

Swedish Committee for Afghanistan  
( SCA )

Rural Engineering Technical Support Unit  
( RETSU )

## GUIDELINES

for

RURAL DRINKING WATER SUPPLY PROJECTS

in

AFGHANISTAN

1/10/96  
Rural Engineering Technical Support Unit  
Swedish Committee for Afghanistan  
Tel: 0093 70 42 0000  
Fax: 0093 70 42 0000

Revised for 1996.

822AF-16754

## A. INTRODUCTION

These guidelines describe the procedure to be followed in connection with the implementation of safe drinking water projects in rural Afghanistan.

The guidelines apply to the following types of installation:

- a. Shallow wells, improved with concrete rings and fitted with handpumps, in areas where the water table is more than 7 (Seven) meters.
- b. Shallow wells with less than 7 metres water table, shall not be improved.
- c. In case of water table less than 7 metres, if the traditional bore hole is available in the area, a bore well can be constructed.

## B. PROJECT AGREEMENT

The basis for the start-up of a safe drinking water supply project is to assess the need and reach an agreement with the local community regarding their contribution in the implementation of the project. Prior to starting the implementation, the community should be in agreement regarding their contribution. The agreement (see Annex I) shall be signed by the community representatives, elders and SCA representative from the regional office. The community will be responsible for the following as local contribution:

1. Shelter for the site personnel and storing of materials near by the site.
2. Excavation of the wells at their own expense.
3. The security of the site personnel and materials.
4. Selection of mechanic and his monthly payment.
5. In the long term, the maintenance of the wells and handpumps.

## C. BASE-LINE SURVEY

A base-line survey should be carried out by the Regional Office Rural Engineering Manager, and the Water Supply Field Engineer after a project agreement has been signed with the representatives of the project area. During the survey no commitment can be made with the community in the project area regarding the improvement of specific existing wells or the digging/drilling of new ones. The main purposes of survey are:

1. To provide the information necessary for accurate planning.
2. To provide information which can serve as a "base-line" against which the results of the project can be assessed after completion.

The survey shall consists of the following:

### a. Mapping of the project area:

The locations of all the villages and hamlets, within the project area, are to be marked on a map with their names and numbers. Where possible, this mapping should utilise existing maps. If some of the villages within the project area are not marked on the map, they should be added. If no map is available, a sketch map of the project area should be drawn.

**b. Village survey**

The village survey will cover all the villages in the project area. One form will be filled in for each village, which will be identified by the same name and number as that used on the map (see Annex II).

**D. PROJECT DESIGN and PLANNING**

Based on the information provided by the survey, project planning will be undertaken regarding:

- a. The number, the type ( a shallow well which will be improved/constructed/bore hole with handpump ) and the location of the wells.
- b. The project costs, time frame and staffing.
- c. The community organisation set up to sustain the project e.g. the selection of local mechanics to be trained and equipped.

**E. GENERAL GUIDELINES**

The project design and planning will be based on the following general guidelines:

**1. Improvement / Construction of shallow wells**

- a. Only public wells are improved. Wells inside compounds should not be selected for improvement unless the number of families living inside the compound is equal to or above the minimum user group defined below.
- b. For a well to be selected for improvement, the minimum user group is 15 families.
- c. If the user group is above 30 families more than one well may be considered for improvement.
- d. The well site should not be on private land, unless, all the families reach a consensus.
- e. The improved/constructed wells should be acceptable and accessible to the target group traditionally and socially.
- f. The wells should be dug by the community.
- g. No well shall be selected / constructed out of the target area.

**2. Shallow wells fitted with handpumps**

- a. Shallow wells will only be fitted with hand pumps where agreements can be reached with at least 50 user groups regarding a maintenance system based on user payment. The 50 user groups should be living within a radius of 10 km from a bazaar, from which they can buy spare parts for hand pump maintenance.
- b. Hand pumps will only be fitted on improved wells with a depth of 7 meters or more.
- c. In the sequence of improvement and installation of hand pumps, priority should be given to wells with a depth of more than 25 meters or a user group larger than 30 families.

- d. Shallow wells of 7 - 20 meters and more than 20 meters depth, shall be installed with KABUL/MAIWAN PUMPS and INDUS PUMPS respectively.
- e. If hand pumps are not maintained by the user group, they will be removed. Maintenance should be monitored over at least a six month period after installation.

### 3. Bore wells with handpumps

Bore wells shall be installed where:

- a. Water table is less than 7 metres, and there is the possibility of ground water contamination by surface water.
- b. Boring of wells traditionally ( by local technology ) is available in the area.
- c. The cost of the boring shall be reasonable, in all cases it should not exceed the allocated budget for a well.
- d. The minimum user group for a bore well is the same as for a shallow well.
- e. Bore wells should only be installed where an agreement can be reached with the user group regarding the site.

## F. STEPS TO IMPLEMENT WATER SUPPLY PROJECT

### 1. Site Camp / Production Centre

A site camp will be established in order to produce well component ( Rings, Top rings, Top ring covers, Slabs and columns ). The field workers will also be accommodated at the site camp.

#### a. Tools / Equipment for Production Centre:

Water pump	1	De-watering Pump	1
Wheelbarrow	3	Spade	6
Pick axe	6	Hand tools	4 sets
Tent	6	Bed	12
Cushion	12	Pillow	12
Quilt/Blanket	12	Bed sheet	24
Floor cover	6	Kitchen equipment	12 persons

4WD single cabin pick-up

#### b. Staff Required for Site Camp:

Store Keeper	1
Cook	1
Driver	1
Guard	2

## 2. Site selection

### a. Considerations

1. In general, priority should be given to the most needy villages within the project area i.e. those without access to safe drinking water or those where comparatively few families enjoy such access.
2. In areas where a large proportion of the population are refugee's, wells should first be improved/constructed in the villages where there are sufficient people to contribute the labour required.
3. 40 or more well sites should be selected within a radius of 10 km from the production centre.
4. To the extent that it is technically feasible the selection of the actual wells to be improved and of the sites for new wells should be based on the following social criteria:
  - All families from the intended user group must have access to the well so that they are able to use it.
  - The well should be located in a place where considerations of Purdah do not prevent the women from using it.
  - As a rule, the well should be located so that access cannot be monopolised by anyone claiming that since it is on their land, it is their private property. New wells (Open or Bore) should only be dug if all heads of households of the user group agree to the site.
5. To select a site according to these criteria requires that it be done in consultation with the heads of as many of the families of the intended user group as possible.

### b. Staff Required for Site Selection

Field Engineer	1/4 time
Foreman	1/2 time

## 3. Production

### a. Activities

The following activities should take place prior to production:

1. Select the site camp close to a reliable water source where the area is large enough to accommodate a large number of well components.
2. Prepare the ground for production.
3. Transport tools, equipment, cement and steel bars to the site camp.
4. Provide sand and gravel.
5. Store the tools, equipment, cement and steel bars in suitable place.
6. Cement should not be stored longer than three months

**b. Components**

The following items are produced (see Annex III):

- i. **Ring**, the number of rings for a well depends on its depth and nature of stratum + 5% loss for breakage.

Inner diameter:	762.00	mm
Outer diameter:	864.00	mm
Height:	460.00	mm

Sand:	0.01	m3
Gravel:	0.03	m3
Cement:	0.42	bag
Total Volume:	0.06	m3

Mixture:	Cement / Sand / Gravel		
	1	1	2

Steel:	8.46	m / ring (10% overlap)
	3.00	rings of steel
	0.46	kg / concrete ring
	3.00	mm (diameter)

- ii. **Top ring**, one per well.

Inner diameter:	915.00	mm
Outer diameter:	1041.00	mm
Height:	610.00	mm

Sand:	0.03	m3
Gravel:	0.06	m3
Cement:	0.80	bag
Total Volume:	0.11	m3

Mixture:	Cement / Sand / Gravel		
	1	1	2

Steel:	6.95	m / ring (10% overlap)
	5.00	rings of steel
	0.92	kg / concrete ring
	3.00	mm (diameter)

- iii. **Top ring cover**, one per well.

Inner diameter:	570.00	mm
Outer diameter:	1041.00	mm
Height:	90.00	mm

Sand:	0.01	m3
Gravel:	0.03	m3
Cement:	0.39	bag
Total Volume:	0.05	m3

Mixture:	Cement / Sand / Gravel		
	1	1	2

Steel:	6.30	m
	3.81	kg

iv. **Manhole, one per well.**

Diameter:	510.00	mm
Outer diameter:	1041.00	mm
Height:	90.00	mm

Sand:	0.01	m3
Gravel:	0.03	m3
Cement:	0.36	bag
Total Volume:	0.05	m3

Mixture:	Cement / Sand / Gravel		
	1	1	2

Steel:	6.30	m
	3.81	kg

v. **Slab, one per well without full ring.**

Outer:		
Length:	1600.00	mm
Width:	1118.00	mm
Thickness:	889.00	mm

Inner diameter:	762.00	mm
-----------------	--------	----

Sand:	0.02	m3 / slab
Gravel:	0.04	m3 / slab
Cement:	0.61	bag / slab

Mixture:	Cement / Sand / Gravel		
	1	1	2

Steel:	10.00	mm (diameter)
	11.20	m / column
	6.77	kg / column

vi. **Column, two per well.**

Length:	1651.00	mm
Width:	216.00	mm
Thickness:	150.00	mm

Sand:	0.03	m3 / two columns
Gravel:	0.06	m3 / two columns
Cement:	0.44	bag / two columns

Mixture:	Cement / Sand / Gravel		
	1	1	2

Steel:		
	10.00	mm (diameter)
	12.48	m / column
	7.55	kg / column

Steel:	4.00	mm (diameter)
	4.80	m / column
	0.35	kg / column

**c. Staff Required for Production**

Field workers required for a production centre, producing an average of 12 rings per working day are as follows:

-	Site Engineer	1/4 time	-	Mason	1
-	Foreman	1/2 time	-	Labours	4

**4. Construction**

**a. Specifications**

All the selected wells should be fully constructed. A fully constructed well means:

**i. Rings**

The rings should only be transported to the well site when the digging process is fully completed (depth of water should be a maximum of 1.5 meters in the well). As an average, 20 rings per well are recommended.

The well should be full ringed when there is a possibility of collapse because the well has been constructed in:

- a sandy area,
- a very soft soil/loose stratum,
- a mixture of sand and gravel, or
- land with small stones.

**ii. Slab**

A slab is used when the well does not require full rings.

**iii. Top ring**

All the wells with full rings should have a top ring.

**iv. Top ring cover**

A top ring cover is placed on the top ring to bear a pedestal for the installation of a hand pump.

**v. Columns**

Two columns are fitted on the well. The main functions of the columns on the well are as follows:

- Using a reel, bucket and rope when the hand pump is not working.
- Cleaning the well occasionally.

**vi. Apron/Cap**

A circular apron is constructed 1200 mm from the top ring, surrounding the well.

Materials Required:

Sand:	0.42	m3
Gravel:	0.63	m3
Cement:	6.00	bags
Mixture Volume:	1.25	m3
Stone (small size):	2.00	m3

Curing of concrete products should be done for a period of at least two weeks.

**b. Staff Required for Construction**

Site Engineer:	1/4 time	Skilled Labours:	1
Foreman:	1/2 time	Unskilled Labours:	1
Mason:	1		



## 5. Pump installation

### a. Pump Components

The pump components are as follows:

- |                        |                        |
|------------------------|------------------------|
| - Pump head assembly   | - Pump rod             |
| - Handle               | - Rod centralises      |
| - Rod hanger assembly  | - Bearing              |
| - Rod hinge pin        | - U-Seek               |
| - Fulcrum pin          | - Valve Bobbin         |
| - PVC raising main     | - O-Ring small         |
| - Solvent cement       | - Flapper              |
| - Plastic rope 6 mm    | - Compression Cone     |
| - Pipe centralises     | - Cylinder             |
| - Foot valve complete  | - Pump pedestal        |
| - Foot valve connector | - Steel Cone           |
| - Foot valve receiver  | - Stainless steel Cone |
| - Plunger complete     | - Fishing Tool         |
| - Plunger rod          | - Box Spanner          |
| - Plunger body         |                        |

Prior to installing a pump, all of the above items should be carefully checked and transported to the well site.

### b. Staff Required for Pump Installation

Field Engineer	1/4 time	Skilled Labours	1
Foreman	1/2 time	Unskilled Labours	2

## G. HAND PUMP MAINTENANCE

The objective is to create an autonomous local maintenance system, which will not require long-term support from SCA (the implementing agency). This requires: that the responsibility for the maintenance (including the cost of maintenance) rests with the users; that the implementing agency undertakes to train local persons in the skills necessary to maintain and repair the installations; and, that arrangements for a continuous supply of spare parts are made.

The maintenance of the installations (improved shallow/bored hole wells with hand pumps) will be the responsibility of the user group, who will also bear the costs of maintenance.

The establishment of a maintenance system involves the following steps:

- a. Discussions with the representatives of the project area in connection with the project agreement on:
  - i. How to organise a community payment system to cover the costs of the maintenance.
  - ii. Whom to select and train as hand pump mechanics.

These discussions should be continued with the user groups in order to decide on the specific arrangements.

- b. Organisation of a community payment system may be done in different ways. It may either be based on already existing institutions (examples are the mir-ab, or the exchange of services for grain between artisans and farmers), or it may be based on market relations.

- c. The selection of the persons for training as mechanics is related to the way the maintenance system is organised. If it is based on artisan relations, local blacksmiths should preferably be selected for training. If it is based on market relations, a mechanic (e.g. vehicle, tractor or cycle) should be selected for training in one or more bazaar centres within the project area.
- d. The persons who are trained as mechanics should be identified during the survey or site selection. More persons should be identified, as needed, since some may withdraw for various reasons or be rejected during the training.
- e. The number and location of persons who are selected for training will depend on the number of hand pumps installed and the distance between the villages within the project area. The number of hand pumps to be maintained by each hand pumps mechanic should preferably be large enough to yield a supplementary income which makes the work worthwhile, 40-50 hand pumps. At the same time, the area to be covered by a single hand pump mechanic should not be too large, since this may reduce the level and frequency of maintenance and repair.
- f. The actual training should include practical on-the-job instruction, and should be concluded with a competence test of the skills of the mechanic. Trainees who do not pass the test should be rejected. Trained hand pump mechanics should be registered on the record attached (see Annex IV).
- g. The hand pump mechanic should be involved in the installation of the pumps which he is going to maintain. As part of the training, the hand pump mechanic will be provided with the necessary tools free of charge.
- h. The hand pump mechanic should be provided with a list of ex-factory spare part prices.
- i. The performance of the mechanic should be monitored over at least a six month period.
- j. One bicycle should be provided to each mechanic, but maximum one bicycle per 40 wells.
- k. One SPARE PART KIT should be given to the selected mechanic or the local community.
- l. Shopkeepers who are willing to market the spare parts for the hand pumps should be identified in the bazaar centres. In order to avoid a monopoly and high prices on spare parts, two shopkeepers should preferably be identified to market spare parts within a particular project area.
- m. Shopkeepers should be introduced to the DACAAR Hand Pump Factory in Swabi from where they can obtain the spare parts at market price. Regular mechanics who are selected for training as hand pump mechanics may also be the ones who can market the spare parts.

The selected mechanics should be trained while installing pumps on the wells in their respective areas. The mechanics will be provided with Pump Maintenance Kit.

The components of the Pump Maintenance Kit are as follows:

- Rod hanger assembly	1	- Pump Rod	10
- Rod hinge pin	1	- Rod centralises	15
- Fulcrum pin	1	- Bearing	30
- PVC raising main	12m	- U-Seek	30
- Solvent cement	1	- Valve Bobbin	10
- Plastic rope 6 mm	100m	- O- Ring small	10
- Pipe centralises	1	- Flapper	1
- Foot valve complete	1	- Compr. Cone	1
- Foot valve connector	1	- Stainless Bolt	2
- Plunger complete	1	- Fishing Tool	1
- Plunger rod	1	- Box spanner	1
- Plunger body	2		

## **H. SUPERVISION**

- a. Initially, the water supply projects should be supervised daily by the RO's and the RETSU to mobilise the project personnel and the community.
- b. A field engineer will be assigned to supervise the project regularly as well as the Rural Engineering Manager in the ROs.
- c. The local authority and the community key persons should supervise the project occasionally to motivate the villagers for active community participation.
- d. The ongoing activities, expenditure, personnel/field workers skills, work quality and the community contribution should be overseen, as outlined in the project planning.
- e. A site book should be kept on site, and all activities and visitors will be recorded. The site stock ledger (see Annex V) must be kept updated at all time. The Site Engineer is responsible for keeping these records.

## **I. MONITORING**

- a. A combined group of selected persons from the ROs and RETSU should monitor the project regularly.
- b. RETSU will monitor the project activities based on the project planning.
- c. The following points will be monitored:
  - i. The basic project documents.
  - ii. The progress of the specific tasks/activities against the work plan and SCA policy.
  - iii. The project budget against the implementation costs.
  - iv. The project personnel/field worker.
  - v. The community involvement/contribution.
- d. The project will be monitored as agreed in the basic project documents and as required by the SCA Management and donors. This may be conducted by either an internal or an external monitoring team.

## **J. REPORTING**

The water supply monthly progress report should be regularly prepared by the field engineer and submitted to the RO and RETSU (see Annex VI).

## K. EVALUATION

The project should be evaluated mid-term/after the project is completed, to assess the following:

- a. Achievements/objectives.
- b. Impact on target group.
- c. Accessibility.
- d. Sustain ability.
- e. Effectiveness.
- f. New project identification.
- g. The extent of utilisation of improved drinking water sources.
- h. The condition of hand pumps and the functioning of the maintenance system.
- i. Internal/external evaluators will be dispatched as selected by the management, ROs and RETSU to evaluate the project.

