

CHAPTER 8 - TRANSPORT INFRASTRUCTURE

CHAPTER 8. TRANSPORT INFRASTRUCTURE.

8.1 Introduction

This section looks at existing transport infrastructure network and farm infrastructure in the five selected province namely; Central Province, Morobe, Madang, East Sepik and the East New Britain Province. In particular, accessibility whether by road, air or sea transport, infrastructure such as resource center, storage facilities and irrigation potential and prospects were ascertained.

The five studied Provinces are depicted on the attached locality map of PNG.

8.0.1 Transport Infrastructure.

The provision of an adequate transport network amongst others is central to the delivery of public infrastructure and services and the promotion of economic activities. For effective government services delivery, in particular rice extension services, passable road networks are critical. Transport is cited as one of the principle constraint to social and economic development in the five surveyed province. Government officers complained that they cannot conduct extension and supervision activities and business because of the high cost of transport. Most of the surveyed districts road networks are in poor conditions and are impassible during wet seasons.

8.0.2 Existing Situation

To determine the existing infrastructure situation of the areas covered under the study, investigation into the transportation network, storage facilities, and the actual farm facilities infrastructure such as the irrigation systems was undertaken.

8.0.2.1 National Roads.

The road network in each province is made up of both the National and Provincial roads. The national roads are the National Highways and roads leading to National Institutions such as prisons, National High Schools etc or connect one provincial capital to another.

National roads are funded and maintained by the National Government, through the National Department of Works. The national maintenance expenditure has declined in the past years to such a state that in the last couple of years, many national roads have deteriorated to an extent that the roads are impassable during the wet weather.

The Department of Works requires a minimum of 25 million kina annually to properly undertake planned maintenance required on all national roads. This year (2002) allocation of ten million kina is considered insufficient to undertake the minimum planned maintenance required for each of the national roads network.

The planned maintenance items used by the Department of Works are:

- i) Routine Maintenance - maintenance undertaken periodically during the year to keep the road in good condition. The activities in routine maintenance include pothole patching, vegetation control or grass cutting, drainage cleaning, patch gravelling etc and is usually undertaken by the day labour force of the department.

- ii) Periodic Maintenance - large maintenance projects undertaken periodically say every four to five years to upgrade the roads to the basic required standards. This includes regravelling and resealing etc.
- iii) Emergency Maintenance - maintenance activities undertaken when the road is closed due to flooding, landslips etc. These are undertaken when the road becomes impassable due to emergency circumstances.

8.0.2.2 Provincial Roads

Provincial roads are funded and maintained by the Provincial Governments. However, inadequate funding in the last five to ten years has prevented implementation of programmed maintenance works done as such to these roads. Any maintenance works done are on an adhoc basis and an emergency requirement only. This approach again is dictated by funding availability.

Another source of funding is through the Member of Parliament's allocation of rural development. However, this source of funding is very competitive and only a fraction is used for road maintenance.

8.0.3 Future Road Development Plans.

For this development study, the national highways to each of the local districts will be assessed and any development projects planned will be determined from plans and information obtained from the relevant departments and or Transport and Works.

8.0.3.1 Farm Roads.

The access to the farm, either from the village road or, the national highway, becomes a private road, and the farmer is responsible for the maintenance of this road.

During the study, the road to each of the selected villages, and then to the model farm, was assessed to determine its usability as to whether the road is only dry-weather or all-weather access.

As the model farm must be accessed during all types of weather, any improvement works required to upgrade the road to all-weather road will be determined for both the village and the farm access road.

8.0.3.2 Storage Facilities

Storage infrastructure (for grain, tools and equipment, chemicals etc), requirements was investigated, and requirements determined by discussions with respective farmers. It is envisaged that construction of storage facilities will observe and use appropriate resources and technology so that it can be easily maintained and sustain over longer period of time. The use of affordable and easily accessible materials will be paramount considerations. To this end we have used standard or modeler designs for local firms to construct storage ad milling facilities at the Resources Centres.

8.0.3.3 Irrigation Infrastructure

The different sites may differ in regards to the availability of water or type of water source for irrigation. Likewise suitable approaches will be proposed to suit the same. For instance some model farms may require open channel, gravity water conveyance systems, others will require mechanical lifting devices to lift water to the farm. The capacity required will depend on area of farmland and the scale of production.

8.0.4 Surveys and Design.

The amount of topographic survey required for each site will be dependent on the areas of the farm and water source etc. It is not possible under the constraints of the study to undertake full topographic survey for each model farm selected. The cost of full topographic survey is K1,500.00 per day for a survey team, plus, additional cost for travel, accommodation, subsistence, drafting and information processing etc.

Survey were limited to site observation, measurement and GPS readings.

Any large farm or infrastructure development will require detail topographic survey and design to provide functional and economic structures and systems.

8.1. Central Province.

Central Province hosts both the nation's capital as well as the Province's headquarter and is accessible by air from anywhere in the country, and from overseas. It also has excellent port facilities to handle the demanding local and overseas sea freight, and the occasional tourist liners.

8.1.1 Transportation Network/ Infrastructure of Study Sites.

Two areas of interest for the study were the Abau District and the Kairuku district. These two districts, on the extreme end and opposite to each other in the Province, are linked through Port Moresby by the Magi and Hiritano highways respectively. Hiritano Highway infact connects the Province to its neighboring Gulf Province as well.

8.1.1.1 Abau District

In the Abau district the only available mode of transport is the road network. The other means of transportation such as, air and sea are non-existent. However, smallcraft sea transport is used, when land transport is difficult due to bad road conditions. The Kupiano and Lalaura airstrips have since been closed for the last ten years.

The only means of transport is by road. Both the National Government and the Provincial Government are responsible for these roads. However to date as is the story nation wide, these road have been neglected.

8.1.1.2 Kairuku District.

The Kairuku district can be accessed by both sea and land transport. Sea transport is used mostly for log ferrying from the Oroi logging camp to Port Moresby. The general population and the business communities uses road as the only ideal means of transport. The road that connects the district to the main commercial and business center is the Hiritano Highway which falls under the national road category.

8.1.1.3 Storage Facilities and Irrigation Potential

Tutubu villages does not have large scale irrigation potential as it does not have large surface water or rivers. Ground water table is very high, which could be used, however mechanical lifting will be required. Ground water near the sea may also be highly saline.

Amau has a large river and irrigation of large area has good potential.

Kubuna in the Bereina District also has large river with low gradient and irrigation will require mechanical lifting. The proposed demonstration farm will require river intake and pressure main to deliver water to the farm.

8.1.2 Present Conditions of Transport Infrastructure.

The road conditions are discussed as observed during the field trips. The conditions may have changed for the better or worst depending on whether or not maintenance activities have been undertaken.

8.1.2.1 Magi Highway.

The Abau District is accessed from Port Moresby by a national highway, the Magi highway. Amau village, the furthest of the two targeted villages is located along the highway approximately, 230kms east of Port Moresby.

Magi Highway can be classified as a highway standard and all weather road. The road is sealed only from Port Moresby to Kapakapa/Hula junction covering a distance of approximately 75kms. From the junction to the Kemp Welch river, the road is unsealed, poorly maintained, and is impassable during the wet weather.

From Kemp Welch river bridge, the road is sub standard chip sealed to before Lebogoro village, a distance of 17kms. From then on, it is gravel road to Kupiano junction and then continues on to Amau river bridge, a distance of approximately, 230kms east of Port Moresby.

From Keau, the end of AusAID funded construction project, to Kupiano junction, the road is impassable during wet weather, due to a number of washed out culverts and ponding on the road. Four major culvert covers and headwalls have been washed out. The washed-out sections remains exposed. The continued use of that section, means driving over the top of the culverts which has resulted in the distortion of the Armco pipes.

From Kupiano junction to Tutubu junction, one major culvert crossing has been washed out. This section is also impassable during flooding.

The section of road from Tutubu junction to Amau is an all weather access road, however, the road is now only one lane width due to lack of maintenance.

8.1.2.2 Tutubu Access Road.

The road to Tutubu serves both Lalaura and Tutubu villages. The road from the Magi Highway junction to the Tutubu/Lalaura junction is 7kms all weather access road; however, there are two locations where a new 900 mm diameter culvert is required. The two kms road from the Lalaura junction to Tutubu village is an all weather road which traverses a flat terrain.

The access road requires general maintenance, including the following:

- i). Clearing of vegetation and table drains,
- ii). Excavating, laying and backfilling of two 900 mm diameter culverts, and
- iii). Re-graveling of selected sections of the road.

8.1.2.3 Hiritano Highway.

The Hiritano Highway accesses the Kuni LLG area. The Hiritano highway currently stops at Malalaua. From Malalaua to Kerema, the road is impassable in most locations.

Our area of interest is Kubuna and Bakoiodu. The Kubuna and Bakoiodu junction along the Hiritano Highway is located approximately, 123.8kms west of Port Moresby. The section of road from Laloki to Brown River was upgraded and sealed in 1982. Apart from some potholes, the road is generally in good condition. The Brown River to Veimauri section, a distance of 28kms, was upgraded and sealed in 1990 and is in good condition. The section from Veimauri to Mariboi has had no major upgrading, however, the road was formed and sealed. The road is narrow and is badly potholed in some sections. A 2.4km section was formed and sealed in 2001.

From Mariboi to the Kubuna turn-off, the road is unsealed. No major failures were noticed, however, the road is very rough due to large river gravel road sub-base and lack of routine and periodic road maintenance on the Mariboi to Hisiu creek section of the road. The section of road from Hisiu turn-off to Logging road turn-off at Vanuamai, there are a number of failed sections of road, including sections without gravel where it would be difficult to pass during wet weather.

From the logging road turn-off to Yule Island turn-off and then to Kubuna turn-off, the road is maintained by the Logging company and is in a good condition.

A short stoppage at the Kubuna/Hiritano Highway junction



8.1.3. Problems of Transportation and Traffic.

The immediate problem of transportation is the current road conditions and the unavailability of Public Motor Vehicles to transport people and cargo to and from Port Moresby. Sea transportation using small crafts is very costly and is avoided by the population.

8.1.4. Directions For Development of the Existing Transport Network.

The maintenance of the National roads such as the Magi Highway is the responsibility of the National Government, through the Department of Works and implementation.

8.1.4.1 Road Maintenance Projects for the Magi Highway.

The Department of Works has three maintenance projects in various stages of implementation programmed for year 2002. These projects are:

8.1.4.1.1 Kapakapa Junction to Kemp Welch River Bridge.

The maintenance project for this section, funded by AusAid has been tendered, and the contractor, Dekenai Company, has already commenced on the works in June 2002.

8.1.4.1.2 Magautou to Keua Section.

This section of the road, a distance of 23kms, funded by the AusAid is also currently under construction by Dekenai Company. The works involves provision of 200mm of road sub-base, overlay and replacement of some existing culverts, including appropriate headwalls and outlet lined drains. The contract also include construction of 18m C200DS bailey bridge for Kwikila and maintenance of eight other bridges including the Kemp Welch and the Ormand river bridges.

8.1.4.1.3 Keua to Amau Section.

The road maintenance unit of the Department of Works is currently awaiting funds to commence the maintenance project which will be funded by the PNG Government to cover the section from Keau to Kupiano junction and continue to Amau. The extent and scope of works will depend on the amount of funding for the project. This project is expected to commence in April/May 2002.

Four washed-out culverts were observed in this section of road, including a number of locations with water ponding, due to lack of maintenance of the road side drains, and culvert in-lets and out-lets.

8.1.4.1.4 Road Maintenance Projects for Hiritano Highway.

The Department of Works has only one maintenance project, programmed for year 2002. The project is the planned upgrading and re-gravelling of the Hisiu junction to the Kubuna road junction, which was awarded to a local contracting company to undertake.

8.1.4.1.5 Kubuna to Bakoiodu Road.

The section of road from the turn-off to the old Mission Station plantation traverses an undulating and hilly terrain. The road is in good condition as the Logging company maintains the road. The road from the Old Mission plantation, to Kubuna Mission which is a distance of approximately 6kms, requires some maintenance, including replacement of decking of an existing bridge.

At Bakoiodu Mission, the road crosses the river via a low-ford crossing which leads to Idoidoi village. The ford crossing requires some programmed maintenance works to open the culvert blockages and prevent complete washout due to erosion of the eastern approach.

The section of road from Idoidoi to Bakoiodu, a distance of a further 18kms climbs gradually and is very rough due to erosion and lack of maintenance.

8.1.5 Summary

Both Magi and Hiritano Highways have not been maintained adequately in the past resulting in parts of these two highways becoming impassable during wet weather. At the time of the completion of this Report, contractors, through AusAid funding assistance, have already commenced maintenance works on the two highways.

The district roads are in no better shape, except in the Kairuku district where a logging company is maintaining a particular road for its own interest as well.

The storage facilities are quite simple, while irrigation potential appears to be good for Amau and Kubuna.

8.1.6 Road infrastructure Mapping.

The inserted maps, illustrates the surveyed Abau and Kairiku districts road networks. The proposed Kubuna Rice Resources Centre projects are detailed in the Appendix of this report respectively.

8.2 Morobe Province.

Morobe Province can be reached by air from anywhere in PNG. It is also connected to the Highlands region by the Okuk Highway, and to the Madang Province by the Ramu Highway (Lae/Madang road). Being a maritime province, it is also well served by both overseas and local passenger and cargo vessels.

8.2.1 Transport Infrastructure Network of Surveyed Sites.

The two areas of interest to this survey were the Finschaffien and the Lae Districts.

8.2.1.1 Finschaffien District.

The transportation network basically consists of the three modes of transportation: land transport in and between areas easily serviced by the main supply route; the maritime transport along the coastline of the district, and air transport into areas where accessibility by road transport is non-existent. The main Finschaffien Airstrip at Gadigu has been closed for *some time now, and not in use.*

The district is accessed by only air and sea transport. Although the two districts share a land boundary. There is no road link between the and maritime transport is the only means of transport between Lae and Gadigu, the District Headquarters of the Finschaffien district. The Lutheran Shipping Company operates a regular six day schedule between Lae and Gadigu.

8.2.1.2 Lae District.

In the Lae District most people use Road as the means of transportation of goods and services and entertainment. The areas to the South-East and North-East of Lae city, use the sea lanes to transport people, goods and services between locations in the coastal areas of the district.

In the both districts above, land transport is via a network of both national and provincial network of roads.

8.2.1.3 Storage Facilities and Irrigation Potential.

The target villages studied in the two Districts lack proper storage facilities. In terms of irrigation potential, the Three and Four mile farmers in Lae District already have in place, a gravity open channel irrigation system. For the farmers surveyed in both Finschaffien and Poahum, assistance of a mechanical lifting device for irrigation is considered appropriate and will be required.



One of the seasonal creeks that provide irrigation water for lowland rainfed rice plots. 3-5 mile Lae district, MP

8.2.1.4 Provincial Rice Resource Center.

Provincial Rice Resource Center was identified at, 3 Mile, within two distinct facilities, and close proximity to each other, are discussed below.

8.2.1.4.1 National DAL In-Service Training College

Although this facility was used in the past by the National DAL to run DAL related courses for its extension officer's nation-wide, is no longer used for this purpose. Other Government Departments and private groups use it to host conferences, training seminars/workshops and other short-term courses for their staff.

The college consists of classroom facilities, accommodation facilities for 40 participants, mess and kitchen facilities, an entertainment area and an office facility for the support staff with the necessary office equipment. It also has ample vacant land area for use as rice demonstration plots and etc if required.

The facility is within the Lae city limits, and can be reached without any difficulty. It has a 24hrs power supply from ELCOM, and other utilities like water, sewerage and telephone services including the internet services are available and operational.

Presently, the facility is being manned/managed by an Officer-In-Charge with two Assistants.

8.2.1.4.2 Provincial DAL Facility.

Provincial DAL facility at 3Mile, is directly opposite the above National DAL college, with the Highlands Highway separating the two. The facility has been used in the past by the Provincial DAL to train its provincial staff. Because of the reforms in the Provinces, all, but one, staff has been posted to the respective LLGs

The facility has an office building, two staff houses, and two hardstands, less the super structures. It has power, water and telephone services. However, the telephones have been

disconnected due to non-payment of bills. Presently, the facility is in use and has been left to deteriorate to an extent, where the office building needs full R&M, and engineer services resurrected to be able to operate to its original capacity.



3mile- Lae MP- Section as the existing DAL station which is proposed to be upgraded to Provincial Rice Resource center

Details of infrastructure improvements required are detailed in Part II of this report.

8.2.2 Present Conditions of Transport Infrastructure

8.2.2.1 Finschafften Highway.

Finschafften the district headquarters is not connected to the Provincial Capital Lae by road. The road network in Finchafften is a local road network, which connects the main villages to the district headquarters and the seaport.

The road that leads to both Wareo and Salodi, the target villages, is the Finschhafen Highway (F/Hwy), which commences at Gadigu, the District headquarters. The two target areas of study as above are located 18 to 20 kms off and to the left of the Highway at Km 20 from Gadigu in the easterly direction.

The Finschafften Highway is standard all-weathered, National Highway running east from Gadigu. This unsealed highway has been reasonably maintained; in fact, at the time of the visit, there was evidence of recent maintenance work been carried out under the National road maintenance program.

However, during the wet weather, two low-level river/creek crossing can make this highway impassable for short periods of time due to flooding.

8.2.2.2 Wareo Access Road.

The road to Wareo serves both Salodi and Wareo village areas. At approximately Km 20 from Gadigu, the road to both Wareo and Salodi branches off to the left from the F/Hwy. From this junction, the road quickly rises to about 400m above sea level, traversing a hilly country, through kunai grass and secondary growth; with patches of rainforest in between. This 20kms of road is poorly maintained, and is therefore impassable during the wet- weather period. This access road requires general maintenance, including the following:

- i). Clearing of vegetation and table drains.
- ii). Regravelling of the entire road length.
- iii). Reducing gradient at selected section of the road.

8.2.2.3 Bukawa Highway.

Bukawa Highway (B/Hwy), is considered as the Main Supply Route (MSR), serving the population alongside, including Poahum (or Last Kunai as is more commonly known), one of the target areas for the study. Poahum is 13kms to the east of Lae city, using the Kamukumun /Unitech / Bumayong High School route. Alternate route is via the Malahang Industrial Centre, and is approximately the same distance as the former route; where the both meet at Bumayong market before crossing the DSB Bridge, over the Busu river. Of the two routes above, the latter one seems to provide better riding comfort as it has been recently sealed, and therefore, has no pot-holes.

B/Hwy is urban arterial standard, all weathered road, sealed from Lae to Igam Barracks junction, a distance of 6kms. Section of road from this junction to Busu river, a distance of 3kms, is unsealed and poorly maintained. From Busu river bridge, the unsealed highway crosses the Busu river over the DSB Bridge, where it commences a short climb which levels out onto a flat rolling country. Same terrain continues for approx 2kms, to a low-level river crossing where, a new C200DS bailey bridge was being constructed for launching. At the time of the visit in early May this year, a contractor was engaged and working, under the AusAid program for both road maintenance and bridge replacement works.

8.2.2.4 Poahum Access Road.

Poahum junction is another 2kms from and on the right hand side from the newly constructed C200DS bailey bridge above. The rice farms start approximately 200m from this junction, and continue for another 1km. The access road is basically on a flat terrain in a kunai grass country. Although the road geometry is in a reasonable shape, accessibility can be with great difficulty in wet weather.

Following maintenance works are required to restore the road to it's a all weather standard road.:

- I). Clearing of vegetation,
- ii). Building up of the road level, including re-gravelling the entire road length,
- iii). Excavating, laying and back-filling of relief culverts at selected points along the road.

8.2.2.5 Three(3) and Four(4) Mile Access Roads.

Three and Four Mile settlements, the last of the targeted areas, in Lae district, are within the Lae city boundary; and hence, road accessibility to the farms is not great difficulty.

8.2.3 Problems of Transportation and Traffic.

8.2.3.1 Finschaffen District.

The immediate problem of transportation is the current deteriorating road conditions, especially, the provincial roads, followed by the unavailability of regular public motor vehicles to transport people and cargo between locations. Smaller maritime transport (dinghies) is very popular along the coastal areas, but costly, and as much as possible, is avoided by the population. Lutheran Mission Shipping Company operates a regular coastal shipping service for cargoes, and, a daily passenger ship(except Sundays) between Lae and Gadigu, the District headquarters for the Finschaffen district.

8.2.3.2 Lae District.

Again, the immediate transport problem is deteriorating road conditions, and the unavailability of public motor vehicles. Whilst this could be true for most of the Lae District populace, for the people living along the fringes of Lae city, this is not a big problem.

8.2.4 Direction of Development of the Transportation Network.

The maintenance of the National roads such as the Bukawa highway is the responsibility of the National Government , through the Department of Works and Implementation.

8.2.4.1 Road Maintenance Projects for Bukawa Highway.

AusAid funded the maintenance of this Highway from Busu Bridge to Bukawa, and work has already commenced.

8.2.4.2 Provincial Roads.

Funding for the maintenance of Provincial Roads has been a problem for the last five years. Only this year, some funds were released for this purpose.

8.2.4.2.1 Finschaffen Road Maintenance,

At the time of the visit to the area in early May 2002, a local contractor had commenced work from Gadigu to and past the Mape River bridge.

8.2.5. Summary.

The state of road infrastructure in the Province, and in particular, the visited Districts, range from "all-weather" use in and within Lae city boundary to "impassable during wet weather" outside of the city.

Although there was some evidence of recent maintenance of the roads, both National and Provincial roads, it is strongly believed that it was election-related. Probability of its recurrence in future are not certain.

Storage facilities are again, simple as in the other visited areas. The farmers in the Three and Four mile areas already have a open channel system under gravity flow to irrigate the rice plots. Other farmers will require pumping assistance to lift the water for distribution to plots.



ACS team members aboard MV Total enroute Finschhafen to Lae- Sea transport is relatively cheaper to air transport - There is no road connection

8.2.6 Road infrastructure Mapping and Building Plans.

The maps, of the surveyed Lae and Finchaffen districts road networks and Concept Plans for the proposed Rice Resource Centers are in Annexure 3.

8.3 Madang Province.

Madang Province can be reached by air from anywhere in PNG. As a coastal and marine time province Madang has a port of entry facility for cargo shipping liners as well as is served by local passenger shipping vessels. A National Highway links the Madang Province to the neighbouring Highlands Region and the Morobe Province.

8.3.1 Transport Network/Infrastructure of Studied Sites,

The two areas of interest to this survey were the Madang District and the Usio District.

8.3.1.1 Madang District

The most used mode of transport is road. However the coastal areas have a choice between sea and land transport. High cost of small sea transport, has been a deterrent and as such sea transport is not a popular means, except when roads become impassable during wet weather. Madang airport is service by Air Nuigini the National flag carrier, as well as many major third level airlines.

The basic mode of transport in the District therefore, is the land transport that is either through the provincial or national road network.

8.3.1.2 Usino District.

Usino District is a land-locked area and therefore road transport is the only mode of transport and uses a network of both national and provincial network of roads.

8.3.1.3 Storage Facilities and Irrigation Potential.

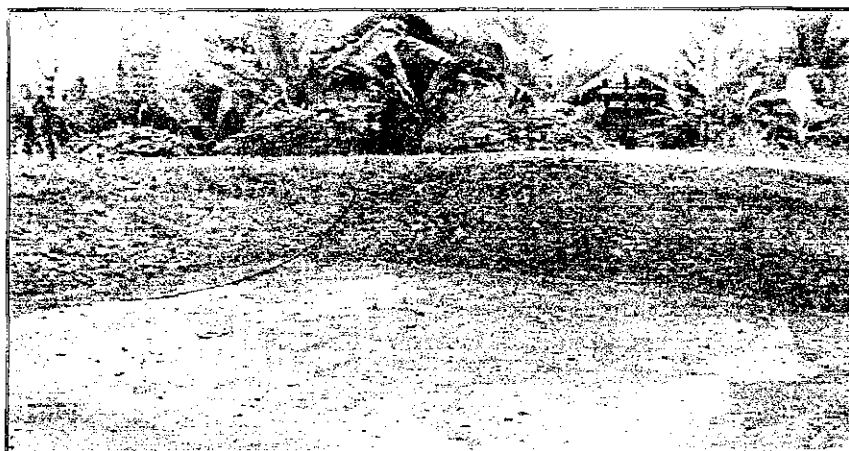
Storage infrastructure used in the studied villages in both districts are best described as “basic”; meaning that most farmers are using part of their house, either above or below the floor level, as their rice and tool storage facility. This approach however has its limitations, especially where bugs are concern. Improvement to this “simple” structure would be a distinct and separate storage house, ideally built over a fishpond, so as to prevent insects, rats etc from attacking the rice.



Perennial creek bed that was piped into several fish ponds by a farm household in the Danaru village – Usino Bundi – Madang

The studied rice fields in Lagaha, which were cultivated on slopes did not have any form of irrigation. However, for flatter areas closer to the rivers and creeks, open channel and/or piped gravity system would be the most ideal type. Others will require the assistance of a lifting device to lift water to the farms.

The type of irrigation to use will depend, amongst other considerations, the physical layout of the plots, and the farmers’ ability to afford the cost of piping and the associated fittings and, the lifting devices.



Fish pond under construction at the back of the house at Danaru village - Usino Bunidi.

For the Usino district farmers, there is potential to irrigate the plots using gravity either via open channel, network of piping or the combination of both as the farms are located below water source/s. In fact, farmers at the two farm sites, one at Danaru village, and the other at Yakambu village, are already using piped water under gravity flow for irrigation and other household water requirements.

8.3.2 Present Conditions of Infrastructure of Transportation

8.3.2.1 Umun Village Access Road.

Umun village is one of the two target villages under the study in the Madang District. It is 21kms in the N-Westerly direction from Madang town. The road is a all weather partly sealed road.

The route follows the Madang/Lae Highway, and turns off to the right from the Highway at km 5 mark. From this junction, the sealed road continues and rises slightly to about 50m above sea level, over an undulating terrain. At km 13 mark, (which is also the road junction leading to Lagaha, the second village of study for the Madang District), the sealed road ends, and begins the gravel road for another 8kms to Unum village.

A logging company (JANT) is responsible for the maintenance of the entire road length, and therefore has no major maintenance problems on this road at this stage.

8.3.2.2 Lagaha Access Road.

Road that leads to Lagaha village is a dry weather basic access road that turns off to the right at Km 13 mark along the road to Unum village. From this junction, the road goes for another 15kms across the ridgelines in the hilly terrain, and stops 200m short at the base of Lagaha village. Lagaha village is another 20m to 30m above this point, on an up-hill climb for about 300m.

The basic road geometry is intact, however, since there has not been any maintenance done for a long time, the road has deteriorated to an extent where at least, two sections of the road need to be reconstructed. Also, there is a washed-out low-level ford crossing that needs to be

replaced. The road therefore is impassable during the wet weather and requires the general maintenance including the following specific works:

- i). Clearing of vegetation,
- ii). Re-establishing road drainage system,
- iii). Re-gravelling the entire length (15kms) of the road,
- iv). Replacement of the washed-out ford,
- v). Re-construction of sections of road.



The four wheel drive had to be pulled out and pushed in the last 5 KM out of Lagaha village to the main highway.

8.3.2.3 Madang/Lae Highway (Ramu Highway)

The road that lead to Usino District, where our two other target villages are located, is the Madang/Lae Highway. This sealed national highway starts at Madang, and traverses due south for 25kms over a flat terrain. From this point on, the road starts to climb the hilly terrain, for the next 66kms up and over the ranges to the Usino junction market. Sections of this road over the ranges have not been sealed, and therefore have created great difficulties to traffic passage during wet weather. Furthermore, at least three sections of the road were observed to have pavement failures, due to uneven settlement in the sub-grade. The work on the selective upgrading and sealing on this section of the highway was funded for by the World Bank three years ago.

8.3.2.4 Access to Danaru and Yakumbu Villages.

Danaru and Yakambu villages, last of the two target villages, are 3kms and 18kms respectively, from the Usino junction market; and are both situated along the Madang/Lae Highway, meaning, accessibility to the two villages is not a difficulty. In fact, they are along the section of the highway that can be reached from either the Lae or Madang end of the highway.

8.3.3 Problems of Transportation and Traffic.

Unlike the coastal districts where one has an alternative in sea transportation, Usino, a land-locked district, only has one mode of transportation: land. And when you have a provincial road system that has not been maintained or, adequately maintained for a long while, then, obviously, that mode of transport will deteriorate. The main problem here is again, the current poor conditions of the provincial road system, due to lack of funding. While this is only half of the problem, the other half is the lack of reliable Public Motor vehicle support to transport people and cargoes between places.

8.3.4 Direction of Development of the Transportation Network.

The maintenance of the Madang/Lae highway is the responsibility of the National Government, through the Department of Works and Implementation.

8.3.4.1 Road Maintenance Projects for Madang/Lae Highway (Ramu Highway).

The World Bank funded the upgrading and sealing project for this highway. Unfortunately, for the last few years, the National Government has not been able to produce the funds to maintain the Madang end of the highway, which at this stage is a concern to the traveling public during wet-weather.

8.3.4.2 Road Maintenance Projects for Provincial Roads.

For the last five years, there has always been inadequate funding allocation to maintain all provincial roads to an acceptable condition. Only for this year, some of the provincial roads were given some funds for road maintenance, but again, not enough to adequately address the problem.



The last 5 km of road from Lagaha village to the main highway - Madang District is accessible only during the dry season. Even with a four wheel drive vehicle, during the wet season the survey team took 3 hours to negotiate this section

8.3.5 Summary.

Ramu Highway is an all weather road, however due to lack of maintenance some section are difficult to negotiate during wet weather. It is the provincial roads that suffer the most from lack of maintenance. Although the sea transport provides an alternative mode of transport for the coastal population, the high costs of operation usually plays the deciding factor.

The road along the Umun village is well maintained, by a logging company as part of the agreement as well as for its own interest and is accessible in all weather conditions.

Storage facilities are simple structures within the houses, improvements are being made as to making the facilities more rat-proof etc by having them built over fish ponds. The irrigation status to the visited villages in the Usino district is quite advanced, where certain village farmers were already using piped water under gravity flow for both farming and household/personal requirements.

8.3.6 Road infrastructure Mapping and Building Plans.

The inserted maps, illustrates the surveyed Madang and Usino-Bundi districts road networks and Concept Building Plans for proposed Rice Resource Centers.

8.4 East Sepik Province.

East Sepik Province can be reached by air from anywhere in PNG. Air New Gini and other major third level airline operators operate scheduled services to and from Wewak. Being also a coastal province town, it has good port facilities at Wewak to service both the local coastal and overseas cargo/passenger vessels. Wewak/Atape Highway links the E.S.P to its neighboring Sandaun Province. Although it also shares a common land border with Madang, Enga and the Southern Provinces, road links are yet to be established.

8.4.1 Transport Network/Infrastructure of Studied Sites.

The two areas where the surveys were conducted are the Wewak and Maprik districts.

8.4.1.1 Wewak District.

Since Wewak district includes some of the nearby islands of Muschu and Kairuru, the transport network basically consists of both sea and land transportation. The people along the Wewak coast use the sea transport when road conditions are bad. As for the people of the nearby islands, sea transport is the only means of getting to and from mainland Wewak. Muschu Isl village, for example, one of the two target villages for the study, is a 45mins trip by 40HP OBM.

People of the mainland Wewak district use mainly the road transport network to move around between locations.

8.4.1.2 Maprik District

The transportation network is basically the land transport. The nearby Hayfield has been closed for some time now and hence, air transport is non-existent. Therefore, all movement of people and cargoes are done using the road transport system.

8.4.1.3 Storage Facilities and Irrigation Potential.

There were no specific facilities for the storage of the un-milled rice. The village farmers use part of their houses as simple storage facilities for their rice. In terms of irrigation potential, the two visited villages, Aupik and Waikakum, will require water lifting devices to irrigate their fields, and could be quite expensive.

8.4.1.4 Rice Mill and Storage facilities at Hayfield.

There were two large purpose designed and built sheds to store both un-milled and milled rice at Hayfield. One of the two sheds contain the 300 kgs per hours capacity rice mill, which, at the time of the visit (21st May 2002), was not operational due to unavailability of rice to mill. The rice mill and the storage facilities at Hayfield, have been there for the processing and storage of rice produced from all over the East Sepik Province. Nuku district, also a rice growing area, in the West Sepik province, and due to its close proximity to Maprik, also uses these facilities.

8.4.2 Present Condition of Infrastructure of Transportation.

8.4.2.1 Maprik Highway.

The route that leads to Maprik District, is the Maprik Highway, which commences in Wewak. Aupik #1 village, the furthest of the two target villages of the study, is located 125kms North –West of Wewak town, and 16kms from Maprik station in the same direction.

The Maprik Highway is a highway standard all-weather sealed road from Wewak town to Gonombu village, a distance of approximately 49kms from Wewak town. From Gonombu village, and for the next two kms, the sealed road had deteriorated to an extent where sealed sections can be hardly noticed.

From this point on, it is a gravel road to Hayfield junction and continues onto Maprik station, the district Headquarters for Maprik district, a distance of approximately, 109 kms north west of Wewak town. The road up to the Hayfield junction is unsealed, poorly maintained, and is impassable during wet weather.

The gravel road continues from Hayfield junction to Maprik station, a distance of approximately 9kms. This section of the road seems to have been sealed in the past, however, due to lack of re-sealing maintenance over the years, it has now become a gravel road. This gravel road seems to be maintained in a reasonably good condition, and hence, is an all-weathered road.

8.4.2.2 Aupik#1 Village Access Road.

The route that goes to Maprik station, continues for another 16kms onto Aupik #1 village, the last and the furthest of the two target villages under the study. The road traverses a hilly and rolling country with a mixture of secondary growth and patches of rainforest in between. Due to long periods of non-maintenance, sections of it need re-construction to restore the road to its original profile. Hence, this road is inaccessible during wet weather.

8.4.2.3 Access to Waikakum #2 Village

Waikakum #2 village is along the Maprik Highway, and approximately, 5kms before the Hayfield junction. Hence, accessibility to the village is not a difficulty.

8.4.2.4 Access to Nienguanje Village

Nienguanje village route, one of the two studied in the Wewak district, follows the Wewak/Aitape Highway for 16 Kms in the north-west direction from Wewak town.

From the junction, the road turns due south over a flat terrain for approximately 4 Kms, through the mixture of grassland and patches of rainforest. The road is poorly maintained, and therefore is impassable during wet weather.

The road needs general maintenance, including the following specific works: reconstruction of head and wing walls for 2 x 600mm diameter monier culverts; regravelling of the entire 4 Kms of road, establishment of side drains.

8.4.2.5 Access to Warak

Warak village, the last of the two villages studied in the Wewak district, is approximately 15kms N-W of Wewak town, on an island of *Muschu*; and is 45minutes by 40HP OBM on a 19foot fiberglass dinghy. The village is located on the beach-front at the first inlet. There are no vehicle roads on the island. All transportation of goods and personnel between locations, is done with the combination of walking and use of small watercraft



Warak village – Muschu Island north of Wewak is accessible only by motorized banana boat. The survey team prepared for the trip back to Wewak

8.4.3 Problems of Transportation and Traffic

The immediate problem of transportation is the current deteriorating conditions of the road, followed by unreliable presence of Public Motor Vehicle support to transport people and cargoes between locations.

For the people on the islands off Wewak, despite its high operational cost, use of small watercraft is the only mode of transport.

8.4.4 Direction of Development of the Transportation Network.

The maintenance of the national roads, like the Wewak/Maprik and Wewak/Aitape highways is the responsibility of the National Government, through the Department of Works and Implementation.

8.4.3.1 WewakMaprik Highway.

Under the National Road Maintenance program for 2002, maintenance of section of the unsealed road, starting from the Wewak end, had already commenced. The sealed section from Wewak was noticed to have a number of failures due to uneven settlement of the sub-grade. These sections have been marked and identified on the road; but work has not been undertaken. These strips will cause the closer of this road in due course if not attended to in the near future.

8.4.3.2 Nienguanje Village Road.

Continuous inadequate funding under the infrastructural works for the last few years has not helped much with the maintenance of village roads in general, including the Nienguanje village road. Although some attempts were noticed to have been made on the maintenance of this road, there needs to be lot more effort put in to make this road trafficable to at least, all weather standard road.

8.4.5 Summary.

Although very small sections of the two districts were covered for the purpose of this study, it is representative of the whole Province; in terms of road infrastructure. The main supply routes, like the Maprik Highway, and village roads like the one above, that connect villages to towns and other villages, continue to suffer from inadequate maintenance and rehabilitation works support.

The people on the coastlines of the Province have an alternate in small-craft maritime transport, when the road system fails them. But for the island districts of the province, sea transport is the only means of mobility between locations.

The storage facilities in the villages are simple structures, and part of a dwelling, made of bush materials.

In terms of irrigation potential, availability of water sources in the surveyed villages are not a problem; however, it requires mechanical lifting devices to get the water to the farms.

8.4.6 Road infrastructure Mapping and Building Plans.

The inserted maps, illustrates the surveyed Wewak and Maprik districts road networks and Concept Building Plans for proposed Rice Resource Centers proposed for East Sepik Province.

8.5 East New Britain Province

New Britain is an island province, and therefore, can only be reached by sea or air transport from anywhere in PNG. The province has a well-developed road network system where most roads are sealed and interconnected. Rabaul used to be the East New Britain Provincial capital until 1994 when, the nearby volcano erupted and destroyed the whole township.

The provincial capital has since been relocated to Kokopo and is fast becoming one of the major commercial centers in this Islands Region. Rabaul however, still provides the services for the Provinces major port facilities, hospital and volcano logical observatory services.

8.5.1 Transport Infrastructure Network of Surveyed Sites.

Rabaul and Kokopo districts were chosen for the study. The study included the Raputup village on Madaka islands of the Duke of York group.

8.5.1.1 Kokopo District.

The Kokopo District is part of the Gazelle, the home of the Tolai people which is a well developed area. The Kokopo District road network are very well developed and any point in the district on the main land can be easily accessed during all weather conditions.

The mode of transport for the outer islands such as the Duke Of York group of islands is sea transport. The vessels used are the small banana boats. The Department of Transport use to operate coastal vessels to services the remote districts of Pomio and the outer islands, however this has now ceased.

The Kokopo township, the district headquarters of Kokopo, has been the administrative headquarters of the East New Britain province since the volcanic eruption in 1994. All engineered such as telephone, electricity, and reticulated water and sewerage are available.

8.5.1.2 Rabaul District.

The Rabaul District headquarter which is Rabaul Town was the administrative headquarters of the East New Britain Province before the volcanic eruptions in Rabaul.

The Rabaul District still hosts the main Sea Port, the Provincial Hospital and the Volcanological Observatory. All the engineered services such as telephones, electricity and reticulated water and sewerage are also available in Rabaul Township. Kokopo and Rabaul are in close proximity, only thirty kilometers from each other.

The two target villages in the Rabaul District, are physical located in the Kokopo and the Gazelle district. These villages are actually resettlement estates where the people of Rabaul District were relocated after the volcano eruption.

The resettlement estates are managed by the Rabaul District Administration.

8.5.1.3 Storage Facilities and Irrigation Potential.

The target villages studied in the two Districts in the East New Britain Province lacked proper storage facilities.

In terms of irrigation potential, the target village of Raputup is on an island and does not have creeks or major sources of water for irrigation. Ngunguna is located North west of Kokopo along the Kokopo to Vunamami road. The area does not have any flowing rivers or creeks for irrigation.

8.5.1.4 Provincial Rice Resource Center.

The OSISCA Warangoi training center located South East of Kokopo along the Warangoi road will service adequately the need for local farmer training for the province and a separate Provincial Resource Centre is not required.

8.5.2 Present Conditions of Infrastructure of Transportation.

8.5.2.1 Kokopo Rabaul Road

As stated, the Gazelle area which consist of Kokopo District, the Rabaul District and the Gazelle Distict are well connected by a series of all weather sealed roads.

The main Kokopo to Rabaul road was devastated by the volcanic eruptions and the section of road near Valcan crater is currently not sealed.

The road that leads to Ngunguna one of the target village is located off the Kokopo - Rabaul road. The other village of Raputput is on the Duke of York group of islands (Makada Island) and is not accessible by road. Raputput is only accessible by boat.

Nagunguna village is approximately six kilometers southwest from Kokopo town. The road to the village turns off at approximately three kilometers of the Kokopo to Rabaul road and heads to Vunadidir the East New Britain administrative headquarters. Nagunguna village is located approximately four kilometers from the Kokopo to Rabaul and Vunadidir road junction.

The Kokopo to Rabaul and the Vunadidir roads are sealed roads. The three kilometers of the Kokopo to Rabaul road is badly potholed. From the Kokopo to Rabaul road junction to Nagunguna village the road is in good condition.

8.5.2.2 Kokopo Kerevat Road

The Kokopo Kerevat road is the main provincial trunk road. This is the road that serves the Gelagela Resettlement Estate. Gelagela resettlement estate is physically located in the Kokopo District. However the people who were resettled are from the Rabaul District, therefore the resettlement estates are managed by the Rabaul District administration.

The Gelagela resettlement estate is located approximately 20 kilometres south of Kokopo along the Kokopo Vunadidir road. The road is mostly sealed except for a three kilometer section at approximately fifteen kilometers from Kokopo. Generally the road is in good state of repair.

8.5.2.3 Warangoi and Pomio Road.

The Talvat-Sikut village is physically located in the Gazelle District along the Pomio road. The resettlement estate can be reached from Kokopo via the Kokopo to Vunadidir road, the Warangoi Hydro Station road and then the Pomio road.

The Kokopo Vunadidir road, the Warangoi Hydro road and the Pomio road to Talvat – Sikut resettlement estate are all sealed roads. The roads are accessible in all weather conditions.

The map of the Kokopo district showing the target villages and the road leading to this villages is shown.

8.5.3 Problems of Transportation and Traffic.

8.5.3.1. Kokopo and Rabaul Districts.

The immediate problem of transportation is the current condition of the Kokopo to Rabaul road and the other major roads such as the Rabaul to Vunadidir road which is a part of the New Britain Highway.

All the other road links are all in good state of repair and the whole of the Gazelle area is well serviced by privately owned passenger motor vehicles.

8.5.4 Direction of Development of the Transportation Network,

The maintenance of the National roads such as the New Britain Highway is the responsibility of the National Government, through the Department of Works and Implementation.

8.5.4.1 Road Maintenance Projects for Kokopo to Rabaul road.

Kokopo to Rabaul road is a provincial road for which AusAid has provided funding for reconstruction. Contract has been awarded and construction is expected to commence soon.

8.5.4.2 Provincial Roads.

The East New Britain provincial government provides funding for the maintenance of Provincial Roads. In recent years donor agencies such as European Union and AusAid has provided funding for the upgrading and sealing of the provincial roads as part of the Gazelle Restoration Program. The Gazelle restoration is a program to relocated the Provincial Headquarters form Rabaul to Kokopo and the resettlement of the volcano affected villagers of the Rabaul District.

8.5.5 Summary

The East New Britain Province is perhaps the only Province in PNG that enjoys the best road network system. The recent Rabaul volcano eruptions were actually blessings in disguise, as lot of financial assistance came pouring in from Aid donors, to assist with the rehabilitation of the devastated Rabaul town, and building up of Kokopo as an alternate Provincial capital. This inevitably led to improving the infrastructure of the area; and in particular, the road network system.

Being an Island province, the outer islands still rely on sea transport as their only means of transport to move between locations. The facilities at OISCA are providing the same/similar aims of this study, and therefore can easily be in-corporated into the Provincial Resource Centre. The storage facilities, like most of other visited centers, share part of the house to store the rice. Because the whole of Rabaul and Kokopo districts do not have open running rivers/creeks, irrigation facilities/potential to the visited sites will be expensive to install.

8.5.6 Road infrastructure Mapping and Building Plans.

The map of the surveyed Rabaul and Kokopo districts road networks are provided in Annexure 4.

8.6 Conclusion

8.6.1 General

An efficient rural based Road Infrastructure network linking people to services leads to not only social well-being and economic prosperity within the area, but, contributes indirectly to the nation's overall development and prosperity.

The locals of the study locations have an existing rural road network which links them to other areas of their respective Provinces.

Investigations into the social well-being and the rate of economic activity within the studied areas indicated a general decline due to transport difficulties and other communication problems encountered by the people.

The current deteriorating road conditions within these areas are of great concern, in that the farm produce cannot be brought out to the markets, people die because they cannot get to the hospitals quickly and on time etc.

The other related problems are the unreliable public motor vehicle support system; and, the high operation costs of sea and air transport. Whilst for some villages near the urban areas, these problems do not seem to be felt as much.

8.6.2 Accessibility.

The main supply routes, or the national highways that were in the visited areas have been allowed over the years to deteriorate to an extent, where certain sections of the roads become impassable during the wet seasons. Because this is a nation wide concern, the degree of deterioration of the roads will vary between Provinces; for example; in the ENB Province, most of the villages in the visited districts, are accessible by road, in all weather conditions, because it has a well developed road network system. In other visited districts in Central, Morobe, Madang, and ESP Provinces, accessibility to the villages is limited to only during dry weather.

In addressing this problem, the Government has already, through Aid donor countries and other financial institutions embarked upon major maintenance and rehabilitation works program to the major highways throughout the country; including the ones in the visited districts. The degree of the problem is such that it will take up to five years, to at least fix the current problems. Apart from inadequate funding under its recurrent budget for routine maintenance for these projects, the National Government's capacity/capability, through the Department of Works and other appropriate Government agencies to implement these projects has been under question. As this continues, villagers will continue to suffer because "all weather accessibility" will be denied to them.

Hence, absence of "all weather access" road continues to be the number one problem faced by the rural farmer; this is followed by lack of reliable public motor vehicle support to the

rural farmer to take his produce to the market, or rice milling facilities, which are normally centralized some distances away.

8.6.3 Storage Facilities.

In general, most storage facilities in the visited villages were actually part of the farmer's house shared with his family. Because of the shared nature of the facility, the laxity on the part of the farmers' family in proper disposing of food scrap etc increases the chances of rat etc attacks on the stored rice. These structures are after all, of simple construction and made from local materials. The improvement to this structure was seen at Danaru village, where a farmer constructed a simple, yet effective, stand-alone facility, over a fish-pond to store his bags of rice; and prevented attacks from rats etc.

In Hayfield, Maprik district, two purpose designed and built storage facilities are used by all rice farmers in the Province, to store both milled and un-milled rice. Rice mill is also housed in one of these building. At the time of the visit though, the sheds were empty and the mill was not operating because; firstly, there was no rice in the building to mill, and secondly, the rice could not get there because most village roads were impassable during the wet weather.

8.6.4 Irrigation Facilities/ Potential.

Of the five Provinces visited under the study, only Morobe and Madang visited farmers use some form of irrigation for their crops, including rice. The 3,4 and 5mile rice farmers, within the Lae city limits, use an open channel under gravity flow to irrigate their rice paddies.

The people of Danaru and Yakambu also use the gravity to reticulate the water through pipe network system, for irrigation purposes and other household requirements.

No signs of irrigation were noticed in the visited farms in Central, ESP and the ENB Provinces. However, rivers and creek-lines provide good source of water for irrigation, and by using low head pumps, potential for irrigation exists in the Central and the ESP. In the ENB province, and in particular, the visited villages, there are no open flowing rivers and creek-lines; meaning that either a well or a bore will have to be dug/sunk; making this system, more expensive than the former.

8.6.5 Resource Centers.

As required under the study, following facilities were identified to be developed into Rice Resource Centers:

- Kubuna Pastoral Centre, for Central Province;
- Former National and Provincial DAL training facilities at 3 Mile, Lae; Morobe Province;
- St Benedict's College, Madang, for Madang Province and
- PNG Bible College at Wewak for ESP

These centers will be used to run short training programmes, promote local rice growing, plant demonstration plots, promote seed production and locate rice related machinery. They will also provide rice milling services to the farmers. *Concept Plans of Rice Milling and Storage Shed, Machinery workshop and other maintenance items costings are provided as Annexure.*

8.1 Summary of Road Conditions in Surveyed Sites

Surveyed Sites		Summary of Road Conditions			
		Distances from town/districts center (km)	Type of road (National/Provincial/LG)	Describe road conditions & Accessibility	
Province/District	Villages				
1. Central - Abau	1. Tutubu	210	National/Provincial	Bad	
	2. Amau	230	Natonal	Bad	
	- Karuku	1. Idoido	142	National/Provincial	Fair
		2. Yumuna	158	National Highway	Fair
2. Morobe - Finschhafen	1. Wareo				
	2. Salodi				
3. Madang	1. Lagaha	28	National/Provincial	Bad	
	- Madang	2. Umun	21	National/Provincial	Fair
	- Usino-Bundi	1. Danaru	69	National Highway	Fair
		2. Yakumbu	84	National Highway	Fair
4. East Sepik - Wewak	1. Warak	Sea transport			
	2. Nienguanje	20	National/Provincial	Bad	
	- Maprik	1. Aupik	125	National/Provincial	Bad
		2. Waikakum	95	National/Provincial	Fair
5. E/New Britain	1. Raputup	sea transport			
	- Kokopo	2. Ngunguna	7	Provincial road	Good
		1. Gelagela	20	Provincial road	Good
	- Rabaul	2. Talvat-Sikut	40	Provincial road	Good

8.2 Irrigation Potential and Grain Storage & Milling Facilities

Surveyed Sites		Summary of Road Conditions			
		Potential for irrigation? Yes or No	Source of water (State name of river creek or bore)	Grain storage & milling facilities? (Yes or No)	
Province/District	Villages				
1. Central - Abau	1. Tutubu	Yes	Bore	No	
	2. Amau	Yes	Amau River	No	
	- Karuku	1. Idoido	Yes	Kubuna River	No
		2. Yumuna	Yes		No
2. Morobe - Finschhafen	1. Wareo	Yes	Perrinial Creek	No	
	2. Salodi	Yes	Perrinial Creek	No	
	- Lae	1. Three Mile	Yes	Perrinial Creek	No
		2. Poahum	Yes	Busu River	No
3. Madang	1. Lagaha	Yes	Gogol Tributaries	No	
	- Madang	2. Umun	Yes	Gogol River	No
	- Usino-Bundi	1. Danaru	Yes	Tributaries of Ramu	No
		2. Yakumbu	Yes	Tributaries of Ramu	No
4. East Sepik - Wewak	1. Warak	Yes	Perrinial Creek	No	
	2. Nienguanje	Yes	Perrinial Creek	No	
	- Maprik	1. Aupik	Yes	Perrinial Creek	No
		2. Waikakum	Yes	Perrinial Creek	No
5. E/New Britain	1. Raputup	Yes	Perrinial Creek	No	
	- Kokopo	2. Ngunguna	Yes		No
		1. Gelagela	Yes	Bore	No
	- Rabaul	2. Talvat-Sikut	Yes		No

8.3 The proposed two sheds for each of the four provincial rice resources centers (PRRC).

Province	Location of PRRC	Machinery Shed (Standard or otherwise)	Grain storage/Milling She
1. Central	Kubuna DPI Station	Standard	Standard
2. Morobe	3-Mile DPI Station	Existing Slab	Existing Slab
3. Madang	St. Benedict	Standard	Standard
4. Wewak	Sepik Bible College	Standard	Standard