valley

KEY
- Highlands Highway
- District Road
- Reservoir Area
- Land Recommended for Tea Estate.

Por. 176 Por. 186

Por. 53

Por. 55

Por. 54

Por. 56

UNUSED LAND

YONKI TOWNSHIP

UNUSED

Km.
Mechanical harvesting will need a planted spacing of 50x90x106cms which will give a bush population of 18,500 plants per hectare. This spacing will enable the self-propelled harvesters with their 300cm-wide tracks to straddle five rows of tea simultaneously.

Each harvester is capable of handling 50 hectares on a 20-day plucking round, so for 500 hectares, eight of these harvesters will be required. Experience has shown that two further machines are required as reserve to enable rounds to be shortened or caught up on as required, and to allow for overhaul and maintenance of the machines.

Each hand-held harvester is capable of handling 20 hectares on 20-day round and approximately eight of these are needed to support the larger self-propelled machines in areas which may be inaccessible to them. In addition, these machines will be required during the initial stages of the project.

For easier co-ordination, I have shown progression of the project under the heading or 'Year', rather than under 'Phases'. Each phase is shown under the year to which it relates, with accompanying details.

5.1 YEAR 1

Phase 1 (Field)

1. Recruit required staff.
2. Elcom connection to site.
3. Building programme:
   - 1 expatriate manager's house
   - 2 national managers houses
   - Supervisor and labour quarters
   - Power house
   - Equipment yard
4. Select, mark out and prepare first nursery for 1,000,000 seedlings, with associated infrastructure.
5. Mark out and plan field blocks and 100 hectare perimeters.

6. Mark out and commence work on road network and the general communications and transport plans.

7. Mark out and commence work on main drainage systems.

8. Commence working-up of first 100-hectare block (to include subsoiling, ploughing and broadcasting of suitable covercrops).

9. Consider plans for short-term cropping on available land areas for soft fruit and vegetables and potatoes.

10. Select and mark out factory site.

**Capital purchases:**

- Housing and vehicles
- Agricultural equipment - some may be available from Elcom, or on hire from local businesses.
- Fencing and security

First power unit - a small Caterpillar 3208 would be most suitable. This unit, whilst providing sufficient power initially for all domestic uses, water pumps, nurseries etc., would also serve as a standby after the Elcom connection of a sufficient size, say, to provide power for full domestic needs as well as supply power for the sorting room, in case of breakdowns by Elcom.

The first nursery would not only provide the initial stand of tea for manufacture, but would:

- be a practical field test for larger acreages, very advisable in the case of any project where large amounts of capital are to be committed at a later stage.

- provide a source of clonal vegetative material for future nurseries. When considering the vast number of seedlings which will be required, the existing sources of clonal VP material may not be sufficient. It is anticipated that initially sources such as Kuk Research Station and the Southern Highlands can be used, flown by light plane to Aiyura.
5.2 YEAR 2

Phase 2 (Field)

1. Plant out first 50 hectare block.
2. Prepare second nursery for 2,000,000 plants
3. Building programme:
   - Offices
   - Further labour quarters
4. Continue road and drainage programmes.
5. Commence working-up of second 100 hectare block.
   - Housing/office materials
   - Additional support vehicles

The critical time for planting out seedlings is between October and February.

Should the first nursery proceed on schedule and the requisite 1,000,000 seedlings be available, then to meet the time factor, some 200,000 plants per month or 10,000 per day should be planted.

5.3 YEAR 3

Phase 3 (Field)

1. Plant out 100 hectares, now 20,000 per day minimum.
2. Prepare third nursery for 2,000,000 plus shortfalls on first two years if any.
3. Continue drainage and road programmes
4. Contine short-term cash cropping if adopted
5. Commence working-up of third 100-hectare block.
5.4 YEAR 4

Phase 4 (Field)

1. Plant out 100 hectares, at 20,000 per day.
2. Prepare fourth nursery for 2,000,000 plus shortfalls.
3. Continue drainage and road programmes.
4. Continue cash cropping if adopted.
5. Commence working-up of fourth 100-hectare block.
6. Slash excess leaf production from first 50-hectare block, apart from clonal VP requirement.
7. Order one hand harvester.

Capital purchases:

- Housing
- 1 x hand harvester
- 4 x mechanical harvesters
- Support vehicles

Phase 1 (Factory)

The main factory building cannot be phased into several years and has to be built in one hit. The requirements will be as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withering area</td>
<td>37 x 66m</td>
</tr>
<tr>
<td>Rolling, fermenting and firing areas</td>
<td>38 x 30m</td>
</tr>
<tr>
<td>Sorting, packing and despatch areas</td>
<td>42.5 x 30.5m</td>
</tr>
</tbody>
</table>

The machinery allowed for in this phase will actually handle the full throughput of made tea within the completion of all phases of the project, within the sorting area only.

The anticipated peak average crop in Phase 1 should not require more than 1 1/2 shifts. Peak average crop is calculated at the rate of .75 per cent in order to allow for a safety margin. It could be easily allowed to go to .60 per cent, but it is felt that this might produce a slightly misleading figure. More
about this will be mentioned later when total production has been reached.

Phase 1 will take up to 25,600 kilos of green leaf per day. The eventual machinery requirements will be for a crop of under 2.5 million kilos of made tea per annum, and machinery other than sorting/packing can be installed on a phased basis to avoid unnecessarily high capitalisation in one hit.

Requirements for Phase 1:

1. Withering

   . Building 2,442 square metres, adequate to accommodate the 18 troughs, three of which will be built in this phase.

   . The height of the roof apex to the floor will be 8 metres, to allow space to drive off moisture laden air.

   . The eventual layout will be nine troughs on the ground floor and nine on the second floor. Each trough will have a capacity of 4,200 kilos of green leaf.

   . One No. 16 heater will be needed to provide hot air for all eighteen of the troughs, and this can most economically be fired on wood fuel, either dried or in the form of charcoal. This heater could be installed in Phase 1 (Year 4), or if capital inputs were to be kept down, installation could be put back to Year 5, when more troughs would have been constructed.

2. Manufacture

   . Withered leaf would be fed into a rotovane to condition it for the CTC machines.

   . The CTCs would be in a single bank for Phase 1, and consist of 3 x 36" units with segments milled to the following specifications:

     No. 1 - 8 tpi x 50
     No. 2 - 8 tpi x 50
     No. 3 - 10 tpi x 50

   . The processed leaf would then go to a fermenting machine, and on to a vibro fluid bed drier.
3. **Sorting**

The full set-up of sorting machinery has to be installed in a single exercise, and will be sufficient for the throughput of 1,050 kilos per hour.

4. **Packing/despatch**

Self bulking is to be installed as illustrated in the sketch plan (available at IASER), with bins for storing various grades of tea. Feed would be by a system of conveyors which will be equipped with modified fibre extractors and infra-red bulbs to reduce moisture content percentage prior to packing.

**Capital purchases:**

- material for 3 withering troughs (cap. 12,600 kgs)
- 1 x 15" McTear rotovane
- 1 bank x 36" CTC machines complete with conveyors, belts, and spare segments
- 1 x fermenting machine
- 1 x vibro fluid bed dryer
- 1 x waterwide heater
- 1 x jumbo sorter
- 1 x Middleton sorter
- 2 x Trinick sorters
- 1 x No. 16 SCD Heater (withering) - could go to Year 5
- assorted conveyors
- sawbenches and sheds

**Spare parts stock (to equal 10 per cent value of machinery):**

- 3 x fibre extractors
- 1 x 18" ball breaker
- 1 x automatic weighing scale
1 x hammer mill
storage bins
conveyors with modified fibre extractors etc.
packing machine (twin vibrator type).

In addition to the above, as the factory would have a 100 per cent CTC outturn, milling and sharpening facilities must be installed in Phase 1.

CTC rollers will need to be changed weekly and a full milling and chasing operation carried out. This involves highly skilled staff and is a totally vital operation on which too much emphasis cannot be placed. Poor standards in resharpening will reduce throughput and give random grade percentages, with a poor open flaky style of made tea, resulting in poor prices. The CTC machine is the very heart of manufacture, and the CTC objective is to produce a grainy bulk tea of low volume and high density, particularly essential for modern tea bag requirements.

5. Workshop

- Recruit suitably experienced staff who can in turn train apprentices. Such staff are available.

- Build workshops suitable for their functions.

The capital purchases detailed below are sufficient for one bank of CTC machines. Once all three lines are installed, an additional milling machine will be required, as twelve hours are needed to mill and chase one pair of rollers, and ultimately it will be necessary to mill and chase nine pairs a week. The milling equipment will have to be operated on a shift basis to make maximum usage of the machinery.

Capital purchases:

- 1 x automatic milling cum chasing machine
- 1 x general purpose 8' lathe
- 1 x grinder for sharpening cutters and chasers
- 1 x general purpose grinder
housing and vehicles
- 1 x electric welding set
- 1 x gas welding set
- 1 x drilling machine

6. Power

One transformer of 500 kVA should be installed which will be adequate for the eventual connected load of 580 kVA taking the diversity factor into account.

Standby power for the first phase will include the 40-kilowatt unit first purchased in Year 1, and the load will be around 300 kVA. An additional generating set of around 200 kW (250 kVA) will be sufficient, taking the diversity factor into account.

Capital purchases:

- Transformer and wiring - Elcom have indicated that this would be provided FOC within reason.
- 1 x 200-kW Caterpillar genset complete.
- General electrification requirements

A sketch has been provided (available from Dr Walter at IASER) illustrating the design to be adopted with all machinery layouts within the main building complex. This is the main building only, and later, more detailed drawings will have to be produced to show the layout of other related buildings, including the powerhouse, workshops, vehicle maintenance bays etc.

5.5 YEAR 5

Phase 5 (Field)

1. Plant out 100 hectares.

2. Prepare fifth nursery for 2,000,000 plants plus any shortfalls from previous years.

3. Continue road and drainage programmes.

4. Continue cash cropping if adopted.
5. Recruit further senior staff, supervisors and labour.

6. Commence harvesting and manufacture.

Obviously by this time, a sufficient period will have elapsed to assess the suitability of the project, before first major injection of capital in the previous year.

**Yield**

The major portion of the original 50 hectares planted will have been utilised for clonal vegetative production. This will leave the acreage by Year 5 yielding approximately as detailed below, based on yield calculations as follows:

**Yield calculation:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Made tea per hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>500 kgs</td>
</tr>
<tr>
<td>3</td>
<td>1,000 kgs</td>
</tr>
<tr>
<td>4</td>
<td>1,500 kgs</td>
</tr>
<tr>
<td>5</td>
<td>3,000 kgs</td>
</tr>
<tr>
<td>6</td>
<td>4,500 kgs</td>
</tr>
</tbody>
</table>

**Project at Year 5:**

- 50 ha @ 1,500
- 100 ha @ 1,000
- 100 ha @ 500
- 100 ha @ Nil

**Total expected yield:** 225,000 kilos made tea.

In order to establish the throughput of green leaf on an average basis, it is necessary to calculate the peak daily average. This will establish when it will be necessary to bring in more withering troughs, and also when Phase 2 of the manufacturing machinery will be required, as also, of course, Phase 3.

To calculate peak average, made tea is multiplied by the average expected made tea/ green leaf ratio of 5:1 (20 per cent). This figure will then be multiplied by a percentage, which is normally taken at .75 per cent, in order to obtain a daily peak average at absolutely optimum limits. This would ensure that for normal average purposes, if the factory has been machined up to these calculations, on no more than, say, 20 days a year would the factory have to go from two to three shifts. The figure could be reduced to .60 per cent but to do this would leave no safeguards and would be inadvisable.

Thus: 225,000 x 5 x .75% = 8,438 green leaf PDA.
From this it can be calculated that a amount of withering space and machine capacity would be required.

At this stage, it should be noted that yields have been worked out using projections for 100 per cent clonal vegetatively propagated planting material, which gives a vastly superior yield to normal unselected material. It is suggested that as propagation of such material is of a 'state-of-the-art' nature, such nurseries would not be suitable for smallholders.

It might be advisable to look at polyclonal seed nurseries for other than the main estate production, depending upon whether nurseries for smallholders were to be set up within the parent estate or on site in the smallholdings under their own management structure.

**Capital purchases:**
- 3 x hand-held harvesters
- 4 x mechanical harvesters
- 1 x hand-held pruner
- remaining support vehicles
- housing

5.6 **YEAR 6**

**Phase 6 (Field)**

1. Plant out 100 hectares, 20,000 minimum per day.
2. Prepare sixth nursery for 1,600,000 plants plus any shortfalls from previous years.
3. Finalise road and drainage programmes.
4. Complete last planting area's working up programme.
5. Commence smallholder projects if applicable.
6. Recruit remaining staff and commence selection of final staff and labour for ultimate maintenance.
7. Continue harvesting and manufacture.
Factory

Withering troughs will be added within the main structure on an as and when required basis, as production in the field, calculated on the optimum PDA figure, advances in multiples of 4,200 kilos of green leaf (trough capacity). These trough requirements will not be included in the various phases of the main factory, but simply shown from time to time under 'Capital Purchase' headings.

**Capital purchases:**

- Materials for two withering troughs
- 2 x hand-held pruning machines

Mechanical tractor-mounted pruners of the South American type are available, but in the writer's experience are far more costly than hand-held pruners, particularly for maintenance and POL, and the work output is not at all commensurate with the additional costs involved on such models as are currently on offer worldwide.

One hand-held pruner is capable after some practice of covering one hectare per day. If a three-year pruning cycle is adhered to, some 20 per cent of the estate will require to be pruned annually. This will require four to six of these machines.

It is not recommended that pruning programmes start until the estate is well established, but this will have to be more accurately judged in the field at a later date.

5.7 **YEAR 7**

**Phase 7 (Field)**

1. Plant out 50 hectares at 10,000 per day minimum.
2. Prepare nursery for continuation of infilling programme.
3. Continue smallholder development if applicable.
4. Continue harvesting and manufacture.
5. Commence the repatriation of development labour.
6. Finalise selection of maintenance staff and labour.
7. Set up training programmes.
At this stage, 350 hectares should be in production. The expected production, if estimates have been adhered to and given no shortfalls in acreage due to inclement weather in previous years, or excessive vacancies in the planted areas, and assuming growth to be as expected, will be approximately as follows:

- 50 ha @ 4,500 kgs made tea/hectare
- 100 ha @ 3,000 kgs
- 100 ha @ 1,500 kgs
- 100 ha @ 1,000 kgs
- 100 ha @ 500 kgs
- 50 ha @ Nil

The PDA will not be higher than 30,938 kgs GL, and thus it will be time at the beginning of Year 7 to set up additional troughs and also Phase 2 of the factory.

Phase 2 (Factory)

This is virtually a repetition of the processing machinery ordered in Phase 1. All such machinery is linked together and is termed a 'line'. This factory will eventually have three lines of processing machinery leading to a single sorting/packing/despatch complex.

The 36" CTC machines will give a throughout of 1,250 kilos of withered leaf per hour - a bank of three machines - or 1,600 kilos of unwithered leaf (green leaf) per hour.

Capital purchases:

- materials for three additional troughs
- 1 x 15" McTear rotovane
- 1 bank of three x 36" CTC machines
- 1 x fermenting machine
- 1 x vibro fluid bed dryer
- 1 x waterwide burner
5.8 YEAR 8

Phase 8 (Field)

1. Continue infilling nurseries.
2. Maintenance of 500 hectares estate.
3. Continue smallholder development.
4. Continue harvesting and manufacture.
5. Finalise repatriation of development labour.
6. Commence training programmes.

Capital purchases:

- materials for three additional troughs

In Year 8, all 500 hectares should be in production, with 150 hectares at full capacity. The maximum PDA will be no higher than 46,875 GL, and withering trough capacity 46,200 kilos GL.

5.9 YEAR 9

Phase 9 (Field)

1. Maintain infilling nurseries.
2. Maintain 500 hectares estate, including upkeep of road infrastructure, bridges, culverts, ferries and transport.
3. Continue harvesting and manufacture.
4. Continue smallholder development.
5. Continue training programmes.

Phase 3 (Factory)

The third line of processing machinery will now be installed. With each bank of three CTC machines producing 1,600 kgs of processed leaf per hour, the total output will be 4,800 kilos. This will take total production as follows assuming PDA not to exceed 80,000 odd kilos GL.

\[
\frac{80,000}{4,800} = 16 \text{ hours, i.e. 2 shifts}
\]
The fluid bed dryers outturn is 350 kilos made tea/hour. The three lines will produce therefore 1,050 kgs MT/Hr.

\[ 1,050 \times 16 = 16,800 \text{ kgs MT (2 shifts).} \]

Dryer recovery percentage is approximately 21 per cent, therefore:

\[ 80,000 \text{ FDA} \times 21\% = 16,800 \text{ MT} \]

Thus it can be observed that all machinery within the lines is closely linked to production requirements.

Phase 3 machinery will take leaf from 51,200 kgs FDA onwards and should therefore be installed at the beginning of Year 9.

**Capital purchases:**

- materials for four additional troughs
- 1 x 15" McTear rotovane
- 1 bank of 3 x 36" CTC machines complete
- 1 x fermenting machine
- 1 x vibro fluid bed dryer
- 1 x waterwide burner
- 1 x automatic milling cum chasing machine
- 1 x 250 kw (312 kva) Standby genset

The machine shop will require the additional milling machine to handle the vastly increased turnaround in CTC segments for the three lines of machinery.

The other standby generating set will also be needed.

**5.10 YEAR 10**

**Field:** Maintain programme

**Factory:** Install final three troughs for withering

The estate will now have, all being well, 350 hectares in full production and the balance 150 in partial production. The FDA GL will not exceed 73,125.
If the decision was taken earlier to engage in these activities, then by now a separate capital programme would have been formulated for setting up juicing and canning facilities within the factory complex to handle excess vegetable and soft fruit production from surrounding areas.

In addition, the citrus nurseries would by now have been planted out on the high slopes along the edges of the estate, and production would be under way. Possibly smallholder production would have been started, and obviously the infrastructure of the tea estate with both available management, security, space, transportation and marketing expertise, would be the centre of such spin-off industries, which will require professional handling to be effective.

At this stage, it may be possible to consider the production of consumer packaged goods in the form of tea bags, tinned vegetables and fruit, and fruit juice products to offset imports of these items.

5.11 YEAR II

Field and factory: Maintain production and commence pruning assessment.

The maximum PDA will now be at .75 per cent, 81,563 GL, with 450 hectares under full production.

5.12 YEAR III

Field and factory: As per Year II

All 500 hectares, barring any unforeseen circumstances, should now be fully infilled and under full production.

Although the PDA will show at a maximum of 84,375 GL, and the trough space will be equivalent to 75,600 kgs green leaf, it is not thought that it will be necessary to provide any additional withering or machine space. The PDA has been calculated with a safety margin and there should be little or no undercapacity. In the unlikely event on a few days of the year when overproduction does occur, it will be possible to run to three shifts and to increase slightly the trough capacity.
6.0

CASHFLOWS

6.1 GENERAL GUIDE TO COSTS

This is not intended as a detailed and exhaustive layout of year by year cashflows, commencing with a FDL and showing completion of the loan. Such documentation will require far more detail than it is possible to enumerate within this present report.

I have instead shown detailed costs of capital equipment, and a general expenditure schedule for each year. I have also included details of likely yields and their probable returns on a trilevel projectional basis. It is also possible to note the actual existing costs for running tea estates on a per-hectare basis, using existing estates data where similar technology is operated with success on mature acreages.

All costs on machinery are inclusive of ocean freight and include electric motors, belts, and associated parts.

All items within the costings are at current price levels and no allowance has been made either to inflate these costs or to adjust price levels on sales throughout the exercise.

All buildings are 100 per cent steel structure with custom orb, cement bases (waterproofed), and the costs are inclusive of all materials and labour, but not management.

Obviously a scheme of this nature will have to have professional management, but I have not shown any fees or other such content from year to year. I have instead shown an amount under 'Administration' on a per-kilo basis which might be acceptable as the fees.

Overall cost in toea per kilo of made tea is estimated as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of green leaf to factory</td>
<td>48.26 toea</td>
</tr>
<tr>
<td>Cost of factory etc.:</td>
<td>50.60 toea</td>
</tr>
<tr>
<td>Administration costs:</td>
<td>8.74 toea</td>
</tr>
<tr>
<td>Freight to port:</td>
<td>3.00 toea</td>
</tr>
</tbody>
</table>

Total: 110.00 toea per kilo, or

K1,100.00 per tonne FOB Lae.
Obviously these costs do not include the initial field and factory development costs, not capital purchases in the first formative years.

6.2 REQUIREMENTS

6.2.1 Nurseries

For 100,000 plants costs are as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beds and o/head shade</td>
<td>K3,500</td>
</tr>
<tr>
<td>Polybags</td>
<td>K1,000</td>
</tr>
<tr>
<td>Collection of soil</td>
<td>K300</td>
</tr>
<tr>
<td>Filling bags</td>
<td>K500</td>
</tr>
<tr>
<td>Nine months maintenance</td>
<td>K600</td>
</tr>
<tr>
<td>Pesticides/foliar</td>
<td>K100</td>
</tr>
<tr>
<td>Cloche materials w/labour</td>
<td>K2,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>K8,600</strong></td>
</tr>
</tbody>
</table>

Upkeep of mature acreage: this can generally be calculated at approximately K1,000 per hectare exclusive of harvesting operations.

6.2.2 Staff and labour

Field

1 General manager
1 expatriate manager
3 national managers

Harvesters: self-propelled (8 machines used, 2 reserve)

Support vehicles

Harvesters: hand-held

3 men per machine per shift. 2 shifts w/4 machines to be used simultaneously at any one time...24 men.

This same gang of men can also be used to operate the hand-held pruners as they are required only for a month or two each year.
Five mechanics will be required between the workshop and the field for running maintenance and normal overhauling of the harvesters.

Balance work will require approximately 40 labour.

**Factory**

1 expatriate manager  
4 national managers  
Shift supervisors

The ultimate PDA crop will be processed in two shifts as a general rule. Manpower requirements will be:

**1st. shift - 24 men**  
1 maintenance mechanic

**2nd. shift - 20 men**  
1 maintenance mechanic

**Support services**

1 expatriate manager  
1 electrician  
1 apprentice  
3 fitters/welder  
2 apprentices  
2 semi-skilled mechanics  
1 apprentice  
2 mechanics (1 each shift)  
1 senior mechanic  
4 mechanics

6.3 **YIELD EXPECTATIONS**

Generally speaking, VP clonal tea is far more vigorous than ordinary tea, and such a high bush population as that being used here might not be necessary. However, it will give quicker returns, and will not be detrimental to the development of the plantation. The yield expectations have been deliberately kept to a conservative level (See Table 3). The lefthand column shows a typical Western Highlands estate's
production from a newly planted section. The right-hand column shows the project used in this project. Figures are in made tea per hectare.

Table 3
Yield Expectations

<table>
<thead>
<tr>
<th>Year No</th>
<th>Control</th>
<th>Project/ per hect</th>
<th>Total Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>nil</td>
<td>nil</td>
<td>nil</td>
</tr>
<tr>
<td>2</td>
<td>1,000</td>
<td>500</td>
<td>nil</td>
</tr>
<tr>
<td>3</td>
<td>1,600</td>
<td>1,000</td>
<td>nil</td>
</tr>
<tr>
<td>4</td>
<td>3,000</td>
<td>1,500</td>
<td>100,000</td>
</tr>
<tr>
<td>5</td>
<td>3,200</td>
<td>3,000</td>
<td>225,000</td>
</tr>
<tr>
<td>6</td>
<td>3,600</td>
<td>4,500</td>
<td>450,000</td>
</tr>
<tr>
<td>7</td>
<td>4,300</td>
<td>4,500</td>
<td>825,000</td>
</tr>
<tr>
<td>8</td>
<td>2,900 (pruned)</td>
<td>4,500</td>
<td>1,250,000</td>
</tr>
<tr>
<td>9</td>
<td>5,500</td>
<td>4,500</td>
<td>1,625,000</td>
</tr>
<tr>
<td>10</td>
<td>5,800</td>
<td>4,500</td>
<td>1,950,000</td>
</tr>
<tr>
<td>11</td>
<td>Not available</td>
<td>4,500</td>
<td>2,175,000</td>
</tr>
<tr>
<td>12</td>
<td>Not available</td>
<td>4,500</td>
<td>2,250,000</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>YIYO</td>
<td>YIYO</td>
</tr>
</tbody>
</table>

Pruning should be started after the first three full years of production, and then on a three-yearly rotation.

As can be seen from the above figures, yield projections are in fact well below what could be expected should there be other than normal conditions. In case it is found that the figure in the right hand column is confusing, please note that it relates to total crop harvested in kilos of made tea, and that the differences in figures change as planted acreages come into bearing at differing yields.

On the following pages are given for each year the approximate development costs, staff requirements etc., in order of priority, and where applicable, projected probable income on a trilevel basis.
### YEAR 1

**Expenditure**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>General expenses</td>
<td>K100,000</td>
</tr>
<tr>
<td>Nursery 1,000,000 plants</td>
<td>86,000</td>
</tr>
<tr>
<td>Generating set (Cat. 3208) complete</td>
<td>21,000</td>
</tr>
<tr>
<td>Wiring etc.</td>
<td>20,000</td>
</tr>
<tr>
<td>Plough and subsoil</td>
<td></td>
</tr>
<tr>
<td>100 hectares</td>
<td>25,000</td>
</tr>
<tr>
<td>Drains and roads</td>
<td>5,000</td>
</tr>
</tbody>
</table>

**Capital:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 expatriate house</td>
<td>45,000</td>
</tr>
<tr>
<td>2 medium-range houses</td>
<td>50,000</td>
</tr>
<tr>
<td>Labour quarters</td>
<td>10,000</td>
</tr>
<tr>
<td>Supervisor’s house</td>
<td>10,000</td>
</tr>
<tr>
<td>Powerhouse (part)</td>
<td>10,000</td>
</tr>
<tr>
<td>Yard and fencing</td>
<td>10,000</td>
</tr>
<tr>
<td>2 utilities 4 x 4</td>
<td>24,000</td>
</tr>
<tr>
<td>1 tractor plus</td>
<td></td>
</tr>
<tr>
<td>2 trailers</td>
<td>20,000</td>
</tr>
</tbody>
</table>

**Total Expenditure:** K431,000

**Income:**

**Total Income:** M1

### YEAR 2

**Expenditure**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management - 1 expatriate, 2 nationals</td>
<td></td>
</tr>
<tr>
<td>Planting - 50 hectares</td>
<td>K55,000</td>
</tr>
<tr>
<td>Nursery - 2,000,000 plants</td>
<td>172,000</td>
</tr>
<tr>
<td>Maintenance - 50 hectare @ 1,000</td>
<td>50,000</td>
</tr>
<tr>
<td>General expenses</td>
<td>50,000</td>
</tr>
<tr>
<td>Subsoil and plough</td>
<td>25,000</td>
</tr>
<tr>
<td>Drains and roads</td>
<td>10,000</td>
</tr>
</tbody>
</table>
### YEAR 2 (cont’d)

<table>
<thead>
<tr>
<th>Capital</th>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offices</td>
<td>30,000</td>
<td></td>
</tr>
<tr>
<td>Labour quarters</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>Vehicle</td>
<td>12,000</td>
<td></td>
</tr>
<tr>
<td>1 tractor plus 2 trailers</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>434,000</td>
<td>Nil</td>
</tr>
</tbody>
</table>

### YEAR 3

<table>
<thead>
<tr>
<th>Field</th>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management: 1 expatriate 2 nationals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant 100 hectares</td>
<td>K105,000</td>
<td></td>
</tr>
<tr>
<td>Nursery 2,000,000 plants</td>
<td>172,000</td>
<td></td>
</tr>
<tr>
<td>General expenses</td>
<td>50,000</td>
<td></td>
</tr>
<tr>
<td>Maintenance 150 hectares</td>
<td>150,000</td>
<td></td>
</tr>
<tr>
<td>Subsoil and plough</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 hectares</td>
<td>25,000</td>
<td></td>
</tr>
<tr>
<td>Drains and roads</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>Capital:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 tractor plus 2 trailers</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td>Labour quarters</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>Factory:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 expatriate house</td>
<td>45,000</td>
<td></td>
</tr>
<tr>
<td>2 national houses</td>
<td>50,000</td>
<td></td>
</tr>
<tr>
<td>1 vehicle 4 x 4</td>
<td>12,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>649,000</td>
<td>Nil</td>
</tr>
</tbody>
</table>
YEAR 4

Field:

Management: 1 expatriate
2 nationals

<table>
<thead>
<tr>
<th>Item</th>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant 100 hectares</td>
<td>K105,000</td>
<td></td>
</tr>
<tr>
<td>Nursery - 2,000,000 plants</td>
<td>172,000</td>
<td></td>
</tr>
<tr>
<td>General expenses</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>Maintenance 250 hectares</td>
<td>250,000</td>
<td></td>
</tr>
<tr>
<td>Subsoil and plough 100 hectares</td>
<td>25,000</td>
<td></td>
</tr>
<tr>
<td>Drains and roads</td>
<td>10,000</td>
<td></td>
</tr>
</tbody>
</table>

Capital:

<table>
<thead>
<tr>
<th>Item</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour quarters</td>
<td>10,000</td>
</tr>
<tr>
<td>1 hand harvester</td>
<td>1,500</td>
</tr>
<tr>
<td>4 mechanical harverseters</td>
<td>140,000</td>
</tr>
<tr>
<td>1 vehicle 4 x 4</td>
<td>12,000</td>
</tr>
<tr>
<td>1 national’s house</td>
<td>30,000</td>
</tr>
</tbody>
</table>

Factory:

Management: 1 Expatriate (factory)
1 Expatriate (w/shops)
4 Nationals

Factory Phase 1:

Capital:

<table>
<thead>
<tr>
<th>Item</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 expatriate house</td>
<td>45,000</td>
</tr>
<tr>
<td>2 nationals houses</td>
<td>50,000</td>
</tr>
<tr>
<td>2 vehicles</td>
<td>24,000</td>
</tr>
<tr>
<td>Electrification</td>
<td>80,000</td>
</tr>
<tr>
<td>Factory buildings - withering</td>
<td>210,000</td>
</tr>
<tr>
<td>Fermenting/drying</td>
<td>98,000</td>
</tr>
<tr>
<td>Sorting/packing/despatch</td>
<td>111,000</td>
</tr>
<tr>
<td>Power (addition)</td>
<td>10,000</td>
</tr>
<tr>
<td>3 withering troughs</td>
<td>42,000</td>
</tr>
<tr>
<td>1 x 15” rotovane</td>
<td>18,000</td>
</tr>
<tr>
<td>1 bank 3 x 36” CTCs</td>
<td>55,000</td>
</tr>
<tr>
<td>CTC segments (spare)</td>
<td>3,000</td>
</tr>
</tbody>
</table>
### YEAR 4 (cont'd)

<table>
<thead>
<tr>
<th>Item</th>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x Fermenter</td>
<td>40,000</td>
<td></td>
</tr>
<tr>
<td>2 sawbenches &amp; sheds</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>1 x VFB drier</td>
<td>85,000</td>
<td></td>
</tr>
<tr>
<td>Conveyors (asst.)</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>1 x waterwide burner</td>
<td>35,000</td>
<td></td>
</tr>
<tr>
<td>1 x jumbo sorter</td>
<td>7,000</td>
<td></td>
</tr>
<tr>
<td>1 x middleton sorter</td>
<td>4,500</td>
<td></td>
</tr>
<tr>
<td>2 x trinick sorters</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>1 x SCD heater</td>
<td>36,000</td>
<td></td>
</tr>
<tr>
<td>3 x fibre extractors</td>
<td>14,000</td>
<td></td>
</tr>
<tr>
<td>1 x ball breaker 18&quot;</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>1 x auto. weighing scale</td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>1 x hammer mill</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>Storage bins</td>
<td>18,000</td>
<td></td>
</tr>
<tr>
<td>1 x twin vibrator packer</td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>Modified fibre extractor</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>Conveyors plus infrared bulbs</td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>Genset (Cat. 200 kW)</td>
<td>36,000</td>
<td></td>
</tr>
</tbody>
</table>

**Workshop:**

| Item                        | Expenditure | |
|-----------------------------|-------------|---
| Milling machine             | 8,000       | |
| 8' GP lathe                 | 8,000       | |
| Special grinder             | 10,000      | |
| GP grinder                  | 800         | |
| Electric welder             | 1,000       | |
| Gas welder                  | 1,000       | |
| Drilling machine            | 2,000       | |
| Cutters and chasers         | 2,000       | |
| Spares general @ 10% overall| 100,000     | |

\[ \text{Total Expenditure} = 2,063,000 \]

\[ \text{Net Income} = \text{Nil} \]

**Income:**

\[ 50 \text{ hectares} @ 1,000 \text{ kgs MT/ha} = 50,000 \]
\[ 100 \text{ hectares} @ 500 \text{ kgs MT/ha} = 50,000 \]

**Equivalent to 100 tonnes**
YEAR 4 (cont'd)  

<table>
<thead>
<tr>
<th>Trilevel projections:</th>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>Kl,450 per tonne = 145,000</td>
<td></td>
</tr>
<tr>
<td>*Medium</td>
<td>Kl,600 per tonne = 160,000</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>Kl,750 per tonne = 175,000</td>
<td></td>
</tr>
</tbody>
</table>

2,063,800 Kl60,000

Note: *In each year the medium price will be taken to show in the 'income' column.

YEAR 5  

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
</table>

Field:

Management: 1 General manager  
1 Expatriate  
3 Nationals

| Plant 100 hectares | 105,000 |
| Nursery - 2,000,000 plants | 172,000 |
| General expenses | 100,000 |
| Maintenance 350 ha | 350,000 |
| Subsoil and plough 100 hectares | 25,000 |
| Drain and roads | 10,000 |

Capital:

| Labour quarters | 10,000 |
| General manager's house | 50,000 |
| 2 vehicles 4 x 4 | 24,000 |
| 1 General manager's vehicle | 25,000 |
| 3 hand-held harvesters | 4,000 |
| 4 mechanical harvesters | 140,000 |
| 1 hand pruner | 1,000 |
YEAR 5 (cont'd)  

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factory:</strong></td>
<td></td>
</tr>
<tr>
<td>Management: 1 expatriate (factory)</td>
<td></td>
</tr>
<tr>
<td>1 expatriate (w/shops)</td>
<td></td>
</tr>
<tr>
<td>4 nationals</td>
<td></td>
</tr>
<tr>
<td>General expenses</td>
<td>100,000</td>
</tr>
<tr>
<td>Capital:</td>
<td></td>
</tr>
<tr>
<td>Cutters and chasers</td>
<td>2,000</td>
</tr>
<tr>
<td>CTC segments</td>
<td>3,000</td>
</tr>
<tr>
<td>Housing 6 units</td>
<td>60,000</td>
</tr>
<tr>
<td>1 tractor plus 2 trailers (Firewood)</td>
<td>20,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,201,500</td>
</tr>
<tr>
<td><strong>Income:</strong></td>
<td>Nil</td>
</tr>
</tbody>
</table>

50 hectares @ 1,500 kgs MT/ha = 75,000  
100 hectares @ 1,000 kgs MT/ha = 100,000  
100 hectares @ 500 kgs MT/ha = 50,000  
100 hectares @ Nil  
**Total** 225,000  
Equivalent to 225 tonnes made tea  

**Trilevel Projections:**  
Poor  
Kl,450 per tonne = 326,250  
Medium  
Kl,600 per tonne = 360,000  
Good  
Kl,750 per tonne = 393,750  
**Total** 1,201,500  
**360,000**  

YEAR 6  

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field:</strong></td>
<td></td>
</tr>
<tr>
<td>Management: 1 General manager</td>
<td></td>
</tr>
<tr>
<td>1 expatriate</td>
<td></td>
</tr>
<tr>
<td>3 nationals</td>
<td></td>
</tr>
</tbody>
</table>
YEAR 6 (cont’d)  

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant 100 hectares</td>
<td>105,000</td>
</tr>
<tr>
<td>Nursery - 1,000,000 plants</td>
<td>86,000</td>
</tr>
<tr>
<td>General expenses</td>
<td>100,000</td>
</tr>
<tr>
<td>Maintenance 450 hectares</td>
<td>450,000</td>
</tr>
<tr>
<td>Subsoil and plough 50 hectares</td>
<td>15,000</td>
</tr>
<tr>
<td>Drains and roads</td>
<td>10,000</td>
</tr>
</tbody>
</table>

**Capital:**

| Labour quarters | 10,000 |
| Hand pruners | 2,000 |
| 2 Mechanical harvesters | 70,000 |
| 2 Hand-held harvesters | 3,000 |

**Factory:**

**Management:**
- 1 Expatriate (factory)
- 1 Expatriate (w/shops)
- 4 Nationals

**General expenses**

| General expenses | 100,000 |

**Capital:**

| 2 Withering troughs | 28,000 |
| Cutters and chasers | 2,000 |
| CTC segments | 3,000 |

**Income:**

| 50 ha @ 3,000 kgs MT/ha = | 150,000 |
| 100 ha @ 1,500 kgs MT/ha = | 150,000 |
| 100 ha @ 1,000 kgs MT/ha = | 100,000 |
| 100 ha @ 500 kgs MT/ha = | 50,000 |
| 100 ha @ Nil | 0,000 |

Equivalent to 450 tonnes

**Trilevel projections**

| Poor | K1,450 per tonne = | 652,500 |
| Medium | K1,600 per tonne = | 720,000 |
| Good | K1,750 per tonne = | 787,500 |

**Total**

<p>| K984,000 | 720,000 |</p>
<table>
<thead>
<tr>
<th>YEAR 7</th>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management:</td>
<td>1 general manager</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 expatriate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 nationals</td>
<td></td>
</tr>
<tr>
<td>Plant 50 hectares</td>
<td>55,000</td>
<td></td>
</tr>
<tr>
<td>Nursery 50,000 plants</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>General expenses</td>
<td>150,000</td>
<td></td>
</tr>
<tr>
<td>Maintenance 500 ha</td>
<td>500,000</td>
<td></td>
</tr>
<tr>
<td>Drains and roads</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td><strong>Capital:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour quarters</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td><strong>Factory:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management:</td>
<td>1 expatriate (factory)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 expatriate (w/shops)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 nationals</td>
<td></td>
</tr>
<tr>
<td>General expenses</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td><strong>Capital:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factory Phase 2:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 withering troughs</td>
<td>42,000</td>
<td></td>
</tr>
<tr>
<td>1 x 15&quot; rotovane</td>
<td>18,000</td>
<td></td>
</tr>
<tr>
<td>1 bank 3 x 36&quot; CTCs'</td>
<td>55,000</td>
<td></td>
</tr>
<tr>
<td>1 x fermenting machine</td>
<td>40,000</td>
<td></td>
</tr>
<tr>
<td>1 x VFB drier</td>
<td>85,000</td>
<td></td>
</tr>
<tr>
<td>1 x waterwise burner</td>
<td>35,000</td>
<td></td>
</tr>
<tr>
<td>Spare CTC segments</td>
<td>3,000</td>
<td></td>
</tr>
<tr>
<td>Cutters and chasers</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>K1,105,000</strong></td>
<td><strong>Nil</strong></td>
</tr>
</tbody>
</table>

**Income:**

- 50 ha @ 4,500 kgs MT/ha = 225,000
- 100 ha @ 3,000 kgs MT/ha = 300,000
- 100 ha @ 1,500 kgs MT/ha = 150,000
- 100 ha @ 1,000 kgs MT/ha = 100,000
- 100 ha @ 500 kgs MT/ha = 50,000
- 50 ha @ Nil

**Total:** 825,000

Equivalent to 825 tonnes
Trilevel projections:

Poor  K1,450 per tonne = 1,196,250
Medium K1,600 per tonne = 1,320,000
Good  K1,750 per tonne = 1,443,750

K1,105,000  1,320,000

YEAR 8

Field:

Management: YIYO
Nursery 50,000  5,000
General expenses 150,000
Maintenance 500 hectares 500,000

Factory:

Management: YIYO

Capital:

3 withering troughs 42,000
Cutters and chasers 2,000
CTC segments 3,000

Income:

150 ha @ 4,500 kgs MT/ha 675,000 kgs
100 ha @ 3,000 kgs MT/ha 300,000
100 ha @ 1,500 kgs MT/ha 150,000
100 ha @ 1,000 kgs MT/ha 100,000
50 ha @ 500 kgs MT/ha 25,000

Total 1,250,000

Equivalent to 1,250 tonnes

Trilevel projections:

Poor  K1,450 per tonne = 1,812,000
Medium K1,600 per tonne = 2,000,000
Good  K1,750 per tonne = 2,187,500

K702,000  2,000,000
YEAR 9

Field:

<table>
<thead>
<tr>
<th>Management - YIYO Nursery 50,000</th>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>General expenses</td>
<td>150,000</td>
<td></td>
</tr>
<tr>
<td>Maintenance 500 hectares</td>
<td>500,000</td>
<td></td>
</tr>
</tbody>
</table>

Factory:

<table>
<thead>
<tr>
<th>Management - YIYO General expenses</th>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100,000</td>
<td></td>
</tr>
</tbody>
</table>

Capital:

Factory Phase 3:

- 4 withering troughs: 56,000
- 1 x 15" rotovane: 18,000
- 1 bank 3 x 36" CTCs': 55,000
- 1 x fermenting machine: 40,000
- 1 x VFB drier: 85,000
- 1 x worldwide burner: 35,000
- 1 x milling machine: 8,000
- 1 standby genset: 41,000
- Cutters & chasers: 2,000
- CTC segments: 3,000

Income:

250 ha @ 4,500 kgs MT/ha = 1,125,000 kgs
100 ha @ 3,000 kgs MT/ha = 300,000
100 ha @ 1,500 kgs MT/ha = 150,000
50 ha @ 1,000 kgs MT/ha = 50,000

Total: 1,625,000 kgs

Equivalent to 1,625 tonnes

Trilevel projections

- Poor: K1,450 per tonne = 2,356,250
- Medium: K1,600 per tonne = 2,600,000
- Good: K1,750 per tonne = 2,843,750

K1,098,000 2,600,000
YEAR 10

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Field:</strong></td>
<td></td>
</tr>
<tr>
<td>Management - YIYO</td>
<td></td>
</tr>
<tr>
<td>Nursery 50,000 plants</td>
<td>5,000</td>
</tr>
<tr>
<td>General expenses</td>
<td>150,000</td>
</tr>
<tr>
<td>Maintenance 500 ha</td>
<td>500,000</td>
</tr>
<tr>
<td><strong>Factory:</strong></td>
<td></td>
</tr>
<tr>
<td>Management - YIYO</td>
<td></td>
</tr>
<tr>
<td>General expenses</td>
<td>100,000</td>
</tr>
<tr>
<td><strong>Capital:</strong></td>
<td></td>
</tr>
<tr>
<td>3 (final) withering troughs</td>
<td>42,000</td>
</tr>
<tr>
<td>Cutters and chasers</td>
<td>2,000</td>
</tr>
<tr>
<td>CTC segments</td>
<td>3,000</td>
</tr>
<tr>
<td><strong>Income:</strong></td>
<td></td>
</tr>
<tr>
<td>350 ha @ 4,500 kgs MT/ha = 1,575,000 kgs</td>
<td></td>
</tr>
<tr>
<td>100 ha @ 3,000 kgs MT/ha = 300,000</td>
<td></td>
</tr>
<tr>
<td>50 ha @ 1,500 kgs MT/ha = 75,000</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,950,000 kgs</td>
</tr>
<tr>
<td>Equivalent to 1,950 tonnes</td>
<td></td>
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<tr>
<td><strong>Trilevel projections:</strong></td>
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<tr>
<td>Poor</td>
<td>K1,450 per tonne = 2,827,500</td>
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<tr>
<td>Medium</td>
<td>K1,600 per tonne = 3,120,000</td>
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<tr>
<td>Good</td>
<td>K1,750 per tonne = 3,412,500</td>
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K802,000 3,120,000
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<tr>
<th>YEAR 11</th>
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<tr>
<td>YIYO</td>
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<tr>
<td>Factory:</td>
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<tr>
<td>YIYO</td>
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<td>Capital:</td>
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<tr>
<td>450 ha @ 4,500 kgs MT/ha = 2,025,000</td>
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<td>50 ha @ 3,000 kgs MT/ha = 150,000</td>
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<td>Total</td>
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<td></td>
<td>Equivalent to 2,175 tonnes</td>
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**Tri-level projections:**

- Poor  K1,450 per tonne = 3,153,750
- Medium K1,600 per tonne = 3,480,000
- Good  K1,750 per tonne = 3,806,250

K760,000  K3,480,000

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<td>Capital</td>
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<tr>
<td>Income:</td>
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**PEAK PRODUCTION YEAR**

No further capital or developmental costs

500 ha @ 4,500 kgs MT/ha = 2,250,000 kgs

Equivalent to 2,250 tonnes
YEAR 12 (cont'd)  

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<th>Price trilevel projections:</th>
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<tbody>
<tr>
<td>Poor</td>
</tr>
<tr>
<td>Medium</td>
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<tr>
<td>Good</td>
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</table>

YIYO  

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>K760,000</td>
<td>K3,600,000</td>
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</tbody>
</table>

It might be considered that a considerable portion of monies under such headings as 'General expenditure' are in excess of normal requirements, but it is felt better to allow this leeway.

It should be remembered that the field figures cater for development and capital costs, general maintenance and additional general expenses associated with a project of this kind, which latter expenses will gradually phase out. The figures do not cater for the cost of harvesting, which can be costed out at approximately 0.010 toea per kilogramme. In any case note after the full acreage has been established, and is in full production, the cost of green leaf to the factory is equal to 48.26 toea per kilo of made tea, as mentioned earlier.

The only capital item required to be continued on an annual basis will be the cutters and chasers, and the CTC segments.

Cutters and chasers for the milling machines become worn out and must be changed periodically. CTC segments are prone to damage and wear and tear. Each roller in a CTC machine is composed of a number of 2" segments mounted on a central spindle. Every 90 hours, every roller has to be resharpened as a whole unit and the calculation and angling of the grooves and cross grooves makes all the difference to tea quality during production.

The capital provision is for 60 x 20" segments. An 8 1/2" diameter segment will wear to only 7", and then has to be discarded after approximately 14 months usage.

The only other capital expenditure will of course be for scheduled replacement of capital items such as the vehicles.

Fertilisers
The cost of fertilisers has been included under the 'Maintenance' heading.
As a general guide, the following figures can be taken for a project consisting of normal healthy tea:

Six to seven applications of NPK 20.14.14 at 1,000 kgs to the hectares, giving 190 kgs N per hectare.

Two to three applications of SOA (22% N) at 100 kgs to the hectare giving obviously 22 kgs N per hectare.

Applications of urea with possibly copper and zinc added as required, as a foliar/aerial spray.

Applications of MOP at the rate of 100 kg to the hectare, as and when required.

Again as a guide, the total cost of fertiliser for 500 hectares will be about 200,000 kina per annum or more. Labour will cost about 5,000 kina for application by hand. It is possible to use adapted harvesters or high-mounted tractors for both spraying and fertiliser (basal) applications.
Figure 1. Yonki Dam Project - Tea LCC Component

INCOME & EXPENDITURE GRAPH

- Ordinary Expenditure
- Income
- Expenditure Including Development Costs
- 50 ha. 1st. Yield to Clonal VP

MILLION K. 3

MILLION K. 2

MILLION K. 1

YEAR
ONE  TWO  THREE  FOUR  FIVE  SIX  SEVEN  EIGHT  NINE  TEN  ELEVEN  TWELVE

-6.19
7.0 RECOMMENDATIONS FOR MANAGEMENT

7.0 PRODUCTION OPTIONS

Recommendations would depend upon the three alternatives for the setting out of the scheme as already discussed elsewhere, and are as follows:

Smallholders. If this option were to be adopted, then as discussed, it would be virtually impossible to employ professional management, and the job would have to fall to existing government departments such as DPI.

However, I feel that it has already been established that anything less than a professionally run operation is virtually doomed to failure.

Smallholders and nucleus estate. Professional management would operate the nucleus estate. Because of the 'door buying' technique to be adopted for smallholders, this professionalism would automatically extend to the smallholders tea production.

A purpose-recruited officer or officers would need to be sought by the Government through the DPI to take charge of the smallholders production and liaison closely with the nucleus estate.

Nucleus estate. There would have to be professional management involved to ensure state of the art production and marketing.

7.2 MANAGEMENT OPTIONS

Management availability can be divided into several categories:

1. Existing tea producing companies within Papua New Guinea could be offered a management contract. This would in the writer's opinion not be a satisfactory arrangement, as production would be in some cases competing with existing commercial ventures and thus be prone to undermanagement.

2. A government department such as DPI could manage the project in its entirety.
There is very little or no professional expertise available within this department that has had direct involvement in the commercial production of tea as a profitable and successful venture.

Recruitment of overseas personnel would thus be essential and these persons, although adequately qualified and with the required practical experience, would suffer a period of 'acclimatisation' to get the feel both of the agricultural conditions and the handling of the people to be involved. Such a time period in such an initially heavily capitalised venture would prove to be extremely expensive.

However, as smallholder field managers with access to established expertise and with the assistant of DPI field officers with experience of the area and the people, this type of person could be of great value.

3. The government may care to shop around outside Papua New Guinea to find a company or organisation that might consider investing in a new tea project in this country. If this were so, it would have both disadvantages as well as advantages.

As a company providing its own or part of the finance required, it would obviously insist upon its own professional management, which might be advantageous in some ways, disadvantageous in others, as already stated.

By providing its own or part of the total financial package, this would assist this country a very great deal by reducing the indebtedness which has recently been the attention of the IMF.

The disadvantage of such an operation would be that such a company or organisation would expect to receive a considerable share of the operation. As the share of the proposed Arona Valley Trust reduced, and as the same repayment amount would be present, in effect the Trust would lose a number of years before obtaining any benefits in direct proportion to the amount of other shareholders.

It would be largely dependent upon government policies as to whether one advantage would be strong enough to overrule the disadvantages stated.

4. There remains the private enterprise sector of professional agricultural management, as embodied by the existing management agencies.
The two main agencies within the Highlands, and the only ones represented within the Kainantu/Yonki area, are:

- Angco Development
- National Plantation Management Agency

The former is part of a larger national conglomerate, whilst the latter is actually a government-owned agency, mainly accredited to the Department of Finance, and run on private commercial lines.

Either of these agencies could be requested to manage such a project, as they are both well versed in both agriculture generally and handling the people of the area, and are conversant with the area both climatologically and topographically.

I understand that Angco have come into the area comparatively recently, whilst the self-styled NPMA have been established in Kainantu since 1979 and have some 50 coffee and cardamom projects presently in hand.

I note also that NPMA have already become involved with the establishment of a one million coffee seedling nursery sponsored by Elcom for local projects designed to meet the needs of displaced persons affected by the Yonki Dam Project, and have organised a number of surveys, business groups and other related activities.

From what information I can obtain, it would appear that Angco staff are recruited largely from Australia or within Papua New Guinea. This has more or less precluded them from obtaining staff with a background in tea, although I believe that they have at least two persons within the country with some basic knowledge of the industry.

From investigations into the background of NPMA, it would seem that there is a large pool of available practical experience in both tea, coffee, cardamom, and other spices. This appears to be due to their recruiting policy which encourages multiple experience in various crops over a long-term career, and also draws most of its staff from countries actively involved in these crops' production.

From questioning agency staff in Kainantu, I gather NPMA has an accumulated total of some 41 years experience in tea, comprising service in both Indian and Papua New
Guinea tea industries. It was not possible to question any Angco staff in Kainantu as I was unable to meet them, but I understand they have no tea experience.

Of the two agencies assessed, it seems that NPMA has a number of satellite consultancies available with considerable tea experience in other countries, which could be called upon if required.

Should an agency be chosen to manage the project, it is most important that not only professional and experienced personnel be engaged, but that their track records as well as that of the agency should show the ability to bring to the project the highest expertise.

I would recommend that the best form of management would be a combination of an agency for the main estate, with purpose-recruited professionals to control smallholder production under guidance from the nucleus estate’s management.

The difference in technique and expertise would make a very great deal of difference indeed to the viability or otherwise of the project.
8.1 GENERAL

The main problems with tea are clearly to make it grow successfully, produce a good quality crop, and to sell it at a good enough price so that regardless of market ups and downs, costs are covered and a satisfactory profit made.

In order to make it grow successfully, certain factors such as climate and soil have to be favourable, and I have dealt with this elsewhere.

The main consideration regarding growth, having established that climate and soil and suitable or can be made suitable, is the selection of the material which is going to give the crop.

There are many ways of putting out a tea estate, as practised in many countries of the world, which will produce varying results. As the cost of technology rises, and with it the spiralling costs of labour and fuel, greater accent is placed on the planting out of especially bred material which, over a long period of time, has been selected and evolved from mother trees known as clones purely by vegetative propagation. Certain clones have been selected for their known qualities which will influence the quality of the made tea product. Others have been selected for resistance to disease or pests or drought. By careful interbreeding of these selected clones from the original mother bushes in, say, Assam in India, millions upon millions of generally suitable planting material has been bred to produce an ideal plant which will overcome most problems and give enhanced yields.

It is therefore essential to use such clones in order to eradicate problems which might arise through shortfalls in production of inferior qualities of tea, thus affecting overall crop performance, and more important, overall prices and income.

It has been shown over and over again that the plantations which produce consistently good quality teas of a type required by certain sections of the market will always find buyers at a reasonably satisfactory price, although, of course, prices will be affected by rises and falls in the market, but to a lesser extent. Inevitably on a falling market, poorer quality, large-bulk teas suffer first.
The problem arises, therefore, when an estate produces low-cost, high-quantity and low-quality teas. In times of great shortages or when world markets spiral upwards as happened recently, such estates gain. But in the long run, they can make dramatic losses, and frequently do.

8.2 ARONA VALLEY

It is difficult to assess what problems may arise in the Arona Valley in the future.

Should the project go ahead, a very great deal depends on how it is handled and by whom. This factor alone could make or break the project. From what I could see during my short research associateship, and from my past twenty-five years' experience, there does not seem to be any major significant impediment to the development of a healthy estate. But without doubt, problems will arise from time to time, and it will depend upon the efficiency and experience of the management as to whether such problems will be mastered without detriment to the project.
9.0

SOCIAl ASPECTS

The tea project would not require a large number of labourers except in the initial planting-out stages.

This planting could be done by contract labour brought in specifically for this purpose from the Southern Highlands or Okapa. I understand that most of the able-bodied persons immediately within the Yonki area will be able to find work on the actual dam project.

Any labourers brought in from outside would be specifically on a seasonal basis and would be transported back to their origin on expiry of the contract planting.

However, there would be some requirement for a number of semi-skilled labour and artisan basis class employees, with a number of apprenticeships and opportunities for management training and employment.

Such persons should be first sought within the local Arona/Yonki community. The categories required would be as follows:

- Carpenters
- Automotive fitters
- Mechanics - garage
- Harvesters
- Workshops
- Clerks
- Electricians
- Plumbers
- Drivers - harvesters support vehicles
- Field managers
- Factory managers

There would be a number of other beneficial aspects to the community, from small business ventures.

Wood fuel

The quantity of fuel required would be enormous, and experience shows that a fairly large number of contractors can be employed for the supply of this commodity.

Making of pallets

This could be a lucrative small industry for a number of suppliers. A continuous supply would be required.
Transport

At full production, 2.25 million kilos of tea would be available for trucking to Lae. Additionally, there would be a large amount of goods to come from Lae, such as fertilisers, chemicals.

In addition to such business ventures, the management infrastructure and general facilities could provide a number of benefits to the local people and their agricultural development with virtually no additional cost to the main project. These could include:

- on-the-job training for smallholders.

- provision of areas for experimental work on other crops such as citrus, cinchona, cardamom – all of which would be suited for both smallholder distribution as well as establishment within the lease areas on slopes.

- provision of training and expertise to co-ordinate vegetable production, and also soft fruit (mentioned in more detail elsewhere in this report) by smallholders, and the setting up of canning and juicing plants for both vegetables and fruit.

Overall it is felt that the opportunities for development both in business and on the land exceeds the available opportunities for similar population groups in very many other areas of this country.

The idea of an integrated Arona Valley Development Trust, with a main agricultural project such as tea and many smaller spin-off projects is in unique within this country. In the Yonki/Arona situation, it could provide a lead for other areas for a release from the compensation spirals which are so unproductive and expensive.
APPENDIX

SOIL TEST RESULTS IN ARONA VALLEY
### LABORATORY REPORT

#### SOIL TEST RESULTS

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<thead>
<tr>
<th>SAMPLE NAME</th>
<th>SAMPLE NO</th>
<th>BULK DENSITY g/mL</th>
<th>pH</th>
<th>PHOSPHORUS mg/L</th>
<th>POTASSIUM mg/100g</th>
<th>CALCIUM mg/100g</th>
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### B. SPECIAL TESTS

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<th>LIME REQUIREMENT kg/ha</th>
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**METHODS USED:** Samples are analysed as received at the laboratory using Analytical Services in-house methods as summarised below. More complete details of test methods used are available upon application.

SOIL: pH (1:2.5 soil: distilled water); Phosphorus (Olsen extraction); Extractable Cations (Neutral, IN ammonium acetate); C.E.C. (Sum of exc. bases and acidity); Organic Matter (Dichromate oxidation); Available Nitrogen (Keeney and Bremner, Anaerobic); Lime Requirement (Metson's method); Salts (Conductivity, 1:5 ratio or saturation extract); Phosphate Retention (Saunders method); Reserve Magnesium (Boiling in hydrochloric acid). Soils are air-dried and ground to pass 2mm sieve prior to analysis.

PLANT TISSUE: Nitrogen (Kjeldahl digestion); Iodine and Cobalt (Dry Ash). Other nutrients (Nitric-perchloric acid digestion). Plant tissue results are expressed on a Dry Matter basis.

**ANALYTICAL PRECISION:** Results reported herein have COV's from 3 to 10%, excepting soil Na, C.E.C., Avail. N, Lime Req., Res. Mg, plant Mo, Cu, Se, & I, which have COV's between 10 and 15%.

**TELARc**

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**ANALYST**

[Signature]
**LABORATORY REPORT**

**SOIL TEST RESULTS**

### A. BASIC TEST

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<tr>
<th>SAMPLE NAME</th>
<th>SAMPLE NO</th>
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<th>PHOSPHORUS mg/l</th>
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**METHODS USED:** Samples are analysed as received at the laboratory using Analytical Services in-house methods as summarised below. More complete details of test methods used are available upon application.

SOIL: pH (1:2.5 soil: distilled water); Phosphorus (Olsen extraction); Extractable Cations (Neutral, IN ammonium acetate); C.E.C. (Sum of exch. bases and acidity); Organic Matter (Dichromate oxidation); Available Nitrogen (Keeney and Bremner, Anaerobic); Lime Requirement (Metson's method); Salts (Conductivity, 1:5 ratio or saturation extract); Phosphate Retention (Saunders method); Reserve Magnesium (Boiling in hydrochloric acid). Soils are air-dried and ground to pass 2mm sieve prior to analysis.

PLANT TISSUE: Nitrogen (Kjeldahl digestion); Iodine and Cobalt (Dry Ash); Other nutrients (Nitric-perchloric acid digestion). Plant tissue results are expressed on a Dry Matter basis.

**ANALYTICAL PRECISION:** Results reported herein have COV's from 3 to 10%, excepting soil Na, C.E.C., Avail. N, Lime Req., Res. Mg, plant Mo, Co, Se, & I, which have COV's between 10 and 15%.

**RECEIVED:** 23 Sep. 1985

**ANALYST:** [Signature]
### METHODS USED

- **Sample Testing:**
  - Method: AATCC 62-2000, Soil Stain Fastness Test (Indoor and Outdoor Exposure to Light and Water)
  - Instrument: Colorfastness Meter

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AGRICULTURAL REPORT ON THE ARONA VALLEY

By

H. Lewis
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<td>2.6 AFFORESTATION</td>
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3.0 DEVELOPMENT PREREQUISITES

3.1 MARKETING

3.2 MANAGEMENT COMPANY (AGENCY)

3.3 STAFFING REQUIREMENTS AND BUDGET

3.4 AVAILABILITY OF RURAL CREDIT

4.0 CONCLUSIONS

TABLE MANAGEMENT BUDGET

REFERENCES

Ref. 1
The terms of reference for the report which were received from IAGER in a letter dated 6 September 1985 are:

1. Identify suitable projects (cash crop or otherwise) for village smallholders. Appraise funding and extension service requirements. Nominate the implementing agency.

2. Appraise the advisability and facility of establishing a small-scale agricultural research nursery. Determine land requirements, local land availability and funding requirements. Advise on the continuance or otherwise of the experimental nursery established by Elcom. Make recommendations on the nature of the management and ownership of an agricultural research nursery. Nominate the implementing agency.

3. Determine the feasibility of establishing an agency (company) to provide combined management, research and extension services to embrace both the proposed large-scale cash crop project and smallholder projects. Detail all personnel, infrastructural and service establishment and recurrent costs. Nominate the implementing agency.
SUMMARY

In examining the agricultural requirements for the Arona Valley, account has been taken of the present situation and future developments which can occur. With a mild climate and good rainfall, a wide range of crops and livestock can be grown in the area. The report gives an outline of the short-term, medium- and long-term strategies to be adopted. The people of the area are keen to have development and want help. They are also determined that they will not be ignored.

Consideration has been given to providing the services required. A long-term advisory service is required, which will include management, technical, marketing and accounting.
RECOMMENDATIONS

1. There is an immediate need to increase the extension service that is being provided now.

2. An early decision to be made for the large-scale, cash crop trial establishment, i.e. citrus or tea.

3. An agricultural management company should be appointed within three months.

4. All agricultural extension work to be under the control of the management company to ensure continuity and consistency, with reporting to the authority and monitoring by national DPI.

5. Rural credit to be made available as soon as possible so that a supply of local produce will be available when construction of the dam starts. The availability of agricultural credit specifically for the people of the Arona Valley would be evidence of a determination to redress grievances.

6. The present nursery to continue for the next two or three years. In the meantime, adjacent to the trial plot, a seed production unit of 40 hectares can be established. The whole area would become the nursery site in the future.

7. Two mini cattle-breeding ranches be established from cattle taken from the present herd on the Elcom property. These should be made available at a discount price.

8. Sheep and goats be introduced during the next two or three years.

9. Small pig and poultry projects to be established for more formal sales, together with an improvement in pig and poultry husbandry in the villages.

10. Vegetable production be started as soon as possible. There is a ready market for vegetables now on a regular basis. This would provide a fast income, but guidance must be given on what, when, where and how to grow.
11. When a decision has been made on which major cash crop will be planted, the fullest participation by the people will be necessary. This crop must not be reserved for the nucleus estate alone.

12. Afforestation be carried out. Youth groups can be utilised to do this work. They would be able to earn some money for their efforts. Funding will be required for this work.
1.0

INTRODUCTION: THE NEED FOR AN AGRICULTURAL STUDY

The fact that the government had purchased land for the dam and used it not for a reservoir, as was promised, but as a cattle ranch, is one aspect of the growing resentment of the people of the Arona Valley. These people have high expectations of the resultant economic growth they would receive if the dam was built. A permanent viable economic base must be established. As the people are, at the moment, subsistence farmers with minor cash cropping, a broader agricultural economic base must be provided to the people.

It is realised that the following points are outside my brief to comment upon but are illustrations of some of the feelings of the people and were continually bought out, often forcefully:

- A second payment is forthcoming.
- The payment was not enough as the price of land has gone up and therefore there should be more money paid to the original owners.
- Some of the technicians and supervisors employed by Elcom should be from the Arona Valley.
- Job opportunities must be made available in the first instance to the Arona Valley people and thereafter to outsiders.
- 'We will get free electricity.'
- 'No didiman has visited us.'
A multiple approach to the agricultural development of the Yonki dam area will be needed.

The terrain is uneven from rolling land at the southern end of the valley to steeper land on the western side, with gullies near the dam site which would be unsuitable for cultivation. On the eastern side, there is more gently sloping land with some gullies.

2.1 NEED FOR TECHNICAL ADVICE

Establishment of a large-scale cash crop project will create a focal point for the agriculture in the valley. The nucleus estate will be able to supply both technical advice and processing/outlet facilities for production from smallholders, enabling more orderly marketing and quality control. If the people have a share of the profits from the marketing organisation, then there will be less problems and suspicion that someone else is making a profit from their efforts.

It is absolutely essential that full technical advice be available. Staff will be needed who have technical knowledge of specific crops and livestock, with practical experience and who are able to impart their knowledge, not from the office but among the people, on an on-going basis for many years. Loan finance and supervision will be given to those who request assistance. The people should not be forced to undertake development of their land if they do not wish to do anything.

2.2 RESEARCH NURSERY

An experimental agricultural research nursery as such is not recommended. This would entail a big expenditure if it was to be done properly, and is not seen to be necessary.

A nursery to provide planting materials for the agricultural development of the Arona Valley will be necessary. The present nursery established by elcom could remain for the next two or three years to supply coffee and timber tree seedlings. Sale of seedlings should be made to recover some of the nursery costs.
It would be preferable to establish the nursery near the trial plot. This would make this area the focal point for agricultural activities in the Arona Valley. Forty hectares should be set aside for the nursery. Not all of this area would be required for the supply of coffee, tea, citrus or timber and some of the area would be used for multiplying potatoes, legumes and pasture seed. This nursery would supply the requirements for planting materials for the major crop(s) which will be established.

Citrus and/or tea are under consideration as alternative major tree crops to be established as the nucleus estate (on Elcom-owned land). Owing to a surplus production of coffee in the world, suitable alternative crops must be found (see DPI [Port Moresby] and Department of Foreign Affairs [N.Z.] 1985).

The Land Use Section of the DPI is undertaking a soil survey of the Arona Valley which will have a large bearing on the final choice between either citrus or tea as the major crop, the climate of the area being generally suitable for either. Citrus is already being grown in the area, although only on a scattered and minor scale, in village gardens. The people are already familiar with the crop and provided soil reports are satisfactory, citrus would be the better crop to establish in the area.

As pointed out in the 'Citrus Industry Establishment in PNG' report (ibid.), there are other crops which could be processed through the same factory as citrus. For example: tomatoes, guavas, mangoes, pineapples and other fruits, all of which may be grown within a reasonable distance of the Arona Valley. This would be of considerable benefit as this would broaden the agricultural base and enable optimum use of the land, resources and the processing factory.

Other crops which have a potential for processing should be planted for evaluation adjacent to the proposed trial plot proposed in the citrus report. The nursery for the supply of planting material should be located near the trial plot. Initially this area would supply potato, legume and pasture seeds for sale.

2.3 SHORT-TERM DEVELOPMENT

Of immediate concern is the present state of crops which were planted in past years and the land which is being prepared for planting at present.
2.3.1 COFFEE

Coffee has been grown in the area for over twenty years. This is in various stages of neglect. The growers admit that their production has fallen considerably, but no action is being taken to rectify the situation. Although it would appear that this is of no pertinence to the problem of identifying suitable agricultural projects for village smallholders, it is relevant to the present and future. If remedial and sustained efforts are not implemented, there will be no lasting benefits to the people.

As an example, new coffee is being planted and unless action is taken quickly to improve standards by a sustained and concentrated technical and supportive effort, for a period of some years there will be no benefits to the people. This support will show the people the effort and skills which will be provided with other projects. Coffee is a crop about which they are familiar and which is not 'just' introduced. This will give them added confidence in other projects and in themselves.

A coffee nursery has been established recently and some blocks for coffee planting are being prepared in some villages. The villagers are being helped by the Dam Co-ordinator, Mr Andrew Kgalaua, who is singly covering a large area and undertaking many functions (and doing an excellent job), and is unable to devote sufficient time to any one project. There is also no finance available for fertiliser nor anything else; consequently establishment would be poor, with resultant poor yields in future and loss of confidence.

It is recommended that coffee already planted be rehabilitated and new coffee blocks planned for be planted. No other new plantings should be encouraged until a firm decision has been made on the other major crop(s) to be established.

2.3.2 VEGETABLE CROPS

English potatoes are a crop which can be grown successfully in the area, and together with other vegetables can provide a cash income and employment for the young people. This is especially important and is further covered in Mrs L. Giddings's report (see Vol. 3).

It is recommended that a start be made as soon as possible on this aspect of development if produce is to be available for sale at the start of the construction phase. Surplus can be sold to other areas of Papua New Guinea, and as an on-going
project in the future. Also, by having a wider range and more consistent production of food available, the health of the people could improve.

2.4 MEDIUM- AND LONG-TERM DEVELOPMENT

2.4.2 CATTLE

There have been cattle associated with the Arona Valley for more than twenty years. Apart from the present herd on the Elcóm land, there are some cattle projects owned by village people. The cattle that are in the valley are in good condition and have good potential. Pasture improvement will be necessary. Cattle may run on those areas which are unsuitable for cultivation. It is proposed that two mini breeding ranches of 250 heads of cattle be established, one for the Agarabi and the other for the Gadsup people. The land for the mini ranch would be leased from a village which would receive a rent for that land. The cattle and improvements would be owned by the two groups separately.

Breeding would be carried out on the two ranches. There are problems associated with cattle breeding; for example, the provision of bulls, inbreeding and calving problems. These, together with other problems would be under the control of a manager. Individuals would purchase the cattle in small numbers for fattening and the mini ranches would arrange for marketing them. The number of cattle which an individual or group would have would be in relation to their available feed and ability to look after stock. A period of employment on the breeding ranch should be a requirement before a project is stocked. The manager of the breeding ranch would be the primary advisor to the small fattening projects. Although cattle projects in the past have not been as successful as they should have been, with closer supervision, success can be attained in the long term.

2.4.2 SHEEP AND GOATS

There is a potential for raising both sheep and goats, which could provide a good source of protein. These animals can forage in more difficult terrain than cattle. There are a few goats wandering around, uncontrolled. It will be essential that herding be practised or gardens would be destroyed. With sheep, the danger of wild dogs decimating flocks must be avoided.
2.4.3 PIGS

An improvement in village pigs is necessary and should be carried out as a policy when dealing with general improvement in subsistence agriculture. It is recommended that not more than two small pig-raising projects be established, producing a total of ten porkers per week. Some of them could be sold to the workers' mess during the construction phase; at the same time, sales could be developed further afield.

2.4.4 POULTRY

A poultry egg production unit to supply eggs during the construction stage and for local sales could be established, to produce approximately 300 eggs a day. Improvements to village egg and meat production would be part of general subsistence agricultural improvement. It is not recommended that a broiler production unit be established. There would be insufficient demand to meet the capital required to establish a processing plant.

2.5 OTHER CASH CROPS

It is not recommended that cardamom and cinchona be established in the Arona area, as these crops have a higher value and can be reserved for more remote areas of Papua New Guinea. The higher freight rates which are applicable to these more remote areas can be more readily absorbed by the higher value.

2.6 AFFORESTATION

There are considerable areas of steep slopes and gullies in the Arona Valley which need planting of trees to control erosion (reducing the sediment carried by the water will extend the life of the dam). In future years, these trees can be a useful source of income to the landowners as they may be used on a phased harvesting and replanting basis for firewood and timber.

Suitable trees could be made available from the nursery. An advisory officer will be necessary to give needed technical assistance.

On the western side of the valley where there are already some gullies, it is advisable to pay youth groups to do the planting and some maintenance for the first few years. But it must be made clear that the trees belong to the landowners and not to anyone else.
3.0

DEVELOPMENT PREREQUISITES

3.1 MARKETING

General marketing arrangements of produce will be undertaken by the management company. A company with local shareholders could be formed to undertake the marketing of produce, with supervision provided by the Agricultural Management Company. Orderly marketing of produce which is geared to market demand will result in benefits to all.

3.2 MANAGEMENT COMPANY (AGENCY)

It will be absolutely essential that there is a cohesive, comprehensive and continuous management and extension service. Research will be limited to the evaluation of the major crops to be established in the Arona Valley as mentioned in Section 2.1. A special fund for this evaluation to be carried out will be necessary.

There must be clear directions for the agricultural development to proceed, and policy directions emanating from one source. There have been instances in Papua New Guinea where there have been project personnel going off in different directions. Conflict and confusion have ensued to the detriment of the people to whom the original project was directed. The personnel who will be involved in agriculture, horticulture, livestock and forestry must have policy directions from the agricultural management company. Differences of opinion must be sorted out at top management and not on the ground.

The management company would have a representative on the co-ordinating committee of whatever authority is formed to oversee the Arona Valley development along the lines as suggested in 7.0 of the IASBR study of May 1985 (Walter and Sumanop 1985). The monitoring of the agricultural management company should be undertaken by the national Department of Primary Industry or a suitable body delegated to act on the department's behalf.

It is recommended that the agricultural management company be chosen by tender. Services to be provided would include the following:
(a) extension services for the various crops to be grown;

(b) management services, including marketing, accountancy and purchasing;

(c) research on the major crop(s) to be grown in the area.

3.3 STAFFING REQUIREMENTS AND BUDGET

A broad outline only is possible as much more detailed planning and firm decisions will have to be made, especially in relation to the large-scale cash crop project and the consequent plantings on village land.

The budget outline (see next page) is for a five-year period only and will be subject to review. There will be a need to continue at the outline level for a further five-year period. The introduction of a new major cash crop will require an additional programme of implementation.

In the budget, provision has been made for the purchase of two more tractors and implements to assist faster development. These can be hired out to recoup the costs. A company in which the local people have substantial shares could be formed which would sell farm requirements and market produce on behalf of the growers. A capital sum of K50,000 has been allowed to establish the stock of farm requirements. This company would be managed by the agricultural management company.

3.4 AVAILABILITY OF RURAL CREDIT

The funding requirements need to be assessed on individual merits for each proposed project. These budgets will be drawn up by the management company which is responsible for implementation. Approval of loans would be through the authority or whatever body is created. Although no detailed study has been undertaken, a loan fund of K4 million should be made available for loans during the first five-year period. If a decision is reached before then on the establishment of the large-scale cash crop project, this loan fund limit will need to be reviewed.
### Table 1
Management Budget

<table>
<thead>
<tr>
<th>YEAR STAFF</th>
<th>SALARY (K'000)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>General Manager</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cattle Manager</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extension Manager</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing (Purchasing Manager</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accountant</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office staff</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Block</strong></td>
<td></td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td>Salaries &amp; wages as per citrus budget</td>
<td>32</td>
<td></td>
<td>19</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Junior Staff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursery (1)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cattle (2)</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop Extension (4)</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drivers (4) @K1,800</td>
<td>7.2</td>
<td>7.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labourers - ranches (2)</td>
<td>2.5</td>
<td>2.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labourers - nursery (4)</td>
<td>5.0</td>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **ANNUAL SALARIES & WAGES** | | 178 | 165 | 165 | 168 | 168--

### CAPITAL

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (K'000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing Gen. Mgr.</td>
<td>40</td>
</tr>
<tr>
<td>Housing managers (4)</td>
<td>120</td>
</tr>
<tr>
<td>Housing Junior staff (7)</td>
<td>84</td>
</tr>
<tr>
<td>Housing labourers (10)</td>
<td>30</td>
</tr>
<tr>
<td>Office block</td>
<td>75</td>
</tr>
<tr>
<td>Storage shed 120 sq.m</td>
<td>20</td>
</tr>
<tr>
<td>Vehicles (5 utilities @ K15,000</td>
<td>75</td>
</tr>
<tr>
<td>tractors (2) @ K13,000</td>
<td>26</td>
</tr>
<tr>
<td>Machinery</td>
<td>23</td>
</tr>
<tr>
<td>Seeds, fertiliser, tools etc.</td>
<td>50</td>
</tr>
<tr>
<td><strong>Total Capital</strong></td>
<td>545</td>
</tr>
</tbody>
</table>

### Annual Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (K'000)</th>
</tr>
</thead>
</table>
| Repairs & maintenance | 9--
| 2.5% buildings | 9--
| 10% machinery & tools | 11--
| Fuel | 15--
| Misc. administration, utilities, contingencies etc. | 73 |
| **Total Annual Costs** | 108 | 41 | 41 | 62 | 41 | 285--

**ANNUAL TOTAL**

| | 831 | 282 | 282 | 448 | 285--
The Arona Valley and the surrounding areas have very high agricultural potential. With their location geographically near the centre of Papua New Guinea, the attraction of establishing a new agricultural industry in the form of a citrus industry — supplying in years to come both the home market in fresh citrus and fruit juice and an export market — is of great significance.

The level of management services provided will require review when the choice of the major cash crop is made. The staffing levels advocated would be inadequate to provide the necessary inputs required to get a major new industry established.

An adequate road system, which will be maintained, is required now. This item is not in my brief, but attention is drawn to this because so often it is overlooked.

Due to the circumstances which pertain to the Arona Valley and surrounding areas, there is a unique opportunity to fully develop the potential both of the people and their land. This unique opportunity must not be permitted to pass.
REFERENCES

Department of Primary Industry (PNG) and Ministry of Foreign Affairs (N.Z.), 1985. 'Citrus Industry Establishment in Papua New Guinea: A Prefeasibility Study'.

TOURISM IN THE ARONA VALLEY

By

Charles Lepani
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</tr>
</thead>
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<tr>
<td>Summary</td>
<td>v</td>
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<tr>
<td>Recommendations</td>
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<td>2.0 Survey of International Tourism Market in PNG</td>
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<td>4.1</td>
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<tr>
<td>4.2 Estimates</td>
<td>4.1</td>
</tr>
<tr>
<td>5.0 Ownership and Management</td>
<td>5.1</td>
</tr>
<tr>
<td>5.1 Ownership</td>
<td>5.1</td>
</tr>
<tr>
<td>5.2 Management</td>
<td>5.2</td>
</tr>
</tbody>
</table>
6.0 NATIONAL GOVERNMENT INVOLVEMENT

6.1 GOVERNMENT POLICY ON TOURISM

6.2 TOURISM: A JOINT VENTURE BETWEEN GOVERNMENT AND THE TOURISM INDUSTRY

6.3 A TOURISM AUTHORITY IN THE ARONA VALLEY

7.0 CONCLUSION

PERSONS CONSULTED

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TABLES

1. PNG INTERNATIONAL VISITOR ARRIVALS 1978-1984

2. VISITORS TO PNG BY COUNTRY OF ADDRESS 1978-1984

3. HOLIDAY VISITORS TO PNG 1979-1984

4. BUSINESS, OFFICIAL AND CONFERENCE VISITORS TO PNG 1978-1984

5. AVERAGE ANNUAL OCCUPANCY RATES
TERMS OF REFERENCE

1. Identify the most suitable type of hotel/motel project with estimates of costs and recommendations for management and ownership. Recommend further government action required and nominate implementing agency.

2. Investigate the possibility of establishing a tourism authority in the area. Nominate the implementing agency.
SUMMARY

The Yonki Dam project has socio-economic consequences for the lives of the 24,885 people at Arona Valley. One of the expected benefits from flooding the valley floor area is the creation of a lake which, in turn, is expected to provide recreational facilities such as fishing, boating and an hotel/motel complex for tourism.

This report discusses the general trends in the Papua New Guinea tourism market over the last eight or so years, and relates this scenario to the possibilities of developing a tourism industry at Arona Valley, in particular the establishment of a hotel/motel complex. The report provides estimates of investment costs for a hotel/motel complex, which are in the vicinity of K300,000. The report also advises on the ownership and management of the proposed hotel/motel complex. The company should be owned by the Arona Valley Development Authority as a major shareholder, with other investors such as KKB and Taiga Corporation as minority shareholders. Management should be recruited locally where possible.

The report also discusses what possible government actions at the national, provincial and district levels are required to assist the tourism industry at Arona Valley. It calls for a clear statement of government policy on tourism, and a close co-operative effort with the established tourism industry in Papua New Guinea.

In the Arona Valley, the possibility of establishing an independent tourism authority is remote. Rather, utilisation of existing resources in government sectoral organisations whose functions relate to tourism, such as the Tourism Authority, the Parks and Wildlife Authority, Kainantu Council, would be adequate at this stage. The private tour operators and hoteliers could also be co-opted to promote the Arona Valley area as a tourist attraction once the lake has been established.

The report argues that ultimately the control and co-ordination of tourism in the area be placed under the proposed Arona Valley Development Authority.
In essence, the report argues for a prudent approach in establishing the hotel/motel complex in terms of its costs. The report also argues against the establishment of a tourism authority in the area, as existing agencies and the proposed Arona Valley Development Authority could adequately perform the functions of a tourism authority.
RECOMMENDATIONS

1. The Arona Valley hotel/motel project should proceed to the feasibility study stage before the final decision is taken.

2. The Arona Valley Development Authority should be the majority shareholder with minimum equity of 50 per cent and other investors to include all national companies operating at Kainantu District, as well as Nakondi Investments, the provincial government business arm.

3. Management should also be locally recruited wherever possible and shared management know-how with Kainantu Lodge would be advantageous.

4. The national government should clarify policy on tourism as it affects its commitments to infrastructure, domestic travel costs etc.

5. The private tour operators and travel industry to continue to take the lead in management of tourism industry.

6. The establishment of a tourism authority at Arona Valley is not necessary. Rather, this activity can be incorporated in the proposed Arona Valley Development Authority.
1.0

INTRODUCTION

The Yonki III stage of the Upper Ramu Hydro-Electricity Scheme has created renewed interest amongst the Arona Valley people for some tangible benefits from the project to flow to them. This stage of the project requires the flooding of a substantial area of the valley floor to create a lake and a storage facility for water to supply continuous year-round power generation capacity.

At the time land was purchased from the Arona Valley people in 1970-71, they were told that amongst the socio-economic benefits that they would gain from the project would include recreational facilities such as fishing, boating and the prospects of tourism-related activities. This report discusses the possibilities of tourism-related activities at Arona Valley.

The terms of reference seek to establish the scope or broad parameters of a hotel/motel venture at Arona Valley, when the reservoir is constructed as the next stage of the Upper Ramu Hydro-Electricity Scheme. These parameters include the cost of the hotel/motel, its siting and the management and ownership arrangements.

The terms of reference also calls for recommendations to be made on what further government actions are required, and the nomination of the implementing agency. Lastly, the terms of reference require the consultant to investigate the possibility of establishing a tourism authority in the area, and to nominate the implementing agency.
2.0

SURVEY OF THE INTERNATIONAL TOURISM MARKET
IN PAPUA NEW GUINEA

A discussion of the development of a hotel/motel venture necessitates a survey of the market it would serve. Figures from the National Statistical Office show a very slight increase in the number of international visitors to Papua New Guinea of 12 per cent over the period 1978–1984. However, in the intervening years, particularly for the period 1980–1983, there was a dramatic decline of 18 per cent.

Table 1

PNG International Visitor Arrivals 1978–1984

<table>
<thead>
<tr>
<th>YEAR</th>
<th>NO. OF VISITORS</th>
<th>ANNUAL CHANGE (%)</th>
<th>% CHANGE OVER PERIOD 1978–1984</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>29,939</td>
<td>+9</td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>32,7844</td>
<td>+9</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>38,770</td>
<td>+19</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>35,116</td>
<td>-9</td>
<td>12%</td>
</tr>
<tr>
<td>1982</td>
<td>32,505</td>
<td>-7</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>31,618</td>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>33,642</td>
<td>+6</td>
<td></td>
</tr>
</tbody>
</table>

Source: PNG National Statistical Office

Note: Percentage changes rounded off to nearest 1%

This decline in the number of international visitors to Papua New Guinea could be attributed to several factors, including:

- localisation of expatriate positions in both government and private sectors;
- the adverse effects of the worldwide economic recession;
- the recent nationwide upsurge in crime.
It appears that Papua New Guinea's major overseas visitor markets are Australia, New Zealand, Japan, United States and the United Kingdom.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>18,903</td>
<td>19,681</td>
<td>18,651</td>
<td>18,034</td>
<td>17,262</td>
<td>15,733</td>
<td>15,771</td>
<td>-17</td>
</tr>
<tr>
<td>United States</td>
<td>2,630</td>
<td>2,647</td>
<td>2,326</td>
<td>2,671</td>
<td>3,086</td>
<td>3,176</td>
<td>3,664</td>
<td>+39</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1,670</td>
<td>2,214</td>
<td>2,139</td>
<td>2,261</td>
<td>2,013</td>
<td>2,000</td>
<td>2,086</td>
<td>+25</td>
</tr>
<tr>
<td>Japan</td>
<td>2,264</td>
<td>2,543</td>
<td>4,294</td>
<td>2,192</td>
<td>1,703</td>
<td>1,500</td>
<td>1,525</td>
<td>-33</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1,126</td>
<td>1,430</td>
<td>1,442</td>
<td>1,894</td>
<td>1,850</td>
<td>2,523</td>
<td>3,439</td>
<td>+205</td>
</tr>
<tr>
<td>West Germany</td>
<td>647</td>
<td>1,142</td>
<td>1,266</td>
<td>1,053</td>
<td>800</td>
<td>825</td>
<td>789</td>
<td>+22</td>
</tr>
<tr>
<td>Philippines</td>
<td>476</td>
<td>804</td>
<td>1,021</td>
<td>1,177</td>
<td>922</td>
<td>943</td>
<td>743</td>
<td>+54</td>
</tr>
</tbody>
</table>

Source: PNG National Statistical Office
Note: Percentage changes rounded off to nearest 1%.

The National Statistical Office provides figures for the holiday visitors (tourists) category to Papua New Guinea for the period 1979-1984:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>NO. OF VISITORS</th>
<th>ANNUAL CHANGE (%)</th>
<th>SHARE OF TOTAL VISITORS (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>11,079</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>1980</td>
<td>14,006</td>
<td>+26</td>
<td>36</td>
</tr>
<tr>
<td>1981</td>
<td>10,443</td>
<td>-25</td>
<td>30</td>
</tr>
<tr>
<td>1982</td>
<td>9,739</td>
<td>-7</td>
<td>30</td>
</tr>
<tr>
<td>1983</td>
<td>9,124</td>
<td>-6</td>
<td>29</td>
</tr>
<tr>
<td>1984</td>
<td>8,114</td>
<td>-14</td>
<td>24</td>
</tr>
</tbody>
</table>

Source: PNG National Statistical Office
Note: Percentage changes are rounded off to nearest 1%.
The business, official and conference visitors are the largest single group of international visitors to Papua New Guinea, at least over the last seven years.

Table 4

<table>
<thead>
<tr>
<th>YEAR</th>
<th>NO. OF VISITORS</th>
<th>ANNUAL CHANGE (%)</th>
<th>SHARE OF TOTAL VISITORS (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>9,096</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>1979</td>
<td>11,128</td>
<td>+22</td>
<td>34</td>
</tr>
<tr>
<td>1980</td>
<td>12,686</td>
<td>+14</td>
<td>38</td>
</tr>
<tr>
<td>1981</td>
<td>13,290</td>
<td>-5</td>
<td>38</td>
</tr>
<tr>
<td>1982</td>
<td>13,130</td>
<td>-1</td>
<td>40</td>
</tr>
<tr>
<td>1983</td>
<td>12,285</td>
<td>-6</td>
<td>39</td>
</tr>
<tr>
<td>1984</td>
<td>13,058</td>
<td>+6</td>
<td>35</td>
</tr>
</tbody>
</table>

Source: PNG National Statistical Office

Note: Percentage changes rounded off to nearest 1%.

Once again, the annual decline in the business category of visitors to Papua New Guinea is marked for the period 1980-1983. However, this category has maintained its share of the total visitor market at a relatively stable level for the period 1980-1983.
3.0 PROSPECTS FOR AN ARONA VALLEY HOTEL/MOTEL PROJECT

3.1 THE DOMESTIC MARKET BACKGROUND

Internal travel cost has been a major constraint to the ability of residents, as well as visitors, to travel within Papua New Guinea more extensively. There are no figures available for the resident tourist market. However, it could be assumed that income level is the major determinant of travel and recreation, which would then include expatriates and affluent nationals as potential tourists.

Unfortunately, there are no statistics for the regional or town-by-town distribution of the three categories of visitors once they have entered Papua New Guinea. However, broad conclusions can be drawn from the tables. Firstly, the largest visitor group is the business, official and conference category. This category would most likely limit its travel to the two major cities, Port Moresby and Lae, or to a few other urban centres of commercial, industrial and governmental significance. This group of visitors maintains its share of total visitors to Papua New Guinea at a relatively stable level. However, the Arona Valley hotel/motel may not attract a significant number of such visitors.

The second largest group of visitors is the holiday visitor. There are regions in the country which are marketable to such group, and the Highlands region is one of the most interesting for an overseas visitor. Arona Valley may stand to benefit from such a market.

The third category of visitors to Papua New Guinea is the group with relatives and friends resident in the country.

3.2 THE CONFERENCE MARKET

The Arona Valley hotel/motel venture would be an ideal government and private business conference centre. The Eastern Highlands Provincial Government and the national government could take advantage of facilities and the out-of-the-way environment for Cabinet meetings. Government agencies and business executives involved in industries related to agriculture and hydro-electricity could well find the Arona Valley hotel/motel an appropriate location to convene conferences, as it is close to the Ramu Sugar processing mill, the Yonki Dam and various agricultural industries in the Eastern Highlands.
3.3 KAINANTU LODGE EXPERIENCE

Kainantu is the closest centre to Arona Valley with a hotel/motel establishment. The IASER Social Impact Study (Walter and Sumanop 1985) provides some figures as to the actual composition of clients by category, and room occupancy rates of Kainantu Lodge. The guests are divided into the following categories:

- 1/3- Resident tourists (escaping coastal heat)
- 1/3- Friends and relatives visiting Kainantu
- 1/3- International tourists

Room occupancy rates are as follows:

- the more expensive motel rooms: 50 per cent
- the cheaper lodge rooms: 20 per cent.

An occupancy rate of 38 per cent is maintained throughout the year. The motel wing has ten rooms and the lodge has seven rooms (ibid.:10).

3.4 SITING OF THE PROPOSED HOTEL/MOTEL

The land reserved for recreation and hotel/motel development in Arona Valley consists of 56.58 hectares designated as Portions 153, 185 and 186.
4.0
COST ESTIMATES FOR A PROPOSED HOTEL/MOTEL

4.1 ASSUMPTIONS

It is assumed that at least in the foreseeable future, the size of the hotel/motel would be limited to a fifteen-room complex initially, given the outlook on the demand. Such a complex should be architecturally designed to merge with the traditional housing concepts and even utilise local materials for the facade.

4.2 ESTIMATES

The estimates for the proposed hotel/motel are as follows:

(a) Accommodation

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 rooms of 4x 8m = 32 sq.m @ K300/sq.m</td>
<td>K144,000</td>
</tr>
<tr>
<td>Optional verandah and awnings 270 sq.m @ K120/sq.m</td>
<td>32,000</td>
</tr>
</tbody>
</table>

(b) Service Facilities

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dining hall (8x8m = 64sq.m)</td>
<td></td>
</tr>
<tr>
<td>Bar (3x8m = 24sq.m)</td>
<td></td>
</tr>
<tr>
<td>Office/reception (3x8m = 24sq.m) = 160sq.m</td>
<td></td>
</tr>
<tr>
<td>Kitchen/laundry/cool room @ K350/6x8m = 48sq.m</td>
<td>56,000</td>
</tr>
</tbody>
</table>

(c) Conference Room/outdoor entertainment area (6x8m = 64sq.m @ K120/sq.m)

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conference Room/outdoor entertainment area</td>
<td>5,750</td>
</tr>
</tbody>
</table>

(d) Furnishings

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnishings</td>
<td>25,000</td>
</tr>
</tbody>
</table>

(e) Extras

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscaping foreshore developments/fencing</td>
<td>20,000</td>
</tr>
</tbody>
</table>

ESTIMATED TOTAL DEVELOPMENT COSTS K282,760

Note: Cost estimates provided by Paul Frame Architects and Cardno Davies Engineers, Goroka.
The project could cost up to K300,000. This consultant also sought cost estimates from a large Goroka construction company, Summerscales and Lambert, and their cost figures per square metre seem to be reasonably close to those of Frame Architects and Cardno Davies Engineers.

The following estimates were provided for housing construction in the Goroka and Kainantu area by S&L Builders:

- High standard executive-type house - K450/sq.m
- Basic prefabricated (unlined) house - K150/sq.m
- Prefabricated (line) - K350/sq.m

A ball-park estimate of cost per square metre for accommodation of a standard equivalent to Kainantu Lodge was given at K400 per square metre. Given the brevity of time (only two weeks) for this study to be completed, it is not possible to do justice to the Arona Valley hotel/motel project. One of the primary concerns of the terms of reference is 'to identify the most suitable type of hotel/motel project', which implies viability. This critical area needs to be further evaluated with a rigorous analysis of the financial economic viability of the project.

The conservative number of rooms recommended (15) for the Arona Valley hotel/motel is based on annual average figures of room occupancy rates for all accommodation establishments in Papua New Guinea, compared to that of the Kainantu Lodge. They clearly indicate that Kainantu Lodge occupancy rates are well below the national annual occupancy rates.

Table 5

<table>
<thead>
<tr>
<th>Average Annual Occupancy Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotels PNG</td>
</tr>
<tr>
<td>Hotels &amp; guest houses (all)</td>
</tr>
<tr>
<td>Port Moresby hotels</td>
</tr>
</tbody>
</table>

Source: Office of Tourism statistics 1980
(No recent figures are available after 1980)
5.0
OWNERSHIP AND MANAGEMENT

5.1 OWNERSHIP

There are several possible options available for structuring ownership of the proposed hotel/motel project. Firstly, as the Arona Valley people should be the major beneficiaries of developments in the area, the proposed Arona Valley Development Authority could be the sole owner/investor in the project. The cost estimates require the authority to invest up to K300,000 in developing the complex. The question of the ability of the authority to solely finance this investment is one of the considerations, given its commitment to the large agricultural project. In other words, the board of the authority would need to plan its investment projects in terms of timing as to when to commence them, in relation to its funding capability.

Secondly, the project could be jointly owned by the various national companies in Kainantu District, with some ownership allowed for Nokondi Investments, the business arm of the provincial government. The obvious investors would then be the Arona Valley Development Authority, Taiga Development Corporation, KKB and Nokondi. Nokondi has investments in thirteen companies ranging from the minimum 8 per cent ownership in two companies to 100 per cent in three of the companies, according to the 1984 chairman's report. KKB has a number of investments in other companies in Papua New Guinea and overseas, as well as two subsidiaries. Taiga Development Corporation is a village-group corporation, also investing in companies in Papua New Guinea.

All these companies have the financial backing at least to fund an investment such as the hotel/motel project. One of these companies, KKB, has indicated a willingness to invest in and manage such a project.

Given the financial burden that faces the Arona Valley Development Authority, at least initially, and the inexperience in operating such a venture as the hotel/motel project, this consultant sees a reasonable proposition in an ownership structure wherein the authority may own 40 per cent of the venture, while the other three companies could perhaps own 20 per cent each. Another possibility is a 60-40 ownership agreement with the authority owning 60 per cent of the venture.
There are several advantages to this ownership arrangement in that KKB has an established track record in ownership of the Kainsantu Lodge, and could share its knowledge of the trade with the authority and the other partners in ensuring a successful venture. Furthermore, the companies all share a common development objective of progressing communal business endeavours in the Eastern Highlands in general, and the Arona Valley in particular.

While competition is an admirable means of ensuring efficiency, too much competition brought about by separate ownership could jeopardise the survival of both enterprises, given the limited market, at least for the foreseeable future. The joint board of directors of the Arona Valley hotel/motel project would be appointed by the individual boards of the companies owning the hotel/motel, with voting powers governed by the proportion of equity in the venture.

5.2 MANAGEMENT

Having a common ownership, both the management hotel/motel could work towards an aggressive marketing policy to entice visitors to their localities. Both have basically similar services to sell in most aspects of their marketing, and are physically in close proximity in order to share facilities.

The Arona Valley hotel/motel, however, would have the lake as a significantly more attractive product to sell. The authors of the IASER Social Impact Study (ibid., 5.11) describe the following scenario as the main attraction for the Arona Valley hotel/motel:

...Though we assume the waters of the lake will be muddy and not the crystal clear of a high mountainous lake, the reservoir should nevertheless be an attractive site nestling in the picturesque Arona Valley...a belt of casuarina trees or similar tress would add to its beauty...the obvious attractions for tourists would be swimming, boating, fishing and whaling.

In order to promote and market such a product effectively, the manager of Arona Valley hotel/motel must be one whose experience and knowledge in managing such a resort would have to be extensive and proven. Given the particularly unique local political environment in Arona Valley, the management of the hotel/motel would need to exercise skill in their public relations with the Arona Valley people.
Training of nationals would be a major responsibility of the manager. The manager may be recruited locally or internationally. However, attempts should be first made to recruit locally so that there is the added advantage of the manager having some knowledge of Papua New Guinea before assuming the duties and responsibilities of the job.

The projects officer (commercial) of the proposed Arona Valley Development Authority should liaise with the manager of the hotel/motel to maintain a day-to-day monitoring of the venture. However, policy directives must only come from the board members of the authority on the board of the hotel/motel company, along with the other hotel/motel board members.
6.0 NATIONAL GOVERNMENT INVOLVEMENT

Hotel/motel ventures are closely allied with the tourism industry. In examining further government action for the proposed Arona Valley hotel/motel venture, several comments need to be made.

6.1 GOVERNMENT POLICY ON TOURISM

The Papua New Guinea Government has not accorded tourism a priority area for attention since independence. The government established a national Office of Tourism, which in effect was mainly an information centre with a low budget allocation of K20,000 and insufficient staff. The office was closed in 1981 by the government. Recently a new tourism authority was established. As of this writing, the Cabinet approved budgetary allocation of K106,000 for the secretariat in order to recruit staff and fund other establishment costs. As yet, these funds have not been released.

However, the European Economic Community has approved an aid-funded technical assistance project wherein an expert was expected to arrive in January 1986, to review tourism needs of Papua New Guinea and make appropriate recommendations for the promotion of tourism. The move is in the right direction as far as revitalising tourism interest in Papua New Guinea. The government has been ambivalent about tourism mainly because of concern about the potential negative effects of tourism on the rich diverse cultures of Papua New Guinea. However, a well-articulated and well-administered policy on tourism could provide the basis for the future of the industry in Papua New Guinea.

The recognition by the government of the importance of defining policy on tourism by committing funds to the establishment of a Tourism Authority is a further indication of this move to promote a tourism industry.

6.2 TOURISM: A JOINT VENTURE BETWEEN GOVERNMENT AND THE TOURISM INDUSTRY

In respect of the Arona Valley hotel/motel venture, the Eastern Highlands Provincial Government, the Kainantu Council and the proposed Arona Valley Development Authority could contribute to
the national government effort by initially promoting tourism attractions and the rich culture of the province. Tourism throughout Papua New Guinea is left to individual tour operators to organise and basically promote. In discussions with these operators, they express their preference for the 'up-market' tourists from the United States, West Germany and Japan. A co-ordinated and well-planned tourism effort between various levels of government, agencies and private tour operators, through their newly established tourism association, could be a constructive first step. The roles should be clearly defined. The government at various levels and agencies should concentrate their efforts on defining policy and establishing infrastructure, such as parks, cultural events, village businesses selling artefacts, cheaper travel costs etc. The private sector should arrange tourism packages.

It is alleged by some in the industry that 'tour operators' and travel agents are not, in the main, well trained to manage and operate tour ventures, due to their attitude that making profit margins is more important than attending to consumer needs. These are all issues on which a co-ordinated effort between government and those in the industry could focus their attention.

Such efforts should permeate to the district and provincial levels, as previously mentioned. Madang Province has been outstanding in efforts at promoting tourism, mainly due to co-operation between the provincial government and one major tour operator.

It is the view of this consultant that tourism and tourism-related activities, such as hotel accommodation and travel, are a shared responsibility between the government and those in the industry. This consultant therefore recommends that the various policy issues raised here could be adequately co-ordinated by existing government agencies involved in the sectors relating to the policies. The tourism authority should, in conjunction with the Department of Finance and Planning, be able to draw a comprehensive tourism policy and seek the co-operation and assistance of the industry operators to implement the policy.

6.3 A TOURISM AUTHORITY IN ARONA VALLEY

Research and inquiries with the Eastern Highlands Provincial Government, tour operators and hoteliers indicate that a tourism authority in the Arona Valley would not be advisable due to the limited size of the tourism market relative to the cost of establishing and operating such an authority. This consultant concurs with this view.
It is argued that while the lake and its associated recreational activities may prove unique in the Highlands region and adjacent coastal provinces, it may not be an attraction with sufficient appeal to command tourism demand on a large scale, thus requiring a separate tourism authority. Further, commitment of public funds to tourism should await the outcome of the EEC consultant's report, due next year.

Once again, this consultant recommends utilisation of the existing government agencies, tour operators and hotels, to promote tourism in Arona Valley. More appropriately, as the proposed Arona Valley Development Authority is established, it should take on the function of a tourism authority in promoting the lake and its associated recreational activities, ensuring that surrounding Arona Valley residents participate in tourism-related activities, such as cultural shows, and in co-ordinating with the Madang tour operators for cruise ship passengers to take a day's trip to Arona Valley, for instance.

This function need not require extra staff! It could be placed within the management function of Yonki township as a section of that function (see C. Lepani, 'Report on Proposed Arona Valley Development Authority', this volume).
7.0

CONCLUSION

The findings of the report on the existing tourism market in Papua New Guinea, and the trend over the last eight years or so, are not encouraging. While there is a sense of urgency to ensure that Arona Valley people are provided with opportunities to enjoy the spin-off benefits of the Yonki III Dam project, there is a risk also of entering into ventures which may adversely affect such good intentions.

Therefore, the hotel/motel venture needs a careful and thorough feasibility study made on its financial and commercial viability. Ownership of the venture should be vested on the Kainantu District investors. The government at provincial and national levels needs to ensure that a clear policy of tourism is formulated. In this regard, it is encouraging that an EEC-funded tourism consultant is reviewing the tourism industry and assisting the government in formulating such a policy.

The report does not recommend the setting up of a tourism authority in Arona Valley in the foreseeable future due to resource constraints. The proposed Arona Valley Development Authority may assume responsibility of co-ordinating tourism activities and assisting the government at provincial and national levels in formulating a tourism policy as it affects the lives of the Arona Valley people.
PERSONS CONSULTED

John Brogan, Manager, Trans Niugini Tours, Port Moresby

Barry Corrin, Managing Director, Kainantu Kausel Bisnis, Kainantu.

Cardno Davies Engineers, Goroka.

Paul Frame, Architect, Goroka.

Arthur Jawodimbari, Secretary, Department of Culture and Tourism, Waigani.

Oseah Kawa, Assistant Manager, Summerscales and Lambert Pty Ltd., Goroka.

Chris Talie, Secretary, PNG Tourist Association

David Tannenbaum, Manager, Pacific Expeditions, Gordon.
REFERENCES


