The Corporation was also mandated to assist the Government in the formulation and execution of a National Water Development Policy.

9.2.3 Other Institutions Related to Water

(a) Ministry of Local Government (MOLG) and Local Authorities

MOLG is the third institution with major responsibilities for the water supply and sanitation sector. The ministry's mission is to promote the development of Kenya through the establishment and existence of viable and well organised Local Authorities (LA's). MOLG currently oversees 164 LAs which are established by the Minister as provided for in Local Government Act. Among their many responsibilities is the provision of water and sanitation services in their areas as set out in the Act. Of the 164 LA's, 10 administer water and sewerage schemes, and the rest administer sewerage only or sanitation schemes, water being supplied by another water undertaker such as MENR or NWCPC. The Water and Sewerage Department of the Nairobi City Council, although a local authority scheme, is really a special case because of its size and the degree of autonomy it enjoys.

Of the five MOLG departments reporting to the Permanent Secretary and which, together, are to execute the functions and fulfill the mission, the Urban Development Department has direct technical responsibility for water and sanitation (see Figure 2.1.2 for its organisation structure). It has a Planning Division and a Technical Division out of its functions of:

- Formulating, with LA's, urban development policies;
- Coordinating implementation of urban development policies, programmes and projects in LAs; monitoring and evaluating these;
- Providing technical assistance to LAs.

Water and Sanitation Section is one of four technical sections addressing different subsectors of LAs and providing technical assistance to them.

(b) Non-Governmental Organisations (NGOs) and Community Schemes

The impact of NGOs in the provision of water supplies appears to be considerable and to have operated over many years. It has been estimated that at least 60 of the more than 400 NGOs active in Kenya are engaged in the water sector. Most have water components in integrated rural development projects.

It appears that many NGO projects employ MENR staff as technical advisers during development, after which they are handed over to the communities with some ongoing help from the Ministry. However, other water projects which may form part of larger integrated development projects, are undertaken without MENR being notified.

The district or divisional offices of the Ministry should be the contact point for all such schemes and a registration procedure should be mandatory.

In addition to the above, there are schemes operated by small informal groups which often collapse without financial or technical assistance. Those that do not fail are better managed, either with or without external help from, say, MENR field staff, with realistic fund raising arrangements. The Ministry of Culture and Social Services attempts to mobilise and assist groups like these, but is hampered by lack of funds and manpower in the field.

9.3 LEGAL FRAMEWORK OF THE WATER SECTOR

An appropriate legal and regulatory framework is necessary to monitor and control the water sector. The main objectives of the regulatory system are to: ensure compliance with standards of acceptable service, protect the ratepayer and create an environment that promotes stable and viable water institutions. The Kenyan Government has enacted laws related to water supply and sewage disposal including environmental legislation. The main laws include:

(a) The Water Act (Cap 372)

(b) The National Water Conservation and Pipeline Corporation Order (Legal Notice No.270, June 24, 1988)

(c) The Local Government Act (Cap *265)*

(d) The Irrigation Act

(e) The Tana and Athi Rivers Development Authority Act

(f) The Keno Valley Development Authority Act and The Lake Basin Development Authority Act

(g) The Agriculture Act (Cap 318)

(h) The Public Health Act (Cap 242)

(i) The Environmental Management and Co-ordination Act of 1999.

(j) Wildlife (Conservation and Management) Act (Cap 376)

These laws are briefly described and assessed where relevant to the water sector.

9.3.1 The Water Act (Cap 372)

The Water Act, which is the most important law related to water, was first established in 1951 to make better provision for the conservation, control, apportionment and use of water resources. It was revised in 1972 and further subsidiary legislation was enacted in 1995.

(a) The objective of the Water Act

The purpose of the Water Act is to make provision for the conservation, control, apportionment and use of the water resources of Kenya, and for purposes incidental thereto and connected therewith. Except for waters which are wholly situated in a private land owner's domain, the Act vests the rights over all surface and ground water in the Government subject only to the rights which users may acquire under licence.[1] The overall power for the control of every body of water is exercised by the Minister,[2] who has the duty to promote the investigation, conservation and proper use of water resources of Kenya.[3] Part III of the Act provides for the general powers of the Minister. He has power to purchase or acquire land by any other means for the conservation, improvement or use of water,[4] to construct and maintain such works as may be necessary for the protection of the source or course of any body of water, the disposal or control of flood water, the conservation of water, and the distribution, apportionment or measurement of water;[5] to impose water rates upon any person benefiting by such works;[6] to impose water rates in connection with community water projects;[7] to impose water rates on local authorities with respect to water projects in reserved areas;[8] to order drainage of swamps;[9] to establish protected catchment areas in cases where special measures are necessary for the protection of water resources;[10] to expropriate, on payment of compensation, and operate or dispose of water works;[11] to enter upon, use, order the use of, maintain, vary, destroy or remove abandoned water works wherever situated;[12] and, in cases of emergency as a result of a serious deficiency of water for domestic purposes caused by reason of exceptional shortage of rain, accident, or other unforeseen circumstances, to direct that any person who has excess water supply for his domestic purposes does supply to such area or other person the excess quantity.[13]

(b) Institutions under the Water Act

The Act then establishes two important institutions. The first is the Water Resources Authority, established under section 19, with the duties, *inter alia*, to investigate the

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[1] Supra, note 24, section 3.
[2] Ibid., section 4.
[3] Ibid., section 7.
[4] Ibid., section 8.
[5] Ibid, section 9.
[6] Ibid., section 10.
[7] Ibid., section 11.
[8] Ibid. section 12.
[9] Ibid. section 13.
[10] Ibid. section 14.
[11] Ibid. section 15.
[12] Ibid, section 16.
[13] Ibid. section 17.

water resources of the country and advise and make recommendations on the improvement, preservation, conservation, utilization and apportionment, to prepare estimates of the future water supply requirements of any area of the country, and to formulate proposals for meeting the existing and future water supply requirements of any area.[14] The second is the Water Apportionment Board established under section 25, with the duty, to grant permits for proposed diversion, abstraction, obstruction, storage or use of water from a body of water or drainage of a swamp,[15] and powers to prescribe measuring and controlling devices for water consumption,[16] to require equitable use and to prohibit any practice that may cause undue reduction of water during drought and in the case of small watercourses,[17] to determine all questions as to full, efficient, reasonable and beneficial utilization of water,[18] and to declare various matters pertaining to bodies of water.[19] Overall, the Water Apportionment Board works in an advisory capacity to the Minister and determines the apportionment of national waters according to user requests.

(c) Powers of the Minister under the Act

The Act then empowers the Minister to take a number of steps to ensure the protection of water catchment areas and ground water resources. He may declare an area to be a protected catchment area, a conservation area, or a protected area. Where the Minister is satisfied, after consultation with or on the advice of the Water Resources Authority, that special measures are necessary for the protection of water resources in or derived from any area, he may declare such area or any part thereof to be a protected catchment area.[20] By order, the Minister may require, regulate or prohibit any activities within such a protected catchment area which may be contrary to the requisite protection goals. Any person who fails to comply with such order shall be guilty of an offence.[21] Under section 74 of the Act, the Minister has power to declare, after consultation with the Water Resources Authority, an area to be a conservation area if special measures for the conservation of ground water in the public interest whether for the protection of public water supplies or for the protection of water supplies used for industrial or other purposes are required. Any person who has been using ground water in an area so declared to be a conservation area and who desires to continue with the use must, within six months of the Minister's declaration, obtain a permit.[22] Besides, no person may construct and use any well for the abstraction of ground water, extend any existing well for the abstraction of additional ground water, or abstract ground water by mechanical means from any well, within a conservation area without a permit.[23] Where the Minister has appointed an undertaker to be responsible for the control and distribution of water in a given

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[14] Ibid. section 20.
[15] Ibid. sections 36, 78, & 79.
[16] Ibid. section 28.
[17] Ibid. section 29.
[18] Ibid. section 30.
[19] Ibid. section 31.
[20] Ibid. section 14.
[21] Ibid.
[22] Ibid. section 75.
[23] Ibid., section 76.

area,[24] there is a corresponding duty to ensure an adequate supply. Accordingly, whenever the Minister is satisfied that special measures are necessary for the protection of a catchment area from which the water supply of an undertaker is obtained, he may declare such area to be a protected area.[25] By order, he may require, regulate or prohibit the carrying out of any activities in the area that may be inimical to the protection of the area or the water supply obtained therefrom. Such an order must be published in the Gazette and in a newspaper circulating in the district where the area is situated.[26]

(d) Pollution control

The Water Act also addresses the issue of pollution of water resources, albeit in the part of the statute addressing miscellaneous issues.[27] One may be tempted to conclude that pollution, and the quality of water generally, is not given the priority that it deserves in the statute. There is comparatively more emphasis on ensuring that there is no diminution in the quantity and not quality of supplies. However, pollution of water used for human consumption is an offence under the Act.[28] The perpetrator of the pollution shall not be so liable if he was practising a lawful method of cultivation of land or the watering of stock which does not conflict with the principles of good husbandry.[29] Similarly, it is not an offence if the perpetrator is involved in reasonable use of oil, tar, or other substances on any highway or road and reasonable steps are taken to prevent pollution. Finally, the pollution does not constitute an offence where the perpetrator was involved in the disposal of wastes or effluent in any area that the Minister may have specified.[30]

In any event, it is an offence for any person to wilfully and without authority throw, convey, or cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive or unwholesome matter or thing into or near any body of water in such manner as to cause, or be likely to cause, pollution.[31] Besides, under Rule 72 of the Water (General) Rules[32], any person the effluent from whose works is returned to or discharged into a body of water not being "in such a degree of purity as will satisfy" the Water Apportionment Board or containing any matter "poisonous or otherwise likely to be injurious directly or indirectly to public health, to livestock or to crops, or to orchards or gardens irrigated with such water, or to any product for which such water is used in any process whatsoever," shall be guilty of an offence. Absent water quality and discharge standards as well as a monitoring mechanism, these provisions have remained inoperable, although well-intentioned!

A further attempt to amend the Act is now in progress led by the Water Rights

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[24] That is, under section 124 of the Act.
[25] Section 150(1)
[26] Section 150(2).
[27] Part XVI of the Act.
[28] Ibid., section 158(1).
[29] Ibid.
[30] Ibid.
[31] Ibid., section 160(2)(b).
[32] Ibid., L.N. 374 of 1964. See also Rules 77-80.

Section of the MOWR. It is intended that a second Water (Amendment) Bill be prepared, circulated to stakeholders and the Attorney General, and then submitted to Parliament.

9.3.2. The National Water Conservation and Pipeline Corporation Order, 1988

The National Water Conservation and Pipeline Corporation was established in 1988 by an Order,[33] and among its functions are the development and management of the water projects listed in the Schedule to the Order, as amended from time to time.[34] To that end, and in connection with the water projects in the Schedule, Regulation 5 provides that the Corporation shall (a) supply water in bulk to such water undertakers as may be designated by the Minister, (b) supply water, in bulk or otherwise, to such persons or class of persons as the Minister may designate, (c) do all such things as may be necessary or advantageous for the management and development of water projects and for securing an adequate supply of water, and (d) apply for and obtain such licences, permits and authorities required under any written law or as may be desirable. Further, the Regulation provides that the Corporation shall operate under the general direction of the Minister and shall assist the government in the formulation and implementation of a national water development policy.

It is noteworthy that the functions of the Corporation do not include addressing or dealing with factors or activities that may affect the availability of water or its quality. The supply with which the Corporation is concerned is dependent on the availability which, in turn, is dependent on conservation of catchment areas and drainage basins and ensuring that activities in these areas do not lead to diminution of the water in quantity and quality. The implication here is that the Corporation would be rendered functus officio if the supplies dried out!

A major weakness in the legislation establishing the Corporation is the absence of any statement indicating how it is to relate to other institutions, eg MOWR and local authorities, in the development and management of water supplies. This has caused considerable confusion among these other institutions and needs to be resolved.

9.3.3 The Local Government Act (Cap 265)

This Act was set up in 1963 to provide for the establishment of authorities for local government, to define their functions and to provide for "connected" and "incidental" matters. It was revised in 1986.

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[33] Supra, note 37.

[34] As per the last amendment to the Schedule, effected vide L.N. 42 of 1989, the total number of water projects under the Corporation is now forty two.

In the context of this study, the Act provides that every local authority (municipal, town and urban council) may establish, maintain and regulate sewerage and drainage works within or outside its area. It may also compel the construction of private drains and their connection to public drains or sewers, and fix charges for the use of sewerage and drainage facilities.

In addition, a local authority (municipal, town, urban or area council) may undertake the supply of water within its area, and may establish, acquire and maintain works for this purpose. A local authority may make by-laws under this Act to the extent that a water undertaker may make regulations under the Water Act. However, it is not stated dearly that every local authority undertaking water supply is a water undertaker under the Water Act. For example, the Water (Water Undertakers) Rules apply only to gazetted water undertakers.

Many local authorities operate and manage water supply systems, not only as water undertakers but also pursuant to the provisions of the Local Government Act.[35] The water and sewerage department of every local authority is responsible for operation and maintenance of works for the supply systems. Augmentation and expansion of the systems are under the control of the parent ministry.

9.3.4 The Irrigation Act

Section 15(2)(a) of the Irrigation Act (Cap. 347) enjoins the Irrigation Board, in conjunction with the water Resource Authority, to formulate and be responsible for the execution of policy in relation to national irrigation schemes. One can only hope that such policy would take into account and be in consonance with the provisions of the Water Act.

This Act provides for the establishment, constitution and functions of the National Irrigation Board which is responsible for the development, control and improvement of national irrigation schemes in the areas designated by the Minister of Water Resources.

9.3.5 The Tana and Athi Rivers Development Authority Act

The Act provides for the establishment of an authority to advise on the institution and coordination of development projects in the two basins.

9.3.6 The Kerio Valley Development Authority Act and the Lake Basin Development Authority Act

These Acts each provide for the establishment of an Authority to:

(a) Plan and coordinate the implementation of development projects in the

[35] Chapter 65, Laws of Kenya, (Revised Edition, 1986), sections 178-180.

catchment area;

(b) Establish a long range development plan for the area;

(c) Coordinate the abstraction and use of natural resources, especially water, and to monitor this;

(d) Maintain a database of all relevant statistics for the area.

The Acts do not state that the Authorities have sole or any responsibility for developing and distributing water supplies in bulk, either within the Area or outside it.

9.3.7 The Agriculture Act (Cap 318)

Section 201 of the Agriculture Act acknowledges the supremacy of the Water Act. It states -

"Nothing in this Act or any rules made thereunder shall prejudice or affect the provisions of the Water Act, and where anything in this Act or any rule is inconsistent with any such provision that provision shall prevail." This provision should be included under other Acts as far as water is concerned.

The Act promotes agricultural development according to sound practices of good land management and stresses the need for conservation of soil and its fertility. Thereby, the Act indirectly emphasises the importance of preventing of soil erosion and the consequential deterioration of the quality of surface water.

9.3.8 The Public Health Act (Cap 242)

This Act requires local authorities to take all lawful measures to prevent and deal with the outbreak of disease. As there is a direct connection between certain diseases, sewage and water supply, every local authority, whether a water undertaker or not, has a statutory duty in water supply, water pollution and sewage disposal. For this purpose, the Act gives every local authority wide powers to deal with unsatisfactory water supplies, wastewater and sewage disposal and water pollution. For example, a local authority is mandated to prevent pollution of any supply of water used for drinking or domestic purposes, to purify it should it become polluted and to take action against those causing the pollution. Furthermore, the local authority is empowered to exercise its powers outside its area, if for example the source of water is outside its area.

Powers given to the Minister include: delegation of powers to local authorities and others to control the standard of purity of treated effluent and to control industries liable to pollute water courses; making rules for the protection of water supplies in defined areas; prohibition of insanitary irrigation within a town or its environs. There is

a fair amount of subsidiary legislation which includes detailed provisions for drainage and sewerage.

9.3.9 The Environmental Management and Co-ordination Act 1999

Management of water resources has also been addressed by legislation outside the sectoral confines. In particular, this has been addressed under the rubric of environmental protection and conservation by the newly enacted Environmental Management and Co-ordination Act.[36] The Act has detailed provisions on this matter. For instance, section 42 provides that no person shall, without the written approval of the Director General of the National Environment Management Authority, given after an environmental impact assessment in relation to a river, lake or wetland carry out a number of activities, namely, (i) erect, reconstruct, place, alter, extend, remove or demolish any structure or part of any structure in or under the river, lake or wetland; (ii) excavate, drill, tunnel or disturb the river, lake or wetland; (iii) introduce any, animal whether alien or indigenous, dead or alive, in any river, lake or wetland; (iv) introduce or plant any part of a plant specimen, whether alien or indigenous, dead or alive, in any river, lake or wetland; (v) deposit any substance in a lake, river or wetland or in, on, or under its bed if that substance would or is likely to have adverse environmental effects on such water body; (vi) direct or block any river, lake or wetland from its natural and normal course; or (vii) drain any lake, river or wetland. Besides, the Minister is empowered to declare a lake shore, wetland, coastal zone or river bank to be a protected area for purposes of conserving the environmental quality of such a body of water.[37] He may also issue general and specific orders, regulations or standards for the management of river banks, lake shores, wetlands, or coastal zones and for the protection and conservation of such areas if they face imminent risk of environmental degradation. Such orders may provide for, inter alia, the development of overall environmental management plans for the water bodies taking into account the relevant sectoral interests, the development of contingency plans for the prevention and control of all deliberate and accidental discharge of pollutants into the water bodies, as well as the development of plans for the protection of wetlands.[38]

(a) Management of environment - lakes and rivers

The National Environment Management Authority is also under a duty to issue guidelines for the management of the environment of lakes and rivers.[39] It is also required to develop, issue and implement regulations, procedures, guidelines and measures for the sustainable use of hill sides, hilltops, mountain areas and forests and the control of the harvesting of forests and other natural resources so as to protect water catchment areas.[40]

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[36] Act No. 8 of 1999. The Act became operational effective January 14, 2000.
[37] Ibid. section 42(2).
[38] Ibid., section 42(3).
[39] Ibid., section 42(4).
[40] Ibid., sections 44 & 47.

Further, the Minister is empowered to declare any area of land, sea, lake or river to be a protected natural environment area for the purpose of promoting and preserving specific ecological processes, natural environment systems, natural beauty or species of indigenous wildlife or the preservation of biological diversity in general. Once an area has been so declared, the National Environment Management Authority is empowered to issue guidelines and prescribe measures for the management and protection of such area.[41]

(b) Environmental impact assessment - water projects

Section 58 of the Act makes it mandatory for projects that are likely to have adverse environmental impacts on water to undergo environmental impact assessment. These projects are dams, rivers and water resources including storage dams, barrages and piers; river diversions and water transfer between catchments; flood control schemes; and drilling for the purpose of utilizing ground water resources including geothermal energy.[42]

What is clear from the above is that the Environmental Management and Co-ordination Act is innovative in one fundamental way. Unlike the other legal instruments before it, it focuses the management strategy less on the resource (water) per se and more on the protection and conservation of the ecosystems that enhance and maintain both the quality and quantity of the resource available for use. By focussing more on the ecosystems, the Act adopts a holistic approach to water resource management which, in turn, enables the consideration of related factors such as deforestation, agricultural and animal husbandry and human settlements, all of which have direct implications on the availability and sustainable use of water.

(c) Water quality standards

As already noted above, the major problem with the prevention and control of water pollution is the absence of any water quality and discharge standards. With the Environmental Management and Co-ordination Act in force, this may soon become history. Water polluting activities and pollutants will be subjected to strict control measures under the Act. The Act establishes a Standards and Enforcement Review Committee whose functions are, *inter alia,* to advise the National Environment Management Authority on how to establish criteria and procedures for the measurement of water quality, to recommend to the Authority minimum water quality standards for uses such as drinking, industry, agriculture and recreation, and to analyse and submit to the Director General of the Authority conditions for discharge of effluents into the environment.[43] Implementation of the quality standards will be reinforced by penal sanctions, a factor that recognizes societal interest in water quality. Any person who discharges or applies any poison, toxic, noxious or

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[41] Ibid., section 54.

[42] Ibid., section 58 and Second Schedule to the Act.

[43] Ibid., sections 70 & 71.

obstructing matter, radioactive waste or other pollutants or permits any person to dump or discharge such matter into the aquatic environment in contravention of the established water pollution control standards shall be guilty of an offence and liable to imprisonment for a term not exceeding two years or to a fine not exceeding one million shillings or to both such imprisonment and fine.[44] In addition, the person shall be ordered to pay the cost of the removal of the pollutant(s), including the costs of restoration of the damaged environment and, also, to pay third parties reparation, cost of restoration, restitution or compensation as may be determined by the court on application by such third parties.[45]

(d) Trade and industrial effluents

Trade and industrial effluents shall be discharged only into existing sewerage systems and only pursuant to an effluent discharge licence issued by the local authority operating or supervising such sewerage system.[46] The discharge licence may be cancelled by the Authority if (i) the holder contravenes any provision of the Act, (ii) the holder fails to comply with any condition specified in the licence, or (iii) the Authority considers it in the interest of the environment or in the public interest so to do.[47] Otherwise all licenses issued for effluent discharge shall be kept in a register to be maintained by the Authority as a public document that may be inspected by any person on payment of the prescribed fee.[48]

An important provision of the Act is section 158 which provides that any written law in force before the commencement of the Act relating to the management of the environment shall have effect subject to such modifications as may be necessary to give effect to the Act. Further, where the provisions of such law conflict with those of the Act, the latter shall prevail. This provision is crucial in charting the future trends in legislative action with respect to the management of the environment generally and water in particular.

9.3.10 Wildlife (Conservation and Management) Act (Cap. 376).

Mention should also be made of the Wildlife (Conservation and Management) Act (Cap. 376). Under S.15 thereof, the Minister is empowered, upon certain conditions being satisfied, to prohibit, restrict or regulate any particular acts in any area adjacent to the Park, National Reserve or local sanctuary. In particular, he may declare an area to be a protection area and may also specify the acts which are prohibited or regulated and the extent or manner of such restriction or regulation. The Minister's action might well encroach upon water allocation and related matters. Should that happen, it would then become necessary to ensure that the Minister's actions are in conformity with the express provisions of the Water Act.

9.4 CONCERNS WITH THE CURRENT INSTITUTIONAL FRAMEWORK

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[44] Ibid., section 72.
[45] Ibid.
[46] Ibid., sections 74 & 75.
[47] Ibid., section 76.
[48] Ibid., section 77.

Past measures and policies have not effectively addressed the problems in the water supply and sanitation sector. The water delivery systems continue being ineffective and inefficient. The main reasons for these are:

(a) The politics of water - Water has been regarded as a social good. It is therefore part of a political culture that water provision and sanitation is the obligation of the state. Citizens, administrators and politicians regard water utilities as naturally existing to fulfill that social role. Moreover, water utilities are significant employers and instruments of political patronage.

(b) Uncertainty over the policy regime and regulatory framework has been a major constraint in the water supply and sanitation sector management. It is held that rules which are clear, sound and stable, and institutions which enforce those rules in a fair and predictable manner, are the linchpin to efficient institutions.

(c) The role of private capital and management in the water supply and sanitation sector and the pricing of services have not been clarified. Lack of detailed information on the sector and its potential as a business is a major reason why entrepreneurial resources have yet to be mobilized on a scale consistent with the potential of the sector.

(d) There are no performance standards for water utilities in Kenya currently. This means that managers cannot be sanctioned for poor performance. This extends to the fact that there are no effective sanctioning system for wayward and dishonest employees as well.

(e) The centralized system of managing water utilities particularly those under the MENR and NWCPC makes efficient operations difficult.

(f) Water services are provided by centrally managed monopolistic public enterprises or government departments. Those charged with the responsibility for delivery of water services are rarely given the managerial and financial autonomy they need to do their job properly.

(g) Users of these services both actual and potential are not well positioned to make their demands felt.

In addition to the above there are specific constraints arising from the administrative and financial over water. These are:

(h) The Ministry is responsible for all features of water development and management. This includes policy formulation, water sector regulation and is also the main water undertaker. This leads to over centralized decision making processes leading to slowness in project implementation and capacity responsiveness.

(i) The financial management aspects of water schemes is governed by Treasury Regulations. Revenues, especially for those schemes operated by the Ministry of Water Resources, revert to District Treasuries with little reference to the dynamic needs of the water schemes. This affects operation of water schemes in that there is absence of financial control at the District level. This results in:

- Lack of attention in even a minor leakage problem as repair financing decisions lies elsewhere.

- In excess financing charges for the water sector.

- Lack of accountability and transparent with respect to the finances raised and utilized by the water schemes.

(j) There exists Parallel authority systems in the implementation of projects, particular at the District and Provincial Water Engineers level.

(k) The Water Act, which is the operative Act for the water sector does not formally recognize the position of the Permanent Secretary in the management of water resources.

(l) Water resource management responsibilities are often fragmented among sector agencies and this becomes a major impediment to integrated water resources management.

9.5 CONCERNS WITH THE EXISTING LEGAL FRAMEWORK

Implementation of the law is generally intended by Government and public authorities. If laws are made for good reasons, there must be equally good reasons for their enforcement. Law which is not implemented because it is not enforced encourages the public to disregard it, and is unfair to those who observe h.

Several studies of the sector spanning two decades have revealed that most problems are due to poor implementation and enforcement of the law, rather than any serious deficiencies in h. It is reported that formal enforcement action is virtually unknown, with scarcely a single prosecution under the relevant laws in the last 35 years. (The Study was unable to verify this absence of prosecutions.) The reasons for this low level of enforcement were:

(a) The division of responsibilities among many agencies, with little coordination and between which cooperation is not always good. At best this makes for procedural difficulties, and at worst leads to lack of interest.

(b) The number of laws involved which may be difficult to understand and correlate, particularly by the subordinate officials concerned.

(c) The demise of the Water Resources Authority and the Regional Water Committees, which, in the absence of amendments to the Water Act, implies that their functions have been taken over unlawfully.

(d) Lack of experience of enforcement procedures by officials and lack of case law.

(e) Staff shortages.

(f) Inability to take Water Act prosecutions to subordinate courts quickly. (The present procedure whereby prosecution of people contravening the Water Act must be initiated by the AG will be quite unworkable if the number of prosecutions increases. This would be better handled by designated officers at a lower level, eg water bailiffs).

(g) An absence of what can best be described as the "philosophy of enforcement", particularly at senior levels. One might add, from the present perspective:

(h) Generally poor motivation among officials of the public service because of inadequate pay and service conditions when these are compared to the private sector and even state corporations.

9.6 PROPOSALS FOR REFORM THE WATER SECTOR

The need to improve the management systems of providing water and sanitation services in urban areas in Kenya is now apparent and urgent. The technical and operational; commercial and financial; human and institutional; and environmental problems of the water utilities must be addressed. This requires examining different management arrangements that will deliver the intent. Three approaches are considered for ameliorating the problems of water supply in Kenya. These are:

(a) Retaining the current water management arrangements but strengthening the operations.

(b) Corporatization of water and sanitation services.

(c) Allowing private sector participation in water utility management.

Each of these options requires careful analysis as to its viability and application in the Kenyan context. These options are discussed hereunder:

9.6.1 Retaining Existing Arrangements

The proponents of **Retaining the current water management arrangements but strengthening the operations** maintain that the current urban water undertakership arrangements remain. They argue the problem is not institutional but one of the quality of management. Therefore performance of the water utilities can be enhanced

without changing current institutional arrangements but by adopting appropriate reform programmes which include:

(a) Strengthening the institutional mechanisms of the Ministries of Water Resources and Local Authorities, the urban centers and the National Water Conservation and Pipeline Corporation.

(b) Developing institutional mechanisms such as contract plans and performance evaluation systems to hold managers of water utilities accountable for results.

(c) Recruiting skilled manpower with market based compensation systems for the utilities.

(d) Increasing the autonomy and freeing water utility managers from government interference in day-to-day operational decision making and from non-commercial goals. This will include granting autonomy to management of the utility to hire and fire, negotiate on tariffs and spend outside civil service rules. It also includes restructuring the board of management to diminish the role of sector ministry and civil servants.

(e) Allowing gradual move to cost recovery tariffs

9.6.2 Corporatization

Corporatization means the formation of autonomous utilities to take charge of water supply and sanitation. Corporatization implies full application of commercial principles to the water service providers. The utilities will have focused and explicit performance objectives, well-defined budgets based on revenues from users, and managerial and financial autonomy. The managers can then be held accountable for their performance. The advantage is rapid improvement in performance.

The key in Corporatization is the formation of autonomous utilities. This can be done through:

(a) Transferring the assets of the water utility to public **trust company**, owned directly by the Government or indirectly through a local authority. The assets are therefore separated and isolated from those of the Government or council. This company will be managed by an independent Board of Trustees similar to that envisaged under the Kenya Revenue Authority Act. Since this is a public company owned by the Government, it will have the capacity to source multilateral funds for development purposes.

(b) Forming an **autonomous operating entity** which will be granted some rights to manage the utility by the public trust company. Corporatization will be achieved where an autonomous operating unit is created and which is then allowed to operate on full commercial principles enjoying commercial freedoms. Corporatization establishes independence of a local authority or government unit and insulates it from noncommercial pressures and constraints. This is because

lack of autonomy and accountability creates problems such as overemployment and unfocused goals occur because managers do not have control over day-by-day operations. They also must refer decisions on prices, wages, employment, and budgets to someone else. It is known that water departments in urban authorities are not autonomous units. Under this phase, mechanisms for the creation of institutional framework which can lead to commercialization would be considered. This will include the role of the main stakeholders in the commercialization process and the internal arrangements required to create autonomous water departments including human resource and finance issues.

9.6.3 Private Sector Participation

Private sector participation (PSP) in water and sanitation is based on the separation of the ownership of assets from the management of those assets. Private sector participation involves changing the managerial characteristics of the water industry. It further calls for the making of a complex set of choices about all the factors influencing water sector performance and creating the conditions under which private involvement can yield the desired performance improvements. Experience from PSP in water and sanitation has helped to:

(a) improve the quality and availability of services

(b) expand service coverage

(c) mobilize capital from both public and private sources for urgently needed investments

(d) introduce new cost-effective technologies and stimulate the development of superior management and more efficient use of labour

(e) reduce operating subsidies, and in some cases, transform them into positive returns on investments

(f) reduce political interference in the operations of water utilities which often contributes to the chronic inefficiency in public utilities[49]

9.7 PROPOSED INSTITUTIONAL OPTIONS AND LEGAL ASPECTS OF MERU URBAN WATER SUPPLY

The proposed institutional options and legal implications for the institutional improvement and rehabilitation of water supply system for Meru Urban Water Supply are guided by:

(a) Government policy on water resource management (Sessional Paper No. 1 of 1999) and policy linkages with Poverty Reduction Strategy Paper (PRSP);

[49] Nakani, P.2

(b) Government policy on the restructuring and privatisation of public enterprises (1992)

(c) Grant financing eligibility for institutional strengthening and infrastructure rehabilitation by development partners and, more particularly, the Government of Japan.

(d) Sustainability of water supply and sanitation services;

(e) Improved access of water service to community, especially women;

(f) Cost effective operations balanced by affordability;

(g) Speed of incorporation in view of current strict deadlines;

(h) Consistency with existing incorporation laws;

(i) Community participation and involvement - public orientation as opposed to private sector orientation;

(j) Substantial autonomy to deliver service without undue political interference.

The options considered and presented hereunder include: State Corporations; Limited Liability Company; societies Act; and the Trustee Act (Perpetual succession) Act, Cap. 164. These options are summarised below. A detailed analysis of these options and their legal implications are presented in Annex 1(Institutional options and Legal aspects of Meru Urban Water Supply and Sewerage Services)

9.7.1 State Corporation

This can be established under the provisions of the State Corporations Act[50] (Chapter 446). This would be a public institution whose day to day operations would be decided by a Board of Directors in which the Government would have a substantial control. It would satisfy the requirement by the Government that it must retain the ownership of its assets and other investments in the sector. It would also meet the condition for grant financing by the Government of Japan through JICA.

However, in the light of the fact that the stated Government policy is to pull out of the water sector, this is not a recommendable option as it would be contradictory to the government policy. Besides, the National Water Conservation and Pipeline Corporation has not particularly been efficient in the discharge of its mandate in order to justify the establishment of another corporation.

9.7.2 Limited Liability Company

[50] Chapter 446, Laws of Kenya, (Revised Edition, 1987).

This can be incorporated under the provisions of the Companies Act[51] and may be limited either by shares or by guarantee and be public or private. A company limited by shares may be public in which case its shares may be floated on the stock exchange and any person may become an investor therein by purchase of the shares. The number of shareholders is limited only by the share capital. A private company, on the other hand, has a limited number of shareholders; they cannot be more than fifty. Since the number of shareholders is limited only by the share capital, a public company may cater for the interests of more stakeholders than the private company. But since, in both cases, the profit motive is the driving force in the membership, this may ensure efficiency in the delivery of services.

The company limited by guarantee is a more social service oriented organization that is not motivated by the profit motive. To that extent, the company may promote community participation and involvement in its decision-making process.

The main disadvantage of a limited liability company is likely to be 'taken over' by people with the economic muscle and be used for their own selfish interest with little or no benefits enuring to the community that is supposed to be benefited. More crucial is the fact that the company will not meet the eligibility criterion for funding by the Government of Japan through JICA. Besides, in cases where companies have been incorporated to take over municipal water supplies, there have been several technical and operational problems. This is especially so in cases where the local authorities concerned have incorporated wholly owned limited liability companies where the municipal councillors have brought in political interference. Cases in point include Eldoret and Nakuru Municipal water supplies.

9.7.3 Co-operative Society

A co-operative society can be registered under the provisions of The Co-operative Societies Act[52] Under the provisions of this Act, a society which has as its object the promotion of the welfare and economic interests of its members, and has incorporated in its by-laws the principles of (a) voluntary and open membership, (b) democratic member control, (c) economic participation by members, (d) autonomy and independence, (e) education training and information, (f) co-operation among co-operatives, and (g) concerns for community in general, may be registered as a co-operative society with or without limited liability.

The co-operative society is a business organization that would provide an effective tool for community participation and involvement in the operations of a water supply project. It would also promote commercial orientation in the sense that members would expect dividends at the end of every year.

Besides taking a considerably long time to be registered, a co-operative society does not enjoy autonomy from government control in the sense that the Commissioner for Co-operative Development, the Registrar of Co-operative Societies and other officers

[51] Chapter 486, Laws of Kenya (Revised Edition, 1989).
[52] Act No. 12 of 1997 repealing The Co-operative Societies Act, Chapter 490.

are all appointees and officials of the Government with considerable statutory powers of control of the operations of the co-operative society. To this extent, the Government would still be in control of the water sector.

9.7.4 Trust Corporation

A trust corporation may be registered under the provisions of the Trustee (Perpetual Succession) Act.[53] Under this Act, trustees who have been appointed by any body or association of persons established for any religious, educational, literary, scientific, social, athletic or charitable purpose, or who have constituted themselves for any such purpose, may apply to the Minister in the prescribed manner for a certificate of incorporation as a body corporate. The trust corporation has perpetual succession, can sue and be sued in its own name, and can hold movable and immovable property and any other interest belonging to or held by any person(s) for the benefit of the trust. New trustees may be appointed to succeed those deceased or retiring. Besides, the trust would enjoy considerable autonomy, but be accountable to the stakeholders in the operations and management of the project. The board of trustees stands in a fiduciary relationship with regard to the stakeholders on whose behalf they manage the trust corporation.

A detailed analysis of the above options are presented in **Table 9.1** below.

[53] Chapter 164, Laws of Kenya (Revised Edition 1981).

Table 9.1: Analysis of Various Substantial Options

OPTION	LEGAL BASIS	ADVANTAGES	DISADVANTAGES	RECOMMENDATION
State Corporation	State Corporations Act (Cap. 446)	❖ Easy to establish ❖ Government backing ❖ Public Institution ❖ Easy transfer of assets	❖ No independence autonomy ❖ Political interference ❖ Would be contrary to stated policy ❖ Low motivation	Not recommended
Limited liability Company	Companies Act (Cap. 486)	❖ Easy to incorporate ❖ Commercial orientation ❖ Public can be shareholders (whose company is not wholly owned by council) ❖ Transparency and accountability ❖ May be exempted from taxation if limited by guarantee ❖ Community participation and involvement ❖ May be supported by development financiers ❖ Separate legal entity from shareholders ❖ No direct government involvement and control	❖ Can be easily wound-up (especially where wholly owned by Council) ❖ Taxation may limit future investment ❖ Can be taken over by a few rich persons purchasing shares thereby frustrating public participation (where company is public) ❖ Transfer of assets problematic	Not recommended as it raises complex logistic problems

Co-operative Society	Co-operative Societies Act (Cap. 490)	❖ Effective tool for community participation ❖ Business oriented ❖ Profit motivation	❖ Takes too long to register ❖ Lack of "common interest" among the co-operators ❖ Government involvement and interference ❖ Transfer of assets problematic ❖ May be easily taken over by the rich	Not a viable option
Trust Corporation	Trustee (Perpetual Succession) Act (Cap. 164)	❖ Easy to register ❖ Perpetual succession, hence sustainability ❖ Independent legal status as public agency ❖ Community service oriented ❖ Governance by own instrument ❖ Political interference unlikely as board of trustees is appointed by stakeholders on basis of instrument ❖ Number of trustees based on instrument ❖ Possible exemption from taxation ❖ Transfer of assets not possible this being a public institution ❖ No shares hence not amenable to acquisition by the rich	❖ All stakeholders may not be represented on the Board of Trustees	This is the best option that is recommended for adoption.

9.8 RECOMMENDED INSTITUTIONAL OPTIONS AND LEGAL IMPLICATIONS

In the light of the above analysis and the requirements of both the Government of Kenya and JICA, the registration of a trust corporation to take over the water supply and sanitation services would be the best option. This option not only meets the requirements of the two parties but also presents fewer logistical and operational problems.

The legal requirement will be as follows:-

(a) Application for registration in the prescribed form accompanied by,

(b) A statement of the objects and constitution of the trust concerned, e.g. to take over and operate the Meru water supply and sanitation services, to enter into an agreement for the lease of any assets and equipment, to impose and charge tariffs for the supply of such services, to employ such personnel or such terms and conditions as may be deemed necessary, to formulate working arrangements for the effective and efficient operation of the water supply, to acquire and hold such property as may be necessary for the discharge of its functions, etc;

(c) A statement and short description of the property or interest therein which at the date of application is held or intended to be held by the trust;

(d) A statement as to whether the trust concerned is a society registered or exempt from registration, or is incorporated under the Companies Act;

(e) The names and addresses of the trustees;

(f) The proposed title of the corporate body, of which the words "trustees" and "registered" shall form part, e.g. THE REGISTERED TRUSTEES OF ------ (TOWN) WATER SUPPLY SERVICE;

(g) The proposed device of the common seal; and

(h) The regulations for the custody and use of the common seal.

Under the constitution in (b) above, provisions can be made for the number of trustees to be registered and how these may be appointed do as to be representative of all the stakeholders.

Organizationally, the Board of Trustees will have the overall management of the trust in order to ensure efficient delivery of services to the consumers. To this extent, it will be its responsibility to hire the management staff and such other personnel as may be required. To ensure transparency and accountability, the Board of Trustees will be expected to consult regularly with the major stakeholders on the progress achieved in implementing the mandate of the Trust. This consultative process will be provided in the trust instrument.

9.9 INSTITUTIONAL FRAMEWORK FOR THE PROPOSED MERU URBAN WATER SUPPLY AND SEWERAGE SERVICE.

In this section we develop the organisational structures and operating mechanism for the Trust Corporation, which is the recommended institutional and legal option for Meru Urban Water Supply and Sewerage Services.

9.9.1 Organisational Structure

The proposed institutional framework comprises the following structures:

(a) The Board of Trustees (BOT)
(b) Management

The role of these structures is now defined.

9.9.2 Board of Trustees

The Board of Trustees will be the governing body of the Trust Corporation. It will acquire and manage assets on behalf of the stakeholders; and will be responsible for policy guidance and the strategic direction of the Trust Corporation. The Board of Trustees will be appointed from the current stakeholders of Meru Urban Water Supply. Major stakeholders are:

(a) Meru Municipal Council;

(b) Meru County Council;

(c) District Water Officer (DWO);

(d) Major consumers, especially the co-operative societies , business enterprises and institutions (educational and health);

(e) Development partners;

(f) Religious organisations;

(g) Community water projects;

(h) District Social Development Officer (DSDO)

The initial appointment will be facilitated by the Inter-Ministrial Core Team. Thereafter, replacement within the Board of Trustees shall be effected by the Trustees themselves on the basis of agreed procedure. This renewal process will be detailed in the constitution of the Trust Corporation.

Other provisions enshrined in the constitution of the Trust are:

(i) That the number of trustees shall be between 5 - 7;
(ii) That Government representation shall be provided in BOT to safeguard public interest;

(iii) That BOT can co-opt, for particular purpose, an expert on issues of relevance to the Trust or beneficial to the advancement of the interests of the Trust;

(iv) That the Board of Trustees shall convene a stakeholders consultative forum every year to keep stakeholders closely informed of the progress in the affairs of the Trust Corporation.

The specific duties of the Board of Trustees are:

(a) To lease and / or acquire and own assets on behalf of the stakeholders;

(b) To appoint the General Manager and senior managers of the Trust Corporation and to fix their remuneration;

(c) To approve the organisational structure and the establishment level of the management and operational staff;

(d) To approve policy and strategy of the organisation;

(e) To approve the capital and operating budgets of the Trust Corporation;

(f) To monitor management performance in accordance with the agreed plans;

(g) To prepare and submit reports to the Stakeholder Council in the manner provided by law and the Trust Instrument.

9.9.3 Management

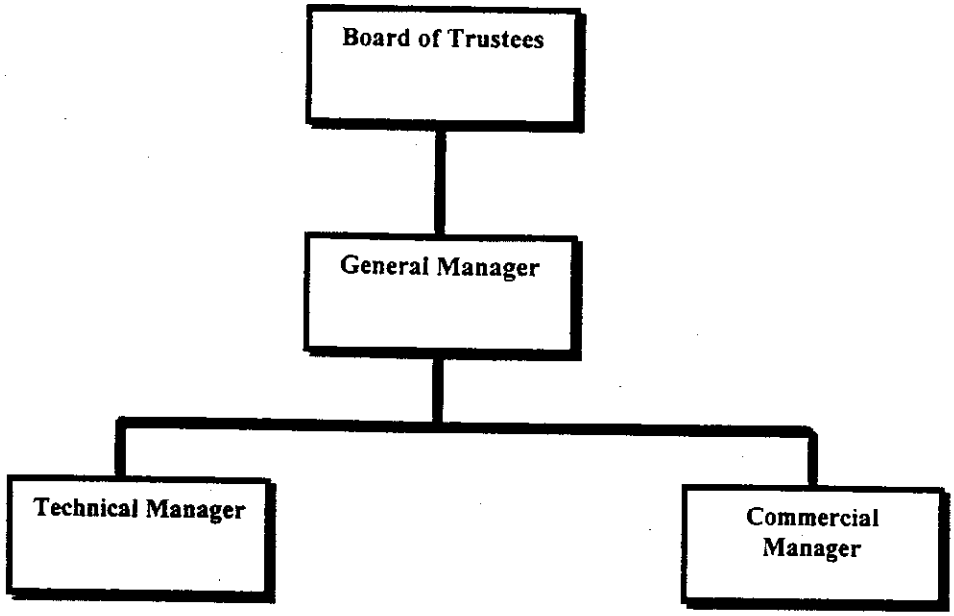
It should be noted that the Trust can operate the water supply and sewerage system in the Town. Alternatively, the Trust can contract out this function to a private operator. In the event the BOT decides to manage these services, it will appoint senior members of the Management Team.

These are:

(a) The General Manager
(b) The Technical Manager
(c) The Commercial Manager

Other positions will be approved by the BOT but will be recruited by the Management Team. The high level organisational structures of the Trust Corporation are illustrated in **Fig. 3.1.**

Fig. 3.1: High level organisational structures for Meru Water Supply and Sewerage Services.



The General Manager: will be responsible for all aspects of the management and operations of the Trust Corporation. These include policy and strategy formulation for BOT approval and subsequent implementation after BOT approval.

The Technical Manager: will be responsible for operations and maintenance; and assets replacement for efficient supply of water and sanitation services.

The Commercial Manager: will be responsible for billing and revenue collection; accounting and financial management of the Trust Corporation. He / She will also approve water supply and sanitation connections and oversee customer service standards.

9.9.4 Syndication of Water Supply and Sewerage Services Management

It is quite possible that some of the smaller towns could derive economies of scale from syndication of the water supply and sewerage services management. This essentially means forming a management company to manage the water and sewerage services in two or more local towns.

The proposal to form a trust corporation on a syndicated basis must be seen against the need to ensure that stakeholders in the "catchment area" of the local town have a common interest in water and sewerage issues that directly affect them. It is unlikely that stakeholders in different local towns could show a common interest that would

sustain the formation of a Water and Sewerage Services Trust Corporation encompassing these different towns. In the event, therefore, where syndication could be a feasible option in the management of the water and sewerage services, this should be confined to the operational management aspects. In effect, therefore, Water and Sewerage Trust Corporations in the concerned local towns could contract out the operations and management of the water supply and sewerage services to a professional private sector operator. This is a feasible option in areas where expertise in the management of these essential services is limited. It is also a more practical and simpler solution than the formation of a management company by the Trust Corporation in the local towns. The latter is likely to suffer from over-politicisation of the leadership and management role of such a company.

9.9.5 Operating Mechanisms

The operations of the Trust Corporation will be as follows:

(a) The initial appointment to the Board of Trustees will be facilitated by the Interministerial Core Team. Appointment will be from current stakeholders and will include Government representation. A woman representative should also be appointment. Subsequent appointments to fill vacancies in the BOT shall be provided in the constitution of the Trust. The relevant provision should allow BOT to renew itself by appointing replacements from specified stakeholders. To obtain ownership and support of stakeholders to the proposed Trust and the appointment thereof, a sensitization and consensus building workshop involving major stakeholders should be held before the Trust Corporation is registered.

(b) The Board of Trustees will "hire and fire" the Senior Managers of the Trust Corporation. The BOT can also contract out the management of the water supply and sanitation system to a private operator. BOT must, however, ensure that the services of the Trust Corporation are not harmed by such an arrangement and will ensure that safeguards are in place to provide services in a sustainable manner. The BOT will own or lease assets and properties on behalf of the Trust Corporation and will enter into contracts with third parties. The BOT will sue and be sued on behalf of the Trust Corporation.

(c) The management (and / or management agent) will manage the day to day operations of the Trust Corporation. Management will be accountable for their performance to the Board of Trustees through regular reports and meetings of the Board of Trustees.

10.0 FINANCIAL, ECONOMIC AND SOCIAL EVALUATION

10.1 INTRODUCTION

This section provides the financial, economic and social evaluation of Meru Urban Water Supply. The financial viability analysis is only useful for indicative purposes only. It is contended that projects of this nature should rely more on economic and social viability. These two aspects are given more emphasis in the evaluation.

10.2 INSTITUTIONAL MANAGEMENT COSTS

To obtain the desired results from the rehabilitation of the Meru water supply, there will be need for new institutional arrangement. This will be supported by a change in management style. This involves substantial investment, which is taken as part of the cost of the project. The financial costs of undertaking this exercise are summarized in Table 10.1.

Table 10.1: Institutional Development Costs Meru Town Water Supply

No.	Activity	Bases of cost estimate	Estimated cost (Ksh.)
1	Hold consensus building workshop	(a) Travel refreshments and honorarium for 50 participants at SH. 5,000 /= per participant	250,000
		(b) Consultants facilitation costs and travel	700,000
		(c) Transport and related expenses for ministry staff	200,000
2	Develop and register the trust instrument	Legal and follow up effort	50,000
3	Management Contract	Appoint local expert to support the institutional rehabilitation process for the 3 year period	39,600,000
4	(a) Identify water supply and sewerage infrastructure and estimate cost	Standard infrastructural valuation procedures	5,000,000
	(b) Identify and value other assets.		
5	Develop staffing and financial plans for the new organisation	25 working days at Sh. 40,000 per w/day	1,000,000
6	Develop operations manual	20 working days at Sh. 30,000 per day	600,000
7	Operational Support	Vehicles, motor cycles, computers and software, office equipment	
8	Provide initial working capital to the new organisation	Average annual billings for the last 3 years	3,000,000
Sub -total			**50,400,000**
Contingency (10%)			**5,040,000**
Total			**55,440,000**

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Sub -total			**50,400,000**
Contingency (10%)			**5,040,000**
Total			**55,440,000**

It is contended that the key problem in the town's water supply system is management weakness. Institutional support is recommended as the foundation for improving the nature and efficiency of management.

10.3 WATER TARIFFS

Meru water supply scheme is subject to the tariff regime legally set by the Minister of Water. The legal tariffs are as indicated in the Table 10.2.

Table 10.2: Urban Water Tariffs

PART I - GENERAL	Charge(Kshs.)
(a) Where no meter is installed, a monthly charge of	200
(b) Where a meter installed, the charges will be as follows:	
(i) Where the amount of water sold through the meter in any one month does not exceed 10 cubic metres (minimum charge)	200
(ii) Where the amount of water sold through the meter in any one month is more than 10 cubic metres but does not exceed 20 cubic metres, the charge per cubic metre in excess of 10 cubic metres	25
(iii) Where the amount of water sold through the meter in any one month is more than 20 cubic metres but does not exceed 50 cubic metres, the charge per cubic metre in excess of 20 cubic metres	30
(iv) Where the amount of water sold through the meter in any one month is more than 50 cubic metres but does not exceed 100 cubic metres, the charge per cubic metre in excess of 50 cubic metres	45
(v) Where the amount of water sold through the meter in any one month is more than 100 cubic metres but does not exceed 300 cubic metres, the charge per cubic metre in excess of 100 cubic metres	75
(vi) Where the amount of water sold through the meter in any one month is more than 300 cubic metres the charge per cubic metre in excess of 300 cubic metres	100
c) Where water is sold through a meter at a kiosk, the charge per cubic metre	15
d) Where water is sold by retail at a kiosk per unit of 20 litres or part thereof, the charge per	2
e) For the bulk sales to an undertaker for resale, the charge per cubic metre	15
PART II - BOARDING SCHOOLS	Charge
1. A school with a permissible water demand not exceeding 600 cubic metres per month, the charge per cubic metre	20
2. A school with a permissible water demand not exceeding 1200 cubic metres per month, the charge per cubic metre	25
3. Any other learning institution with a permissible water demand of 1200 cubic metres per month, the charge per cubic metre	25
4. The charge per cubic metre of water consumed in excess of permissible water demand	45

Source: Kenya Subsidiary Legislation, 1999: Legal Notice No. 174

The tariffs apply only to those who have formal access to water. Those with no access to water and who acquire water from vendors pay about Ksh10.00 per 20-litre or Kshs. 500 per m^3. This, for all practical purposes, is a very high charge and has a dramatic effect on the household disposable income. A computation based on the water consumers'

distribution and billing in Meru gives an average billing rate of Kshs25.40 per m^3.

10.4 FINANCIAL COSTS OF REHABILITATION

The financial costs for rehabilitation works for Meru water supply amount to Kshs.353 million. These are composed of the cost of rehabilitation water supply amounting to Kshs.288 million, sewage rehabilitation cost of Kshs.10 million and that of institutional reform amounting to Kshs.55 million (Table 10.1).

10.5 ECONOMIC COSTS OF REHABILITATION

The economic costs for the rehabilitation of Meru water supply have been taken to be the total financial costs plus the incremental costs of households to connect to the mains. An average of 3,200 additional households will be connected at a cost of Kshs.1,500 per household. The resulting additional costs will be Kshs.4,800,000 bringing total economic costs to Kshs.358 million.

10.6 FINANCIAL BENEFITS FROM REHABILITATION

The main benefit of the rehabilitation plan will be institutional strengthening of the town's water supply system. This will result in enhancement of management. The observable outcomes will be increased water supply, reduction of water losses and improvement in the revenue collection efficiency. The benefits will accrue under the following assumptions:

1. The management Consultant is in place at the beginning of Year 1 and involved for it period of 36 months.

2. The distribution network and metering would be rehabilitated/replaced during the first year of the management involvement.

3. Staff levels, remuneration and requirements are as proposed by the recommended Meru organization chart.

4. The working capital to kick-start the process is available.

5. The appropriate infrastructure to support operations (transport, computers and software requirements and office space) is available.

The benefits will occur as summarized in the following paragraphs.

10.6.1 Revenue from Extra Water Sold

The scheme is designed to produce an average of 6,000 m^3 per day. It currently produces 4,400 m^3 per day. Projected demand will reach 27,398 m^3 per day in 10 years. Increased management efficiency with rehabilitation will improve water production to design capacity from the third year of rehabilitation. This will improve water revenues by an average of

Kshs.14.8 million per annum.

10.6.2 Reduction in Unaccounted for Water (UfW)

The average UfW has been determined to be 65.87%. Assuming that the management consultant has the piping system replaced/repaired and the billing under control within the first year, and this should result in UfW being reduced to 25% during year 1 and 2 and then sustained to not exceed 20% during years 3 – 7, then to 10% during years 8-10.

Reduction in UfW will result in revenue improvement averaging Kshs.20.8 million per annum using the average tariff rate of Kshs.25.40 per m^3 for Meru.

10.6.3 Improvement in Collection Efficiency

Collection efficiency for the last three years averaged 37.42%. No change is anticipated in the first year. Improved collection efficiency to 87% in year 2 is expected as a result of improved services. The efficiency will change to 95% as the billing system is enhanced through computerization from year 3 to 10. Improved collection efficiency will improve cash flows by an average of Ksh.7.9 million per annum.

10.6.4 Improvement in Sewerage Coverage Revenue

The utility will obtain additional revenue from improved sewer coverage and enhanced billing. This is estimated at 20% of water revenue.

10.7 Economic Benefits from Rehabilitation

In identifying the benefits, the way to be consistent and accurate is to look at all people conceivably affected by the program and ask how much better off they will be as a result of the expected water and sanitation rehabilitation exercise in the town. In order to give a precise estimation of the social benefits accruing to each individual category, a number of assumptions are made in each approach.

The major focus for this study is on three broad categories of social benefits that are assumed to accrue to the household within a situation of an improved water and sanitation system. These are:

- Social/economic benefits (hereby referred to as opportunity costs) of alternative uses of time previously used for fetching water by the household over along distance.
- Social benefits enjoyed by the household due to better health for water users and their families.
- Social benefits accruing from a reduction in health costs.

10.7.1 Valuation of Economic Benefits of Time Saved

The methodology used in the calculation of these benefits is founded on a number of assumptions. These assumptions include:

(i) The minimum amount of water required by each household to meet basic sanitary requirement is 100L per day. Therefore at the cost of Kshs 10 per a 20L-jerrican of raw water, the household would have to spend an average of Kshs 50 per day on water.

(ii) Assuming that the water source is one km away, it means that it would take on average a minimum of 30 minutes per trip to fetch a 20L-jerrican of water. Consequently, to get the minimum daily water requirement of 100L (i.e. 5x20L-jerricans) it would take 2.5 hours.

(iii) Assuming that a household earns an average minimum daily wage rate of Kshs 150 for an eight-hour normal working day, it is then possible to calculate the opportunity cost of fetching water in terms of man-hours spent and converting this to money units. The loss is (2.5/8 x Kshs 150) = Ksh.47 per household per day. The annual total loss per household is Ksh.47x365 days = Ksh.17,155.

10.7.2 Economic Benefits of Better Health for Water Users

In analyzing the benefits accrued to an individual, the study considered the opportunity cost of falling sick due to a water and sanitation-related problem. Given the health data on Meru (the study, however, from the outset acknowledges lapses in data capture), on average, each household losses 30 productive days due to the debilitating effects of water related ailments. Assuming a mean daily average wage rate of Kshs.150 per person per day, it then follows that the total loss per household will be Kshs.150*50 = Kshs.4,500 per annum. This is the benefit that would accrue to the users with improvement in water delivery.

10.7.3 Economic benefits from reduction in Health costs.

According to the findings of the Welfare Monitoring Survey II of 1994, the budget share of household income spent on health care in Meru is 1.8%. Assuming that 50% of this income goes to sanitation related ailments, and given that the average mean monthly household income for Meru is Kshs.9,320.70, it implies that the household spends Kshs.83.90 on this type of ailments per household per month. The total expenditure by per household in the town is Kshs.83.90 x 12 = Kshs.1,006.80 per annum.

10.7.4 Summary of Economic Benefits Derived for Meru Town

Nature of Benefits	Derived Benefits in Kshs Per Household per annum
Economic benefits of time saved from fetching water from source	17,155
Economic benefits of better health for users and their families	4,500
Economic benefits in reduced health cost	1,007
Total Annual benefits per HH	**22,662**

10.8 ABILITY TO MEET O&M COSTS

The water supply will be able to raise enough incremental revenue to cover operating and maintenance costs. The net contribution margin is projected to average Kshs.22.4 million per annum.

10.9 FINANCIAL EVALUATION.

Preliminary evaluation of the proposed Water Supply rehabilitation project should be undertaken in compliance with the financial and economic viability of the project. The overall results of the financial evaluation of Meru Town Water Supply Scheme are summarized in **Table 10-3.** An average discount rate of about 4%, which reflects the current cost of soft loans to Kenya is used for the evaluation. The base evaluation is for a period of 10 years.

Table 10. 3 Financial Evaluation of Meru Town Water Supply

Financial Evaluation					
FIRR		NPV		RER	
Rate	Viability	Kshs.	Viability		Viability
-5%	N/V	(91,699,120)	N/V	0.890	N/V
N/V	=	Not Viable			

The results of the financial evaluation given in the Table 10.3 indicate that f Meru Town Water Supply is not financially viable, based on the current tariff and a 10-year project life. The NPV of Kshs.(79,544,917) shows that even after rehabilitation of the waterworks the supply will not be able to recover the initial cost of the Investment by year 10.

The financial internal rate of return (FIRR) is -4% and below the hundle rate of 4%. The revenue – expenditure ratio (RER) is 0.912 indicating the project is barely able to cover all its costs.

However, as the results of the sensitivity analysis below reveals, the results need to be interpreted cautiously.

10.9.1 Financial Sensitivity Analysis

It is generally agreed that evaluation a water utility over a ten-year period may be too ambitious. Most water utility investments are expected to indicate positive returns from 25 to 30 years after investment. In this case the project was financially evaluated using the following scenarios:

Case 1: The project is has a life of 15 years

Case 2: The project is has a life of 15 years but costs (Investment + O&M) increase by 15%

Case 3: The project is has a life of 15 years and is financed by Grant

In carrying out the above analysis we assume that the cash flow at the end of year 10 is maintained in the additional periods. The results of this analysis are presented in Table 10.4

Table 10.4: Financial Sensitivity Analysis Meru Town Water Supply

	Base Case	Case1	Case2	Case3
	Project has a life of 10 years	**Project has a life of 15 years**	**Project has a life of 15 and Investment Cost and O&M increase by 15%**	**Case 1 but Project financed by Grant**
FIRR	-5%	4%	0%	4%
NPV	(91,699,120)	2,111,852	(78,946,385)	96,405,690
RER	0.8900	1.1498	0.9998	1.1498
	N/V	F/V	N/V	FV
N/V	=	Not Viable		
FV	=	Financially Viable		

The project becomes financially viable immediately the more realistic time frame of 15 years is adopted, with a very encouraging return of 5% and a Net Present Value of Kshs.14 million. The project is also viable when financed by Grant. The project is, however, sensitive to cost changes.

10.10 ECONOMIC EVALUATION

The results of the economic evaluations are summarized in Table 10.5, which shows that the rehabilitation costs for Meru Town Water Supply are justifiable with a fair acceptable economic rate of return. An average discount rate of about 4%, which reflect the current cost of soft loans to Kenya is used for the evaluation.

The project is evaluated using:

(a) a rate of EIRR (Economic Rate of Return)
(b) a value of NPV (Net Present Value)
(c) a ratio of CBR (Cost Benefit Ratio)

Table 10.5 Economic Evaluation

EIRR		NPV		CBR	
Rate	Viability	Kshs.	Viability		Viability
11%	EV	82,375,027	EV	0.770	EV
EV	=	Economically Viable			

The project is economically viable with a high EIRR against the hurdle rate of 4%.

The positive NPV value of Kshs.77 million makes the project economically very attractive. The project is also able to cover its costs comfortably with a cost-benefits ratio (CBR) of 0.775.

10.11 ECONOMIC SENSITIVITY ANALYSIS

An economic sensitivity analysis was performed to determine whether changed circumstances would affect the viability of the project. The following assumptions have been made for the sensitivity analysis.

Case 1: Investment costs increase by 15%
Case 2: O&M costs increase by 15%
Case 3: Both investment costs and O&M increase by 15%

The results of the sensitivity analysis are presented in Table 10.6.

Table 10.6: Economic Sensitivity Analysis Meru Town Water Supply

	Base Case	Case1	Case2	Case3
		Increase Investment Cost by 15%	Increase O&M by 15%	Increase both costs by 15%
EIRR	11%	6%	9%	5%
NPV	82,375,027	32,501,719	59,727,555	9,854,246
CBR	0.770	0.846	0.810	0.886
	EV	EV	EV	EV
EV	=	Economically Viable		

The project is economically viable under all the given conditions. The project economically stands well against any changes in investment and operating costs and is viable under all circumstances.

10.11 SOCIAL EVALUATION

There is no doubt that society values water due to its effect on social welfare. In this study the two main issues considered were full time availability of clean water and the impact of water on public sanitation and health. Residents in the urban area were requested, through a rapid assessment survey, to specify the relative importance they attach to each of these two aspects.

In all the cases, full time availability of clean water was considered to be of very great importance, with a weighting of 89% by residents surveyed. The residents were willing to pay a higher tariff to have availability of water guaranteed. This means that it might be probable for tariff increases to be justified and hence enhance the financial viability of the project.

The residents were quite clear in their minds that clean water impacts positively on public sanitation and health. On health issues, the response indicated that 90% of disease incidences suffered at the local level should be eliminated by the supply of clean water. Again, residents were willing to pay a premium to mitigate against the health effects of non-availability of clean water.

11 IMPLEMENTATION PLAN FOR THE PROPOSED REHABILITATION PROGRAMME

11.1 WATER SUPPLY REHABILITATION

Figure 11.1 shows the planning and construction schedule for rehabilitating the Meru water supply system. The implementation of waste water system rehabilitation would proceed in parallel to that of the water supply.

11.2 WASTEWATER AND SANITATION REHABILITATION

Figure 11.1 shows the planning and construction schedule for rehabilitating the Meru sewerage system.

11.3 UTILITY MANAGEMENT PLAN

The implementation plan for utility management for Meru town water supply and sanitation is shown in Figure 11.1.

11.4 LEGAL AND INSTITUTIONAL FRAMEWORK

The transitional arrangements from the current ownership and operation of the Urban Water Supply to the operations of the Trust Corporation will be structured as follows;

(a) Develop consensus among important stakeholders on the proposed approach to the operations of Meru Urban Water Supply and Sewerage Services (the Trust Corporation). This is best achieved through a stakeholder workshop.

(b) Appoint members of the Trust from identified stakeholders

(c) Prepare the constituting instrument for Meru Urban Water Supply and Sewerage Services. This can be done concurrently with activities (a) and (b) above. Registration, however, must await stakeholder consensus. On achievement of consensus on the proposed approach, present the Trust Instrument and registration forms to the Registrar of Trusts at AGs Chambers and ensure registration of the Trust Corporation.

(a) Concurrently with (a), (b) and (c) above, carry out an inventory of the water supply system infrastructure of Meru Urban Water Supply and Sewerage System. Assign estimated value to these assets. Carry out a valuation of all other assets of Urban Water Supply including equipment, vehicles, furniture, fittings and loose assets.

(e) Develop organisational structures and staffing plans for the new organisation;

Figure 11.1

STUDY OF INSTITUTIONAL IMPROVEMENTS AND REHABILITATION OF WATER SUPPLY AND SEWERAGE SYSTEMS FOR 10 LOCAL TOWNS IN KENYA
IMPLEMENTATION SCHEDULES OF PROPOSED PLANS
MERU WATER SUPPLY AND SEWERAGE REHABILITATION WORKS AND O&M

Ref	Activity description	Duration in months	MONTH
			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
A	**REHABILITATION WORKS**		
1	Appoint consultant for rehabilitation works	3	
2	Feasibility study, detailed design	7	
3	Tendering procedures, award and negotiations	9	
4	Construction	12	
5	Defects Liability Period	12	
B	**O&M**		
6	Appoint management consultant	3	
7	Establish consumer data base/billing system	4	
8	Management and staff training	12	
9	Meter replacement and repair	9	
10	Other recommended action plan activities	24	

(f) Complete the financial plan for the new organisation;
(g) Agree on:

(i) Lease, transfer or sale of infrastructural assets and other assets by GOK and Meru Municipal Council to the Trust Corporation;

(ii) Transfer or recruitment of the existing staff to the new organisation. Agree also on the retirement package or the transfer within the Ministry of staff not absorbed in the new organisation;

(iii) Arrange financial support to the new organisation.

(g) Develop the operations manual for Meru Urban Water Supply and Sewerage Services;

(h) Ensure all the assets, staff and financial resources are in place in the new organisation (necessary transfers / acquisitions made)

These activities and time frames are illustrated in **Table 11.1.**

Table 11.1: Meru Water Supply and Sewerage Services – Transitional arrangements and time frame

No.	Activity	Month	1	2	3	4	5	6	7	8	9	10	11	12
1.	Hold consensus building workshop		●	- - -	- - -	- - -	★							
2.	Appoint Board of Trustees		●	- - -	- - -	- - -	★							
3	Develop and present for registration the Trust Instrument		●	- - -	- - -	- - -	- - -	★						
4.	Identify and make an inventory of water and sanitation infrastructure assets and estimate their value. Identify and estimate the value of other assets.					●	- - -	- - -	- - -	★				
5.	Develop structures and staffing plans						●	- - -	- - -	★				
6.	Prepare financial plan for the Trust						●	- - -	- - -	★				
7.	Agree on: (i) Lease, transfer or sale of assets (ii) Transfer or recruitment of staff (iii) Financial support					●	- - -	- - -	- - -	- - -	★			
						●	- - -	- - -	- - -	- - -	★			
						●	- - -	- - -	- - -	- - -	★			
8.	2.1 Develop operations manuals							●	- - -	★				
9.	Assets, staff and financial resources in place										★			
10.	Meru Water Supply and Sewerage Services operational											★		

Key:	2.2 Event ● - - - ▶	2.3 Event deadline ★

11.5 FINANCIAL PLAN

11.5.1 Business Plan

The summarized business plan for Meru town is given in Table 11.2. The specific feature of interest is that the utility will be able to fully cover its operating and maintenance costs. The plan indicates also very healthy net cash flows from year to year. If these are re-invested into the system, then the residents of the town can be guaranteed a reliable water supply for many years to come. However, the achievements of the predictions indicated in this business plan are strictly contingent upon there being the appropriate institutional framework for the town. This will call for a change in management style and structures that will facilitate the delivery of the set intent.

11.5.2 Financing Plan

It is assumed that the rehabilitation costs will be composed of four components: Institutional Strengthening, Professional Input for works, Water Supply and Sanitation. These financial costs of the project are projected to be incurred as follows:

Table 11.4: Financing Plan for Meru Town Water Supply

YEAR	1	2	3	4	Total
	Kshs	Kshs	Kshs	Kshs	Kshs
Institutional Development Costs	26,400,000	14,520,000	14,520,000	-	55,440,000
Consultancy Fees for Works (20% of works)	14,559,560	24,802,600	9,921,040	322,000	49,605,200
Water Supply Rehabilitation	71,992,800	119,988,000	47,995,200	-	239,976,000
Sanitation Rehabilitation	805,000	4,025,000	1,610,000	1,610,000	8,050,000
Total Overall Project Cost	113,757,360	163,335,600	74,046,240	1,932,000	353,071,200

The total cost of rehabilitation is approximately Kshs.353 million. These costs are spread over a four-year period. The working capital and the institutional set-up costs must be availed at the beginning of the rehabilitation plan. It should be noted that the financial evaluation has been based strictly on the cost of rehabilitation only.

Table 11-2: BUSINESS PLANS Meru Town Water Supply

CASH FLOWS

Year	1	2	3	4	5	6	7	8	9	10
REVENUE GENERATED										
Revenue from Extra Water Sold	8,900,160	13,350,240	14,833,600	14,833,600	14,833,600	14,833,600	14,833,600	14,833,600	14,833,600	14,833,600
Revenue from Unaccounted for Water	16,671,854	16,671,854	18,711,474	18,711,474	18,711,474	18,711,474	18,711,474	20,751,094	20,751,094	20,751,094
Savings from Collection Efficiency	-	6,809,930	7,908,749	7,908,749	7,908,749	7,908,749	7,908,749	7,908,749	7,908,749	7,908,749
Revenue from Sewerage Charges	8,158,480	8,158,480	8,158,480	8,158,480	8,158,480	8,158,480	8,158,480	8,158,480	8,158,480	8,158,480
Total	33,730,494	44,990,504	49,612,303	49,612,303	49,612,303	49,612,303	49,612,303	51,651,923	51,651,923	51,651,923
Expenditures (Kenya Shilling)										
Transport & Staff Related Expenses	6,071,489	8,098,291	8,930,214	8,930,214	8,930,214	8,930,214	8,930,214	9,297,346	9,297,346	9,297,346
O&M	6,746,099	8,998,101	9,922,461	9,922,461	9,922,461	9,922,461	9,922,461	10,330,385	10,330,385	10,330,385
Postage	128,176	170,964	188,527	188,527	188,527	188,527	188,527	196,277	196,277	196,277
Telephone	306,947	409,414	451,472	451,472	451,472	451,472	451,472	470,032	470,032	470,032
Purchase of meters	553,180	737,844	813,642	813,642	813,642	813,642	813,642	847,092	847,092	847,092
Stationery	367,662	490,396	540,774	540,774	540,774	540,774	540,774	563,006	563,006	563,006
Fuel & Gas	1,703,390	2,272,020	2,505,421	2,505,421	2,505,421	2,505,421	2,505,421	2,608,422	2,608,422	2,608,422
Current O&M Costs	(3,853,067)	(3,853,067)	(3,853,067)	(3,853,067)	(3,853,067)	(3,853,067)	(3,853,067)	(3,853,067)	(3,853,067)	(3,853,067)
Incremental O&M Costs	12,023,876	17,323,963	19,499,444	19,499,444	19,499,444	19,499,444	19,499,444	20,459,493	20,459,493	20,459,493
Sulplus(Deficit)	21,706,617	27,666,541	30,112,859	30,112,859	30,112,859	30,112,859	30,112,859	31,192,430	31,192,430	31,192,430
Average Tariff (Kshs/m3)	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4	25.4
Investment Costs										
Net Cash Flow	21,706,617	27,666,541	30,112,859	30,112,859	30,112,859	30,112,859	30,112,859	31,192,430	31,192,430	31,192,430
Cumulative Cash Flow	21,706,617	49,373,158	79,486,017	109,598,876	139,711,735	169,824,594	199,937,452	231,129,882	262,322,312	293,514,742

12 CONCLUSIONS AND RECOMMENDATIONS

12.1 WATER SUPPLY REHABILITATION

12.1.1 Improvements

On completion of the El Nino Emergency Programme (ENEP) the expanded and rehabilitated treatment works will have a design capacity of approximately 6,000m^3/day. The El Nino works does not include any rehabilitation of the distribution network. In order to increase the potential customer base it is essential that some expansion (as well as rehabilitation) of the distribution network is undertaken.

Existing storage facilities are minimal and should be augmented.

Installation of bulk and zonal meters will assist in identifying causes of unaccounted for water, with consequent improvement in efficiency.

In the longer term, additional treatment capacity will need to be constructed as the population is projected to over 170,000 by 2010. Studies have been done identifying and detailing new intake works and treatment works, storage facilities and reticulation expansion.

12.1.2 Rehabilitation Requirements for Meru Water Supply

The recommended rehabilitation measures are summarised in Table 12.1.

12.2 SEWERAGE SYSTEM REHABILITATION

12.2.1 Improvements to the Sewerage System

Only a small area of Meru is served by the existing sewerage system and no expansion of the system is allowed for in the rehabilitation works. It is recommended that the pipes be unblocked and the manholes cleaned.

The anaerobic pond at the sewage disposal works should be de-sludged to improve the quality of the effluent.

The treatment and disposal of the effluent using the rehabilitated percolation system will need careful maintenance. Disposal is through a series of perforated buried pipes fed by an open concrete channel and which discharge in the root area of eucalyptus trees. The channel and eventually the perforated pipes became choked with leaves from the trees and the system ceased to work. Rehabilitation should include covering the channel. The recommended rehabilitation measures are summarised in **Table 12.1**.

Table 12.1 **SUMMARY SCHEDULE OF PROPOSED REHABILITATION WORKS FOR MERU WATER SUPPLY**

Item	Unit	Ref	Component	Condition	Proposed action	Comments	Implementation
1.	Inlet works	1.1	Flow control mechanism	Missing	Install	Prevention of raw water overflow	Rehabilitation
2.	Storage	2.1	4 no. 1,000 m^3 tanks		Construct	Existing storage facilities are insufficient	Rehabilitation
3.	Meters	3.1	Bulk meters	None are working	Install on main trans - mission pipelines and at zone boundaries	Measure flows and identify leaks and breaks in distribution system	Rehabilitation
		3.2	Domestic meters		Replace		Rehabilitation
4.	Pipelines	4.1	Distribution system pipes = and > DN50	In use, but old and undersized.	Replace, lay new pipes	System constructed in 1950s and 70s	Rehabilitation
		4.2	Rising main DN100 from Milimani to Kaithe site	Disused	Replace.	To transfer treated water to high level zone	Rehabilitation
5.	Logistical support	5.1	Office buildings, vehicles	In poor condition	Rehabilitate and equip offices with computers, furniture, etc. Supply vehicles	Improve O&M capacity, improve working conditions	Rehabilitation

12.3 INSTITUTIONAL AND LEGAL FRAMEWORK

12.3.1. Legal and institutional guidelines

Meru water supply, like the other nine towns covered in this study, is served by the Ministry of Environment and Natural Resources. The water operator is the District Water Officer (DWO).

In recommending a viable institutional and legal framework for Meru Urban water Supply and Sewerage Services, the following guidelines were utilized: Government policy on the water sector Government policy on the restructuring and privatisation of public enterprises and the eligibility criteria for grant funding within the sector by Government of Japan. Other considerations include; sustainability of water supply and sanitation services; improved access to community, especially women; community participation and involvement; speed of incorporation in view of current strict deadlines and consistency with existing incorporation laws; - public orientation as opposed to private sector orientation.

The legal framework for water sector management in Kenya include: The Water Act, Cap. 372; The National Water Policy set out in Sessional Paper No. 1 of 1999; and the National Water Master Plan. The institutional framework for the water sector involves: the Ministry of Environment and Natural Resources; the National Water Conservation and Pipeline Corporation; the five River Basin Development Authorities; private sector operators and non governmental organisations;

12.3.2 Options for Meru Urban Water Supply and Sewerage Services

Applying these guidelines, various institutional and legal options for Meru Urban Water Supply and Sewerage Services were listed and expounded upon. They were:

(a) State corporation
(b) Limited liability company
(c) Co-operative society
(d) Trust corporation

After weighing the advantages and disadvantages of each option, and evaluating their conformance with Government of Kenya and JICA requirements, the formation of a Trust Corporation for Meru Urban Water Supply and Sewerage Services was proposed as the best option.

12.3.3 Legal Requirements and Institutional Framework For A Trust Corporation

The legal requirements for creating the proposed Trust Corporation for Meru Urban Water Supply and Sewerage Services were outlined, together with an institutional framework. The following two structures were recommended:

(a) A Board of Trustees (BOT)

The Board of Trustees will be the governing body of the Trust Corporation. It will acquire and manage assets on behalf of the stakeholders; and will be responsible for policy guidance and the strategic direction of the Trust Corporation. The proposed Board of Trustees will be appointed from the current stakeholders of Meru Urban Water Supply and Sewerage Services.

(b) Management structures

The Trust can operate the water supply and sewerage system in the Town or alternatively, the Trust can contract out this function to a private operator. In the event the BOT decides to manage these services, it can appoint senior members of the Management Team.

These are:

(a) The General Manager
(b) The Technical Manager
(c) The Commercial Manager

12.3.4 Implementation and recommended institutional form.

The transitional arrangements from the current ownership and operation of the Urban Water Supply and Sewerage Service to the operations of the proposed Trust Corporation were outlined. The arrangements were:

Developing consensus among important stakeholders on the proposed approach to the operations of Meru Urban Water Supply and Sewerage Services (the Trust Corporation); appointing members of the Trust from identified stakeholders; Preparing the constituting instrument for Meru Urban Water Supply and Sewerage Services; carrying out an inventory of the water supply system infrastructure of Meru Urban Water Supply System and assigning values to these assets; developing organisational structures and staffing plans; completing the financial plan for the new organisation; agreeing on transfer modalities; developing an operations

manual for Meru Urban Water Supply and Sewerage Services; and ensuring all the assets, staff and financial resources are in place in the new organisation.

12.5 Overall Financial and Economic Evaluation

Table 12.2 Meru - Overall Financial and Economic Evaluation (Without Sensitivity Analysis)

Financial Evaluation			Economic Evaluation			Social Concerns		Overall Evaluation
FIRR	NPV	RER	EIRR	NPV	CBR	Health needs	Water needs	
N/V	**N/V**	**N/V**	**V**	**V**	**V**	**V**	**V**	**ESV**

N/V = Not Viable
V = Viable
ESV = Socio-economically Investment Justifiable

Table 12.3 Meru - Overall Financial and Economic Evaluation (With Sensitivity Analysis)

Financial Evaluation			Economic Evaluation			Social Concerns		Overall Evaluation
FIRR	NPV	RER	EIRR	NPV	CBR	Health needs	Water needs	
V	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**ESV**

V = Viable
ESV = Socio-economically, Investment is Justifiable

12.5.1 Financial Evaluation

The project has been assessed not to be financially viable under the current tariff regime if a 10-year period is selected. However, the project's ability to cover more than adequately its O&M costs is highly commendable.

It should nevertheless be observed that the 10-year life span given for financial evaluation might be unrealistic for utility investment. A 15-year life span is assumed to be more appropriate; and over the period, the project is financially viable whether financed by loan or Grant.

12.3.2 Economic Evaluation

The project is fully economically viable. From a public goods perspective, it makes good sense to invest in rehabilitating the water and sanitation services.

12.3.3 Social Evaluation

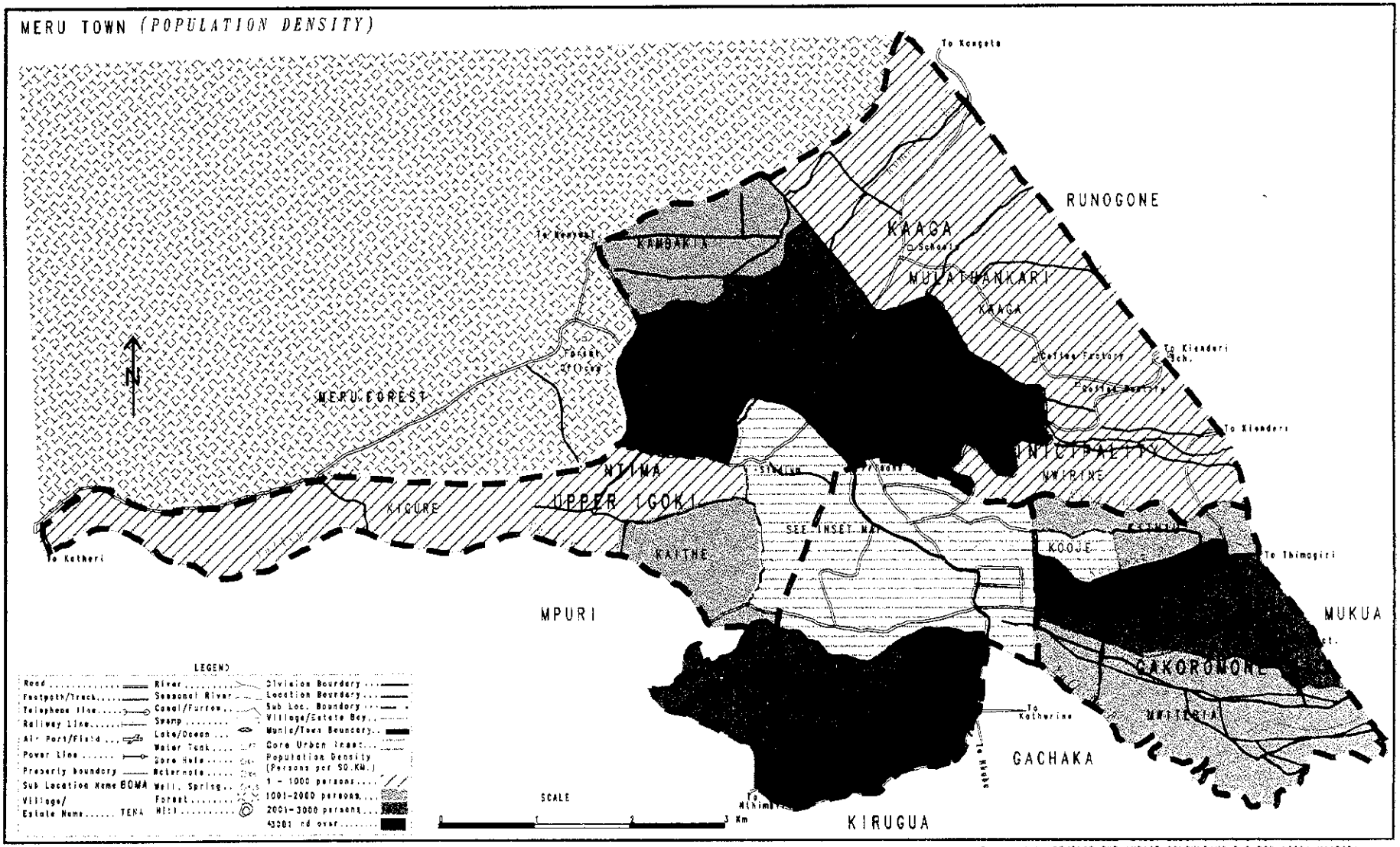
It was found that 90%, on average, of the residents consider supply of clean water a higher priority than other social infrastructure. They would also be willing to pay a higher tariff to obtain the social benefits arising from a clean and adequate water supply system. The project is therefore socially justified

12.3.4 Overall Evaluation

The project is financially and socio-economically justified as provided in Table 12.3.

APPENDIX B1
MERU TOWN

MERU TOWN *(POPULATION DENSITY)*



B1-1

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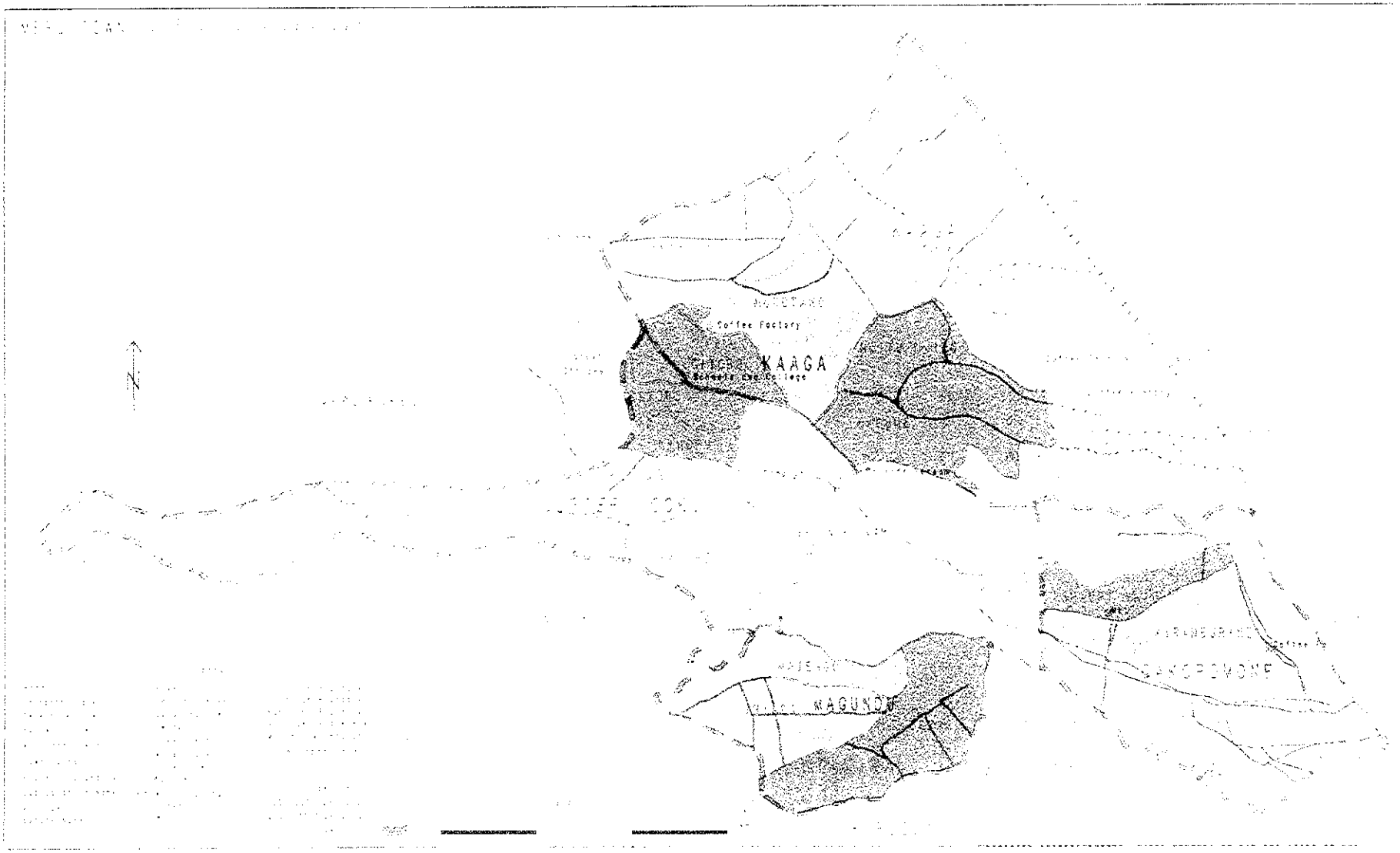
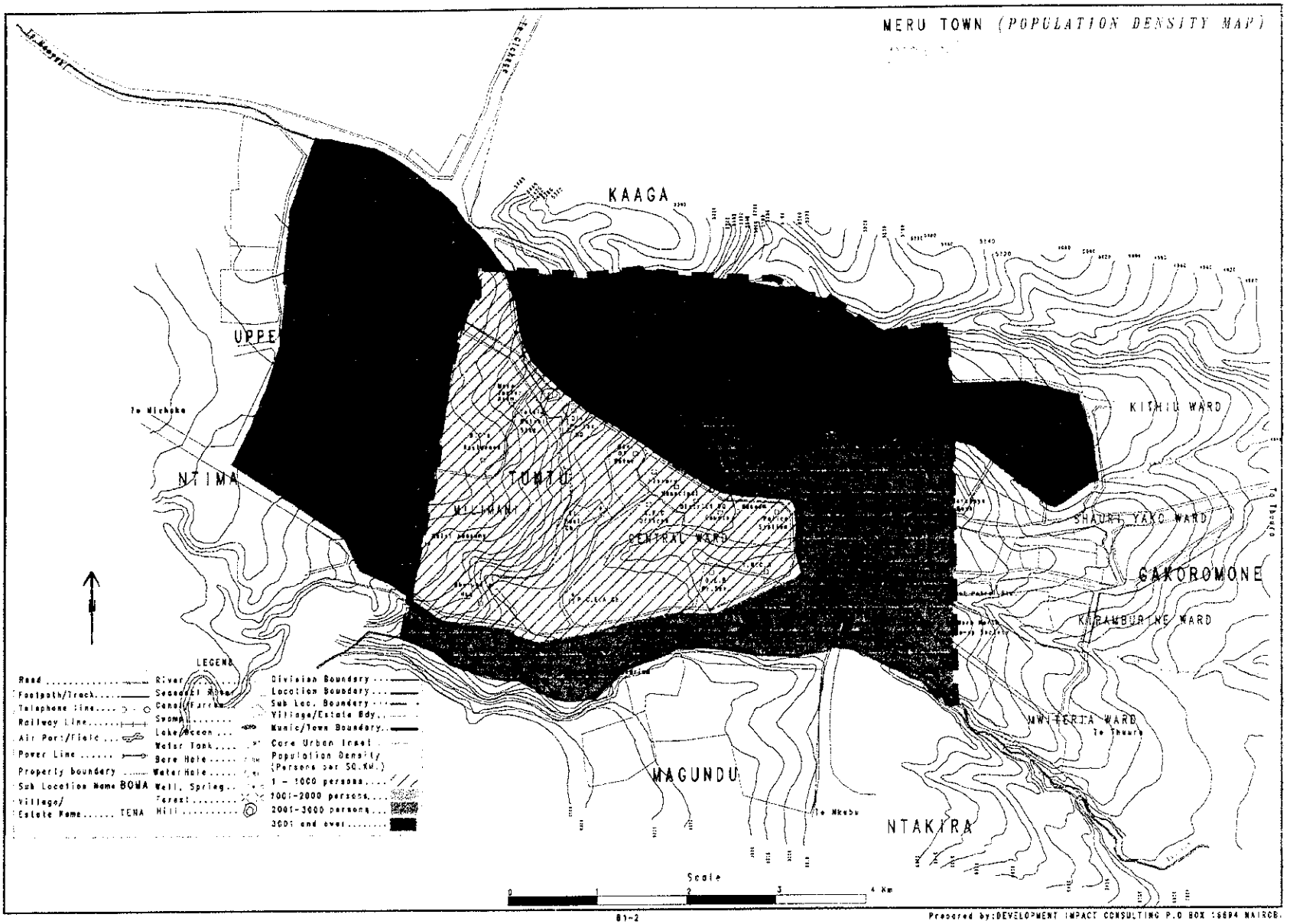

N
Coffee Factory
KAAGA
MAGUNGU
BANGUMOKE


MERU TOWN (POPULATION DENSITY MAP)
KAAGA
UPPE
NTIMA
TUMTU
MIGUANI
CENTRAL WARD
KITHIU WARD
SHAURI YAKO WARD
GAKOROMONE
KAMBURINE WARD
MWERIA WARD
MAGUNDU
NTAKIRA
To Nkubu
To Thuuru
LEGEND
Road
Footpath/Track
Telephone Line
Railway Line
Air Port/Field
Power Line
Property boundary
Sub Location Name BOMA
Village/
Estate Name TENA
River
Seasonal River
Canal/Furrow
Swamp
Lake/Ocean
Water Tank
Bore Hole
Water Hole
Well, Spring
Forest
Hill
Division Boundary
Location Boundary
Sub Loc. Boundary
Village/Estate Bdy
Municipal/Town Boundary
Core Urban Inset
Population Density
(Persons per SQ.KM.)
1 - 1000 persons
1001-2000 persons
2001-3000 persons
3001 and over
Scale
0 1 2 3 4 Km
81-2
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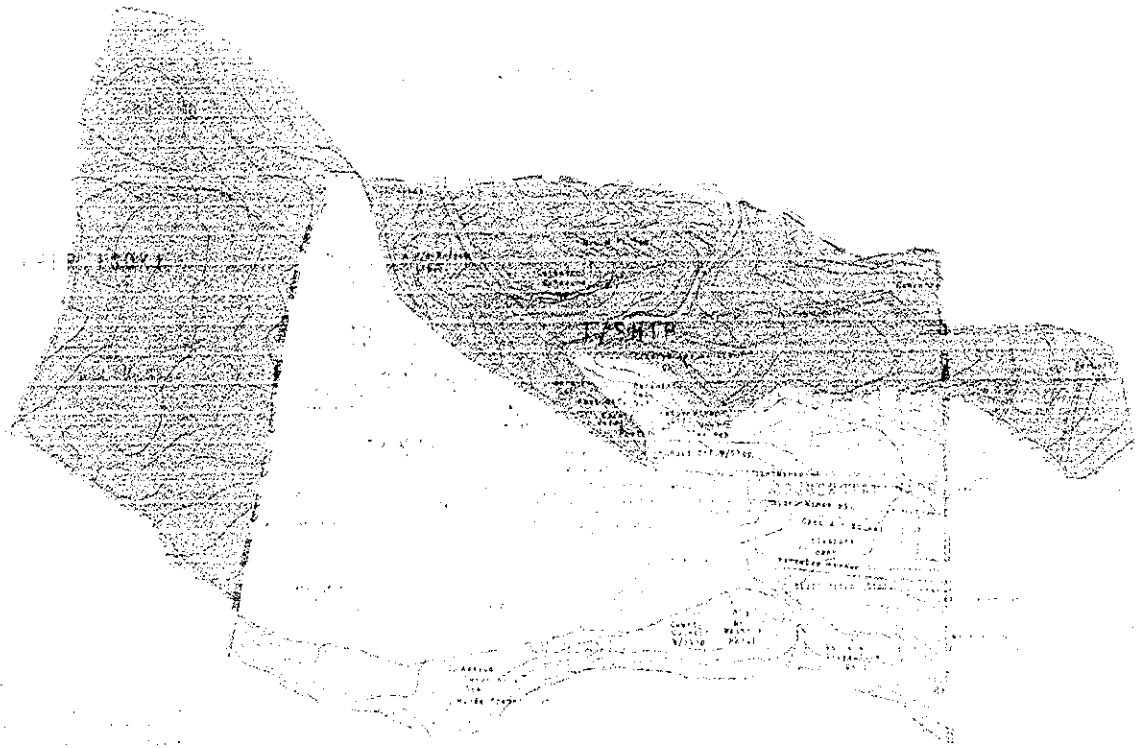

APPENDIX B2
MERU
TOWN

SEWAGE PONDS

EFFLUENT DISPOSAL SYSTEM
(PERCOLATION)

KATHITA RIVER INTAKE

2 No. 75m^3 GROUND LEVEL STORAGE TANKS AT KAITHE SITE

APPENDIX A2 - ENGINEERING PRINCIPAL DESIGN CRITERIA

The following principal design criteria are used, with reference to the appropriate sections of the 1986 Design Manual prepared by the Ministry of Water.

(a) Water quality

(i) Bacteriological quality of water

No faecal coliforms (1986 Design Manual, section 5.2.2, subsection A.1). Following the 1994 WHO guidelines for drinking water quality, this can be achieved by disinfection:

- with a free chlorine residual of 0.5 mg/l (8.12.4 of the 1986 Manual gives 0.3 mg/l to 0.5 mg/l);
- at a pH less than 8, and
- a turbidity less than 1 NTU;
- for at least 30 minutes.

Section 138 of the draft Water Act states:

"All water undertakers must ensure that <u>any</u> water for human consumption shall be disinfected using approved disinfectants and the required <u>residual</u> levels maintained at the reservoirs, distribution lines and end points."

The word "any" means that all potable water must be disinfected, even groundwater. The word "residual" implies that the approved disinfectants will be limited to chlorine compounds or other halogens. It would not cover UV radiation, ozone, etc.

(ii) Chemical quality of water

- Fluoride to be less than 1.5 mg/l, or 3 mg/l in exceptional cases (1986 manual, section 5.3.1).
- Colour to be less than 15 TCU (5.3.2) or up to 50 TCU in exceptional cases (5.3.3).
- Turbidity to be less than 1 NTU for disinfection (1994 WHO guidelines).
- pH to be between 6.5 and 8.5 (5.3.2) or up to 9.2 in exceptional cases (5.3.3), but less than 8.0 during disinfection (1994 WHO guidelines).

- Iron to be less than 0.3 mg/l (5.3.2), or 1.0 mg/l in exceptional cases (5.3.3).
- Manganese to be less than 0.1 mg/l (5.3.2), or 0.5 mg/l in exceptional cases (5.3.3).
- Water should not attack concrete or ferrous products (5.3.4). This requirement imposes further limitations on pH.

(b) Treatment

(i) General

The works should be designed for continuous operation (8.1.4).

(ii) Pre-settlement

Section 8.4.1 of the 1986 Design Manual recommends pre-settlement ahead of slow sand filters when raw water turbidity is between 20 and 100 NTU. Pre-settlement tanks may also be used ahead of clarifiers when the turbidity exceeds 1,000 NTU.

(iii) Aeration

Not required for surface waters (Section 8.6.1). May be required for groundwater (8.6.2) to be followed by sedimentation or filtration when carried out to oxidise iron and manganese.

(iv) Treatment chemicals

Coagulant	:	aluminium sulphate (8.7.4)
pH correction	:	soda ash (8.7.4)
Disinfectant	:	tropical chloride of lime or calcium hypochlorite (8.12.2)

(v) Sedimentation

Section 8.9.3 of the 1986 Design manual requires horizontal flow tanks with a design surface loading of 1 m/hr.

Section 8.9.4 states that the operational requirements of vertical-flow, sludge blanket clarifiers are so strict that they should not be used except under very exceptional circumstances.

(vi) Rapid gravity filtration

The principal criteria for rapid gravity filters are:

- design surface loading to be 5 m/hr (8.10.1);

- filter bed thickness 0.7 m to 1.0 m (8.10.2);
- filter media to be quartz sand, 0.5 mm to 1.0 mm, with a uniformity coefficient less than 1.5 (8.10.2);
- backwash rate to be 50 m/hr minimum (8.10.4);
- air scour only in exceptional cases (8.10.4).

(vii) Chemical dosing for disinfection

The World Health Organisation recommends that water intended for potable use should be disinfected with 0.5 mg/l of free available chlorine for at least thirty minutes at a pH less than 8. This recognises that germicidal efficiency is dependent on both the free chlorine concentration and the time of contact.

To achieve a free chlorine residual, sufficient chlorine must be dosed to react with any dissolved ammonia, iron, manganese, etc. The required doses are:

- 7.6 g of chlorine to react with 1 g of ammonia;
- 0.54 g of chlorine to react with 1 g of ferrous iron, and
- 1.5 g of chlorine to react with 1 g of manganese.

(c) Transmission systems

Transmission systems should be designed for:

- twenty-four hour operation (implied in 12.7.1 for clear water pumps, explicit in 12.7.2 for raw water pumps and 12.7.3 for borehole pumps);
- one standby pump (12.8.1);
- diesel generators to provide 50% cover (12.8.2);
- a minimum head of 4 m in the transmission main (9.3.7).

(d) Storage

Section 11.3.1 of the 1986 Design Manual requires balancing storage to be fifty per cent of the daily demand. Section 11.3.2 requires the following emergency storage:

- 12 hours for gravity supply to storage;
- 18 hours for pumped supply;
- 8 hours for supplies from more than one independent system.

(e) Distribution

The principal criteria are as follows:

Minimum head at consumer connections to be 10 m;
Maximum head generally not greater than 60 m.

(f) Water demand in urban areas

People with individual connections	high class housing	250lcd
	medium	150
	low	75
People without connections	low	20

APPENDIX B3
MERU TOWN

MERU WATER SCHEME ORGANISATION CHART
STUDY OF INSTITUTIONAL IMPROVEMENT ON REHABILITATION OF WATER SUPPLY SYSTEMS FOR TEN(10) LOCAL TOWNS IN KENYA

MERU **FIGURE: 8.1.2**

Total Staff:	10	+	38	= 48
Total Accounts:	3225			

District Water Officer
Mr. Njeru
BSc Engineering

Deputy District Water Officer
Mr. Mureithia

Secretary

Head Of O&M
Mr. Mukundi
Senior Inspector W/S KEWI

Head Of Revenue
Mr. Kabodia
Senior Inspector W/S

Asst.. Head Of Revenue
Mr. Lucy Ngatha
Inspector Ground Water KEWI

Revenue Clerks
- Florida Karwirwa
- Patrick Gitonga
- Bernard Onyango
- Nyaga Miaru
- Irene Mweti
- Mary M.

Trained On The Job (SS)

Officer In Charge
Mr. Sammy Michuki
Senior Inspector W/S

• **Meter Reading**	• Bernard S/WS (CRO) • Helen -WSO II (WSO) • Stanley -WSO II (WSO) • Wilson -Art. I (Pipe Fitter)	• **New Connection**	• Samuel -MR (MR) • Festus -P/M I (MR) • John -MR III (MR) • Ann -HCO (MR)
• **Meter Servicing**	• Abraham -Art. I (Pipe Fitter) • Geoffrey - Art. I (Pipe Fitter)	• **Bursts**	• John -Tel. Op. (Line Patrol) • Stanley - Art I (Kathita Intake +Line patrol)
• **Line Patrol**	• James - Art. I (Line Patrol) • David - Mech. I (Pipe Fitter) • Charles -Art. I (Pipe Fitter) • Naiton -Art. I (Pipe Fitter) • Joseph -P/Mech.. (Watch. T.Works)		• Tesee -WSO II (WSO) • Joyce -Tel. Op. (MR) • Justus -Art I (Pipe Fitter) • Molly -SSS (Line Patrol) • Joseph -SSI (MR) • Hezron -Art I (Pipe Fitter)
• **Disconnection**	• Kennedy -Art. II (Pipe Fitter) • Peter -Art. II (Pipe Fitter) • Edward -SSS (Watch. T.Works)		
• **Reconnection**	• Paul - SS II (Watch. T.Wks) • Silvester -SS II (Chem. Att. T. Works) • Samuel -SS II (MR)		

Accounts Off. In Charge
Mr.. Gituma
High Cler.Off. ACNC I +II

Accounts Assistant
Mr.. Mugwika
In House Trained

Store Supplies Off.
Mr.Kagura
Sen. Asst. In Charge of Supplies

Store man
Mr.B. M. Mboroki

Personnel/Exc. Officer
Mrs. Tarcilla Karimi
High Cler.Off. S.C.O

Registry
??

Staff members shared between district and Meru Water Supply.

Development Impact Consulting

Engineering and Utility Management Ltd.

GIBB Eastern Africa
LAWGIBB Group Member

Gibb Eastern Africa Ltd.

P. O. Box 16694, NAIROBI Tel: 713741, 712649 Fax: 712720 E-mail: dic@insightkenya.com

CONSORTIUM

Study of Institutional Improvement and Rehabilitation of Water Supply Systems for Local Towns in the Republic of Kenya

Location: MERU WS System
Date: 25-28.09.2000

Interviewer: LEK and CK

****

Discussion/Interview with: District Water Officer: Eng. Mr. Njeru
Officer in Charge: Sammy N. Michuka

Contact:
P.O.Box 467
Meru
Telephone: 0164-20116

JICA Study Team: Mr. Doya present in Meru

UNTIL 1990 MERU WS WAS WITH THE COUNCIL, BUT DUE TO PROBLEMS TAKEN OVER BY MENR