添付資料 5.4　Minutes of Discussions
(July 31, 2003)

REPUBIC OF MACEDONIA
MINISTRY OF TRANSPORT AND COMMUNICATIONS
-Department for Housing - Communal Works and Infrastructure-

Our number: 18-
Date: 31.07.2003

To **Mr. Keiichi MURAOKA**
Leader
Basic Design Study Team
JICA

Dear Sir,

I have herein acknowledged your letter dated July 31, 2003 and have confirmed the contents of the attachment of the letter.

Yours Faitfully,

Ministry of transport and communications
HEAD OF DEPARTMENT
Goce Stankoski

July 31, 2003

Mr. Goce Stankoski
Head of Department for Housing Communal Works and Infrastructure
Ministry of Transport and Communications

Dear Mr. Stankoski,

I have the honor to refer to our recent discussions regarding the Project for Improvement of Water Supply in Inhabited Places in Skopje Outskirts (hereinafter referred to as "the Project").

In March and May 2003, Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched Basic Design Study Teams on the Project to the Former Yugoslav Republic of Macedonia (hereinafter referred to as "Macedonia"), and through discussion, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the study.

In order to explain and to consult with Macedonia on the components of the draft report, JICA sent to Macedonia the Draft Report Explanation Team (hereinafter referred to as "the Team"), headed by myself from July 28 to August 7, 2003.

In the course of discussions, I believe that the main items described on the attached sheets have been confirmed.

On behalf of all the members of the Team, I wish to express my sincere appreciation to the officials concerned of your government for their kind assistance and close cooperation extended to the Team.
I hope that the Project will contribute to the enhancement of friendly relations between our two countries.

Yours Sincerely,

Keiichi MURAOKA
Leader
Basic Design Study Team
JICA

ATTACHMENT

1. Components of the Draft Report

The Government of Macedonia agreed and accepted in principle the components of the draft report explained by the Team.

2. Minutes of Discussions (27 March, 2003 and 12 June 2003)

Both sides read and confirmed again all the contents of the previous Minutes of Discussions, one on the first field survey of 27 March 2003 and another on the second field survey of 12 June 2003..

3. Japan's Grant Aid Scheme

The Macedonian side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Macedonia as explained by the Team and described in Annex-3 of the Minutes of Discussions signed by both parties on 27 March, 2003.

4. Schedule of the Study

JICA will complete the final report in accordance with the items confirmed and send it to Macedonia around September 2003.

5. Other Relevant Issues

The following issues were discussed and confirmed by both sides.

(1) Components of the Project

Both sides agreed that the Project components would be construction of 9 water supply systems in 21 settlements of 7 municipalities (Cucer Sandevo, Cair, Ilinden, Gazi Baba, Petrovec, Studenicani and Zalenikovo). The systems and the target settlements are listed in ANNEX-1.

(2) Components for Radisani in Cair

MTC explained that as to Radisani in Cair has terminated the construction contract including procurement of pump and installation of pipeline, which were duplicated with the contents of request to Japan's Grant Aid, as shown in ANNEX-2.

Both sides confirmed that the procurement of pump and installation of pipeline would be included in the Project.

(3) Necessary administrative measures for construction

MTC assured the Team to complete necessary administrative measures for construction as follows and to report the result to JICA Austria Office in writing by early October 2003.

1) All the municipalities:
   To complete necessary procedure for Environmental Impact Assessment (EIA) and construction permission
2) Radisani in Cair:
   To pass the review of the technical document (T/D) by Skopje PE
3) Zelenikovo:
   To get agreement of using water supply with Skopje PE
4) Studenicani:
   To get approval of using water resources by Ministry of Agriculture (water right)

(4) Construction schedule conducted by the Municipalities respectively

Both sides confirmed that the construction schedules conducted by the Municipalities are as follows.

- Cair in Radisani:
  To complete two reservoirs by August 2003
  To complete primary pipeline (approx. 600m) by August 2003
- Gazi Baba, Ilinden, Petrovec:
  To complete primary pipeline by December 2003

Both sides agreed that the construction work should be completed according to the schedule in order to avoid delay of construction under the Project and each Municipality shall take responsibility for completion of construction with necessary promotion and support by MTC.

(5) Operation, maintenance and management of water supply system

9 water supply systems which will be constructed under the Project would be operated, maintained and managed by 5 public enterprises (PE) of Cucer Sandevo, Skopje, Ilinden, Studenicani and Zelenikovo. The Macedonian side promised that each PE shall make every effort for proper management of the systems.

The Team recommended that as for Studenicani PE and Zelenikovo PE, it was necessary to get technical guidance and support from Skopje PE about proper management of water supply system since both PE did not have enough experience. The Macedonian side promised that MTC would coordinate between experienced PEs and two PEs so that the proper management would be possible, taking into consideration with supplier-user relation of water.

(6) Recruitment of necessary personnel

For proper management of the water supply systems constructed under the Project, assignment of necessary personnel is required as follows:

- Cucer Sandevo PE: three personnel (two operators, one technician)
- Ilinden PE : four personnel (three operators, one technician)
- Zelenikovo PE : one personnel (one operator)
- Studenicani PE : two personnel (one operator, one technician)

The Macedonian side understood that each municipality and PE should recruit necessary number of

personnel until the end of August 2005.

(7) Mitigation of Negative Environmental Impact

The Team explained that the negative environmental impact caused by the increase of wastewater after the Project should be overcome by the effort of Macedonian side. The Macedonian side is well aware about the matter and has committed to take necessary measures to promote construction of wastewater treatment system.

(8) Budgetary arrangement of the Macedonian side

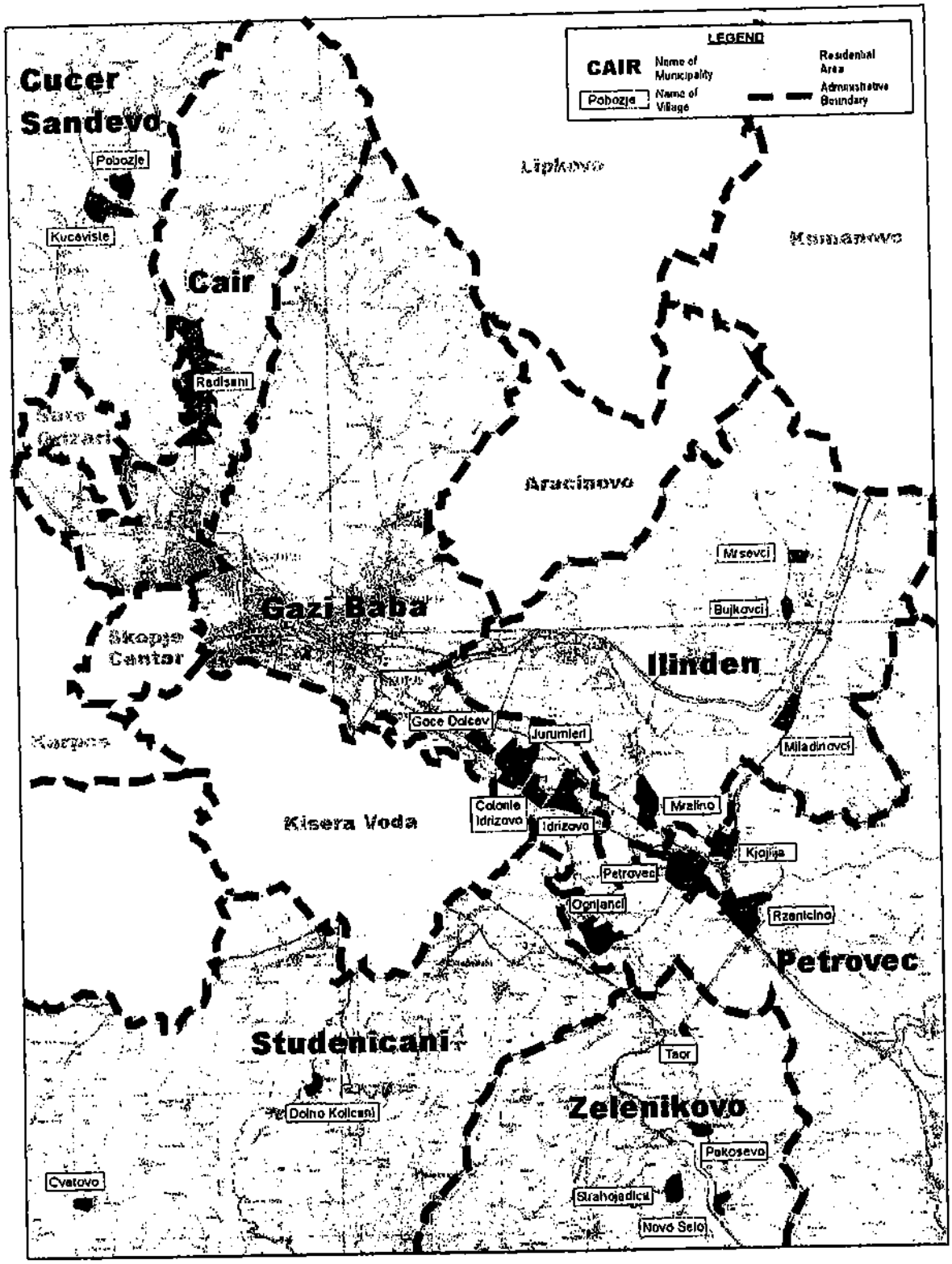
The Macedonian side agreed to be responsible for the items and make necessary budgetary arrangement to cover required amount of cost shown in ANNEX-3.

(9) Safety and security

The Macedonian side would ensure that necessary measures are taken for the safety and security of the Japanese nationals involved in the Project.

Both sides agreed that implementation will be reconsidered at any target settlements at any time by the Japanese Government through discussion with Macedonian Government if safety condition is not secured.

ANNEX-1

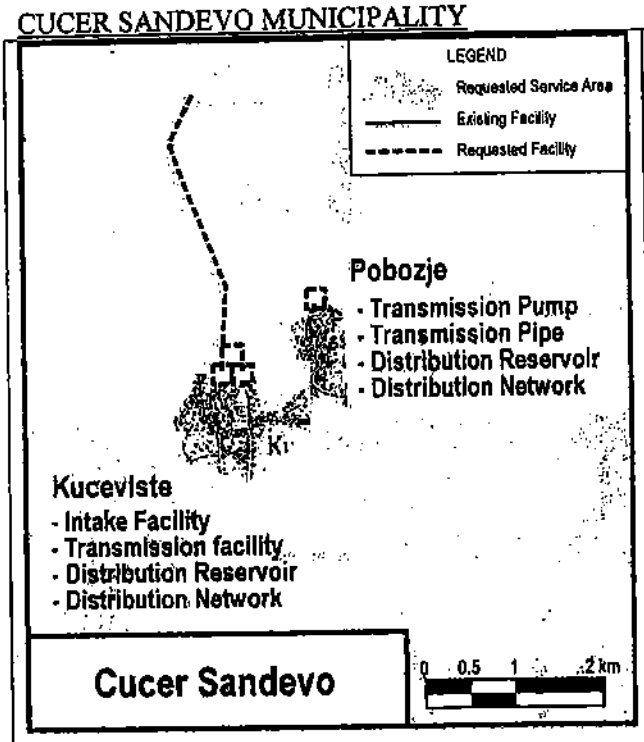


Location Map

ANNEX-1

Components of the Project

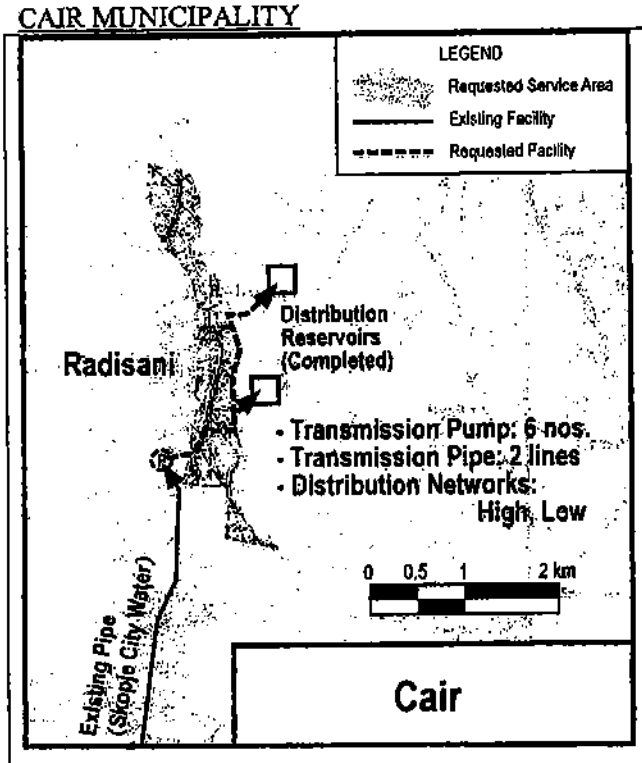
CUCER SANDEVO MUNICIPALITY



System: **POBOZJE**
Service area: Pobozje
- Procurement/ Installation of Transmission Pump
- Procurement/ Installation of Disinfection System
- Completion of Transmission Pipe: from P/S to Reservoir (Remaining approx. 200 m)
- Distribution Reservoir: 1 tank (120 m^3)
- Secondary Network in Pobozje Village

System: **KCEVISTE**
Service area: Kuceviste
- Expansion of Intake Facility
- Transmission Pipe: approx. 3.0 km
- Rehabilitation of Existing Reservoir: 1 tank (including New Disinfection Facility)
- Construction of New Reservoir: 1 tank (100 m^3, including new disinfection facility)
- Secondary Network in Kuceviste Village

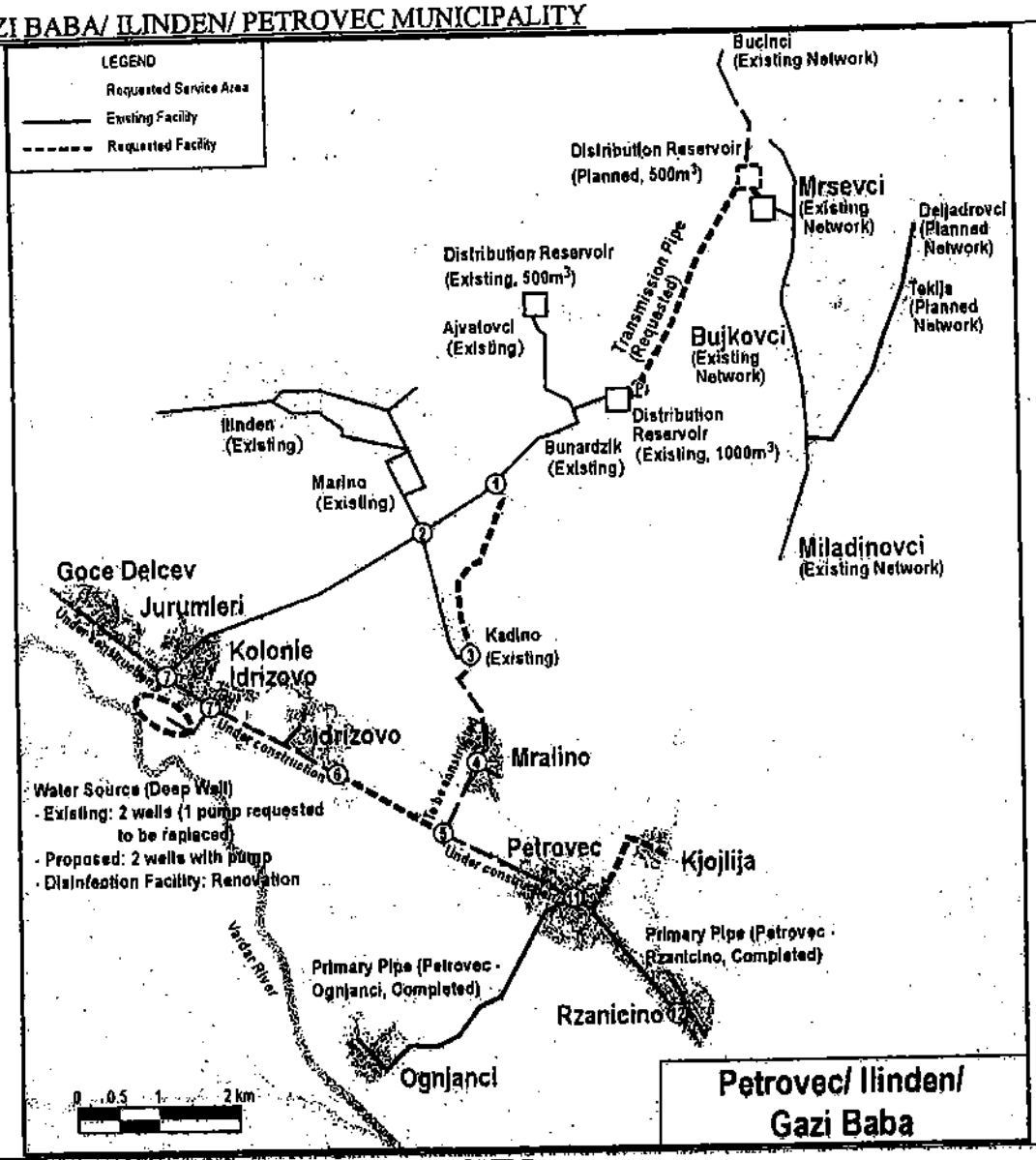
CAIR MUNICIPALITY



System: **RADISANI**
Service area: Radisani
- Transmission Pump House: 1 building
- Transmission Pump: 3 sets for Higher Zone
- Transmission Pump: 3 sets for Lower Zone
- Transmission Pipe to Higher Reservoir
- Transmission Pipe to Lower Reservoir (Except approx. 600m which was constructed by Cair Municipality)
- Secondary Network for Higher Zone
- Secondary Network for Lower Zone

ANNEX-1

GAZI BABA/ ILINDEN/ PETROVEC MUNICIPALITY



System: **GAZI BABA, ILINDEN and PETROVEC**
Service area (Gazi Baba): Goce Delcev, Jurumleri, Kolonie Idrizovo, Idrizovo (4 villages)
Service area (Ilinden): Mralino (1 village)
Service area (Petrovec): Petrovec, Ognjanci, Rzanicino, Kjojlija (4 villages)

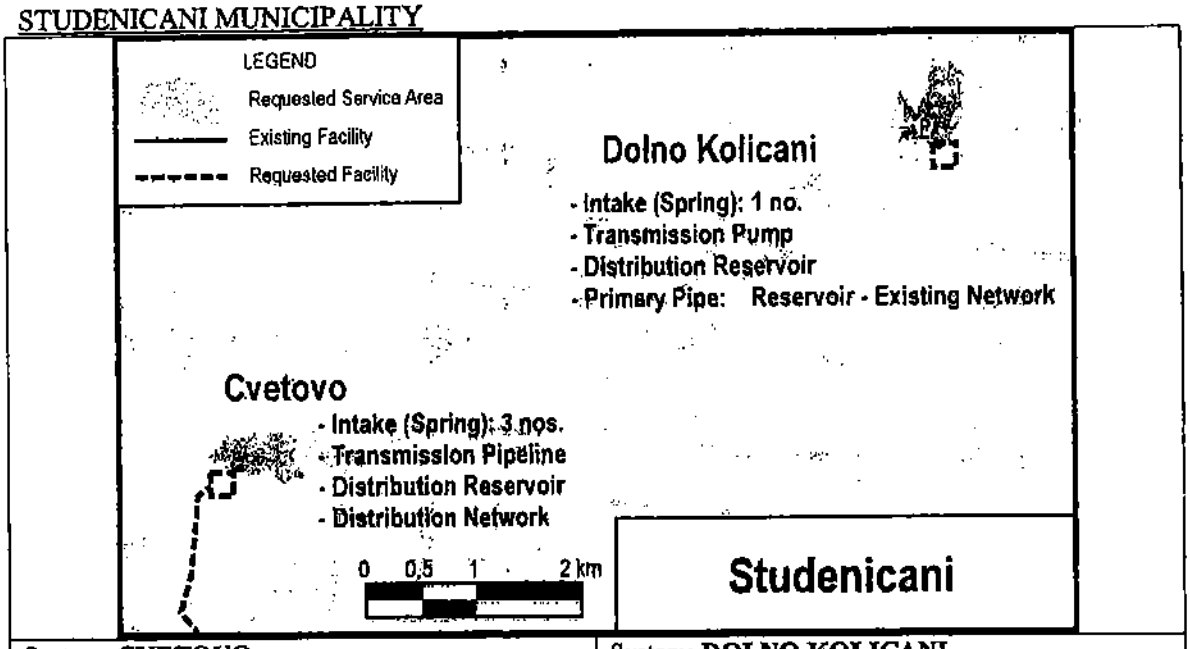
- Intake Well in Jurumleri: Two New Wells (Jurumleri, Gazi Baba)
- Intake Pump of Jurumleri: One Pump to be Replaced (Jurumleri, Gazi Baba)
- Disinfection Facility in Jurumleri: Renovation (Jurumleri, Gazi Baba)
- Primary Pipe: 1 – 3 (2,015 m, Ilinden), 5 – 6 (2,313 m, Ilinden), 11 – Kjojlija (1,300 m, Petrovec)
- Secondary Network: Goce Delcev, Jurumleri, Kolonie Idrizovo, Idrizovo (Gazi Baba)
- Secondary Network: Mralino (Ilinden)
- Secondary Network: Petrovec, Ognjanci, Rzanicino, Kjojlija (Petrovec)

System: **ILINDEN EAST**
Service area (Ilinden): Mrsevci, Bujkovci, Miladinovci (3 villages)

- Transmission Pump: Bunardzik Reservoir Site (Ilinden)
- Transmission Pipe: Bunardzik – Existing Reservoir (Ilinden)

ANNEX-1

STUDENICANI MUNICIPALITY



System: **CVETOVO**
Service area: Cvetovo
- Intake Facility: 3 nos.
- Transmission Pipe: Intake to Reservoir
- Disinfection Facility: 1 no.
- Distribution Reservoir: 1 tank (100 m^3)
- Primary Pipe Reservoir to Network
- Secondary Network

System: **DOLNO KOLICANI**
Service area: Dolno Kolicani
- Intake Facility: 1 no.
- Transmission Pipe: Intake to Pump Station
- Pump Station: 1 no.
- Transmission Pipe: Pump Station to Reservoir
- Disinfection Facility: 1 no.
- Distribution Reservoir: 1 tank (100 m^3)
- Primary Pipe: Reservoir to Existing Network

ZELENIKOVO MUNICIPALITY

System: **ZELENIKOVO 3 VILLAGES**

Service area: Taor
- Primary Pipe to Taor Village (Except Constructed Pipe, Approx. 450m)
- Secondary Network: Taor

Service Area: Pakosevo & Novo Selo
- Primary Pipe: Zelenikovo St. to Novo Selo
- Secondary Network: Pakosevo and Novo Selo

System: **STRAHOJADICA**
Service Area: Strahojadica
- Pump Station: 1 no.
- Transmission Pipe to Reservoir
- Distribution Reservoir: 1 tank (100 m^3)
- Primary Pipe: Reservoir to Network
- Secondary Network: Strahojadica

(689

РЕПУБЛИКА МАКЕДОНИЈА
МИНИСТЕРСТВО ЗА ТРАНСПОРТ И ВРСКИ
Скопје

Примено 18.07.2003
Орг. единица | Број | Прилог | Вредност
18 | 7716/2 | |

ОПШТИНА ЧАИР
Одделение за урбанизам, уредување на градежно земјиште, сообраќај, комунална инфраструктура и заштита на животната средина
Бр. 16-360 од 17.07.2003 год.
Скопје
тел: 616-870 / факс: 616-867

РЕПУБЛИКА МАКЕДОНИЈА
МИНИСТЕРСТВО ЗА ТРАНСПОРТ И ВРСКИ
Сектор комунални работи и инфраструктура
Скопје

Предмет: Одговор на Ваш допис
Бр. 18-7716/5 од 15.07.2003 год.

Заради реализација на „Проектот за имплементација на водоснабдувањето на населените места во регионот на Скопје". Ве известуваме за превземените активности и нивно извршување.

- Изградбата на двата резервоара е завршена, примарниот вод (600 м´) е завршен.
- Преклопувањето на договорот за водоснабдување во Радишани, е решен со поранешниот изведувач.
- Проектот за водоснабдување има позитивно влијание врз животната средина.
- Техничката документација за водоводот во Радишани, доставена е на стручна ревизија во ЈП „Водовод" и истата е во тек.

Со почит !

Директор
Клара Јовковска, дипл. инг. арх.

ANNEX-2

(translation)

CAIR MUNICIPALITY
Department for Urban Planning, Landscaping, Traffic, Communal Infrastructure and Environmental Protection
Ref. No 16-360, 17.07.2003
Skopje
Tel:616-870 FAX:616-867

To: Republic of Macedonia
Ministry of Transport and Communication
Sector for Communal Works and Infrastructure
Skopje

Subject: Reply to inquiry ref. No. 18-7716/5, 15.07.2003

For the implementation of the Project for Improvement of Water Supply of Inhabited Places in Skopje Outskirts, we inform you about the undertaken activities and its execution.

- Construction of the two reservoirs is completed, and the primary pipeline (600m) is completed.
- The overlapping of the contract for water supply of Radisani is settled with the previous contractor.
- The water supply project has positive impact on the environment.
- The Technical Documentation for water supply in Radisani is submitted for expert review to PE Vodovod Skopje, and the procedure is on-going.

Respectfully,

Mrs. Kara Jovkovska, Director

ANNEX-3

Items to be managed in the construction stage and Project costs borne by the Government of Macedonia

<Items to be managed by the Government of Macedonia in the construction stage>

(1) Land acquisition (securing right for use of land)

(2) Electrical power supply to water supply systems

(3) Construction of fence to protect water supply facilities
(intakes, reservoirs, pump stations)

(4) Promotion and implementation of house connection

<Project costs borne by the Government of Macedonia>

Project costs borne by the Government of Macedonia (Unit: million MKD)

Description	Expenses	Remarks
(1) Cost for construction (electric power line to the sites, fence)	20	
(2) Annual operation and maintenance cost	17.7	By municipalities (concerned public enterprises)

MKD: Macedonian Denar

添付資料 6　要請村落評価結果

要請村落評価結果

I. 第一次評価

(1) 評価基準

	基準	項目	評価点 (Score)		
A	治安状況	- 紛争時の状況 - 現状 - 将来の見通し	安全 (3 pts)	条件付 (1 pts)	危険 (0 pts)
B	水源の有無	- 水源開発計画 - 現地踏査結果	十分 (3 pts)	条件付 (1 pts)	不足 (0 pts)

(2) 第一次評価結果

All the requested sites are evaluated based upon the above conditions. As a result, the following was identified. The evaluation result was tabulated below.

- Securities of the requested sites are confirmed as safe except Aracinovo sites where mine clearance shall be considered before implementation of the project.
- Water sources of the requested sites are assumed to be appropriate except Dolno Kolicani village where risk of water shortage in the proposed source was found.

第一次評価結果

地方自治体	村落	評価 (評価点)		
		A 治安状況	B 水源	合計
Cucer Sandevo	Pobozje	安全 (3)	十分 (3)	6
	Kuceviste	安全 (3)	十分 (3)	6
	Kucevaska Bara	安全 (3)	十分 (3)	6
Cair	Radisani	安全 (3)	十分 (3)	6
Aracinovo	Grusino	条件付 (1)	十分 (3)	4
	Orlanci	条件付 (1)	十分 (3)	4
	Brnjarci	条件付 (1)	十分 (3)	4
Gazi Baba	Goce Delcev	安全 (3)	十分 (3)	6
	Jurumleri	安全 (3)	十分 (3)	6
	Kolonie Idrizovo	安全 (3)	十分 (3)	6
	Idrizovo	安全 (3)	十分 (3)	6
Ilinden	Mralino	安全 (3)	十分 (3)	6
	Mrsevci	安全 (3)	十分 (3)	6
	Bujkovci	安全 (3)	十分 (3)	6
	Miladinovci	安全 (3)	十分 (3)	6
	Tekija	安全 (3)	十分 (3)	6
	Deljadrovci	安全 (3)	十分 (3)	6
	Bucinci	安全 (3)	十分 (3)	6
Petrovec	Petrovec	安全 (3)	十分 (3)	6
	Kjojlija	安全 (3)	十分 (3)	6
	Rzanicino	安全 (3)	十分 (3)	6
	Ognjanci	安全 (3)	十分 (3)	6

地方自治体	村落	評価 (評価点)		
		A 治安状況	B 水源	合計
Studenicani	Cvetovo	安全 (3)	十分 (3)	6
	Dolno Kolicani	安全 (3)	条件付 (1)	4
Zelenikovo	Taor	安全 (3)	十分 (3)	6
	Pakosevo	安全 (3)	十分 (3)	6
	Novo Selo	安全 (3)	十分 (3)	6
	Strahojadica	安全 (3)	十分 (3)	6

II. 第二次評価

(1) 評価基準

第二次評価基準

	基 準	項 目	評価 (評点)		
C	用水目的	C1: 生活用水の割合	多数 (3)	中間 (1)	少ない (0)
	緊急性・必要性	C2: 自治体での普及率	70%未満 (3)	70 - 90% (1)	90 - 100% (0)
		C3: 水系疾病の状況 (水質)	著しい (3)	多くない (1)	ほぼ無し (0)
	要請サイト	C4: 当初要請村落との整合	変更なし(1)	-	変更あり(0)
		C5: 当初システムとの接続	可能 (1)	-	不可 (0)
		C6: 他ドナーへの重複要請	なし (3)	-	あり (0)
D	テクニカルドキュメント(T/D)	D1: T/D の有無	在り (3)	準備中 (1)	無し (0)
		D2: 技術的な妥当性	適当 (1)	-	不確か (0)
		D3: 自治体による承認	承認済 (3)	-	未承認 (0)
E	Public Enterprise の運営能力	E1: PE の有無	在り (3)	準備中 (1)	無し (0)
		E2: 支払い意思・能力	十分 (3)	条件付 (1)	無し (0)
F	環境	F1: 下水道システム	在り (3)	計画中 (1)	計画無し(0)

(2) 第二次評価結果

Requested Site		Population		Priority	Evaluation item												
					C1	C2	C3	C4	C5	C6	D1	D2	D3	E1	E2	F	Total
Cucer Sandevo	13 inhabited places	8,693	people	2002 census (7493) plus Kcevaka Bara (1200)													
	Population served	4,243	48.8%	Data based on 1994 census population													
	Pobozje	960	11.0%	3rd	3	3	1	1	1	3	3	1	3	3	3	1	**26**
	Kceviste	3,500	40.3%	1st	3	3	1	0	0	3	3	1	3	3	3	1	**24**
	Kcevaska Bara	1,200	13.8%	2nd	3	3	1	0	0	3	1	0	3	3	3	1	**21**
Cair	5 inhabited places	70,441	people	2002 census, One urban and four villages													
	Population served	42,265	60.0%	Rate of population served estimated													
	Radisani	6,500	37.5%	1st	3	3	3	1	1	3	3	1	3	3	3	1	**28**
Aracinovo	6 inhabited places	11,315	people	2002 census													
	Population served	8,000	70.7%	Including on-going project													
	Grusino	1,500	13.3%	1st	3	1	1	1	1	3	3	1	3	1	3	1	**22**
	Orlanci	900	8.0%	2nd	3	1	1	1	1	3	3	1	3	1	3	1	**22**
	Brnjarci	418	3.7%	3rd	3	1	1	1	1	3	1	1	3	1	3	1	**20**
Gazi Baba	23 inhabited places	72,780	people	2002 census													
	Population served	45,124	62.0%	Rate of population served assumed from the urban populatio													
	Goce Delcev	1,280	1.8%	2nd	3	3	3	0	1	3	3	1	3	3	3	1	**27**
	Jurumleri	3,326	4.6%	1st	3	3	3	1	1	3	3	1	3	3	3	1	**28**
	Kolonie Idrizovo	850	1.2%	4th	3	3	3	0	1	3	1	1	3	3	3	1	**25**
	Idrizovo	1,500	2.1%	3rd	3	3	3	1	1	3	1	1	3	3	3	1	**26**
Ilinden	12 inhabited places	16,180	people	Data from PE Ilinden													
	Population served	14,360	88.8%	Data including water supply system from Oil Refinery Factory													
	Mralino	830	5.1%	1st	3	1	3	1	1	3	3	1	3	3	3	1	**26**
	Mrsevci	700	4.3%	2nd	3	1	1	0	1	3	3	1	3	3	3	1	**23**
	Bujkovci	670	4.1%	2nd	3	1	1	0	1	3	3	1	3	3	3	1	**23**
	Miladinovci	1,500	9.3%	2nd	3	1	1	0	1	3	3	1	3	3	3	1	**23**
	Tekija	270	1.7%	6th	3	1	1	0	1	3	3	1	3	3	3	1	**23**
	Deljadrovci	490	3.0%	5th	3	1	1	0	1	3	3	1	3	3	3	1	**23**
	Bucinci	230	1.4%	7th	3	1	1	0	1	3	3	1	3	3	3	1	**23**
Petrovec	17 inhabited places	8,205	people	2002 census													
	Population served	1,085	13.2%	Including individual local water supply system													
	Petrovec	2,490	30.3%	1st	3	3	3	1	1	3	3	1	3	3	3	1	**28**
	Razanicino	903	11.0%	3rd	3	3	3	1	1	3	3	1	3	3	3	1	**28**
	Kojlija	354	4.3%	4th	3	3	3	1	1	3	1	1	3	3	3	1	**26**
	Ognjanci	1,207	14.7%	2nd	3	3	3	1	1	3	1	1	3	3	3	1	**26**
Studenicani	18 inhabited places	17,314	people	2002 census													
	Population served	15,100	87.2%	Including on-going project													
	Cvetovo	1,000	5.8%	1st	3	1	1	0	0	3	3	1	3	1	3	1	**20**
	Dolno Kolicani	1,800	10.4%	2nd	3	1	1	0	0	3	3	0	3	1	3	1	**19**
Zelenikovo	15 inhabited places	4,115	people	2002 census													
	Population served	2,500	60.8%	Without weekend house residents													
	Taor	158	3.8%	4th	3	3	3	0	1	3	3	1	3	3	3	1	**27**
	Pakosevo	222	5.4%	1st	3	3	3	1	1	3	3	1	3	3	3	1	**28**
	Novo Selo	168	4.1%	2nd	3	3	3	1	1	3	3	1	3	3	3	1	**28**
	Strahojadica	222	5.4%	3rd	3	3	1	1	1	3	3	1	3	3	3	1	**26**

(Note)

- Population data sources are based on 2002 census, interview from municipality, figure in the technical document.
- Each requested village is prioritized among each municipality based on opinion of municipality as well as the consultant.
- Evaluation points are scored by the consultant based on field survey and discussion with MTC.

添付資料 7　村落調査結果

村落調査

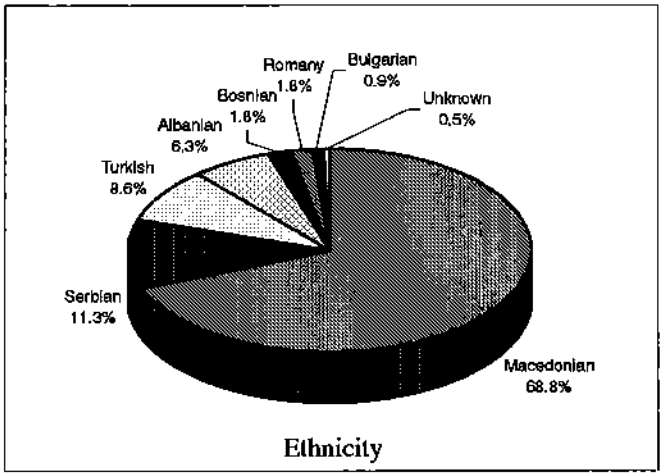
1. 調査概要

調査手法	: 聞き取り調査
調査工程	: ANNEX-1 参照
調査項目	: ANNEX-2 参照
対象村落人口	: 31.936 人（7 郡 21 村落）
調査世帯数	: 221 世帯（1,251 人）
調査世帯（対人口比）	: 3.9%

2. 調査結果概要

(1) 民族構成

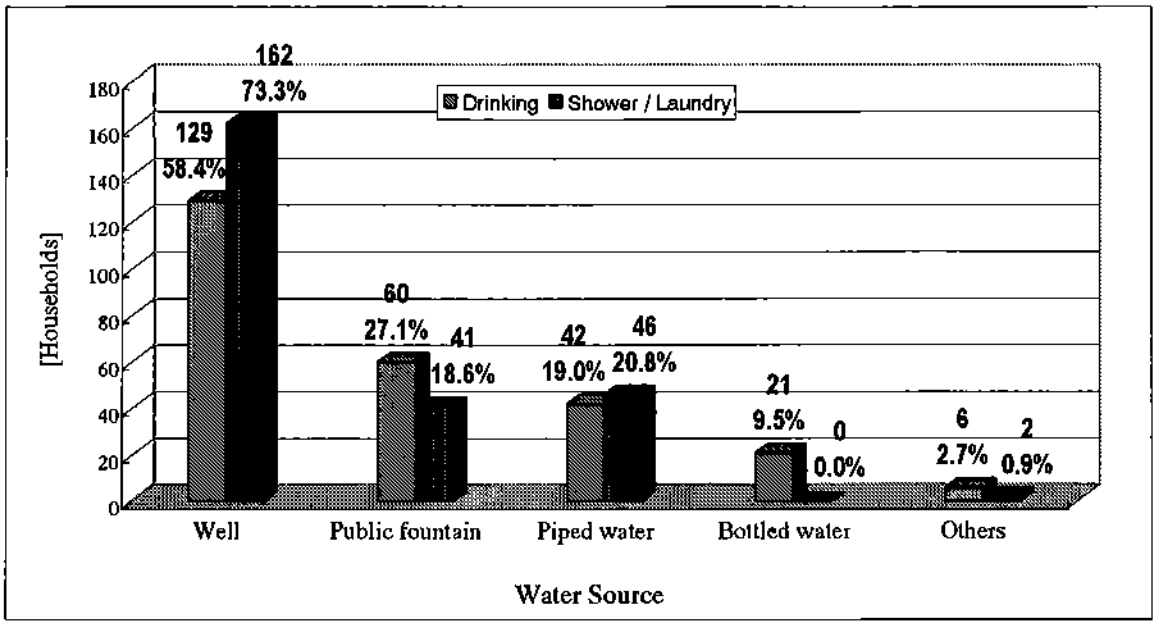
調査世帯の民族構成を右図に示す。調査世帯の抽出は、各郡役所を通じて行ったため、実際の民族構成に合致していない可能性がある。しかし、対象村落は比較的小さな村が多く、同じ村落内であれば水利用実態や生活レベルに大きな差異は無く、調査結果に大きな影響を及ぼすものでは無いと考えられる。



(2) 水源

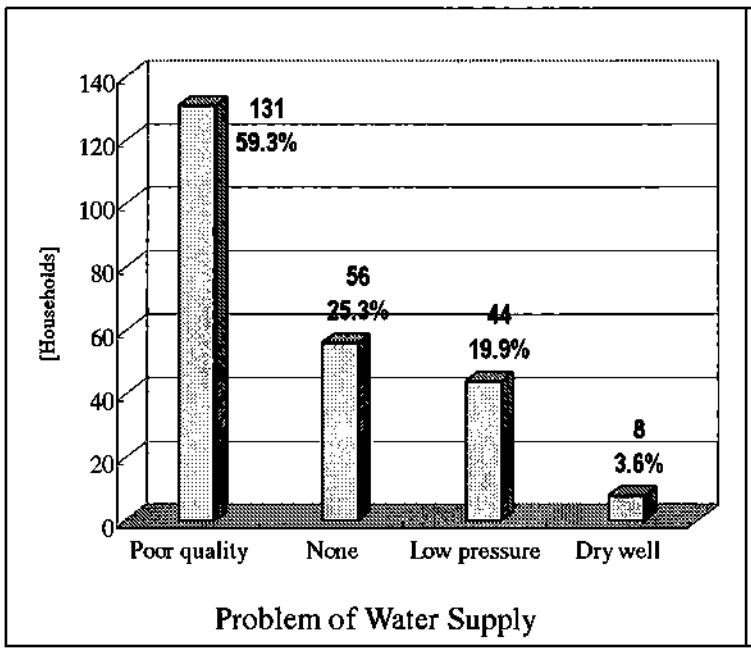
生活用水は井戸から取水している世帯が大半を占める。井戸の殆どは電動ポンプによって揚水している。水位低下や枯渇のため井戸が安定的に使用できない世帯では、村内または他村の水場へ水汲みに行き生活用水を確保している。水道より給水を受けている世帯でも断水が多いため、井戸や村内の水場を併用し生活用水を確保している。

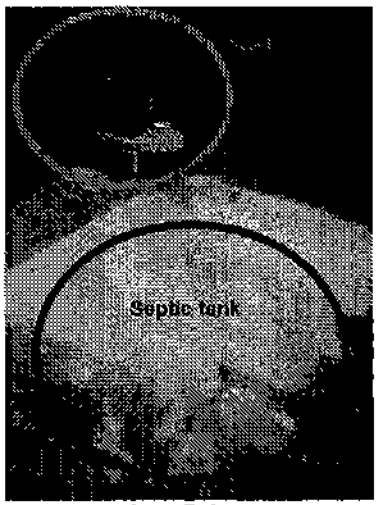
シャワーや洗濯にくらべ飲料水の井戸使用率が約 15 ポイント少ないのは、井戸水の汚染(主に生活雑排水による）により、飲料水を他の水源に求めざるを得ない村落があるためである。また、飲料用にペットボトル水を購入している世帯が全体の 9.5%と少なくない。ペットボトルを購入している世帯は Cair 郡や Gazi Baba 郡などスコピエ市に隣接した村落に多く見られる。



(3) 給水に係わる問題

対象村落の住民にとって最大の懸念事項は水質であり、21 村落中 19 村落、221 世帯中 131 世帯から水質が問題として挙げられた。水源を井戸に依存する村落で特に顕著であり、生活雑排水による汚染が主原因と考えられる。





Goce Delcev

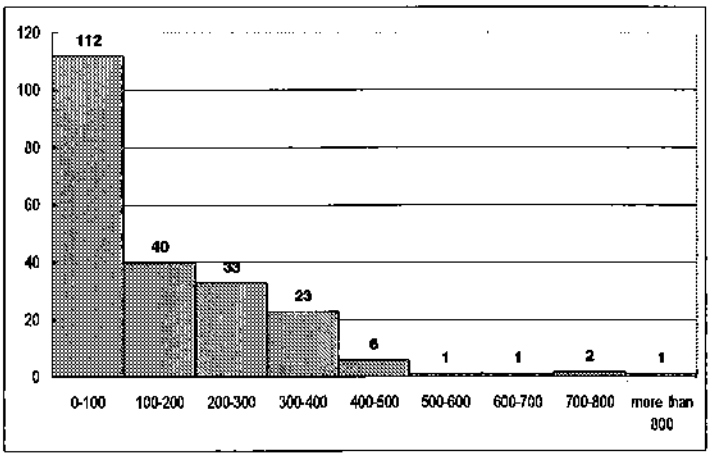
井戸と浄化槽が近接している。汚水の浸出により井戸水は汚染されており、飲料水としては利用できない。

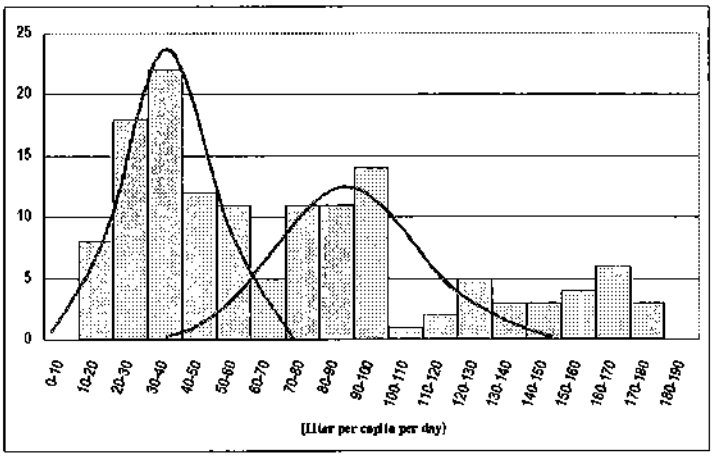
(4) 使用量

一日一人当りの使用量を調査したが、村落平均で 26.5～719.0 リットルと非常に大きな差が出た。村内の水場への水汲みやペットボトル水を購入することによって生活用水を確保している世帯は、容器の容量を確認していることから回答の信頼性は高いが、井戸（電動ポンプ）より取水している世帯では使用量が定量できず残念ながら回答の信頼性は極めて低い。

そこで、庭への散水や畑への水が除かれている冬季の一日一人当たり使用量のヒストグラムを作成した。右上の図に示されるように 0～100 リットルが圧倒的に多い。T/D においても需要量を 150 リットルと設定していることから、0～200 リットルの度数分布を見ると、右下の図に示されるように40リットル前後と90リットル前後の2つの頂点があると考えられる。

このことから、使用量の多い村落でも90リットル程度の使用量であると考えられる。





(5) 水道料金支払い可能額

水道料金の支払い可能額の村落別平均値は 187～975MKD（全体平均 390MKD）、世帯月収に占める割合は 1.5～7.6%（全体平均 3.1%）と村落によって差のある結果を得た。

[MKD/month]

	全村落平均		村落別平均	
			最大値	最小値
収入	12,778	100.0%	20,750	6,200
支出				
水道*	363	2.8%	825	100
電力	2,043	16.0%	2,833	900
廃棄物*	135	1.1%	151	120
支払い可能な水道料金	390	3.1%	975	187

*：水道、廃棄物料金を徴収されている世帯のみを計算している。

[MKD/month]

村落	世帯収入	支払い可能額		村落	世帯収入	支払い可能額	
Pobozje	10.586	311	2.9%	Petrovec	8,450	213	2.5%
Kceviste	10,823	361	3.3%	Rzanichino	13,250	500	3.8%
Radisani	14,500	404	2.8%	Koilija	10,600	400	3.8%
Jurumleri	15,429	321	2.1%	Ognjanci	20,625	975	4.7%
Idrizovo	12,180	390	3.2%	Cvetovo	8,086	393	4.9%
Kolonija. Idrizovo	8,583	187	2.2%	Dolno Kolicani	10,167	388	3.8%
Goce Delcev	12,778	339	2.7%	Novo Selo	9,740	370	3.8%
Mralino	10,643	279	2.6%	Pakosevo	11,200	410	3.7%
Bujkovci	19,600	380	1.9%	Taor	14,000	530	3.8%
Mrsevci	20,750	975	4.7%	Strahojadica	6,200	470	7.6%
Miladinovci	16,000	245	1.5%	All Villages	12,778	390	3.1%

また、現在水道料金を課されている世帯と課されていない世帯に分けて集計した結果を以下に示す。既に水道料金を課されている世帯でも正常に給水がされるなら現在の料金より多く支払ってもよいと考えており、支払い可能額(許容額)は現在の 128%との結果を得た。

[MKD/month]

	世帯数 ①	水道料金 ②	支払可能額 ③	③/②	世帯収入 ④	③/④
水道料金を課されている世帯	24	363	464	128%	14,920	3.1%
水道料金を課されていない世帯	197	—	381	—	12,517	3.0%

Interview Survey Plan

1. Schedule

Date		Team-A	Team-B
14-May	wed	Kceviste (orientation)	
15-May	thu	Kceviste (east)	Kceviste (west)
16-May	fri	Radicani (north)	Radicani (south)
17-May	sat		
18-May	sun		
19-May	mon	Radicani (north)	Radicani (south)
20-May	tue	Pobozje	Idorizovo
21-May	wed	Goce Delcev	Coloni idorizovo
22-May	thu	Jurumlei	Petrovec
23-May	fri	Jurumlei	Petrovec, Rzanichio
24-May	sat		
25-May	sun		
26-May	mon	Cvetovo	Ognjanci, Kojlija
27-May	tue	Dolno Kolicani	Mralino
28-May	wed	Pakosevo, Novo Selo	Mrsevci, Bujkovci
29-May	thu	Taor, Stranhojadica	Miladinovci

2. Number of Households to Interview

TEAM-A

Municipality	Inhabited Place	Number of Household
Cair	Radisani	23
Cucer Sandevo	Kcevicte	11
	Pobozje	7
Gazi Baba	Jurumleri	21
	Goce Delcev	9
Studenicani	Cvetovo	7
	Dolno Kolicani	12
Zelenikovo	Pakosevo	5
	Novo Selo	5
	Taor	5
	Stranhojadica	5
Total		110

TEAM-B

Municipality	Inhabited Place	Number of Household
Cair	Radisani	23
Cucer Sandevo	Kcevicte	11
Gazi Baba	Idrizovo	10
	Colonie Idrizovo	6
Petrovec	Petrovec	16
	Rzanichino	6
	Ognjanci	8
	Kojlija	5
Ilinden	Mralino	6
	Mrsevci	5
	Bujkovci	5
	Miladinovci	10
Total		111

ANNEX-2

The Project for Improvement of Water Supply in Inhabited Places in Skopje Outskirts in the Republic of Macedonia

QUESTIONNAIRE

Ref. No. ____ - _____.
Name of village: _____ of _____ municipality
Number of persons of a household: _____ persons

Q1. Type of water source

Q1-1. for drinking and cooking: piped water / shallow well / bottled water / others (_____)
Q1-2. for shower: piped water / shallow well / bottled water / others (_____)
Q1-3. for laundry: piped water / shallow well / bottled water / others (_____)
Q1-4. for garden watering: piped water / shallow well / bottled water / others (_____)
Q1-5. for livestock: piped water / shallow well / bottled water / others (_____)

Q2. Water usage		summer	winter
Q2-1.	Drinking & cooking:	_____ liters/day or_____ buckets/day;	_____ liters/day or_____ buckets/day
Q2-2.	Shower:	_____ times/day, _____ buckets/day;	_____ times/day, _____ buckets/day
Q2-4.	Garden watering:	_____ times/week, _____ buckets/day;	_____ times/week, _____ buckets/day
Q2-5.	Livestock:	_____ times/week, _____ buckets/day;	_____ times/week, _____ buckets/day

(size of the bucket: diameter ____ cm, height ____ cm)

Q3. Problem of water supply

Q3-1. poor water quality / low pressure / dry well / others (_____)
Q3-2. How far is water source from the house ? _____ km or _____ minutes for one way
How many times do you fetch water ? _____ times a day

Q4. Monthly expenses of a household

Q4-1. for water _____ Denar per month
Q4-2. for power (electricity) _____ Denar per month
Q4-3. for solid waste disposal _____ Denar per month

Q5. Average monthly income of a household (Unit: Denar/month)

_____ Denar per month

Q6. Acceptable or affordable expense for piped water (Unit: Denar/month)

_____ Denar per month

Q7. Type of sanitary facility

sewerage / septic tank / pit latrine / others (_____)

Note:

Name of Surveyor_____

Summary of Interview Survey

Municipality	Village	Population		Ethnicity			Type of water source* [households]			Problem of current water supply [households]		Waler usage for drinking, shower, laund	summer	winter	average	Monthly income and expense [Denar/month]		
All municipalities	All villages	Village population	31,936	Ethnicity:			Drinking:					Persons per household			5.7	Income	12,778	100.0%
				Macedonian	152	68.8%	Well	129	58.4%	Poor quality	131	59.3%	Water volume [Liter per capita per day			Expense		
		Interviewed household	221	Serbian	25	11.3%	Public fountain	60	27.1%	None	56	25.3%		213.0	157.2	185.1	Water	363	2.8%
		Persons of the interviewed households	1,251	Turkish	19	8.6%	Piped water	42	19.0%	Low pressure	44	19.9%	Frequency [times per week]				Power	2,043	16.0%
		Persons per household	5.7	Albanian	14	6.3%	Bottled water	21	9.5%	Dry well	8	3.6%	Shower	5.4	3.8	4.6	Solid Waste	135	1.1%
		Sampling rate	3.9%	Bosnian	4	1.8%	Others	6	2.7%				Laundry	4.1	3.3	3.7	Acceptable Water Charge		
				Romany	4	1.8%												390	3.1%
				Bulgarian	2	0.9%	Shower / Laundry:												
				Unknown	1	0.5%	Well	162	73.3%										
					221	100.0%	Piped water	46	20.8%										
							Public fountain	41	18.6%										
							Others	2	0.9%										
							Gardening / Livestock												
							Well	119	53.8%										
							Public fountain	31	14.0%										
							Piped water	30	13.6%										
Cucer Sandevo	Pobozje	Village population	768	Household:		7	Drinking:			Low pressure	7	Persons per household			4.7	Income	10,586	100.0%
				Ethnicity:			Piped water		5	Poor quality	2	Water volume [Liter per capita per day				Expense		
		Interviewed household	7	Macedonian		7	Public fountain		2					86.4	60.6	73.5	Water	286	2.7%
		Persons of the interviewed households	33				Shower / Laundry:					Frequency [times per week]				Power	1,507	14.2%
		Persons per household	4.7				Piped water		5			Shower	3.8	2.9	3.4	Solid Waste	0	0.0%
		Sampling rate	4.3%				Public fountain		2			Laundry	3.4	2.5	3.0	Acceptable Water Charge		
							Gardening / Livestock											311	2.9%
							Piped water		5										
							Public fountain		2										
	Kceviste	Village population	2,057	Household:		22	Drinking:			Low pressure	6	Persons per household			6.5	Income	10,823	100.0%
				Ethnicity:			Public fountain		20	Poor quality	1	Water volume [Liter per capita per day				Expense		
		Interviewed household	22	Serbian		18	Well		5	Dry well	1			99.5	80.7	90.1	Water	0	0.0%
		Persons of the interviewed households	144	Macedonian		3	Piped water		3	None	14	Frequency [times per week]				Power	1,392	12.9%
		Persons per household	6.5	Unknown		1	Shower / Laundry:					Shower	5.6	2.3	4.0	Solid Waste	0	0.0%
		Sampling rate	7.0%				Public fountain		17			Laundry	3.8	3.1	3.4	Acceptable Water Charge		
							Well		7									361	3.3%
							Piped water		3										
							Gardening / Livestock												
							Public fountain		15										
							Well		7										
							Piped water		3										

*: Plural answers can be chosen

Summary of Interview Survey

ANNEX-3

Municipality	Village	Population		Ethnicity		Type of water source* [households]		Problem of current water supply [households]		Water usage for drinking, shower, laund	summer	winter	average	Monthly income and expense [Denar/month]		
Cair	Radisani	Village population	8,676	Household:	46	Drinking:		Poor quality	34	Persons per household			4.7	Income	14,500	100.0%
				Ethnicity:		Well	40	Dry well	5	Water volume [Liter per capita per day				Expense		
		Interviewed household	46	Macedonian	41	Bottled water	4	None	11		145.9	110.5	128.2	Water	0	0.0%
		Persons of the interviewed households	215	Bulgarian	2	Water tanker	1			Frequency [times per week]				Power	2,456	16.9%
		Persons per household	4.7	Romany	2	Piped water	1			Shower	5.2	3.3	4.3	Solid Waste	0	0.0%
		Sampling rate	2.5%	Serbian	1	Fetching to Skopje city	1			Laundry	3.9	3.1	3.5	Acceptable Water Charge		
						Shower / Laundry:									404	2.8%
						Well	43									
						Water tanker	1									
						Piped water	1									
						Fetching to other village or city	1									
						Gardening / Livestock										
						Well	34									
Gazi Baba	Jurumlei	Village population	3,319	Household:	21	Drinking:		Poor Quality	14	Persons per household			4.9	Income	15,429	100.0%
				Ethnicity:		Well	18	None	7	Water volume [Liter per capita per day				Expense		
		Interviewed household	21	Macedonian	20	Bottled water	5				199.0	80.3	139.7	Water	0	0.0%
		Persons of the interviewed households	103	Serbian	1	Shower / Laundry:				Frequency [times per week]				Power	2,517	16.3%
		Persons per household	4.9			Well	21			Shower	4.5	3.6	4.1	Solid Waste	151	1.0%
		Sampling rate	3.1%			Gardening / Livestock				Laundry	4.1	3.7	3.9	Acceptable Water Charge		
						Well	21								321	2.1%
Gazi Baba	Idrizovo	Village population	2,384	Household:	10	Drinking:		Poor quality	2	Persons per household			4.0	Income	12,180	100.0%
				Ethnicity:		Well	10	None	8	Water volume [Liter per capita per day				Expense		
		Interviewed household	10	Macedonian	8	Shower / Laundry:					370.0	257.5	313.8	Water	0	0.0%
		Persons of the interviewed households	40	Albanian	2	Well	10			Frequency [times per week]				Power	1,980	16.3%
		Persons per household	4.0			Gardening / Livestock				Shower	7.0	2.6	4.8	Solid Waste	0	0.0%
		Sampling rate	1.7%			Well	5			Laundry	6.4	2.4	4.4	Acceptable Water Charge		
															390	3.2%
	Kolonija Idrizovo	Village population	1,288	Household:	6	Drinking:		Poor quality	3	Persons per household			4.3	Income	8,583	100.0%
				Ethnicity:		Piped water	3	None	3	Water volume [Liter per capita per day				Expense		
		Interviewed household	6	Macedonian	6	Well	2				334.6	253.8	294.2	Water	100	1.2%
		Persons of the interviewed households	26			Bottled water	1			Frequency [times per week]				Power	2,550	29.7%
		Persons per household	4.3			Shower / Laundry:				Shower	7.0	2.5	4.8	Solid Waste	0	0.0%
		Sampling rate	2.0%			Piped water	3			Laundry	5.3	3.3	4.3	Acceptable Water Charge		
						Well	3								187	2.2%
						Gardening / Livestock										
						Well	1									
	Goce Dolcev	Village population	1,421	Household:	9	Drinking:		Poor quality	9	Persons per household			5.0	Income	12,778	100.0%
				Ethnicity:		Bottled water	8			Water volume [Liter per capita per day				Expense		
		Interviewed household	9	Macedonian	9	Well	3				51.1	41.1	45.1	Water	0	0.0%
		Persons of the interviewed households	45			Shower / Laundry:				Frequency [times per week]				Power	1,939	15.2%
		Persons per household	5.0			Well	9			Shower	4.1	3.6	3.8	Solid Waste	150	1.2%
		Sampling rate	3.2%			Gardening / Livestock				Laundry	3.1	3.1	3.1	Acceptable Water Charge		
						Well	3								339	2.7%

*: Plural answers can be chosen

Summary of Interview Survey

ANNEX-3

Municipality	Village	Population		Ethnicity		Type of water source* [households]		Problem of current water supply [households]		Water usage for drinking, shower, laund	summer	winter	average	Monthly income and expense [Denar/month]		
Ilinden	Mralino	Village population	830	Household:	7	Drinking:		Poor quality	7	Persons per household			7.3	Income	10,643	100.0%
				Ethnicity:		Well	5			Water volume [Liter per capita per day				Expense		
		Interviewed household	7	Macedonian	6	Public fountain	2				421.6	372.5	397.1	Water	0	0.0%
		Persons of the interviewed households	51	Serbian	1	Shower / Laundry:				Frequency [times per week]				Power	2,357	22.1%
		Persons per household	7.3			Well	7			Shower	7.0	5.6	6.3	Solid Waste	120	1.1%
		Sampling rate	6.1%			Gardening / Livestock				Laundry	4.7	4.7	4.7	Acceptable Water Charge		
						Well	6								279	2.6%
	Bujkovci	Village population	670	Household:	5	Drinking:		Poor quality	5	Persons per household			5.0	Income	19,600	100.0%
				Ethnicity:		Piped water	4	Low pressure	5	Water volume [Liter per capita per day				Expense		
		Interviewed household	5	Macedonian	5	Well	3				372.0	272.0	322.0	Water	520	2.7%
		Persons of the interviewed households	25			Bottled water	1			Frequency [times per week]				Power	1,760	9.0%
		Persons per household	5.0			Shower / Laundry:				Shower	7.0	4.8	5.9	Solid Waste	120	0.6%
		Sampling rate	3.7%			Piped water	5			Laundry	4.2	2.0	3.1	Acceptable Water Charge		
						Well	3								380	1.9%
						Gardening / Livestock										
						Piped water	2									
						Well	1									
	Mrsevci	Village population	700	Household:	4	Drinking:		Low pressure	4	Persons per household			6.0	Income	20,750	100.0%
				Ethnicity:		Piped water	4	Poor quality	3	Water volume [Liter per capita per day				Expense		
		Interviewed household	4	Macedonian	4	Well	2	Dry well	1		352.1	279.2	315.6	Water	825	4.0%
		Persons of the interviewed households	24			Public fountain	2			Frequency [times per week]				Power	2,750	13.3%
		Persons per household	6.0			Shower / Laundry:				Shower	7.0	7.0	7.0	Solid Waste	146	0.7%
		Sampling rate	3.4%			Piped water	4			Laundry	3.3	3.0	3.1	Acceptable Water Charge		
						Well	2								975	4.7%
						Public fountain	2									
						Gardening / Livestock										
						Piped water	4									
						Well	2									
						Public fountain	2									
	Miladinovci	Village population	1,500	Household:	10	Drinking:		Low pressure	9	Persons per household			5.4	Income	16,000	100.0%
				Ethnicity:		Piped water	9	None	1	Water volume [Liter per capita per day				Expense		
		Interviewed household	10	Macedonian	9	Well	7				246.3	163.0	204.6	Water	0	0.0%
		Persons of the interviewed households	54	Romany	1	Shower / Laundry:				Frequency [times per week]				Power	2,680	16.8%
		Persons per household	5.4			Piped water	9			Shower	7.0	4.9	5.9	Solid Waste	124	0.8%
		Sampling rate	3.6%			Well	7			Laundry	4.3	2.3	3.3	Acceptable Water Charge		
						Gardening / Livestock									245	1.5%
						Well	9									
						Piped water	7									

*: Plural answers can be chosen

ANNEX-3

Summary of Interview Survey

Municipality	Village	Population		Ethnicity		Type of water source* [households]		Problem of current water supply [households]		Water usage for drinking, shower, laund	summer	winter	average	Monthly income and expense [Denar/month]		
Petrovec	Petrovec	Village population	2,588	Household:	16	Drinking:		Poor quality	15	Persons per household			5.5	Income	8,450	100.0%
				Ethnicity:		Well	9	None	1	Water volume [Liter per capita per day				Expense		
		Interviewed household	16	Macedonian	12	Public fountain	6				396.6	284.1	340.3	Water	0	0.0%
		Persons of the interviewed households	88	Bosnian	2	Bottled water	1			Frequency [times per week]				Power	2,075	24.6%
		Persons per household	5.5	Serbian	1	Shower / Laundry:				Shower	6.5	4.1	5.3	Solid Waste	0	0.0%
		Sampling rate	3.4%	Romany	1	Well	15			Laundry	4.1	2.8	3.5	Acceptable Water Charge		
						Public fountain	1								213	2.5%
						Gardening / Livestock										
						Well	4									
	Rzanichino	Village population	939	Household:	6	Drinking:		Poor quality	5	Persons per household			4.8	Income	13,250	100.0%
				Ethnicity:		Public fountain	4	None	1	Water volume [Liter per capita per day				Expense		
		Interviewed household	6	Macedonian	4	Well	2				810.3	627.6	719.0	Water	0	0.0%
		Persons of the interviewed households	29	Serbian	1	Shower / Laundry:				Frequency [times per week]				Power	2,833	21.4%
		Persons per household	4.8	Bosnian	1	Well	6			Shower	7.0	3.5	5.3	Solid Waste	0	0.0%
		Sampling rate	3.1%			Gardening / Livestock				Laundry	4.2	3.5	3.8	Acceptable Water Charge		
						Well	3								500	3.8%
	Kojlija	Village population	368	Household:	5	Drinking:		Poor quality	5	Persons per household			10.0	Income	10,600	100.0%
				Ethnicity:		Fetching to Petrovec	4			Water volume [Liter per capita per day				Expense		
		Interviewed household	5	Albanian	4	Well	1				326.0	278.0	302.0	Water	0	0.0%
		Persons of the interviewed households	50	Bosnian	1	Shower / Laundry:				Frequency [times per week]				Power	2,020	19.1%
		Persons per household	10.0			Well	5			Shower	7.0	7.0	7.0	Solid Waste	0	0.0%
		Sampling rate	13.6%			Gardening / Livestock				Laundry	6.0	5.2	5.6	Acceptable Water Charge		
						Well	4								400	3.8%
	Ognjanci	Village population	1,255	Household:	8	Drinking:		Poor quality	7	Persons per household			6.5	Income	20,625	100.0%
				Ethnicity:		Well	6	Low pressure	1	Water volume [Liter per capita per day				Expense		
		Interviewed household	8	Macedonian	3	Public fountain	2				407.7	346.2	376.9	Water	0	0.0%
		Persons of the interviewed households	52	Albanian	3	Shower / Laundry:				Frequency [times per week]				Power	2,088	10.1%
		Persons per household	6.5	Serbian	2	Well	8			Shower	7.0	7.0	7.0	Solid Waste	0	0.0%
		Sampling rate	4.1%			Gardening / Livestock				Laundry	3.9	3.4	3.6	Acceptable Water Charge		
						Well	4								975	4.7%
Studenicani	Cvetovo	Village population	826	Household:	7	Drinking:		None	7	Persons per household			10.6	Income	8,086	100.0%
				Ethnicity:		Public fountain	7			Water volume [Liter per capita per day				Expense		
		Interviewed household	7	Turkish	7	Shower / Laundry:					29.4	23.6	26.5	Water	0	0.0%
		Persons of the interviewed households	74			Public fountain	7			Frequency [times per week]				Power	1,500	18.6%
		Persons per household	10.6			Gardening / Livestock				Shower	2.9	2.9	2.9	Solid Waste	0	0.0%
		Sampling rate	9.0%			Public fountain	7			Laundry	2.2	2.2	2.2	Acceptable Water Charge		
															393	4.9%

*: Plural answers can be chosen

Summary of Interview Survey

ANNEX-3

Municipality	Village	Population		Ethnicity		Type of water source* [households]		Problem of current water supply [households]		Water usage for drinking, shower, laund	summer	winter	average	Monthly income and expense [Denar/month]		
Studenicani	Dolno Kolicani	Village population	1,516	Household:	12	Drinking:		Low pressure	10	Persons per household			6.5	Income	10,167	100.0%
				Ethnicity:		Public fountain	12	Poor quality	1	Water volume [Liter per capita per day				Expense		
		Interviewed household	12	Turkish	12	Piped water	10	None	1		50.6	34.0	42.3	Water	0	0.0%
		Persons of the interviewed households	78			Well	1			Frequency [times per week]				Power	1,079	10.6%
		Persons per household	6.5			Shower / Laundry:				Shower	4.3	4.0	4.1	Solid Waste	0	0.0%
		Sampling rate	5.1%			Public fountain	12			Laundry	4.9	4.9	4.9	Acceptable Water Charge		
						Piped water	11								388	3.8%
						Well	1									
						Gardening / Livestock										
						Public fountain	5									
						Piped water	4									
						Well	1									
Zelenikovo	Novo Selo	Village population	165	Household:	5	Drinking:		Poor quality	4	Persons per household			4.8	Income	9,740	100.0%
				Ethnicity:		Well	5	Dry well	1	Water volume [Liter per capita per day				Expense		
		Interviewed household	5	Macedonian	5	Shower / Laundry:		None	1		97.9	68.8	83.3	Water	0	0.0%
		Persons of the interviewed households	24			Well	5			Frequency [times per week]				Power	900	9.2%
		Persons per household	4.8			Gardening / Livestock				Shower	2.4	2.4	2.4	Solid Waste	120	1.2%
		Sampling rate	14.5%			Well	4			Laundry	2.3	2.0	2.2	Acceptable Water Charge		
															370	3.8%
	Pakosevo	Village population	246	Household:	5	Drinking:		Poor quality	5	Persons per household			4.8	Income	11,200	100.0%
				Ethnicity:		Well	5			Water volume [Liter per capita per day				Expense		
		Interviewed household	5	Macedonian	5	Shower / Laundry:					200.0	127.1	163.5	Water	0	0.0%
		Persons of the interviewed households	24			Well	5			Frequency [times per week]				Power	1,440	12.9%
		Persons per household	4.8			Gardening / Livestock				Shower	3.5	3.5	3.5	Solid Waste	120	1.1%
		Sampling rate	9.8%			Well	5			Laundry	2.5	2.5	2.5	Acceptable Water Charge		
															410	3.7%
	Taor	Village population	169	Household:	5	Drinking:		Poor quality	4	Persons per household			6.4	Income	14,000	100.0%
				Ethnicity:		Piped water	3	Low pressure	2	Water volume [Liter per capita per day				Expense		
		Interviewed household	5	Macedonian	5	Public fountain	2	None	1		156.3	70.3	113.3	Water	100	0.7%
		Persons of the interviewed households	32			Bottled water	1			Frequency [times per week]				Power	2,400	17.1%
		Persons per household	6.4			Shower / Laundry:				Shower	4.3	4.1	4.2	Solid Waste	120	0.9%
		Sampling rate	18.9%			Piped water	5			Laundry	4.5	4.0	4.3	Acceptable Water Charge		
						Gardening / Livestock									530	3.8%
						Piped water	5									
	Strahojadica	Village population	251	Household:	5	Drinking:		Poor quality	5	Persons per household			8.0	Income	6,200	100.0%
				Ethnicity:		Well	5			Water volume [Liter per capita per day				Expense		
		Interviewed household	5	Albanian	5	Public fountain	1				123.8	67.5	95.6	Water	0	0.0%
		Persons of the interviewed households	40			Shower / Laundry:				Frequency [times per week]				Power	930	15.0%
		Persons per household	8.0			Well	5			Shower	3.7	3.7	3.7	Solid Waste	0	0.0%
		Sampling rate	15.9%			Gardening / Livestock				Laundry	5.0	5.0	5.0	Acceptable Water Charge		
						Well	5								470	7.6%

*: Plural answers can be chosen

添付資料 8　他ドナーの援助動向

1. Federal Republic of Germany

Social Infrastructure Program, Phase I (up to year 2003)

Water supply project

No.	Municipality	Project Name	Amount (EURO)
1	Prilep	Water supply of inhabited place Galichani, Phase I (well pump station, transmission pipeline and reservoir): Eur.75,365.29, Phase II (water supply network): Eur.55,908.32	131,273.61
2	Pehchevo	Reconstruction of water supply network inhabited place Umlena	59,278.97
3	Rodovish	Water supply of Radvish, phase II	172,626.74
4	Ohrid	Water supply of inhabited place Velgoshti	230,602.86
5	Pehchevo	Reconstruction of water supply network inhabited place Chiflik	63,443.80
6	Brvenica	Water supply of inhabited place Dolni Chelopek	56,930.98
7	Bitola	Reconstruction of infrastructure at Bulevard in Bitola including change of sewerage collection and water supply network.	207,314.83
8	Bitola	Reconstruction of secondary network in 9 streets of setllement Bair.	83,555.32
9	Berovo	Reconstruction of water supply network in Marshal Titro street and 23rd August street	152,184.51
10	Radovish	Reconstruction of transmission pipeline in inhabited place Damjan	83,442.89
11	Probishtip	Reconstruction of 2nd network in village Probishtip	227,306.33
12	Resen	Installation of water supply and sewerage in Goce Delcev street	200,282.83
13	Pehchevo	Reconstruction of 2nd network in inhabited place Roboro and construction of playground in inhabited place Umlena	97,677.59
14	Prilep	Reconstruction of main water supply pipeline in 3 streets, Kej Prvi, Strushka and Antulesk	1,534,078.74
15	Resen	Water supply in Oteshevo	
16	Brvenica	Water supply system in inhabited place Gorri Chelopk	
17		Other inhabited place	
		Total	3,300,000.00

2. Austria

Austrian Technical Cooparation

Water supply and sewerage project

No.	Municipality	Project Name	Amount (EURO)
1	Krivogastani	Krivogastani project (Phase I)	6,400,000
2	Krivogastani	Ditto (phase II)	10,640,114
3	Krivogastani	Ditto (Aditional project of Phase II)	6,390,128
4	Krivogastani	Ditto[Phase III)	13,000,000
5	Senoko	Senokos[PhaseI]Negotino	9,083,272
6	Cucer Sandevo	Cucer Sndevo (Phase I)	9,380,878
7	Cucer Sandevo	Ditto (Phase II)	290,000
8		Development and consolidation of water and sewage sector	435,000
9		TBC Hospital Jasenovo	80,000
10	Negotino	Negotino Polog.	435,000
11	Senoko	Senokos (Phase II)	435,000
		Total of water supply project	56,569,392
1		Makedonsky Brod (Phase I)	53,300
2		Ditto (Phase II)	1,484,000
3		Suto Orizani	433,000
		Total of sewage project	1,970,300

3. European Agency for Reconstruction

Community Assistance for Reconstruction, Deviropment and Stabilization Progr:

Water supply project

No.	Municipality	Project Name	Amount (EUR)
1	Arachinovo	Water supply system for settlement	453,403
2	Dobrushevo	Water supply pipeline from Radobor to Trap and Budakovo, connection to water supply system	199,998
3	Izvor	Water supply system for Omorani and Vasil Antevski	198,517
4	Kriva Palanka	Water supply with Tyrol road from river Stanachka rake to the existing water filter	484,955
5	Orizari	Water supply system for Orizari, connection to the existing water supply system of Kochani	498,405
6	Oslomej	Water supply system for Popovjani, Jagodal-Dolenci connection to existing system	489,507
7	Sopotnica	Water supply system for Zhan (Crna Reke 7km)	183,087
8	Srbinovo	Main water supply pipeline to Bukovik	478,133
9	Tearce	Water supply system (3,820 m length)with intake from Bistrica to Tearce, Prsovce and Glovi	500,000
10	Vevchani	Reconstruction of asbestos cement pipe (10 km)	346,130

添付資料 9　人口予測・水需要予測

(1) Population Forecast and Population Served

Municipality	Inhabited place	(A) Population in 1994	(B) Population in 2002	(C) Growth rate	(D) Technical Doc.		(E) Result after discussion (2002)	Growth rate by village (%)	(F) Population in 2008	(G) Population served
					Population	Year				
Cucer Sandevo	Municipality	8,064	7,493	-1.04%						
	Kuceviste	**1,869**	**2,011**		**2,571**	**2002**	**2,057**	**1.0**	**2,183**	**2,183**
Cair	Municipality	63,375	70,441	1.52%						
	Radisani	**7,579**	**8,424**		**9,600**	**2009**	**8,676**	**1.8**	**9,656**	**9,656**
Gazi Baba	Municipality	67,664	72,780	1.05%						
	Goce Delcev				**1,280**	**2000**	**1,421**	**1.5**	**1,554**	**1,554**
	Jurumleri	**3,326**	**3,577**		**3,383**	**1994**	**3,319**	**1.2**	**3,565**	**3,565**
	Kolonie Idrizovo				**850**	**1981**	**1,288**	**1.2**	**1,384**	**1,384**
	Idrizovo				**1,500**	**1981**	**2,384**	**1.2**	**2,561**	**2,561**
Ilinden	Municipality	14,512	15,823	1.24%						
	Bujkovci	**645**	**703**				**670**	**1.0**	**711**	**711**
	Mrsevci	**650**	**709**				**700**	**1.0**	**743**	**743**
	Miladinovci	**1,429**	**1,558**				**1,500**	**1.0**	**1,592**	**1,592**
	Mralino	**791**	**862**				**830**	**1.0**	**881**	**881**
Petrovec	Municipality	8,123	8,205	1.013%						
	Ognjanci	**1,207**	**1,255**				**1,255**	**1.0**	**1,332**	**1,332**
	Petrovec	**2,490**	**2,588**				**2,588**	**1.0**	**2,748**	**2,748**
	Kjojlija	**354**	**368**				**368**	**1.0**	**391**	**391**
	Rzanicino	**903**	**939**				**939**	**1.0**	**996**	**996**
Studenicani	Municipality	14,747	17,314	2.32%						
	Cvetovo	**847**	**994**		**847**	**1994**	**826**	**1.0**	**877**	**877**
	Dolno Kolicani	**1,395**	**1,638**		**1,500**	**1994**	**1,516**	**1.0**	**1,609**	**335**
Zelenikovo	Municipality	4,236	4,115	-0.41%						
	Taor	**158**	**153**		**158**	**1994**	**169**	**1.0**	**180**	**180**
	Pakosevo	**222**	**216**		**222**	**1994**	**246**	**2.0**	**277**	**277**
	Nova Selo	**149**	**145**		**149**	**1994**	**165**	**2.0**	**186**	**186**
	Strahojadica	**228**	**221**		**250**	**1994**	**251**	**2.0**	**283**	**283**
Total	Municipality	180,721	196,171	1.18%						
	Inhabited place	24,242	26,363				31,168		33,709	32,435

(2) Water Demand and Production Capacity

Municipality	Inhabited place	Population served in 2008	Unit Demand		Water Demand		(E) Daily Ave. (C+D)	(F) +Leakage		L/c/d	(G) Peak Factor	(H) Peak Day Production (m3/d)
			(A) Domestic (L/c/d)	(B) Others (%), (A)x(B)	(C) Domestic (m3/d)	(D) Others		Rate (%)	+Leakage (m3/d)			
Cucer Sandevo	Kuceviste	2,183	100	1,500	1,999	600	2,599	20	3,248	1,488	2	4,873
Cair	Radisani	9,656	150	30	1,448	435	1,883	10	2,092	217	1	2,720
Gazi Baba	Goce Delcev	1,554	145	30	225	68	293	20	366	236	2	549
	Jurumleri	3,565	145	30	517	155	672	20	840	236	2	1,260
	Kolonie Idrizovo	1,384	145	30	201	60	261	20	326	236	2	489
	Idrizovo	2,561	145	30	371	111	483	20	603	236	2	905
Ilinden	Bujkovci	711	145	30	103	31	134	20	168	236	2	251
	Mrsevci	743	145	30	108	32	140	20	175	236	2	263
	Miladinovci	1,592	145	30	231	69	300	20	375	236	2	563
	Mralino	881	145	30	128	38	166	20	208	236	2	311
	Existing area	12,197	145	30	1,769	531	2,299	20	2,874	236	2	4,311
	Future expansion area	1,051	145	30	152	46	198	20	248	236	2	371
Petrovec	Ognjanci	1,332	145	30	193	58	251	20	314	236	2	471
	Petrovec	2,748	145	30	398	120	518	20	647	236	2	971
	Kjojlija	391	145	30	57	17	74	20	92	236	2	138
	Rzanicino	996	145	30	144	43	188	20	235	236	2	352
Studenicani	Cvetovo	877	65	20	57	11	68	10	78	89	1	78
	Dolno Kolicani	335	100	10	34	3	37	20	46	138	2	69
Zelenikovo	Taor	180	150	30	27	8	35	10	39	217	2	59
	Pakosevo	277	150	30	42	12	54	10	60	217	2	90
	Novo Selo	186	150	30	28	8	36	10	40	217	2	60
	Strahojadica	283	150	30	42	13	55	10	61	217	2	92
Total	20	45,683			8,217	2,458	10,607					19,168
		32,435										

添付資料 10　Jurumleri 地下水 揚水テスト結果

Jurumleri の地下水賦存量の検討

1）揚水試験

Jurumleri には既に 1983 年に 2 本の井戸が掘削されており、稼働している。

それぞれの掘削深度及び揚水量は下記の通りであるが、現在は 2 本の井戸は交互に運転されている。

B-1･･･22m、35L/s;　B-2･･･28m、32.5L/s

パイプ及びスクリーンの径は 600 mm である。

地下水賦存量を検討するために実施した揚水試験結果は以下の通りである。

既存井戸の揚水試験データ(2003.5.27)

		B-1		B-2	
測定時間	経過時間(min)	水位(m)	水位降下量(m)	水位(m)	水位降下量(m)
10:00	0	0.230		1.870	
10:05	5	0.275	0.045	2.240	0.370
10:15	15	0.275	0.045	2.220	0.350
10:30	30	0.285	0.055	2.250	0.380
10:45	45	0.290	0.060	2.252	0.382
11:00	60	0.280	0.050	2.252	0.382
11:30	90	0.290	0.060	2.262	0.392
12:30	150	0.285	0.055	2.245	0.375
13:30	210	0.290	0.060	2.255	0.385
14:30	270	0.290	0.060	2.252	0.382

注1) 水位はそれぞれMonitoring Point (M.P)から測定した。
B-1の地盤を基準点（地盤高 0m）とするとそれぞれのM.Pは
下記の通りである。
B-1:-2.265m
B-2:-0.550m
注2)水位測定は下記の条件で実施した。
初期水位はB-1は30分、B-2は12時間ポンプによる揚水を停止し
水位である。
観測水位はB-1はポンプを停止、B-2は32.5L/sの揚水開始。

2）透水係数の算出

上記揚水試験結果より揚水開始後約 30～45 分で定常状態に達していると判断される。

従って、透水係数の算出にあたっては、下記の完全不圧井(full penetrated non-confined water well)の式を準用した。

$K=Q(\ln R-\ln r)/\pi(H^2-h^2)=0.732Q(\log R-\log r)/(H^2-h^2)$

ここに各パラメーターの値は下記の通りである。

Q：B-2 の揚水量；32.5L/s=1.95m³/min

R：B-1 と B-2 間の距離；83.5 m

r：B-2 の井戸径；0.3 m

H 及びｈの算出は以下の通りである（図参照)。

B-1 の地盤面を基準面（地盤高 0 m）とすると、B-2 の地盤面は－0.50 m である。

B-2 の井戸底までを透水層とすると、透水層の下限深度は－28.50 m となる。

B-2 の揚水時の B-1,B-2 の定常水位は以下の通りである。

B-1･･･0.290 m(－2.56 m),　　B-2･･･2.262 m(－2.81 m)

従って、

H=28.50－2.56＝25.94(m),　　ｈ＝28.50－2.81=25.69(m)

以上の数値より調査地の帯水層の透水係数(K)を算出すると

K=0.27 m/min=4.5×10^{-1}cm/s

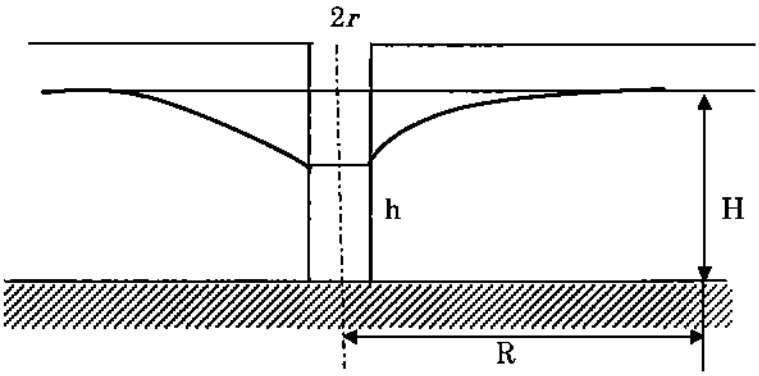


図　完全不圧井における揚水（「新版　地下水調査法」p212）

３）地下水賦存量の推定

算出された透水係数を用いて、計画地の地下水賦存量を推定する。

○計画地の静水位は以下のように考える。

揚水試験前の静水位は下記の通りである。

B-1･･･－(2.27+0.23)=－2.50 m,　　B-2･･･－(0.55+1.87)=－2.42 m

従って、平均して－2.46 m とする。

○計画地には現在 2 本の井戸が交互に稼働しているが、地下水賦存量を推定するにあたっては、仮に計画地に 1 本の井戸を考え帯水層の半分程度まで揚水水位を下げるものとする。

現在の井戸ではポンプは井戸上端より約 16m に設置されているので、それより 3 m 上まで(－13.50 m)揚水時に水位を下げるものとして算出する。

○計算式

上記の式で透水係数(K) =0.27 m/min=4.5×10^{-1}cm/s を用いて、揚水量(Q)を求める。

$Q=K\times(H^2-h^2)/0.732(\log R-\log r)$

ここに；

h=28.50－13.50=15.00 m,　　H=28.50－2.46=26.04 m

r=0.3 m,　　R（影響圏の半径）=300 m とする。

Q=57.7 m^3/min=3,460 m^3/h=83,000 m^3/d