

822

ID. JA 89



5813  
**Government of the Republic of Indonesia**  
**Ministry of Public Works**  
**Directorate General of Cipta Karya**

## **51 Ibu Kota Kecamatan Water Supply Sector Project in West Java**

# **Preliminary Report on Catchment and Water Resources Protection**

February 1989

**COWiconsult** Consulting Engineers  
and Planners AS

in association with

 **CIRIAJASA**  
CONSULTING ENGINEERS



**PT. RESCO NUSANTARA KONSULTAN**

Project office : Jalan Cimanuk 34, Bandung 40115 Telephone (022) 73287

822 - ID. JA 89 - 5813

# 51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

**COWIconsult**

Consulting Engineers and Planners AS

in association with

**CIRIAJASA and  
RESCO NUSANTARA**

Ir. A.R. Tambing, Direktur  
Direktorat Air Bersih  
Jl. Raden Patah I/1  
Kebayoran Baru  
Jakarta Selatan

Your ref :

Our ref : 89/02/47/AC-BP Date : 28 February 1989

Subject : 51 IKK Water Supply Sector Project-West Java (DANIDA)  
Final Report on Water Resources-Catchment Protection

Dear Sir,

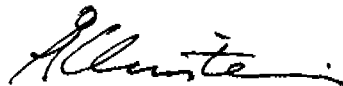
We are pleased to submit herewith the Preliminary Report on Catchment and Water Resources Protection concerning the above project and called for by Addendum 3 to Contract No.


HK. 02.03.01  
DAB-17/CES/DANIDA/87

The report forms a supplement to the Final Report on Water Resources worked out for the above project and according to the above contract. Both reports are being submitted simultaneously but for practical reasons (size of the volumes) under separate covers.

We are also forwarding 2 copies of each of the reports to Ir. Sugandi, PPSAB, with a copy of this letter.

Yours Sincerely,

  
Aage Christensen  
Team Leader

  
B. Pulawski  
Chief Hydrogeologist

copy : Ir. Priono Salim, Kasubdit Perencanaan Teknis  
DAB - Jkt.

Ir. Djoko Rismianto, Kasi Air Baku Perencanaan Teknis  
DAB - Jkt.

Ir. Prastoro Yuwono, Pimpinan Proyek  
DAB - Jkt

Ir. Sugandi S, Pimpinan Proyek Air Bersih Bandung  
PPSAB - Bandung



Government of the Republic of Indonesia  
Ministry of Public Works  
Directorate General of Cipta Karya

# 51 Ibu Kota Kecamatan Water Supply Sector Project in West Java

## Preliminary Report on Catchment and Water Resources Protection

February 1989

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CONTENTS

Page

RINGKASAN

i

EXECUTIVE SUMMARY

ii

1. INTRODUCTION

1.1

2. PRESENT LEGISLATION AND PRACTICE

2.1

3. PRESENTATION OF ENVIRONMENTAL INFORMATION - P I L

3.1

4. RECOMMENDATIONS ON PROTECTIVE MEASURES

4.1

APPENDICES

I. PIL AND PROTECTIVE MEASURES - SPRINGS

II. PIL AND PROTECTIVE MEASURES - DRILLED WELLS

III. PIL AND PROTECTIVE MEASURES - SURFACE WATER SOURCES

IV. WATER RESOURCES PROTECTION - SUMMARY SHEETS

GENERAL INFORMATION

## RINGKASAN

Laporan Pendahuluan mengenai Tadahan dan Perlindungan akan Sumber-sumber Air ini diajukan sesuai dengan "Terms of Reference" pada Adendum No. 3 dari Kontrak Konsultasi.

Laporan menjelaskan secara singkat tentang perundang-undangan yang ada dalam bidang pengelolaan sumber-sumber air dan perlindungan lingkungan.

Tampak bahwa perundang-undangan yang ada dan cukup terlaksana baik hanya memadai untuk bidang pengembangan sumber air serta pengelolaannya, sedangkan untuk perlindungan lingkungan masih membutuhkan undang-undang khusus dan pedoman pelaksanaan.

Untuk keperluan proyek ini, khususnya untuk melaksanakan usulan tindakan perlindungan sesuai undang-undang yang ada; dapat diselesaikan dengan pendekatan secara administratif oleh Pemerintah Daerah Tk. I dan II terhadap kedua aspek perlindungan sumber air yaitu perlindungan terhadap debit (pengelolaan) dan perlindungan kualitas (perlindungan lingkungan).

Untuk memenuhi persyaratan "Environmental Management Act" atau EMA (Ketentuan-ketentuan pokok Pengelolaan Lingkungan Hidup) maka Penyajian Informasi Lingkungan - PIL - tahun 1982 dari setiap sumber air ke 44 IKK yang akan dilaksanakan disajikan dalam laporan ini.

Sehubungan dengan debit (maksimum 20 liter/detik) dan jumlah sumur produksi (maksimum 3 sumur) hanya pada beberapa IKK saja maka EMA menetapkan bahwa Analisa Mengenai dampak Lingkungan (AMDAL) tidak diperlukan.

"PIL" disajikan dalam bentuk formulir isian (Appendix I - III) yang juga secara singkat menginformasikan usulan ukuran lindung yang akan dilaksanakan. Setiap "PIL" dilampirkan dengan peta topografi yang menggambarkan daerah-daerah yang tercakup.

Penjelasan tentang pendekatan untuk menerapkan Penyajian Informasi Lingkungan (PIL) dan usulan ukuran lindung, diberikan pada Bab 3 dan 4.

Setelah komentar-komentar dan usulan-usulan diterima, Laporan Akhir akan diselesaikan dan bahan-bahan secara terperinci dipersiapkan bagi setiap IKK untuk diajukan kepada Pemerintah daerah khususnya.

## EXECUTIVE SUMMARY

This Preliminary Report on Catchment and Water Resources Protection has been worked out in compliance with Terms of Reference of the Addendum 3 to the Consultancy Contract.

The Report accounts briefly for the existing legislation within the field of water resources management and environmental protection. It appears that while there exist an adequate legislation and a rather well established practice within the water resources development and management, the environmental protection aspect still needs more precise legislation guidance and more decisive enforcement.

For the purpose of this Project and its concern to implement the proposed protective measures the existing legislation is sufficiently clear by putting the administrative responsibility of both aspects of water resources protection i.e. yield protection (management) and quality protection (environmental protection) on the Provincial and on the Regional Government (Pemda). In practice the Pemda shall be approached in all aspects of water resource protection.

In compliance with the requirements of the Environmental Management Act (EMA) - (Ketentuan-ketentuan Pokok Pengelolaan Lingkungan Hidup) - of 1982 the Report presents the environmental information (PIL) - Penyajian Informasi Lingkungan - on each of the water sources selected for the 44 IKKs to be implemented.

Due to the rather low yields (max. 20 l/s) and the limited number of productive wells in any of the IKKs (max. 3) the EMA - stipulated Analysis of the Environmental Impact, (AMDAL) of the Project is not required.

Together with PILs, each presented on a separate form, in Appendices I to III are also briefly outlined the protective measures proposed to be implemented for each source. Each proposal is supplemented with a topo-map showing the area involved.

Explanation of the approach applied for both the Presentation of the Environmental Information (PIL) and the proposal of the protective measures is given in Chapter 3 and 4.

After receiving comments and suggestions on amendments, a final report will be worked out and made operational by preparing detailed materials for each IKK to be submitted to the concerned Regional Governments (outside the present Term of Reference)

## 1. INTRODUCTION

### 1.1 Background

The present report is a part of the Final Report on Water resources worked out for the 51 IKK Water Supply Sector Project according to the consultancy contract

No. HK. 02. 03. 02  
DAB-17/CES/DANIDA/87

between the Direktorat Jenderal Cipta Karya and Cowiconsult, Copenhagen in association with Ciriajasa and Resco Nusantara, both of Jakarta.

The reports are edited separately for practical reasons but submitted simultaneously.

The present report has been worked out in compliance with the Terms of Reference of the above Contract as well as with the subsequent requests by the Client and the financing agency, DANIDA, to have the water resources protection issues dealt with more comprehensively. This wish has been expressed in the TOR for Addendum 3 where a preliminary report on that issue has been called for.

Due to the novel character of the environmental and water resources protection issues and thus an expressed lack of established practice in dealing with these issues, the report is a preliminary one. After being presented to the Client and discussed with the involved authorities a revised, final version shall be worked out together with detailed recommendations for each water source on the protective measures to be taken. This activity shall take place in the beginning of the implementation phase of the Project.

### 1.2 Objectives and Scope of the Report

The aim of this report is to present, for each selected water source, the set of impacts that may affect adversely the future exploitation of the source and to indicate or advise on the steps that shall be taken to protect the source.

Two types of impacts are relevant in that respect

- environmental pollution
- depletion of the yield either due to natural conditions or overexploitation of the resource

Both aspects are considered in this report.

After a brief presentation of the existing legislation on water resources protection in Indonesia, the approach applied for the Presentation of the Environmental Information - termed PIL (Penyajian Informasi Lingkungan) - is described and the recommendations on the protective measures to be applied are outlined.

The PIL for each of the sources as well as the recommendations are presented on a standardised forms given in Appendices I to III for springs (I), wells (II) and surface water sources (III).

Finally, Appendix IV gives a summary for each IKK of the general, environmental and resource related information and proposal on the actions to be taken.



## 2. PRESENT LEGISLATION AND PRACTICE

### 2.1 Water Resources Development and Management

The first, comprehensive regulation on water resources promulgated in the time of the independence of the Republic is the Law No. 11 of 1974 on Water Resources Development.

According to this law, water resources are natural or man-made bodies of water either at the surface or underground. Following the above Law a suite of acts and regulations on water resources management on national level have been promulgated.

These are :

- Government Act No. 22 of 1982 on Water Resources Management
- Regulation of Minister of Mines and Energy No. 03/P/M/Pertamben of 1983 on Groundwater Management
- Decree of Director General of Geology and Mineral Resources No. 392.K/526/060000 of 1985.

On provincial level, the relevant act is the recently promulgated regulation No. 3 of 1988 on Control of Abstraction of Groundwater and Surface Water and Disposal of Waste Water worked out by the Badan Pengelola Air (BAPAIR), Jawa Barat.

All the above acts are primarily concerned not so much with the environmental protection as with the protection and management of the yield, the protection of quantity.

Of interest for the Project are the institutional arrangements within water resources development.

According to the above acts and especially the Law no. 11 of 1974 and the Act no. 22 of 1982 the responsibilities with respect of water resources are as follows :

- a) The Minister of Public Works through its Directorate General of Water Resources is responsible for and concerned with development of :

## 2.2

- surface waters
  - springs in case the capturings do not alter the subsurface hydraulics of the spring (gravity capturings)
  - development of groundwater for irrigation purposes (in consultation with and on the technical approval of the Directorate of Geology and Mineral Resources).
- b) The Minister of Mines and Energy through its Directorate General of Geology and Mineral Resources is responsible the development of
- groundwater and
  - springs in case capturings alter their geo-hydraulic conditions.

The Directors General may in some specific matters transfer their authority in that respect to the Directorate of Environmental Geology, or to the Head of Regional Office of Minister of Mines and Energy or to the Dinas PU Pengairan in case of surface water sources.

### 2.2 Concessions for Water Resources Utilization

While the technical aspects of water resources and their development rest with the two above Directorates, the administration of water resources development are handled by the Provincial Governments (Pemda).

Thus the use of any water resource for any purpose, be it domestic supply, irrigation or industrial use is subject to license to be issued by the Governor. The licenses are issued on the basis of binding technical recommendation from the two Directorates or their above mentioned nominees.

In order to handle the administrative tasks and to be able to follow the technical contents of the recommendations the Governor of West Java set up a Water Resources Management Office - Badan Pengelola Air (BAPAIR). Besides assisting the provincial administration with issuing licenses, the BAPAIR shall also control that the conditions on which the license has been issued are observed as well as coordinate the efforts in controlling of the industrial waste water disposal.

From the point of view of the Project it is interesting to state that the application for the license to develop a water source must have the following attachments :

## 2.3

- principal approval by the Bupati
- location maps
- a filled out form issued by Directorate of Environmental Geology
- Presentation of Environmental Information (PIL) and Analysis of Environmental Impact (AMDAL), called for by the Environmental Management Act of 1982 (see below under 2.3).

Thus, although the license is issued by the Governor, accept of the Regional Government (the Bupati) is necessary. Thus again, for practical purposes, protection of a given water source within a given administrative area can be effected by the Bupati's control through approvals of applications for resource development.

With respect of the Presentation of Environmental Information (PIL) and of the Analysis of Environmental Impact (AMDAL) the PIL has to be submitted every time a request for development of water resource is submitted. The AMDAL is only worked out in case of expected major environmental influence the extraction may cause. In case of groundwater development the AMDAL must be worked out when the extraction is more than 50 l/sec or involves more than 5 boreholes.

Thus in the case of the present Project, where the extraction is at most 20 l/sec from maximum 3 boreholes at any of the IKKs, the Environmental Information shall be given only for each of the 44 sources selected while no AMDAL is needed.

### 2.3 Environmental Protection

The awareness of and the need for a balanced environmental use was recognized since the beginning of the Republic.

As in most countries also the Government of Indonesia aims to integrate the environmental policy in all decision makings on development. However one should bear in mind, that these objectives are to be reached in a development planning which focuses on economic growth with industry and agriculture as spearheads. This will expectedly result in numerous conflicting situations between the environmental and development interests.

To cope with the growing problems the Ministry for Development Supervision and Environment was established and later on changed into the Ministry for Population and Environment (KLH).

The first legislative act solely concerned with environmental protection is the Environmental Management Act (EMA) - Ketentuan-ketentuan pokok Pengelolaan Lingkungan Hidup - promulgated in 1982 as Act no. 4, giving the basic provisions for the management of the living environment.

The Act is a very general one and provides for legislation in more detail. Thus a great number of laws, regulations and instructions is being scheduled to be worked out and implemented by the concerned Ministries. Some of these regulations are already presented, such as the quality standards for drinking and swimming waters by the Minister of Health. However most of the legislative works is still to be done. Thus no comprehensive legislation on environmental protection of groundwater resources exists.

One of the more important rules of the EMA is its stipulation that each activity plan that is likely to cause a significant impact on the environment have to present an analysis of that impact, AMDAL (Analysis of Environmental Impact).

The analysis have to be carried out according to the given regulations and it shall give account of and consider the following elements :

- a. the population which will be affected by the impact
- b. the extent of the distribution area of the impact
- c. the period of the impact retention
- d. the impact intensity
- e. the number of the other environmental components which will be affected by the impact
- f. the cumulative nature of such an impact
- g. the reversibility of irreversibility of the impact

This stipulation came into effect July 1987 and detailed guidelines for AMDALS are being worked out by various concerned authorities.

The problem which arises in the case of environmental protection of water resources is that they can be affected by a multitude of different sectoral activities such as industry, agriculture, forestry etc. Thus an effective environmental protection requires implementation and an effective coordination and control of protective measures on a sectoral level within a given area.

Considering the quite recent character of the environmental legislation it is understandable that it is still deficient in details and frustrating in implementation.

Of importance for the Project and the implementation of the proposed protective measures is the EMA's administrative ruling stating in article 18 that :

the sectoral coordination of the protection of the living environment is the responsibility of the Governor while the management of the living environment in relation to the implementation of national policies pertaining to that environment shall be carried out on the regional level by the Regional Government (Pemda).

#### 2.4 Conclusion

For both types of water resource protection called for by the Project i.e.

- protection of the yield (conservation)
- protection against pollution (environmental protection)

the responsible authorities are the Governor and the Regional Government through their respective technical offices.

For handling the water resources management the Governor of West Java established the Water Resources Management Office (BAPAIR). For co-ordinating the environmental tasks he has at his disposal the Bureau for Population and Environment (BKLH). Both offices are rather young with as yet limited resources and experience.

For all practical purposes and in all aspects of water resources protection the Project shall approach the Regional Government, Pemda.

### 3. PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

In APPENDICES I to III the environmental information, PIL, for each of the retained water sources is given on a standardized form. The forms differ somewhat for each of the three main source types : wells, springs and surface waters.

The format as well as the contents of the appendices is preliminary and is of course subject to changes or ammendments in the final edition of the report.

Each PIL consists of a general information on the source containing technical data such as location, yields, means of extraction etc. followed by information on the source's geological and morphological setting and its present environmental conditions.

Further the presentation briefly accounts for the possibilities of pollution of :

- the source itself,
- it's immediate surrounding
- it's catchment area.

It should be noted that for the groundwater sources, (springs and boreholes) their topographical catchment areas are given although their hydrogeological catchments may differ from the topographical ones. Further, "upstream" catchments are indicated for boreholes in hilly areas (volcano slopes) where a downward water flow is obvious. In flat areas the catchment areas have been equalled with a circular zone of influence estimated from the pumping tests and the general hydrogeological condition of the area.

Finally for each of sources the sensitivity to pollution of its catchment area has been assessed. This assessment is based on the sources' response to the catchment's contamination (a surface water intake on a little stream for instance is very sensitive to the pollution of its catchment) as well as the catchment's geological and morphological characteristics.

The sensitivity is not quantified but expressed in relative terms with following graduation : safe, not sensitive, sensitive, quite sensitive, very sensitive.

#### 4. RECOMMENDATIONS ON PROTECTIVE MEASURES

##### 4.1 General

The recommended protective measures are presented on the same form as the PILs (App. I - II) and are arranged in the same order as the indications of the pollution possibilities i.e. :

- the site itself (well, intake, capturing)
- the surroundings of the source
- the source's catchment area.

The recommendation on protection is followed for each of the above mentioned 3 protection "zones" by indication of the authority responsible for the implementation and control of the protective measures. It is thus understandable that the responsibility shifts from the IKK-Water Supply Unit and Camat for the intake sites through Camat and Pemda for the surroundings to Pemda or even Governor for entire catchments.

For each of the sources the PIL and the recommendation on protection are followed by a topo-map of the source area showing the location of the source and indicating the proposed protection area/catchment.

For springs and smaller streams, the entire catchment is being proposed to be protected or future undesirable activities controlled.

For big rivers or irrigation canals both getting their waters from large watersheds, stretching over several Kabupatens, only the immediate distance upstream has been indicated for protection. The protection of the entire watershed is supposed to be of much more general interest than protection of the proposed intake only and thus to be the responsibility of the Governor.

For boreholes (wells) the protective area in hilly areas (slopes of volcanoes) is divided in two sub-areas

- a. the well's influence zone (for simplicity assumed as being circular)
- b. the well's catchment area consisting of the influence zone and the "upstream" area of the groundwater flow (see topography maps APPENDICES II.3.3 and II.13.2 for example).

The influence zone (a) shall be subject to both environmental protection and yield protection (resource conservation). Within the catchment area (b) only the environmental protection shall be implemented.

In flat or sub-flat areas with corresponding rather flat piezometric groundwater surface the protective area consists of the well's radial influence zone only.

#### 4.2 Yield Protection

Protection of the yield has been proposed for all sources. Specially important is the yield protection of springs with yields at or close to the respective IKK's water demand and of the wells with equally low yields.

The protection of the spring's yield is rather simple by not granting additional water rights to the outflowing water. However, care shall be exercised not to permit exploitation of the groundwater (by f. ex. wells) close to the spring as this may deplete the yield of the spring considerably.

The protection of the yield of drilled wells shall be carried out by not permitting any other boreholes within a certain distance from the borehole or at least by demanding a hydrogeological evaluation of the impact the proposed drilling will have on the Project's well.

The "protective distance" has been set equal with the estimated zone of influence of the well. Two standard zones have been proposed :  $R = 500$  m and  $R = 1000$  m based on the results of the pumping test, the general hydrogeological conditions of the area and the IKK's present and possible future water demand.

#### 4.3 Environmental Protection

Intake site shall be primarily protected against pollution by :

- waste waters or polluted water flowing into the intake chambers or seeping down along the casing of wells
- fuel and oils from gen-sets seeping into the intake structures or down to the aquifer
- entrance of animals



### 4.3

The surroundings of the intake structures or boreholes shall be equally subject to strict protection. Control must be exercised with all activities that may pollute the source.

Especially the following activities shall be prohibited or controlled :

- no storage of fuels, oils, tars, obnoxious chemicals, fertilizers or pesticides
- no garbage disposal sites
- no permanent, bigger installations of liquid fuel driven engines. Single, temporary installations shall have a special permit and be controlled for leakages of fuel.

The protection of entire catchment shall have both an immediate and a long sighted aim. Also here the following shall be observed. :

- no storage of fuels, oils, tars, harmful chemicals, fertilizers or pesticides
- garbage disposal sites and sewerage systems shall have their impact evaluated before a possible permission be granted
- no extensive deforestation to control erosion
- mining activities (also of sand and gravel) shall be subject to environmental impact evaluation and permits
- controlled land use.

A very specific problem of groundwater catchment protection in coastal areas is the control of possible saline water intrusion as a result of overexploitation of the well itself or a more regional overexploitation. To monitor the possibility of such a development control measures in the form of frequent water quality checks have been proposed for the concerned IKKs.

### 4.4 Conclusion

The above discussion of the protective measures and explanation of the Appendices is intended as an input for the concerned authorities to prepare the necessary instructions and by-laws.

#### 4.4

These acts shall be prepared for each source based on the data and the proposals given in this report and supplemented with comments and additional inputs by the enacting authorities.

It is proposed that after issuing the final edition of this report, detailed materials shall be prepared for each IKK in collaboration between the Client (PPSAB) the local and regional authorities , and the concerned Water Enterprises (PDAMs).

## APPENDICES

- I . Presentation of Environmental Information (PIL) and Protective Measures - SPRINGS & TAPPING
- II . Presentation of Environmental Information and Protective Measures - DRILLED WELLS
- III . Presentation of Environmental Information and Protective Measures - SURFACE WATER SOURCES
- IV . Water Resources Protection Summary Sheets - GENERAL INFORMATION

APPENDIX I

Presentation of Environmental Information  
(PIL) and Protective Measures

SPRINGS AND TAPPING

## APPENDIX I

### Presentation of Environmental Information (PIL) and Protective Measures

#### SPRINGS AND TAPPING

Appendix

##### Kab. Serang

1. 1.01 Padarincang I.1.1 - 1.2

##### Kab. Sukabumi

2. 4.02 Cisolok I.2.1 - 2.2

3. 4.06 Kalapanunggal I.3.1 - 3.2

4. 4.08 Nagrak I.4.1 - 4.2

##### Kab. Cianjur

5. 5.04 Warungkondang I.5.1 - 5.2

##### Kab. Karawang

6. 6.04 Pangkalan I.6.1 - 6.2

##### Kab. Subang

7. 7.01 Sagalaherang I.7.1 - 7.2

8. 7.02 Jalan Cagak I.7.1 - 7.2

9. 7.04 Cissalak I.7.1 - 7.2

##### Kab. Sumedang

10. 8.02 Situraja I.8.1 - 8.2

Appendix

Kab. Tasikmalaya

11.	9.06	Cikalong	I.9.1 - 9.2
12.	9.09	Pagerageung	I.10.1-10.2
13.	9.10	Leuwisari	I.11.1-11.2
14.	9.05	Cibalong	I.12.1-12.2
15.	9.04	Kawalu	I.13.1

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : PADARINCANG Kab. SERANG Water Demand : 10 l/s

=====

A. GENERAL

1. Spring : Name : Cirahab Lega  
Desa : Curenggoong , Kampung : Sukaraja  
- Yield : Max : Measured : 95 l/s, Design (calculated) 105 l/s  
Min : Measured : 44 l/s, Design (calculated) 35 l/s  
- Type : Gravity  , Artesian
2. Extraction : Pumping by PLN  or genset  , Gravity
3. Geology : Young volcanics
4. Catchment (topographical) : Area : 2.5 km<sup>2</sup>  
- Morphology : Foot-slopes of the Paraksak mount  
- Cover : Soil, sandy-soil  
- Present environmental conditions : Forest, habitation, rice field  
- Sensitivity to pollution : Quite sensitive

B. POLLUTION POSSIBILITIES

1. Capturing : Surface waters from sawahs entering the capturing
2. Surrounding : Surface waters from sawahs entering the capturing
3. Catchment : From habitation, deforestation, dumping of harmful materials

C. PROTECTION RECOMENDATIONS

1. Environmental Protection

- Capturing : Sanitary zone, appropriate design  
\_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM)
  - Surroundings : Controlled human activity, no store of chemicals  
\_\_\_\_\_ , Responsibility of : Camat, Pemda
  - Catchment : No deforestation, no storage or dumps of chemicals, controlled land use development  
\_\_\_\_\_ , Responsibility of : Camat, Pemda
2. Yield Protection : Control with other consumption of water conflicting with IKKs demand , Responsibility of : Pemda

(See map overleaf)

# 51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix I.1.2

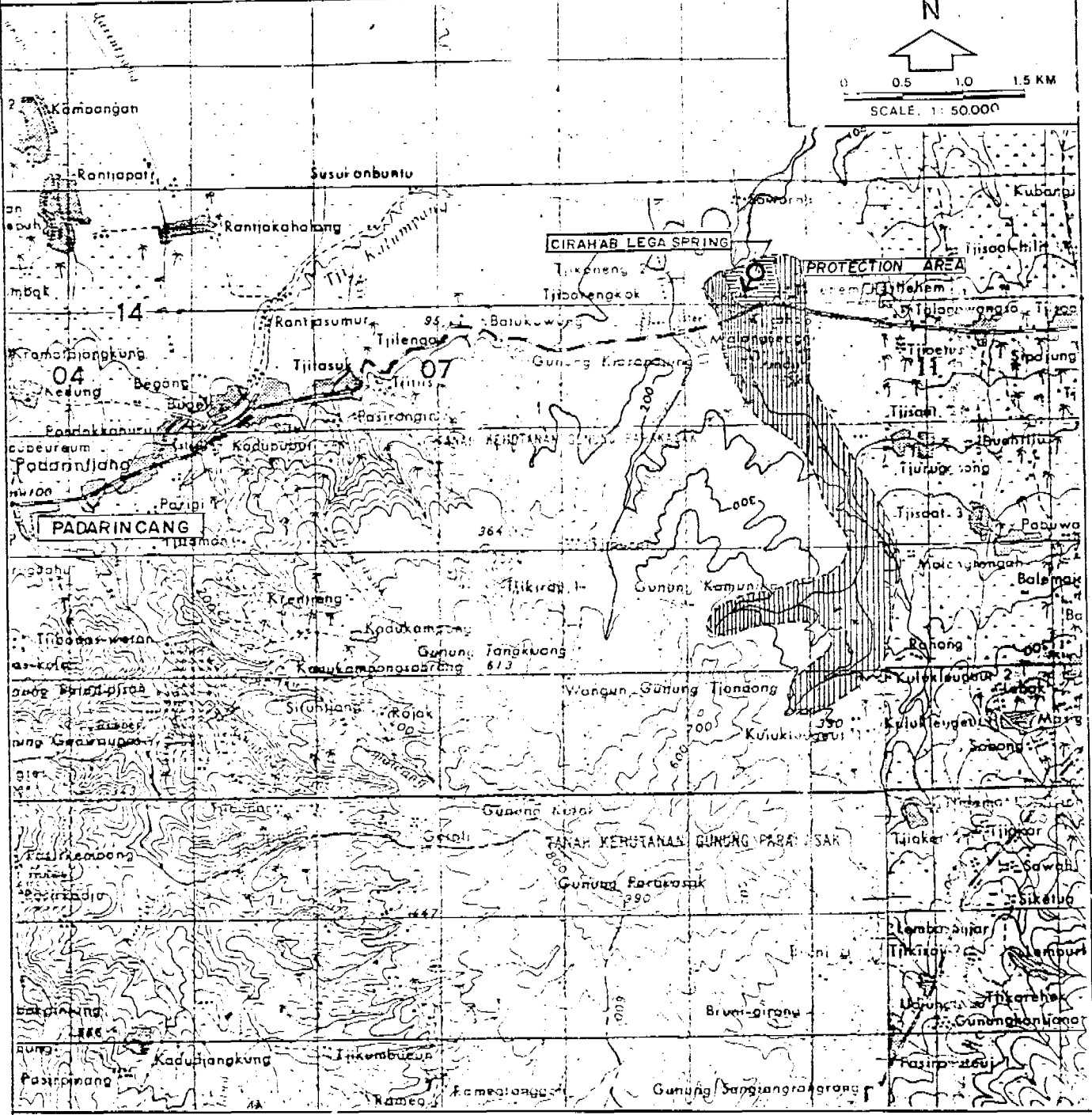
IKK : PADARINCANG

KAB : SERANG

WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SPRING

LOCATION : Ds. CURUGGOONG



## NOTE



CAPTURING SITE



PROTECTION ZONE

No other spring or groundwater exploitation without assessment of impact on the spring



CATCHMENT PROTECTION

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission



WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : CISOLOK Kab. SUKABUMI Water Demand : 5 l/s

A. GENERAL

1. Spring : Name : Cikahuripan Wangun

Desa : Cisolok , Kampung : Ganesa

- Yield : Max : Measured : 13.5 l/s, Design (calculated) 16 l/s

Min : Measured : 10.9 l/s, Design (calculated) 7 l/s

- Type : Gravity  , Artesian

2. Extraction : Pumping by PLN  or genset  , Gravity

3. Geology : Central Mountains volcanics and sediments

4. Catchment (topographical) : Area : 2.0 km<sup>2</sup>

- Morphology : Mountain slope

- Cover : Soil, sandy-soil

- Present environmental conditions : Rubber plantation, dense vegetation

- Sensitivity to pollution : Very sensitive

B. POLLUTION POSSIBILITIES

1. Capturing : Surface run-off seeping into the intake

2. Surrounding : Surface run-off seeping into the intake

3. Catchment : Deforestation, housing or industrial development, dump sites

C. PROTECTION RECOMENDATIONS

1. Environmental Protection

- Capturing : Sanitary zone, proper design of drainage system

\_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM)

- Surroundings : No dumps of harmful materials, controlled habitation

\_\_\_\_\_ , Responsibility of : Camat, Pemda

- Catchment : No dumps of harmful materials, no deforestation, controlled development

\_\_\_\_\_ , Responsibility of : Camat, Pemda, Perkebunan

2. Yield Protection : No other watering use than this project

\_\_\_\_\_ , Responsibility of : Pemda

(See map overleaf)

IKK : CISOLOK

KAB : SUKABUMI

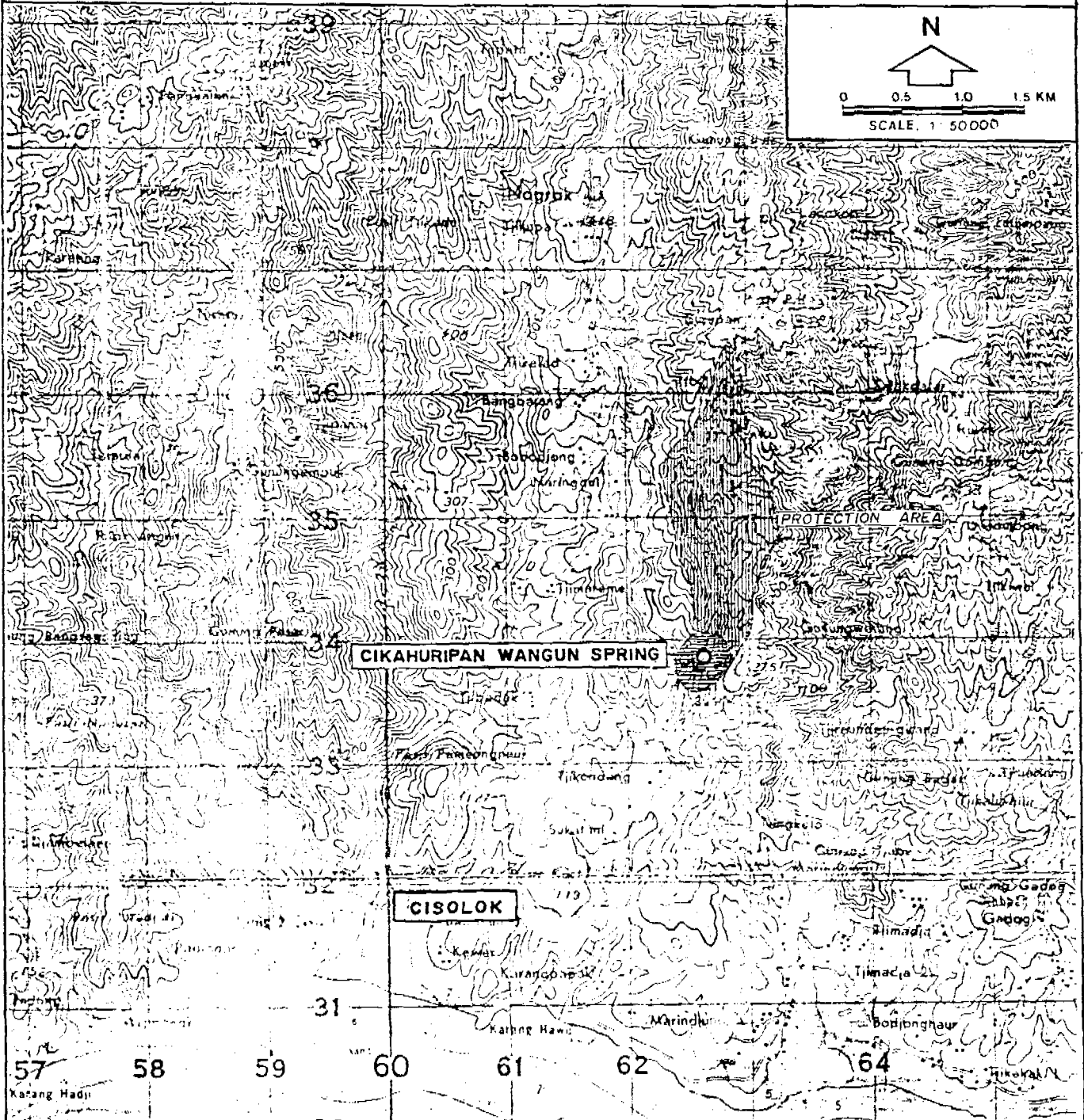
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SPRING

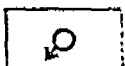
LOCATION : Ds. CISOLOK



0 0.5 1.0 1.5 KM  
SCALE: 1:50000



**NOTE**



**CAPTURING SITE**



**PROTECTION ZONE**

No other spring or groundwater exploitation without assessment of impact on the spring



**CATCHMENT PROTECTION**

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : KALAPANUNGGAL Kab. SUKABUMI Water Demand : 5 l/s

=====

A. GENERAL

1. Spring : Name : Kiararugrug  
 Desa : Pulosari , Kampung : Cigoong  
 - Yield : Max : Measured : 30.00 l/s, Design (calculated) 36 l/s  
 Min : Measured : 14.33 l/s, Design (calculated) 9 l/s  
 - Type : Gravity  , Artesian
2. Extraction : Pumping by PLN  or genset  , Gravity
3. Geology : Young volcanics
4. Catchment (topographical) : Area : 1.0 km<sup>2</sup>  
 - Morphology : Mid-slope of Endut mountain  
 - Cover : Soil, sandy-soil  
 - Present environmental conditions : Rice-fields, natural vegetation  
 - Sensitivity to pollution : Not sensitive

B. POLLUTION POSSIBILITIES

1. Capturing : Surface water seepage into the capturing
2. Surrounding : Surface water seepage into the capturing
3. Catchment : Limited possibilities

C. PROTECTION RECOMENDATIONS

1. Environmental Protection
- Capturing : Sanitary zone, appropriate design drainage system  
 \_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM)
- Surroundings : Appropriate design drainage system  
 \_\_\_\_\_ , Responsibility of : Camat, Pemda
- Catchment : No dumps of harmful materials, controlled changes of  
landuse , Responsibility of : Camat, Pemda
2. Yield Protection : No other exploitation of the source than this  
project , Responsibility of : Pemda

(See map overleaf)

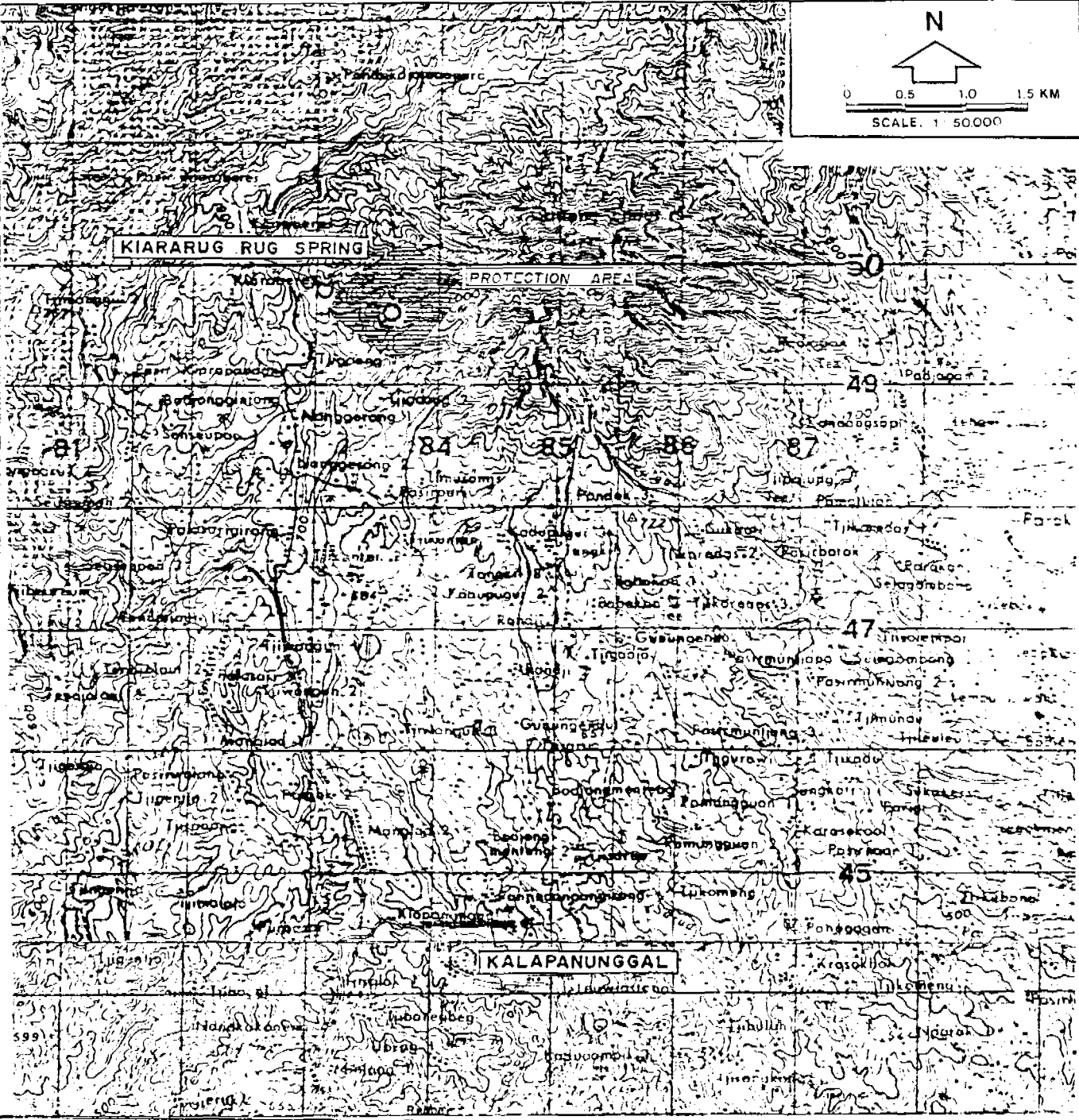
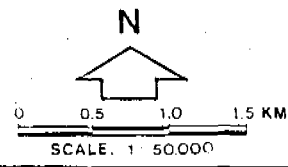
IKK : KLAPANUNGGAL

KAB : SUKABUMI

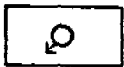
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SPRING

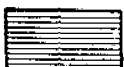
LOCATION : Ds. PULOSARI



**NOTE**



CAPTURING SITE



PROTECTION ZONE  
No other spring or groundwater exploitation without assessment of impact on the spring



CATCHMENT PROTECTION  
- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides  
- No garbage disposal sites or sewage systems without permission  
- No extensive deforestation  
- Mining activity (also sand and gravel) after permission

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : NAGRAK Kab. SUKABUMI Water Demand : 5 l/s

=====

A. GENERAL

1. Spring : Name : Cilempod
- Desa : Nagrak Utara , Kampung : Pasir Bentik
- Yield : Max : Measured : 15.6 l/s, Design (calculated) 19 l/s  
Min : Measured : 11.0 l/s, Design (calculated) 7 l/s
- Type : Gravity  , Artesian
2. Extraction : Pumping by PLN  or genset  , Gravity
3. Geology : Young volcanics
4. Catchment (topographical) : Area : 2.2 km<sup>2</sup>
- Morphology : Mountain slope, surrounding by hilly areas
- Cover : Thick soil, sandy
- Present environmental conditions : Habitation, rice fields, vegetation
- Sensitivity to pollution : Not sensitive

B. POLLUTION POSSIBILITIES

1. Capturing : Surface water run-off entering the capturing
2. Surrounding : From habitation, road accident with harmful materials
3. Catchment : From habitation, road accidents, possible future storage of harmful materials

C. PROTECTION RECOMENDATIONS

1. Environmental Protection
- Capturing : Sanitary zone, proper design  
\_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM)
- Surroundings : Regulation of human activities, no cutting the vegetation  
\_\_\_\_\_ , Responsibility of : Camat, Pemda
- Catchment : Controlled land-use of the area  
\_\_\_\_\_ , Responsibility of : Camat, Pemda
2. Yield Protection : No other additional water use than this project  
\_\_\_\_\_ , Responsibility of : Pemda

(See map overleaf)

51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix I.4.2

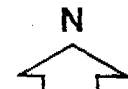
IKK : NAGRAK

KAB : SUKABUMI

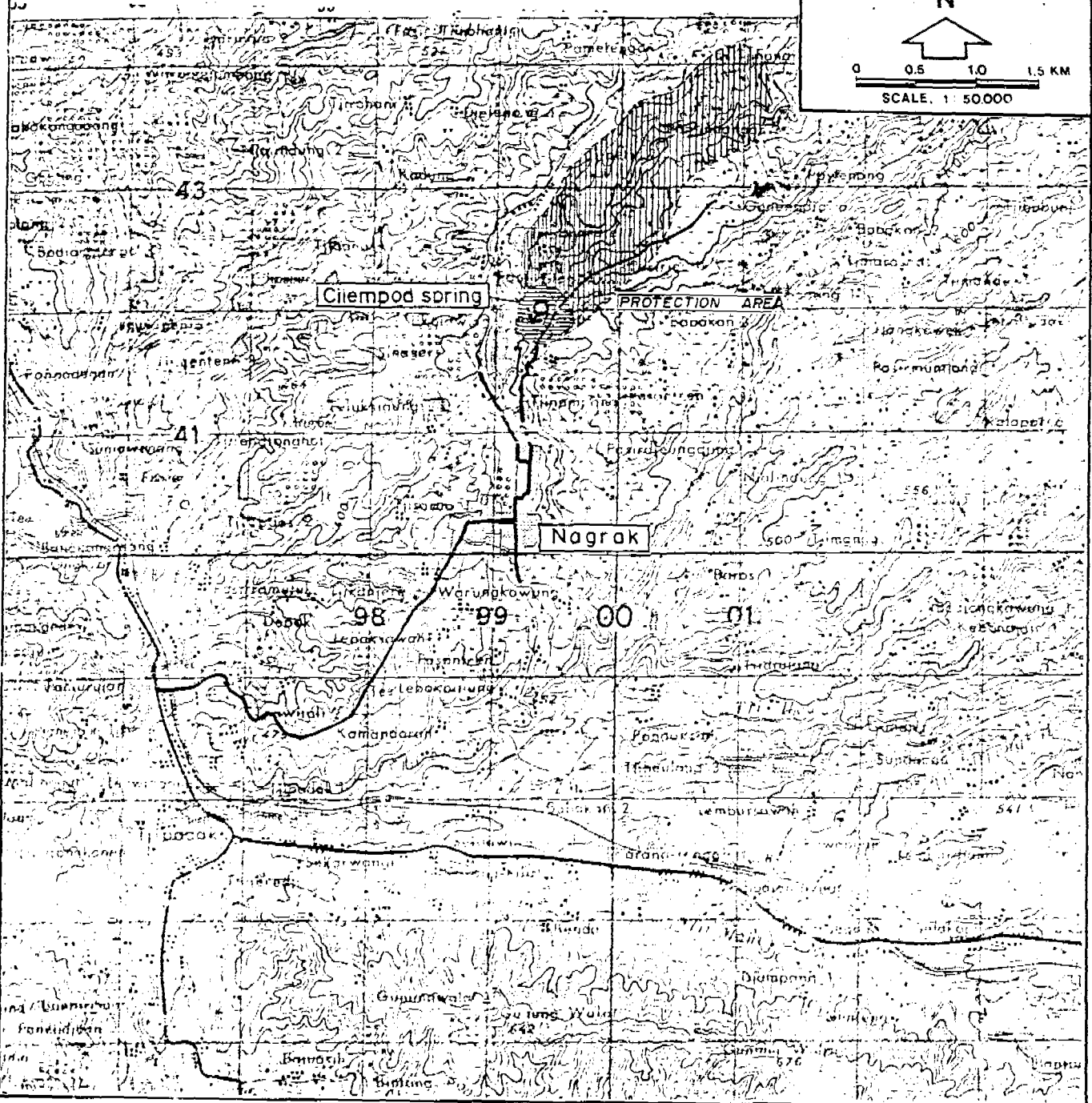
SOURCE TYPE : SPRING

LOCATION : Ds. NAGRAK UTARA

WATER RESOURCES PROTECTION SHEET



0 0.5 1.0 1.5 KM  
SCALE: 1 : 50000



**NOTE**



**CAPTURING SITE**



**PROTECTION ZONE**

- No other spring or groundwater exploitation without assessment of impact on the spring



**CATCHMENT PROTECTION**

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission



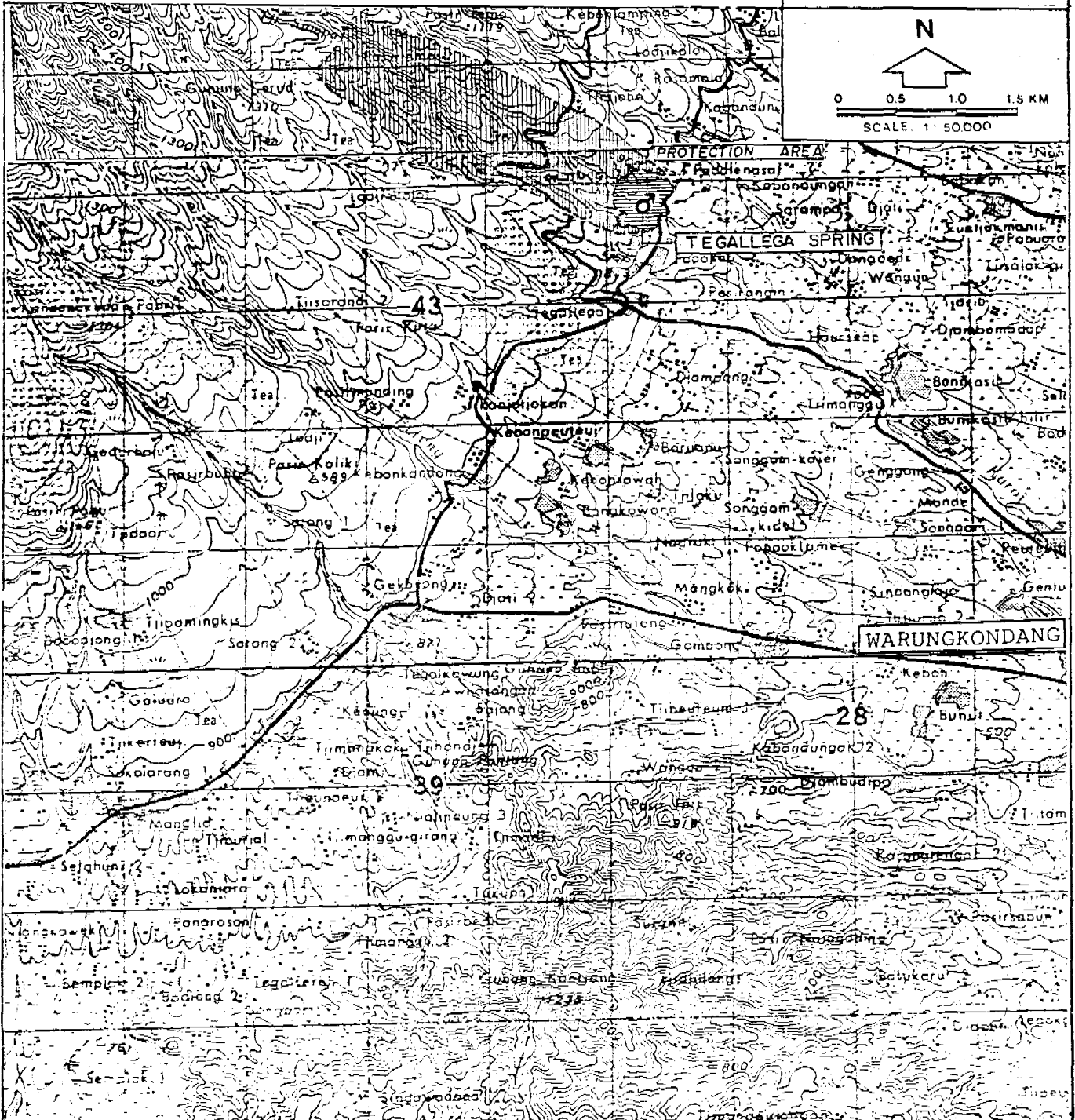
IKK : WARUNGKONDANG

KAB : CIANJUR

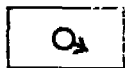
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SPRING

LOCATION : Ds. TEGALLEGA



NOTE



CAPTURING SITE



PROTECTION ZONE

No other spring or groundwater exploitation without assessment of impact on the spring



CATCHMENT PROTECTION

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission



WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : PANGKALAN

Kab. KARAWANG

Water Demand : 5 l/s

## A. GENERAL

1. Spring : Name : Ciburial  
Desa : Tamansari , Kampung : Ciburial  
- Yield : Max : Measured : 50 l/s, Design (calculated) 65 l/s  
Min : Measured : 39.5 l/s, Design (calculated) 30 l/s  
- Type : Gravity  , Artesian
2. Extraction : Pumping by PLN  or genset  , Gravity
3. Geology : Limestone formation (karst)
4. Catchment (topographical) : Area : 3.5 km<sup>2</sup>  
- Morphology : Dispersed hill  
- Cover : Soil, limestone  
- Present environmental conditions : Habitation, natural vegetation  
- Sensitivity to pollution : Sensitive (kavstic area)

## B. POLLUTION POSSIBILITIES

1. Capturing : Surface run-off entering the capturing, flooding by river
2. Surrounding : Surface run-off entering the capturing, flooding by river, human activities (washing, defecation)
3. Catchment : From habitation, possible dumping of harmful materials

## C. PROTECTION RECOMENDATIONS

## 1. Environmental Protection

- Capturing : Sanitary zone, appropriate structure design system  
\_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM)
- Surroundings : Controlled human activity, no storage of harmful materials , Responsibility of : Camat, Pemda
- Catchment : No dumps of harmful materials, controlled land use  
\_\_\_\_\_ , Responsibility of : Pemda
2. Yield Protection : Other consumption only after permission  
\_\_\_\_\_ , Responsibility of : Pemda

(See map overleaf)





51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

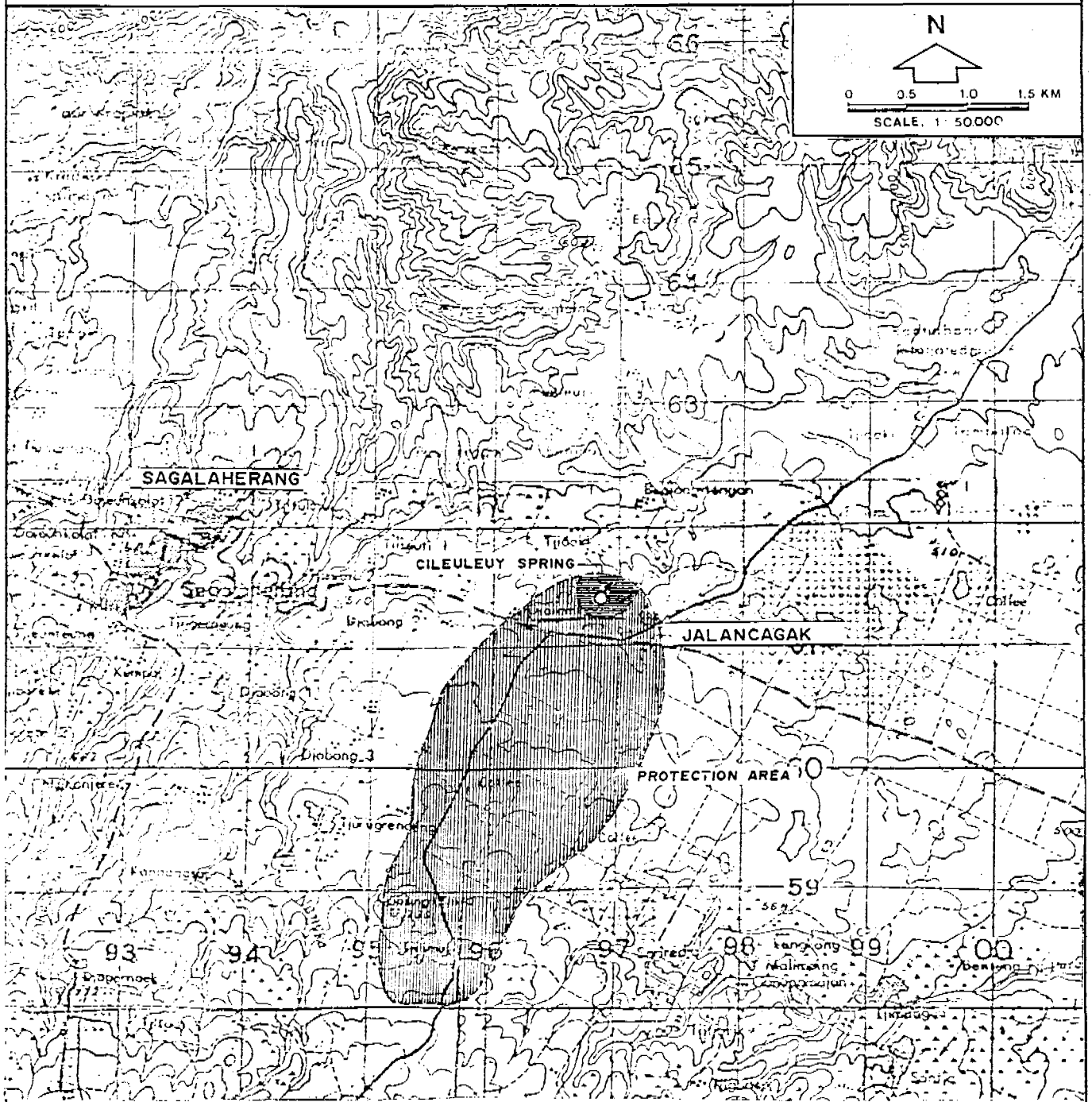
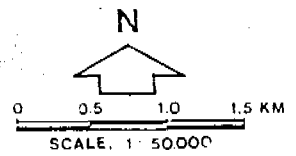
Appendix I.7.2

IKK : SAGALAHERANG, JALANCAGAK & CISALAK KAB : SUBANG

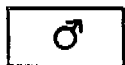
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SPRING

LOCATION : Ds. JALAN CAGAK



**NOTE**



CAPTURING SITE



PROTECTION ZONE

No other spring or groundwater exploitation without assessment of impact on the spring



CATCHMENT PROTECTION

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : SITURAJA Kab. SUMEDANG Water Demand : 10. l/s

=====

A. GENERAL

1. Spring : Name : Cicaneang
- Desa : Haurkuning , Kampung : Jelegong
- Yield : Max : Measured : 325 l/s, Design (calculated) 380 l/s  
Min : Measured : 285 l/s, Design (calculated) 160 l/s
- Type : Gravity |x| , Artesian |\_|
2. Extraction : Pumping by PLN |\_| or genset |\_| , Gravity |x|
3. Geology : Spring flowing from young volcanics lava flow
4. Catchment (topographical) : Area : 2 km<sup>2</sup>
- Morphology : Lower slopes of the Slamet volcano, rolling
- Cover : Lava flow block, vegetation, habitation
- Present environmental conditions : Housing, main road, ponds, irrigation canal
- Sensitivity to pollution : Very sensitive

B. POLLUTION POSSIBILITIES

1. Capturing : Surface water inflow into the capturing
2. Surroundings: From nearby habitation, from the polluted water in the pond
3. Catchment : IKK habitation, road accidents, possible storage of chemical.

C. PROTECTION RECOMENDATIONS

1. Environmental Protection

- Capturing : Sanitary zone, proper design  
\_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM)
- Surroundings : Regulation against excessive use of the pond for washing, control habitation  
\_\_\_\_\_ , Responsibility of : Camat, Pengairan
- Catchment : No storage of harmful materials, controlled development of area (industry etc.)  
\_\_\_\_\_ , Responsibility of : Pemda, Pengairan

2. Yield Protection : Controlled use of spring for other purposes than existing uses.  
\_\_\_\_\_ , Responsibility of : Pemda, Pengairan

(See map overleaf)

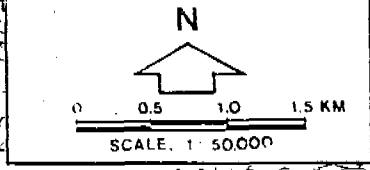
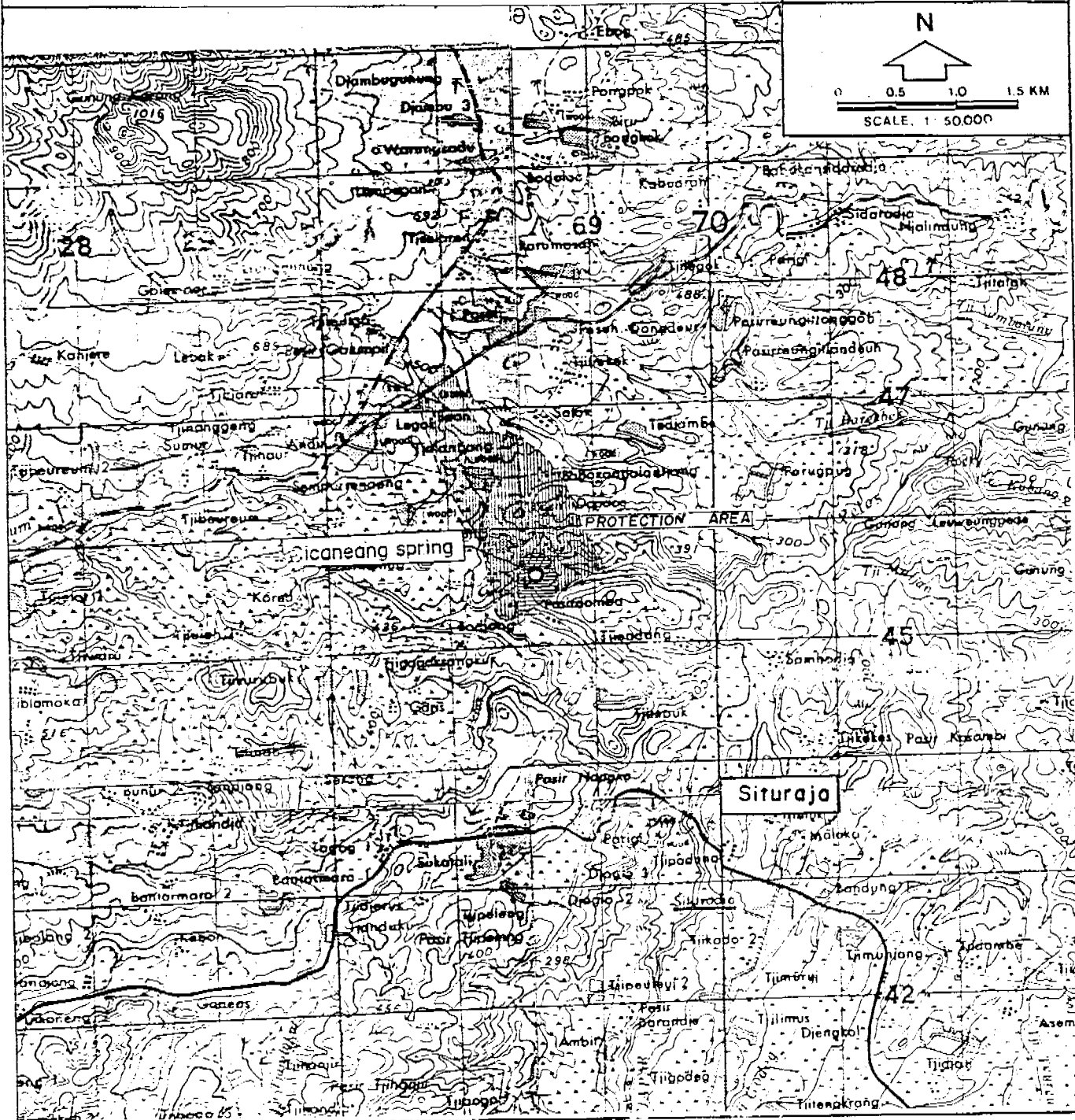
IKK : SITURAJA

KAB : SUMEDANG

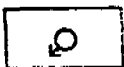
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SPRING

LOCATION : Ds. HAUR KUNING



**NOTE**



CAPTURING SITE



PROTECTION ZONE

No other spring or groundwater exploitation without assessment of impact on the spring



CATCHMENT PROTECTION

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : CIKALONG Kab. TASIKMALAYA Water Demand : 10 l/s

=====

A. GENERAL

1. Spring : Name : Cicayur
- Desa : Cikanra , Kampung : Cijawer
- Yield : Max : Measured : 14.28 l/s, Design (calculated) 18 l/s
- Min : Measured : 12.00 l/s, Design (calculated) 8 l/s
- Type : Gravity  , Artesian
2. Extraction : Pumping by PLN  or genset  , Gravity
3. Geology : Hilly limestone area
4. Catchment (topographical) : Area : 2.0 km<sup>2</sup>
- Morphology : Dispersed hill
- Cover : Soil, clay, volcanic-tuff
- Present environmental conditions : Natural vegetation
- Sensitivity to pollution : Sensitive

B. POLLUTION POSSIBILITIES

1. Capturing : Surface run-off entering the structure
2. Surrounding : Surface run-off entering the structure
3. Catchment : Pesticides, storage of chemical, uncontrolled devlp.

C. PROTECTION RECOMENDATIONS

1. Environmental Protection
- Capturing : Sanitary zone, proper (rigid) design
- \_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM)
- Surroundings : No dumps of harmful materials, controlled habitation
- \_\_\_\_\_ , Responsibility of : Camat, Pemda
- Catchment : No surface of chemicals, control of develop of the
- area , Responsibility of : Camat, Pemda
2. Yield Protection : No other water use than this project
- \_\_\_\_\_ , Responsibility of : Pemda

(See map overleaf)

51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix I.9.2

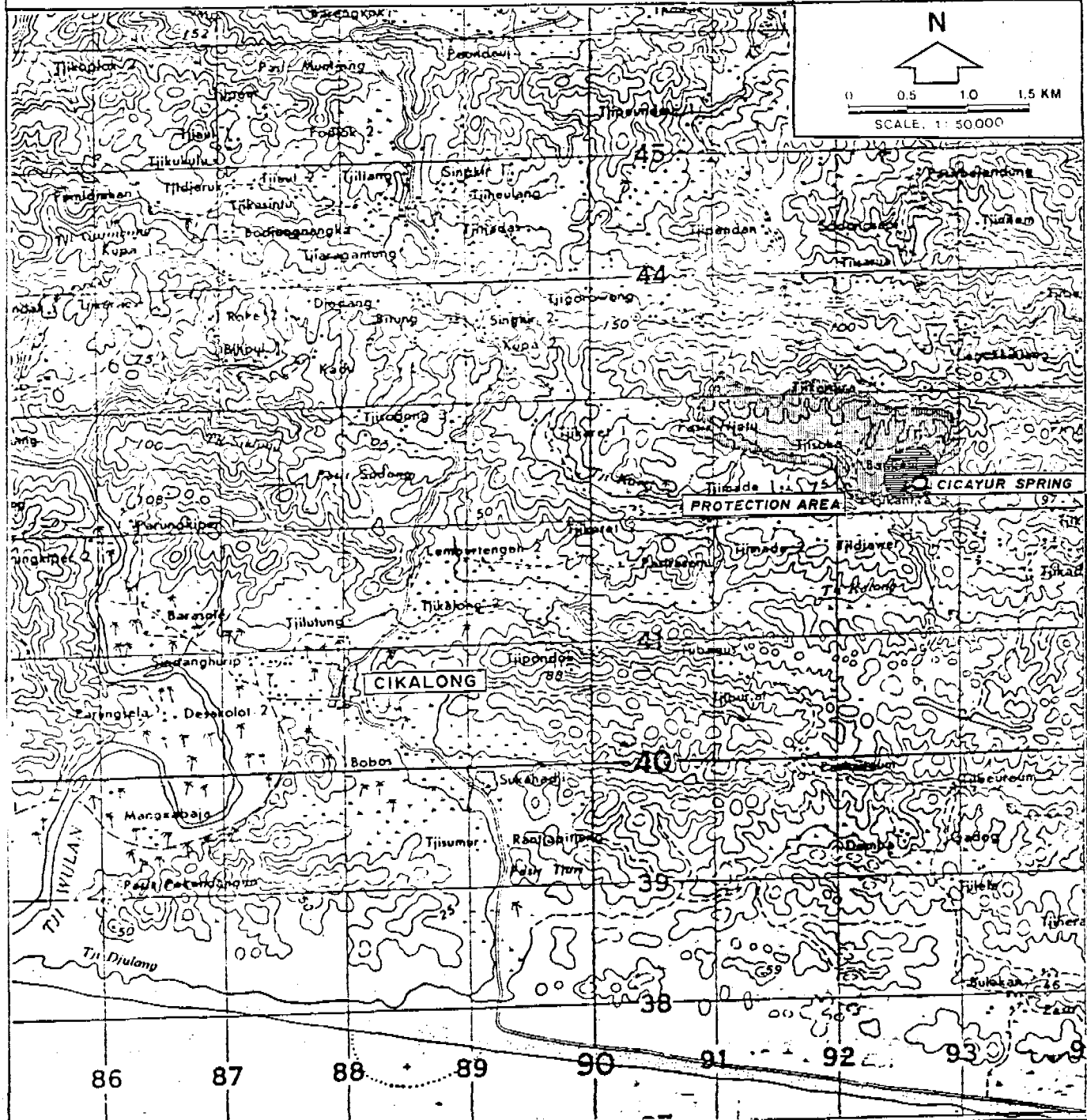
IKK : CIKALONG

KAB : TASIKMALAYA

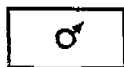
WATER RESOURCES  
PROTECTION SHEET

SOURCE TYPE : SPRING

LOCATION : Ds. CIKANCRA



NOTE



CAPTURING SITE



PROTECTION ZONE

No other spring or groundwater exploitation without assessment of impact on the spring



CATCHMENT PROTECTION

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission



WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : PAGERAGEUNG Kab. TASIKMALAYA Water Demand : 10 l/s

=====

A. GENERAL

1. Spring : Name : Cipanyusupan  
 Desa : Nangewer , Kampung : Pangkalan  
 - Yield : Max : Measured : 25.0 l/s, Design (calculated) 30 l/s  
 Min : Measured : 14.4 l/s, Design (calculated) 9 l/s  
 - Type : Gravity  , Artesian
2. Extraction : Pumping by PLN  or genset  , Gravity
3. Geology : Young Volcanics
4. Catchment (topographical) : Area : 1.5 km<sup>2</sup>  
 - Morphology : Slope of mountain-ridge  
 - Cover : Thick soil  
 - Present environmental conditions : Forrest vegetation  
 - Sensitivity to pollution : Very sensitive

B. POLLUTION POSSIBILITIES

1. Capturing : Polluted surface run-off entering the capturing
2. Surroundings: Polluted surface run-off entering the capturing
3. Catchment : Deforestation, storage of harmful materials

C. PROTECTION RECOMENDATIONS

1. Environmental Protection

- Capturing : Sanitary zone, proper design of drainage system  
 \_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM), Kehutanan
- Surroundings : No exessive habitation, no vegetation cutting  
 \_\_\_\_\_ , Responsibility of : Pemda, Kehutanan
- Catchment : No deforestation, controlled are development, no  
dumps , Responsibility of : Pemda, Kehutanan

2. Yield Protection : No other water use than this project  
 \_\_\_\_\_ , Responsibility of : Pemda

(See map overleaf)

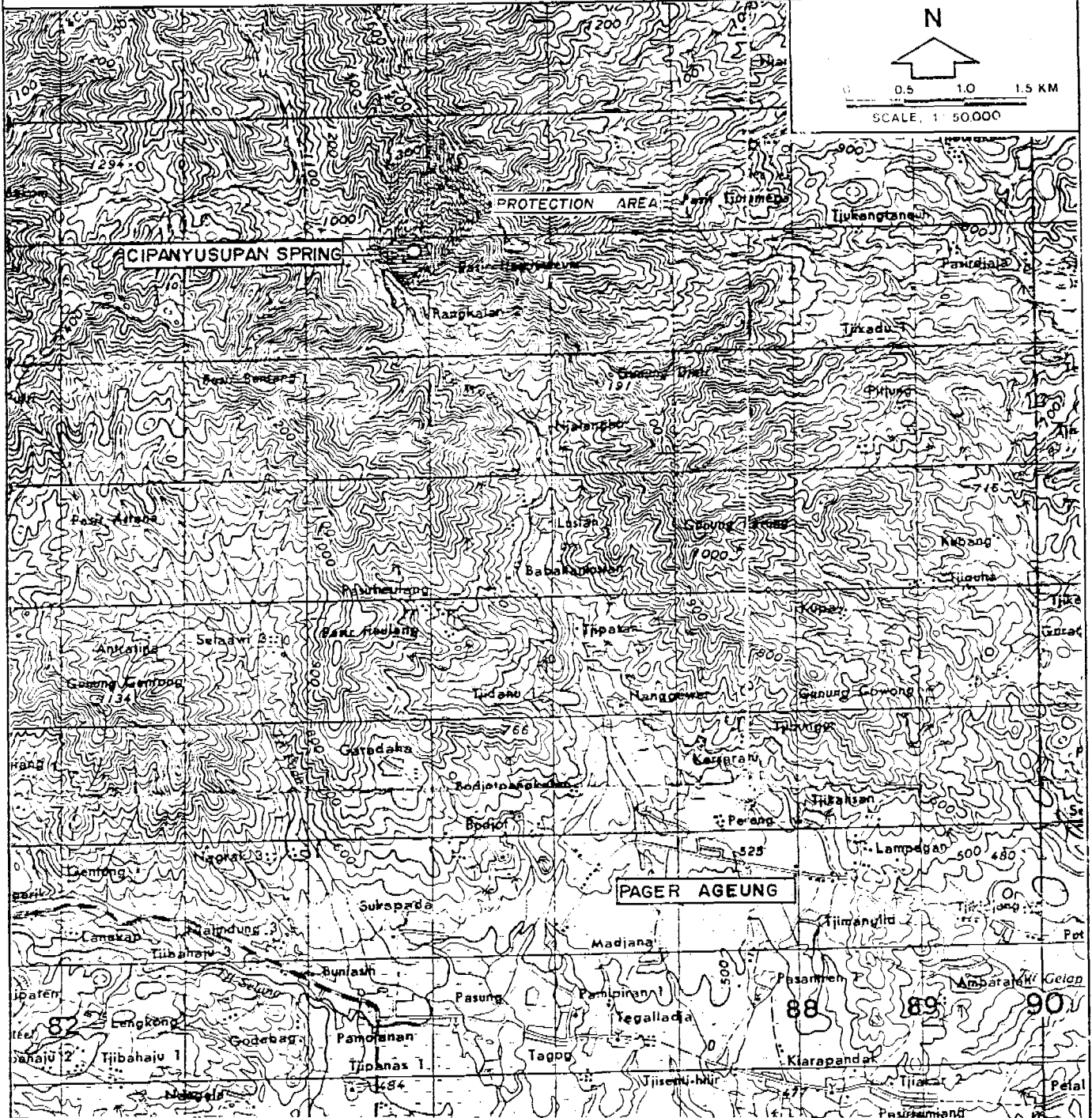
IKK : PAGERAGEUNG

KAB : TASIKMALAYA

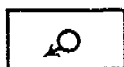
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SPRING

LOCATION : Ds. NANGEWER



**NOTE**



CAPTURING SITE



PROTECTION ZONE

No other spring or groundwater exploitation without assessment of impact on the spring



CATCHMENT PROTECTION

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : LEUWISARI Kab. TASIKMALAYA Water Demand : 10 l/s

=====

A. GENERAL

1. Spring : Name : Cikebon  
Desa : Sukaharja , Kampung : Cikoneng  
- Yield : Max : Measured : 22.23 l/s, Design (calculated) 27 l/s  
Min : Measured : 19.0 l/s, Design (calculated) 11 l/s  
- Type : Gravity |x| , Artesian |\_|
2. Extraction : Pumping by PLN |\_| or genset |\_| , Gravity |x|
3. Geology : Spring flowing from young volcanics breccia
4. Catchment (topographical) : Area : 3.0 km<sup>2</sup>  
- Morphology : Mountain slopes, hilly areas  
- Cover : Thick soil, sandy-soil  
- Present environmental conditions : Vegetation, spread housing, rice-fields  
- Sensitivity to pollution : Sensitive

B. POLLUTION POSSIBILITIES

1. Capturing : Surface water entering the capturing
2. Surroundings: Surface water entering the capturing, human activity (washing, defecation) storage of chemicals
3. Catchment : Deforestation, dump sites, uncontrolled land use (industry etc.)

C. PROTECTION RECOMENDATIONS

1. Environmental Protection

- Capturing : Sanitary zone, proper design of drainage system  
\_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM)
  - Surroundings : No dumps of harmful material, controlled human activity , Responsibility of : Camat, Pemda
  - Catchment : No deforestation, no dump sites, controlled land use  
\_\_\_\_\_ , Responsibility of : Camat, Pemda
2. Yield Protection : No other water use than this project  
\_\_\_\_\_ , Responsibility of : Camat, Pemda

(See map overleaf)

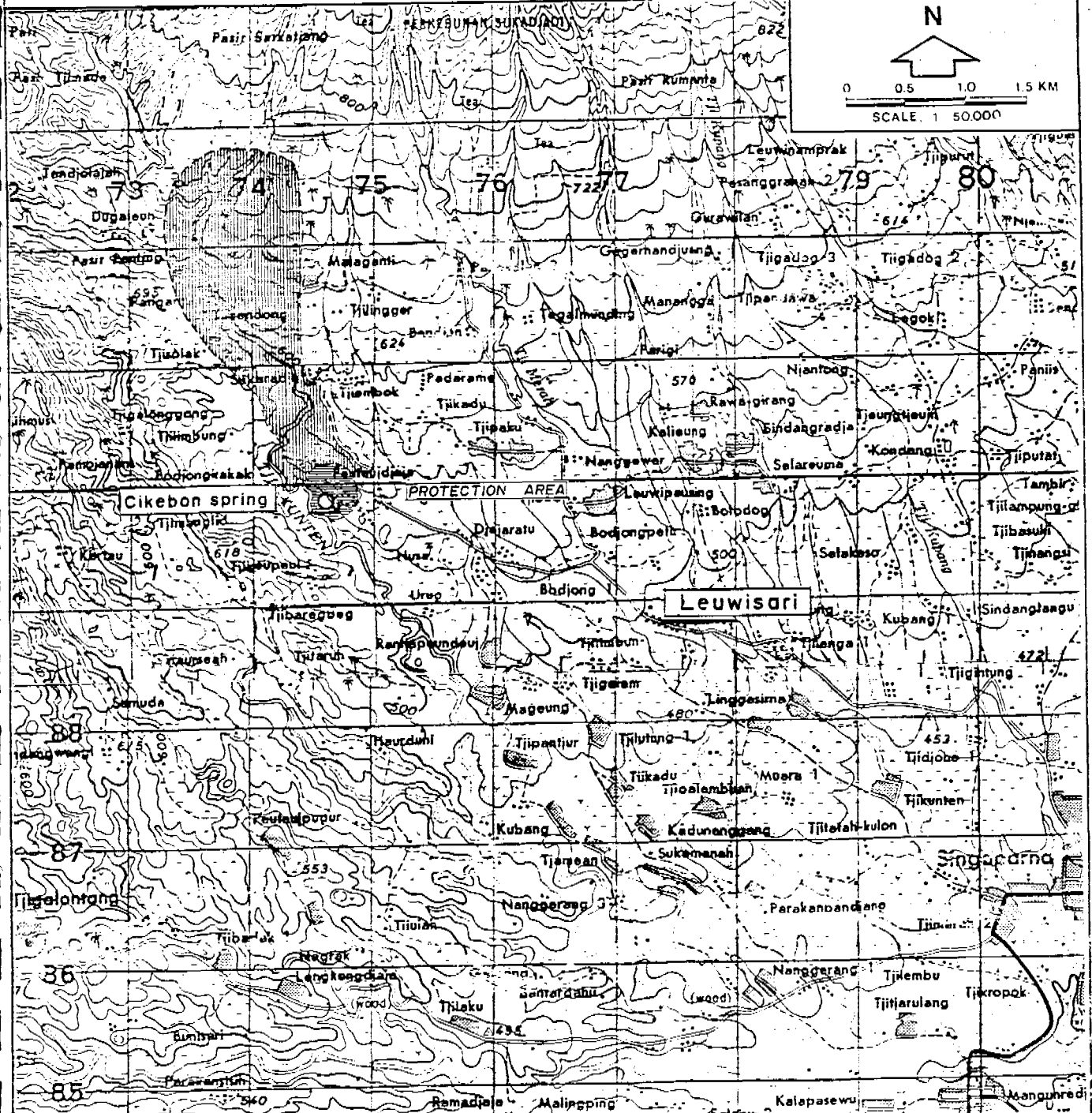
IKK : LEUWISARI

KAB : TASIKMALAYA

WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SPRING

LOCATION : Ds. SUKAHARJA



**NOTE**



CAPTURING SITE



PROTECTION ZONE

No other spring or groundwater exploitation without assessment of impact on the spring



CATCHMENT PROTECTION

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : CIBALONG Kab. TASIKMALAYA Water Demand : 5 l/s

=====

A. GENERAL

1. Spring : Name : Cigelap

Desa : Parung , Kampung : Cinangsi

- Yield : Max : Measured : 23 l/s, Design (calculated) 28 l/s

Min : Measured : 16 l/s, Design (calculated) 10 l/s

- Type : Gravity  , Artesian

2. Extraction : Pumping by PLN  or genset  , Gravity

3. Geology : Limestone formation

4. Catchment (topographical) : Area : 3.0 km<sup>2</sup>

- Morphology : Slopes of the Southern Mountain Range

- Cover : Clayey, soils, sawahs, grassland, natural vegetation

- Present environmental conditions : Vegetation, rice-field, spread housing

- Sensitivity to pollution : Quite sensitive

B. POLLUTION POSSIBILITIES

1. Capturing : Surface water seepage into the intake

2. Surroundings : From habitation, from polluted water in the ponds

3. Catchment : Uncontrolled habitation, development dumping of harmful materials

C. PROTECTION RECOMENDATIONS

1. Environmental Protection

- Capturing : Sanitary zone, appropriate design  
\_\_\_\_\_, Responsibility of : IKKs-unit (PDAM)

- Surroundings : Control with use of the ponds, no storage of chemicals , Responsibility of : Camat, Pemda

- Catchment : No dump sites, controlled area development  
\_\_\_\_\_, Responsibility of : Camat, Pemda

2. Yield Protection : No other additional water use than this project

\_\_\_\_\_, Responsibility of : Pemda

(See map overleaf)

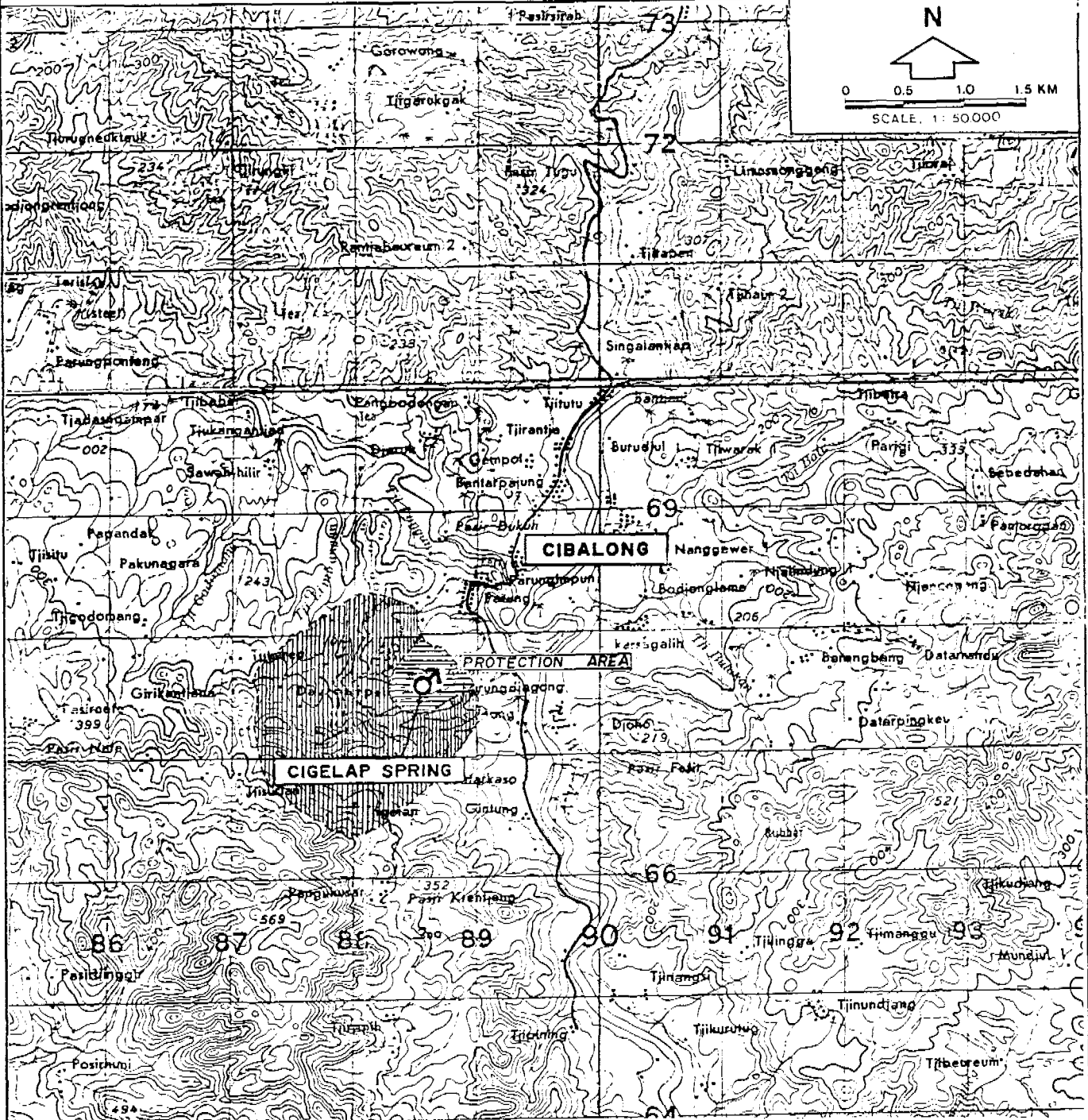
IKK : CIBALONG

KAB : TASIKMALAYA

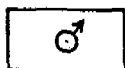
WATER RESOURCES  
PROTECTION SHEET

SOURCE TYPE : SPRING

LOCATION : Ds. PARUNG



**NOTE**



CAPTURING SITE



PROTECTION ZONE

No other spring or groundwater exploitation without assessment of impact on the spring



CATCHMENT PROTECTION

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission

51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix I.13.1

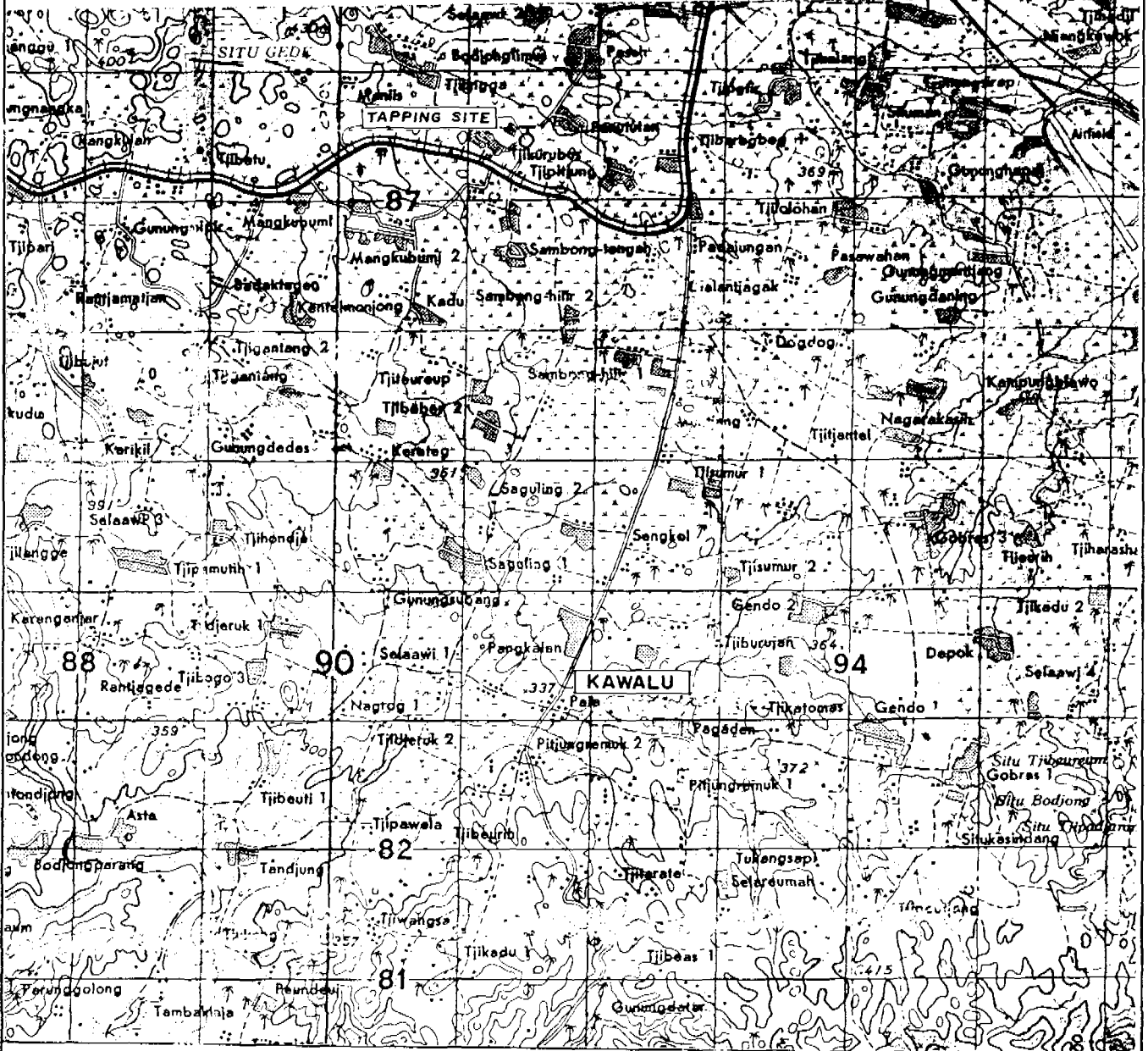
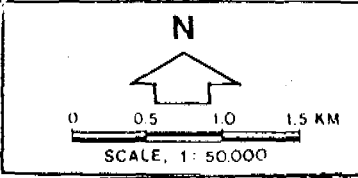
IKK : KAWALU

KAB : TASIKMALAYA

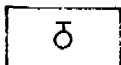
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : TAPPING

LOCATION : CIGURUBUG



NOTE



TAPPING SITE

Protection requirement consider at the Captation BNA Tasikmalaya

APPENDIX II

Presentation of Environmental Information  
(PIL) and Protective Measures

DRILLED WELLS



## APPENDIX II

### Presentation of Environmental Information (PIL) and Protective Measures

#### DRILLED WELLS

Appendix

#### Kab. Serang

1.	1.02	Kasemen	II.1.1 - 1.2
2.	1.04	Kragilan	II.2.1 - 2.2
3.	1.07	Ciomas	II.3.1 - 3.2
4.	1.08	Pabuaran	II.3.1 - 3.2
5.	1.09	Walantaka	II.4.1 - 4.2
6.	1.10	Pamarayan	II.5.1 - 5.2

#### Kab. Lebak

7.	3.07	Warunggunung	II.6.1 - 6.2
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#### Kab. Cianjur

8.	5.07	Bojong Picung	II.7.1 - 7.2
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#### Kab. Karawang

9.	6.07	Lemahabang	II.8.1 - 8.3
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#### Kab. Subang

10.	7.03	Binong	II.9.1 - 9.3
- 11.	7.05	Kalijati	II.10.1-10.3
12.	7.07	Comprens	II.11.1-11.2
13.	7-09	Cipunegara	II.12.1-12.2

Appendix

Kab. Sumedang

- |     |      |          |              |
|-----|------|----------|--------------|
| 14. | 8.01 | Cimalaka | II.13.1-13.2 |
| 15. | 8.03 | Paseh    | II.14.1-14.2 |

Kab. Tasikmalaya

- |     |      |          |              |
|-----|------|----------|--------------|
| 16. | 9.06 | Cikalong | II.15.1-15.2 |
|-----|------|----------|--------------|

Kab. Garut

- |     |       |               |              |
|-----|-------|---------------|--------------|
| 17. | 11.01 | Karangpawitan | II.16.1-16.3 |
| 18. | 11.02 | Cisurupan     | II.17.1-17.3 |
| 19. | 11.03 | Banyuresmi    | II.18.1-18.2 |
| 20. | 11.04 | Leuwigoong    | II.18.1-18.2 |

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : KASEMEN Kab. : SERANG Water Demand : 5 l/s

-----  
A. GENERAL

1. Borehole : Kasemen

Desa : Kalanggaran Kampung : Unyur

- Depth : Drilled 151 m , Equipped 87.5 m , Grout seal 27 m deep

- Recommended yield : 10 l/s, estimated |\_!, pump test |x!

- Pump type : Submersible Power : PLN |x!, Genset |\_!

2. Geology : Flat area (Banten tuff)

3. Aquifer type : Unconfined , Depth(s) 31-37, 42-48, 57-60, 75-81 m

4. Protection cover : Lithology None Tot. thickness - m

5. Catchment (topographical at the estimated radius of influence) 3.2 km<sup>2</sup>

- Zone of influence : R<sub>(est i m)</sub> = 1,000 m, Area 3.2 km<sup>2</sup>

- Present environmental conditions : Rice-fields, spread housing,  
close highway

- Sensitivity to pollution : Very-sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : Wet-rice fields and habitation

3. Catchment : Possibility of saline water intrusion at over pumping  
Industrial development (nearby Serang), depots of  
chemicals

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head  
area , Responsibility of : IKKs-Unit (PDAM)

- Surroundings : No depots of harmful materials, no excessive build  
activity , Responsibility of : Camat, Pemda

- Catchment : No dumps of harmful materials, controlled area  
 , Responsibility of : Camat, Pemda

2. Yield Protection : No other boreholes in a radius of 1,000 m, without  
assessment of impact on the well.  
 , Responsibility of : Pemda

(see map overleaf)

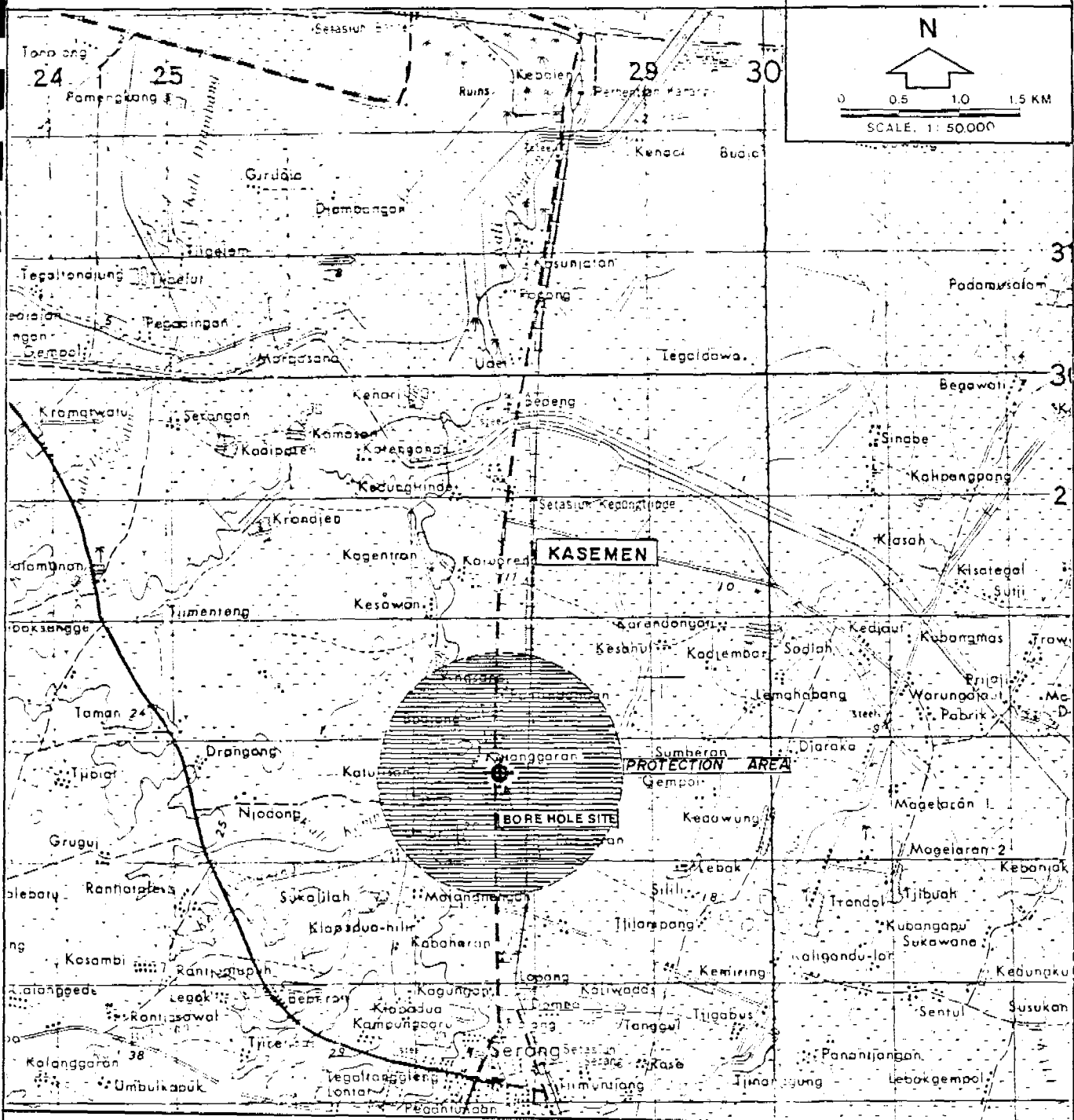
IKK : KASEMEN

KAB : SERANG

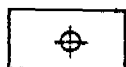
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : DEEP WELLS

LOCATION : Ds.KALANGGARAN



**NOTE**



**BOREHOLE SITE**



**ZONE OF INFLUENCE**

- No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well
- Control of salinity

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : KRAGILAN Kab. : SERANG Water Demand : 10 l/s

A. GENERAL

1. Borehole : Kragilan II

Desa : Sentul Kampung : Sentul

- Depth : Drilled 83 m , Equipped 68 m , Grout seal 25 m deep

- Recommended yield : 10 l/s, estimated |\_|, pump test |x|

- Pump type : Submersible Power : PLN |x|, Genset |\_|

2. Geology : Flat area (Banten tuff)

3. Aquifer type : Confined , Depth(s) 39-49, 59-62 m

4. Protection cover : Lithology Clay Tot. thickness 16 m

5. Catchment (topographical at the estimated radius of influence) 3.2 km<sup>2</sup>

- Zone of influence : R<sub>(estim)</sub> = 1,000 m, Area 3.2 km<sup>2</sup>

- Present environmental conditions : Spread housing, building,  
rice-field

- Sensitivity to pollution : Not sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : Habitation, present and future industrial activities

3. Catchment : Harmfull future industrial activity, saline water  
intrusion

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head  
area, salinity control  
\_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM)

- Surroundings : No dumps and harmful materials, excessive build actv.  
\_\_\_\_\_ , Responsibility of : Camat, Pemda

- Catchment : No depots of harmful materials, no harmful industrial  
no overpumping  
\_\_\_\_\_ , Responsibility of : Camat, Pemda

2. Yield Protection : No other production boreholes in a radius of 1,000 m  
without assessment of impact on the well.  
\_\_\_\_\_ , Responsibility of : Pemda

(see map overleaf)

51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix II.2.2

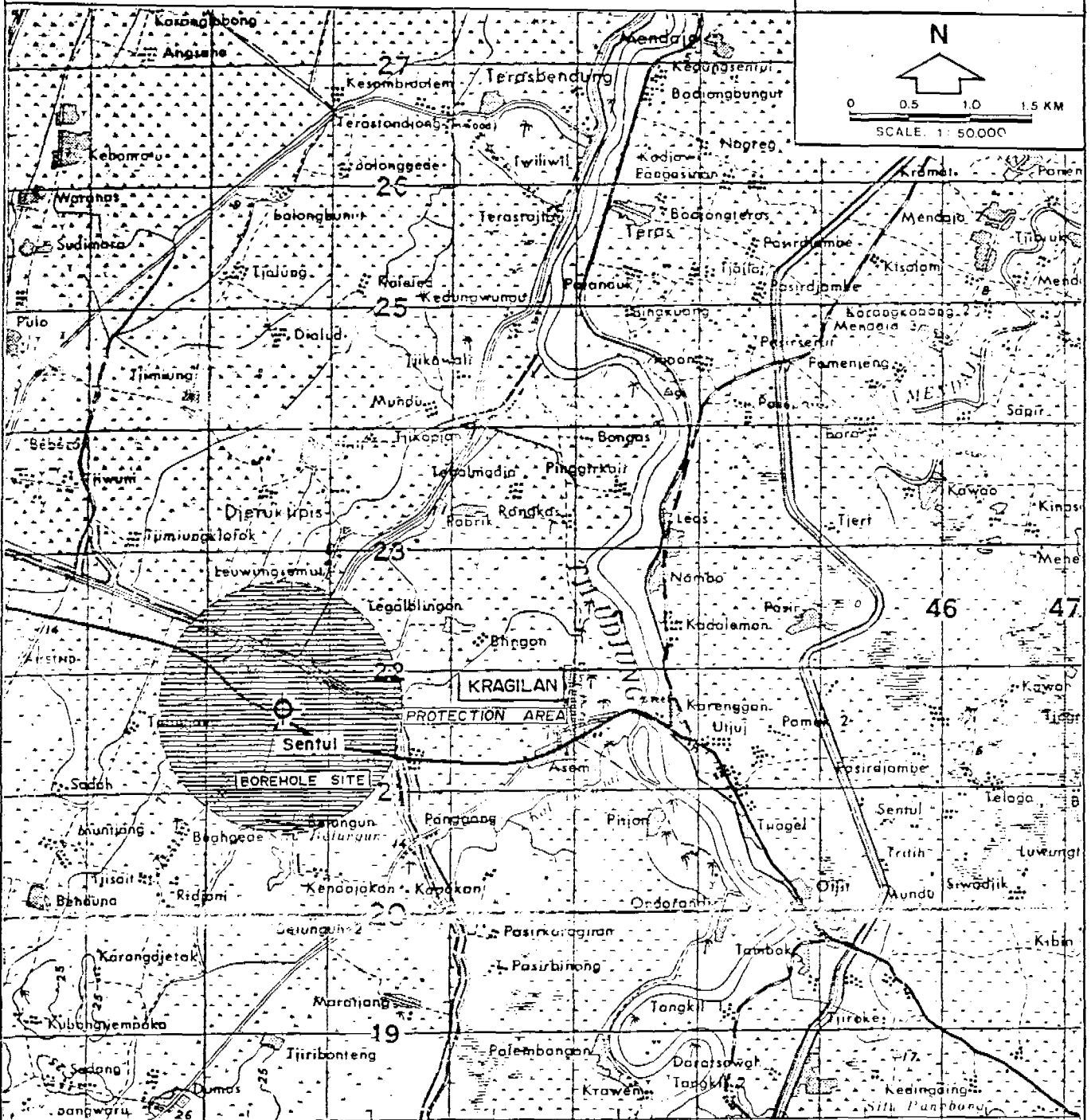
IKK : KRAGILAN

KAB : SERANG

WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : DEEP WELL

LOCATION : Ds. SENTUL



NOTE



BOREHOLE SITE



ZONE OF INFLUENCE

- No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well
- Control of salinity

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : CIOMAS & PABUARAN Kab. : SERANG Water Demand : 5 + 5 l/s  
=====

A. GENERAL

1. Borehole : Ciomas

Desa : Sukaberes Kampung : Nengger

- Depth : Drilled 51 m , Equipped 50 m , Grout seal 12 m deep

- Recommended yield : 10 l/s, estimated !, pump test |x|

- Pump type : Submersible Power : PLN |x|, Genset !;

2. Geology : Young volcanic, dissected slopes of the Karang volcano

3. Aquifer type : Confined , Depth(s) 24-27,30-33, 41-44, 45-48 m

4. Protection cover : Lithology none Tot. thickness - m

5. Catchment (topographical at the estimated radius of influence) 2.2 km<sup>2</sup>

- Zone of influence : R<sub>(estim)</sub> = 500 m, Area 0.8 km<sup>2</sup>

- Present environmental conditions : Wooded areas, plantations,  
spread housing

- Sensitivity to pollution : Very sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : Habitation, use of pesticides and fertilizers

3. Catchment : Overuse of pesticides, harmful future industrial activity (if any), deforestation

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head area , Responsibility of : IKKs unit (PDAM)

- Surroundings : No dumps of harmful materials, limited use of pesticide and fertilizer , Responsibility of : Camat, Pemda

- Catchment : No harmful industrial activities, no storage of chemicals, no deforestation , Responsibility of : Pemda, Camat

2. Yield Protection : No other boreholes in a radius of 500 m, without assessment of impact on the well , Responsibility of : Pemda

(see map overleaf)

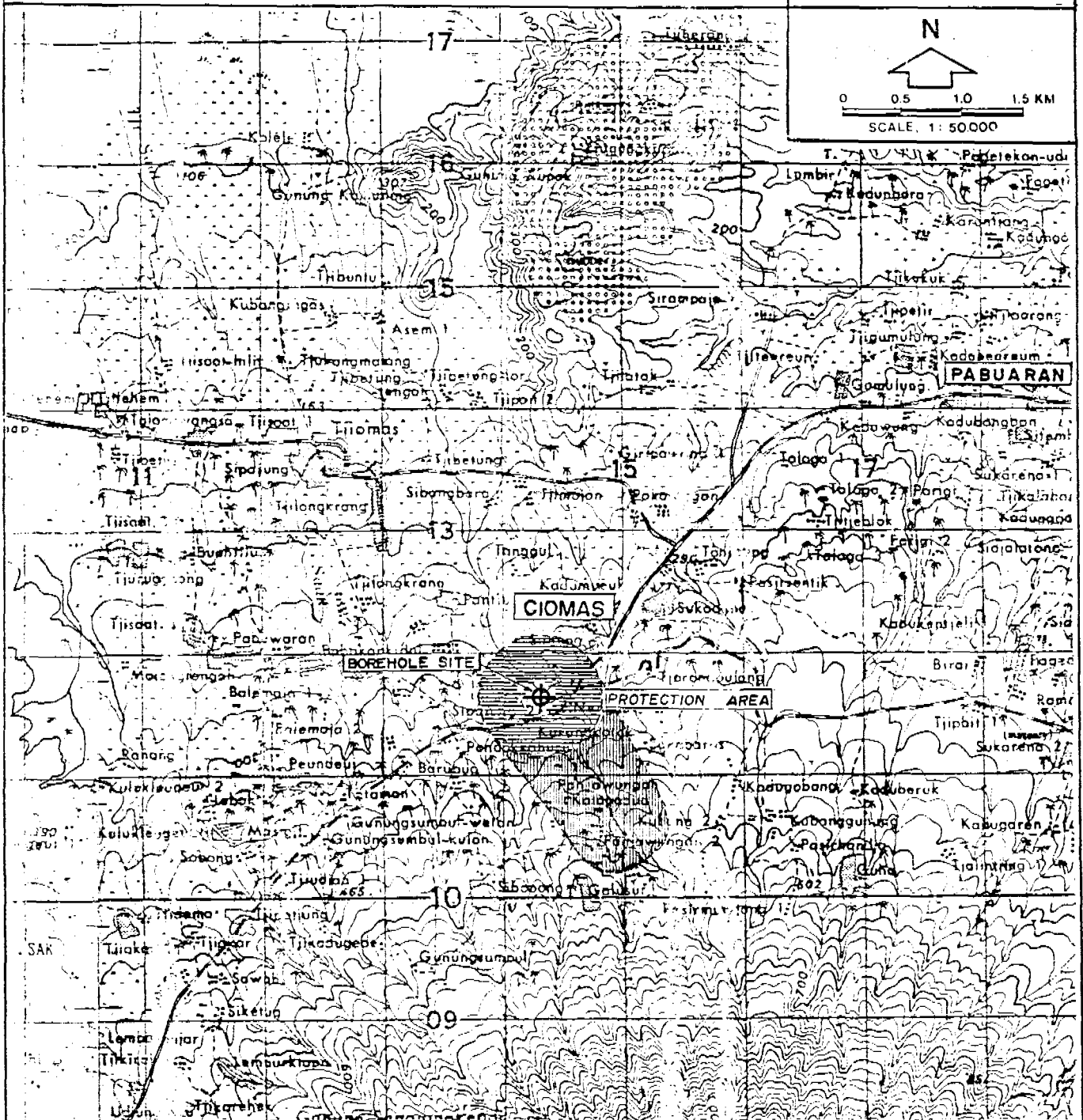
IKK : CIOMAS & PABUARAN

KAB : SERANG

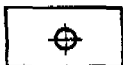
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : DEEP WELL

LOCATION : Ds. SUKABARES



NOTE



BOREHOLE SITE



ZONE OF INFLUENCE

No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well



CATCHMENT PROTECTION

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission



WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : WALANTAKA Kab. : SERANG Water Demand : 5 l/s  
=====

A. GENERAL

1. Borehole : Walantaka  
Desa : Pager Ageung Kampung : Jeha
  - Depth : Drilled 120 m , Equipped 115 m , Grout seal 15 m deep
  - Recommended yield : 10 l/s, estimated 1 l/s, pump test 1x
  - Pump type : Submersible Power : PLN 1x, Genset 1
2. Geology : Flat area (Banten tuff)
3. Aquifer type : Unconfined , Depth(s) 23-35, 52-55, 61-73, 97-109 m
4. Protection cover : Lithology None Tot. thickness - m
5. Catchment (topographical at the estimated radius of influence) 0.8 km<sup>2</sup>
  - Zone of influence : R<sub>(estim)</sub> = 500 m, Area 0.8 km<sup>2</sup>
  - Present environmental conditions : Rice-field, spread housing
  - Sensitivity to pollution : Very sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes, infiltration
2. Surroundings : Wet-rice fields, habitation
3. Catchment : Pesticides, uncontrolled development, storage of chemicals

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head area , Responsibility of : IKKs-unit (PDAM)
- Surroundings : No depots of harmful materials, no excessive build activity , Responsibility of : Camat, Pemda
- Catchment : No depots of harmful materials, no uncontrolled industrial development , Responsibility of : Camat, Pemda

2. Yield Protection : No other boreholes in a radius of 500 m, without assessment of impact on the well. , Responsibility of : Pemda

(see map overleaf)

51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix II.4.2

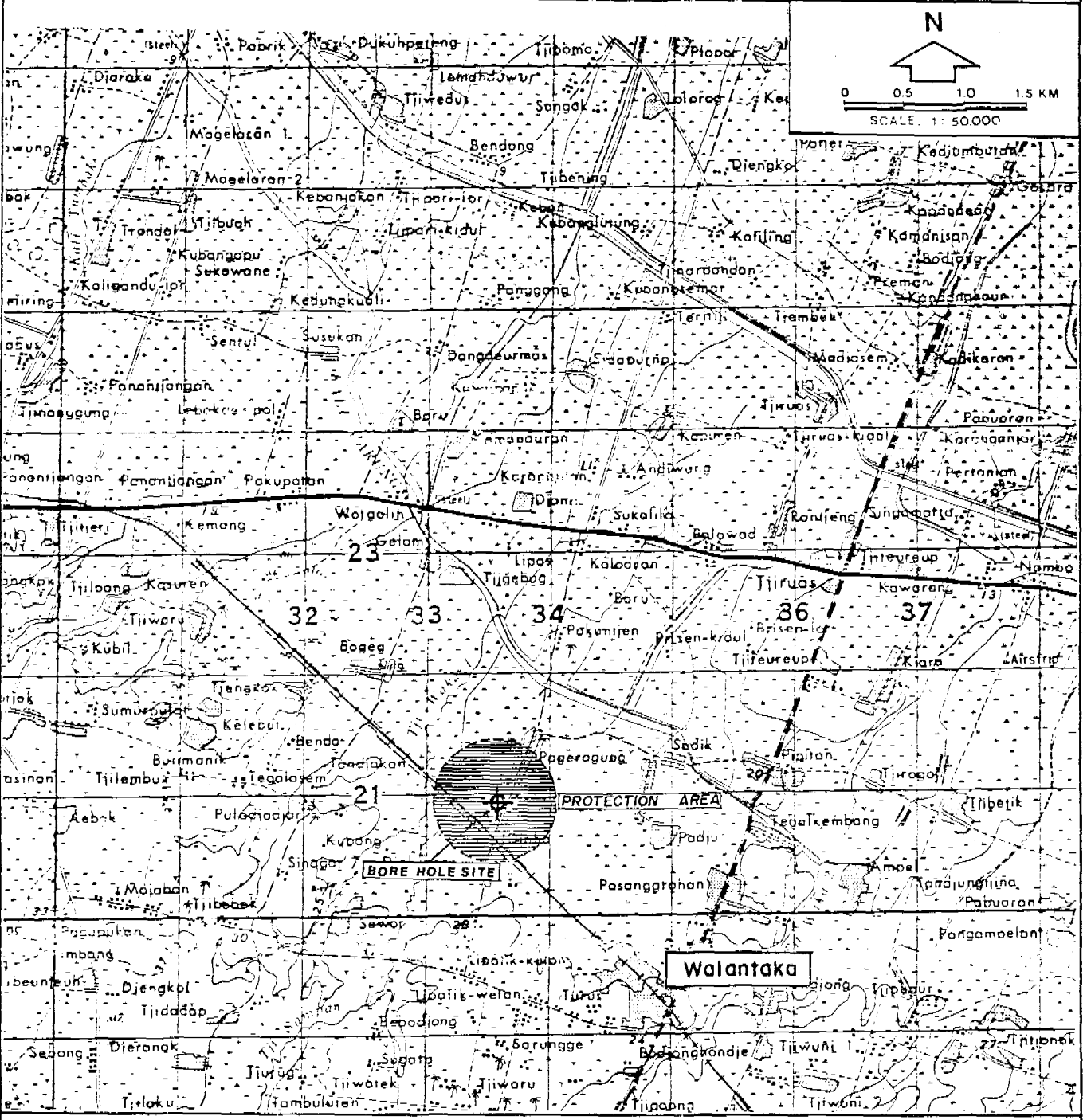
IKK : WALANTAKA

KAB : SERANG

WATER RESOURCES  
PROTECTION SHEET

SOURCE TYPE : DEEP WELL

LOCATION : Ds. PAGAR AGUNG



**NOTE**



**BOREHOLE SITE**



**ZONE OF INFLUENCE**

- No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well
- Control of salinity

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : PAMARAYAN Kab. : SERANG Water Demand : 10 l/s

=====

A. GENERAL

1. Borehole : Pamarayan

Desa : Sangiang Kampung : Leuwibanteng

- Depth : Drilled 165 m , Equipped 152 m , Grout seal 25 m deep
- Recommended yield : 10 l/s, estimated !, pump test !x!
- Pump type : Submersible Power : PLN !x!, Genset !\_!

2. Geology : Flat bottom of alluvial valley (Banten tuff)

3. Aquifer type : Unconfined , Depth(s) 33-39, 94-100, 106-112, 134-146m

4. Protection cover : Lithology clay Tot. thickness 18 m

5. Catchment (topographical at the estimated radius of influence) 3.5 km<sup>2</sup>

- Zone of influence : R<sub>(estim)</sub> = 1,000 m, Area 3.2 km<sup>2</sup>
- Present environmental conditions : Rice-field, spread housing
- Sensitivity to pollution : Not sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes
2. Surroundings : Present and future agricultural activity, storage of chemicals
3. Catchment : Harmfull future industrial activity (remote possibility ?)

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head area , Responsibility of : IKKs-Unit (PDAM).
- Surroundings : No depots of harmful materials, no excessive building activity , Responsibility of : Camat, Pemda
- Catchment : Controlled development (if any) , Responsibility of : Camat, Pemda

2. Yield Protection : No other deep production boreholes in radius of 1,000 m, without assessment of impact on the well. , Responsibility of : Pemda

(see map overleaf)

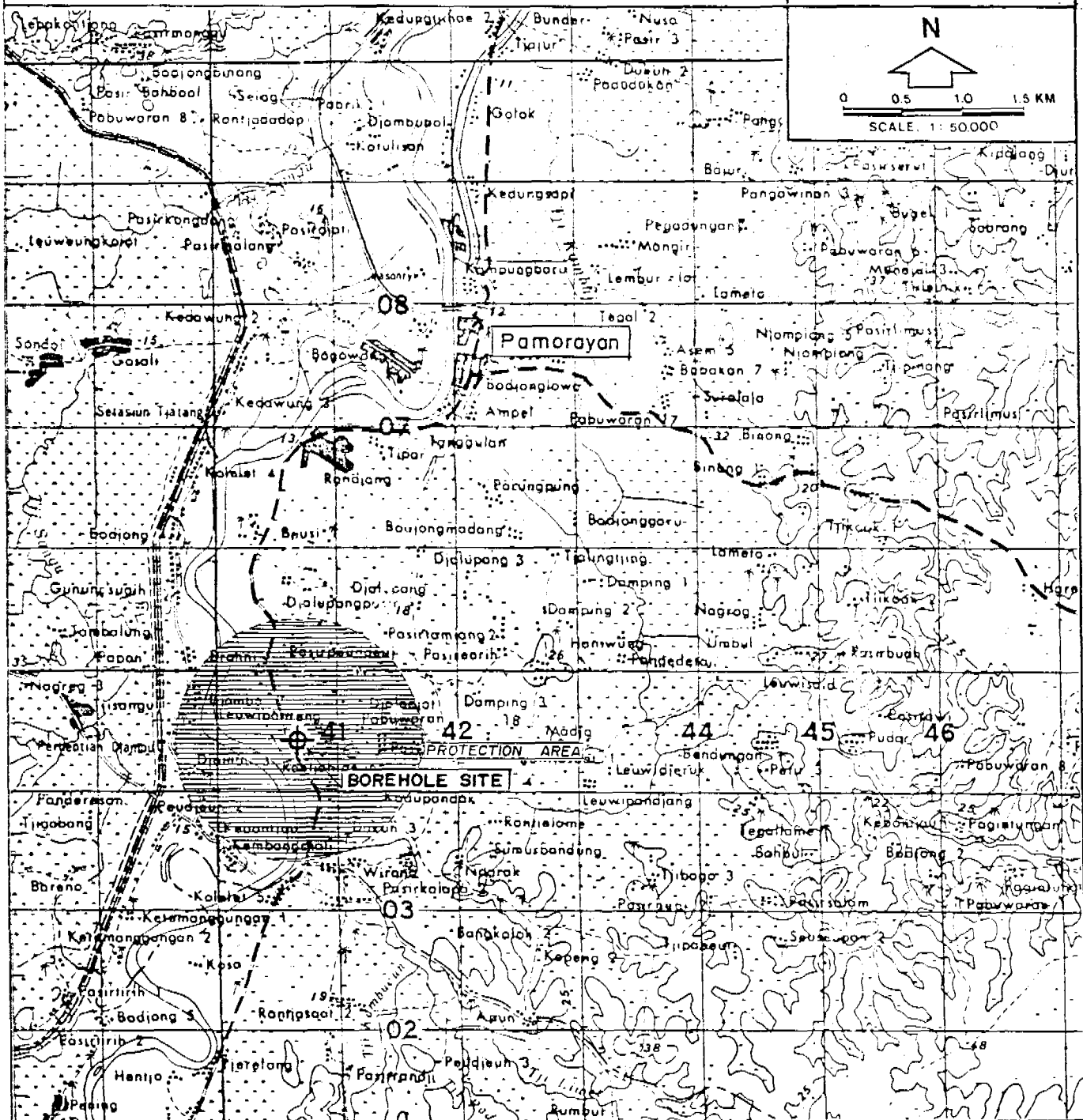
IKK : PAMARAYAN

KAB : SERANG

**WATER RESOURCES PROTECTION SHEET**

SOURCE TYPE : DEEP WELLS

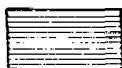
LOCATION : Ds. PAGER AGUNG



**NOTE**



**BOREHOLE SITE**



**ZONE OF INFLUENCE**

No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : WARUNGGUNUNG Kab. : LEBAK Water Demand : 5 l/s

A. GENERAL

1. Borehole : Warunggunung

Desa : Warunggunung Kampung : Lebak Madang

- Depth : Drilled 154 m , Equipped 126 m , Grout seal 25 m deep

- Recommended yield : 5 l/s, estimated |\_!, pump test |x!

- Pump type : Submersible Power : PLN |x!, Genset |\_!

2. Geology : Gently sloping young volcanics

3. Aquifer type : Unconfined , Depth(s) 51-57, 84-93, 99-111, 117-120 m

4. Protection cover : Lithology Claystone, clay , Tot. thickness 22 m

5. Catchment (topographical at the estimated radius of influence) 3.2 km<sup>2</sup>

- Zone of influence : R<sub>(estim)</sub> = 1,000 m, Area 3.2 km<sup>2</sup>

- Present environmental conditions : Rice-field, spread housing,  
irrigation line

- Sensitivity to pollution : Safe

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : (From irrigation canals, wet rice-fields)

3. Catchment : (Pesticides, harmful chemicals-infiltration)

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head  
area , Responsibility of : IKKs-Unit (PDAM)

- Surroundings : No excessive build activity, no depots of harmful  
materials , Responsibility of : Camat, Pemda

- Catchment : No dumps of harmful materials  
 , Responsibility of : Camat, Pemda

2. Yield Protection : No other deep wells in a radius of 1,000 m, without  
assessment of the impact on the well  
 , Responsibility of : Pemda

(see map overleaf)

51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix II.6.2

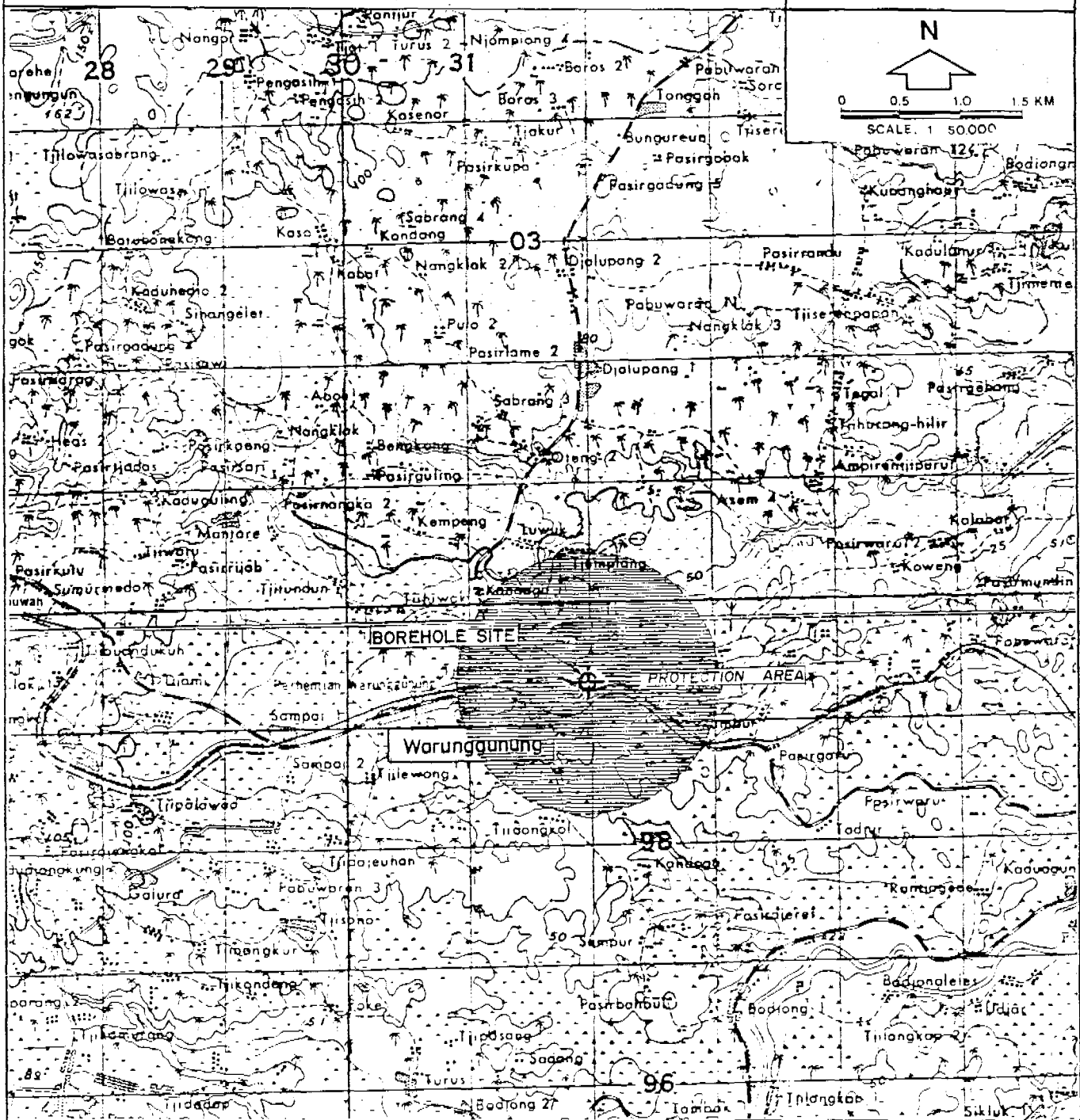
IKK : WARUNGGUNUNG

KAB : LEBAK

WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : DEEP WELL

LOCATION : Ds. WARUNGGUNUNG



NOTE



BOREHOLE SITE



ZONE OF INFLUENCE

No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : BOJONG PICUNG Kab.. : CIANJUR Water Demand : 5 l/s  
=====

A. GENERAL

1. Borehole : Bojong Picung

Desa : Hegarmanah Kampung : Sukamanah

- Depth : Drilled 105 m , Equipped 86.5 m , Grout seal 25 m deep

- Recommended yield : 2.5 l/s, estimated |\_|, pump test |x|

- Pump type : Submersible Power : PLN |x|, Genset |\_|

2. Geology : Flat area, undifferentiated young volcanic

3. Aquifer type : Unconfined , Depth(s) 37-43, 56-65, 77-80 m

4. Protection cover : Lithology claystone, clay Tot. thickness 4 m

5. Catchment (topographical at the estimated radius of influence) 1 km<sup>2</sup>

- Zone of influence : R(estim) = 500 m, Area 0.8 km<sup>2</sup>

- Present environmental conditions : rice-field, spread housing,  
irrigation canals

- Sensitivity to pollution : Sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : From habitation, irrigation canals

3. Catchment : Wet rice-fields, industrial Land use in the future

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head  
area , Responsibility of : IKKs-Unit (PDAM)

- Surroundings : No excessive building activity, no depots of chemicals  
 , Responsibility of : Camat, Pemda

- Catchment : No harmful industrial disposal, depots of harmful  
materials , Responsibility of : Camat, Pemda

2. Yield Protection : No other boreholes in a radius of 500 m without  
assessment of the impact on the well

, Responsibility of : Pemda

(see map overleaf)

51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix II.7.2

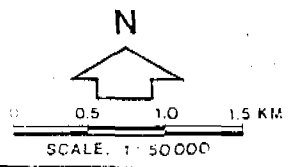
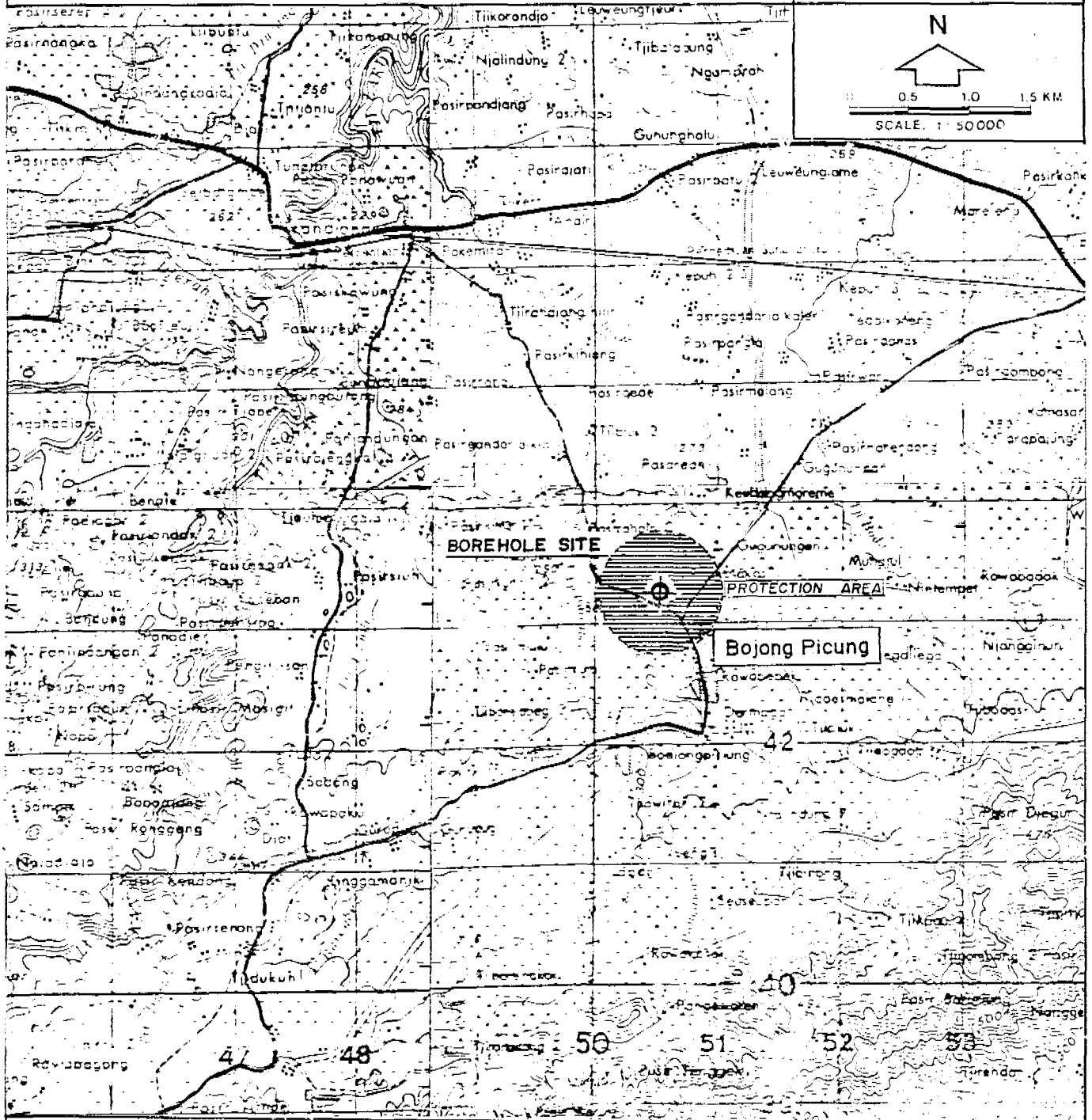
IKK : BOJONGPICUNG

KAB : CIANJUR

WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : DEEP WELL

LOCATION : Ds. HEGARMANAH



**BOREHOLE SITE**

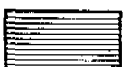
**PROTECTION AREA**

**Bojong Picung**

**NOTE**



**BOREHOLE SITE**



**ZONE OF INFLUENCE**

No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well





WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : LEMAHABANG Kab. : KARAWANG Water Demand : 20 l/s

A. GENERAL

1. Borehole : Lemahabang I

Desa : Lemahabang Kampung : Krajan

- Depth : Drilled 152 m , Equipped 134 m , Grout seal 30 m deep

- Recommended yield : 10 l/s, estimated |  |, pump test |x|

- Pump type : Submersible Power : PLN |x|, Genset |  |

2. Geology : Flat area composed of alluvial formations

3. Aquifer type : Unconfined , Depth(s) 36-43 (between), 81-83, 110-112  
123-128 m

4. Protection cover : Lithology None Tot. thickness - m

5. Catchment (topographical at the estimated radius of influence) 6 km<sup>2</sup>

- Zone of influence : R<sub>(estim)</sub> = 1,000 m, Area 3.2 km<sup>2</sup>

- Present environmental conditions : Rice-field, spread housing

- Sensitivity to pollution : Quite sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : From habitation and wet rice-field

3. Catchment : Possibility of saline water instrusion at prolonged over exploitation

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drain of well-head area salinity control, Responsibility of : IKKs-Unit (PDAM)

- Surroundings : No depots of harmful materials, no excessive build activity , Responsibility of : Camat, Pemda

- Catchment : No depots of harmful materials, no harmful industrial activity, no overpump , Responsibility of : Camat, Pemda

2. Yield Protection : No other boreholes in a radius of 1,000 m, without assessment of impact on the well. , Responsibility of : Pemda

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : LEMAHABANG Kab. : KARAWANG Water Demand : 20 l/s  
=====

A. GENERAL

- 1. Borehole : Lemahabang II  
  - Desa : Kedawang Kampung : Lampean
  - Depth : Drilled 142 m , Equipped 130.5m , Grout seal 30 m deep
  - Recommended yield : 10 l/s , estimated |\_! , pump test |x!
  - Pump type : Submersible Power : PLN |x! , Genset |\_!
- 2. Geology : Flat, composed of alluvial formations
- 3. Aquifer type : Unconfined , Depth(s) 39-45, 55-60, 66-69, 89-92 m  
121-124 m
- 4. Protection cover : Lithology clay, claystone, Tot. thickness 23 m
- 5. Catchment (topographical at the estimated radius of influence) 6 km<sup>2</sup>  
  - Zone of influence : R(estim) = 1,000 m , Area 3.2 km<sup>2</sup>
  - Present environmental conditions : Rice-field, spread housing
  - Sensitivity to pollution : Safe

B. POLLUTION POSSIBILITIES

- 1. Well site : Seepage along the grout and casing pipes
- 2. Surroundings : From habitation and wet rice-field
- 3. Catchment : Possibility of saline water intrusion at prolonged over-exploitation.

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drain of well-head area, salinity control  
\_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM)
- Surroundings : No depots of harmful materials, no excessive build activity  
\_\_\_\_\_ , Responsibility of : Camat, Pemda
- Catchment : No depots of harmful materials, no harmful industrial activity, no overpump  
\_\_\_\_\_ , Responsibility of : Camat, Pemda

- 2. Yield Protection : No other boreholes in a radius of 1,000 m without assessment of impact on the well.  
\_\_\_\_\_ , Responsibility of : Pemda

(see map overleaf)

# 51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix I.8.3

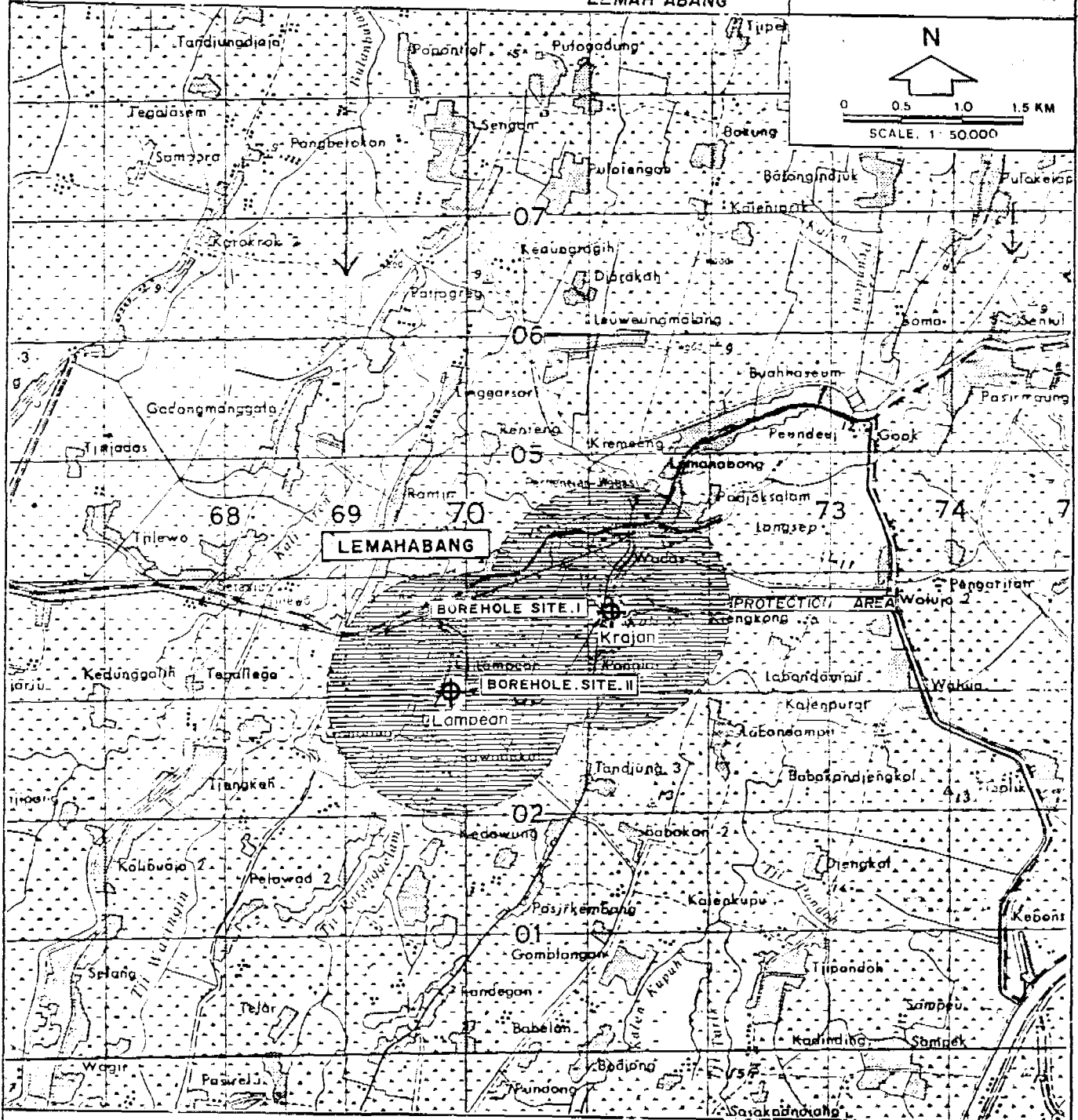
IKK : LEMAH ABANG

KAB : KARAWANG

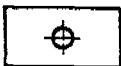
## WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : DEEP WELLS

LOCATION : KEDAWUNG, LEMAH ABANG



### NOTE



BOREHOLE SITE



ZONE OF INFLUENCE

- No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well
- Control of salinity

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : BINONG Kab. : SUBANG Water Demand : 10 l/s

A. GENERAL

1. Borehole : Binong I  
Desa : Kediri Kampung : Kediri  
 - Depth : Drilled 148 m , Equipped 147 m , Grout seal 25 m deep  
 - Recommended yield : 7.5 l/s , estimated |\_| , pump test |x|  
 - Pump type : Submersible Power : PLN |x| , Genset |\_|
2. Geology : Alluvial deposits
3. Aquifer type : confined , Depth(s) 40-42, 52-56, 67-70, 73-76, 78-82  
90-142 (Between) m
4. Protection cover : Lithology Clay Tot. thickness 28 m
5. Catchment (topographical at the estimated radius of influence) 6 km<sup>2</sup>  
 - Zone of influence : R<sub>(estim)</sub> = 1,000 m , Area 3.2 km<sup>2</sup>  
 - Present environmental conditions : Housing surrounding by rice-field  
 - Sensitivity to pollution : Safe

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes
2. Surroundings : From habitation and wet rice-field
3. Catchment : Harmfull future industrial activities, storage of chemicals

C. PROTECTION RECOMENDATION

1. Environmental Protection
  - Well site : Sanitary zone(r = 5 m), proper drain of well-head area salinity control  
, Responsibility of : IKKs-Unit (PDAM)
  - Surroundings : No depots of harmfull materials, no excessive build activity , Responsibility of : Camat, Pemda
  - Catchment : No depots of harmfull materials, no uncontrolled industrial development  
, Responsibility of : Camat, Pemda
2. Yield Protection : No other deep boreholes in a radius of 1,000 m, without assessment of the impact on the well.  
, Responsibility of : Pemda

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : BINONG Kab. : SUBANG Water Demand : 10 l/s

A. GENERAL

1. Borehole : Binong II  
Desa : Kediri Kampung : Kediri  
  - Depth : Drilled 144 m , Equipped 142 m , Grout seal 25 m deep
  - Recommended yield : 5 l/s, estimated |\_ , pump test |x|
  - Pump type : Submersible Power : PLN |x| , Genset |\_
2. Geology : Alluvial deposits
3. Aquifer type : Confined, Depth(s) 49.50-59.50, 67-85,  
96-137.5 (between) m
4. Protection cover : Lithology Clay Tot. thickness 18 m
5. Catchment (topographical at the estimated radius of influence) 6 km<sup>2</sup>  
  - Zone of influence : R<sub>(estim)</sub> = 1,000 m, Area 3.2 km<sup>2</sup>
  - Present environmental conditions : Housing surrounding by rice-field
  - Sensitivity to pollution : Safe

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes
2. Surroundings : From habitation and wet rice-field
3. Catchment : Harmfull industrial activities, storage of chemicals

C. PROTECTION RECOMENDATION

1. Environmental Protection
  - Well site : Sanitary zone(r = 5 m), proper drain of well-head area  
salinity control  
, Responsibility of : IKKs-Unit (PDAM)
  - Surroundings : No depots of harmfull materials, no excessive build  
activity , Responsibility of : Camat, Pemda
  - Catchment : No depots of harmfull materials, no uncontrolled  
industrial development  
, Responsibility of : Camat, Pemda
2. Yield Protection : No other deep boreholes in a radius of 1,000 m,  
assessment of the impact on the well.  
, Responsibility of : Pemda

(see map overleaf)

51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix II.9.3

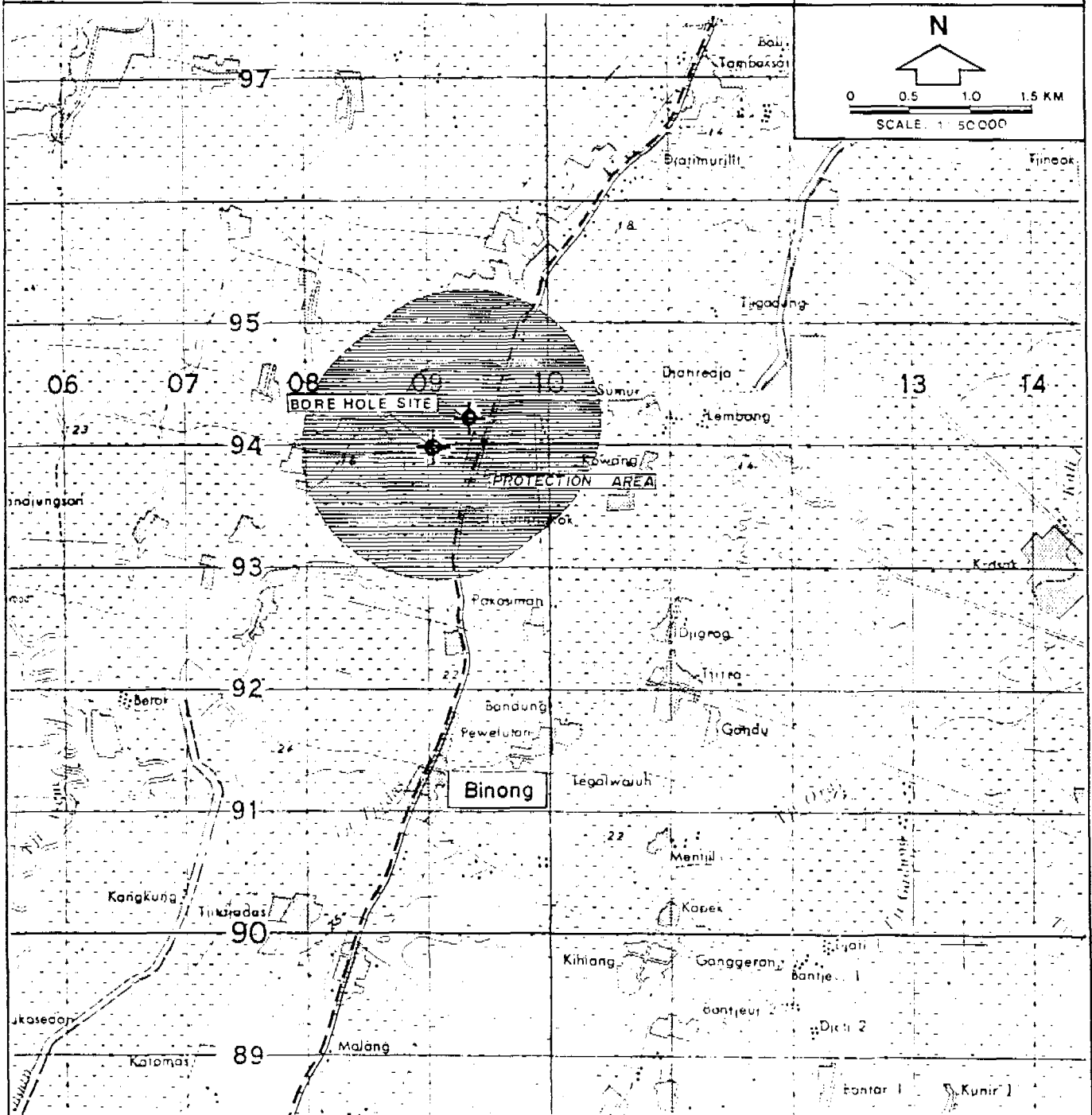
IKK : BINONG

KAB : SUBANG

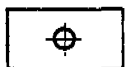
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : DEEP WELLS

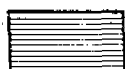
LOCATION : Ds. KEDIRI



NOTE



BOREHOLE SITE



ZONE OF INFLUENCE

- No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well
- Control of salinity

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PII

IKK : KALIJATI Kab. : SUBANG Water Demand : 10 l/s

GENERAL

1. Borehole : Kalijati I  
Desa : Kaliangsana Kampung : Sudimampir  
- Depth : Drilled 105 m , Equipped 83 m , Grout seal 30 m deep  
- Recommended yield : 7.5 l/s, estimated ;, pump test !x!  
- Pump type : Submersible Power : PLN !x!, Genset !;
2. Geology : Alluvial deposits, tuffaceous sandstone, tuffaceous
3. Aquifer type : Unconfined, Depth(s) 44-50, 64-70, 74-77 m
4. Protection cover : Lithology Sandstone Tot. thickness 17 m
5. Catchment (topographical at the estimated radius of influence) 6 km<sup>2</sup>  
- Zone of influence : R<sub>(estim)</sub> = 1,000 m, Area 3.2 km<sup>2</sup>  
- Present environmental conditions : Plantation, spread housing  
- Sensitivity to pollution : Not sensitive (deep groundwater level)

POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes
2. Surroundings : From habitation and plantation (pesticides ?)
3. Catchment : Excessive, uncontrolled development, depots of harmful material

PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head area , Responsibility of : IKKs-Unit (PDAM)
  - Surroundings : No excessive building activity, no depots of harmful materials , Responsibility of : Camat, Pemda
  - Catchment : Controlled industrial activity , Responsibility of : Camat, Pemda
2. Yield Protection : No other deep wells within a distance 1,000 m from the project well. , Responsibility of : Pemda

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : COMPRENG Kab. : SUBANG Water Demand : 10 l/s

A. GENERAL

1. Borehole : Compreng
- Desa : Compreng Kampung : Compreng
- Depth : Drilled 160 m , Equipped 153 m , Grout seal 30 m deep
  - Recommended yield : 7 l/s, estimated 1!, pump test 1x!
  - Pump type : Submersible Power : PLN 1x!, Genset 1!
2. Geology : Alluvial Deposits
3. Aquifer type : confined, Depth(s) 50.5-52.5, 67.5-69.5, 106-148(between)m
4. Protection cover : Lithology clay Tot. thickness 20 m
5. Catchment (topographical at the estimated radius of influence) 3.5 km<sup>2</sup>
- Zone of influence : R<sub>(estim)</sub> = 1,000 m, Area 3.2 km<sup>2</sup>
  - Present environmental conditions : housing and rice-field
  - Sensitivity to pollution : Safe

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes
2. Surroundings : From habitation and agricultural activity
3. Catchment : Possibility of saline water intrusion at over-pumping

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drain of well-head area, salinity control  
\_\_\_\_\_, Responsibility of : IKKs-Unit (PDAM)
- Surroundings : No depots of harmful materials, no excessive build activity  
\_\_\_\_\_, Responsibility of : Camat, Pemda
- Catchment : No storage of harmful materials without permission  
\_\_\_\_\_, Responsibility of : Camat, Pemda

2. Yield Protection : No other production boreholes within a distance 1,000 m without assessment of impact on the well  
\_\_\_\_\_, Responsibility of : Pemda

(see map overleaf)



51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix II.11.2

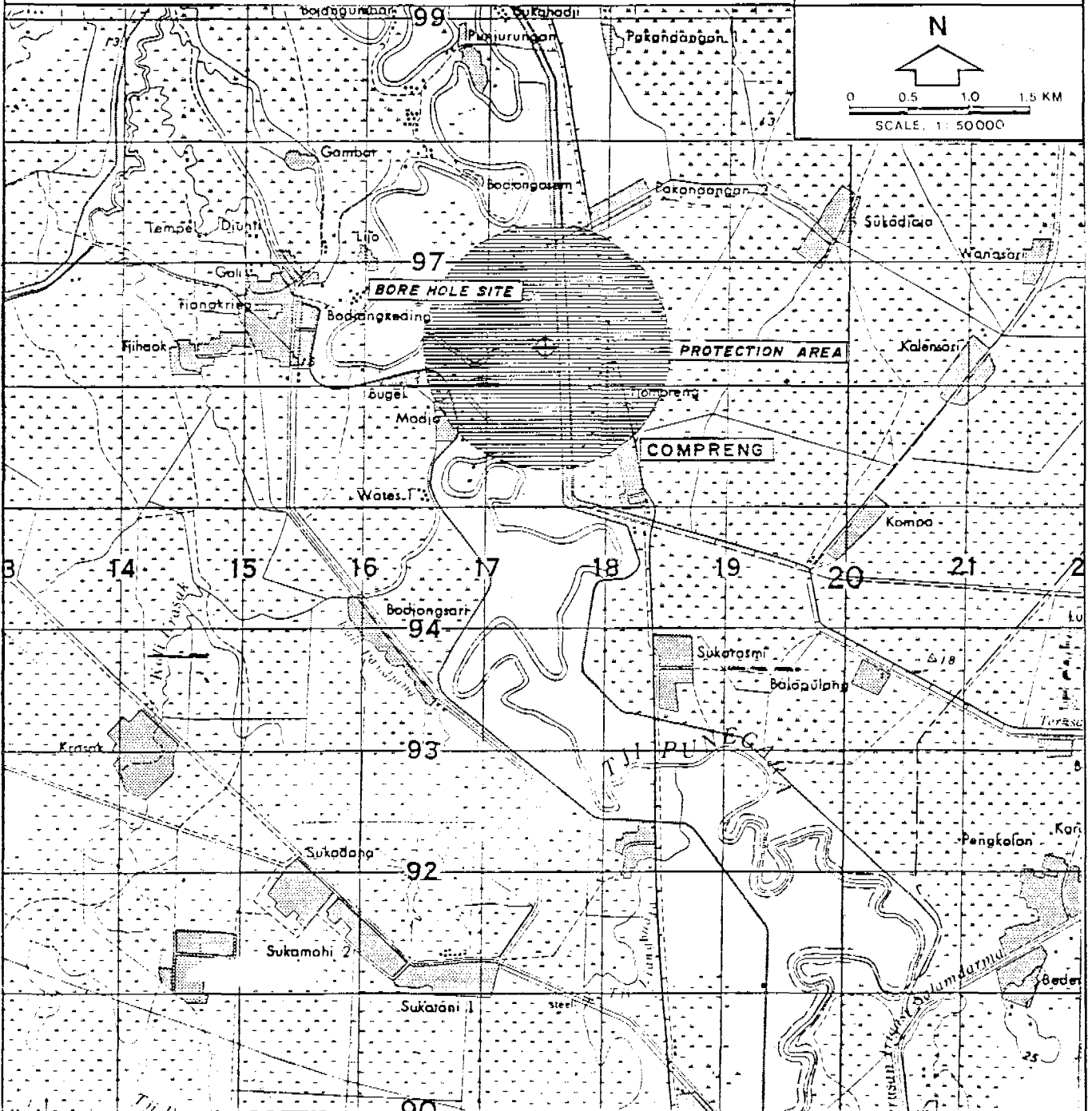
IKK : COMPRENG

KAB : SUBANG

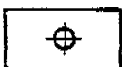
WATER RESOURCES  
PROTECTION SHEET

SOURCE TYPE : DEEP WELL

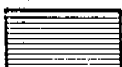
LOCATION : Ds. COMPRENG



**NOTE**



**BOREHOLE SITE**



**ZONE OF INFLUENCE**

- No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well
- Control of salinity

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : CIPUNAGARA Kab. : SUBANG Water Demand : 10 l/s

A. GENERAL

1. Borehole : Cipunagara (borehole in Kec. Comprang)

Desa : Kiarapayung Kampung : Kiarasari

- Depth : Drilled 126 m , Equipped 53 m , Grout seal 11 m deep

- Recommended yield : 3 l/s, estimated 1, pump test 1

- Pump type : Submersible Power : PLN 1, Genset 1

2. Geology : Northern alluvial plains.

3. Aquifer type : Confined, Depth(s) 16-19, 23-37(between), 45.50-48.50 m

4. Protection cover : Lithology Clay Tot. thickness 7 m

5. Catchment (topographical at the estimated radius of influence) 3.5 km<sup>2</sup>

- Zone of influence : R<sub>(estim)</sub> = 1,000 m, Area 3.2 km<sup>2</sup>

- Present environmental conditions : Extensive rice-fields

- Sensitivity to pollution : Not sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : Wet rice-field

3. Catchment : Overuse of fertilizers and pesticides

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head area , Responsibility of : IKKs-Unit (PDAM)

- Surroundings : No depots of harmful materials, limited use of agricultural chemicals , Responsibility of : Camat, Pemda

- Catchment : No depots of harmful materials , Responsibility of : Camat, Pemda

2. Yield Protection : No other boreholes in a radius of 1,000 m without assessment of impact on the well , Responsibility of : Pemda

(see map overleaf)

51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix II.12.2

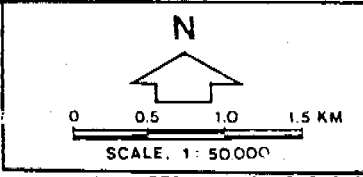
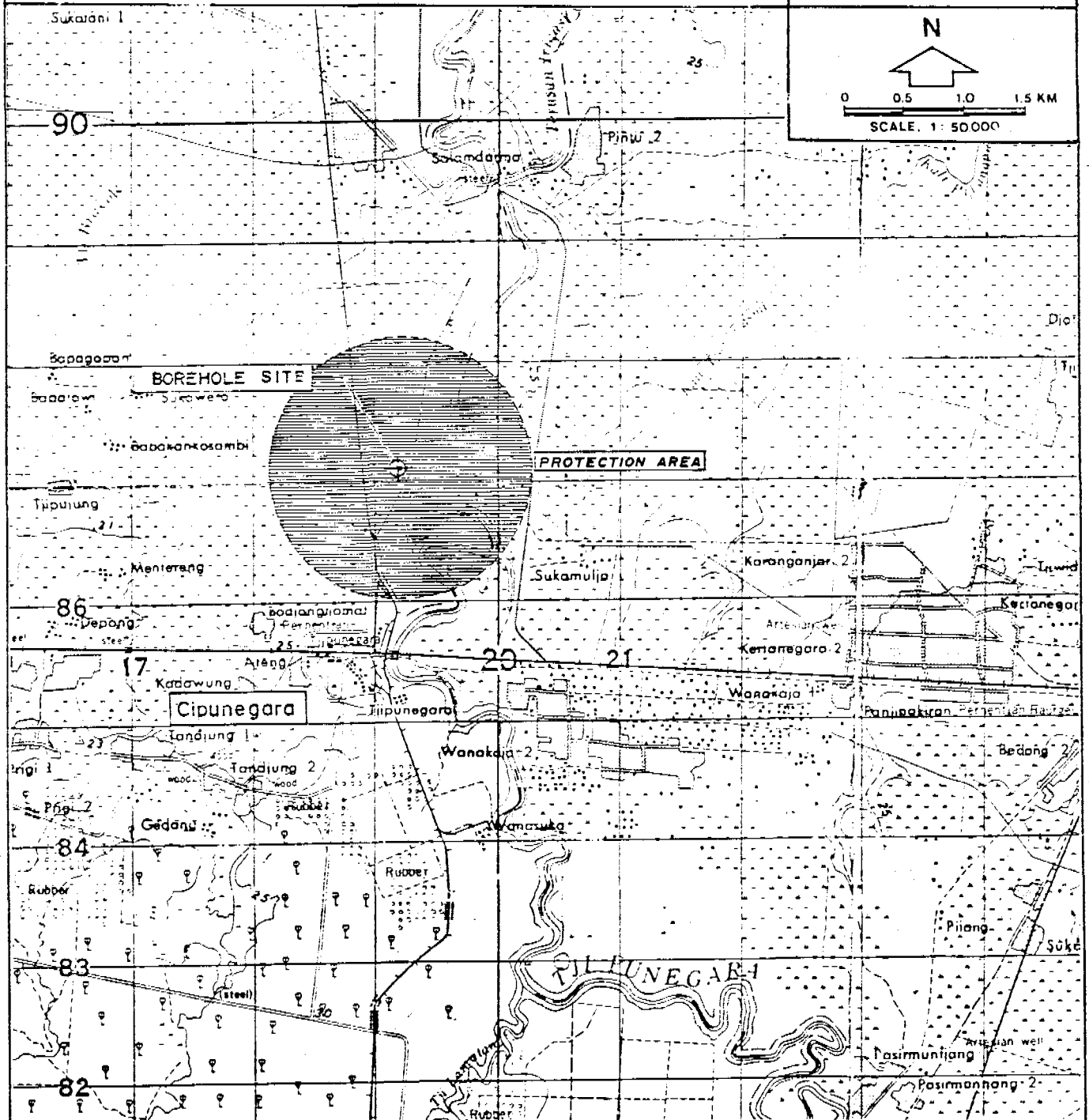
IKK : CIPUNAGARA

KAB : SUBANG

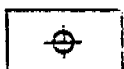
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : DEEP WELL

LOCATION : Ds. KIARASARI



NOTE



BOREHOLE SITE



ZONE OF INFLUENCE

No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : CIMALAKA Kab. : SUMEDANG Water Demand : 20 l/s  
=====

A. GENERAL

1. Borehole : Cimalaka III

Desa : Citimun Kampung : Sukatani

- Depth : Drilled 50 m , Equipped 50 m , Grout seal 30 m deep
- Recommended yield : 10 l/s, estimated |\_!, pump test |x!
- Pump type : Submersible Power : PLN |x!, Genset |\_!

2. Geology : Young volcanics (Breccia tuff and lava flow)

3. Aquifer type : Unconfined , Depth(s) \_\_\_\_\_ m

4. Protection cover : Lithology Sandy, clayey Tot. thickness 5 m

5. Catchment (topographical at the estimated radius of influence) 2.2 km<sup>2</sup>

- Zone of influence : R(estim) = 500 m, Area 0.8 km<sup>2</sup>
- Present environmental conditions : Housing
- Sensitivity to pollution : Sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : From the habitation

3. Catchment : Overuse of pesticides & harmful future industrial activities, gravel mining

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head area , Responsibility of : IKKs-Unit (PDAM).
- Surroundings : No storage of harmful materials, no excessive sewage disposal (latrines etc.) , Responsibility of : Camat, Pemda
- Catchment : No harmful industrial activities, no garbage sites, no chemical storage , Responsibility of : Pemda, Camat

2. Yield Protection : No other boreholes in a radius of 500 m without impact assessment , Responsibility of : Pemda

(see map overleaf)

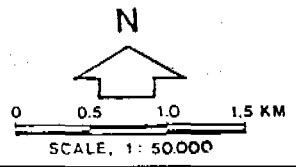
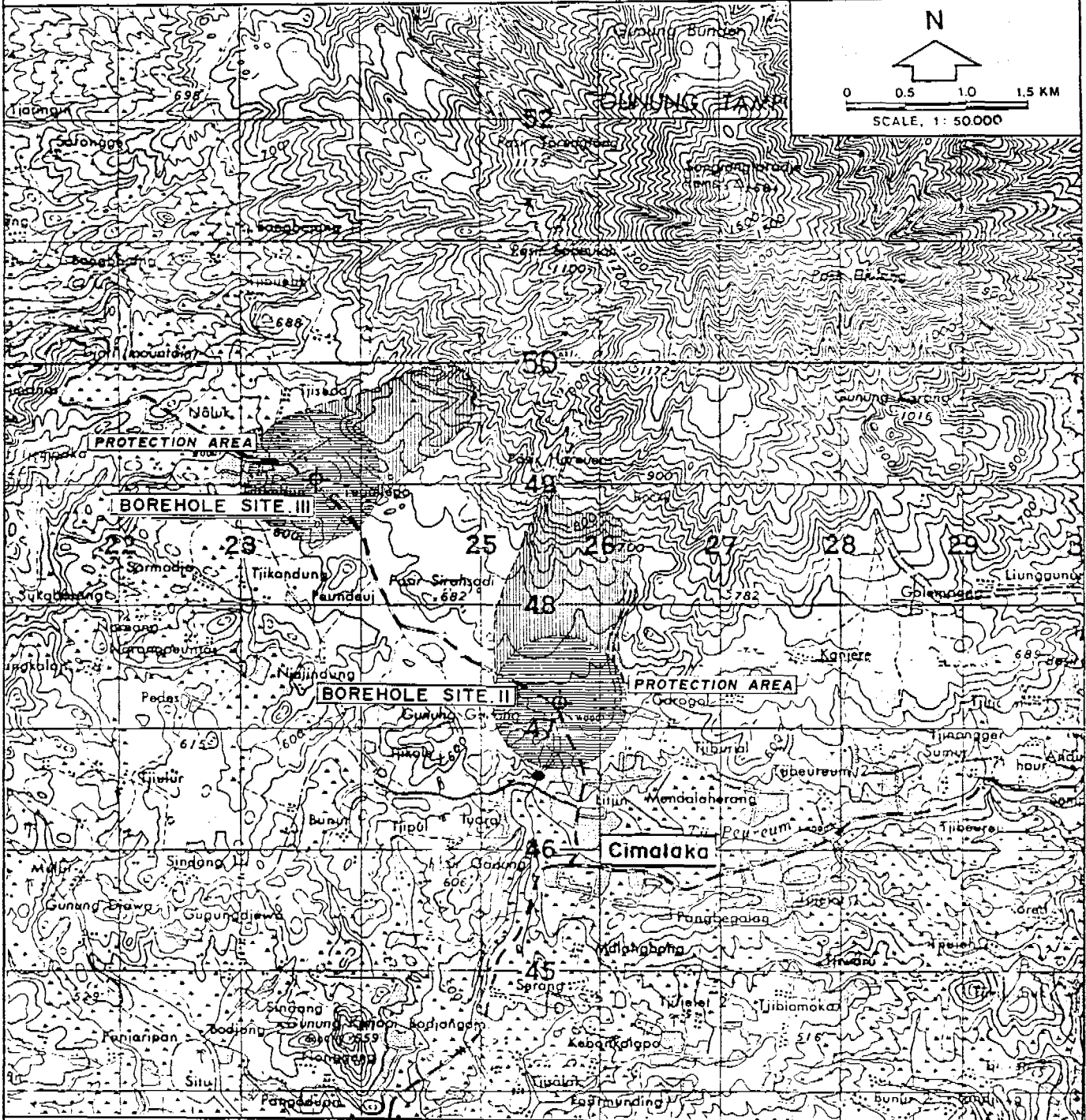
IKK : CIMALAKA

KAB : SUMEDANG

WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : DEEP WELLS

LOCATION : CITIMUN



**NOTE**



**BOREHOLE SITE**



**ZONE OF INFLUENCE**

No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well



**CATCHMENT PROTECTION**

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : PASEH Kab. : SUMEDANG Water Demand : 20 l/s  
=====

## A. GENERAL

1. Borehole : Paseh I

Desa : Paseh Kaler Kampung : Nagrak

- Depth : Drilled 66.5 m , Equipped 66 m , Grout seal 25 m deep
- Recommended yield : 20 l/s , estimated |\_! , pump test |x!
- Pump type : Submersible Power : PLN |x! , Genset |\_!

2. Geology : Young volcanics on the slope of Tampomas

3. Aquifer type : Unconfined , Depth(s) 39-49 (between) , 53-57 , 61-64 m

4. Protection cover : Lithology None Tot. thickness - m

5. Catchment (topographical at the estimated radius of influence) 1 km<sup>2</sup>

- Zone of influence : R<sub>(estim)</sub> = 500 m , Area 0.8 km<sup>2</sup>
- Present environmental conditions : Plantation, spread housing
- Sensitivity to pollution : Quite sensitive

## B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : From nearby habitation

3. Catchment : Present and future plantation or agricultural activity, deforestation

## C. PROTECTION RECOMENDATION

## 1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head area , Responsibility of : IKKs-unit (PDAM)
- Surroundings : No depots of harmful materials, excessive build activity , Responsibility of : Camat, Pemda
- Catchment : No harmful industrial activity, depots of chemicals, no deforestation , Responsibility of : Camat, Pemda

2. Yield Protection : No other boreholes in a radius of 500 m, without assessment of impact on the well.  
\_\_\_\_\_ , Responsibility of : Pemda

(see map overleaf)

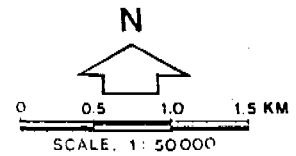
IKK : PASEH

KAB : SUMEDANG

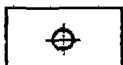
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : DEEP WELL

LOCATION : Ds.PASEH KALER



NOTE



BOREHOLE SITE



ZONE OF INFLUENCE

No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well



CATCHMENT PROTECTION

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : CIKALONG Kab. : TASIKMALAYA Water Demand : 10 l/s

A. GENERAL

1. Borehole : Shallow borehole Cikalong (to be carried out)

Desa : Mandalajaya Kampung : Sukahaji

- Depth : Drilled 25-30 m , Equipped 25-30m , Grout seal 5 m deep

- Recommended yield : 2-3 l/s, estimated !, pump test !x!

- Pump type : Submersible Power : PLN !, Genset !x!

2. Geology : Alluvium

Aquifer type : Unconfined , Depth(s) 5-9.7, 13-15, 17-19, 20-26 m

4. Protection cover : Lithology Clay and clay sandy Tot. thickness 5 m

5. Catchment (topographical at the estimated radius of influence) 1.8 km<sup>2</sup>

- Zone of influence :  $R_{(estim)} = \underline{500}$  m, Area 0.8 km<sup>2</sup>

- Present environmental conditions : Vegetation, sawahs, spread housing

- Sensitivity to pollution : Sensitivity due to lack of thick protection cover

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : From habitation and sawahs

3. Catchment : Pesticides, harmful future industrial activities

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone, proper drainage of well-head area and waste water disposal channel  
\_\_\_\_\_ , Responsibility of : IKKs-Unit (PDAM)

- Surroundings : No storage of harmful materials, no waste water disposal , Responsibility of : Camat, Pemda

- Catchment : No storage of harmful materials, no uncontrolled development , Responsibility of : Camat, Pemda

2. Yield Protection : No other boreholes in a radius of 500 m, without assessment of impact on the wells.

\_\_\_\_\_ , Responsibility of : Pemda

(see map overleaf)



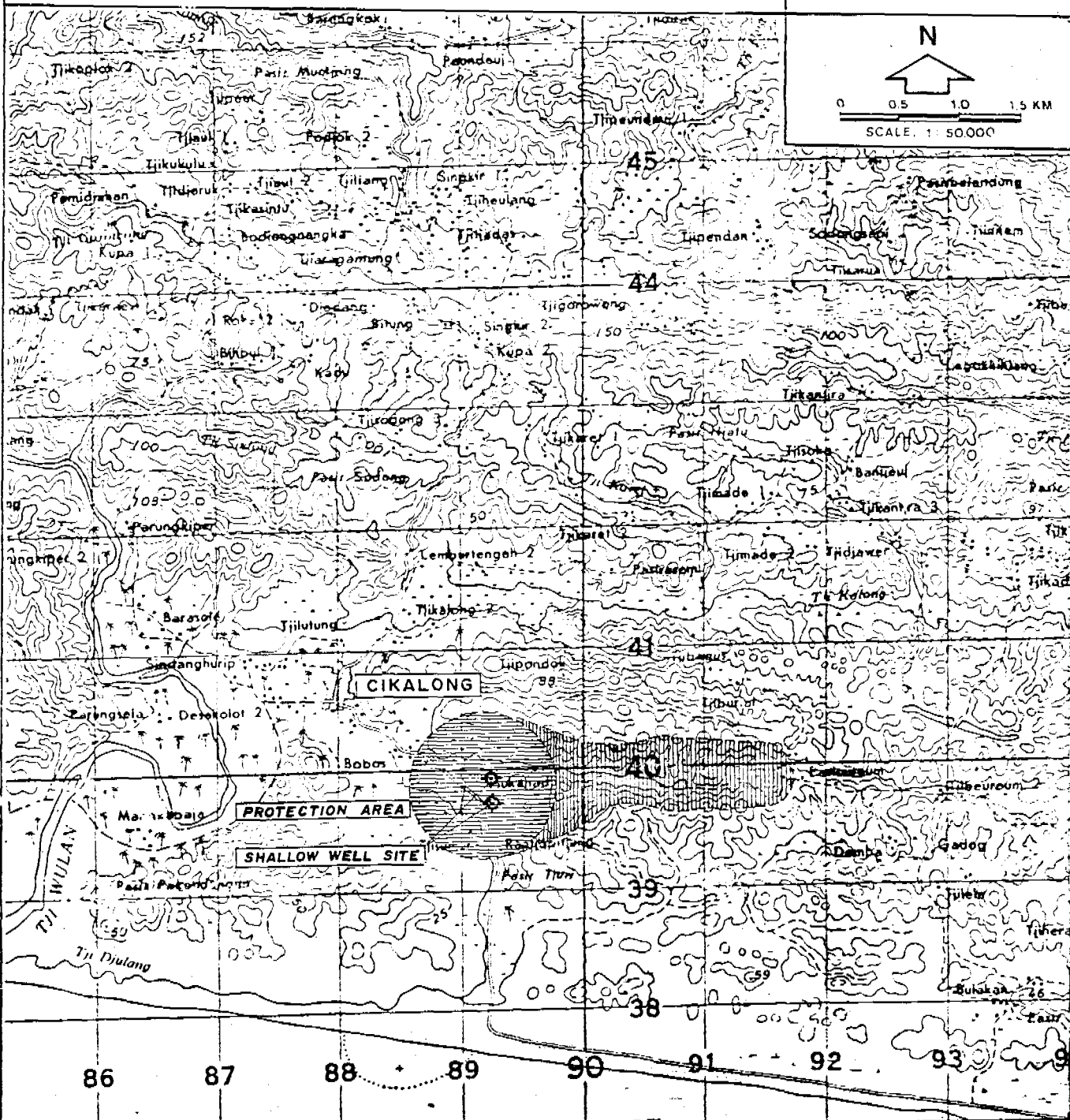
IKK : CIKALONG

KAB : TASIKMALAYA

SOURCE TYPE : SHALLOW WELLS

LOCATION : MANDALAJAYA

WATER RESOURCES PROTECTION SHEET



NOTE



SHALLOW BOREHOLE SITE



ZONE OF INFLUENCE

No exploitation of deep groundwater by third party without a hydrogeological evaluation of the impact on the well



CATCHMENT PROTECTION

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : KARANGPAWITAN Kab. : GARUT Water Demand : 20 l/s

A. GENERAL

1. Borehole : Karangpawitan - I  
 Desa : Gadog Kampung : Sukaraja  
 - Depth : Drilled 100.5 m , Equipped 100 m , Grout seal 20 m deep  
 - Recommended yield : 10 l/s , estimated |\_! , pump test |x!  
 - Pump type : Submersible Power : PLN |x! , Genset |\_!
2. Geology : Young volcanics overlain by alluvium  
 Aquifer type : Unconfined , Depth(s) 62-68, 70-73, 79-83, 90-96 m
4. Protection cover : Lithology None Tot. thickness - m
5. Catchment (topographical at the estimated radius of influence) 1.8 km<sup>2</sup>  
 - Zone of influence : R<sub>(estim)</sub> = 500 m , Area 0.8 km<sup>2</sup>  
 - Present environmental conditions : Vegetation, rice-field, spread Housing  
 - Sensitivity to pollution : Sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes
2. Surroundings : From habitation, wet rice-fields
3. Catchment : Pesticides, harmful future industrial activities, deforestation, mining

C. PROTECTION RECOMENDATION

1. Environmental Protection
  - Well site : Sanitary zone (r = 5 m), proper drainage of well-head area , Responsibility of : IKKs-Unit (PDAM)
  - Surroundings : No depots of harmful materials, no excessive build activity , Responsibility of : Camat, Pemda
  - Catchment : No depots of harmful materials, controlled development no deforestation , Responsibility of : Camat, Pemda
2. Yield Protection : No other boreholes in a radius of 500 m, without assessment of impact on the well. , Responsibility of : Pemda

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : KARANGPAWITAN Kab. : GARUT Water Demand : 20 l/s  
=====

A. GENERAL

1. Borehole : Karangpawitan - II

Desa : Situjaya Kampung : Lemahsari

- Depth : Drilled 105 m , Equipped 98.5 m , Grout seal 48 m deep

- Recommended yield : 20 l/s , estimated 1 l/s , flow test 1 l/s

- Pump type : None Power : PLN 1 l/s , Genset 1 l/s

2. Geology : Young volcanics overlain by alluvium

3. Aquifer type : Confined , Depth(s) 75-85 m

4. Protection cover : Lithology Clay, clayey Tot. thickness 12 m

5. Catchment (topographical at the estimated radius of influence) 2.0 km<sup>2</sup>

- Zone of influence : R<sub>(estim)</sub> = 500 m , Area 0.8 km<sup>2</sup>

- Present environmental conditions : Padies-field, ponds, housing

- Sensitivity to pollution : Safe

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : From habitation, wet rice-fields

3. Catchment : Pesticides, harmful future industrial activities, deforestation, mining

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head area , Responsibility of : IKKs-Unit (PDAM)

- Surroundings : No depot of harmful materials, no excessive build activity , Responsibility of : Camat, Pemda

- Catchment : No depots of harmful materials, controlled development, no deforestation , Responsibility of : Camat, Pemda

2. Yield Protection : No other boreholes in a radius of 500 m, without assessment of impact on the well. , Responsibility of : Pemda

(see map overleaf)

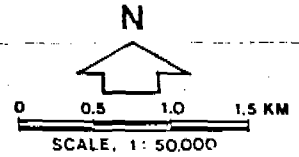
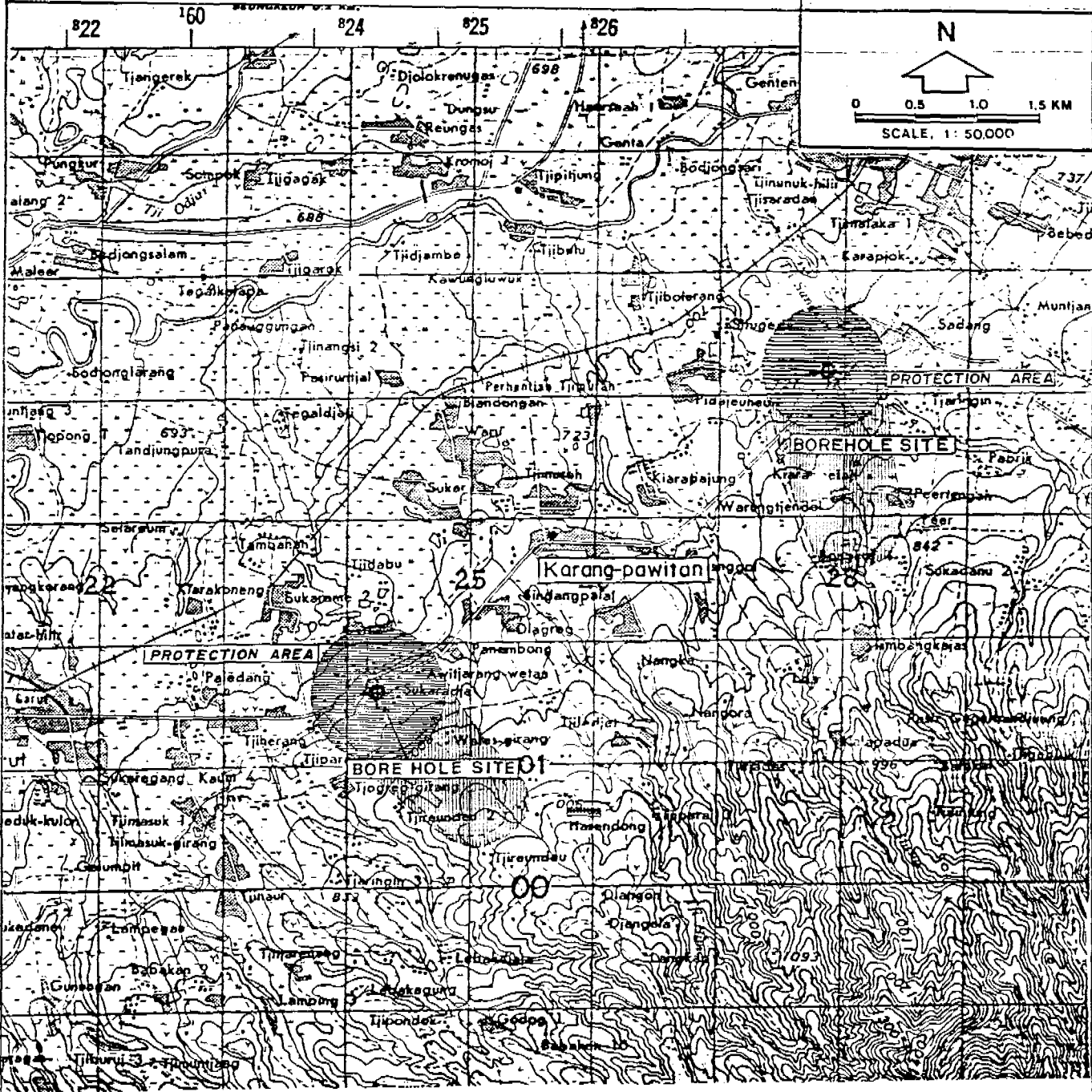
IKK : KARANG PAWITAN

KAB : GARUT

WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : DEEP WELLS

LOCATION : GADOG, SITUJAYA



**NOTE**



BOREHOLE SITE



ZONE OF INFLUENCE  
No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well



CATCHMENT PROTECTION  
- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides  
- No garbage disposal sites or sewage systems without permission  
- No extensive deforestation  
- Mining activity (also sand and gravel) after permission

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : CISURUPAN Kab. : GARUT Water Demand : 10 l/s

A. GENERAL

1. Borehole : Cisurupan I

Desa : Cidatar Kampung : Cidatar

- Depth : Drilled 100 m , Equipped 73 m , Grout seal 15 m deep
- Recommended yield : 5 l/s, estimated |\_|, pump test |x|
- Pump type : Submersible Power : PLN |x|, Genset |\_|

2. Geology : Young volcanics valley between Papandayan and Cikuray volcano

3. Aquifer type : Unconfined , Depth(s) 24-27, 31-34, 39-51 (between)  
57-60, 65-68 m

4. Protection cover : Lithology Sandy, clayey Tot. thickness 5 m

5. Catchment (topographical at the estimated radius of influence) 2.3 km<sup>2</sup>

- Zone of influence :  $R_{(est\ i\ m)}$  = 500 m, Area 0.8 km<sup>2</sup>
- Present environmental conditions : Vegetation, plantation , spread housing
- Sensitivity to pollution : Quite sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes
2. Surroundings : From habitation storage of harmful materials
3. Catchment : Uncontrolled development, storage of harmful materials deforestation

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone , proper drainage of well-head area  
, Responsibility of : IKKs-Unit (PDAM)
- Surroundings : No depots of harmful materials, no excessive build activity , Responsibility of : Camat, Pemda
- Catchment : No depots of harmful chemicals, controlled development  
, Responsibility of : Pemda, Perkebunan

2. Yield Protection : No other deep wells within 500 m radius  
, Responsibility of : Pemda

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : CISURUPAN Kab. : GARUT Water Demand : 10 l/s

A. GENERAL

1. Borehole : Cisurupan II

Desa : Cisurupan Kampung : Palalangon

- Depth : Drilled 85 m , Equipped 72 m , Grout seal 20 m deep

- Recommended yield : 5 l/s, estimated |\_!, pump test |x!

- Pump type : Submersible Power : PLN |x!, Genset |\_!

2. Geology : Young volcanics valley between Papandayan and Cikuray volcano

3. Aquifer type : Unconfined , Depth(s) 44-47, 53-56, 58.5-67.5 m

4. Protection cover : Lithology Sand Tot. thickness 12 m

5. Catchment (topographical at the estimated radius of influence) 2.3 km<sup>2</sup>

- Zone of influence : R<sub>(estim)</sub> = 500 m, Area 0.8 km<sup>2</sup>

- Present environmental conditions : Vegetation, plantation, spread housing

- Sensitivity to pollution : Quite sensitive

B. POLLUTION POSSIBILITIES

1. Well site : Seepage along the grout and casing pipes

2. Surroundings : From habitation of land use planning

3. Catchment : Uncontrolled development, storage of harmful materials deforestation

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone, proper drainage of well-head area, Responsibility of : IKKs-Unit (PDAM)

- Surroundings : No depots of harmful materials, no excessive build activity, Responsibility of : Camat, Pemda

- Catchment : No depots of harmful chemicals, controlled development, Responsibility of : Pemda, Perkebunan

2. Yield Protection : No other deep wells within 500 m radius, Responsibility of : Pemda

(see map overleaf)

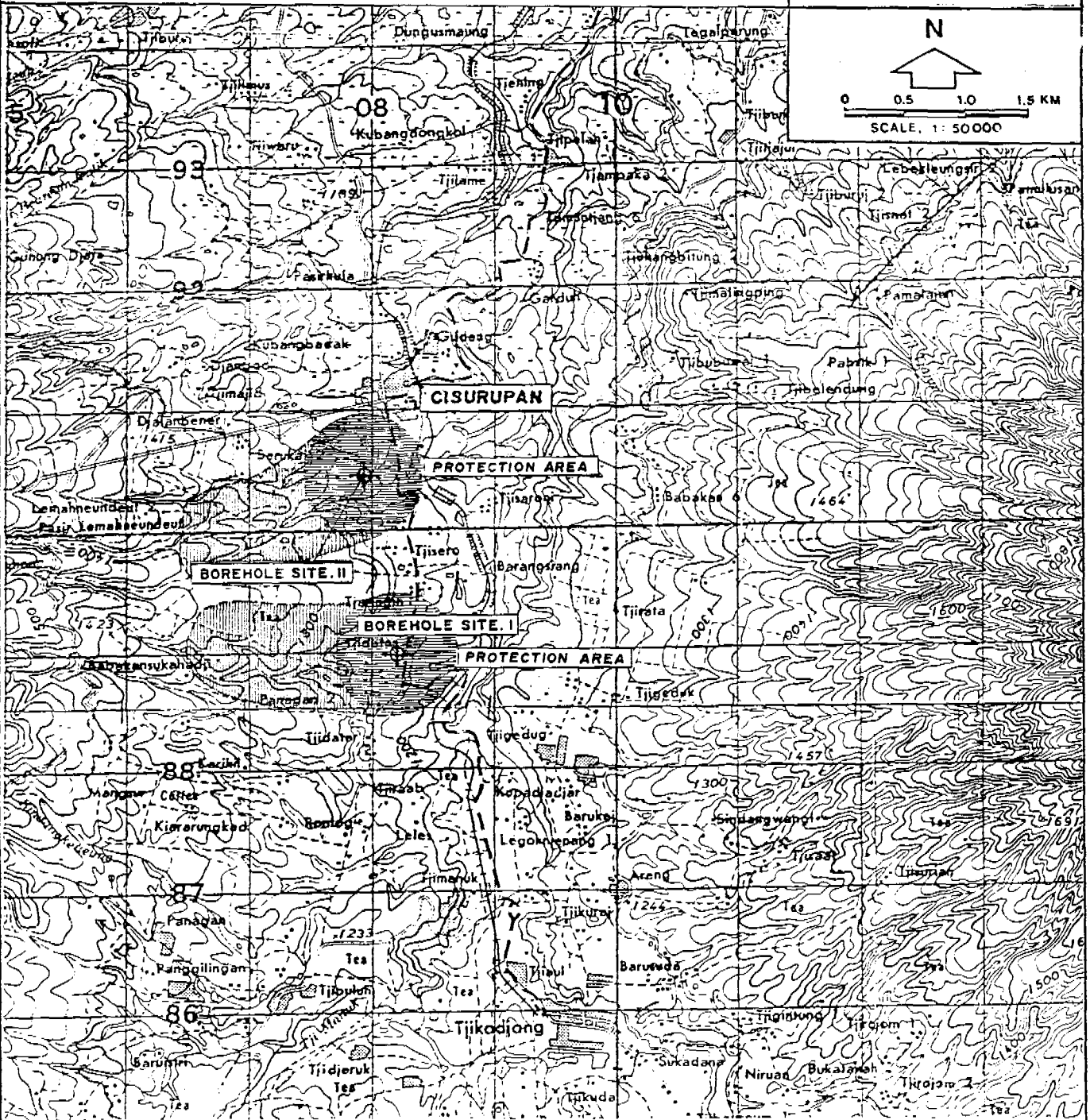
IKK : CISURUPAN

KAB : GARUT

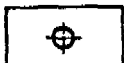
**WATER RESOURCES PROTECTION SHEET**

SOURCE TYPE : DEEP WELLS

LOCATION : CIDATAR & CISURUPAN



**NOTE**



**BOREHOLE SITE**



**ZONE OF INFLUENCE**

No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well



**CATCHMENT PROTECTION**

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : BANYURESMI & LEUWIGOONG Kab. : GARUT Water Demand : 10+10 l/s

A. GENERAL

1. Borehole : Banyuresmi II  
Desa : Cipicung Kampung : Cipicung
  - Depth : Drilled 94 m , Equipped 93 m , Grout seal 60 m deep
  - Recommended yield : 20 l/s, estimated !, flow test !x!
  - Pump type : Booster Power : PLN !x!, Genset !\_!
2. Geology : Flat area of young volcanic and alluvium of the Garut basin
3. Aquifer type : Confined , Depth(s) 83-89 m
4. Protection cover : Lithology Clay, claystone Tot. thickness 21 m
5. Catchment (topographical at the estimated radius of influence) 2.2 km<sup>2</sup>
  - Zone of influence : R(estimated) = 500 m, Area 0.8 km<sup>2</sup>
  - Present environmental conditions : Rice-field and spread housing
  - Sensitivity to pollution : Safe

B. POLLUTION POSSIBILITIES

1. Well site : None due to artesian conditions
2. Surroundings: None due to artesian conditions
3. Catchment : Uncontrolled industrial development, storage of chemicals

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Well site : Sanitary zone (r = 5 m), proper drainage of well-head area , Responsibility of : IKKs-Unit (PDAM)
- Surroundings : - , Responsibility of : Camat, Pemda
- Catchment : No harmful industrial activities, no uncontrolled development , Responsibility of : Camat, Pemda

2. Yield Protection : No other boreholes in a radius of 500 m, without assessment of impact on the well.  
Responsibility of : Pemda

(see map overleaf)



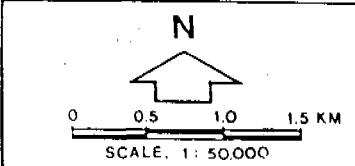
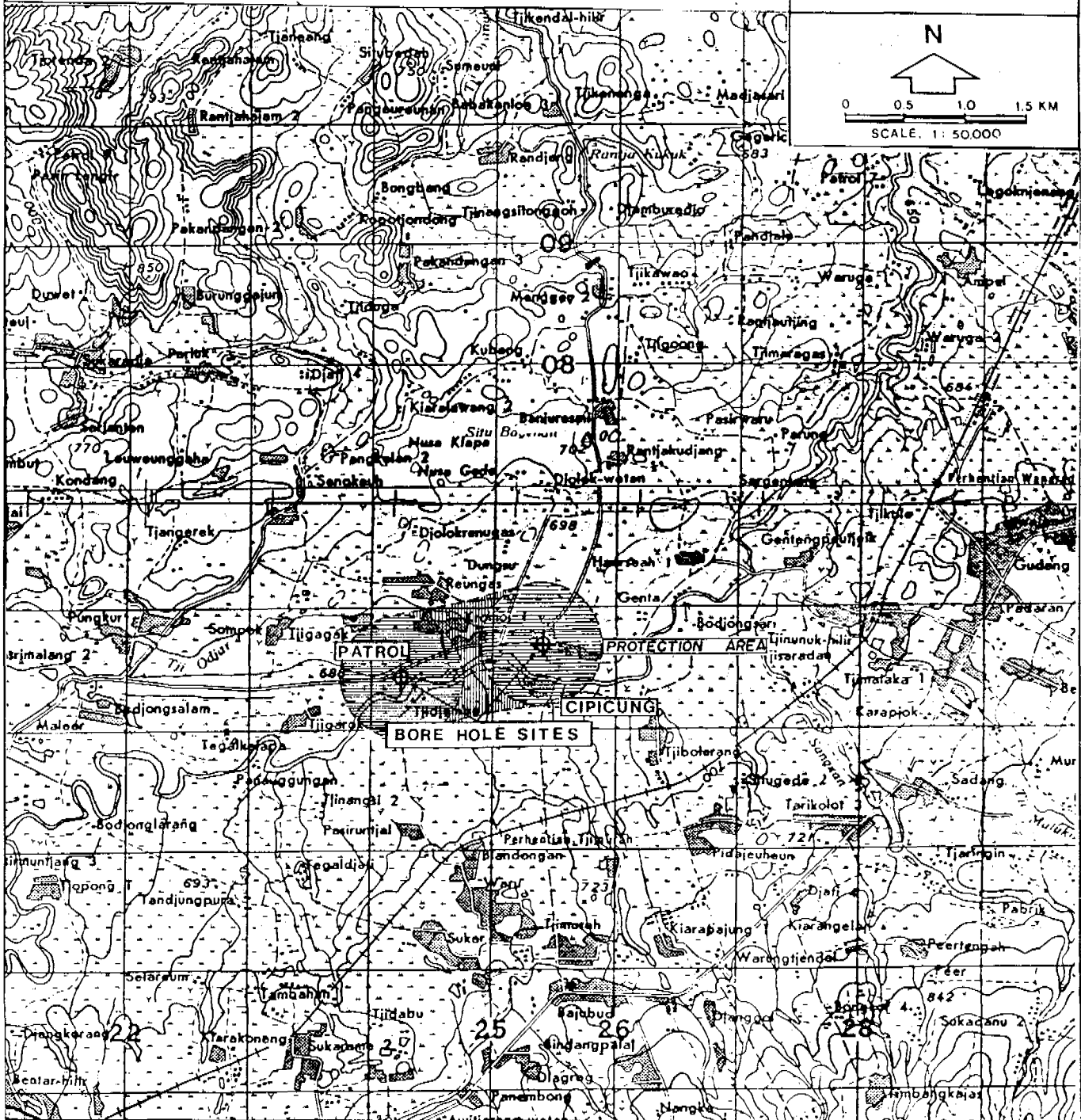
# 51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix II.18.2

IKK : BANYURESMI & LEUWIGOONG KAB : GARUT

## WATER RESOURCES PROTECTION SHEET

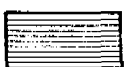
SOURCE TYPE : DEEP WELLS LOCATION : CIPICUNG



### NOTE



**BOREHOLE SITE**



**ZONE OF INFLUENCE**

No exploitation of deep groundwater by third part without a hydrogeological evaluation of the impact on the well



**CATCHMENT PROTECTION**

- No storage of liquid fuels, tars, chemicals, fertilizers and pesticides
- No garbage disposal sites or sewage systems without permission
- No extensive deforestation
- Mining activity (also sand and gravel) after permission

APPENDIX III

Presentation of Environmental Information  
(PIL) and Protective Measures

SURFACE WATER SOURCES

## APPENDIX III

### Presentation of Environmental Information (PIL) and Protective Measures

#### SURFACE WATER SOURCES

Appendix

#### Kab. Sukabumi

- |    |      |             |               |
|----|------|-------------|---------------|
| 1. | 4.01 | Warungkiara | III.1.1 - 1.2 |
| 2. | 4.10 | Cikembar    | III.1.1 - 1.2 |
| 3. | 4.14 | Gegerbitung | III.2.1 - 2.2 |

#### Kab. Cianjur

- |    |      |                |               |
|----|------|----------------|---------------|
| 4. | 5.01 | Sukanegara     | III.3.1 - 3.2 |
| 5. | 5.11 | Cikalong Kulon | III.4.1 - 4.2 |

#### Kab. Karawang

- |    |      |          |               |
|----|------|----------|---------------|
| 6. | 6.06 | Batujaya | III.5.1 - 5.2 |
|----|------|----------|---------------|

#### Kab. Subang

- |    |      |          |               |
|----|------|----------|---------------|
| 7. | 7.08 | Blanakan | III.6.1 - 6.2 |
|----|------|----------|---------------|

#### Kab. Sumedang

- |     |      |            |               |
|-----|------|------------|---------------|
| 8.  | 8.04 | Wado       | III.7.1 - 7.2 |
| 9.  | 8.05 | Tomo       | III.8.1 - 8.3 |
| 10. | 8.07 | Ujung Jaya | III.8.1 - 8.3 |

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : WARUNGKIARA & CIKEMBAR Kab. : SUKABUMI Water Demand : 10+10 l/s  
=====

A. GENERAL

1. Surface Water Source : Name : Cikoneng Ubrug Dam

Intake in Desa : Cikoneng Ubrug , Kampung : Cikoneng Ubrug

- Flow : Max(estimated) : 20 l/s (fixed by PLTA-flow distribution opening)

Min(estimated) : 20 l/s

2. Extraction : Pumping by PLN |x| or genset |\_! , Gravity |\_!

3. Catchment :

- Area : 3.5 km<sup>2</sup>

- Morphology : Disperse hills of Southern Mountains

- Cover : Soil, tertiary formation deposits

- Present environmental conditions : Reservoir for hydropower

- Sensitivity to pollution : Low sensitive

B. POLLUTION POSSIBILITIES

1. At Intake : Pollution from nearby habitation

2. Surroundings: Pollution from nearby habitation

3. Catchment : Possible up-stream pollution of the reservoir

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Intake : Sanitary zone  
\_\_\_\_\_ , Responsibility of : IKKs-unit (PDAM)

- Surroundings : No excessive of local use for toileting on up-stream canals , Responsibility of : Camat, PLTA-unit Ubrug

- Catchment : No storage or dumps of harmful materials along the dam shores , Responsibility of : PLTA-unit, Pemda

2. Yield Protection : No special measures necessary apart of firm commitment by the PLTA  
\_\_\_\_\_ , Responsibility of : Pemda, PLTA-unit Ubrug

(See map overleaf)

# 51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

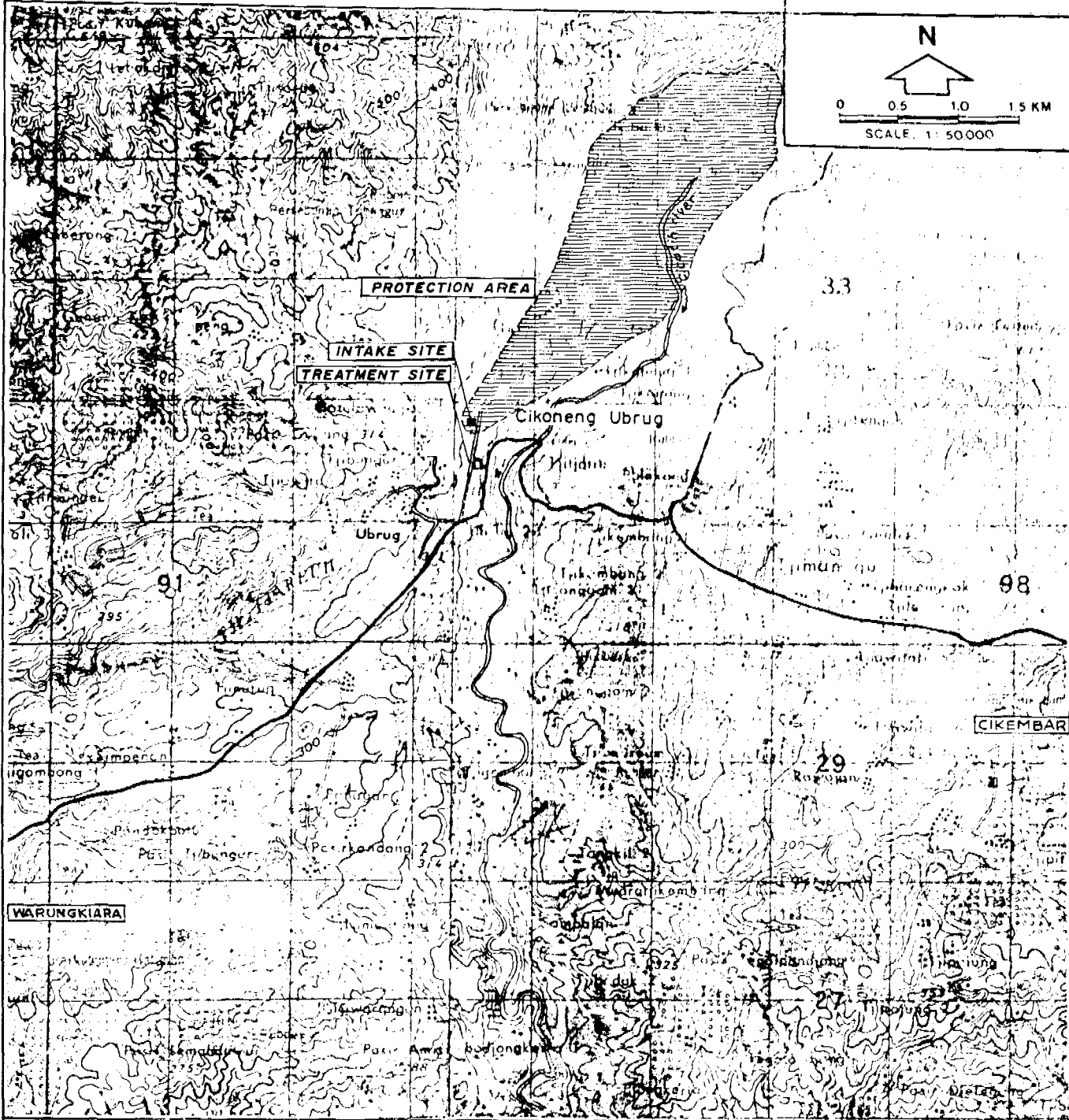
Appendix III-1.2

IKK : WARUNGIARI & CIKEMBAR

KAB : SUKABUMI

## WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : STREAM (OVER FLOW) LOCATION : Ds. CIKONENG UBUG



### NOTE



INTAKE / TREATMENT SITES

#### CATCHMENT PROTECTION



- Catchment to be protected against :
- Deforestation
  - Garbage disposal sites
  - Uncontrolled storage of chemicals and fuels
  - Uncontrolled industrial and habitation development

#### PROTECTION ZONE

- No industrial outlets
  - No garbage disposal or storage of harmful materials
- Protection of the remaining part of the catchment, due to its size shall be the concern of the Provincial authorities.

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : Gegerbitung Kab. : SUKABUMI Water Demand : 10 l/s

A. GENERAL

1. Surface Water Source : Name : Cimandiri river

Intake in Desa : Gegerbitung , Kampung : Puncak Sayang

- Flow : Max (estimated) : 250 l/s

Min (estimated) : 50 l/s

2. Extraction : Pumping by PLN |x| or genset |\_!|, Gravity |\_!

3. Catchment :

- Area : 5 km<sup>2</sup>

- Morphology : Foothills

- Cover : Soil, volcanics materials

- Present environmental conditions : Habitat, sawahs, nat. vegetation

- Sensitivity to pollution : Sensitive

B. POLLUTION POSSIBILITIES

1. At Intake : Daily human activities (washing, toilets), animal watering

2. Surroundings: Daily human activities (washing, toilets), animal watering

3. Catchment : Dump sites, industrial activities, deforestation, storage of chemicals

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Intake : Sanitary zone  
\_\_\_\_\_ , Responsibility of : IKKs - unit (PDAM)

- Surroundings : No effluent outlets or bathing and defecation 100 m  
upstream intake , Responsibility of : IKKs-unit (PDAM)

- Catchment : Deforestation, no waste dumps, no uncontrolled land  
development , Responsibility of : Pemda.Camat

2. Yield Protection : Control with other upstream consumption of water  
conflicting with the IKKs demand

\_\_\_\_\_ , Responsibility of : Pemda

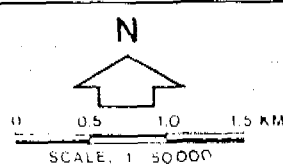
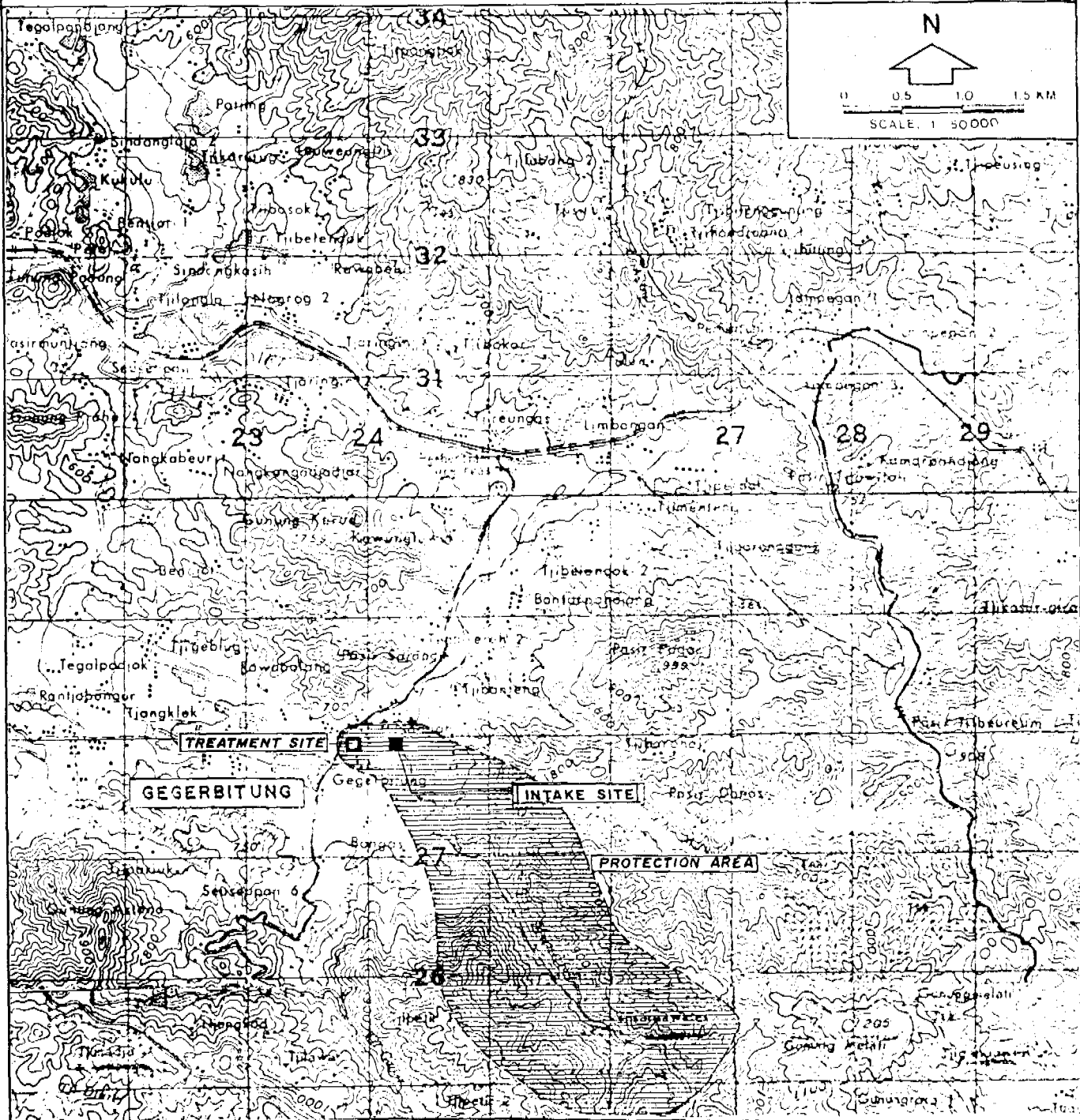
IKK : Gegerbitung

KAB : Sukabumi

WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SURFACE WATER

LOCATION : Ds. Gegerbitung



**NOTE**



INTAKE / TREATMENT SITES



CATCHMENT PROTECTION

- Catchment to be protected against :
- Deforestation
  - Garbage disposal sites
  - Uncontrolled storage of chemicals and fuels
  - Uncontrolled industrial and habitation development

PROTECTION ZONE

- No industrial outlets
  - No garbage disposal or storage of harmful materials
- Protection of the remaining part of the catchment, due to its size shall be the concern of the Provincial authorities.

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : SUKANEGERA Kab. : CIANJUR Water Demand : 10 l/s

A. GENERAL

1. Surface Water Source : Name : Cibalapulang hulu river

Intake in Desa : Sukanegara , Kampung : Pasirtulang

- Flow : Max (estimated) : 35 l/s

Min (estimated) : 20 l/s

2. Extraction : Pumping by PLN |  | or genset |  |, Gravity |x|

3. Catchment :

- Area : 2 - 3 km<sup>2</sup>

- Morphology : Middle - slope, dispersed hills

- Cover : Thick soil, weathered volcanics

- Present environmental conditions : Dense vegetation, tea plantation

- Sensitivity to pollution : Very sensitive due to the little size

B. POLLUTION POSSIBILITIES

1. At Intake : Polluted surface run-off entering the intake area

2. Surroundings: Polluted surface run-off entering the intake area

3. Catchment : Possible harmful, up-stream activity

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Intake : Sanitary zone, no polluting and unhygienical activity , Responsibility of : IKKs - unit (PDAM)

- Surroundings : No effluent outlets, no bathing and defecation 100 m up-stream , Responsibility of : Pemda, Perhutani

- Catchment : No excessive vegetation-cutting, no excessive use of chemicals and pesticides , Responsibility of : Pemda, Perhutani

2. Yield Protection : No space for other stream consumption , Responsibility of : Pemda

(See map overleaf)



51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix III.3.2

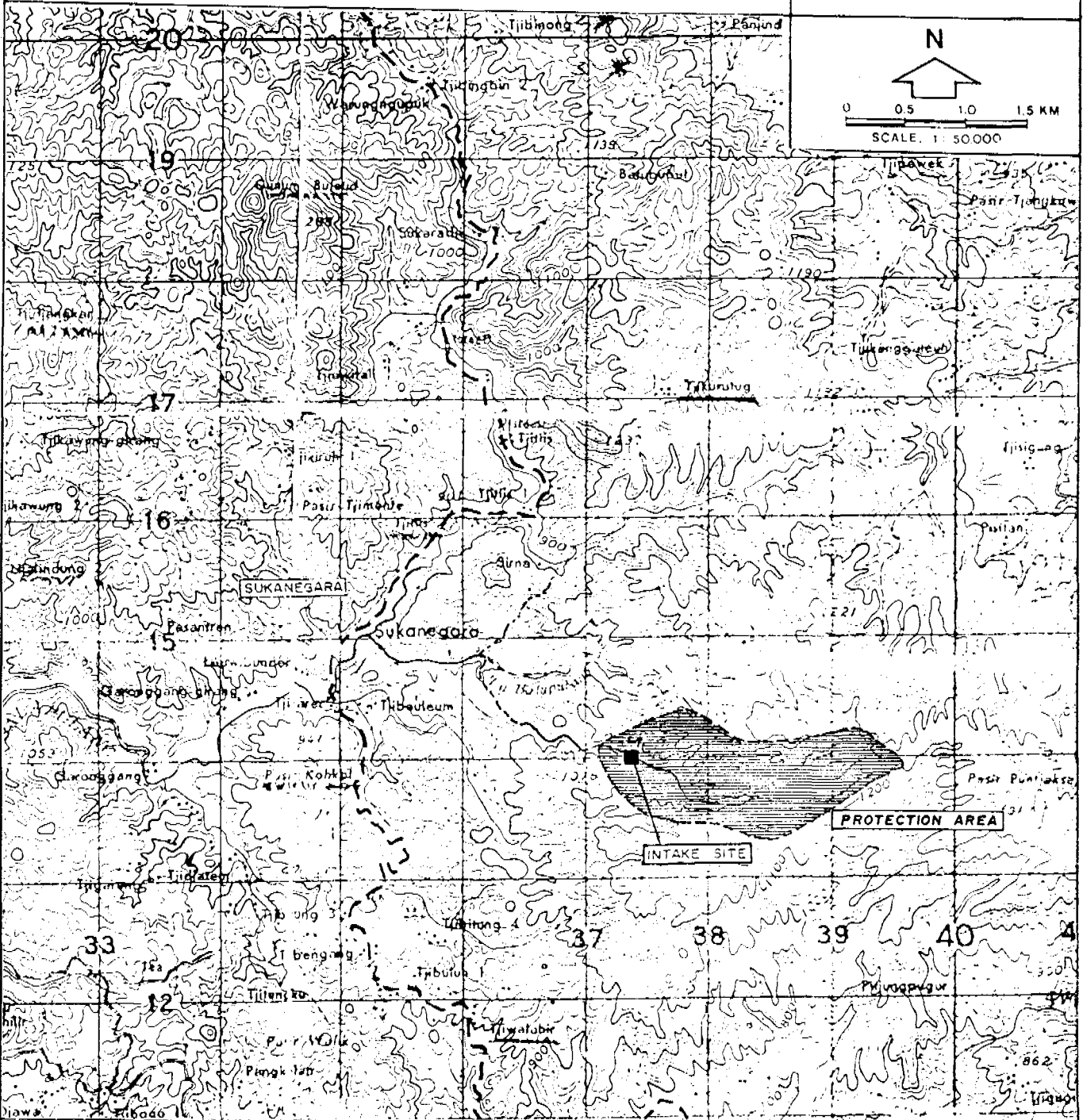
IKK : SUKANEGARA

KAB : CIANJUR

SOURCE TYPE : STREAM

LOCATION : PASIR TULANG

WATER RESOURCES PROTECTION SHEET



**NOTE**



**INTAKE SITE**

**CATCHMENT PROTECTION**



Catchment to be protected against :

- Deforestation
- Garbage disposal sites
- Uncontrolled storage of chemicals and fuels
- Uncontrolled industrial and habitation development

**PROTECTION ZONE**

- No industrial outlets
  - No garbage disposal or storage of harmful materials
- Protection of the remaining part of the catchment, due to its size shall be the concern of the Provincial authorities.

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : CIKALONG KULON Kab. : CIANJUR Water Demand : 20 l/s

A. GENERAL

1. Surface Water Source : Name : Cikundul river

Intake in Desa : Majalaya , Kampung : Majalaya

- Flow : Max (estimated) : 800 l/s

Min (estimated) : 700 l/s

2. Extraction : Pumping by PLN ;\_!\_ or genset ;\_!\_ , Gravity

3. Catchment :

- Area : 7 km<sup>2</sup>

- Morphology : Hilly to mountainous

- Cover : Volcanic materials

- Present environmental conditions : Spread habitation, forest, sawahs

- Sensitivity to pollution : Quite sensitive

B. POLLUTION POSSIBILITIES

1. At Intake : Inflow of nearby sawah waters

2. Surroundings: Waste-water run-off from nearby habitations

3. Catchment : Limited possibilities if unchanged land use

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Intake : Sanitary zone, proper design

\_\_\_\_\_ , Responsibility of : IKKs - unit (PDAM)

- Surroundings : No effluent outlets or bathing and defecation 100 m  
up-stream intake , Responsibility of : Camat, Pemda

- Catchment : No dumps of harmful materials up-streams, no  
deforestation , Responsibility of : Camat, Pemda

2. Yield Protection : Control of other water use up-streams

\_\_\_\_\_ , Responsibility of : Pemda

(See map overleaf)

# 51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix III.4.2

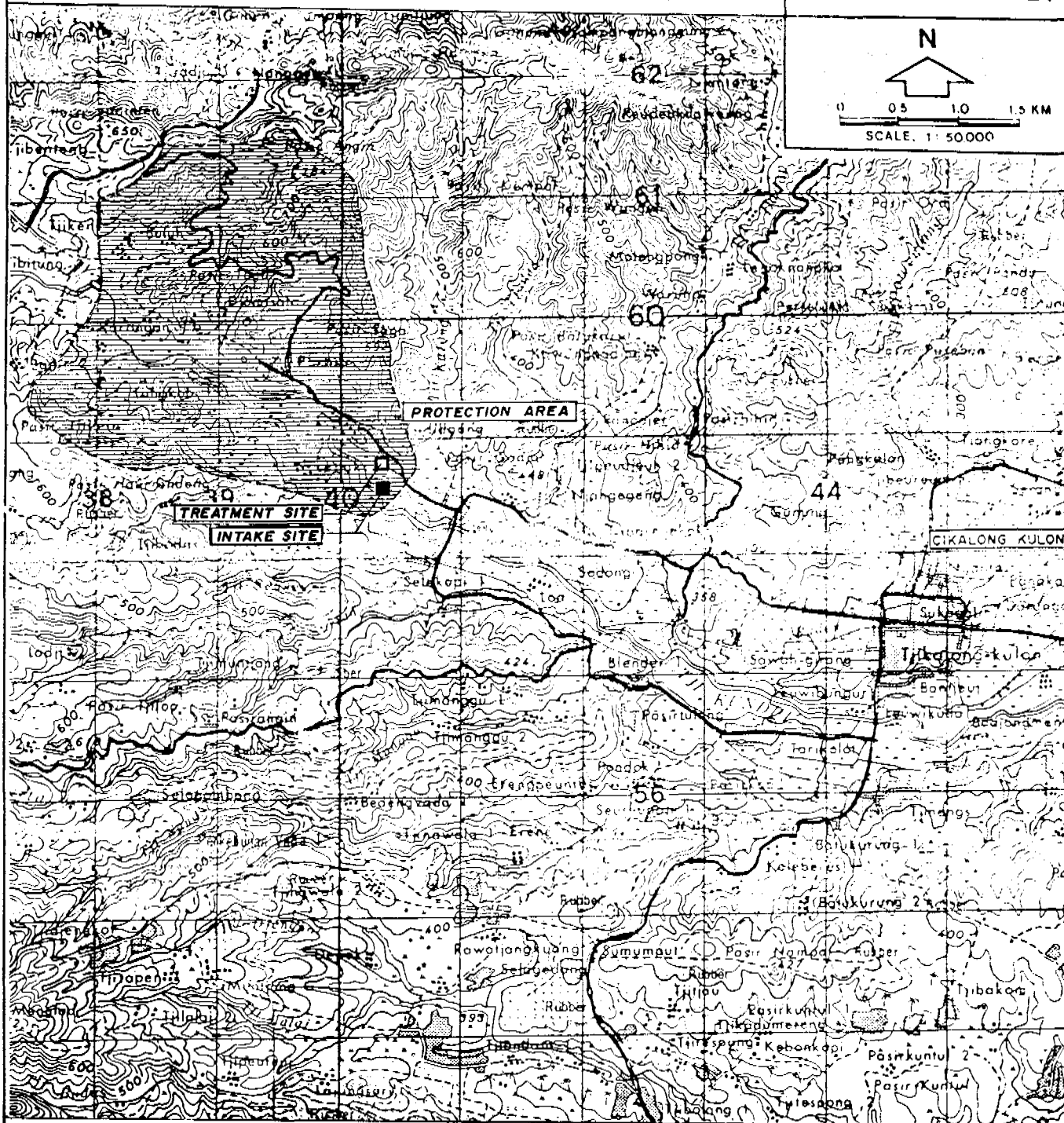
IKK : CIKALONG KULON

KAB : CIANJUR

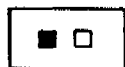
WATER RESOURCES  
PROTECTION SHEET

SOURCE TYPE : SURFACE WATER

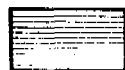
LOCATION : Ds. MAJALAYA



## NOTE



INTAKE / TREATMENT SITES



CATCHMENT PROTECTION

Catchment to be protected against :

- Deforestation
- Garbage disposal sites
- Uncontrolled storage of chemicals and fuels
- Uncontrolled industrial and habitation development

PROTECTION ZONE

- No industrial outlets
  - No garbage disposal or storage of harmful materials
- Protection of the remaining part of the catchment, due to its size shall be the concern of the Provincial authorities.

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : BATUJAYA Kab. : KARAWANG Water Demand : 20 l/s

A. GENERAL

1. Surface Water Source : Name : Citarum river + Tarum Timur

Intake in Desa : Telukkambulu , Kampung : Krajan-2

- Flow : Max (estimated) : - l/s (large, not influence to IKK demand)

Min (estimated) : - l/s

2. Extraction : Pumping by PLN |x| or genset |\_|, Gravity |\_|

3. Catchment :

- Area : Extensive

- Morphology : Varying from flat through hilly to mountainous

- Cover : Alluvial deposits, tertiary deposits, volcanic formations

- Present environmental conditions : Not vegetation agricultural, towns, villages, industries

- Sensitivity to pollution : Sensitive

B. POLLUTION POSSIBILITIES

1. At Intake : Limited compared with the pollution of the raw water

2. Surroundings : From nearby habitation

3. Catchment : Up-stream industrial effluents, waste disposal, town effluents agricultural activity

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Intake : Sanitary zone  
\_\_\_\_\_ , Responsibility of : IKKs - unit (PDAM)

- Surroundings : No effluent outlets or bathing and defecation 100 m up-stream intake , Responsibility of : Camat, Pemda

- Catchment : Control on Provincial and Regional level necessary for effective protection  
\_\_\_\_\_ , Responsibility of : Governor, Pemda

2. Yield Protection : No special control coordination with Pengairan necessary , Responsibility of : Pemda, Pengairan

(See map overleaf)

# 51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix III.5.2

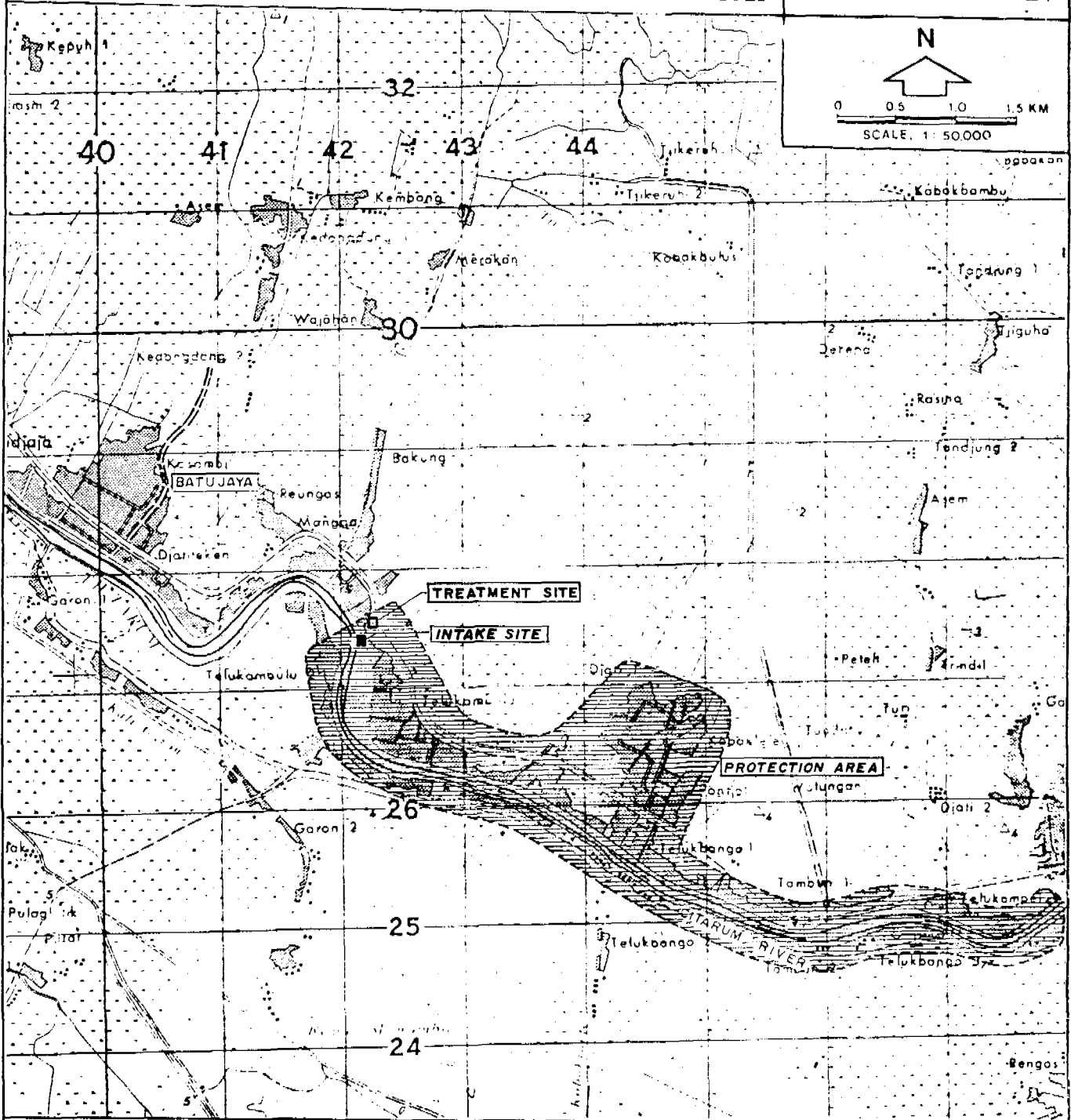
IKK : **BATUJAYA**

KAB : **KARAWANG**

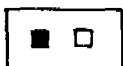
SOURCE TYPE : **SURFACE WATER**

LOCATION : **D. TELUK KAMBULU**

**WATER RESOURCES PROTECTION SHEET**



## NOTE



**INTAKE / TREATMENT SITES**

### CATCHMENT PROTECTION



Catchment to be protected against :

- Deforestation
- Garbage disposal sites
- Uncontrolled storage of chemicals and fuels
- Uncontrolled industrial and habitation development

### PROTECTION ZONE

- No industrial outlets
  - No garbage disposal or storage of harmful materials
- Protection of the remaining part of the catchment, due to its size shall be the concern of the Provincial authorities.



# 51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix III.6.2

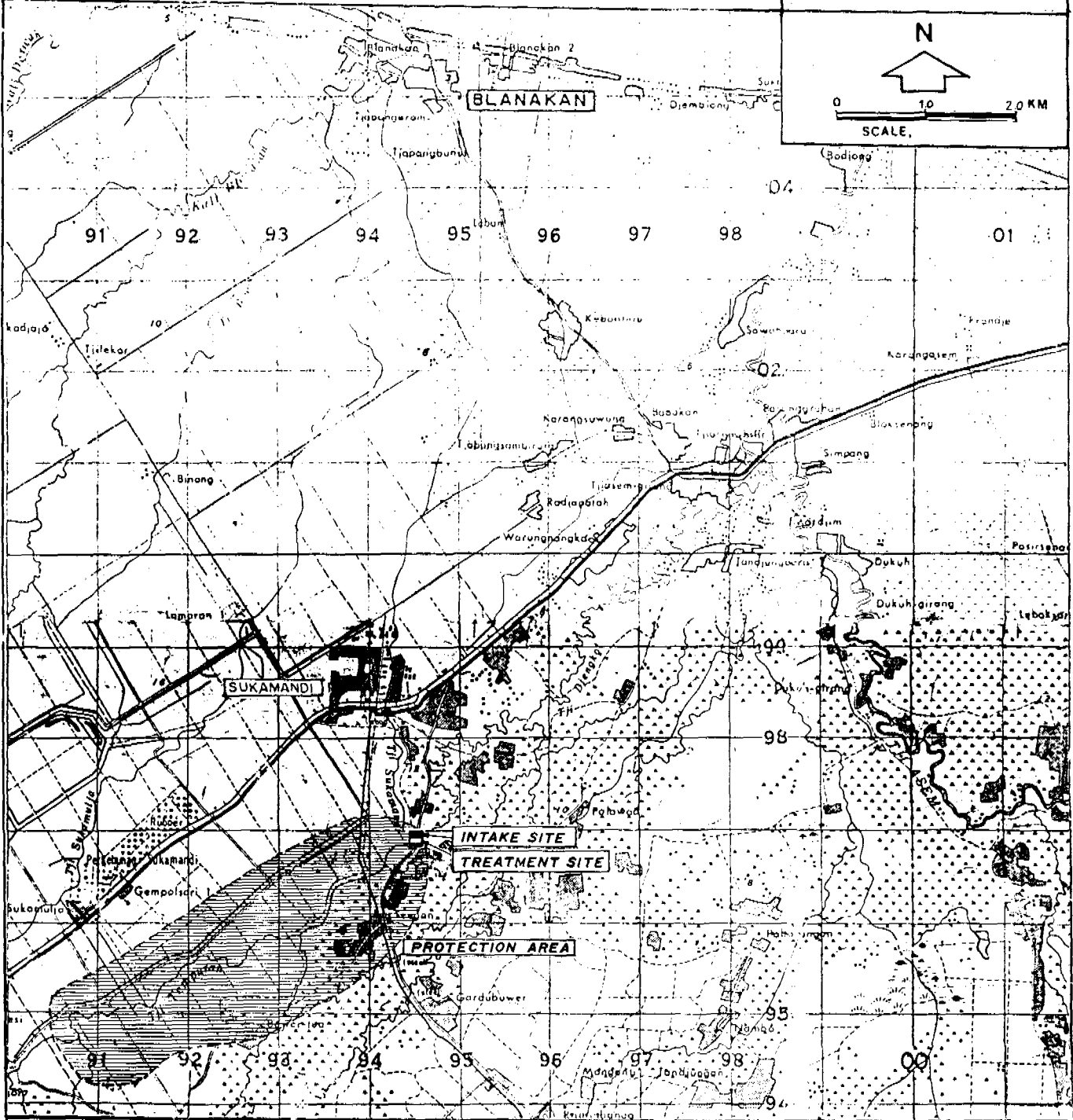
IKK : BLANAKAN

KAB : SUBANG

## WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SURFACE WATER

LOCATION : Ds. SUKAMANDI



### NOTE



INTAKE AND TREATMENT SITES

#### CATCHMENT PROTECTION



Catchment to be protected against :

- Deforestation
- Garbage disposal sites
- Uncontrolled storage of chemicals and fuels
- Uncontrolled industrial and habitation development

#### PROTECTION ZONE

- No industrial outlets
- No garbage disposal or storage of harmful materials

Protection of the remaining part of the catchment, due to its size shall be the concern of the Provincial authorities.

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : WADO Kab. : SUMEDANG Water Demand : 20 l/s

=====

A. GENERAL

1. Surface Water Source : Name : Cimanuk river

Intake in Desa : Cikareo , Kampung : Cikareo hilir

- Flow : Max (estimated) : - l/s (sufficient, not influence with IKKs demand)

Min (estimated) : - l/s

2. Extraction : Pumping by PLN |x| or genset |\_!|, Gravity |\_!

3. Catchment :

- Area : 8.5 km<sup>2</sup>

- Morphology : Hilly to mountaneous

- Cover : Varying from alluvium to volcanic deposits

- Present environmental conditions : Towns., village, plantation, forests agricultural

- Sensitivity to pollution : Sensitive

B. POLLUTION POSSIBILITIES

1. At Intake : Limited compared to the pollution of the raw water

2. Surroundings: Pollution from nearby up-stream habitation activity

3. Catchment : Up-stream pollution by industrial effluents, waste disposal agricultural activity

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Intake : Sanitary zone, proper design  
\_\_\_\_\_, Responsibility of : IKKs - unit (PDAM)

- Surroundings : No sewerage or industrial effluent outlets 2 km upstreams, no defecation 200 m up-stream  
\_\_\_\_\_, Responsibility of : Camat, Pemda

- Catchment : Control on the Provincial and Regional level needed  
\_\_\_\_\_, Responsibility of : Governor, Pemda

2. Yield Protection : No special protection needed, coordination with Pengairan  
\_\_\_\_\_, Responsibility of : Pemda, Pengairan

(See map overleaf)

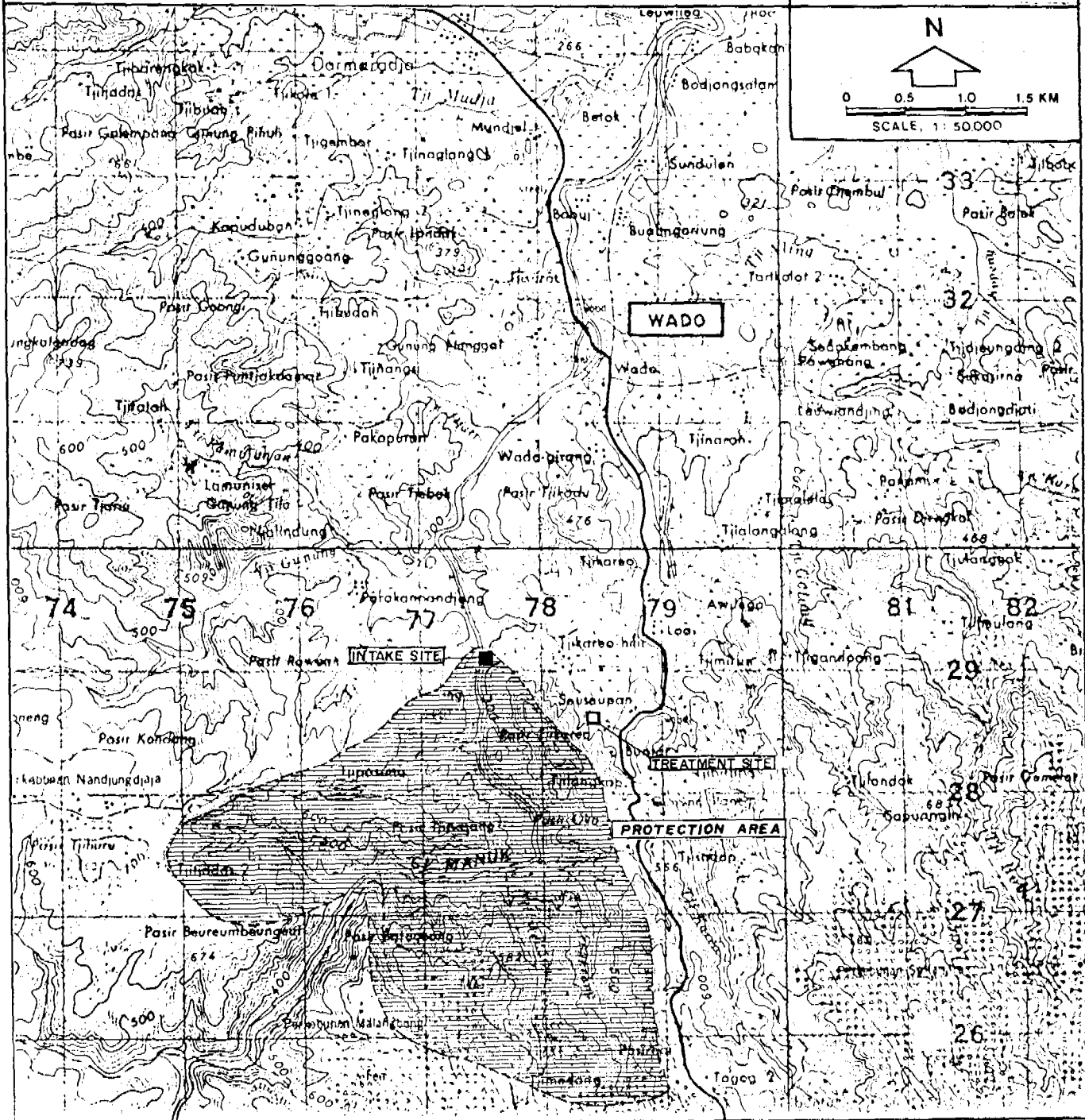


IKK : WADO

KAB : SUMEDANG

WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SURFACE WATER LOCATION :



**NOTE**



INTAKE / TREATMENT SITES

CATCHMENT PROTECTION



- Catchment to be protected against :
- Deforestation
  - Garbage disposal sites
  - Uncontrolled storage of chemicals and fuels
  - Uncontrolled industrial and habitation development

PROTECTION ZONE

- No industrial outlets
  - No garbage disposal or storage of harmful materials
- Protection of the remaining part of the catchment, due to its size shall be the concern of the Provincial authorities.

WATER RESOURCES PROTECTION  
PRESENTATION OF ENVIRONMENTAL INFORMATION - PIL

IKK : TOMO & UJUNG JAYA Kab. : SUMEDANG Water Demand : 15 + 5 l/s  
=====

A. GENERAL

1. Surface Water Source : Name : Cimanuk river  
Intake in Desa : Tomo , Kampung : \_\_\_\_\_

- Flow : Max (estimated) : \_\_\_\_\_ l/s } (sufficient, not influence with IKKs  
Min (estimated) : \_\_\_\_\_ l/s } demand)

2. Extraction : Pumping by PLN  or genset  , Gravity

3. Catchment :

- Area : 5 km<sup>2</sup>
- Morphology : Hilly to mountaineous
- Cover : Tertiary deposits, young and old volcanics
- Present environmental conditions : Agricultural natural land, towns, villages
- Sensitivity to pollution : Sensitive

B. POLLUTION POSSIBILITIES

- 1. At Intake : Limited compared to the pollution of the river
- 2. Surroundings : Pollution from nearby up-stream habitation activity
- 3. Catchment : Up-stream polluted industrial effluents, waste disposal, town effluents, agricultural activity

C. PROTECTION RECOMENDATION

1. Environmental Protection

- Intake : Sanitary zone  
\_\_\_\_\_ , Responsibility of : IKKs - unit (PDAM)
- Surroundings : No effluent outlets 2 km up-stream, no defecation and washing 200 m up-stream  
\_\_\_\_\_ , Responsibility of : Camat, Pemda
- Catchment : Control on Provincial and Regional level with water quality. Warning system !?  
\_\_\_\_\_ , Responsibility of : Governor, Pemda

2. Yield Protection : No special protection needed, coordination with Pengairan , Responsibility of : Pemda, Pengairan

# 51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix III.8.2

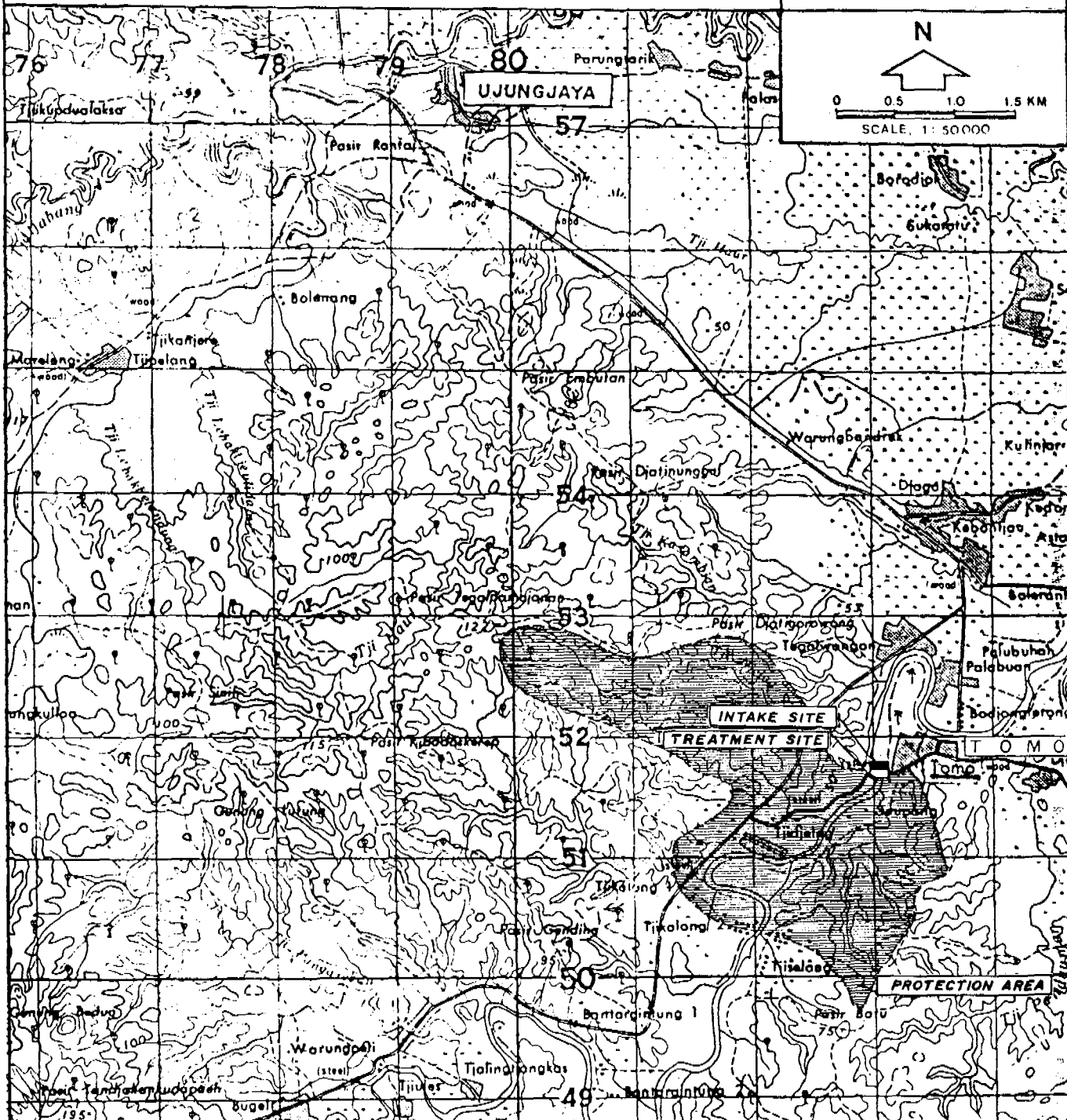
IKK : TOMO & UJUNG JAYA

KAB : SUMEDANG

## WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SURFACE WATER

LOCATION :



### NOTE



**INTAKE AND TREATMENT SITES**



**CATCHMENT PROTECTION**

- Catchment to be protected against :
- Deforestation
  - Garbage disposal sites
  - Uncontrolled storage of chemicals and fuels
  - Uncontrolled industrial and habitation development

**PROTECTION ZONE**

- No industrial outlets
  - No garbage disposal or storage of harmful materials
- Protection of the remaining part of the catchment, due to its size shall be the concern of the Provincial authorities.

51 IKK WATER SUPPLY SECTOR PROJECT IN WEST JAVA

Appendix III.8.3

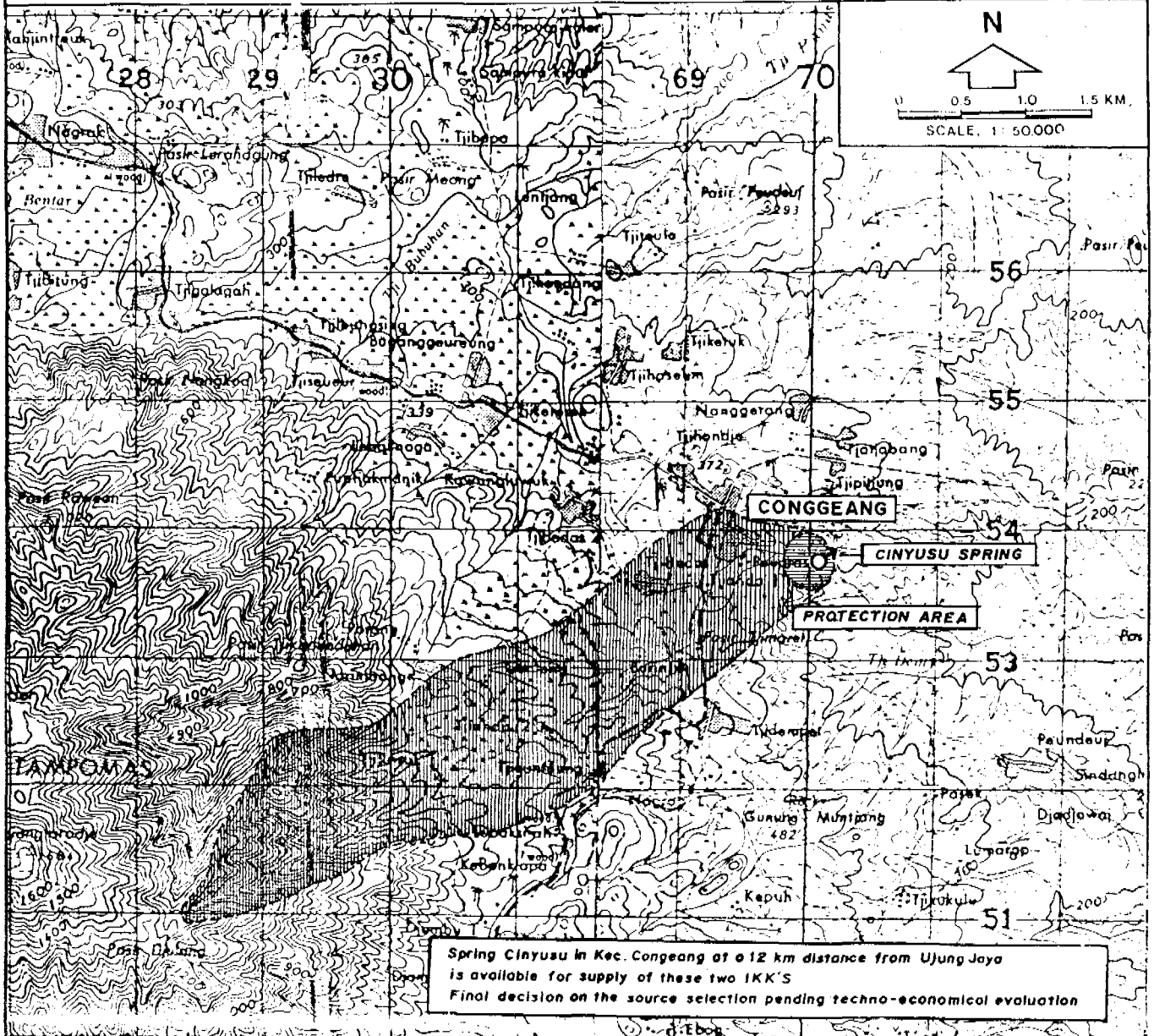
IKK : TOMO & UJUNGJAYA

KAB : SUMEDANG

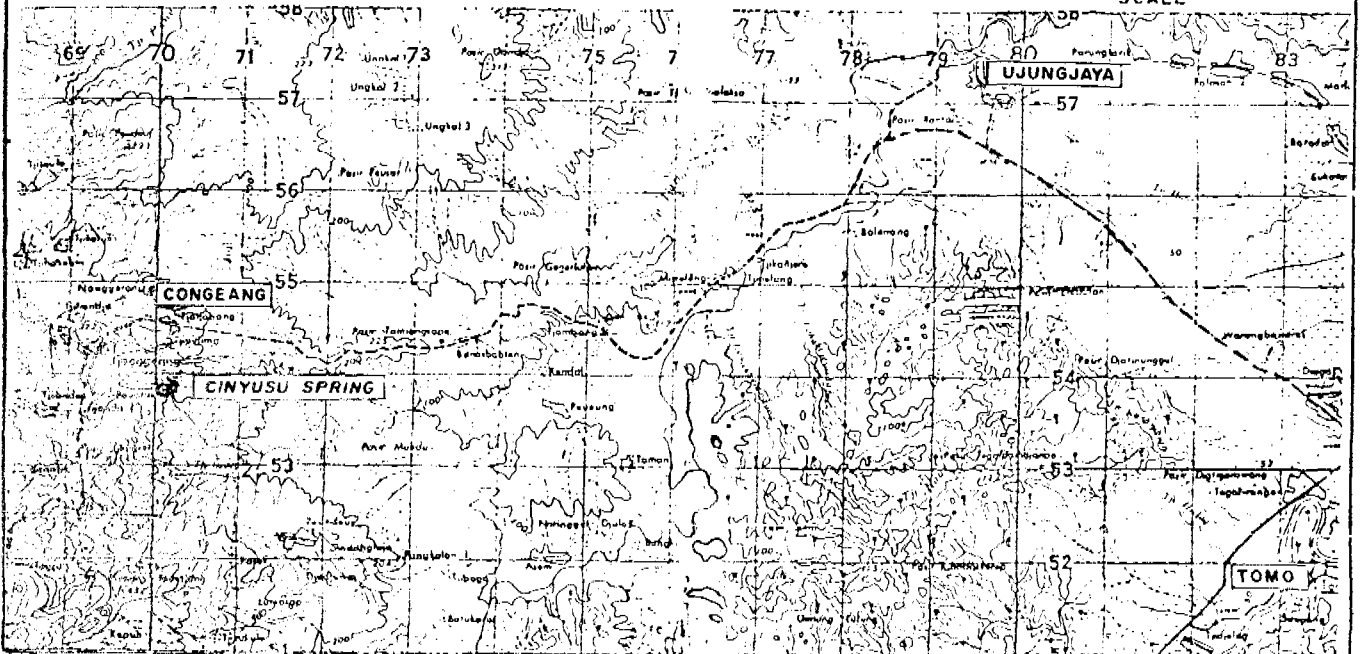
WATER RESOURCES PROTECTION SHEET

SOURCE TYPE : SPRING

LOCATION : KEC. CONGGEANG



INDEX MAP



APPENDIX IV

Water Resources Protection Summary Sheets

GENERAL INFORMATION

## APPENDIX IV

### Water Resources Protection Summary Sheets

#### GENERAL INFORMATION

	Appendix
1. Kab. Serang	IV.1
2. Kab. Lebak	IV.2
3. Kab. Sukabumi	IV.2
4. Kab. Cianjur	IV.3
5. Kab. Karawang	IV.3
6. Kab. Subang	IV.4
7. Kab. Sumedang	IV.5
8. Kab. Tasikmalaya	IV.6
9. Kab. Garut	IV.7

WATER RESOURCES PROTECTION - KAB. SERANG

NO.	I K K	DEMAND L/S	SOURCE	Y I E L D SPRINGS : MIN - MAX BOREHOLES : RECOMMENDED SURF. WAT : MIN	GEOLOGICAL AND ENVIRONMENTAL SETTING	ENVIRONMENTAL PROBLEMS	RESOURCE PROBLEMS	PROTECTIVE MEASURES NEEDED		ACTION
								TECHNICAL	LEGISLATIVE	
1	Padarincang	10	Cirahab Lege spring	44 - 95	Gravity spring flowing from young volcanics. Low morphology. Spring surrounded by sawah.	Surface run-off from sawahs may enter the spring	Control with other consump- tion of water conflicting with IKKs demand	Protection against sur- face run-off	1) Water rights. 2) No dumping of harm- ful wastes in the catchment area	1) Appropriate design 2) By laws
2	Kasemen	5	1 deep well (90 m)	10	Flat area. Sawah. Borehole exploits deep- seated (30-80 m) aqui- fers.	No immediate problems. Future protection needed  Possibility of saline water at over pumping	Protection aga- inst a nearby exploitation by third party needed	Sanitary zone around the well head (5 m radius)  Frequent qual- ity control	1) No dumps of harmful material within a radius of 1 km 2) No other deep wells within a radius of 1 km	1) By laws 2) "
3	Kragilen	10	1 deep well (70 and 90 m)	10	Idem	Idem	Idem	Idem	Idem	Idem
4	Halentaka	5	1 deep well (110 m)	10	Flat area. Sawah and a nearby kampung. Exploi- ting medium deep (20 - 40 m) and deep (60 - 100 m) aquifers	Possibility of pollution through surface infiltra- tion to the medi- um deep aquifer	Idem	Sanitary zone around the well (5 m radi- us)	1) No latrines, stores of fertilizers etc in a zone of 50 m radius 2) No other deep wells within a radius of 500 m, without assessment of impact on the well.	By laws on (1) and (2)
5	Panarayan	10	1 deep well (150 m)	10	Flat bottom of alluvial valley. Sawah. Exploiting medium (30 - 40) and deep (90 - 150 m) aquifers	No immediate problems. About 15 m of clay abo- ve the medium aquifer	Idem	Sanitary zone around the well head (5 m radius)	1) No dumps of harmful material within a radius of 500 m 2) No other deep wells within a distance of 1 km	Idem
6	Cionas	5	1 deep well (100 m)	<100	Dissected slopes of the Karawang volcano. Scarcely populated.	No immediate problems. Future catchment protec- tion needed.	Protection aga- inst nearby exploitation	Sanitary zone of 5 m radius around the well head	1) No harmful dumping within a radius of 500 m. 2) No other wells within 500 m radius.	Idem
7	Pabuaran	5	1 deep well (100 m)	Common with Cionas	Idem	Idem	Idem	Idem	Idem	Idem

WATER RESOURCES PROTECTION - KAB. LEBAK AND SUKABUMI

NO.	I K K	DEMAND L/S	SOURCE	YIELD SPRINGS : MIN - MAX BURHOLES : RECOMMENDED SUMMARY : MIN	GEOLOGICAL AND ENVIRONMENTAL SETTING	ENVIRONMENTAL PROBLEMS	RESOURCE PROBLEMS	PROTECTIVE MEASURES NEEDED		ACTION
								TECHNICAL	LEGISLATIVE	
<u>LEBAK</u>										
1	Warung Gunung	5	1 deep well	5	Gently sloping young volcanics. Saugh. Exploiting deep (150 - 120 m) aquifers.	(Pesticides, harmful chemicals - infiltration)	Protection against a nearby exploitation by third party needed	Sanitary zone of 5 m radius around the well.	1) No dumps of harmful material within a distance of 1 km 2) No other deep wells within a distance of 1000 m	By-laws on (1) and (2)
<u>SUKABUMI</u>										
1	Warung Kiara	10	Cikoneng	20 (fixed by PLTA-Ubrug flow distribution opening)	Southern Mountains Tertiary Formations. Impounded reservoir for hydropower	No immediate problems. Possibility for pollution by upstream activities	No special measures necessary apart of firm commitment by the PLTA	Current quality control	1) Water rights. 2) Control of third parties upstream activities	By-laws on water rights and control of upstream activities (1 and 2).
2	Cikembar	10	Ubrug Dan							
3	Kalopenunggal	10	Kiara Rugrug Spring	9 - 36	Hilly, young volcanics. Located midlope and surrounded by small saughs and natural vegetation.	Surface run-off from saugh	No spare flow for other use than this project.	Idem	1) No dumps of harmful materials. 2) Controlled changes of land use	- Appropriate design - By-laws on water rights
4	Cisolok	10	Cikahuripan Wangun Spring	7-16	Central Mountains Volcanics and sediments. Old rubber plantations.	None except surface run-off entering the intake	No spare flow for other use than this project.	Idem	Idem	- Appropriate design - By-laws on water rights
5	Nagrak	5	Cilemped Spring	7 - 19	Hilly, young volcanics. Located midlope. Minly saughs. Immediate environment natural vegetation.	No immediate problems except surface run-off	Idem	Idem	Idem	Idem
6	Gegerbitung	10	Cimandiri River	50	Hilly Old Volcanics	Possible up-stream pollution	None but no space for excessive up-stream consumption	Idem	Water rights. Control of third parties upstream activities	By-laws on water rights and control of upstream activities



WATER RESOURCES PROTECTION - KAB. CIANJUR AND KAB. KARAWANG

NO.	I K K	DEMAND L/S	SOURCE	YIELD SPRINGS : MIN - MAX BOREHOLES : RECOMMENDED SURF. WAT : MIN.	GEOLOGICAL AND ENVIRONMENTAL SETTING	ENVIRONMENTAL PROBLEMS	RESOURCE PROBLEMS	PROTECTIVE MEASURES NEEDED		ACTION
								TECHNICAL	LEGISLATIVE	
CIANJUR										
1	Sukenegara	5	Cibalapulang river	20 - 35	Old volcanic within dispersed hills. Dense vegetation and tea plantation	Limited, except possibility of harmful upstream activity.	None but no space for excessive upstream consumption	No space for other stream consumption	Water rights. Control at upstream activities.	By-laws for 1. Water rights 2. Control of upstream activities
2	Harung Kondang	10	Tegallega Spring	60 - 125	Gravity spring flowing from young volcanics. Tea plantation and wooded areas.	Surface water may enter the capturing.	Idem	Protect against surface run-off entering the capturing	1) Water right. Controlled future development. 2) Controlled future development.	Appropriate design. By-laws on water rights.
3	Bojong Picung	5	1 deep well	3	Flat area. Sawah. Borehole exploits deep-seated (37-80 m) aquifers.	No immediate problems. Future protection needed	Protection against a nearby exploitation by third party needed	Sanitary zone around the well head (5 m radius)	1) No dumps of harmful material within a radius of 1 km 2) No other deep wells within a radius of 500 m	By laws for both (1) and (2)
4	Cikslong Kulon	20	Cikundul River	> 100	The river flow in hilly areal, young volcanics.	Protection against pollution by third party (industries, etc)	None	Limited possibilities if unchanged land use	1) Water rights 2) Control of third parties activities along the river	By laws on (1) and (2)
KARAWANG										
1	Pangkalan	5	Ciburial Spring	30 - 65	Spring flow from limestone formation (karst)	May be influenced by hazardous dumping in the catchment	Limited space for other consumption then the present project	Surface run-off entering the capturing. Flooding by river	1) Water rights 2) Control of activities within the catchment	Idem
2	Batujaya	20	Citarum River and North Tarum irrigation canal	> 2.000	Alluvial plain close to the sea coast	River pollution (intakes for drinking water supply exist higher upstream)	None	Control on Provincial and Regional level necessary for effective protection	1) Water rights 2) Control of third parties activities along the river	(1) By-laws (2) Coordinate with the protective measures for exist Rangkas bentang intake
3	Lenahabang	20	2 deep wells	10 + 10	Flat area, composed of alluvial formations. Sawah and nearby habitation.	No immediate problems. About 30 m of clay and clayey sand above aquifers. Possibility of saline water at prolonged over exploitation	None	Sanitary zone around the well (5 m radius). Frequent quality control	1) No dumps of harmful materials within a radius of 0,5 km 2) No other deep wells within a distance of 500 m	By laws on (1) and (2)

WATER RESOURCES PROTECTION - KAB. SUBANG

NO.	I K K	DEMAND L/S	SOURCE	Y I E L D SPRINGS : MIN - MAX BOREHOLES : RECOMMENDED SURF. WAT : MIN.	GEOLOGICAL AND ENVIRONMENTAL SETTING	ENVIRONMENTAL PROBLEMS	RESOURCE PROBLEMS	PROTECTIVE MEASURES NEEDED		A C T I O N
								TECHNICAL	LEGISLATIVE	
1	Sagalahaerang	10	Common syst. Cileuleuy spring	200 - 500	Nothern slopes of Tang- kuban Perahu (young volcanics). Mixture of wooded slopes, sawahs and habitation	None Watershed protec- tion advisable	Control with other consump- tion of water complicating with IPKS demand	Against surface run- off entering the intake.	(1) Water rights (2) Watershed protec- tion against harmfull dumping	Appropriate design  By laws on (1) and (2)
4	Binong	10	2 deep wells	5 + 5	Alluvial deposits. Extensive sawahs and habitation. Extensive clay layers above the aquifers	None	Protection aga- inst over ex- ploitation of the aquifer	Sanitary zone of 5 m radius around well- head	No other deep wells within a distance of 1000 m from the project wells	By laws against over ex- ploitation.
5	Kalijati	10	2 deep wells (1 exist. and 1 to be drill- led)	5 + 5	Idem	Idem	Idem	Idem	Idem	Idem
6	Compreng	10	Idem	5 + 5	Idem Artesian conditions	Possibility of saline water of over exploitation	Idem	Frequent qua- lity and yield control	Idem	Idem
7	Blanakan	20	Main irrig. canal (Cijengkol Gate)	20	Nothern alluvial plains Water from Jatiluhur reservoir on the Cita- run.	Possibility of upstream polluti- on	Assurance of water flow du- ring the yearly maintenance	Frequent qua- lity control	(1) Control of third parties upstream activities (2) Water rights	- Operation ins- tructions - By laws on (1) and (2)
8	Cipunegara	10	3 medium deep (50 - 60 m) (1 exist. 2 to be drill- led)	3 + 3 + 4	Nothern alluvial plains. Extensive sawah fields. Aquifer protec- ted by 5 - 7 m thick clay layer	Possibility of fertilizer and pesticide infil- tration (minized by the clay layer)	Limited aquifer potential. Protection aga- inst third par- ty exploitation necessary.	Sanitary zone of 5 m radius around the well head	No other deep well exploitation of the aquifer at a distance of 1000 m from the wells	- Appropriate design - By laws against overexploitation

WATER RESOURCES PROTECTION - KAB. SUMEDANG

NO.	I K K	DEMAND L/S	SOURCE	Y I E L D SPRINGS : MIN - MAX BOREHOLES : RECOMMENDED SURF. WAT : MIN.	GEOLOGICAL AND ENVIRONMENTAL SETTING	ENVIRONMENTAL PROBLEMS	RESOURCE PROBLEMS	PROTECTIVE MEASURES NEEDED		ACTION
								TECHNICAL	LEGISLATIVE	
1	Cimalaka	20	Deep wells (under exe- cution)	<10 + 10>	Young volcanics (Brec- cia tuff and lava flows) on slope of Tam- ponas mount					
2	Situraja	10	Cicireang spring	100 - 380	Spring flowing from young volcanics lava flow, hilly morphology	None	None	Surface water run-off	Water rights	- Appropriate design - Bylaw on water rights
3	Paseh	20	1 deep well	20	Young volcanics on the slope of Tampomas vol- cano. Borehole exploits 40 - 60 m deep aquifer, mainly fissured lava flow.	None protection of upstream catchment reco- mmended	Protection aga- inst over ex- ploitation	Sanitary zone of 5 m radius around well head	No other deep wells within a distance of 1000 m from the project well	By laws on (1) and (2)
4	Hado	10	Cimanuk river	> 2.000	Flat area underlain by Old Volcanics	Possibility of upstream pollu- tion	None	None	1) Water rights 2) Control of upstream activities	By laws on (1) and (2)
5	Tomo	5	Cimanuk river	> 2.000						
6	Ujung Jaya	20	Cimanuk river (*)		Flat area underlain by tertiary deposits	Idem	None	Idem	Idem	Idem

\* Spring Cinyusu in Kec. Congeang at a 12 km distance from Ujung Jaya is available for supply of these two IKK'S (Ujung Jaya and Tomo)  
Final decision on the source selection pending techno-economical evaluation

WATER RESOURCES PROTECTION - KAB. TASIKMALAYA

NO.	I D E K	DEMAND L/S	SOURCE	Y I E L D SPRINGS : MIN - MAX BOREHOLES : RECOMMENDED SURF. INT. : MIN.	GEOLOGICAL AND ENVIRONMENTAL SETTING	ENVIRONMENTAL PROBLEMS	RESOURCE PROBLEMS	PROTECTIVE MEASURES NEEDED		ACTION
								TECHNICAL	LEGISLATIVE	
1	Cikalong	10	Cicayur spring and shallow alluvial aquifer	1 - 50 (spring) 2 - 3 (Shallow Borehole)	Hilly limestone area wooded with some sawah. Flat padi field and habitation	Rapid infiltration. Limited protective cover.	Large yield fluctuations (~100 l/s - 1 l/s)	- Protect against surface water inflow - Frequent quality control - Control of catchment area	No dumps of harmful material in the catchment areas	- Appropriate design - By-laws on catchment control - Operation instructions
2	Pagerageung		Cipanyusupan Spring	9 - 30	Gravity spring flowing from young volcanics on Mount slope. Surrounded by forrest.	Surface run-off from upper part may enter the intake structure	None	- Protect against surface water inflow	1) Water rights 2) No storage of harmful material.	- Appropriate design - By-laws on water rights
3	Lewisari	10	Cikebon Spring	11 - 27	The spring is one of Cipondok the complex spring used for Tasikmalaya Water supply. Flowing from Young Volcanic breccia in hilly area on a mountain slope.	Idem	None	Idem	Uncontrolled land use and no dump sites	Idem
4	Cibalong	5	Cigelep spring	10 - 28	Spring from limestone formation in the Southern Mountain Range.	- Surface runoff - Sensitive for catchment pollution	None but no space for third party exploitation	- Protect against surface water inflow - Frequent quality control - Control of catchment area activities	1) Water rights 2) No harmful dumps in the catchment area	By laws on (1) and (2)
5	Kawalu	20	Tapping from BNA Tasikmalaya	20	Original intake : Spring in young volcanic area	None	None	Covered by the existing protective measures and regulations.		Coordination with the BNA

WATER RESOURCES PROTECTION - KAB. GARUT

NO.	I K K	DEMAND L/25	SOURCE	W I D L D SPRINGS : MIN - MAX BOREHOLES : RECOMMENDED SURF. WAT : MIN.	GEOLOGICAL AND ENVIRONMENTAL SETTING	ENVIRONMENTAL PROBLEMS	RESOURCE PROBLEMS	PROTECTIVE MEASURES NEEDED		ACTION
								TECHNICAL	LEGISLATIVE	
1	Karang Pawitan	20	2 Deep wells of which 1 is artesian	10 + 20	Hilly young volcanics, northern slope of Kratjak and Telagabodas volcanos.	Catchment protec- tion recommended	Protection against over exploitation by third parties	Sanitary zone around well-head 5 m radius Proper drainage of well-head area	1) No other deep wells within 500 m radius 2) No dumps of harmful materials with in 500 m radius 3) No binding promises of the overflow yield for other purposes	By laws on (1) and (2)
2	Cisurupan	10	2 Deep wells	(5 + 5)	Young Volcanics valley between Papandayan and Cikurey volcanos.	Catchment protec- tion recommended	Protection against over exploitation by	Sanitary zone around well head, 5 m radius	1) No other deep wells within 500 m radius 2) No dumps of harmful materials controlled development 3) No binding promises of the overflow yield for other purposes	Idem
3	Banyuresni	10	1 artesian deep well	20	Flat area of young volcanics and alluvium of the Garut intern mountain basin.	No uncontrolled development	Protection against over exploitation by third parties	Sanitary zone around the well head, 5 m radius Proper drainage	1) No other deep wells within 500 m radius 2) No binding promises of the overflow yield for other purposes	Idem
4	Luwigoong	10	Tapping from Banyuresni		Idem			So above under Banyuresni		

Note :

yield in bracket are estimated value