

**BASIC DESIGN STUDY REPORT  
ON  
THE PROJECT  
FOR  
EXPANSION AND DEVELOPMENT  
OF  
THE MEDIUM WAVE RADIO BROADCASTING NETWORK  
(PHASE 2)  
IN  
THE KINGDOM OF NEPAL**

AUGUST 1988

**JAPAN INTERNATIONAL COOPERATION AGENCY**



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## PREFACE

In response to the request of His Majesty's Government of Nepal, the Government of Japan has decided to conduct a basic design study on the Expansion and Development of the Medium Wave Radio Broadcasting Network (Phase 2) (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to the Kingdom of Nepal a basic design study team headed by Mr. Minoru Kondoh, Assistant Director, Engineering Division, Broadcasting Bureau, the Ministry of Posts and Telecommunications, from March 6 to April 19, 1988.

The Team had discussions on the Project with the officials concerned of His Majesty's Government of Nepal and conducted a field survey in the Project areas. After the Team returned to Japan, further studies were made, a draft report was prepared and, for the explanation and discussion of it, a mission headed by Mr. Masato Iwasaki, Second Frequency Section Chief, Frequency Planning Division, Radio Department, Telecommunications Bureau, the Ministry of Posts and Telecommunications was sent to the Kingdom of Nepal from July 22, to July 31, 1988. As a result, the present report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of His Majesty's Government of Nepal for their close cooperation extended to the Team.

August, 1988



Kensuke Yanagiya

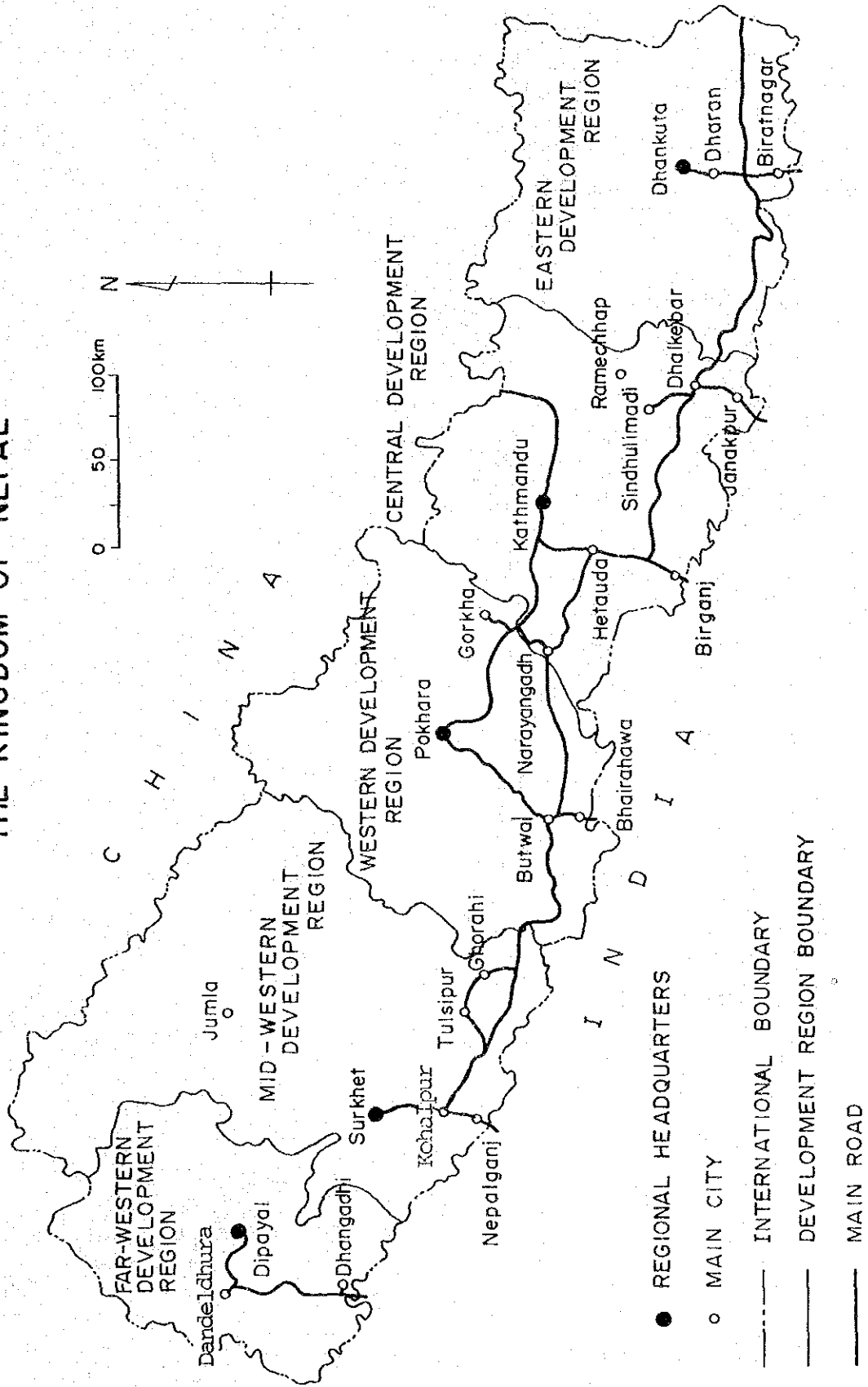
President

Japan International Cooperation Agency

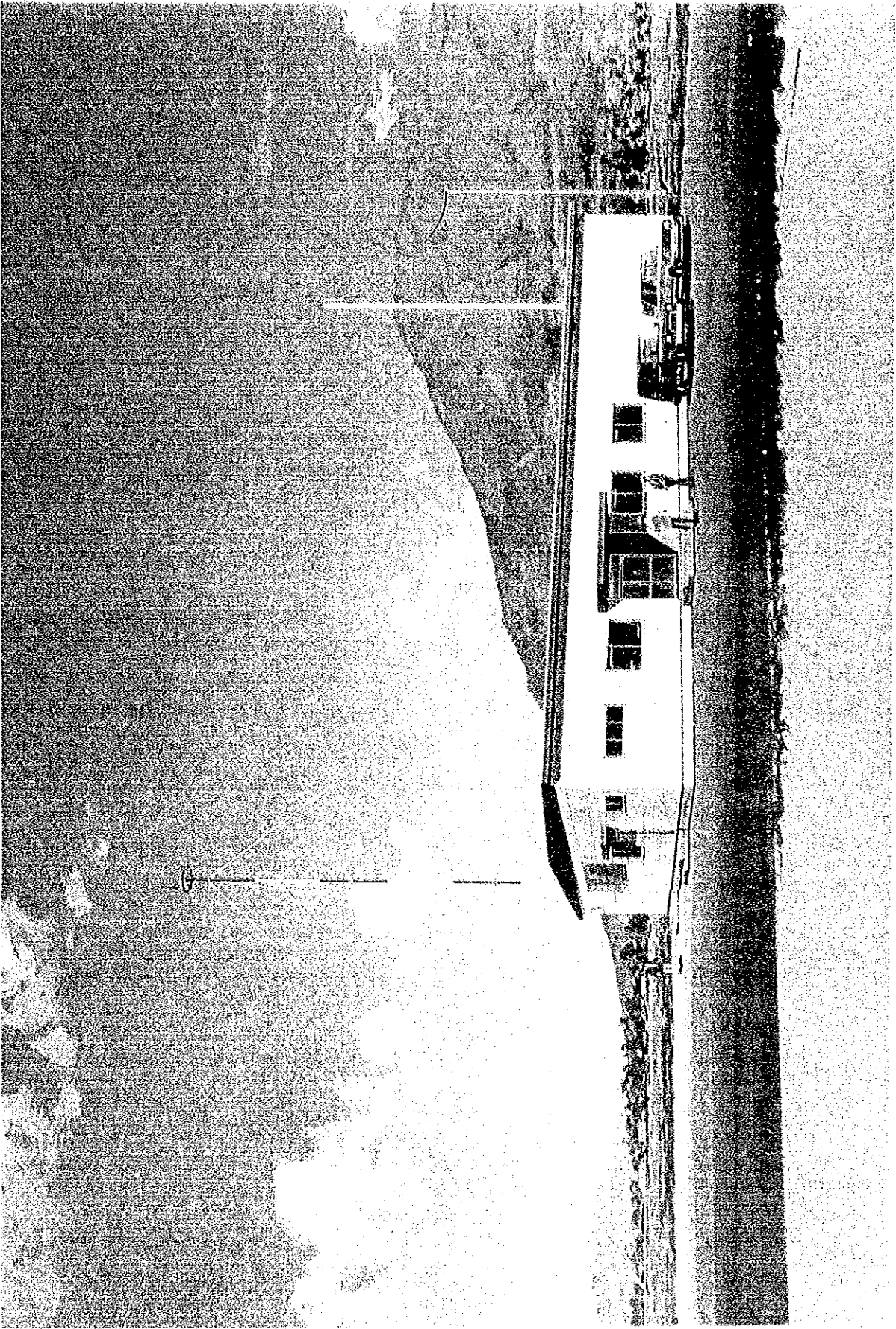




# THE KINGDOM OF NEPAL







Perspective of Surkhet Broadcasting Station



## SUMMARY



## SUMMARY

His Majesty's Government (HMG) of Nepal worked out the First Economic Development Five-Year Plan in 1956. Since then, HMG of Nepal has executed several five-year plans to enhance economic development. It realized that improved mass media, capable of disseminating information extensively among the people and enlightening them at the same time, is required for realizing the plans more effectively. Therefore, HMG of Nepal developed a plan for the expansion and development of the medium wave radio broadcasting network, and requested Japan to cooperate in the plan in 1978.

This plan was intended to build a nationwide medium wave broadcasting network throughout the country by means of constructing 100KW radio transmitting stations at Kathmandu, Pokhara, Dhankuta and Surkhet, and other relay transmitting stations at seven other principal cities.

Among the requested stations, Japan constructed two 100kW broadcasting stations, at Kathmandu and Pokhara, which came into operation in 1983. With these two stations completed, a population coverage of the medium wave radio broadcasting reached 55% and this service has been enjoyed by the people for five years and contributing greatly to the development of the country.

In order to complete the medium wave radio broadcasting network covering the entire land which is the final objective of the Project for Expansion and Development on the Medium Wave Radio Broadcasting Network, HMG of Nepal requested Japan this time that three central transmitting stations and six relay stations be constructed under its grant aid. The Japan International Cooperation Agency (JICA) sent to the Kingdom of Nepal a study team (hereinafter referred to as "the Team") to conduct a field survey for a basic design study of this project for 45 days from 6th March to 19th April, 1988.

The field survey was conducted in the nine proposed sites for broadcasting stations requested by HMG of Nepal in terms of ground

conductivity, latent field strength, circumstances at the sites, power supply conditions, programme transmission equipment, access roads and transport as well as soil conditions.

As a result of the survey, it was concluded that four sites - (1) Surkhet, (2) Dhankuta, (3) Dipayal and (4) Dhalkebar - are appropriate out of the nine proposed sites. Surkhet, Dipayal and Dhankuta are located in the Mid-Western, Far-Western and Eastern Development Regions, as their centre respectively. Dhalkebar is located in a densely populated area in the Terai Region but cannot be covered either from the existing Kathmandu Station or from Dhankuta Station scheduled to be constructed this time. Thus it became necessary to locate a station there.

Dhankuta is a town located on a mountainous area as high as 1,300 meters or more. Because of its elevation and the rugged geography, it is difficult to obtain enough space for construction of a medium wave broadcasting station. It was decided to locate a studio in the city of Dhankuta and a transmitting station in Dharan about 23km south of Dhankuta.

The facilities and equipment to be provided for the above four proposed sites are outlined in the table below:



Site	Transmitter	Antenna	Studio	Programme Line	Power Supply
Surkhet	100kW 1 Set 10kW (Standby) 1 Set	120m	1	Telephone Line (Digital Line Partially)	Available by July 1989
Dhankuta	100kW 1 Set 10kW (Standby) 1 Set	120m	1	Telephone Line	
Dipayal	10kW 2 Sets (Including Standby)	60m	1	Telephone Line (Digital Line Partially)	Heavy Oil Generator (620kW) Available by July 1990
Dhalkebar	10kW 2 Sets (Including Standby)	60m	—	Wireless Link from Janakpur	

Construction will be completed in 9.5 months on average per station after signing of the E/N by both Governments including some overlapping, consulting contract, detailed design and tendering (about 5 months), manufacturing (5.5~6 months), transportation (1.5 months) and installation (7 months including foundation work). The construction period for the four stations depends on work execution order, planning in detail and so forth.

Radio Nepal, the executing agency of this Project, has established its operation system, and it has been competently maintaining the entire facilities and equipment provided at the time of Phase 1. Thus, Radio Nepal will have no problems regarding operation and maintenance of facilities and equipment provided under this grant aid project.

More than 90% of the entire population will be placed under the service areas. They will have an electric field strength of at least

60dB $\mu$ V/m for medium wave broadcasting together with the existing stations after completion of this Project. It is also possible to listen to the above broadcasting in agricultural and mountainous areas where the electric interference is less even if the field strength is lower than the above, which means that the entire nation will actually be covered.

Thus the realization of this Project is expected to contribute extensively to the development of the broadcasting network in the Kingdom of Nepal.

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# **CHAPTER 1 INTRODUCTION**





## CHAPTER 1 INTRODUCTION

Nepal, situated on the southern slope of the Himalayas, is a land locked country having a long border with India to the south. It covers an area of approximately 141,000 km<sup>2</sup> (about 37% of Japan), and had a population of a little over 15.02 million in 1981 according to the Statistical Yearbook 1983/1984 Vol.34 issued by the United Nations (HMG's estimated population was 16.7 million for 1985). Urban population constitutes 6.4 percent and rural population 93.6 percent of the total population 70 percent of the entire population is in the working age group according to the Statistical Year Book of Nepal 1987 issued by HMG of Nepal, of which 56.1 percent is actually working. Most of the working people (91.4 percent) are engaged in farming. Under such an agriculture-oriented economic structure, GNP per capita is \$160 (from Yearbook 1987 issued by HMG of Nepal). Development is a major challenge for HMG of Nepal, and the Government has launched programmes under the guidance and direction of His Majesty to meet the basic needs of the people to put them on a par with the Asian standard by the year 2000.

In order to execute this project, HMG of Nepal considered it essential to circulate information nationwide by means of radio to gain the consensus of the people, and made the plan for the development of the medium wave radio broadcasting network. They requested grant aid from Japan for the above in 1978 as the first stage (Phase 1). In response to this request, Japan constructed 100kW broadcasting stations at Kathmandu and at Pokhara and these two stations started operation in 1983. The completion of this project enabled the population coverage of the medium wave radio service to reach 55%. HMG of Nepal has made a request to Japan this time for helping them execute the Project for Expansion and Development of the Medium Wave Radio Broadcasting Network as the second stage (Phase 2).

In response to this request, the Government of Japan decided to conduct a basic design study, and the Japan International Cooperation Agency (JICA) sent the study team headed by Mr. Minoru Kondoh, of the

Ministry of Posts and Telecommunications, to the Kingdom of Nepal from 6th March to 19th April, 1988.

The request of HMG of Nepal envisages the establishment of a medium wave broadcasting station each in nine regions throughout the country so as to develop the nationwide network. The Team confirmed the background of the Project as well as its contents, and made the field survey in the nine proposed sites in terms of circumstances around the proposed sites, conditions of the sites themselves, latent field strength, power supply conditions, access road and transportation, etc. The Team made this field survey by dividing themselves into three groups in charge of Eastern Region, Western Region and estimation respectively.

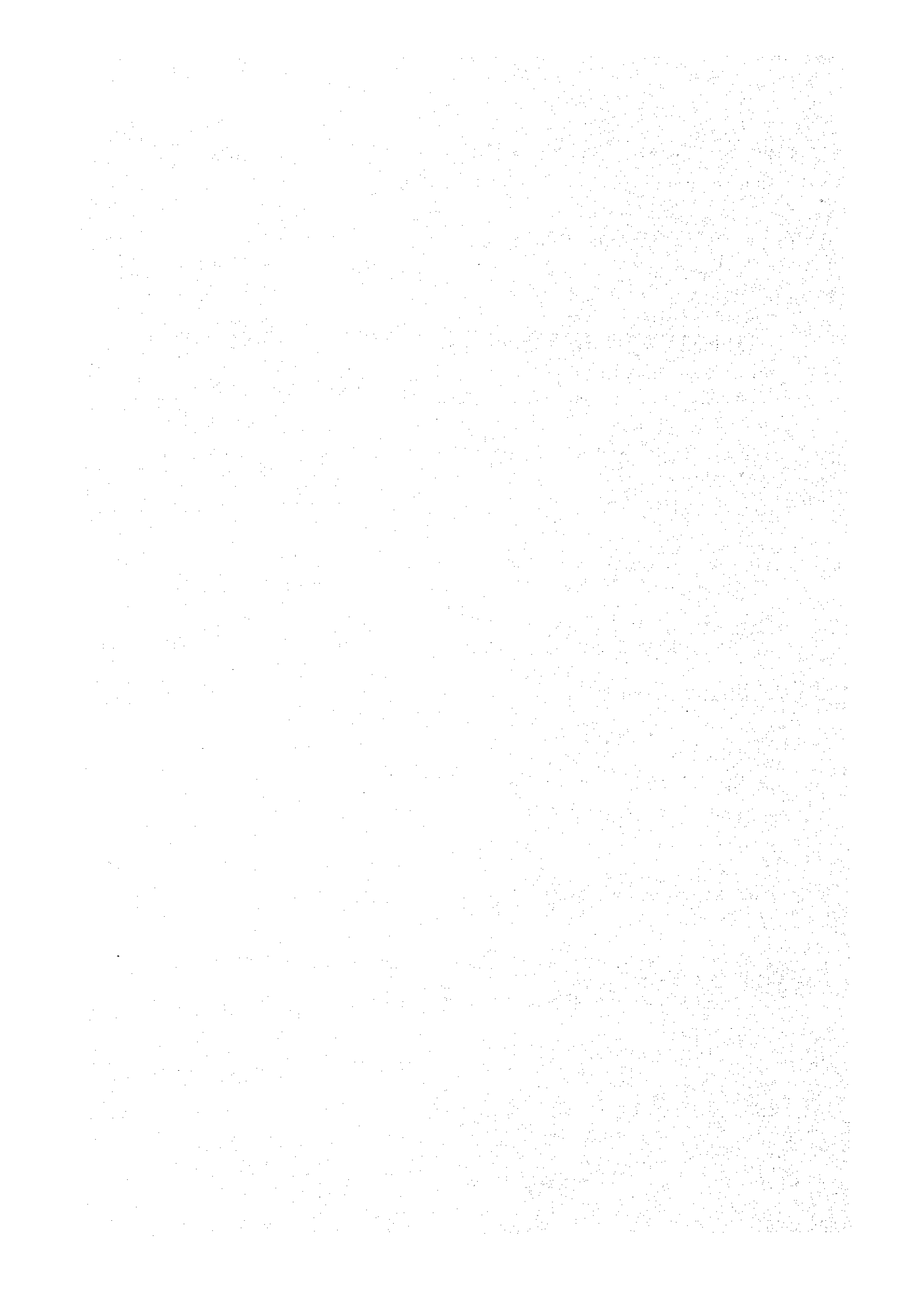
After the field survey the effects of this Project and the validity in view of grant aid cooperation were reviewed in Japan, and the basic design was conducted in terms of facilities, equipment and their scale best suited and essential to the cooperation. The Draft Final Report was prepared on the basis of the above results.

As for the Draft Final Report, JICA dispatched the team headed by Mr. Masato Iwasaki, Second Frequency Section Chief, Frequency Planning Division, Radio Department, Telecommunications Bureau, Ministry of Posts and Telecommunications, to the Kingdom of Nepal, and made an explanation and had a series of discussions with the officials concerned of HMG of Nepal.

In accordance with the results of the discussions, the Final Report is prepared with minor but necessary alterations.

The member list of the Study Team, the itinerary of the study and the minutes of discussions are included in Appendices.

## **CHAPTER 2 BACKGROUND OF THIS PROJECT**



## CHAPTER 2 BACKGROUND OF THIS PROJECT

### 2-1. Need to expand the Medium wave Radio Broadcasting Network

The Kingdom of Nepal has a length of about 850km east-west and 150~220km south-north, and a long border with India to the east, west and south and with China to the north through the Himalaya Mountains, the so-called roof of the world. The total area is about 141,000 square kilometers (equivalent to about 37% of Japan). The country can be geographically divided into three areas, namely, a mountainous area, a hilly area and Terai plains which are running east to west.

The mountainous area lies at an altitude varying from about 4,800 meters to more than 8,000 meters above sea level. This region is called the Himalaya Mountains, and comprises about 30% of the total land area. Only 2% of this region can be used for farming and 8.7% of the total population lives there engaging in stockbreeding mainly of sheep and yaks.

The hill region lies between altitudes of about 600 meters and 4,800 meters above sea level, comprising several pocket valleys and basins such as Pokhara and Kathmandu, and the region amounts to a half of the entire area. 10% of its area is suitable for cultivation and 47.7% of the total population is residing in this region with main occupation of animal grazing and agriculture.

The Terai region extends east to west along the southern side of the country, and this region is a low flat land facing India. It includes most of the fertile land and dense forest area of the country. 40% of its land area is under cultivation. A wide variety of crops such as rice, maize, wheat, sugar cane, vegetables are cultivated.

The population in this region is 43.6% of the total population, but this population is increasing at a more rapid rate.

As stated above, most of the land of the country is covered with mountains and hills, and agricultural villages are scattered in the rugged geography, and the domestic transport network and communications media are not well developed yet. In addition, just about 26% of the population is literate\*. These factors have been hindering the industrial development, social development and improvement of living standards of the people in the Kingdom of Nepal. GNP per capita is \$160 (Statistical Year Book of Nepal 1987).

\* Statistical Yearbook 1984-86 of UNESCO shows that the illiterate rate 1985 of Nepalese 15 years old or more is 74.4%

The economic development plan in Nepal was initiated in 1956 as a result of the lack of the conditions to carry out the development of a road system, transport, power supply, communication, irrigation, education, broadcasting etc.. Thus various factors such as social overhead capital and economic infrastructure had to be strengthened from the very beginning.

A great amount of capital is required for creating the infrastructure. The economic development in Nepal is presently in the Seventh Five-Year Plan period (July 1985 to July 1990). However, the expected economic growth has not been achieved as of today due to various factors unique to this country such as complex geography, multi-tribes and multi-languages in addition to the lack of capital.

In order to modernize the country by overcoming such adverse conditions and difficult circumstances, the Government of Nepal attached importance to mass communication, and under the direction of His Majesty King Birendra, the Government worked out a "National Communication Plan" in 1971 for mass communication in Nepal; its main theme was "Communication for Development".

Medium wave radio broadcasting in particular can transmit extensive information directly to the people throughout the country, thus exerting a great benefits for education in the nation. It

became urgent for HMG of Nepal to develop the medium wave radio broadcasting network, and they requested a network with the nationwide coverage as the second stage following the first stage in 1983.

Medium wave radio broadcasting is stable in reception through all seasons compared with short-wave broadcasting, and listeners can operate the receivers more easily. It can be said that the medium wave broadcasting is best suited for mass media because its wave can easily reach any geographically difficult places in Nepal.

## 2-2. Mass Media in the Kingdom of Nepal

### 2-2-1 Policy and Roles on Mass Media

Mass media in the Kingdom of Nepal is described in detail in the above mentioned "National Communication Plan" and Radio Nepal, the most powerful mass communication agency in Nepal, is also working in line with this Communication Plan.

According to the report titled "Mass Communication - its Progress and Plan in Nepal", the following are listed as recommended mass communication forms:

- 1) The mass communication system should be national and pervasive as far as possible, and its services should be made available to as numerous persons as possible.
- 2) Effort should be made to canalise the flow of national feeling towards development by creative synthesis of new and old ideas while keeping in view the fact of predominance of rural population.
- 3) The language of mass-media should be simple and intelligible.
- 4) The message to be reached by mass-media should have the quality of Nepalese.
- 5) Materials for media for mass communication should be as far as possible of topical interest.
- 6) Faith in and respect for the National Communication Services should be created and augmented by adopting realistic attitude.



- 7) Harmony and uniformity should be maintained among various communication media.

The main objective of broadcasting is laid down in the National Communication Plan as follows:

"to inform extensively about the national and international developments keeping in view the national interest as well as world peace."

In addition, the Plan states the specific policy in broadcasting:

"to broadcast news and views boosting the significance of the Crown about things which promote social welfare, and safeguard nation and nationalism within the framework of \*the Panchayat Systems."

The Plan further lays down:

"not to broadcast anything which will cause injury to civic and moral sense, and national character of the Nepalese, or create misunderstanding or suspicions on friendship between nations and disturb world peace, and false allegations and misrepresentations."

Moreover,

"to broadcast things of national and international significance"

"to broadcast 'topics of the day' regularly after the broadcast of news, programmes which are conducive to general welfare and mental development of children, women, cultivators, villagers."

The Plan also stresses the need for timely steps in order to secure cooperation from various ministries, departments and other sections of HMG for the conduct of programmes.

\* "Panchayat System": There is a self-administrative system in villages and towns throughout the country, called "village panchayat" and "town panchayat." These panchayats are further organized into "district panchayat" forming an administrative unit. This is a democratic administrative organization, unique to Nepal, and there are 75 district-panchayats, about 4,000 village-panchayats and 33 town-panchayats in Nepal.

#### 2-2-2 Development of Broadcasting Activities

Radio Nepal in charge of radio broadcasting in Nepal was established in April 1951, when it broadcast just 4.5 hours a day with a 250W transmitter. A 5kW transmitter was introduced in 1956, and another 5kW transmitter was installed in 1962, which were all short-wave broadcasting equipment. As for medium wave broadcasting, a single compact 60W transmitter was installed in 1953. In 1968, both a 100kW short-wave transmitter and a 10kW medium wave transmitter were introduced at the same time, which initiated regular medium wave broadcasting.

Broadcasting hours were extended from six hours to 7.5 hours a day 1968 to 1971, and nine hours in 1971, 10.5 hours in 1972, and 12 hours in 1973. A 100kW short-wave transmitter was set up in 1978, and another transmitter of the same was added in 1982.

In the process of carrying out the Sixth National Development Five-Year Plan, attention was focused on the medium wave broadcasting which can secure a stable reception; 100kW transmitting stations were constructed in 1983 by Japanese grant aid both in Kathmandu, the centre city for Central Development Region, and in Pokhara, the centre city for Western Development Region.

In addition, studios with new equipment were also constructed in Kathmandu, and the medium wave coverage reached 55% in population after the commissioning of these two 100kW stations.

Broadcasting hours were 13 hours a day Sunday~Friday, 16 hours on Saturday, totalling 94 hours a week as of beginning of 1988. A 30 minute programme was added on every weekday from April 13, thus amounting to 97 hours a week, Further more broadcasting hours are expanded to 101 hours a week from August 17, this year(1988).

As for TV broadcasting activities, Nepal Television Corp. was established in January 1985, and the first TV experimental broadcasting was launched in September 1985 when His Majesty's visit to Australia was telecast. In congratulating His Majesty on his 41st birthday, a VHF 100W experimental broadcasting was implemented on December 29, 1985 mainly for the Kathmandu Basin. Moreover, a 1kW transmitter was installed on Mt. Phulchowki serving part of the Terai Region on the occasion of the summit meeting of SAARC held in Kathmandu in November 1987.

Broadcasting hours are presently about three hours on weekdays with the exception of special programmes on Saturday. Educational programmes amount to 35%, news to 22% and entertainment programmes to 25%.

Being expanded gradually, however, the TV broadcasting is still at an experimental stage, and Nepal Television strongly wishes full-scale telecasting.

### 2-2-3 Diffusion of Radio Receivers

The number of radio receivers in the past five years in Nepal is listed below (source: Radio Nepal);

1984	500,000
1985	600,000
1986	800,000
1987	1,000,000
1988	1,200,000

WORLD RADIO TV Handbook 1987, having a high reliability worldwide on radio and television, shows that radio receivers reached a little over 2.01 million in the Kingdom of Nepal.

According to Statistical Year Book of Nepal 1987, there are about 2.59 million households in Nepal, of which

- \* about 46% of the total households keep radio receivers (in the case of 1.2 million receivers) and
- \* about 78% of the total households keep radio receivers (in the case of 2.01 million receivers)

There were radio/repair shops in every village where our Team could reach only on foot, and there was a radio set in every restaurant for the general public and they used it for information collection and recreation. Radio is the single source of information and recreation for towns and villages where walking is the only way to reach there and there exist no amusements. If possible to buy a set at a price of 300 to 400 rupees (¥1,800 to ¥2,400), people are likely to get it at some small risk. It is considered appropriate to estimate approximately 2 million sets are now in use.

According to the information of the Ministry of the Industry, there are 23 licensed and registered radio receiver assemblers in and around Kathmandu, and diffusion of radio receivers will certainly be accelerated with completion of this Project.

#### 2-2-4 Mass Media other than Radio

As for why the radio broadcasting plays a very important role for the development of Nepal, it can be pointed out that other mass media such as newspapers, telecommunications etc., are not well-developed yet and their infrastructure is very weak.

The generated output of Nepal is 161MW equivalent to as low as about 1/1,000 that of Japan (160,000MW), and the distribution network covers just 6% of the total population. The total length of roads in Nepal is 5,900km, i.e. 0.04km/km<sup>2</sup>. This figure is quite low compared with other countries in Asia, e.g. 0.47km in India, 0.52km in the Philippines (3.0km in Japan).. There are numerous remote villages in Nepal which take several days to reach on foot.

As for mass media other than radio, the statistics of the Government of Nepal discloses that 327 newspapers are in circulation in Central Development Region mostly in and around Kathmandu and 456 newspapers nationwide.

These newspapers are small-scale, and the U.N. Statistical Yearbook 1983/84 indicates that 110,000 copies of daily newspapers were in circulation i.e. 6.4 copies per 1000 persons.

As for the number of circulation per 1000 persons, 575 copies are circulated in Japan, 20 copies in India, 53 copies in Thailand, and 87 copies in Malaysia. Compared with the number of circulation in Asian countries, Nepal is far less.

About 18,000 telephones are now in use in the country, i.e., 0.1 telephone set per 100 persons. In comparison with Asian countries, 0.4 set per 100 persons is used in India, 1.4 sets in Thailand and 7.5 sets in Malaysia.

In Nepal where neither commercial electric power nor road transportation is available, the radio can be battery-operated, requiring no transportation means like newspapers and books, and the

radio waves can be transmitted instantaneously throughout the country, thus being the most effective mass medium.

## 2-3. Usage of Broadcasting in Various Fields

### 2-3-1 Usage of Broadcasting for Promotion of Agriculture and Stockbreeding

The following commodities and services to fulfill the minimum basic needs of the people are listed in the Seventh National Development Five-Year Plan (1985- 1990) now underway by the Government of Nepal:

- 1) foodgrain
- 2) clothing
- 3) fuelwood
- 4) drinking water
- 5) primary health care and sanitation
- 6) primary and skill-oriented education, and
- 7) minimum rural transport facilities.

Since the majority of the people, more than 90% of the population, make their living in agriculture, foodgrain is listed as the No.1 of the "Basic Needs".

Agriculture has been the single source of income and employment of the majority of the people. Poverty is rampant in the agricultural sector. Hence to raise the standard of living of the majority of the poor people, it is imperative that the agricultural sector be developed and advanced. Promotion of the farmer's purchasing power that will lead the country to development is chosen as one of the most important subjects in the Seventh Five-Year Plan.

Radio Nepal has been broadcasting agricultural programmes at early morning and evening hours to fit into the farmer's life style.

Climate in Nepal quite differs between the mountain region, hill region and Terai plain region, which makes the local farming conditions different also. Radio Nepal plans to produce and broadcast the local programmes suitable for each locality after

completion of this Project and when each local station has been provided with a studio and programme production equipment.

### 2-3-2 Usage of Broadcasting for Health Care, Sanitation and Welfare

The population of Nepal was a little over 15.02 million according to the 1981 census, and increased about 30% in ten years from 11.55 million in 1971, which means an average annual growth of about 2.66%. If this continues, the population of Nepal would reach as many as 26 million in 2000, resulting in very serious social problems in terms of food and employment.

Curbing of the population growth rate is a big task of the Government of Nepal, and the propagation of family planning is listed as priority No.1 in the policy of population of the Seventh Five-Year Plan.

Radio Nepal has been broadcasting a family planning programme regularly twice a week (on Thursday and Sunday evenings) and occasionally as a news commentary after news programmes. It is of great importance that people particularly in rural areas are made fully aware of family planning, and radio broadcasting will greatly help.

Nepal had an annual mortality of 19 per 1,000 as of 1980, of which an infant mortality is 144 per 1,000. How to decrease this early mortality and lengthen life expectancy is another issue, and the Government is attempting to decrease the infant mortality to 100 per 1,000 by 2000.

Radio Nepal has been trying to promote the understanding of health care and sanitation through programmes for health, environment, women, children, etc.



### 2-3-3 Usage of Broadcasting for Adult Education

According to Statistical Year Book of Nepal 1987, about 23.3% of the population is literate in 1981. (U.N. statistic shows that 80.8% of 15 years old and over is illiterate in 1975.)

The Government of Nepal made primary education free in the Sixth National Development Plan 1980-1985, and has been trying to extend education and improve the literacy rate. The Government has been tackling adult education aiming at a literacy rate of 38.9% in 1990, the last year of the Seventh Plan, because the Government is fully aware that education for the adult population is essential for the development of the nation.

This problem is listed at the very beginning of Chapter 40 Information and Broadcasting, the Seventh Five-Year Plan, which reads, "Audio-visual information and broadcasting materials are more effective to educate a large number of rural illiterate people below the poverty line living in rural and remote areas. These materials can provide them with information on development activities and make them conscious citizens."

Furthermore, the Seventh Plan reads as follows:

"The objective of the Seventh Plan is to create conducive atmosphere through promoting nationalistic feeling among the people living in various parts of Nepal for their active participation in the national development and to develop information and broadcasting services in order to enhance honour and prestige of Nepal and the Nepalese both within and outside of the country."

#### 2-3-4 Usage of Broadcasting for School Education

The establishment of Durbar School by Nepal's first Prime Minister Rana, was the first Major initiative in the history of education development in Nepal.

However, after the advent of democracy in 1951 there was a series of government efforts, like the formation of the National Education Planning Commission in 1954, All-Round National Education Committee in 1961, the National Education Advisory Board in 1968 in order to implement and refine the education system. In 1971 the New Education System came into operation. In 1975, primary education was made free and accordingly, the Government became responsible for the provision of class rooms, teachers and educational materials.

With the starting of the new education system, the primary school enrolment ratio increased sharply, reaching 83% today.

The establishment of TriChandra College in 1918 marked the beginning of higher education in Nepal. This college had to follow the syllabus of Patna University, India. In 1959, Nepal established its own university Tribhuvan University and another university named Mahendra Sanskrit University was established as a religious school in 1986.

Since 1971, various technical schools have been established.

However, research disclosed that the literacy rate of the total population aged 6 year and over was 5.3% in 1952, 8.9% in 1961, 13.9% in 1971, 23.3% in 1981 and 29.9% in 1985 (estimated). This shows a gradual increase over the years but the literacy rate is still low, hence further expansion of the education system is desired.

Radio Nepal has been broadcasting school programmes for primary education daily (from 1400 hrs).

## 2-4. Present Status of Radio Nepal

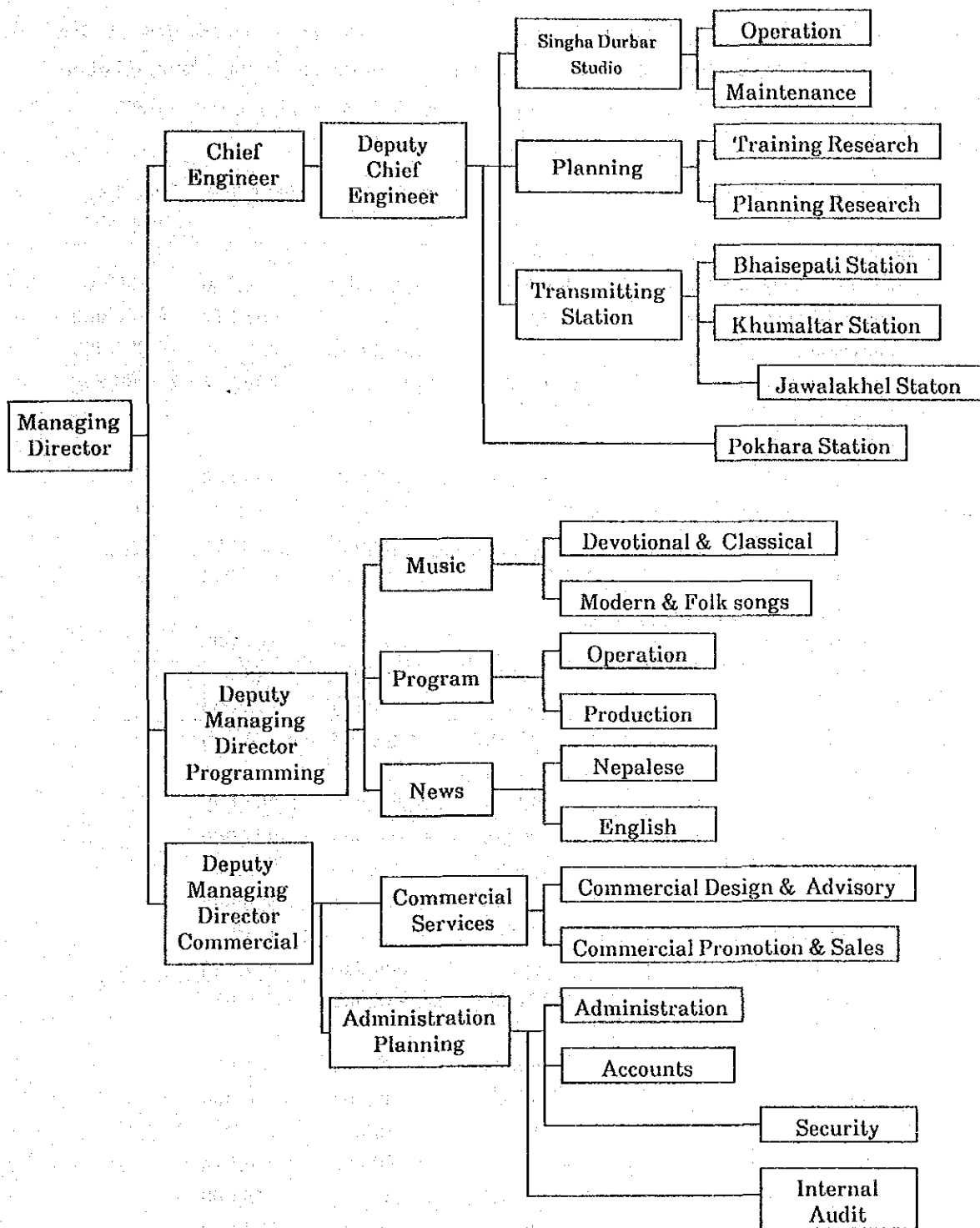
### 2-4-1 Organization

Since 1951, Radio Nepal had been a government department, run totally with government grants. In 1984, it was converted into a semi-autonomous organization (board) with the idea of enabling it to expand its commercial services and to become a self-reliant organization.

Since then, the earnings have considerably increased but have still not attained the target level.

Radio Nepal comes under the auspices of the Ministry of Communications of His Majesty's Government, and the board is headed by a Managing Director, who in turn is guided by the board of directors, which is chaired by the Secretary, Ministry of Communications.

Radio Nepal has 266 staffers in all and its organization can be roughly divided into three sections: engineering, programme and administration. Its outline is illustrated below:



## 2-4-2 Budget and Operating Expenses

The budget and operating expenses for the last three years as well as estimated revenue for this year of Radio Nepal are listed below:

	1985/86	1986/87	1987/1988	1988/1989 (Estimate)
(Unit: Rs)				
<b>Income</b>				
National Treasury Disbursement	3,000,000	3,928,000	70,000	700,000
Commercial Service Revenue	8,727,000	11,700,000	14,001,672	15,800,000
Other Income	1,000,000	2,042,000	2,327,000	4,200,000
<b>Total Income</b>	<b>12,727,000</b>	<b>17,670,000</b>	<b>16,398,672</b>	<b>27,000,000</b>
<b>Expenditure</b>				
<b>Programme Section</b>				
Wages Expense	896,520	977,040	905,000	
(Number of Staff)	(91)	(91)	(85)	
Other Expense	700,000	1,100,000	1,028,000	
<b>Subtotal</b>	<b>1,596,520</b>	<b>2,077,040</b>	<b>1,933,000</b>	
<b>News Section</b>				
Wages Expense	273,312	298,644	301,000	
(Number of Staff)	(23)	(23)	(22)	
Other Expense	150,000	200,000	175,000	
<b>Subtotal</b>	<b>423,312</b>	<b>498,644</b>	<b>476,000</b>	
<b>Engineering Section</b>				
Equipment Investment	4,090,000	5,527,000	3,734,892	
Programme Transmission Fee	100,000	200,000	207,000	
Maintenance Expense	317,000	700,000	820,053	
Wages Expense	1,116,696	1,271,004	1,533,600	
(Number of Staff)	(96)	(96)	(117)	
Other Expense	300,000	300,000	414,526	
<b>Subtotal</b>	<b>5,923,696</b>	<b>7,998,004</b>	<b>6,710,071</b>	
<b>Administration Section</b>				
Stationary Expense	100,000	100,000	81,651	
Wages Expense	536,712	526,404	626,000	
(Number of Staff)	(57)	(56)	(65)	
Electric Power Expense	4,100,000	4,000,000	1,834,814	
Gas/Water Charge Expense	80,000	80,000	40,000	
Telephone/Telex Expense	400,000	400,000	178,300	
Other Expense	588,760	2,700,000	3,306,877	
<b>Subtotal</b>	<b>5,805,472</b>	<b>7,806,404</b>	<b>6,067,642</b>	
<b>Total Expenditure</b>	<b>13,749,000</b>	<b>18,380,092</b>	<b>15,186,713</b>	
<b>Balance</b>	<b>△ 1,022,000</b>	<b>△ 710,092</b>	<b>1,211,959</b>	

## 2-4-3 Broadcasting Programmes and Programming Control

### (1) Programming Control

Radio Nepal broadcasts the following programmes on a medium wave for 101 hours a week (as of August 17, 1988):

#### Sunday - Friday

6:00 ~ 11:00 (5.0 hours)	}	14 hours/day
13:00 ~ 16:00 (3.0 hours)		
17:00 ~ 23:00 (6.0 hours)		

#### Saturday

6:00 ~ 23:00 (17.0 hours)	—	17 hours/day
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In Table 2-4-1 is shown a weekly timetable of broadcasting programmes.

Programmes can be divided into national service and commercial service as shown below from the above weekly programming;

#### Sunday ~ Friday

6:00 ~ 8:40	national service
8:40 ~ 11:00	commercial service
(11:00 ~ 13:00	intermission)
13:00 ~ 14:15	national service
14:15 ~ 16:00	commercial service
(16:00 ~ 17:00	intermission)
17:00 ~ 19:30	national service
(17:00 ~ 17:30	external service;
	short wave 5005kHz only)
19:30 ~ 23:00	commercial service

#### Saturday

6:00 ~ 8:40	national service
8:40 ~ 12:00	commercial service
12:00 ~ 14:15	national service
14:15 ~ 17:00	commercial service

17:00 ~ 19:30 national service  
(17:00 ~ 17:30 external service;  
short wave 5005kHz only)  
19:30 ~ 23:00 commercial service

National service means the programmes for education, culture or vocational training of the people or the programmes to provide information or guidance for the people. These programmes are produced by Radio Nepal mostly or the Government/public bodies such as ministries of education, agriculture, health, family planning association, etc., and are sponsored by these public bodies. Commercial programmes are not broadcasted during these national service hours.

Commercial service, on the other hand means, entertainment programmes, and spot advertisements are allowed in the midst of the programmes, and the programme itself may be provided by sponsors. News programmes broadcasted in the time zone of commercial service are treated as the national service programmes.

In addition to medium wave broadcasting, Radio Nepal has been broadcasting national programmes on short-wave at both 3230kHz and 5005kHz frequencies but the programmes themselves are the same as those on medium wave.

From 17 August, 1988 Radio Nepal is going to broadcast an external service programme in English language at 17:00 on short-wave at 5005kHz, and in the same time slot, the children's programme on medium wave and short-wave at 3230kHz.

## (2) Description of Major Programmes

### \* Religious Programmes

One-hour programme at 6:00 every morning with the start of daily broadcasting on Hinduism and Buddhism



\* Exchange Programmes

Programmes provided from BBC, ABC (Australia), VOA, ....., U.N., etc. three to four times a week (13:30 on Tuesday, 18:30 on Wednesday, etc.)

\* Basic Needs Programmes

To fulfill the basic needs of the people is a major challenge confronting the Government of Nepal in executing the Seventh Five-Year Plan, and this programme is to promote the people's awareness of basic factors such as food, clothing, housing, health care, education and so forth. (every Sunday and other news commentary programmes)

\* Programmes for women and youths

Programmes for the bettering of women's position regularly at 13:00~13:30 everyday and guiding youths as well as youth problems

\* Programmes for children

17:00~18:00 for children on a regular hour basis every day, and welfare and health care programmes of children in the morning and evening on a regular hour basis several times every week

\* Programmes for local agricultural areas

Considered most important not only by Radio Nepal but also by the agriculture-oriented state.

Local development news at 8:30 every morning and various programmes for science and technology, agriculture, lumbering, Panchayat, etc., on Sunday evening.

\* Entertainment programmes

Listening to the radio is one of the big pleasures for Nepalese.

Radio Nepal assigns much time to the entertainment programmes in order to provide sound pleasure.

A variety of music programmes such as Nepalese music and Indian movie music mostly.

Radio dramas produced and broadcasted once every week on Saturday.

(3) Future plans on expansion of programmes

As is clear from the present broadcasting timetable (Table 2-4-1), broadcasting is intermitted 11:00~13:00 (2 hours) and 16:00~17:00 (1 hour) from Sunday to Friday.

Radio Nepal is now planning to increase the service time by two hours everyday to fill the above intermission. Programmes for this will be news for ten minutes, programmes for health, adult education, agriculture, children, science and engineering for local people, and women each for 15 minutes, sports for 15 minutes and campaign for five minutes, totalling two hours.

They also plan to launch FM broadcasting around Kathmandu with news for 15 minutes, music for 2.5 hours and commercial for 15 minutes for the time being.

After completion of this Project, that is, covering the total population with the medium wave broadcasting network, Radio Nepal is now studying to broadcast other programmes by placing the short-wave at No.2 channel.

Table 2 - 4 - 1 Broadcasting Programme Timetable

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday																																																															
6	Religion																																																																					
7	<p style="text-align: center;">News</p> <p style="text-align: center;">Patriotic Song</p> <p style="text-align: center;">Agriculture</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 12.5%;">Police</td> <td style="width: 12.5%;">Classical Music</td> <td style="width: 12.5%;">Forestry</td> <td style="width: 12.5%;">Police</td> <td style="width: 12.5%;">Water Resources</td> <td style="width: 12.5%;">Culture</td> <td style="width: 12.5%;">Science &amp; Technology</td> </tr> <tr> <td>Youth / Small Industry</td> <td>Literature</td> <td>Classical Music</td> <td>Literature</td> <td>Education</td> <td>Education</td> <td>Tourism</td> </tr> </table>							Police	Classical Music	Forestry	Police	Water Resources	Culture	Science & Technology	Youth / Small Industry	Literature	Classical Music	Literature	Education	Education	Tourism																																																	
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#### 2-4-4 Network Facilities and Operating Conditions

Existing facilities of Radio Nepal are as follows:

##### \* Kathmandu Studio

Located at Singha Durbar in the city of Kathmandu with a site area of about 16,000m<sup>2</sup>. There are two studio buildings, old and new. The old one, having six studios and one master control room, is getting obsolete but is still used amid regular repair work. Adjacent to this old building is a new studio building which was constructed in 1983 by Japanese grant aid with a floor area of about 1,200m<sup>2</sup> and five studios and one master control room, equipped with a 100kVA standby generator.

##### \* Jawalakhel Transmitting Station

Philips, Holland 5kW SW transmitter (installed in 1955)

AWA, Australia 5kW SW transmitter (installed in 1961)

Harris Gates, USA 1kW MW transmitter (installed in 1973)

This station serves as a standby station should emergency happen in the other stations.

##### \* Khumaltar Transmitting Station

Marconi, UK 100kW SW transmitter (installed in 1968)

Marconi, UK 10kW MW transmitter (installed in 1968)

Harris Gates, USA 100kW SW transmitter (installed in 1978 and No.2 transmitter in 1982)

##### \* Kathmandu Transmitting Station

Completed in March 1983 by Japanese grant aid cooperation.

Site area is around 87,600m<sup>2</sup>, equipped with a 100m mast radiator of antenna, and a Toshiba 100kW MW and 10kW MW transmitters.

Diesel generator, 100kVA as a standby power source which operates a 10kW transmitter during power interruption.

\* Pokhara Transmitting Station

Completed in March 1983 together with Kathmandu Transmitting Station with a scale almost the same as this Station, but with a small studio and an outside broadcasting van added.

The inside of the building for both the studio and transmitting section is kept quite clean and maintenance as well as management is excellent.

Equipment provided by Japanese grant aid are five years old but well-maintained without any deterioration of performances.

2-4-5 Staff Training System

Radio Nepal plans to establish a training centre to provide systematic training for the engineering and programming staff, but it has not yet begun.

At Tribhuvan University, there is a technical education organization to provide two to three years radio skill and acquire electrical and mechanical skills. These graduates are treated as the technical assistant level in Radio Nepal Engineering Section. Employees of His Majesty's Government of Nepal are divided into ten grades of which the technical assistant level is categorized in grade 5, and grade 6 to grade 10 are management level. The journalism course in Tribhuvan University is also available for programme and news sections and the graduates are employed.

After employed by Radio Nepal, they get trained "on-the-job training" and they are sent to overseas broadcasting bodies, training centres of broadcasting equipment manufacturers, etc. The staff are sent mostly to Japan, some to Malaysia (Kuala Lumpur), Singapore, European countries and the U.S.

## 2-5. Situation behind the Request and its Contents

Based on the concept that broadcasting should positively be used for social development, National Communication Plan, using the broadcasting media as a main component was worked out in 1971 under the direction of His Majesty King Birendra and the first steps were taken for the expansion and development of the radio & TV broadcasting network as stated before.

Broadcasting contributes greatly to school education and adult education as well as promoting agriculture and other industries as aforementioned, and it also plays an important role to disseminate information.

In advanced countries, a term "information society" has long been used, but an information dissemination function is poor in developing countries, which, in turn, hampers the development of the countries.

Many years and much investment are required to develop the information dissemination functions such as newspapers and telephones. For this, infrastructure such as roads and telephone cables must be created first. Radio broadcasting, however, can cover the entire nation with electric waves transmitted from a few stations.

In a country like Nepal having multi-languages and multi-tribes and villages and towns scattering widely, such characteristics unique to radio broadcasting as instantaneousness, simultaneousness and extensiveness should be fully used for:

- \* campaigns of sanitation and family planning,

- \* making the national policies and various information fully known to the people,

\* promotion of friendship and understanding between various tribes, and

\* providing entertainment such as music.

It is certain that radio broadcasting in this country will generate a great effect which is unthinkable in advanced nations.

The Government of Nepal highly evaluated the medium wave broadcasting facilities at both Kathmandu and Pokhara completed by the Japanese grant aid cooperation in 1983, and they made a request this time to Japan for covering the total population by medium wave radio broadcasting.

#### Contents of the request

The Kingdom of Nepal divides its land into five Development Regions; Eastern, Central, Western, Mid-Western and Far-Western for the purpose of developing the country. Their policy is to facilitate development using the centre city in each region as a nucleus. The 100kW MW broadcasting stations are already available in Kathmandu and Pokhara, the centre of Central and Western Development Regions respectively, covering 55% of the populace.

This request is for expansion of the medium wave broadcasting network to provide dependable and quality reception of national programme to a majority populace of Far-Western, Mid-Western and Eastern Development Regions.

The request from the Government of Nepal envisages the establishment of one broadcasting station each provided with programme production equipment at the centre of each Development Region, Dipayal, Surkhet and Dhankuta, and the establishment of repeater or booster stations at Dhalkebar, Butwal, Ramechhap, Gorkha, Ghorahi (or Tulsipur) and Jumla to cover the entire land.



In Table 2-5-1 are listed the specific contents of the requested project.

Table 2-5-1 Outline of Plan

Station Name	Frequency	Transmitter	Antenna	Studio	Programme Line	Remarks
Dhankuta	648kHz	100kW 1 Set 10kw(Standby) 1 Set	120m	1	Telephone Line	(Attended Station)
Surkhet	576kHz	100kW 1 Set 10kw(Standby) 1 Set	120m	1	Telephone Line	(Attended Station)
Dipayal (Dandeldhura)	810kHz	10kW 2 Sets (Including Standby)	60m	1	Telephone Line (Available by the end of 1988)	(Attended Station) No Motorable Road
Dhalkebar	1143kHz	10kW 2 Sets (Including Stanby)	60m	--	Telephone Line	(Attended Station)
Butwal	729kHz	1kW	60m	--	Off Air Relay	(Unattended Station)
Ramechhap	LPC	1kW	60m	--	Off Air Relay	(Unattended Station) No Motorable Road
Gorkha	LPC	1kW	60m	--	Off Air Relay	(Unattended Station)
Ghorahi (Tulsipur)	LPC	1kW	60m	--	Off Air Relay	(Unattended Station)
Jumia	LPC	1kW	60m	--	Off Air Relay	(Unattended Station) No Motorable Road

LPC: Low Power Channel (1,485kHz, 1,584kHz, 1,602kHz)



## **CHAPTER 3 CONTENTS OF THE PROJECT**



## CHAPTER 3 CONTENTS OF THE PROJECT

### 3-1. Objectives

The project objective is to establish the medium wave radio broadcasting network covering the entire land, the only mass media capable of this among others in the Kingdom of Nepal, by expanding the network to Mid-Western, Far-Western and Eastern Development Regions where information has been unavailable most seriously so far, together with the existing MW network completed by the Japan's grant aid cooperation in 1983.

## 3-2. Study of Contents of the Project

### 3-2-1 Proposed Sites for Stations

Review was made on nine sites proposed from HMG of Nepal by giving the following considerations as well as being based on the field survey results:

- (1) It should be possible with the view of covering the entire land to serve more than 90% populace together with the service area provided by the existing stations.
- (2) Stations should be located at the centres of Development Regions.
- (3) Service area should be expanded efficiently.
- (4) Various conditions for construction-work execution (site, commercial power, roads, programme transmission network should be satisfactory.)

In Table 3-2-1 is shown the comparison of nine proposed sites.

Table 3-2-1 Comparison of Proposed Sites

Site	Item	Geographical Importance	Population Coverage	Investment Efficiency	Construction Work
Surkhet		○	○	○	△
Dhankuta		○	○	○	○
Dipayal		○	△	△	△
Dhalkebar		△	○	○	△
Jumla		×	×	×	×
Ghorahi		×	×	×	○
Butwal		△	△	×	○
Gorkha		×	×	×	×
Ramechhap		×	×	×	×

(Remarks) Geographical Importance : High ○, Medium △, Low ×  
 Population Coverage : High ○, Medium △, Low ×  
 Investment Efficiency : Good ○, Slightly better △, Bad ×  
 Construction Work : No Problem ○,  
 Problem, solvable △,  
 Difficult Problem ×

From the comparison in Table 3-2-1 in addition to the discussions made on the sites, Surkhet, Dhankuta, Dipayal and Dhalkebar are considered meaningful in view of necessity and validity, but since Jumla, Ghorahi, Butwal, Gorkha and Ramechhap are not considered necessary, they should be reviewed when the time comes to improve the qualities of receiving condition (noises, interference etc.), thus being excluded from this Project. (Refer to 3-3 Outline of Proposed Sites and Appendices VI Outline of Sites other than Proposed Ones)

### 3-2-2 Frequencies and Power for Transmission

Electric waves of the medium frequency band used for radio broadcasting may propagate too far away at night, and thus may interfere with the broadcasting of neighboring countries, or may be interrupted by foreign stations.

Electric waves are an effective means for communication including broadcasting in general. If they are used in disorder, interference may occur and good quality reception and transmission may not be possible. This is due to the wave characteristics of wide range propagation.

From this point of view, frequencies and broadcasting powers for medium wave stations are regulated by the international agreement concluded at the Regional Administrative LF/MF Broadcasting Conference held twice in 1974 and 1975 by the International Telecommunication Union (ITU).

These frequencies and powers are all registered at the International Frequency Registration Board (IFRB).

The frequencies and powers of the areas in this Project are registered as follows:

Surkhet : 576kHz/100kW, 900kHz/20kW

Dhankuta : 648kHz/100kW, 765kHz/100kW

Dipayal (Dandeldhura) : 810kHz/10kW

Dhalkebar : 1,143kHz/10kW

As the installation plan of stations in this Project is to be an integral part of the expansion plan for the medium wave radio broadcasting network programme in the Kingdom of Nepal, it is desired that the service areas will be increased as effectively as possible.



Medium wave radio broadcasting uses waves propagating over the ground i.e., ground waves, therefore the lower the frequencies, the less attenuated and the higher output power of transmitter, the further propagated.

Accordingly, it is ideal to use the lowest frequency out of those assigned to an area and the largest power permissible. Therefore, the following should be used:

576kHz/100kW for Surkhet, 648kHz/100kW for Dhankuta, 810kHz/10kW for Dipayal and 1,143kHz/10kW Dhalkebar.

### 3-2-3 Application for Change to IFRB

The Project should be executed as stated above but the transmitting points of Dhankuta and Dipayal are different from those registered to IFRB, thus requiring application for change.

As a result of field surveys, Dhankuta and its surrounding area are rugged, and thus it was hard to find a site suitable for a transmitting station. It was decided to locate it at Dharan about 23km south of the registered site.

It was decided to locate a station at Dandeldhura instead of Dipayal when the frequency assignment plan was worked out and Dandeldhura was registered. After that, however, Far-Western Development Region was set and Dipayal became its centre, and His Majesty's Government of Nepal wishes to locate a station in Dipayal and likewise in other Development Regions. Therefore, it was decided in this Project to locate a transmitting station in Dipayal about 54km east of Dandeldhura.

Hence, the following procedure is required for changing the two transmitting stations:

- (1) Administration having a broadcasting station on the same channel or adjacent channel should agree to the above.
- (2) Notification should be made to IFRB.
- (3) IFRB will examine the above and notify to all administrations concerned.
- (4) All administrations notified will send comments, if any, within 16 weeks.

Radio Nepal is now performing the formalities concerning change of the transmitting site for both Dhankuta and Dipayal. The administration that may be affected in this case is "All India Radio," and it is expected to reach an agreement with the telecommunication administration of India without any difficulty.

#### 3-2-4 Programme Production Equipment

The Kingdom of Nepal has been executing various development plans by dividing the land into five Development Regions. By locating the studio and outside broadcasting van in the centres of these Development Regions, it will be possible to produce and broadcast local programmes concerning the area-oriented news and living information, agricultural practices and health care and sanitation matching weather and climate, thus enabling the benefits on the expansion of the radio broadcasting network to be further enhanced.

Taking the above into consideration, a minimum of one studio and one compact outside broadcasting van necessary for producing news and information programmes will be installed in Dipayal, Surket and Dhankuta, centres of Far-Western, Mid-Western and Eastern Development Regions, respectively, so as to create the programme production system for the entire five Development Regions together with the existing stations of Kathmandu and Pokhara.

### 3-2-5 Set Values in Service Area

In this Project, by referring to the sensitivities of the radio sets by type in Japan and through actual listening results at each proposed site, the service area was set to be within the range of 60dB $\mu$ V/m field strength. (dB: This is a unit to represent the ratio of electric power, voltage and so on in terms of 10 (or 20) times the common logarithm of the ratio to the reference value. In the case of electric field strength, the reference value is based on the case that the voltage induced on the antenna with a unit length of 1 meter is 1 $\mu$ V.)

In Fig. 3-2-1 are shown receiver sensitivities by type.

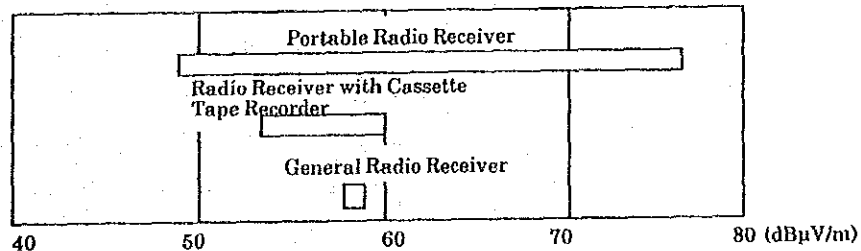


Fig. 3-2-1 Sensitivity of Radio Receiver

This was made based on the Receiver's Performance Survey for Standard Broadcasting (Radio Engineering and Electronics Association, Survey Committee, May 1977). The minimum field strength is shown when the ratio of audio signal (50mW output) to noise is 30dB (practically available value), meaning the lower the number, the better the sensitivity.

### 3-3. Outline of Proposed Sites

Proposed construction sites for this Project shall be the following four areas and five places:

#### 3-3-1 Surkhet

Surkhet, a regional development centre for Mid-Western Development Region, is administratively in an important position. It is in a basin surrounded by mountains all around, but the plain area is about 6km both east-west and north-south, thus relatively wider than other mountainous cities, and cultivates wheat mostly and civilization of people are relatively high.

A regular airline service is available from Kathmandu and Nepalganj, but the road to Nepalganj is very poor. A Chinese road construction firm is presently engaged in total improvement work to be completed by July 1988, but it is said to be delayed until the end of the year.

No domestic medium wave broadcasting can be practically received during the day in Surkhet. Both Kathmandu Station and Pokhara Station could be received at night with a reception evaluation\* of 3~4, but fading reached 10~20dB at the time of the survey, thus long term stable reception might be difficult. Radio Nepal, however, wants this area to be treated as priority 1.

#### \* Reception evaluation

The method to compare and analyze reception status is employed internationally by using the following grading scale:

- |         |           |
|---------|-----------|
| 5 ..... | excellent |
| 4 ..... | good      |
| 3 ..... | fair      |
| 2 ..... | bad       |
| 1 ..... | very bad  |

## (1) Selection of Proposed Site

Nepal Aviation Bureau intends Surkhet Airport to be a high grade one in the future, and thus it was decided to construct a transmitting station at a greater distance from the airport than specified in the present ICAO code after consultation with the Aviation Bureau.

Hence a proposed transmitting station was selected at Bayalkadagadhi 4.8km from the Airport (Refer to Fig. 3-3-1.).

The proposed site faces a main street running east and west in the centre of the basin, and the site is on a gentle slope facing south; hence it is not necessary to worry about the site inundated with water during the rainy season.

### Detail of the site

- 1) Site  
about 300m x 400m of flat lot
- 2) Road  
Paved road between Nepalganj and Kohalpur; and a gravel road including two big bridges were completed on July, 1988 between Kohalpur and Surkhet.
- 3) Commercial power  
With the approval of Finance, Water Resources and Telecommunication Ministries, it was agreed by Electricity Authority and Radio Nepal to construct a 56km-long transmission line in Surkhet, and the poles are presently being erected. The 33kV power line will be completed by June 1989. This project cost of US\$425,000 is being used out of the remainder (US\$7,000,000) of the Sixth Electrification Project (a sum of US\$37,000,000) by ADB funds aid.

- 4) Programme transmission  
An analog relay link between Kathmandu and Nepalganj and a digital relay link between Nepalganj and Surkhet are already under operation. Terminal equipment for broadcasting programmes are required.  
(Refer to Figs. 3-3-6 and 3-3-7.)
- 5) Reception status  
Field strength in the daytime of Pokhara Station is 25 dB $\mu$ V/m with evaluation 1 and 40~60 dB $\mu$ V/m with evaluation 3 at night.

## (2) Estimate of Service Area

- 1) Earth conductivity  
The vicinity has been cultivated long and an earth conductivity of 5mS/m is fairly good. Conductivity for a long-distance propagation path is estimated about 1mS/m based on the wave propagation status of the existing stations.
- 2) Service area (Refer to Fig. 3-3-8.)  
Assume the transmitting condition be set as follows:
  - a) Transmitting power 100kW
  - b) Transmitting frequency 576kHz
  - c) Transmitting site Bayalkadagadhi
  - d) Antenna 120m cylindrical steel mastService area will be about 100km in radius and will cover about 2.05 million populace in the southwestern part of Western Development Region and eastern part of Far-Western Development Region.
- 3) Latent field strength  
The same frequency wave as that assigned to the site does not exist but the service area will be smaller to some extent at night because of a wave of 37~49dB $\mu$ V/m at a lower

adjacent frequency of 567kHz and 49~51dB $\mu$ V/m at an upper adjacent frequency of 585kHz.

### 3-3-2 Dhankuta

Dhankuta, located on the slope of 900~1300m high above sea level in the eastern Nepal, is the centre of Eastern Development Region.

Eastern Development Region consists of the Terai Plain, the southern part and about 1/4 of this region, and the mountain area, the northern part and the rest of this region. In the Terai Plain, there are the cities such as Biratnagar, the second largest city in Nepal, located in the vicinity of the India-Nepal border and Dharan which is an entrance to the northern mountain area. The single industrial zone in Nepal is located around these two cities.

It takes about two days by car from Kathmandu and an airline service is available between Kathmandu and Biratnagar once a day.

#### (1) Selection of Proposed Sites

All of the three planned sites are small in size and ups and downs of the sites are so large that they were all cancelled, and other sites were examined. However, it was impossible to find a relatively flat site with enough space because this Dhankuta area is mountainous.

The Team checked the Dharan area north of the Terai Plain and found an appropriate flat lot in the southern suburb of Dharan, and agreed to this site as the proposed one.

His Majesty's Government of Nepal, on the other hand, strongly wishes to locate the broadcasting station in the Dhankuta area, because the Government already positioned Dhankuta as the centre of Eastern Development Region. It was decided that the studio

should be in the Dhankuta area and the transmitting station in the Dharan area. (Refer to Figs. 3-3-2 and 3-3-3.)

#### Detail of the sites

- 1) Site  
The studio site is about 50m x 100m in size and located in the city of Dhankuta, and the transmitting station site is about 300m x 400m flat lot located in the southern suburb of Dharan.
- 2) Road  
Paved between Biratnagar and Dharan, and paved between Dharan and Dhankuta with some sections unpaved. Both the studio and transmitting station sites face a road connecting the above main road.
- 3) Commercial power  
A 33kV power supply network is already available in the Dharan area with enough capacity. The distance from the nearest substation to the site is about 3 km.  
As there is a 240kW hydro power station in the Dhankuta area, enough power supply for the studio is available.
- 4) Programme transmission  
A telephone network is already available in both Dharan and Dhankuta but terminal equipment are required for broadcasting programmes.  
(Refer to Figs. 3-3-6 and 3-3-7.)
- 5) Reception status  
Biratnagar : Field strength from Kathmandu Station in the daytime is 34~36dB $\mu$ V/m with evaluation 2 and 45~58dB $\mu$ V/m with evaluation 3+ at night.  
Dhankuta : Field strength from Kathmandu Station in the daytime is 34 dB $\mu$ V/m with evaluation 2 and 52~68dB $\mu$ V/m with evaluation 3+ at night.



## (2) Estimate of Service Area

### 1) Earth conductivity

The Terai Plain consists of white earth grit and is cultivated as field and paddy. The conductivity of the Plain is estimated about 3~5mS/m and the mountain area 1mS/m at best.

### 2) Service area (Refer to Fig. 3-3-8.)

The service area at 60dBuV/m will be about 90km in radius and cover about 3.67 million populace provided that a transmitting power is 100kW, conductivity 1mS/m and frequency 648 kHz.

## 3-3-3 Dipayal

Dipayal has a population of 165,000 as Doti district and is in an important position politically as the centre of Far-Western Development Region.

The city is located in the basin surrounded by deep mountains.

An airline service is available from Nepalganj, and the road is very poor, thus securing an overland traffic is difficult in the rainy season especially. Now road improvement work via Dhangadhi and Dandel dhura has been executed using an ADB loan.

Incoming radio waves from existing stations in Nepal were measured in the city of Dipayal, but practically no audible medium waves exist in the daytime. Short-wave broadcasts were received with about 10dB fading but this was estimated unstable depending on seasons and time. Waves from Pokhara Station can be received at night with reception evaluation 3.

## (1) Selection of Proposed Site

In the vicinity of the city, it was not possible to find a flat site meeting the conditions of accommodating both a steel mast for antenna and a house and being more than 2km from the airport. The transmitting site selected is in Samuwagado Area, being the closest to the city of Dipayal among the proposed sites. This site is located on a hilly area along the road access to Dandelhdura and faces the Seti River across the road. (Refer to Fig. 3-3-4.)

It is about 3km from the city to the proposed site along the road, and it is also possible to secure the city transport even in the rainy season. It is about 1.8km in a straight line from the airport, and aircraft operation will probably not be troubled because the site is surrounded by mountains.

The proposed site is a triangular-shaped lot surrounded by roads and a swamp including three farmer's houses and used for wheat farming. The site is on a gentle slope towards northwest, hence it is not necessary to worry that the site might be inundated with water or be flooded.

### Detail of the site

#### 1) Site

The site is about 125m x 275m in size and has a slight slope with about 15m difference in height.

#### 2) Road

A paved road between Dhangadhi in the vicinity of the international boundary with India and Dandelhdura will be completed by May 1989. An asphaltting work plan is now underway between Dandelhdura and Dipayal under the two-year programme.

The above two works are based on an ADB loan.

Therefore, material and equipment transportation is

difficult in the rainy season (June to September) for the time being.

3) Commercial power

Installation of a 620kW heavy oil generator has been requested to the Government of Finland, but HMG of Nepal intends to construct this generating station by themselves if not granted by the former Government. It will be completed by June 1990.

4) Programme transmission

A telephone network (digital system) between Nepalganj and Dipayal is now under construction. It is required to install terminal equipment.

(Refer to Figs. 3-3-6 and 3-3-7.)

5) Reception status

No waves from either Pokhara Station or Kathmandu Station can be received in the daytime. Field strength at night from Pokhara Station is 55~70dB $\mu$ V/m with evaluation 3<sup>+</sup>.

(2) Estimate of Service Area

1) Earth conductivity

The proposed site consists of white earth grit and has been cultivated long, and thus the conductivity of the surface soil is about 5mS/m, relatively good.

Earth conductivity along a long distance transmitting path is estimated about 1mS/m from an actual measurement of propagation status from existing stations, assuming that the conductivity be almost the same because the site is all surrounded by mountains.

2) Service area (Refer to Fig. 3-3-8.)

If the transmitting conditions are set as follows:

transmitting power : 10kW  
transmitting frequency : 810kHz

transmitting site : Samuwagard  
antenna : 60m high cylindrical steel mast  
the service area will be about 43km in radius thus covering  
the cities of Dipayal and Silgarhi at a strong field  
strength and main towns such as Dandelhura and Mangalsen.  
Good propagation can be expected especially in the  
direction of Dandelhura along the Seti River.

Radio Nepal wanted to increase the power to 100kW, but it  
was agreed that this should be a future plan and the  
project would be executed on the basis of 10kW taking  
account of observance of matters registered to IFRB, enough  
coverage of the population in the whole plan (more than  
90%) and power status.

The population within the service area will be about  
560,000 including the entire area of Doti and part of its  
seven areas.

### 3) Latent field strength

Latent field strength on the same channel as 810kHz  
assigned to Dipayal does not exist, but waves with a deep  
fading of which field strength were 46~58 dBuV/m adjacent  
to the lower channel and 30~60dBuV/m adjacent to the upper  
channel were observed, and so the service area will be  
smaller somewhat at night.

### 3-3-4 Dhalkebar

This area is located between Kathmandu Station and Dhankuta  
Station scheduled to be constructed this time and outside of these  
two service areas. As a result of measurement of actual field  
strength and listening on site, it will be necessary to locate a  
station there taking the population in the possible service area into  
consideration.

Dhalkebar is a small town along the main road running east and west in the Terai Plain, and Janakpur with a population of 5~60,000 is located about 22km south of Dhalkebar.

It takes about one day to get there from Kathmandu overland.

#### (1) Selection of Proposed Site

There were two possible sites: Maltol area about 7km east of Dhalkebar and Bardibas area about 10km west of Dhalkebar. Maltol area was better in view of service to Janakpur but Bardibas was selected as the transmitting site because of a strong request from the Nepalese side.

(Refer to Fig. 3-3-5.)

#### Detail of the site

##### 1) Site

The site is located in Bardibas Village about 30km north of Janakpur and a flat space of about 180m x 240m can be secured.

##### 2) Road

Bardibas Village is about 10km from Dhalkebar along a main road running east and west in the Terai Plain. The site is along a road for Sindhulimadi after turning to north from Bardibas.

##### 3) Commercial power

No problem for its capacity but about 15km from the nearest substation.

##### 4) Programme transmission

An analog network exists between Kathmandu and Janakpur but not extended up to Bardibas. We referred to NTC (Nepal Telecommunication Corporation) for the network up to the proposed site at Bardibas. According to NTC, there is no

plan to extend the network to Bardibas from Janakpur nor plan to construct a network exclusively for a broadcasting station because of the long distance (more than 30km). Consequently, an own network for Dhalkebar should be constructed and VHF programme transmission equipment are required from a telecommunication station in Janakpur to the site. Terminal equipment are also necessary like the other stations.

(Refer to Figs. 3-3-6 and 3-3-7.)

5) Reception status

Janakpur:

Field strength from Kathmandu Station is 58dB $\mu$ V/m with evaluation 3+ in the daytime and 63~72dB $\mu$ V/m at night but with evaluation 3 because of interference with an Indian station.

Dhalkebar:

Field strength from Kathmandu Station is 49dB $\mu$ V/m in the daytime but with evaluation 2 because of much electric noise.

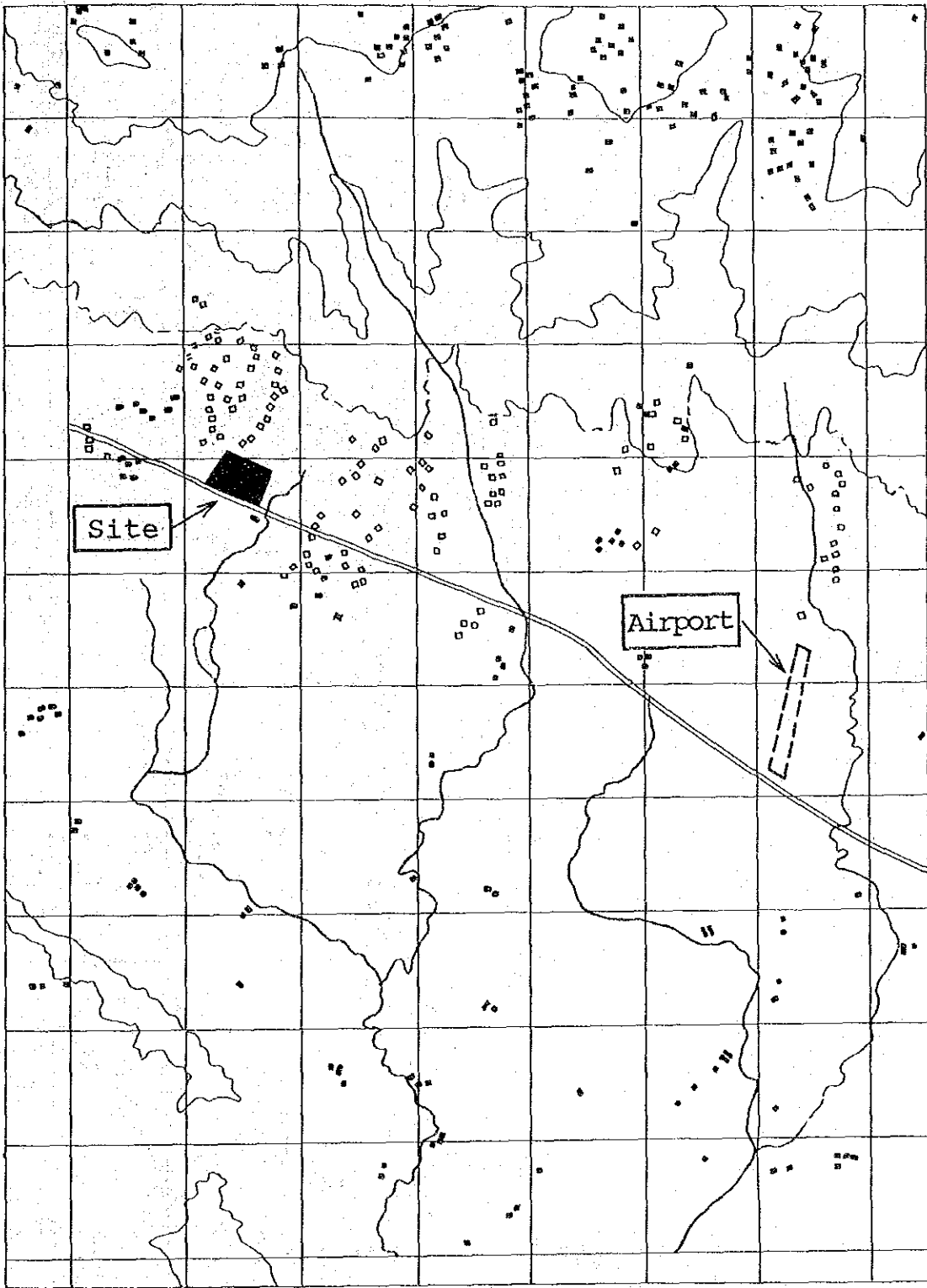
Sindhulimadi:

Field strength from Kathmandu Station is 51dB $\mu$ V/m with evaluation 3+ in the daytime and 42~50dB $\mu$ V/m with evaluation 3~3+.

(2) Estimate of Service Area

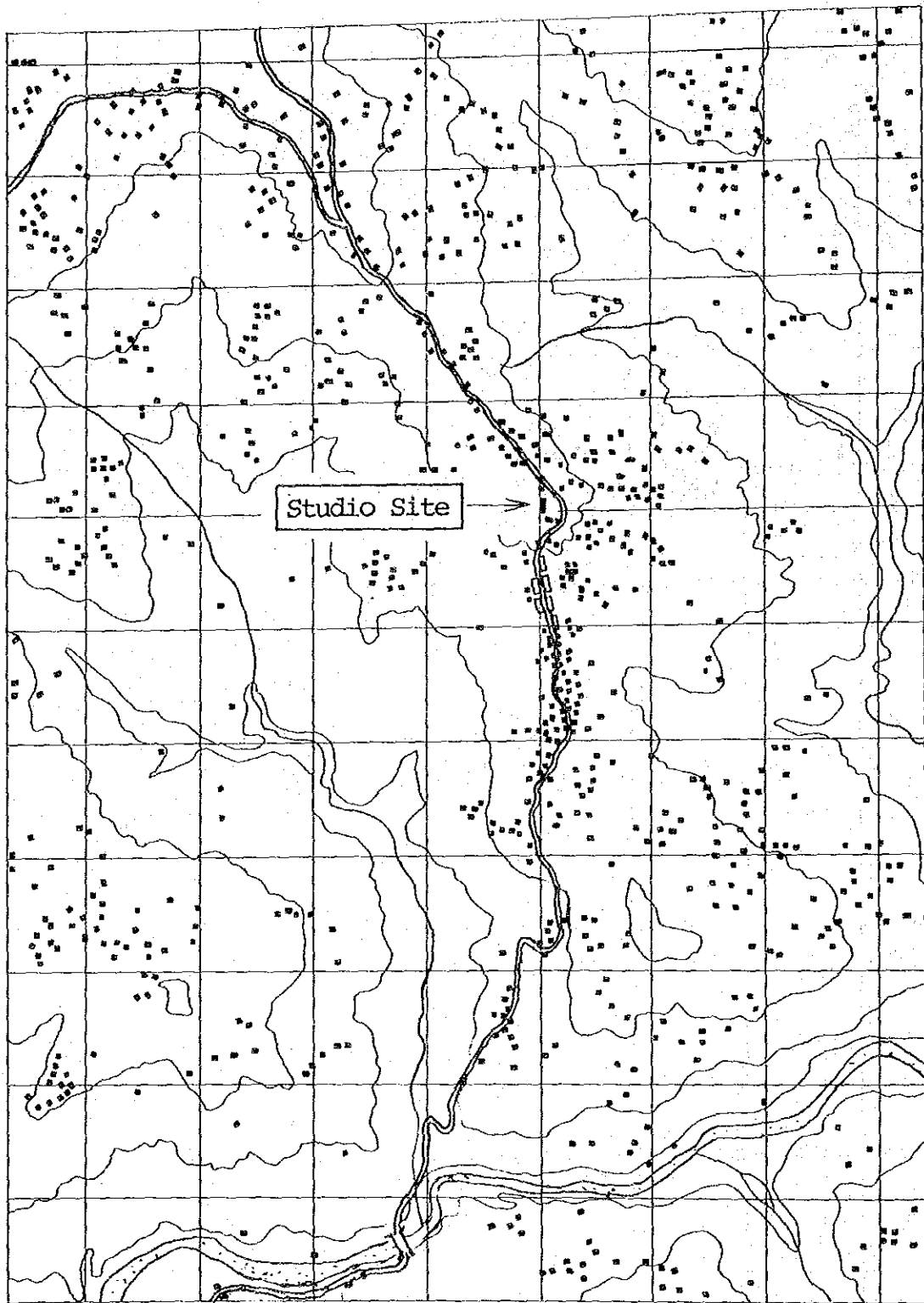
- 1) Earth conductivity is estimated 3~5mS/m in Terai Plain and 1mS/m in the mountains.
- 2) Service Area (Refer to Fig. 3-3-8.)

The service area at 60dB $\mu$ V/m will be about 32km in radius covering a population of about 1.43 million with transmitting power 10kW, conductivity 1mS/m and frequency 1,143kHz.



Scale: 1/50,000

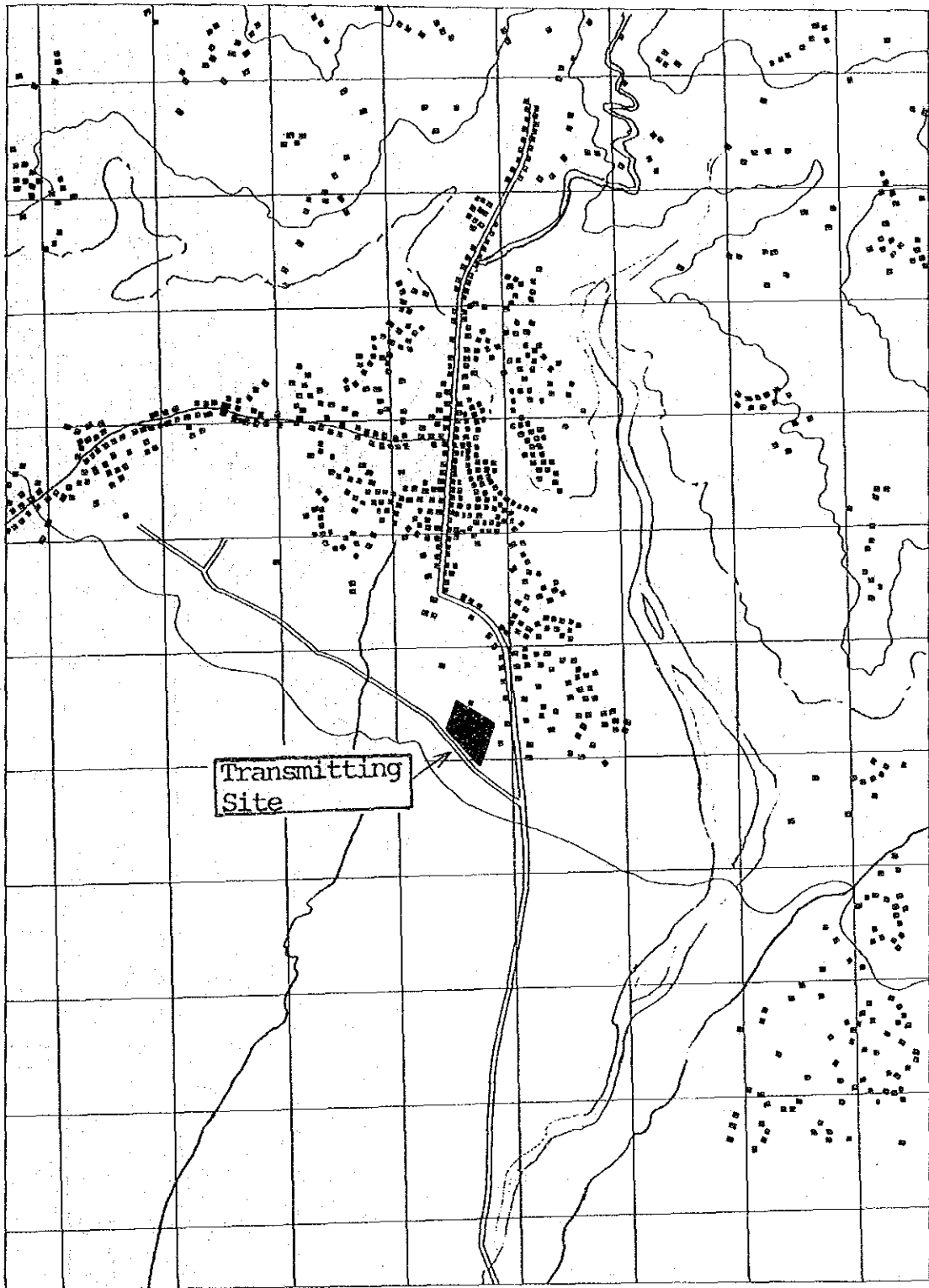
Fig. 3-3-1 Surkhet Broadcasting Station;  
Location of Site



Scale: 1/50,000

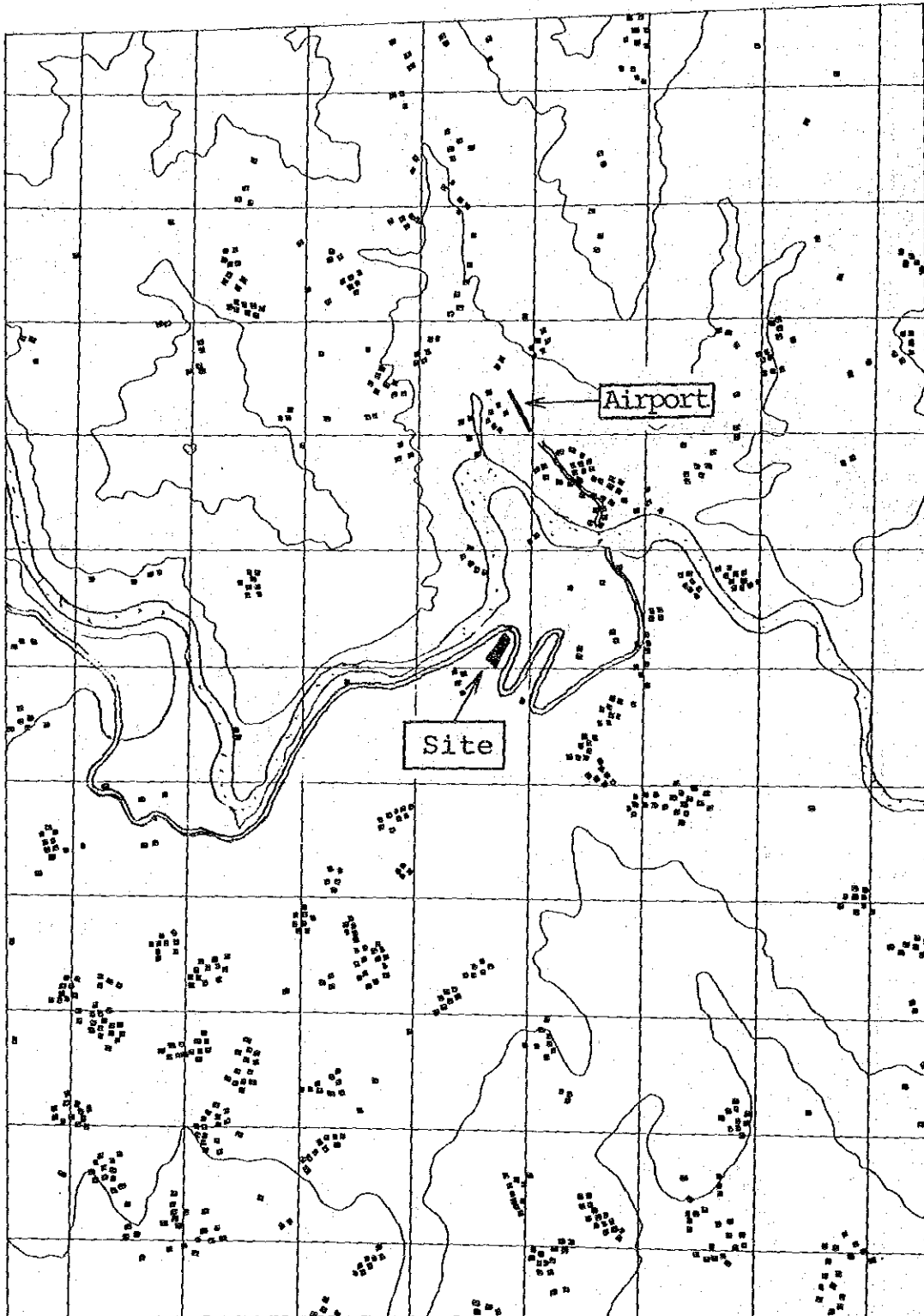
Fig. 3-3-2 Dhankuta Studio;  
Location of Site





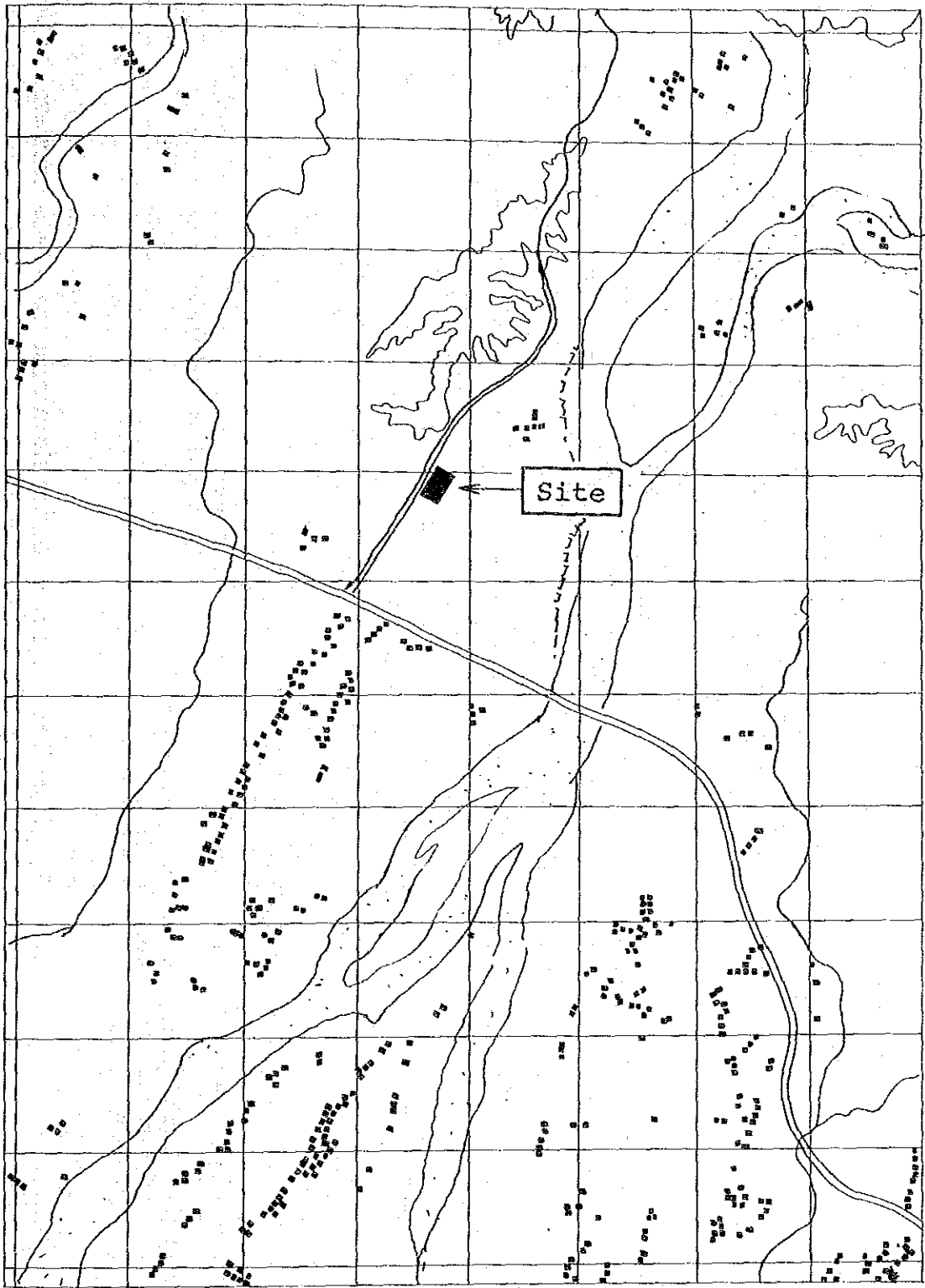
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Fig. 3-3-3 Dhankuta Transmitting Station;  
Location of Site



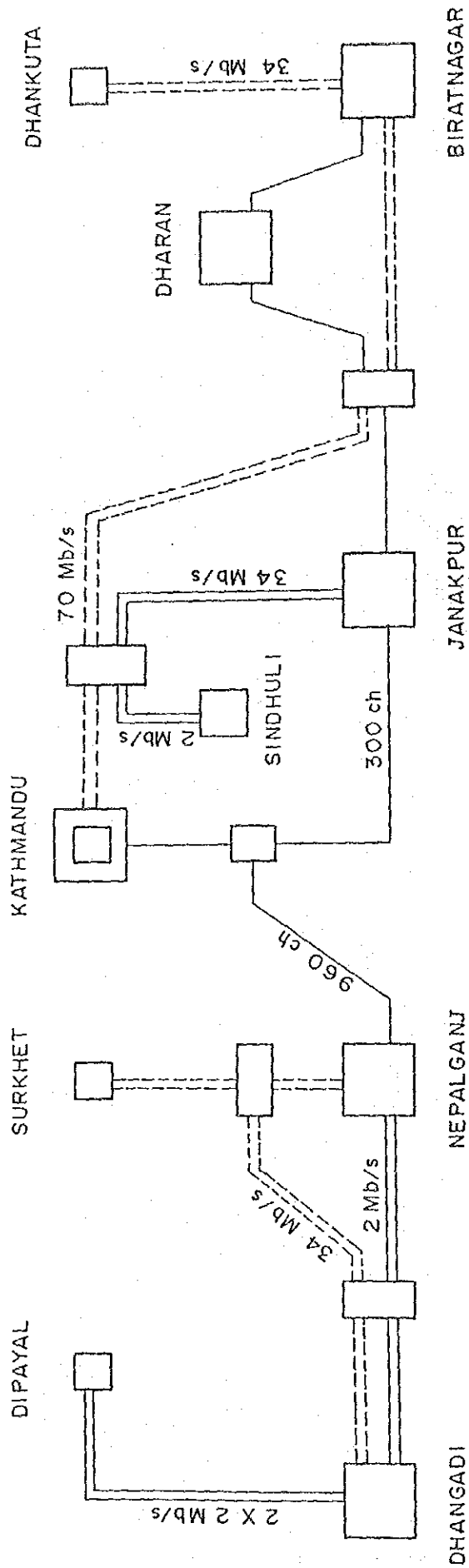
Scale: 1/50,000

Fig. 3-3-4 Dipayal Broadcasting Station;  
Location of Site



Scale: 1/50,000

Fig. 3-3-5 Dhalkebar Transmitter Station;  
Location of Site



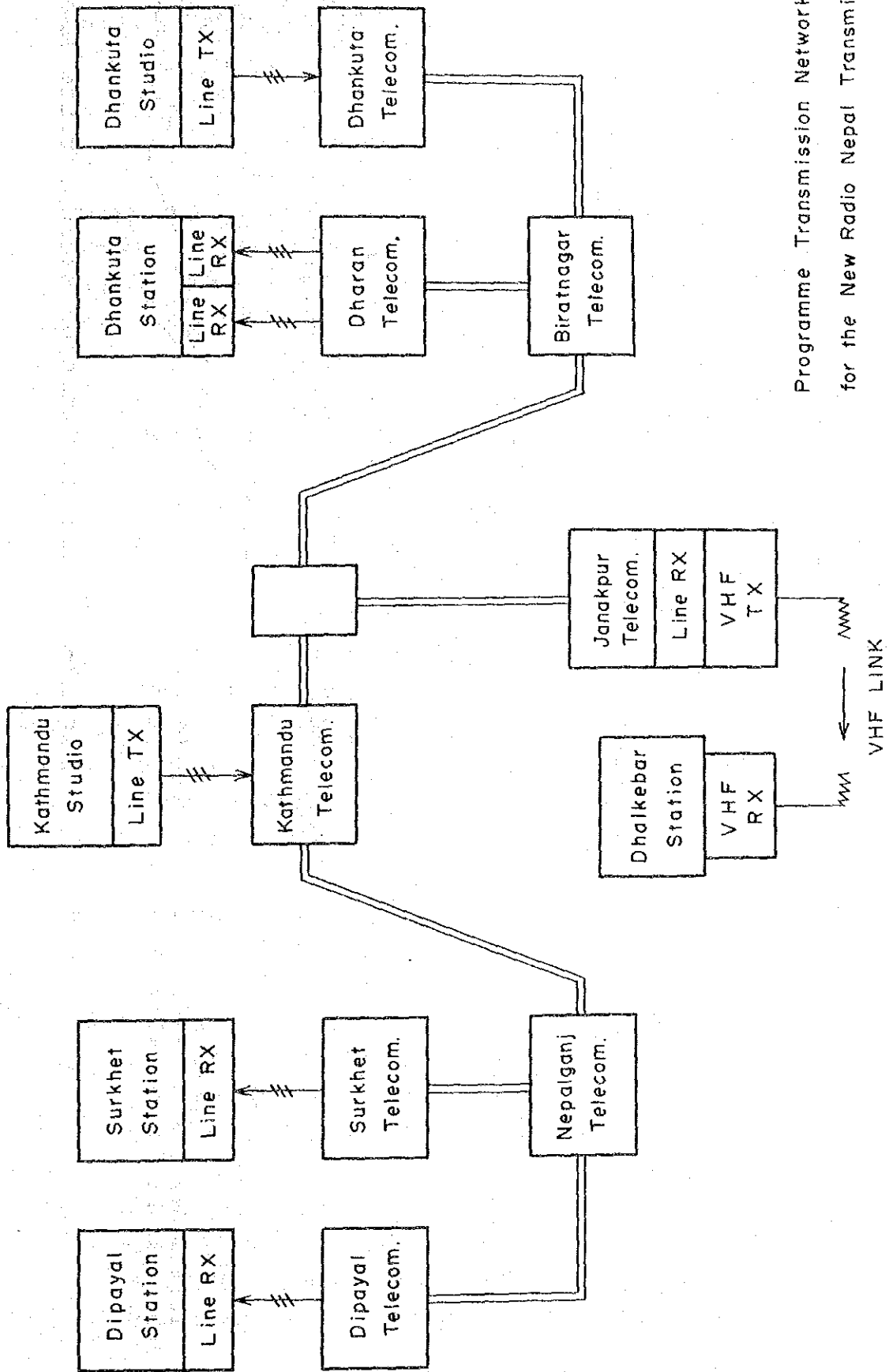
— Analogue UHF or Microwave Radio relay link

== Existing digital Radio relay link

=== Digital Radio relay link to be in operation by the end of '88 or at latest by mid '89.

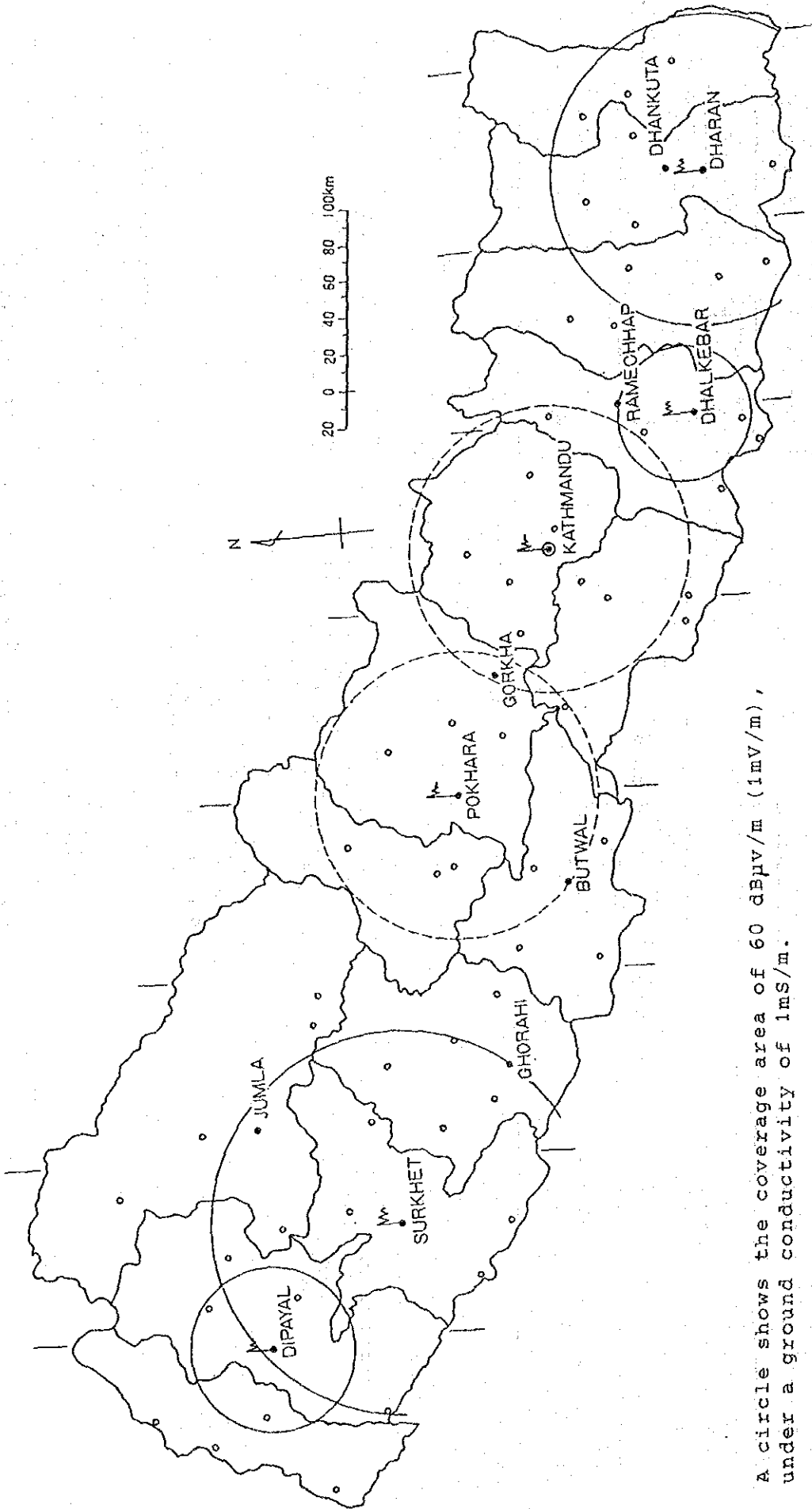
Transmission facilities that may be applicable to radio programmes

Fig. 3-3-6 Trunk Line Network of Telecommunication



Programme Transmission Network  
for the New Radio Nepal Transmitters

Fig. 3-3-7 Programme Transmission Line Network



A circle shows the coverage area of 60 dB $\mu$ V/m (1mV/m), under a ground conductivity of 1mS/m.

Fig. 3-3-8 Map of Expected Radio Service Areas