

## Nthunguni Spring Project

### A Proposal from the Kenya Water, Energy, Cleanliness and Health Project (KWENCH)

The purpose of this project is to construct a water supply system for four schools, five churches and eight commercial centres in Mbooni West District, Kithungo Location, Mbooni Constituency, Mbooni Division, Ngai Ward. Our local partner in the project is the Nthunguni Water Project self-help group. The water supply system will be built in two phases. During the first phase, KWENCH will construct four *in situ* storage tanks made of hard core and cement which will be filled with water from a perennial spring. The water will be tested and, if necessary to ensure potability, the Nthunguni Water Project self-help group will treat the water within the storage tanks on a regular basis. During the second phase, water from the storage tanks will be piped to tank stands located at the schools, churches and commercial centres where it will be stored in plastic, 10m<sup>3</sup> tanks and sold at kiosks located at the bottoms of the stands. The flow of water throughout the project will be entirely by gravity. No water pumps will be needed.

A third phase will consist of the construction of eight composting toilet blocks equipped with hand-washing stations at the commercial areas where water points will have been installed. The composting toilets will be based on the *Fossa alterna* model, in which each toilet stall contains two composting pits. One, already full pit is covered with a concrete slab and allowed to compost as the second pit is used and begins to fill. Once the composting pits are dug, a layer of dried leaves, ash and clean soil will be placed in the bottom of the first pit to be used. After each use, the user will add a handful of a mixture of leaves, ash and soil. When the first pit is full, it will be covered and left to compost for three to six months while the second pit is in use. The compost generated in the pits will be clean, fluffy and odour-free! Each composting toilet block will contain four stalls-two for men and two for women.

KWENCH and the Nthuguni Water Project self-help group will provide hygiene education to the students at the four schools where the tank stands and kiosks have been built while the composting toilets are under construction. The students will then educate their broader communities through dramatic presentations during the ribbon cutting ceremonies for the toilet blocks. Finally, the compost from the composting toilets will be used to support livelihood activities for the Nthuguni Water Project self help group in the form of growing trees, fruits and vegetables. The managing boards of the commercial centres will oversee the production and sale of compost from the toilet blocks. KWENCH and the Nthuguni Water Project self help group will also coordinate with agricultural retail outlets to make the compost available for sale to local farmers.

Project beneficiaries include 50 members of the Nthunguni Water Project self-help group, who will earn income from selling water from the *in-situ* storage tanks and arboriculture/agroculture livelihood projects. Other beneficiaries include the 190,000 people who regularly work at or attend the churches and schools and who buy or sell at the commercial centres. Additional beneficiaries include the workers, skilled and unskilled, who will be hired from within the community to construct the project.

## Budget

Phase 1: Construction of 4 *in-situ* concrete storage tanks (8 meter diameter, 225 m<sup>3</sup> volume)

Materials for 1 tank

2" pipes 4 @ 4,000	16,000
Cement 600 bags @ 800	480,000
Water proof cement 1,600 bags @ 300	480,000
Gate valves 4 @ 3,500	14,000
4x2 timber 1,600 feet @ 90	144,000
6x1 timber 2,700 feet @ 60	162,000
6x2 timber 800 feet @ 120	96,000
3x2 timber 3,000 feet @ 40	120,000
Water proof black board 20 pieces @ 4,500	90,000
Manhole cover 2 pieces @ 5,000	10,000
4" nails 50 kg @ 250	12,500
3" nails 50 kg @ 250	12,500
2" elbow 4 @ 1,200	4,800
Union 4 pieces @ 1,250	5,000
Angle line 2x2 gauge 16 80 pieces @ 3,650	292,000
Flat iron sheet gauge 14 78 pieces @ 3,800	296,400
Boss white 16 gauge 100 pieces @ 500	50,000
Y16 metals 360 @ 1,800	648,000
Y10 metals 280 @ 1,500	420,000
Y8 metals 420 @ 850	357,000
Arching machine for compacting 192 days @ 1,000	192,000
Mixing machine 192 days @ 2,500	480,000
Binding wire 50 kg @ 150	7,500
Subtotal	4,389,700
x 4 storage tanks	17,558,800

Water testing	15,000
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Labour for 4 tanks

6 masons x 6 days/week x 32 weeks @ 1,500/day	1,728,000
4 plumbers x 6 days/week x 32 weeks @ 1,500/day	1,152,000
3 steel workers x 6 days/week x 32 weeks @ 1,500/day	864,000
Labourers for constructing the tanks 10 labourers x 6 days/week x 32 weeks @ 400/day	768,000
KWENCH field supervisor 6 days/week x 32 weeks @ 1,500/day + food supplement 500/week	304,000
Subtotal	4,816,000

Phase 1 subtotal	22,389,800
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Administration (15%)	3,358,470
<u>Contingency (10%)</u>	<u>2,238,980</u>
Phase 1 total	27,987,250

Community contribution	
Sand 720 tonnes @ 2,800	2,016,000
Ballast 150 tonnes @ 2,200	1,320,000
Labourers for digging foundation 20 labourers x 6 days/week x 5 weeks @ 400/day	240,000
Labour for digging tunnels 20 labourers x 6 days/week <u>x 5 weeks @ 400/day</u>	<u>240,000</u>
Subtotal	3,816,000

Phase 2: Construction of 17 tank stands with water tanks and kiosks and connection of the tanks by pipes to the *in-situ* storage tanks and to each other.

a. 17 10m<sup>3</sup> plastic water tanks @ 78,000 1,326,000

b. Tools for digging trenches for pipe-laying

Mattocks 50 @ 1,200	60,000
Shovels 50 @ 1,500	75,000
Pangas 5 @ 400	2,000
<u>Axes 10 @ 800</u>	<u>8,000</u>
Subtotal	145,000

c. 17 40-foot high tank stands

Budget for materials for 1 tank stand

56 pieces 2x2 angle line @ 3,400	190,400
4x2 beams 16 @ 10,000	160,000
H bar 8 @ 8,840	70,720
Ground bolts 64 @ 250	16,000
Heavy gauge 4" flat bar 10 pieces @ 3,500	35,000
Joint bolts 460 @ 30	13,800
Paint 2 tins @ 1,800	3,600
Thinner 10 litres @ 800 per 5 litres	1,600

Brushes 4 @ 350	1,400
Welding rods 4 packets @ 3,000	12,000
2x6 timber 200 feet @ 120	24,000
Cement 20 packets @ 800	16,000
1" gate valves 4 @ 3,500	14,000
1" tap @ 1,500	1,500
1" nipples @ 100	100
1" ball valve @ 1,500	1,500

Iron plate ¼" @ 36,000	36,000
Grinding disks 8 @ 300	2,400
Cutting disks 15 @ 200	3,000
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Subtotal	603,020
x 17 tank stands	10,251,340

d. Construction of kiosks at the bottom of each tank stand

Budget for materials for 1 kiosk

Iron sheets 4 @ 800	3,200
Steel door @ 15,000	15,000
Cement 12 bags @ 800	9,600
Roofing nails 4 kg @ 300	1,200
Nails 4 kg @ 250	1,000
Paint 3 tins @ 1,800	5,400
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Subtotal	35,400
x 17 kiosks	601,800

Budget for labour for 17 kiosks

Masons 2 x 30 days @ 1,500	90,000
Painter 4 days @ 1,500	6,000
Labourers 2 x 30 days @ 400	24,000
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Subtotal	120,000
Subtotal for construction of 17 kiosks	721,800

Community contribution

for 1 kiosk

Bricks 600 @ 10	6,000
Sand 1 tonne @ 2,800	2,800
Ballast 1 ½ tones @ 2,200	3,300
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Subtotal	12,100
x 17 kiosks	205,700

e. Construction of dam at spring outlet

Cement 20 packets @ 800	16,000
3" pipe @ 4,000	4,000
3" T-joint @ 500	500
3" gate valves 2 @ 3,500	7,000
3" nipples 2 @ 250	500
3" union 10 @ 250	2,500
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Subtotal	30,500

Community contribution

Sand 4 tonnes @ 2,800	11,200
Ballast 8 tonnes @ 2,200	17,600
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Subtotal	28,800
f. Connection of dam to first storage tank (500 meters west of spring)	
3" pipes 40 @ 4,000	160,000
3s" sockets 40 @ 120	4,800
3" bend @ 100	100
Subtotal	164,900
g. Connection of first storage tank to tank at Mumani Primary School (800 meters southwest of first storage tank)	
3" pipes 70 @ 4,000	280,000
1" sockets 70 @ 120	8,400
3" sockets 60 @ 120	7,200
1"x 3" T-reducer @ 300	300
Gate valve 2 @ 3,500	7,000
1" nipples 6 @ 100	600
1" elbows 10 @ 120	1,200
1" ball valve @ 1,500	1,500
Subtotal	306,200
h. Connection of tank at Mumani Primary School to tank at Mumani Secondary School (600 meters southeast of Mumani Primary School)	
3" pipes 60 @ 4,000	240,000
1" sockets 80 @ 120	9,600
3" sockets 60 @ 80	4,800
1" pipes 60 @ 800	48,000
1"x 3" T-reducer @ 300	300
1" gate valves 2 @ 3,500	7,000
1" nipples 6 @ 100	600
1" ball valve @ 1,500	1,500
3" union 10 @ 300	3,000
Subtotal	314,800
i. Connection of tank at Mumani Secondary School to tank at Mumani Shopping Centre (1 km south of Mumani Secondary School)	
3" pipes 80 @ 4,000	320,000
1" pipes 60 @ 800	48,000
3" sockets 80 @ 120	9,600
1" sockets 60 @ 80	4,800
1"x 3" T-reducer @ 300	300
1" gate valves 2 @ 3,500	7,000
1" nipples 6 @ 100	600
3" union 10 @ 300	3,000
1" ball valve @ 1,500	1,500

Subtotal	394,800
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j. Connection of tank at Mumani Secondary School to fourth storage tank (800 m west of Mumani Secondary School), same as g, above.

Subtotal	306,200
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k. Connection of fourth storage tank to tank at Kavumbu Market (2 km west of fourth storage tank)

3" pipes 160 @ 4,000	640,000
1" pipes 80 @ 800	64,000
3" sockets 160 @ 120	19,200
3"x 1" T-reducer 2 @ 300	600
3" union 20 @ 300	6,000
1" gate valves 4 @ 3,500	14,000
1" nipples 6 @ 100	600
1" sockets 80 @ 80	6,400
<hr/> Subtotal	<hr/> 750,800

l. Connection of tank at Kavumbu Market to tank at Kavumbu Anglican Church (200 meters north of Kavumbu Market)

3" pipes 20 @ 4,000	80,000
1" pipes 30 @ 800	24,000
3" sockets 20 @ 120	2,400
1" sockets 15 @ 800	12,000
1"x 3" T-reducer @ 300	300
1" elbow 10 @ 120	1,200
1" ball valve @ 1,500	1,500
1" nipple 4 pieces @ 100	400
<hr/> Subtotal	<hr/> 121,800

m. Connection of tank at Kavumbu Anglican Church to tank at Kavumbu Catholic Church (200 meters north of Kavumbu Anglican Church). Same as l, above.

Subtotal	121,800
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n. Connection of tank at Kavumbu Catholic Church to tank at Kavumbu Pentacostal Church (200 meters north of Kavumbu Catholic Church). Same as l, above.

Subtotal	121,800
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o. Connection of the tank at Kavumbu Pentacostal Church to tank at Kavumbu Primary School (200 meters north of Kavumbu Pentacostal Church) Same as l, above.

Subtotal 121,800

p. Connection of dam to second storage tank (500 meters east of the spring) Same as f, above.

Subtotal 164,900

q. Connection of second storage tank to third storage tank (800 meters east of second storage tank)

3" pipes 70 @ 4,000 280,000

3" sockets 70 @ 120 8,400

Subtotal 288,400

r. Connection of third storage tank to tank at Kyamuata Primary School (1 km southwest of third storage tank)

3" pipes 80 @ 4,000 320,000

3" sockets 80 @ 120 9,600

Subtotal 329,600

s. Connection of tank at Kyamuata Primary School to tank at Katulye Shopping Centre (3 km west of Kyamata Primary School).

3" pipes 240 @ 4,000 960,000

1" pipes 20 @ 800 16,000

3" sockets 120 @ 120 14,400

1" elbow 10 @ 120 1,200

1" nipples 4 pieces @ 100 400

Subtotal 992,000

t. Connection of tank at Kyamuata Primary School to tank at St. Joseph Katulye Catholic Church (200 meters to the southeast of Kyamuata Primary School) Same as l, above.

Subtotal 121,800

u. Connection of tank at St. Joseph Katulye Catholic Church to tank at Kitooni Anglican Church (1 km) Same as r, above.

Subtotal 329,600

v. Connection of tank at Kitooni Anglican Church to tank at Kayamuata Shopping Centre (1 km south of Kitooni Anglican Church). Same as r, above.

Subtotal 329,600

w. Connection of tank at Kyamuata Shopping Centre to tank at Kiuma Shopping Centre (1 km south of Kayamuata Shopping Centre). Same as r, above.

Subtotal	329,600
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x. Connection of tank at Kiuma Shopping Centre to tank at Soweto Shopping Centre (1 km south of Kiuma Shopping Centre). Same as r, above.

Subtotal	329,600
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y. Connection of tank at Mumani Secondary School to tank at Kavutini Shopping Centre (2½ km south of Mumani Secondary School).

3" pipes 200 @ 4,000	800,000
3" sockets 100 @ 120	12,000
1"x 3" T-reducer 10 @ 30	3,000
1" elbow 10 @ 120	1,200
1" nipples 5 @ 100	500
1" gate valves 4 @ 3,500	14,000
1" ball valve @ 1,500	1,500
<u>Subtotal</u>	<u>832,200</u>

z. Connection of tank at Kavutini Shopping Centre to tank at Kitooni Shopping Centre (1 km south of Kavutini Shopping Centre). Same as r, above.

Subtotal	329,600
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Budget for labour for building tank stands and connecting pipes

Welders 4 x 6 days/week x 16 weeks @ 2,000	768,000
Masons 8 x 6 days/week x 16 weeks @ 1,500/day	1,152,000
Carpenters 3 x 6 days/week x 16 weeks @ 1,500/day	432,000
Painters 2 x 6 days/week x 8 weeks @ 1,500/day	144,000
Plumbers 2 x 6 days/week x 16 weeks @ 1,500/day	288,000
Labourers 15 x 6 days/week x 16 weeks @ 400/day	576,000
KWENCH field supervisor 6 days/week x 16 weeks	
@ 1,500/day + food supplement 500/week	152,000
<u>Subtotal</u>	<u>3,512,000</u>

Transport of materials <sup>1</sup>	75,000
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Community contribution

Labour for digging trenches for pipes

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<sup>1</sup> Includes material for composting toilet blocks.



100 labourers x 60 days @ 400/day	2,400,000
Phase 2 subtotal	23,163,440
Administration (15%)	3,474,516
<u>Contingency (10%)</u>	<u>2,316,344</u>
Phase 2 total	28,954,300

### Phase 3: Composting Toilet Blocks and Hygiene Education

#### Budget for one composting toilet block

3-meter iron sheets 8 @ 800	6,400
Cement 30 packets @ 800	24,000
Y8 bars 20 @ 800	16,000
Iron nails 4 kg @ 250	1,000
Roofing nails 4 kg @ 300	1,200
Paint 4 tins @ 1,800	7,200
<u>Doors 6 @ 15,000</u>	<u>90,000</u>

Subtotal 145,800

x 8 composting toilet blocks 1,166,400

#### Labour for one composting toilet block

2 masons @ 1,500/day x 20 days	60,000
2 labourers @ 400/day x 20 days	16,000
<u>Painter @ 1,500/day x 4 days</u>	<u>6,000</u>

Subtotal 82,000

x 8 composting toilet blocks 656,000

Subtotal for 8 composting toilet blocks 1,822,400

#### Community contribution

Sand 2 tonnes @ 1,500	3,000
Ballast 2 tonnes @ 1,800	3,600
<u>Bricks 1,500 @ 10</u>	<u>15,000</u>

Subtotal 21,600

x 8 composting toilet blocks 172,800

#### Hygiene Education

Tutor (4 people @ 15,000)	60,000
Consultant to design booklets on hygiene	40,000
Production of booklets on hygiene (8 pages each @ 200 per booklet x 160 booklets)	32,000
Examination booklets (110 per booklet x 160)	17,600
Overheads made from hygiene booklet	1,700
Rental of projector (7,000 per toilet block)	56,000
Rental of public address system	

(microphone, speakers, amplifier 7,000 per toilet block)	56,000
Transport for projector and PA system (6,000 per toilet block)	48,000
Snacks (70 for 8,000 people)	560,000
Sodas (35 for 8,000 people)	280,000
Drinking water for dignitaries (8 cartons with 24 bottles each @ 2,000)	16,000
Subtotal	1,167,300
Phase 3 subtotal	2,989,700
Administration (15%)	448,455
Contingency (10%)	298,970
Phase 3 Total	3,737,125

#### Community contribution:

Soil, ash and leaves for adding to the pits of the composting toilet blocks after construction and after each use.

Handwashing stations, which will consist of reusable plastic bottles, string and soap.

Soil and seeds for producing fruit, vegetables and trees.

**NTHUNGUNI SPRING PROJECT GRAND TOTAL: Ksh 60,678,675**

#### Monitoring and Evaluation

KWENCH and the Nthunguni Water Project self-help group will request the institutions receiving water points and composting toilet blocks to commit to keeping records once the project construction and hygiene education components are complete for purposes of monitoring and evaluating the success of the project. During the first year of project operation, we will request the managing boards at each of the institutions receiving water points and composting toilet blocks to keep records of the numbers of people using these facilities, the costs of maintaining them, the gross income generated by them and the net income generated by them. Teachers at the four schools receiving hygiene education will be requested to observe and qualitatively record changes in student hygiene behaviour. The managing bodies of the commercial areas receiving composting toilets will be requested to keep records of the quantities of compost they produce. KWENCH and the Nthunguni Water Project self-help group will also survey students at the schools receiving hygiene education and community members at large to ascertain whether hygiene behaviour has improved at the end of the first year of project operation. The Nthunguni Water Project self-help group will check with each institution at the end of every quarter during the first year of project operation to ensure that records are being properly kept and to trouble-shoot in case problems connected with the project's operation arise. The Nthunguni Water Project self-help group will work with KWENCH and the relevant institutions experiencing operational problems to try to resolve any such problems.

During the second year of operation, we will continue to track the indicators monitored during the first year. In addition, we will request the institutions receiving the composting toilet blocks to record the amount of income generated through sales of the compost to agricultural retail outlets. We will ask the agricultural retail outlets to track the amount of compost they sell to farmers and the net profit they make from these sales. KWENCH and the Nthunguni Water Project self-help group will survey members of the community to qualitatively ascertain whether productive time spent working or studying has increased as a result of closer proximity to water points, availability of a safe water source and availability of clean toilets and handwashing stations at the commercial areas. Further, we will ask community members whether there have been improvements in health related to improved hygienic practices and availability of safe water sources and whether agricultural income has increased as a result of using compost on crops. The Nthunguni Water Project self-help group and KWENCH will continue to trouble-shoot and to try to resolve project-related problems.

Indicators:

After 1 year of implementation:

1. Number of people using water points and ablution blocks, measured through examination of written records kept by managing boards overseeing commerce at their water points and composting toilet blocks.
2. Net increase in income generated through user fees, as measured through examination of written records kept by managing boards overseeing commerce at their water points and composting toilet blocks.
3. Quantity of compost produced by composting toilets measured through examination of written records kept by managing boards of the commercial centres that have received composting toilet blocks.
4. Observed change in hygiene behaviour in students in schools that received hygiene education and the in broader communities where hygiene education performances have been staged in conjunction with ribbon cutting ceremonies for ablution blocks, measured by surveys of students, teachers and community members.

After 2 years of implementation:

All of the indicators included above, with the addition of:

5. Decrease of productive time used in fetching water from distant springs through use of the water points as measured by surveys of customers of the water points.
6. Decrease in rates of water-related diseases related to drinking contaminated water as measured by surveys of families purchasing water from project water points.
7. Increase in time spent in productive activities as a result of having community toilet blocks and handwashing stations available at commercial areas and as a result of improved hygienic behaviour as measured through surveys of community members.
8. Revenue earned from sales of compost to agricultural retail outlets measured through examination of written records of managing boards of the commercial centres that have received the composting toilet blocks.

9. Net income earned by agricultural retail outlets by selling compost to farmers as measured by their record books.
10. Net income generated by farmers through the sale of seedlings, fruits and vegetables produced using compost from the toilet blocks.