

ASIAN DEVELOPMENT BANK

RRP: NEP 31624

REPORT AND RECOMMENDATION

OF THE

PRESIDENT

TO THE

BOARD OF DIRECTORS

ON A

PROPOSED LOAN

TO THE

KINGDOM OF NEPAL

FOR THE

MELAMCHI WATER SUPPLY PROJECT

November 2000

CURRENCY EQUIVALENTS

(as of 24 November 2000)

Currency Unit	–	Nepalese (Rupee/s (NR/NRs))
Nre1.00	–	\$0.01040
\$1.00	–	NRs74.72

- (i) The Nepalese rupee is pegged to the Indian rupee (Re) at NRs1.60 to Re1.00 and is fully convertible on all current account transactions.
- (ii) For calculations in this report, an exchange rate \$1.00 = NRs72.00 is used, the rate prevailing at appraisal.

ABBREVIATIONS

ADB	–	Asian Development Bank
BDS	–	bulk distribution system
CIDA	–	Canadian International Development Agency
DDC	–	district development committee
DWSS	–	Department of Water Supply and Sewerage
EIRR	–	economic internal rate of return
HEPP	–	hygiene education and promotion program
ICB	–	international competitive bidding
IS	–	international shopping
JBIC	–	Japan Bank for International Cooperation
KVWA	–	Kathmandu Valley Water Authority
LCB	–	local competitive bidding
lpcpd	–	liters per capita per day
MDS	–	Melamchi Diversion Scheme
MLD	–	million liters per day
MOF	–	Ministry of Finance
MPPW	–	Ministry of Physical Planning and Works
MWSDB	–	Melamchi Water Supply Development Board
NDF	–	Nordic Development Fund
NGO	–	nongovernment organization
NORAD	–	Norwegian Agency for International Cooperation
NPC	–	National Planning Commission
NWSC	–	Nepal Water Supply Corporation
O&M	–	operation and maintenance
OPEC	–	Organization of Petroleum Exporting Countries
OPEC Fund	–	OPEC Fund for International Development
PMU	–	Project Management Unit
PO	–	private operator
POE	–	Panel of Experts
RAP	–	resettlement action plan
Sida	–	Swedish International Development Cooperation Agency
STP	–	sewage treatment plant
SUP	–	social uplift program
TA	-	technical assistance
VDC	–	village development committee
WTP	–	water treatment plant

NOTE

In this report, "\$" refers to US dollars.

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LOAN AND PROJECT SUMMARY

Borrower	Kingdom of Nepal
Project Description	<p>The Project will improve the health and well-being of the people in Kathmandu Valley by alleviating the critical water stress in the region, where 1 million urban dwellers receive piped water for only two hours every two days. This will be accomplished by tapping additional water resources from the Melamchi River, increasing the water treatment capacity, enhancing access to water, and optimizing the use of existing water resources. The Project will also improve the living conditions of the people in the project area by mitigating direct and indirect project impacts and channeling benefits to the beneficiaries on a long-term basis, with particular emphasis on social and environmental aspects. The Project will introduce institutional reforms with a view to ensuring sustainability of services.</p>
Classification	Primary: Human Development Secondary: Environment
Environment Assessment	Category: A A summary environmental impact assessment was circulated to the Board on 23 August 2000.
Rationale	<p>Kathmandu Valley, an area of 500 square kilometers and home to about 1.5 million people, is the country's single largest urban economy and is critical to Nepal's economic growth. Water is central to the well-being of the population and the key to its productive capacities. However, current water services are grossly inadequate and unreliable; many people must resort to tankered supplies, bottled water, and both deep and shallow wells. This trend has led to serious environmental concerns as shallow wells are becoming increasingly polluted and deep aquifers are being mined to secure additional water. Poor water quality impacts sharply on public health. In terms of access to water (in the dry season) and quality of water, almost all the population suffer, but the effects are greatest on the health of the poor.</p> <p>In addition, a strong and effective utility is needed to manage water in Kathmandu Valley. Nepal Water Supply Corporation's operational and financial situation has been precarious, mainly due to lack of autonomy, lack of water to distribute and inefficient use of existing resources. The existing institutional framework needs to be comprehensively overhauled to meet the valley's water and wastewater requirements.</p> <p>The Government has recognized that, with external assistance a comprehensive, but least-cost solution has to be found to mitigate the capital city's most serious socioeconomic problem. The Project provides the required opportunity to address both the acute socioeconomic distress caused by the lack of adequate safe water to Kathmandu Valley residents, and the</p>

institutional challenges to provide water and wastewater management services on a sustainable basis.

Objectives and Scope

The main objectives of the Project are to alleviate the chronic water shortage in Kathmandu Valley on a sustainable, long-term basis, and to improve the health and well-being of its inhabitants. The Project also seeks to develop a comprehensive institutional framework for water resource management within the valley. The Project involves the transfer of water from the Melamchi Valley into Kathmandu Valley through a diversion scheme with a 26-kilometer tunnel.

The Project comprises four parts: (i) infrastructure development, (ii) social and environmental support; (iii) institutional reforms, and (iv) project implementation support. Infrastructure development will include the Melamchi diversion scheme, water treatment plant, bulk distribution system, distribution networks, wastewater system, and a shallow groundwater well-field in Manohara. Social and environmental support will include a social uplift program to mitigate project impacts and channel benefits to beneficiaries. A resettlement action plan and an environmental management plan will be implemented to reduce and monitor any adverse social and environmental impacts. It will also include hygiene education, and public awareness programs. Institutional reforms include establishing a regulatory body, introducing a private sector lease contract, and setting up a Kathmandu Valley water authority for comprehensive water resource management and establishing groundwater licensing in Kathmandu Valley. Project implementation support will assist the Government in implementing the Project.

Cost Estimates

The total cost of the Project is estimated at \$464 million, including contingencies and taxes. The total foreign exchange cost is \$273 million (59 percent) and the local currency cost is \$191 million equivalent (41 percent).

Financing Plan

Source	Foreign Exchange	Local Currency	Total Cost	Percent
	(\$ million)			
ADB	93	27	120	25.9
World Bank	61	19	80	17.2
JBIC	46	6	52	11.2
NORAD	23	5	28	6.0
Sida	20	5	25	5.4
NDF	8	1	9	1.9
OPEC Fund	8	6	14	3.0
Japan	14	4	18	3.9
Government	0	118	118	25.4
Total	273	191	464	100

ADB = Asian Development Bank, JBIC = Japan Bank for International Cooperation, NDF = Nordic Development Fund, NORAD = Norwegian Agency for International Cooperation, OPEC Fund = OPEC Fund for International Development, Sida = Swedish International Development Cooperation Agency.

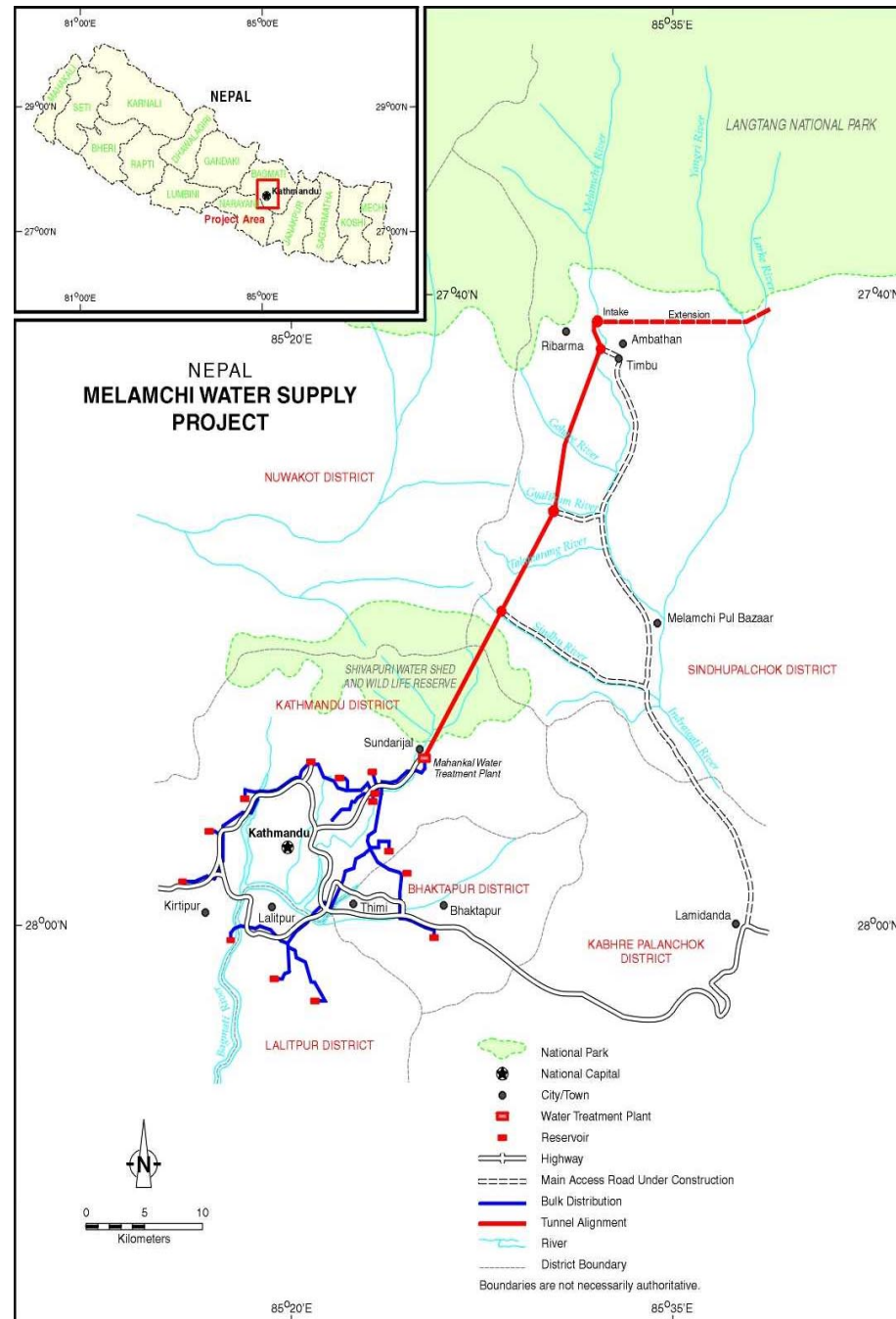
Loan Amount and Terms	A loan for SDR 93,253,000.00 (\$120.0 million equivalent) is proposed to be provided from the Asian Development Bank's (ADB) Special Funds resources with a term of 32 years, including a grace period of 8 years, and an interest charge of 1 percent per annum during the grace period and 1.5 percent per annum thereafter. The ADB funds for the Project as well as all other funds will be provided to the utility in an equal mix of loan and grant. Interest for the loan will be at 8 percent per annum repayable over 20 years including 7 years of grace.
Period of Loan Utilization	31 March 2007
Executing Agency	Ministry of Physical Planning and Works (MPPW)
Implementation Arrangements	The Melamchi Water Supply Development Board (MWSDB) will provide guidance in dealing with major issues affecting the Project. The MWSDB's executive function will be carried out by a project management unit (PMU). The PMU will oversee project implementation activities related to engineering, social and environmental, procurement, administration, financial, and public relations matters. Two panels of experts will be used to supplement consulting services in specific disciplines, including hydraulics, geotechnical engineering, tunnel contracting, and in sociology, environmental management, and consensus building and dispute resolution. A private operator will provide operation and maintenance of the project facilities through a 10-year lease contract.
Procurement	Procurement of goods and services financed by ADB will be done in accordance with <i>ADB's Guidelines on Procurement</i> . Contracts for civil works estimated to cost more than \$1.0 million equivalent will be carried out using international competitive bidding procedures, while those contracts estimated to cost \$1.0 million equivalent or less will be under local competitive bidding procedures. Miscellaneous minor goods that cannot be grouped into a larger contract and cost less than \$500,000 per contract will be procured through international shopping procedures. Procurement for contracts financed by other development agencies will follow their respective guidelines.
Consulting Services	ADB will fund a total of 474 person-months of international and 2,552 person-months of domestic consulting service inputs. The majority will be for the PMU (234 person-months of international and 846 person-months of domestic), and bulk distribution system and construction supervision (113 person-months of international and 750 person-months of domestic). The selection and engagement of consultants will be done in accordance with <i>ADB's Guidelines on the Use of Consultants</i> and other arrangements satisfactory to ADB for the engagement of domestic consultants.

30 September 2006

**Expected Project
Completion Date**

**Project Benefits and
Beneficiaries**

The Project's primary target population is the 1.5 million people (180,000 households) living in the Kathmandu Valley. The urban inhabitants will benefit from improved water supply services with better water quality, increased quantity, improved supply, extended service areas, more equitable water distribution, and better customer services. These benefits will go hand in hand with raised public health, hygiene, and environmental awareness, and improved sanitation facilities and maintenance. The Project will also accrue positive socioeconomic and poverty reduction benefits to the Melamchi Valley population (40,000). These will include increased incomes from the expanded market and upgraded skills, reduced workload for women, better education for children, and reduced incidence of trafficking of girls.



I. THE PROPOSAL

1. I submit for your approval the following Report and Recommendation on (i) a proposed loan to the Kingdom of Nepal for the Melamchi Water Supply Project, and (ii) the proposed administration by the Asian Development Bank (ADB) of a loan for the Project to be provided by the Organization of Petroleum Exporting Countries (OPEC) Fund for International Development (OPEC Fund).

II. INTRODUCTION

2. In April 1996, His Majesty's Government of Nepal asked ADB to take the lead role in assisting the Government to prepare the Project. Recognizing the urgent need to augment water supplies in Kathmandu Valley, ADB advised the Government that investment in physical infrastructure should be accompanied by major reform of the institutional and policy environment governing water supply in the valley. Accordingly, technical assistance (TA) to address urban water supply reforms in the valley was provided in March 1998.¹ Subsequently, in November 1998, an engineering loan was approved by ADB² to assist in preparing detailed designs for the bulk distribution system component of the Project; provide project management support; assess project justification in economic, financial, environmental and social terms; and undertake pilot work for artificial groundwater recharge in the valley. The work under this loan is expected to be completed by June 2001.

3. The Fact-Finding Mission visited Nepal from 3-24 July 2000 to work with the Melamchi Water Supply Development Board (MWSDB) and to develop a consensus with the Government and external agencies on the scope, cost estimates, financing, and implementation arrangements for the Project. Subsequently, the Appraisal Mission³ visited Nepal from 17 September to 4 October 2000 and confirmed various project- and sector-related agreements and arrangements. This report is based on the findings of ADB missions, consultations with project beneficiaries, reports prepared by the TA and loan consultants, discussions with Government ministries and departments, nongovernment organizations (NGOs), and consultations with external agencies involved in the Project. Appendix 1 presents the project framework.

III. BACKGROUND

A. Sector Description

1. Demographic Setting

4. Nepal is divided into three ecologically distinct regions: mountains, hills, and the Terai.⁴ These regions are diverse in climate and topography, as well as in socioeconomic conditions and cultural practices. Over the past five decades, Nepal has been gradually urbanizing as a result of the expansion of the nation's road network, the development of market centers, rural-urban migration, and the natural process of population growth and development. In less than 44 years, the population has increased from 8 million to nearly 22 million. In contrast, the urban population increased tenfold—from 238,000 to nearly 2.3 million. Although the urban population remains relatively small compared with the rural population, urban growth rates, which

¹ TA 2998-NEP: *Urban Water Supply Reforms in Kathmandu Valley*, for \$800,000, approved on 16 March 1998.

² Loan 1640-NEP(SF): *Melamchi Water Supply (Engineering) Project*, for \$5 million, approved on 10 November 1998.

³ The Mission comprised A. C. McIntosh, Senior Project Engineer and Mission Leader; B. Fawcett, Senior Programs Officer; A. Goswami, Counsel; K. Julian, Programs and Implementation Officer; A. Perdiguero, Project Economist; S. Tanaka, Social Development Specialist; C. Vita, Associate Operations Analyst; and I. Walker, Financial Analyst and Staff Consultant.

⁴ Terai is the southern plain area bordering India.

increased the urban population five times over the last three decades, are significant. Kathmandu Valley, with an estimated 1 million urban dwellers and half a million rural dwellers, is leading the way in urbanization with an estimated annual growth rate of 4 percent.

5. The country's socioeconomic structure is based on subsistence agriculture with high underemployment and low agricultural productivity. Over the last two decades, average life expectancy in Nepal increased by 13.5 years, to 57 years, which is the lowest in South Asia. The life expectancy rate for women is lower than that for men. Infant mortality continues to be high, with one of every 10 children dying in infancy. Infants in rural areas are exposed to a higher risk of death than those in urban areas, and infants in the mountainous region are more than twice as likely to die as those in the hilly and lowland regions.⁵ The incidence of maternal mortality is one of the highest in the world; the maternal morbidity rate is also high. Malnutrition is widespread, with over half of all households suffering from some degree of food insecurity.

6. On average, food expenditure accounts for 62 percent of household income, leaving insufficient income to pay for health, education, and other necessities. Although legislation on women's property rights has been drafted for consideration by Parliament, the gender disparity in income is currently acute and results from the control of income by the male head of the household and the near total lack of property rights for women. The disparity in assets and income often has a detrimental effect on household health, nutrition, education, and overall standard of living.

2. Poverty in the Kathmandu Valley

7. Concern is increasing about the persistence of the high poverty incidence among the rural population despite the Government's large development expenditures, assisted by external funding agencies. The recent estimate indicates that 42 percent of the country's total population are living below the official poverty line. According to the Human Development Report of the United Nations Development Programme for 2000, Nepal ranks 144th of 174 countries, with its human development index estimated at 0.474. The poverty incidence is highest in rural areas and remote districts. Against this background, poverty reduction is the primary objective of the Government's development policy, as indicated in the Government's Ninth Development Plan (1997-2002).

8. Nepal's poverty is characterized by social exclusion based on ethnicity, and gender. Occupational castes are found among the poorest, while women suffer more from being in poverty than men due to deprivation of access to education, health, productive assets and resources, and decision-making opportunities.

9. Although no official estimates of the extent of poverty in Kathmandu Valley are available, data derived from the Nepal Living Standards Survey of 1995/96 indicates that based on a poverty threshold of NRs9,000 per capita per annum, equivalent to about \$122, the extent of the urban poor ranges from 10 to 13 percent. However, given that rents and other costs are higher in Kathmandu than in other urban areas of the country, 12 to 15 percent would be a conservative estimate of urban poverty in Kathmandu Valley. Nevertheless, income poverty alone is insufficient to understand the extent of poverty in the valley.

10. Most of Kathmandu's poor live in very low quality houses, squatter settlements, or rented accommodation. Rental accommodation is occupied by a range of low-income groups, such as daily wage earners, hawkers, and partly skilled laborers. Squatters live mainly on marginal government-owned land; their population has grown considerably and is now estimated at

⁵ United Nations Development Programme. 1998. *Nepal Human Development Report, 1998*, Nepal South Asia Center, Kathmandu.

18,000. Overall, most poor live in small settlements in the midst of higher-income housing and, consequently, are not very visible.

11. Access to reliable water supplies is a problem for most low-income communities. Reliance on public supplies from the Nepal Water Supply Corporation (NWSC) is minimal; most urban poor depend on private or traditional sources of supply. Shallow tubewells are a popular source but these are usually contaminated and responsible for a variety of waterborne diseases. About 67 percent of the population believe that the quality of water supplied by NWSC is poor; almost 72 percent of households in Kathmandu Valley treat their water before consumption. Boiling and filtering, the most common means of treatment, involve considerable expense and impact mainly on the poor. Based on a 1999 survey undertaken during project preparation, 36 percent of the households suffer from water-related diseases. Diarrhea, stomach ailments, and dysentery are the dominant health problems and impact significantly on productivity and income because of working days lost and treatment expenses. Although no data is officially available, diarrhea is a leading cause for child mortality throughout Nepal, and Kathmandu Valley in particular.

12. The hardships in accessing water in Kathmandu Valley are severe. With piped water supplies limited to two hours every alternate day, most consumers, and particularly the poor, rely on secondary sources.⁶ Although the time spent by the poor in accessing water for domestic use varies, approximately an hour is required. A number of domestic functions are undertaken at the water point to minimize the volume of water to be carried home. Women are predominantly the carriers of water. Residents of low-income areas carry home only about 10 liters per person of water every day. This is insufficient to maintain basic hygiene and sanitation standards, and is a prime cause of the high levels of morbidity and mortality.

13. The project area also covers a large part of Sindhupalchok District and a small part of Kabhre Palanchok District, both of which are predominantly rural despite their proximity to Kathmandu. The poverty incidence in Sindhupalchok District is high at about 50-55 percent. Eighty-five percent of the population lives at subsistence levels. Small landholding size (0.6 hectare on average), physical remoteness due to topography and lack of roads, low agricultural productivity, and poor access to health and education services perpetuate poverty in the district.

3. National Context of Water Supply

14. Nepal has abundant water resources. It possesses about 2.3 percent of the world's water resources with less than 0.4 percent of the world's population. However, drinking water supplies in most rural and urban areas are inadequate due partly to lack of investment in improved services, but also as a result of failure to develop sustainable operation and management of those services. Coverage of adequate water supplies and sanitation in rural areas is estimated at 66 percent and 18 percent respectively; similar coverage in urban areas is estimated at 66 percent and 67 percent.

4. Situation in Kathmandu Valley

15. Kathmandu Valley, which includes the three major urban centers of Kathmandu, Bhaktapur, and Lalitpur has serious problems with water resources. Due to deforestation of catchments, rapid runoff of rainfall occurs in the short wet season (June to August) and an acute shortage of water flow is experienced in the rivers during the longer dry season. This results in severe environmental pollution of the rivers, particularly the Bagmati, which runs through Kathmandu. In recent years, as a result of the seasonal shortage of water, industries and the water utility itself, have resorted to extracting groundwater. Unfortunately, due to the number of

⁶ Based on a 1999 survey undertaken during project preparation, 86 percent of the sampled NWSC consumers were using secondary sources.

clay layers interspersed in the aquifer, most of the groundwater is not recharged naturally during the heavy rainfalls in the wet season. A number of in-valley alternatives such as damming of tributary rivers and further development of groundwater have been explored. But these are constrained by social and technical issues, and fail to provide a long-term response to the matter of increasing water demand. While water use in Kathmandu Valley must be optimized, the long-term solution must lie in developing out-of-valley resources.

16. One of the most serious concerns of the water supply situation in Kathmandu Valley is the unsanitary conditions created partly by the water shortage and partly by the apparent ignorance of most people about the connection between water, sanitation hygiene, and their health. Ninety percent of the people surveyed do not think they frequently suffer from water-related diseases, but 36 percent are in fact experiencing these.

17. The current piped water supply demand in Kathmandu Valley is about 150 million liters per day (MLD), but the combined supply of groundwater and surface water in the dry season varies between 65 and 85 MLD. Even in the wet season, the supply only reaches 140 MLD. Many people resort to tankered water, costing at least \$1.00 per cubic meter. Average daily consumption is around 70 liters per capita as compared with figures of around 150 liters per capita elsewhere in the region, i.e., the demand is constrained by the availability of water. The piped water supply system is not only handicapped by inadequate water resources, treatment capacity is insufficient and the bulk distribution system is inadequate. Water losses, which cannot be accurately measured due to the absence of 24-hour supply and nonfunctioning meters, are estimated to range from 30 to 40 percent of production depending on the season. Another consequence of the current situation is the exploitation of consumers (and the poor in particular) by both the formal and informal providers of water in terms of price and availability.

18. Of the seven sewage treatment plants (STPs) in Kathmandu Valley, four, with a combined capacity of 19 MLD, need rehabilitation. A new STP with a capacity of 17 MLD is under construction. Another STP treats about 100 truckloads per day of septage from septic tanks. The sewer system is a combined one, taking storm water, septic tank effluent, and raw sewage. Many of these sewers discharge directly into the Bagmati River.

5. Institutional Arrangements and Sector Issues

19. The Ministry of Physical Planning and Works (MPPW) is responsible for all water supply and sanitation in the country. It reviews and approves sector plans, policies, and development budgets. It also supervises several sector institutions, including the Department of Water Supply and Sewerage (DWSS), NWSC, the Rural Water Supply and Sanitation Fund Board, and the Town Development Fund. MPPW also oversees the MWSDB, which was set up in 1998 to implement the Project.

20. NWSC has been responsible for most of the water supplies and sewerage in Kathmandu Valley. Unfortunately, although having autonomy in terms of its legislation, in practice NWSC has not been allowed to exercise it, either as a water utility or as an executing agency for the implementation of major projects to improve water supplies and sewerage. Lack of political will to approve tariff increases, combined with an ever-deteriorating level of service, has meant that NWSC is no longer servicing its debts, which mostly derived from a number of loans from the World Bank over the last 30 years. NWSC has suffered from having four different general managers over the last four years, and is overstaffed. Staff morale is low and the level of skills exhibited by its operation and maintenance (O&M) staff is poor. Furthermore, its budget has been inadequate to undertake proper maintenance. The need for NWSC to improve its service quality has been evident for several years. Recently, the Kathmandu Metropolitan City has been active in developing its own small STPs and some sewers. The Government has now

recognized that some form of private involvement in Kathmandu Valley's water supply management is needed to improve service delivery.

21. DWSS is concerned mainly with rural water supply and sanitation, and in operating a few urban water supply systems outside Kathmandu Valley. It is increasingly cognizant of its role to facilitate rather than implement water and sanitation projects. Communities are involved in the planning, design, construction, O&M, and financing of water supply and sanitation schemes. However, more needs to be done to provide the right set of incentives for DWSS to effectively orient itself to help local communities meet their water and sanitation needs.

22. Key sector issues relate to good governance, private sector participation, cost recovery and sustainability, and conservation of natural resources. The absence of a clearly defined policy for urban water supply and sewerage has handicapped sector progress, and prevented a regulatory body being established to oversee and guide the provision and delivery of quality and affordable water services to consumers. Given the current status of water supply in Kathmandu Valley, such a body is badly needed. A related sector issue is private participation, which is essential to improve service quality and efficiency, and to demonstrate the value that could be added by involving the private sector in the discharge of public responsibilities.

23. With regard to cost recovery, the current situation in Kathmandu Valley, comprising the absence of adequate water resources and poor delivery, does not provide incentives for either the supplier or the consumer to ensure that the costs of an inadequate service are met. This situation is compounded by the absence of a clear statement on tariff policy. Also, the objective of providing equitable service to the poor remains unmet. The Government must take steps to outline a tariff policy based on full cost recovery, that ensures specific access to water for and affordability to the urban poor, and promotes demand management.

24. Water is in short supply in the valley. Conserving water through a set of policies that provide for optimizing water use and ensuring its holistic management is a paramount consideration. The sector cannot hope to develop without a strong conservation bias. Groundwater licensing would prevent further damage to the depleted aquifers and enable recharge. Industries that pollute water sources and are water intensive need to be relocated outside the valley so that scarce resources are optimally used. Also, consumers within the valley need to develop greater consciousness of the economic value of water. To this end, consumers need to agree with the residents of Melamchi Valley on the payment of a levy for the use of water from the Melamchi River. In institutional terms, the absence of a body to coordinate and guide water use within Kathmandu valley is inhibiting the holistic management of all water resources. A valleywide water authority is needed to manage water allocation and use.

B. Government Policies and Plans

25. The Government's Ninth Development Plan calls for sustainable development, effective service delivery, and equitable access to water supply and sanitation services. Specifically, the ninth plan advocates (i) mobilizing local resources for the supply of safe drinking water; (ii) protecting existing water sources; (iii) giving priority to the underprivileged; (iv) encouraging active involvement of user groups; (v) integrating sanitation programs and water supply activities; (vi) developing simple low-cost technologies; (vii) redefining the roles and responsibilities of existing institutions for effective and efficient service delivery and facilitation of decentralized operational modalities; (viii) developing NGOs, community-based organizations, and the private sector as partner organizations for overall sector development; (ix) making user groups and local authorities responsible for project formulation, implementation and O&M; and (x) developing technical and institutional capabilities to reduce water leakage and waste in urban areas.

26. In April 1998, the Government approved a national water supply and sanitation policy, with the main objectives of extending service coverage, maximizing health benefits, and addressing gender concerns. While most of the policy statements are similar to those made in the ninth plan, the newly established sector policy emphasizes that (i) Government agencies should act as facilitators rather than implementers of water supply and sanitation projects, and such facilitation should take place at decentralized levels; (ii) the benefits of water supply and sanitation projects are to be measured in terms of improved health and reduced suffering for women and disadvantaged groups; (iii) the Government must retain certain roles to safeguard the public interest, such as coordinating sector activities, regulating water resource use, monitoring water quality, and conducting certain aspects of utility operations; (iv) community-based and private sector approaches to the provision of water supply and sanitation services are the most efficient and cost effective; and (v) water supply and sanitation is sustainable only if beneficiaries meet O&M needs.

27. The Government, with the assistance of the World Bank and the Canadian International Development Agency (CIDA), has been formulating a national water sector strategy. For Kathmandu Valley, the Government has developed a specific water supply and wastewater sector strategy (Appendix 2) based on integrating the needs of the people, and land and water use. The vision for the next 30 years embraces a population of between 2.6 and 3.7 million which is restricted by planning and the provision of services. The relocation of polluting and water-intensive industries, such as the carpet factories, outside of the valley will help. Likewise the development of small towns, including their water supplies, will help to stem the flow of urban migration to Kathmandu Valley. Strict adherence to an agreed land-use plan will be needed to allow the population density to be controlled. This in turn, will lead to a better quality of life.

28. Water demand in Kathmandu Valley is estimated to reach 600 MLD by 2030, inclusive of industrial water use. This is likely to be met from about 150 MLD of surface and groundwater resources within the valley and 450 MLD from surface waters in the Melamchi, Yangri, and Larke river basins. Conjunctive use of surface and groundwater is envisaged, where the sustainable yield of groundwater inside the valley is not exceeded. Part of the sector strategy is to optimize the use of water within the valley. This will entail development of rainwater harvesting, farmers' trading water rights, and demand management by pricing and awareness; reduction of piped water losses; wastewater recycling and storage of wet season water for dry season use. For wastewater, the development vision includes, in the short term, an accent on rehabilitating existing facilities; increasing numbers of public toilets; improving operation of on-site sanitation, including desludging and treatment of septage; and introducing wetlands treatment of grey water.

29. Fundamental to the valley sector strategy, is the concept of comprehensive water resource management under a future Kathmandu Valley water authority (KVWA), which will represent the local authorities and be responsible for the conservation, development, and management of all surface water and groundwater, including use for water supply and irrigation, and disposal of wastewater including pollution control. The authority will be encouraged to use the private sector to manage and develop water supply and wastewater services. A water supply and sanitation regulatory body will be established initially for Kathmandu Valley and later for the whole of Nepal. The strategy for cost recovery for water supply services in the valley is that full cost recovery, including revenues from tariffs covering all future investments, will be phased in by 2010. For wastewater disposal, in the near future only O&M costs will be recovered through tariffs, but this will be extended to include debt servicing and greater recovery of investment costs in a phased manner. Groundwater licensing will be introduced in the immediate future and major industrial users will be required to pay for water consumed on a volume basis.

C. External Assistance to the Sector

30. Major external assistance for rural water supply and sanitation started in the 1970s and accelerated in the 1980s with the launch of the International Water Supply and Sanitation Decade (1980-1990). Earlier, the World Bank and, more recently, ADB have been the lead external funding agencies. ADB has provided four loans since 1984 for a total of \$63 million, covering about 3 million rural population in the Eastern, Midwestern and Far Western regions. Of the four ADB financed-projects, three are completed and the fourth is progressing well. Apart from ADB, the United Nations Children's Fund and the governments of Finland, Switzerland, and the United Kingdom have also provided assistance for the development of rural water supply and sanitation. More recently, the World Bank assisted in establishing a rural water supply and sanitation development fund board, which has been active in implementing community-based and demand-responsive rural water supply and sanitation schemes.

31. In September 2000, ADB approved a loan for the Small Towns Water Supply and Sanitation Sector Project.⁷ The project will improve water supply and sanitation conditions in 40-50 small towns with an average population of 12,000 per town. Water users will contribute 50 percent of subproject costs in cash and kind. The project represents a special effort by ADB to promote participatory development and the Government's decentralization agenda.⁸

32. In the urban water supply and sanitation sector, the World Bank has been providing credits to NWSC since the late 1970s. Much of this assistance has centered on Greater Kathmandu water supply and sanitation, and is expected to continue with support to the Project through the proposed private sector lease contract, distribution rehabilitation, and distribution expansion. The Government of Japan has also provided much development assistance to the sector, including support for the construction of two water treatment plants in Kathmandu Valley. Details of external assistance to the sector are presented in Appendix 3.

D. Lessons Learned

33. Valuable lessons have been learned from ADB's assistance to the country and sector. Countrywide lessons are reported in the 1999 Country Synthesis of Evaluation Findings.⁹ The key lessons include the following:

- (i) Participation of local communities during both design and implementation is crucial for project sustainability and success.
- (ii) Project design should institute appropriate O&M mechanisms and properly delineate responsibilities.
- (iii) Good governance and anticorruption measures contribute to a more favorable project implementation environment.
- (iv) Private sector participation should be encouraged, especially in the marketing, distribution, and maintenance of project outputs.

34. The lessons learned from World Bank experience in the sector in Kathmandu Valley are primarily that legislating autonomy for an institution such as NWSC does not necessarily make it a good water utility, nor a good executing agency, if no political support exists for that

⁷ Loan 1755-NEP: *Small Towns Water Supply and Sanitation Sector Project*, for \$35 million, approved on 12 September 2000.

⁸ At the request of the Government, and in line with ADB's sector strategy, ADB is also preparing an urban environmental improvement project aimed at Kathmandu Valley satellite towns.

⁹ ADB, 1999. *Nepal: 1999 Country Synthesis of Evaluation Findings*, Manila.

autonomy. Also, investment in physical infrastructure needs to be properly sequenced with institutional reform. Trying to achieve reforms in parallel with investment did not prove successful, as the implementing agency's focus was on setting physical targets, while institutional change was marginalized. The lessons learned have been incorporated in project design by ensuring that (i) a transparent and pro-poor tariff policy will be endorsed by the Government, (ii) a water supply and sanitation regulatory body will be established to implement policy in the valley, and (iii) a private sector contract will be awarded to manage water supply and sewerage in the valley. However, major investments in the distribution system will be subject to satisfactory performance of the lease contract.

35. Lessons that ADB has learned from its experience in the urban water supply sector elsewhere in Asia can also be applied to this Project. Tariffs are the lifeblood of a utility. Tariffs ensure revenues that translate into the ability to provide and maintain high-quality service to consumers. The notion that the poor cannot pay for water is a myth. Invariably, the poor pay more for water on a unit basis than the more affluent, because they must procure water by the container rather than through a piped supply to their homes. The scarcity of water in Kathmandu Valley illustrates that water is an economic good. Tariffs that recover full costs ensure that water consumption is controlled, and the burden of subsidy on the Government is reduced.

E. ADB's Sector Strategy

36. The primary objective of ADB's operational strategy in Nepal is to achieve sustainable poverty reduction. To achieve this, ADB interventions aim to improve efficiency, predictability, transparency, and accountability in key institutions responsible for delivering services, while reducing poverty through equitable access to basic social services to enhance human development. ADB's sector strategy for water supply and sanitation supports the Government's strategy. The most important elements are (i) establishing comprehensive water resource management of river basins; (ii) establishing transparent government policy; (iii) implementing regulatory control of the sector, especially for levels of service, cost recovery, and maintenance; (iv) using the private sector for both development and management; and (v) taking care of the urban poor. ADB will continue to support rural and small towns water supply and sanitation. Investments in wastewater may be considered for Kathmandu Valley during 2006-2008 to support the private sector managed utility in attaining self-sufficiency. ADB is also providing regional TA to support (i) the establishment of regulatory systems and networking of water utilities and regulatory bodies, and (ii) private sector delivery of water supply and sanitation services (and solid waste disposal) to the urban poor. ADB and CIDA are considering cofinancing a TA grant to study optimizing water use in Kathmandu Valley.

F. Policy Dialogue

37. In the course of project preparation, ADB staff actively engaged the Government in policy dialogue. The dialogue focused on four areas: good governance, private sector participation, cost recovery, and conservation of natural resources.

1. Good Governance

38. Policy dialogue has led to (i) the establishment of MWSDB as an autonomous body to implement the Project; (ii) the acceptance of an independent regulatory body to administer Government policy on water supply and sanitation in Kathmandu Valley; and (iii) the acceptance of KVWA to be responsible to local authorities for comprehensive water resource management of Kathmandu Valley. These reforms support the national process of civil service reform and good governance being implemented in parallel through other ADB operations, as governance is being devolved to local authorities and the private sector, and more transparency and accountability is being introduced. Furthermore, the private sector will be given the opportunity

to show how it can implement development more efficiently than the Government. Because of this, a lease contract rather than a pure management contract will be introduced for the management of the Kathmandu Valley urban water supply and sewerage. The policy dialogue to set up KVWA has been ongoing as the concept was first introduced under TA 2998-NEP (footnote 1), which was implemented from January 1999 to July 2000. Stakeholder participation has been a feature of the process.

39. ADB has strongly promoted good governance in the sector through (i) clear definition of government policy; (ii) an independent regulatory body to implement that policy; (iii) comprehensive water resource management at the local authority level; and (iv) implementation of policy and plans, and O&M by the private sector. ADB has recommended that at least one of the members of the regulatory body to be a female. A strong effort has been made to move away from regulation by contract to having a regulatory body in place prior to award of any private sector contract. The main emphasis will be on implementation of tariff policy and service standards.

2. Private Sector Participation

40. Private sector participation was a prerequisite for ADB's involvement in the Project. A private sector lease of 10 years for the Kathmandu Valley water supply, treatment, and distribution is due for award in September 2001. The Project facilities are also expected to be managed by the private sector operator from 2006. While private sector participation in general has been a project precondition by external funding agencies, the nature of the contract has been crafted through a participatory approach in which Government, NWSC, the private sector, and the external funding agencies have been able to contribute to a common goal. ADB's main concerns have centered on the objectives of the lease contract and matching performance to those objectives. One of those objectives is the equitable distribution of water, this entails ensuring that the poor have equal access to water and are not disadvantaged in terms of unit cost.

3. Cost Recovery and Sustainability

41. In South Asia, the concept of water as a social good prevails over that of water as an economic good. The transition from one to another generally comes about as a result of water shortage as is now the case in Kathmandu Valley. The Government has embraced the concept of full cost recovery for the water supplies to be phased in with the Project. Its agreement to a 50:50 loan-grant ratio for relending of funds to the utility can be compared with the same terms for a much better-off water and drainage utility in Sri Lanka. Tariff principles agreed with the Government include the need for cost recovery, demand management, specific access to water for and affordability to the urban poor, and easy means for payment of water bills. Cost recovery will mean all O&M costs are recovered pre-Project and all O&M plus debt service costs are recovered post-Project. In the policy dialogue, ADB agreed with the Government that the private operator will not be allowed to sell water in bulk where the resale by vendors is at a unit cost more than would be paid by the more affluent with house connections.

4. Conservation of Natural Resources

42. Policy dialogue has led to acceptance of (i) groundwater licensing and charging in Kathmandu Valley; (ii) the payment of a levy by Kathmandu Valley consumers to the people of Melamchi Valley for use of their water; (iii) allowing KVWA to holistically manage all the water in Kathmandu Valley, and thus preserve the quality and quantity of the resource; (iv) promotion of the relocation of polluting and water intensive industries outside of Kathmandu Valley; and (v) the policy to optimize water use in Kathmandu Valley as a necessary step to be taken before and in tandem with the use of water from the Melamchi River. These are all major reforms in

terms of what is being done elsewhere in Asia. The Government's readiness to embrace these reforms adds credence to its commitment to the Project and the sector. Groundwater licensing is necessary to ensure long-term sustainability of this resource while used conjunctively with surface sources. The levy on the water tariff for consumers in Kathmandu Valley is a visible acknowledgement by the Government that it is unfair to take from one area of the country and give to another without appropriate compensation. Consensus-building dialogue will be needed between the Government, and the people of Melamchi Valley during 2001 to reach agreement on the amount of the levy. Establishing KVWA is an ambitious reform measure, but as agreed with the Government this can be phased in progressively so that KVWA's functions increase with time. ADB will also provide (together with CIDA) TA for optimizing water use in Kathmandu Valley—whereby new sources of supply (such as rainwater harvesting) will be developed, and data on sources and demand will be continually refined under a computerized model so that the conjunctive use of surface and groundwater can be carefully managed.

G. Project History

43. The Project's history dates to 1988 when a prefeasibility study was undertaken to investigate out-of-valley water resources. It examined several options and three types of schemes, i.e., gravity, pumped, and storage. The Melamchi Valley had the best combination of economy and yield to meet the design target of 2 cubic meter (m³)/second (s) and be expandable—all based on gravity supply. From a plain reading of the map, diverting water from the Indrawati River, the closest water source to Kathmandu Valley, appears logical. However, this option was ruled out because the elevation of the river is about 500 meters below the valley and would involve high-pumping costs in perpetuity. In 1992, a full feasibility study was completed showing that the development of the Melamchi River, followed by later developments of the adjacent Yangri and Larke rivers, was technically, socially, environmentally, economically, and financially feasible and the least-cost solution to providing water to Kathmandu Valley in the foreseeable future.

44. Between 1996 and 1999, options to include hydropower in the Project were considered but were finally rejected in 2000 on environmental grounds. In-valley alternatives that were seriously considered include (i) damming of in-valley rivers—rejected due to low yield and community objections, (ii) major in-valley storage—rejected due to technical problems of water retention and public safety, and (iii) trading of water rights—rejected on social grounds. Appendix 4 gives more details of the Project's history.

IV. THE PROPOSED PROJECT

A. Rationale

45. Kathmandu Valley, an area of 500 square kilometers (km) and home to about 1.5 million people, is the country's single largest urban economy and critical to Nepal's economic growth. Over 86 percent of its residents are engaged in urban-based employment with 55 percent being self-employed. About 15 percent of the urban population is poor and income disparities are high. Population growth is increasing at an annual rate of approximately 4 percent. This coupled with an increase in incomes, is imposing extraordinary demands on basic water supplies and wastewater management services.

46. Water is central to the well-being of the valley's population and the key to its productive capacity. Currently, water services are grossly inadequate and unreliable. Water supplies to registered consumers (about 86 percent of the population) are no more than two hours every alternate day in the dry season. About 35 of the 112 municipal wards do not get any water in the last 2-3 months of the dry season. Only about a third of NWSC's consumers have fully plumbed facilities; the rest rely on yard taps and shared facilities such as standposts. Recent

studies show that without individual connections, the scope for improvements in public health is limited. In the dry season, many consumers have to resort to tankered supplies (at costs up to \$1.00 per cubic meter [m³]), bottled water, and deep wells. Serious environmental problems are emerging because of the shortages, as shallow wells are becoming increasingly polluted and deep aquifers are being mined in an effort to secure additional water.

47. Poor water quality impacts sharply on public health. Surveys show that the incidence of diarrhea is almost 50 percent, stomach pain 23 percent, and dysentery 15 percent. Skin diseases, hepatitis, and malaria are also common. While details are not available, empirical evidence suggests that the impact of water-borne diseases on morbidity and mortality rates is high. Productivity is affected by sick time lost on account of water-borne diseases.

48. The shortage of water impacts particularly on the poor. While access in terms of distance and time of availability is inadequate, the quality of water from various sources has the most serious impacts on the health of the poor. Almost 50 percent of the water sources are contaminated by fecal coliforms. Poor water management produces severe hardships for low-income groups. The average time spent on water collection in informal settlements is one hour per trip. Households in these settlements often have to collect water between 1 and 15 times a day. Individual low-income renters are particularly disadvantaged as they depend on landlords for water services and are not supported by the community.

49. Coupled with the lack of adequate water supplies and wastewater facilities is the absence of a strong and effective public utility to serve the valley's needs. NWSC has been in a precarious operational and financial situation due mainly to a lack of autonomy, lack of water to distribute and inefficient use of existing resources. The current institutional framework to meet and manage Kathmandu Valley's water and wastewater requirements needs to be comprehensively overhauled.

50. The Government has recognized that an urgent, comprehensive, but least-cost solution has to be found to mitigate the capital city's most serious socioeconomic problems and has articulated a strategic approach to meet the challenge. Its essential components are (i) optimization of water use in Kathmandu Valley; (ii) development of new water sources outside the valley; (iii) developing an institutional framework for comprehensive water resource management and private sector operations; (iv) ensuring sustainability through full cost recovery and demand management; (v) integrating improvements in water services with other urban sector developments in the valley; and (vi) adopting a people-based approach where public awareness, public relations, and hygiene education are continuing activities.

51. The Project provides the required opportunity to address both the acute socioeconomic distress caused by the lack of adequate safe water to valley residents, and the institutional challenges to providing water and wastewater management services on a sustainable basis to the valley's population. External assistance is needed to support the Government's plans and strategies to augment the supply of water to the valley, improve water supply and wastewater management services, and build institutional arrangements that will effectively sustain the services.

B. Objectives and Scope

52. The main objectives of the Project are to alleviate the chronic water shortage in Kathmandu Valley on a sustainable, long-term basis, and to improve the health and well-being of its inhabitants, particularly the poor. The Project also seeks to develop a comprehensive institutional framework for water resource management within the valley. The Project comprises four parts.

1. Infrastructure Development

53. The Melamchi Diversion Scheme (MDS) will bring 170 MLD of raw water from the Melamchi River into Kathmandu Valley through a 26 km tunnel. About 25 km of access roads will be built and 29 km of existing roads upgraded to facilitate construction and maintenance of the project facilities. A water treatment plant (WTP) with an initial capacity of 170 MLD, but with provision for expansion to 510 MLD will be built to treat the water diverted from the Melamchi River into Kathmandu Valley. A bulk distribution system (BDS) will be established comprising service reservoirs strategically located in the valley and bulk supply pipelines to the reservoirs from the WTP. Distribution networks will be rehabilitated and improved at primary, secondary, and tertiary levels. Wastewater system improvements will also be undertaken in a phased manner. A shallow groundwater well field will be developed at Manohara within the valley to extract, treat, and distribute 15 MLD of water in the dry season and 25 MLD in the wet season.

2. Social and Environmental Support

54. A social uplift program (SUP) will be undertaken to mitigate direct and indirect project impacts, and to channel benefits to Melamchi Valley on a long-term basis to improve the living conditions of the people in the area. It will include buffer zone development, rural electrification, health, education, and income generation and community development. Separately, hygiene education, and public awareness and relations programs will be developed and implemented. A resettlement action plan (RAP), estimated to cost \$15.8 million, was developed and will be implemented in conjunction with the Project. An environmental management plan will also be implemented to mitigate any adverse environmental impacts and to monitor progress. A third party monitoring program will closely monitor implementation of the RAP and environment management plan. A hygiene education and promotion program (HEPP) will be provided in Kathmandu Valley. A groundwater monitoring program to ensure that the valley's groundwater resources are sustainably tapped has been designed and is being implemented. A web-site will be developed in the local language to make project information available to the general public.

3. Institutional Reforms

55. The Project provides an opportunity to introduce major institutional reforms for enhanced efficiencies in the management of water and wastewater in Kathmandu Valley. A regulatory body for water supply and sanitation will be established, having at least one female member, initially for the valley and later for the country. Private sector management of urban water supplies from source to consumer, and sewerage from consumer to outfall will be introduced through an initial 10-year lease contract. KVWA will be established to provide comprehensive water resource management in the valley including that for groundwater, surface water, domestic water supply, and irrigation. KVWA will be a small, professional body that lets out contracts to the private sector for implementation of its policies and plans. When the private operator's lease contract is renegotiated after 5 years, KVWA will be a counter-party to the contract. Finally, groundwater licensing will be introduced in Kathmandu Valley to facilitate the controlled extraction of groundwater.

4. Project Implementation Support

56. This will comprise establishing a project management unit (PMU) with government counterpart staff, and international and domestic consultants. The MWSDB will be responsible for overall project management, coordinating the work under the various components. Consultants will support the PMU in carrying out various project administration activities including monitoring of construction supervision, social and environmental activities, contract administration, and project accounting. About 234 person-months of international consulting support and 846 person-months of domestic consulting support will be provided.

C. Technical Justification

57. Water is acutely short in Kathmandu Valley. In the dry season, the combined surface and groundwater production for public use is as low as 65 MLD, amounting to an average consumption for the 1 million people connected to the piped supply of about 46 liters per capita per day (lpcpd) after accounting for system losses. In the wet season, production can increase to 120 MLD, but losses increase to at least 40 percent of production, implying that average consumption from the piped water supply is still only about 72 lpcpd. Also, water is not equitably distributed, so at least one quarter of the people connected to the piped water supply system never get piped water in the dry season. Another disturbing factor in the present situation is that more than half of the production comes from groundwater, yet it has an average sustainable yield of only about 15 MLD from deep tubewells. This means most of the groundwater extraction is mining. Other cities in Asia have learned that this can lead to serious land subsidence problems.

58. Three interlinked solutions to the problem are available. First, a transparent Government policy on tariffs made known to the consumers, the funding agencies, and the utility is required. Second, an independent regulatory body should be established to monitor policy implementation, and in particular decide if tariff revisions requested by the utility conform with the policy. Third, a legal contract with the private sector to manage the water supplies should be put in place. The Project is designed around the three identified solutions. Phasing of the project funding¹⁰ will provide leverage to ensure that the solutions are properly implemented.

59. With regard to the harnessing of additional water, use of water in the Kathmandu Valley must be optimized. This is possible through (i) damming some of the rivers that feed into the valley to store wet season flows for use in the dry season, (ii) excavating shallow Sri Lankan style tanks for the same purpose, (iii) trading water rights with farmers, (iv) harvesting rainwater, and (v) recycling wastewater. These possibilities were examined in the context of least-cost alternatives, current and anticipated social and political realities, and the likely speed of reforms. When out-of-valley alternatives were looked at, the Melamchi option was identified as the most promising. However, the pursuit to optimize water use should not be postponed; the Project allows more time to fully study the possibilities. Meanwhile, demand management, crucial to optimizing water use, will be introduced using relatively high tariffs, post-Project, which will make demand price elastic.

60. Following the visit of a panel of experts (POE), agreement was reached that the MDS tunnel would be best operated as a pressure tunnel with provision for periodic desilting and adequate air vents. For both hydraulic and construction purposes, the minimum tunnel cross-sectional area will be 10.7 square meters (m²). Drill and blast methods for tunnel boring will be employed. The intake is best located where the weir crest is at 1,425 m due to the poor geology and the topography at the slightly higher intake site.

61. The water treatment plant is expected to be of conventional design. Land acquisition will be minimized even though a future design capacity of 510 MLD is assumed. Stable and continuous water supply for the WTP will be taken into account in terms of tunnel maintenance.

62. The bulk distribution system was designed for 255 MLD capacity because it will take not only the Melamchi water (170 MLD) but also existing supplies of 85 MLD. The BDS will be duplicated at the time of harnessing the Yangri River. The design incorporates potential for closing the bulk distribution to make a complete ring main; this will improve distribution efficiency and reliability.

¹⁰ The World Bank will consider providing an additional \$65 million for the Project in 2003 subject to satisfactory implementation of policy and institutional reforms and good progress on the private sector lease contract.

63. Improvements to the distribution system await the appointment of the private operator in 2001. Effective metering of all consumers is needed as is mapping of the distribution network. The private operator will be expected to undertake considerable training of the utility staff, as inadequate staff capacity was identified as a serious constraint. Also it will be necessary for the contractor to link any new connections with increases in production capacity and reduction of losses. By fixing visible leaks coverage of 24-hour supply may be available pre-Project, but full coverage with a 24-hour supply is not expected until project completion.

64. Three factors will influence the nature and extent of wastewater improvements to be effected under this Project. The first is the need to make what has already been put in place work well. That includes rehabilitating existing STPs and sewers, and ensuring proper collection and treatment of septage from septic tanks. The second is the need to look at more on-site sanitation and natural treatment of wastewater. The third is that large-scale sewerage schemes with more STPs would be too costly for the Government to implement simultaneously with the Project.

D. Cost Estimates

65. The Project is estimated to cost \$464 million including contingencies, interest during construction, and taxes and duties. Foreign exchange costs are estimated at 59 percent of total costs; local currency costs at 41 percent. The main cost items (base costs) are the MDS (\$74.29 million), WTP (\$39.33 million), BDS (\$48.47 million), and the distribution network improvements (\$65.95 million). Table 1 gives a summary of the estimated costs; details are in Appendix 5.

Table 1: Cost Estimates
(\$ million)

Item	Foreign Exchange	Local Currency	Total Cost
A. Base			
1. Infrastructure Improvements	193.03	83.36	276.39
2. Social and Environmental Support	2.10	10.34	12.44
3. Institutional Reforms	1.80	0.76	2.56
4. Project Implementation Support	24.89	7.74	32.63
Subtotal (A)	221.80	102.20	324.00
B. Contingencies			
1. Physical ^a	22.20	10.20	32.40
2. Price ^b	21.40	9.40	30.80
Subtotal (B)	43.60	19.60	63.20
C. Interest During Construction and Fees	7.60	33.20	40.80
D. Taxes and Duties	0.00	36.00	36.00
Total	273.00	191.00	464.00
Percent	58.8	41.2	100

^a 10 percent of base cost.

^b 2.4 percent per annum on foreign and local costs; interest during construction = 8 percent interest on 50 percent of project costs, including taxes and duties and price contingencies; taxes and duties – 10 percent on all expenditures plus 1 percent project duty on foreign costs.

E. Financing Plan

66. The project components are at various stages of preparation, partly because of earlier financing constraints and partly because of their relevance to the critical path for commissioning. Table 2 shows the financing plan; details are in Appendix 5. An ADB loan for \$120 million is proposed to finance costs relating to the MDS, SUP, BDS, wastewater system improvements, project management, and other social and environmental improvements. The loan will finance about 26 percent of the total project cost, including 34 percent of foreign exchange costs (\$93 million), and 14 percent of the local currency costs (\$27 million). It will be provided from ADB's Special Funds resources, be repayable over 32 years including 8 years of grace, carry interest at 1 percent per annum during the grace period and 1.5 percent thereafter.

67. The local cost financing being provided by ADB for the Project is justified on country and project considerations. Nepal relies on development assistance for about 50 percent of its annual development expenditures. While the budget deficit remains stable from year to year at about 3.9 percent of gross domestic product, the inflow of aid funds is required to finance the foreign and local cost components of development projects. The proposed level of local cost financing is justified based on the Government's weak revenue generation capacity and the need for donor assistance to meet financing requirements, particularly for large infrastructure projects. The Government accords top priority to the Project as it will alleviate the acute water shortage in Kathmandu Valley and reduce the incidence of disease caused by poor water quality. Local currency costs account for 41 percent of total project costs, of which the Government is providing 61 percent. However, local financing assistance by external project cofinanciers is required to supplement the Government's contribution, and is justified given the large domestic cost component of the Project.

Table 2: Financing Plan
(\$ million)

Source	Foreign Exchange	Local Currency	Total Cost	Percent
ADB	93	27	120	25.9
World Bank	61	19	80	17.2
JBIC	46	6	52	11.2
NORAD	23	5	28	6.0
Sida	20	5	25	5.4
NDF	8	1	9	1.9
OPEC Fund	8	6	14	3.0
Japan	14	4	18	3.9
Government	0	118	118	25.4
Total	273	191	464	100.0

ADB = Asian Development Bank, JBIC = Japan Bank for International Cooperation, NDF = Nordic Development Fund, NORAD = Norwegian Agency for International Development, OPEC = Organization of Petroleum Exporting Countries, Sida = Swedish International Development Cooperation Agency.

68. The Government is expected to finance approximately 25 percent of the project cost; its cash contribution is estimated at \$46.6 million (10 percent of the total cost), net of taxes and duties, and interest during construction. The Government is expected to be able to meet the average annual contribution of counterpart funds estimated between \$5 and \$12 million. Concurrently with NWSC signing a private sector lease contract for the leased assets with the PO, the Government will transfer the leased assets to the utility and enter into a subsidiary loan agreement upon terms and conditions satisfactory to ADB. The terms of repayment of the loan for purchasing the leased assets will be on a 50 percent grant, 50 percent loan basis, and for the loan portions, will include an annual interest rate of 8 percent, with principal repayable over

20 years inclusive of a 7-year grace period. The Government will assume the foreign exchange risk on all sums due and owing under the subsidiary loan agreement.

69. The World Bank is expected to provide a credit of about \$15 million in 2001 (for the private sector lease contract and urgently needed rehabilitation of the distribution network). The provision of an additional credit of about \$65 million in 2003 (for the distribution network improvements) will be contingent upon satisfactory performance under the initial credit and the overall progress of the Government in implementing the reform agenda. The Japan Bank for International Cooperation (JBIC) will fund about \$52 million in 2001 (for the WTP). The Norwegian Agency for International Development (NORAD) will provide a grant equivalent to \$28 million in 2001 (\$25 million to meet the tunnel costs, and \$3 million previously committed for MDS design). The Swedish International Development Cooperation Agency (Sida) has agreed in principle to provide funds matching those of NORAD, equivalent to \$25 million in mixed credits in 2001 (for part financing of the tunnel). The Nordic Development Fund (NDF) will fund \$9 million in 2001 (to finance the construction supervision for the MDS). The OPEC Fund will finance about \$13.7 million in 2001 (for the access roads). The Government has asked the Japanese Government to finance the shallow groundwater development in Manohara for about \$18 million on a grant basis.¹¹ All cofinancing is on a parallel basis, including the ADB-administered OPEC Fund. The terms and conditions of financing of the various funding agencies are shown in Appendix 5.

F. The Executing Agency

70. MPPW will be the Executing Agency for the Project, and MWSDB will be the Implementing Agency. MWSDB members include the MPPW secretary as chairperson, members at the joint secretary level from the Ministry of Finance and Ministry of Water Resources, and the mayor of Kathmandu Metropolitan City and the executive director as member Secretary, who will also be the project director. The full time executive director, also at the joint secretary level, will be appointed from MPPW. MWSDB has about 40 staff of which 20 are professionals. It has been successfully executing the ADB-funded Melamchi Water Supply (Engineering) Project.¹² It has also demonstrated autonomy in decision making, which was the main objective when it was established. The Government will ensure continued non-interference with MWSDB's autonomy of decision making.

G. Implementation Arrangements

1. Project Management Unit

71. A high-level steering committee comprising the ministers of Ministry of Finance, Ministry of Water Resources, MPPW and the vice-chairman of the NPC will be established to deal with major issues affecting the Project. The PMU will be established within the responsibility of the MWSDB and will be responsible for the day-to-day management of the Project. The PMU will be headed by the project director, who will be a senior officer at joint secretary level. Its government counterpart staff will be supported by a team of domestic and international consultants. The PMU will have six divisions: (i) an information division comprising public relations, management information system, reporting, and planning and scheduling; (ii) an engineering division for specifications, drawings, construction supervision, and quality and safety monitoring; (iii) a social and environment division to cover resettlement, compensation, social mobilization, gender, hygiene education, NGO coordination, consensus building, environmental management, and benefit monitoring; (iv) a procurement division addressing legal aspects, claims, consultants, suppliers, and contractors; (v) an administration division

¹¹ The amount will be firmed up during the basic design study to be carried out over a period of six months commencing in November 2000.

¹² Loan 1640-NEP: *Melamchi Water Supply (Engineering) Project*, for \$5 million, approved on 10 November 1998.

responsible for personnel, transport, records, communication, and payroll; and (vi) a finance division for budget, loan administration, accounts, auditing, and disbursement. The Government agreed to exert its best endeavors to ensure that, subject to satisfactory performance, the initially appointed project director and PMU division heads will be maintained in the positions for a minimum of three years during project implementation and will seek ADB's concurrence for any change of those appointments. Preliminary organization charts for the Project in general and the PMU in particular are given in Appendix 6.

72. The external funding agencies involved in the Project and the Government have agreed on a special coordination mechanism. MWSDB will convene a meeting every two months in Kathmandu at which external funding agencies, together with the Government, will review implementation progress and assist the Government in taking any corrective action needed. Separately, ADB will undertake two review missions each year; these will be of two weeks duration and representatives of external funding agencies will join them for at least a week each. At the end of the review mission, the MOF will convene a meeting of donors, MWSDB and Government officials. Every four months, MWSDB will submit progress reports to the Government and the external funding agencies.

73. The consultants for the various project components (including the access roads, MDS, SUP, WTP, and BDS) will report to the PMU. The PMU will be responsible for preparing disbursement projections and budgeting allocations for counterpart funds. Also reporting to the PMU will be a social and environmental monitoring unit. Two panels of experts will be used to supplement consulting services provided under the construction supervision contracts and the PMU. Specific disciplines identified include hydraulics, geotechnical engineering and tunnel contracting for the technical POE, and sociology, environmental management, and consensus building and dispute resolution for the social and environmental POE. The POEs will visit twice a year to examine and provide advice on specific issues and identify any potential issues. They will report to the project director who will make the final decision on the event of any conflict between any of the consultants. The construction supervision consultants for the various components will provide monthly reports to the PMU.

2. Implementation Schedule

74. The Project is expected to be commissioned by September 2006. Tunnel and intake design and tendering will be completed in 2001. Access roads will be completed mid-2002. Tunnel construction, which is on the critical path, will take about four and a half years including mobilization of the contractor. Construction of the WTP and BDS are expected to commence in 2003, and each component will be completed simultaneously with the MDS to conduct a test run operation of the WTP. The private operator (PO) is expected to commence operations in January 2002. The implementation schedule is given in Appendix 7.

3. Procurement

75. Procurement of goods and services financed by ADB will be done in accordance with ADB's *Guidelines on Procurement*. Contracts for civil works estimated to cost more than \$1.0 million equivalent will be carried out using international competitive bidding (ICB) procedures while those contracts estimated to cost \$1.0 million equivalent or less will be under local competitive bidding (LCB) procedures. To the extent possible, the procurement of goods will be grouped into packages larger than \$500,000 to be suitable for ICB procedures. Miscellaneous minor goods that cannot be grouped into larger contracts and cost less than \$500,000 per contract will be procured through international shopping (IS) procedures. Minor items, costing less than the equivalent of \$100,000 per contract may be purchased directly. Indicative procurement packaging is shown in Appendix 8.

76. The MDS will be bid as three separate contracts, one for power lines, the second for the intake and part of the tunnel, and the third for the remainder of the tunnel. The second one will be funded by ADB using ICB procedures. The BDS will be funded by ADB and will consist of two contracts for civil works (one for the north and the other for the south pipe-laying and reservoir construction); and three contracts for the supply of pipes, valves, (ICB procedures), and flowmeters (IS procedures). The main wastewater improvement procurement packages (under ICB procedures) will be for the supply and installation of interceptor sewers, and for the rehabilitation and extension of several wastewater treatment plants. Other smaller packages, such as for septage trucks, sewer cleaning equipment, public toilets, and the septage treatment plant will be procured under IS procedures. The procurement of vehicles and office and computer equipment for the PMU will follow IS procedures. Supply of equipment and civil works for the SUP will be through very small contracts and will follow LCB procedures encouraging the participation of local community-based organizations in association with local firms.

77. Several external agencies will finance additional goods and services for the Project. The part of the tunnel not covered by ADB financing and the power lines, will be financed by NORAD and Sida. It will follow NORAD and Sida procurement procedures. It will be competitively bid among Norwegian and Swedish consortia. The access roads will be bid as three contracts. The first two, adit access roads and public road upgrading, will be financed by the OPEC Fund using ICB procedures in accordance with *ADB's Guidelines on Procurement*. Construction of the main access road will be financed by the Government using LCB procedures. The WTP will be bid as one contract for civil works, including the supply and installation of mechanical and electrical equipment. It will follow ICB procedures in accordance with JBIC procurement guidelines. Four distribution network improvement contracts to be financed by the World Bank will follow ICB procedures in accordance with World Bank procurement guidelines. The specific packaging is expected to include one contract for rehabilitation and one for the supply of pipes and fittings during the first phase, and two additional contracts, during the second phase, one for civil works and one for pipes and fittings.

4. Consulting Services

78. The selection and engagement of all consulting services financed by ADB will be in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for the engagement of domestic consultants. A team of international and domestic consultants, based at the PMU, will assist in implementing, managing and monitoring project activities. A total input of 234 person-months of international consulting, and 846 person-months of domestic consulting is planned.

79. For the BDS, only construction supervision consulting is needed. This includes 113 person-months of international consulting, and 750 person-months of domestic consulting. In accordance with ADB guidelines and subject to a satisfactorily negotiated contract, the BDS design consultants will be retained for construction supervision. The design and construction supervision consulting for the wastewater improvements component will also be funded by ADB and will include 35 person-months of international consulting and 188 person-months of domestic consulting.

80. The SUP will require 12 person-months of international consulting and 396 person-months of domestic consulting in addition to NGO inputs for the following components: buffer zone, health, education, income generation, and rural electrification. For the HEPP, an NGO will be engaged for 132 person-months of domestic consulting services to prepare and implement a public hygiene awareness project in Kathmandu Valley. The third-party monitoring agent, a capable NGO, will provide 80 person-months of domestic consulting services to carry out external monitoring of implementation of the RAP and the environment management plan. The public awareness component will require 12 person-months of international consulting and 160

person-months of domestic consulting. The training component will require 8 person-months of international consulting. For the POE, 60 person-months of international consulting is provided over the whole of the implementation period. Consulting services to be financed by ADB are given in Appendix 9.

81. Additional consulting services will be financed by other external funding agencies. The design and construction supervision of the MDS will be financed by NORAD and NDF, respectively. For the WTP, design and construction supervision is expected to include approximately 150 person-months of international consulting, and 600 person-months of domestic consulting and will be funded by JBIC. The PO will advise on the design of the distribution improvements and the WTP where feasible.

82. Activities supporting institutional development (as distinct from institutional reforms) have been incorporated in the Project. It will be the responsibility of all consulting teams to transfer their knowledge and skills to government counterpart staff and communities wherever possible through a structured training program as well as on the job training. Under the SUP, the institutional structure of the Local Governance Program will be used to build the capacity of DDCs and VDCs. The PO will be required to increase the skills of the utility staff.

5. Advance Action

83. Advance action has been approved for recruiting consultants for Project management and for procurement actions prior to bid evaluations including issuance of invitations to bid and prequalification of contractors for the construction of access roads. Initial activities are under way.

6. Operation and Maintenance

84. The PO will be responsible for the O&M of all project facilities including the adit access roads. Processing is under way, and an action plan to effect award of contract by 30 September 2001, and mobilization by January 2002, has been agreed to by World Bank and the Government. The regulatory body will be established before a contract is awarded to the private operator. The Government is represented in the contract processing by the private sector participation committee. The World Bank has employed consultants to support the processing. Coordination is being maintained with both MWSDB and ADB. The PO's performance will be monitored against predetermined targets related to achieving the objectives of the contract. The stated objectives of the lease contract and performance-related areas will include (i) reduction of physical and commercial losses, (ii) equitable distribution of water on a daily basis, (iii) maintenance of computerized consumer accounts and management information systems, (iv) increase in number of connections, (v) maximization of revenue collection, (vi) increase in public awareness of water use including hygiene, (vii) improvement of sanitation services, (viii) training of personnel involved in water management, (ix) customer service performance indicators (including hours of supply and water quality), and (x) mapping of the physical system.

7. Disbursement Procedures

85. The MWSDB will be responsible for preparing disbursement projections and requesting budgetary allocations for counterpart funds. It will establish an imprest account for the Project. The initial amount will be no more than a six-month projected disbursement. The imprest account will be established, managed, and liquidated in accordance with ADB's *Loan Disbursement Handbook*. The MWSDB will coordinate in the timely release of funds to the contractors.

8. Reports, Accounts, and Audit

86. The MWSDB, with assistance from the consultants, will submit project progress reports to ADB every four months in a format and detail acceptable to ADB. These reports will include (i) consolidation and analysis of monthly reports from the construction supervision consultants, (ii) project schedule, critical path activities, project accounts, commitments and disbursements, land acquisition, resettlement and compensation, and (iii) public relations activities. Annual monitoring reports will also be submitted on social and environmental issues and groundwater. MWSDB will submit a project completion report to the Government and ADB within three months of physical completion of the Project. The report will emphasize the development impacts achieved.

87. The MWSDB will set up the project accounts in accordance with Government guidelines. Separate accounts will be maintained for each external funding agency. Accounts will be maintained on the basis of international accounting standards. All accounts, including the imprest accounts and the financial statements of MWSDB, will be audited by auditors acceptable to ADB. Assisted by the consultant, the PMU will prepare the required information for audit in accordance with ADB's project auditing requirements. The project audit will be carried out annually, and audited statements of project accounts and financial statements will be submitted to ADB within 12 months of the close of the Government's fiscal year.

88. An audited annual report of the utility under the control of the PO will be submitted to ADB no later than six months after the end of each fiscal year. The report will include the complete and audited financial statements of the utility in accordance with international accounting standards.

9. Monitoring and Evaluation

89. MWSDB will finalize Project performance indicators and establish baseline conditions in consultation with the POEs for the purposes of Project monitoring and evaluation (M&E). M&E indicators and procedures will be tested for data availability and other constraints, revised if necessary, and institutionalized in the MWSDB and MPPW, which shall ultimately be responsible for maintaining the M&E systems. Indicative performance indicators will be agreed between MWSDB and ADB. The benefit monitoring and evaluation will also take due account of the approaches and guidance provided under ADB's "Benefit Monitoring and Evaluation: A Handbook for Bank Staff, Staff of the Executing Agencies and Consultants."

H. Environmental and Social Measures

1. Environment

90. Measures to mitigate adverse environmental impacts have been incorporated in the project design. The hydropower component was excluded on primarily environmental grounds. These aspects include less water in the river at the intake site, more spoil to dispose of from the tunnel, longer access roads, transfer of large quantities of water from one river basin to another, and future development necessary inside a national park.

91. The most critical environmental issue for the people of Melamchi Valley is the amount of water to be taken from the Melamchi River and whether it will affect current irrigation use. The water withdrawal not only will not affect existing uses, but a guarantee will be provided that in the dry season a minimum of 30 percent of natural flow will be left in the river. All of the water abstracted will be used after treatment for water supply purposes and will not be used for flushing the Bagmati River except in connection with the periodic cleaning of the tunnel. In addition, when water flows from the Melamchi Valley to the Kathmandu Valley a levy will be paid

on all abstraction volumes as measured at the WTP by Kathmandu Valley water consumers to the inhabitants of the Melamchi Valley via a mechanism which is to be agreed between the Government and the inhabitants. The levy will be used to fund activities determined by the inhabitants, and the continuation and maintenance of SUP activities.

92. An approved environmental management plan will mitigate against construction impacts. Construction phase impacts will be controlled by appropriate clauses in the construction contracts. In Melamchi Valley, this is expected to mitigate environmental impacts associated with (i) cutting down of trees and wildlife hunting by the construction workforce, (ii) damage to the water quality of local waterways, (iii) increased erosion, (iv) damage to rivers and fish due to poor spoil and topsoil management, (v) deterioration of air quality along haul roads and at construction plant sites, and (vi) failure to rehabilitate land temporarily occupied by the contractor's facilities. Along the access roads and at adits, this will help mitigate environmental impacts associated with slope stability and soil erosion. For the BDS, mitigation measures will be similar to those in Melamchi Valley, but in addition several pipeline river crossings are provided. Constructing bridges and inverted siphons will temporarily create conditions similar to operation of borrow areas in river beds.

93. Construction supervision consultants will be responsible for ensuring that contractors follow contract specifications, particularly for environmental mitigation. In addition, the Social and Environmental Division of the PMU will monitor compliance. A final check on compliance with sound environmental practices will be made through an independent assessment by a social and environmental monitoring domestic NGO. The results of this assessment will be reported to ADB.

94. During the operational phase, the main impact in Melamchi Valley will be on fish that live during the dry season in the reaches of the Melamchi River immediately below the proposed intake. Over the long-term, the lower dry season flows may result in species more tolerant of low-flow conditions displacing the current fish life. Environmental measures included in the SUP include (i) a catchment management and tourism promotion program, (ii) an environmental awareness program for buffer zone residents, and (iii) an afforestation program with the establishment of forest-user groups and a cultural preservation program for one village. A by-product of the water treatment process is sludge. The designer of the WTP will liaise with the PO over environmentally acceptable methods of sludge disposal. Numerous large trees along the pipeline route and in reservoir areas will have to be cut down. One reservoir and its supply and delivery pipelines will be in Gokarna Forest affecting trees there. Wherever feasible, replacement trees will be planted on adjacent land. A summary environmental impact assessment report was circulated to the ADB Board of Directors on 23 August 2000.

2. Social

95. The location and design of infrastructure has been carefully considered to minimize, if not avoid, land acquisition and resettlement. Permanent land acquisition is expected for the MDS (main access road and access roads to adits), WTP, and BDS (reservoirs and pipeline route), the distribution network (pipeline route), and the sewerage system improvements amounting to about 131 ha, mostly agricultural land. Temporary land acquisition of 101 ha is also expected for construction camps, borrow pits, and other construction-related activities. Approximately 98 structures of 91 households will be affected either partially or wholly, and about 25 households will be displaced. To ensure smooth operation, the Government has agreed that no civil works contracts will be awarded until all land acquisition is complete. Some community facilities and common property resources (irrigation channel, community forest, community hall) will also be affected. Loss of income directly due to the Project (e.g., loss of crops and commercial business) will be compensated, and rehabilitation assistance will be provided for severely affected persons. The RAP developed for the Project and its policy

framework were agreed to by MWSDB and ADB. The overall cost of the RAP is estimated at \$15.8 million, of which \$12.0 million is for land acquisition. A summary RAP is in Appendix 10.

96. The SUP will be implemented in Melamchi Valley to mitigate indirect adverse impacts. It will include development activities covering: buffer zone development, rural electrification, health, education, and income generation and community development. Women's special needs for reproductive health, adult literacy, skills development and income generation, legal awareness raising, and antitrafficking measures (for women and girls) will also be addressed. To ensure ownership and sustainability, the SUP will (i) take a participatory approach through community mobilizers; (ii) utilize the institutional structure of the ongoing Local Governance Program; and (iii) be sustained in the long term by levies paid by the water users in Kathmandu Valley in the postconstruction stage (2007 and beyond).

97. The Project has been prepared with extensive participation of stakeholders, including beneficiaries, adversely affected people, VDCs and ward representatives, DDC and Municipality officials and representatives, ministries concerned and MWSDB, the private sector, external funding agencies, NGOs, and consultants. The Project will address the direct participation of beneficiaries through (i) SUP implementation, (ii) representation of adversely affected people in the compensation determination committee, and (iii) representation of Kathmandu Valley beneficiaries in a water users association. The Project will also undertake consensus building at all levels on issues such as water services, environmental and social mitigation and compensation, and employment. For adversely affected communities in the Melamchi Valley, local consultative groups will be established in each affected wards and VDC. Prior to 31 December 2001, a consultative committee will be established representing the inhabitants of the Melamchi Valley and will include representatives of the MWSDB and the chairperson. Memoranda of understanding will be signed between this consultative committee and the Government. To ensure that women's participation and gender concerns are fully addressed, a gender strategy will be developed and implemented. Apart from this, it has been agreed that at least one of the members of the regulatory body will be female.

98. Project preparation involved extensive consultations with NGOs. Their main concerns related to (i) volume of water extracted from the Melamchi River, (ii) privatization of water supplies, (iii) prospective tariffs, (iv) transparency of and access to information, (v) explanation of assurances sought by external agencies, and (vi) involvement in the dissemination of information. NGOs will be included in the consensus building activity between the Government and Melamchi Valley residents. The assurances provided by the Government will be explained on the project web-site. They will also be employed in the public relations contract for dissemination of information about the Project. Overall, they will form the backbone of SUP implementation in Melamchi Valley.

99. HEPP will be one of the most important social measures to be taken by the Project for people living in Kathmandu Valley. The greatest need is now, before the Project is commissioned. Initially a pilot program will be developed; to be upscaled when proven effective. Within six months of the award of the contract, the Government will ensure that this program will be taken over by the PO of the water supplies.

100. Special measures are being taken to ensure that the introduction of the private operation of the water supplies will especially benefit the poor. These include access to good quality bottled water, assured connections to piped water (where the cost of the connection is recovered over time through the tariff), targeted hygiene education and promotion programs, and an affordable tariff based on basic needs consumption and targeted environmental sanitation improvements. Women's participation will be highlighted, especially in the formation of water users groups. Equitable distribution of water will be one of the PO measurable

performance targets. The PO will not be allowed to sell bulk water to a third party who sells the water at a price higher than the PO's average tariff imposed for piped water.

101. To support the introduction of privately operated water supplies, a public awareness/relations unit will be established in the PMU. This unit will ensure that stakeholders are kept informed about the Project and are given an opportunity to express their views. The public relations program will be a proactive campaign that will identify any potential conflict area at an early stage, assist in consensus building between the Project and the local communities, and manage public expectations on compensation and the SUP.

V. PROJECT JUSTIFICATION

102. The Project will provide a least-cost solution to mitigate the socioeconomic stress caused by the inadequate supply of safe water on Kathmandu Valley residents by optimizing water use in the valley as well as developing new water sources outside the valley. This will benefit 180,000 households in the valley by improving water supply services, in terms of quantity, quality, and timeliness of supply, as well as more equitable distribution. About 20 percent of these households live in poverty, with incomes less than NRs6,000 per month. The impact ratio for the poor has been estimated to be four times that for the not-so-poor. The Project will also provide socioeconomic benefits to about 40,000 residents of Melamchi Valley by increasing incomes from improved access and expanded markets, reduced workload for women, better education for children, and reduced incidence of trafficking of women. These benefits have not been quantified and, to that extent, the economic benefits are understated.

A. Financial and Economic Analyses

1. Financial Analysis

a. Supply and Demand

103. Water supply projections assume that in the preproject period, supply may increase as a result of a gradual reduction of losses, and rehabilitation or expansion of groundwater and surface water sources. Projections of demand assume a population of 1.5 million in Kathmandu Valley in 2000, and a growth rate of 4 percent from 2001 falling to 2.8 percent in 2016 and thereafter. Utilization of Melamchi water is expected to be about 73 percent in 2007, and approach 100 percent by 2011. Accordingly, about 80 percent of the population will be served upon commissioning of the Project, rising to about 95 percent in 2016. With careful management and relocation of key industries out of the valley, further investments may be deferred.

b. Cost Recovery Policy and Assumptions

104. During the preproject period, average tariffs are expected to rise from NRs6.9/m³ in 2000 to NRs12.8/m³ in 2006 (in 2000 prices) to meet cash O&M costs as well as private operator and regulatory costs. The financial projections assume (i) improved collection efficiency; (ii) metered standpipes charged at the lifeline rate; (iii) users meeting payment obligations; (iv) groundwater charges for nondomestic consumers; and (v) wastewater charged as a 50 percent surcharge on the water tariff. Post-Project, average tariffs will be NRs23.0/m³ by 2008, adequate to cover O&M, debt servicing, regulatory, and private operator costs. All nondomestic use of groundwater is assumed to cease by 2008.

c. Affordability and Willingness-to-Pay

105. For low-income households consuming 60 lpcpd (or 9.2 m³ per month), Kathmandu Valley water tariffs as a percentage of household income are expected to increase from 0.7

percent in 2000 to 1.1 percent in 2006, and 1.9 percent by 2009 and onward. Where a low-income household is also connected to the sewerage system, affordability peaks at 2.8 percent in 2008. For median-income households consuming 125 lpcpd (or 19.1 m³ per month), affordability is expected to rise from 1.2 percent of household income in 2000 to 1.9 percent in 2006, and 3.2 percent in 2009 and onward. This is equivalent to NRs550 per month per household. Where such households are also connected to the sewerage system, tariffs will rise from 1.8 percent in 2000 to 2.8 percent in 2006, and 4.8 percent in 2008 and onward. Commercial consumers will be charged the same as domestic consumers, but consumption over 30 m³ per month will attract the highest tariff level of NRs77 per m³ in 2009 and may be compared with the average incremental financial cost tariff of NRs88 per m³. A recent survey shows 90 percent of households are willing to pay NRs500 per month for a 24-hour supply of piped potable water. This compares with a current average of NRs150 per month. On average, less than 5 percent of disposable household income will be spent on water; this is in line with current global norms.

d. Financial Internal Rate of Return

106. The overall financial internal rate of return for the Project is 4.7 percent. This may be compared with a weighted average cost of capital for the Project of 0 percent, where the onlending rate is 8 percent and domestic inflation is 8 percent resulting in a real interest rate of 0 percent. Similar to other urban water supply projects, the financial internal rate of return showed sensitivity to increases in capital costs and revenues. A summary of financial analysis is provided in Appendix 11; details are available in Supplementary Appendix A.

e. Financial Performance of NWSC

107. Over the past five years, the financial performance of NWSC has been poor due to high water losses, poor service, low tariffs, and low collection efficiencies. Accounts receivable have risen to 311 days equivalent of sales in 2000. Consequently, NWSC has only been able to maintain a positive cash flow by deferring debt service payments to the Government. At the current levels of net profit and operating losses, NWSC will not be able to meet any ongoing capital expenditure out of retained earnings.

108. NWSC's poor financial performance has led to the proposal to engage a private operator to manage water supply and sewerage systems in Kathmandu Valley. This is expected to result in improved operational performance and a reduction in water losses and improved collection efficiencies. Financial projections and assumptions for water supplies in the valley are set out in Supplementary Appendix A.

2. Economic Analysis

a. With and Without the Project

109. The without-project option offers a very bleak scenario for Kathmandu Valley. Since NWSC would be unable to meet demand, piped water delivery would continue to be limited to less than 2 hours every two days, pressures and water quality would be poor, and inequality would persist for water distribution. Therefore, the economic price of water would rise from NRs40/m³ currently to NRs110/m³ in 2012.

110. A number of alternative options, including in-valley storages were considered, but were found to be impractical because of various shortcomings, such as high financial and social costs, low yield, and other problems associated with population density and land use. The proposed design involves a low-level tunnel, no impoundment storage, and no hydropower, and was considered a least-cost and least environmentally disruptive option. Furthermore, it retains

the option for low-cost gravity expansion of supply from the Yangri and Larke rivers and in-valley storage in the future.

b. Economic Benefits

111. The project benefits accrue from (i) the saving of time and cost in fetching, carrying, pumping, purchasing, storing, and treating water; (ii) reduced risk of health problems; and (iii) reduced overexploitation of groundwater. Additional benefits accrue from the increased supply of water available. The economic analysis uses demand curves and associated income and price parameters to evaluate annual nonincremental and incremental benefits. The approach internalizes the benefits associated with health, welfare, and convenience.

c. Economic Internal Rate of Return

112. The economic evaluation assumes base economic costs of \$322 million and incremental O&M costs at 1 percent of total costs plus \$0.04/m³ of water production. A standard conversion factor of 0.9 is assumed. Total costs are high because of the need to provide a sound basis for future expansion. Benefits are estimated at NRs1,500 million/year initially and increase to about NRs6,000 million/year in subsequent years.

113. The economic internal rate of return (EIRR) for the Project (with 170 MLD capacity) is 13.5 percent, while the EIRR for the full development is 15.3 percent. The EIRR was tested for sensitivity to tariff levels, water losses, income growth, nondomestic tariffs, and capital costs. The EIRR is estimated to be 10.1 percent at the current water loss figure of 40 percent, 11.9 percent with real income growth reduced to 1 percent per year, 12.9 percent with a 50 percent decrease in the nondomestic tariffs, and 12.6 percent with a 10 percent increase in capital costs. A summary of the economic analysis is provided in Appendix 11; details are available in Supplementary Appendix B.

d. Tariffs

114. The principles of a tariff policy were developed by the Government and incorporated in the water supply and wastewater sector strategy for the Kathmandu Valley (Appendix 2). The tariff will build on the principles of demand management, cost recovery, services to the poor, and easy payment of water bills. It will be aimed at the staged recovery of all O&M costs, regulatory fees, debt servicing needs, levy for water abstraction from Melamchi River, and a portion of future investments. The tariffs will be maintained in real terms by periodically adjusting for inflation. Commercial groundwater abstraction will be licensed and metered and charged volumetrically. Based on these principles, and on the results of ongoing studies supported by the World Bank, the Government is expected to determine an appropriate tariff structure for Kathmandu Valley early in 2001.

e. Subsidies

115. While the Government has agreed to phase in full cost recovery in financial terms for the water supplies in Kathmandu by 2010, some subsidies will be provided in the interim. These include (i) funds to develop the Project that will be passed on to the utility in an equal mix of grant and loan; (ii) subsidy for all capital works for wastewater improvements; (iii) subsidy to users of groundwater; (iv) subsidy provided to farmers who use current water resources for irrigation; (v) subsidy provided to industries that pollute the waterways and environment to enable them to convert to clean technologies; (vi) cross-subsidy provided by other water users to the urban poor to ensure equitable access to water; and (vii) subsidy provided to the PO for the first three years. Subsidies related to the Project and wastewater improvements are in line with those currently provided elsewhere in Asia. All subsidies will be phased out during the

project period except for the two relating to wastewater improvements and the cross-subsidy provided by other water users. These can be supported because the full cost recovery of wastewater tariffs is not expected to be achievable at affordable tariffs. Cross-subsidy of the urban poor through a lifeline block for a minimum quantity of water is also supportable on the grounds that it ensures that health and related sanitation benefits are available to the whole community. These costs result in public benefits that arise from reduced health care-related costs and fewer work days lost due to ill health from water-borne diseases.

B. Environment

1. Physical Environment

116. Access roads, transmission lines, and construction camps will be built. Potential road grade and affected area instability will be improved by reducing the slopes of embankments, use of upslope and downslope gabions, proper drainage, and stabilization by grass planting. Road construction, spoil disposal, and borrow material sites have been identified and tested, and locally required smaller ones will be confirmed during detailed road design. Road construction spoil will not be dumped along the roadside or into rivers or ravines. If the local people require fill materials, they will be permitted to take road spoil on a "take-for-free" basis. After MDS construction, the main access and adit roads will improve access to the upland and near-river areas along the Melamchi River with an estimated 2,000 households benefiting directly or indirectly. Likewise, tunnel spoil will also be made available to the local people for use as road or track fill, fencing, house foundations, and walls.

117. Upon completion, the MDS will divert 2 m³/sec of water from the Melamchi River to the WTP. In the dry season from February to April, approximately 55 percent of the Melamchi River flow, upstream of the first major irrigation intake, will be diverted leaving about 45 percent as residual flow. During the rest of the year, a much larger percentage of environmental flows will be retained in the Melamchi River. This is particularly important for the May-June and October-November periods when fish migration occurs. All existing water demands for the Melamchi River for irrigation, water mills, and domestic purposes can be met safely on a year-round basis.

118. The BDS and distribution network will be constructed within the semiurban and urban areas of Kathmandu Valley. Trenches will be dug along road rights-of-way and across intervening sections of mainly agricultural land. All reservoir construction will be located on either rural or semiurban open land.

2. Biological Environment

119. The number of trees to be cut due to the construction of the various adit access roads, portal and spoil disposal sites, and borrow areas has yet to be determined in detail due to alterations to MDS configuration. Most of the trees affected are located in degraded community forests. Once road centerlines and construction works area boundaries are determined by the updating studies on the MDS, all affected trees whether on private or public property will be properly inventoried, and owners compensated. Any replacement afforestation required by the Department of Forestry will be negotiated and implemented during the construction phase as mitigation. Of note, several ongoing community forest use groups are operating with bilateral and NGO assistance in the Melamchi area; they will be used, as appropriate, to implement forestry-related mitigation.

120. The operation of the Melamchi diversion weir will only marginally affect the fish population. Long and middle distance fish migration does not occur in the Melamchi River upstream of the Timbu River because of the presence of natural barriers. Reductions in water flow will occur between the intake and the confluence of the Indrawati River, but residual flows

in the critical periods for fish breeding in the main areas will be adequate to maintain suitable habitats similar to existing ones. Under the Project, a river, water use, and fisheries management program will be designed and implemented, involving local user groups including irrigators, water-mill owners, fisherfolk, and local community-based organizations.

121. Approximately 40 trees will be removed from the agricultural land to be cleared for the WTP. However, a riverbank buffer zone is proposed for the east bank of the Bagmati River and will be planted with trees. In addition the WTP site boundary zone will be landscaped with larger trees, as both aesthetic and noise buffering mitigation.

122. Construction of the BDS will require numerous nonindigenous trees to be cut, most are either poplars or eucalyptus along the Ring Road and other public road rights-of-way. In several locations affected by the BDS pipelines, these fast-growing species are causing problems due to wind breakage with resulting damage to frontage road properties, so their removal and replacement with more suitable species will be locally acceptable. Tree cutting at the reservoir sites will be limited. To mitigate this impact, the Project will replace all trees as required by, and as agreed with, the relevant authorities such as the Department of Roads, DDCs, VDCs, or community-based organizations involved in their establishment and maintenance, as some areas are indicated to be under "locally sponsored projects." An assessment of environmental impacts and mitigation measures is in Appendix 12.

C. Social Dimensions

123. **Kathmandu Valley.** The primary beneficiaries of the Project are 1.5 million people (180,000 households) in Kathmandu Valley (1.25 million direct beneficiaries and 0.25 million indirect). Improved water supply services with better water quality, more water (and reduced unaccounted for water) and timely supply, extended service areas, more equitable water distribution, and better customer services will benefit them through (i) reduced anxiety about the unreliable water supply; (ii) improved health by reducing water-related diseases and better hygiene practices, especially for children; (iii) reduced burden, time saved, and cost of water collection, storage, and boiling and other treatment of water, especially for women and female children; (iv) more safety for women in water collection as night-time water collection is not necessary; and (v) reduced burden and time saved to deal with service agents. Such benefits only materialize if the better water supply services go hand in hand with increased public health, hygiene and environmental awareness, and improved sanitation facilities and maintenance. Overall, these benefits will also have a significant positive impact on the next generation and the rest of the country as the Kathmandu Valley case sets a good practice model. The issue of the potential negative impact of the raised water tariff on low-income households will be addressed through an equitable tariff structure under the privately operated facilities.

124. **Melamchi Valley.** Several socioeconomic and poverty reduction benefits will accrue to the population (40,000) in the 14 VDCs in Melamchi Valley through the project infrastructure construction and the SUP. These include (i) improved access to Kathmandu and within Melamchi Valley using the access roads; (ii) increased incomes from the expanded market and upgraded skills; (iii) availability of electric power; (iv) reduced workload for women; (v) increased gender awareness in the community; (vi) increased adult literacy rates; (vii) better educated children; (viii) greater health and family planning awareness and improved health conditions, especially for women and children; and (ix) reduced incidence in trafficking of girls. A full assessment of the social dimensions of the Project is given in Appendix 13.

125. **Resettlement and Land Acquisition.** Some direct adverse social impacts are also envisaged (see SEIA for environmental aspects) and adequate mitigation measures and grievance mechanisms, based on consultations with the affected population, are in place. Potential indirect adverse social impacts could include (i) social disruption caused by the influx

of outside workers, including sexually transmitted diseases; (ii) loss of employment or income due to changes in the economic structures; (iii) increased trafficking of women and girls, and (iv) increased child labor. These will be addressed through the SUP. An antichild labor clause will be included in the contract document. No specific ethnic or caste groups will be especially adversely affected, but the vulnerable groups (e.g., severely affected persons, households headed by women) have been identified for special assistance.

D. Impact on Poverty

126. Socioeconomic surveys conducted during project preparation suggest that about 20 percent of households in Kathmandu Valley live in poverty, with incomes less than NRs6,000 per month. The major project benefits are savings and incremental benefits accruing to water users and to the economy, from the improved water supply and management. An examination of the demand curves indicates that the net benefit accruing to a poor household (benefit less tariff paid) is about the same as that accruing to a not-so-poor household, but the composition of the benefits is different. The poor household has a small absolute savings benefit and a large absolute incremental benefit. Assuming a single rate tariff, the distribution of the net benefits to consumers is about equal to the distribution of the population. However, the relative impact on the poor is better, with impact ratios of net benefit over income estimated at 1.6 for the poor and 0.4 for the not-so-poor. Assuming a stepped tariff structure, the impact ratio for the poor increases to 1.8, while that for the not-so-poor decreases to 0.3.

E. Risks

127. ADB staff assessed the main Project risk as follows: One of the main risks is lack of community support. If the community is not kept adequately informed of project intentions, activities, and progress, work may be disrupted. Compensation expectations in Melamchi Valley will need to be managed sensitively. To address this risk, numerous public consultations have already been held. In the PMU, a special social and environmental division is being established. Consensus-building activities will be conducted under the guidance of a dispute resolution expert.

128. A significant amount of land must be acquired in the Melamchi and Kathmandu valleys. Delays are possible and resettlement may be problematic. However, the RAP was prepared and the census survey, already under way, will be completed once the exact location and design of the project infrastructure is known. A clear grievance procedure has been established and advertised. The Government has also agreed to complete land acquisition before awarding any civil works contracts.

129. Hydrological data on the Melamchi Khola spans a relatively short period. During the dry season, the stream may not be able to consistently supply the design flow of water and still maintain residual flows. To address this aspect, methods to optimize water use in Kathmandu Valley will be studied in 2001. Conjunctive use of groundwater and surface water is also proposed.

130. The private operator must be allowed to function in an environment that is free of political pressures; and to determine its own staffing, tariffs, and operational system. Otherwise, the existing unsatisfactory state of water supply could continue. The establishment of a regulatory body will greatly minimize this risk. However, if interference still occurs, future support from the World Bank for the distribution network improvements will be jeopardized, as indeed will further ADB funding.

131. A team of international consultants also undertook a risk analysis of the Project during November 2000. The approach used was a structured method for risk management which

recognizes uncertainties as representing both risks as well as opportunities. The focus was on cost and time schedule. For the cost element, the main uncertainties identified were (i) distribution of water, (ii) quality of project management, (iii) rock conditions in the tunnel, (iv) the limited preparation stages for some components, and (v) the market conditions for bidding contracts. The consultants concluded that as against the current cost estimate (\$464 million) the most likely cost was \$494 million. For the time element, the main uncertainties identified were (i) rock conditions in the tunnel, (ii) local people involvement, (iii) distribution of water, and (iv) strong project management. The consultants concluded as against the current projection of 70 months that the most likely time for completion would be 86 months.

132. It was recommended that sharper focus be given to the strategic objective of the Project as a whole as well as the individual component objectives and targets. Special attention must be given to the geological conditions, project management, the distribution system and people's participation. It is necessary to closely monitor developments effecting expenditure and progress. Contingency plans need to be in place to cater for cost over-runs and delay in project implementation. Risk analysis and management should be seen as an on-going activity. These recommendations will be addressed through more investigation drilling, the terms of reference of the PMU, the ADB's Project Administration Memorandum, loan review missions and the visits of the POEs.

VI. ASSURANCES

A. Specific Assurances

133. The Government has given the following assurances, in addition to the standard assurances, which have been incorporated in the legal documents.

- (i) The Government will within six months of loan effectiveness, or a date otherwise agreed by ADB, ensure that the recent amendments to the NWSC Act are promulgated.
- (ii) The Government will, within six months of loan effectiveness, or at a date otherwise agreed by ADB, ensure that the Drinking Water Supply Act and/or other relevant legislation has been promulgated or amended to establish an enabling environment for the private operator to operate the leased assets, bill and collect water charges, withdraw service from defaulters, and be insulated from external interference.
- (iii) The Government will, within 12 months of loan effectiveness, or at a date otherwise agreed by ADB, obtain a grant of about \$18 million from the Government of Japan, or equivalent funds from other sources.
- (iv) The Government will obtain a second IDA credit of about \$65 million, or equivalent funds from other sources, by 30 June 2004.
- (v) The Government will approve a policy on groundwater abstraction, monitoring, and licensing in Kathmandu Valley, satisfactory to ADB, by 31 December 2001.
- (vi) The Government will approve and the MPPW publicly notify the approval of the Kathmandu Valley urban development sector strategy by 31 December 2001. The Government will formulate and begin to implement land use planning and controls in Kathmandu Valley by 31 December 2003.

- (vii) The Government will approve and the MPPW publicly notify the approval of the policy on a Kathmandu Valley levy for Melamchi Valley by 31 December 2001. The Government will ensure by 31 December 2002, that legislation will be enacted to require the payment of a levy by the water consumers of the Kathmandu Valley to the inhabitants of Melamchi, Yangri and Larke valleys for the payment of water taken from those valleys.
- (viii) The Government will designate MWSDB as the Implementing Agency and ensure that it effectively carries out its responsibilities. The Government will ensure noninterference with the autonomy of decision making by MWSDB under the terms of the Development Board Act 1957 or any successor thereto.
- (ix) The Government and MWSDB will ensure that the regulatory body prepares and submits to ADB, within three months of the end of the fiscal year, annual reports on the performance of the private operator of water and wastewater assets.
- (x) The Government and MWSDB will ensure that all necessary measures in design, construction, operation, maintenance, and monitoring are taken to mitigate possible adverse environmental impacts associated with the Project in accordance with the environmental impact assessment, environmental management plan and applicable safety and environmental standards of the relevant government agency. During the construction of the Project, MWSDB will assure that the implementation of the mitigating measures are properly documented in the working drawings, specifications, construction logbook, and the minutes of construction meetings. MWSDB will collate in an annual report to ADB the implementation of the environmental and safety measures during construction and operation of the project. In the event the Project is cited for violation of any environmental and safety laws, regulations, and standards, the annual report will include a certification from the relevant government agency that the violation has been corrected or a plan to correct the defect has been submitted and/or approved by the relevant government agencies.
- (xi) The Government and MWSDB will ensure that all necessary measures are taken to mitigate possible adverse social impacts and maximize the social benefits associated with the Project, including implementation of the SUP, HEPP, RAP, and resettlement policy framework for the Project in accordance with ADB's *Involuntary Resettlement Policy and Handbook on Resettlement*, and the resettlement standards of the relevant government agency.
- (xii) The Government in complying with the Water Supply and Wastewater Sector Strategy for the Kathmandu Valley will ensure that (a) tariffs for private sector operation of water and wastewater assets meets (i) cash operating costs up to 30 June 2006; (ii) all the operating and maintenance costs, interest on debt and debt service capital repayments beyond June 2006; and (b) the private sector operator of water and wastewater assets receives funds for all capital works up to 2010 on a 50:50 loan to grant ratio, and thereafter full cost recovery principles will be applied and (c) tariff structures to be so designed as to (i) provide for the above cost recovery, (ii) apply effective demand management and (iii) ensure affordable and adequate access to the poor to piped water supply services.
- (xiii) The Government will ensure that the subsidiary loan agreement is duly executed, delivered, and become effective concurrently with the signing of the private sector lease contract.

- (xiv) A Low-Income Customer Service Education Unit will be established within the PMU to monitor targeted hygiene education programs, the tariff based on basic needs consumption, and environmental sanitation improvements.
- (xv) By 30 June 2001, the Government will develop and commence implementation of a gender strategy to ensure that women's participation and gender concerns under the Project are fully addressed.

B. Conditions for Loan Effectiveness

134. The following loan and/or grant agreements have been duly executed and delivered, and all conditions precedent to their effectiveness (other than a condition requiring effectiveness of ADB's Loan Agreement) have been fulfilled:

- (i) JBIC loan agreement,
- (ii) NORAD grant agreement,
- (iii) Sida loan and grant agreement,
- (iv) OPEC Fund loan agreement, and
- (v) NDF loan agreement.

135. The Government will have established a high-level interministerial coordination committee with membership including the ministers of MOF, MPPW and Ministry of Water Resources and the vice chairman of the NPC, to deal with major issues affecting the Project.

136. The Government will have provided appropriate counterpart staff to the PMU as agreed.

137. The Borrower will have amended its Resettlement Policy Framework dated 9 November 2000, to reflect the ADB's requirement that the definition of the severely Project affected families includes those who lose 25 percent or more of their total affected land holding within the project affected areas.

C. Conditions for Award of Contract

138. ADB will not approve any proposal for prequalification of civil works contractors until the Government has issued a notification to all interested persons under Section 9 of the Land Acquisition Act 2034 of 1977 for permanent land acquisition for the project component.

139. ADB will not approve any proposal for award of civil works contracts until the Government has obtained possession for permanent land acquisition for the project component under the Land Acquisition Act and temporary land acquisition under the Public Road Act 2031.

140. ADB will not approve any proposal for award of civil works contract for the project tunnel until the following conditions have been met:

- (i) the first IDA credit agreement is executed and delivered, and all conditions precedent to its effectiveness are fulfilled;
- (ii) the Government enacts a law on the establishment and establishes the National Water Supply Regulatory Body in accordance with the Government's strategy for water supply and wastewater management in Kathmandu Valley;
- (iii) the Government awards a private sector lease contract under internationally competitive procedures to a private operator in respect of the leased water supply and wastewater assets in the Kathmandu Valley, and

- (iv) the construction supervision consultants agree to the approved design for the project tunnel.

141. ADB will not approve any proposal for award of contract for the construction of the Project's bulk distribution system until the Government enacts a law on the establishment of the KVWA, and a law on groundwater licensing.

VII. RECOMMENDATIONS

142. I am satisfied that the proposed loan would comply with the Articles of Agreement of ADB and recommended that the Board approve: (i) the loan in various currencies equivalent to Special Drawing Rights 93,253,000.00 to the Kingdom of Nepal for the Melamchi Water Supply Project, with a term of 32 years, including a grace period of 8 years, and with an interest charge at the rate of 1 percent per annum during the grace period and 1.5 percent per annum thereafter, and such other terms and conditions as are substantially in accordance with those set forth in the draft Loan Agreement presented to the Board, and (ii) ADB administer a loan not exceeding \$13,700,000 million to be provided by the OPEC Fund to the Kingdom of Nepal for the Melamchi Water Supply Project.

TADAO CHINO
President

29 November 2000

APPENDIXES

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Supplementary Appendixes
(available on request)

- A Financial Analysis
- B Economic Analysis

PROJECT FRAMEWORK

Design Summary	Project Targets	Monitoring Mechanisms	Assumptions and Risks
1. Sectoral/Area Goals			
1. Improve health and well-being of the people of Kathmandu Valley.	Reduced incidence of water-borne diseases of the population	Ministry of Health statistics	Conjunctive use of surface and groundwater can provide adequate water, and private sector involvement will provide efficient operations.
2. Purpose/Objectives			
2.1 Alleviate shortage of potable water in Kathmandu Valley.	Potable piped water available to Kathmandu Valley urban inhabitants increased from 65 MLD in 2000 to 170 MLD by 2006.	Regulatory body benchmarking	26-kilometer (km) tunnel design and construction is not delayed. Affected persons accept compensation without delay to the Project. Regulatory body will be established on time.
3. Components/Outputs			
3.1 Melamchi Diversion Scheme	Bring 170 MLD of raw water through a 26 km tunnel from Melamchi Valley to Kathmandu Valley by September 2006	Melamchi Water Supply Development Board (MWSDB) and Nepal Resident Mission (NRM)	Norwegian Agency for International Cooperation (NORAD) and Swedish International Development Cooperation Agency (Sida) funding. Access roads available Private sector lease contract awarded Rock conditions favorable. Consensus building succeeds. Organization of Petroleum Exporting Countries (OPEC) funding Japan Bank for International Cooperation (JBIC) funding No land problems No major resettlement or compensation delays
3.2 Adit and access roads	Construction of 25-km adit access roads and upgrading 29-km of existing access roads	MWSDB and NRM	
3.3 Water treatment plant	170 MLD capacity completed in 2006	MWSDB and NRM	
3.4 Bulk distribution system of pipelines and reservoirs	255 MLD capacity completed in 2006	MWSDB and NRM	
3.5 Distribution			
3.5.1 Distribution network improvements	24-hour water supply by 2006	Regulatory body	World Bank (WB) funding depending on performance of private operator

Design Summary		Project Targets	Monitoring Mechanisms	Assumptions and Risks
3.5.2	Private operator/urgent rehabilitation	Private sector lease contract awarded by 30 September 2001	Private sector participation committee (PSPC) and MWSDB	WB funding
3.6	Kathmandu Valley water source improvements	15 MLD by 2005	MWSDB	Japan funding
3.7	Wastewater improvement	Rehabilitate existing sewage treatment plants, sewers and on-site sanitation.	Regulatory body	
3.8	Social uplift program	Mitigate direct and indirect project impacts, and channel benefits to the Melamchi Valley on a long-term basis to improve the living conditions of the people in the area. This will include buffer zone development, rural electrification, health, education, and income generation.	Social and environmental monitoring by third party.	Good communication between the Government and the local authorities and communities in the Melamchi Valley
3.9	Project management	Project management unit (PMU) established within MWSDB with government counterpart staff	Progress reports from MWSDB to external funders	Sufficient capable government counterpart staff are available
4. Activities				
4.1 By Government				
4.1.1	Implement institutional reforms on regulatory body, private sector participation, Kathmandu Valley Water Authority groundwater, urban development and resettlement.	Commence in 2001	NRM MWSDB Ministry of Physical Planning and Works (MPPW)	Political will plus loan covenants
4.1.2	Provide autonomy to MWSDB to implement project.	2001-2006	NRM	Risk of delays
4.1.3	Acquire project land.	2001-2003	MWSDB and PMU	Risk of delays
4.2 By nongovernment organizations (NGOs)				
4.2.1	Assist in implementing resettlement action plan.	2001-2005	MWSDB and PMU	Good working relationship between NGOs, community-based organizations (CBOs), and MWSDB
4.2.2	Implement hygiene education program.	2001-2005	MWSDB and PMU	
4.2.3	Monitor environmental impacts.	2001-2007	MWSDB and PMU	

	Design Summary	Project Targets	Monitoring Mechanisms	Assumptions and Risks
4.2.4	Include social mobilization in social uplift program (SUP).	2001-2005	MWSDB and PMU	
4.3	By Consultants			
4.3.1	Public relations/ awareness	12 person-months international, 160 domestic	MWSDB and NRM	Effective communication
4.3.2	Project management	234 person-months international, 846 domestic	MWSDB and NRM	Strong, capable, efficient personnel
4.3.3	Bulk distribution system	113 person-months international, 750 domestic	MWSDB and PMU	Efficient design and good supervision
4.3.4	Wastewater improvements	35 person-months international, 188 domestic	MWSDB and PMU	Political support Loan covenant
4.3.5	Panel of experts	60 person-months international,	MWSDB and PMU	Quality and synergy
4.3.6	Implement social uplift program	12 person-months international, 396 domestic	MWSDB and PMU	Good public relations effective communication
4.3.7	Hygiene education	132 person-months domestic	MWSDB and PMU	Good public awareness
4.3.8	Social and environment monitoring by third party	80 person-months domestic	MWSDB and PMU	Effective communication
4.3.9	Training	8 person-months international	MWSDB and PMU	Retention of trained staff
4.4	By Contractors			
4.4.1	Melamchi diversion scheme	\$122 million	Supervision consultant and PMU	Good progress
4.4.2	Kathmandu Valley water source improvements	\$23 million	Supervision consultant and PMU	MPPW decisions
4.4.3	Water treatment plant	\$64 million	Supervision consultant and PMU	Competitive bidding
4.4.4	Bulk distribution system	\$77 million	Supervision consultant and PMU	No land problems
4.4.5	Distribution network	\$100 million	Supervision consultant and PMU	
4.4.6	Social uplift program	\$6 million	MWSDB and NRM	Good awareness
4.4.7	Adits and access roads	\$28 million	MWSDB	No resettlement problems
4.4.8	Wastewater system improvement	\$18 million	MWSDB	Private sector participation
4.4.9	Project management	\$18 million	MWSDB and PMU	Availability of capable counterpart staff

WATER SUPPLY AND WASTEWATER SECTOR STRATEGY FOR KATHMANDU VALLEY

A. Background

1. The acute drinking water shortage situation in Kathmandu Valley is a result of deficiencies in sources, weaknesses in system capacity, and inadequate management efficiency. To achieve efficient, effective, and equitable service delivery short and long-term strategies must be developed, specific to Kathmandu Valley, in areas related to

- (i) effective sector planning and continued infrastructure improvement—to manage demand and augment system capacity;
- (ii) establishing a nonconflicting and nonoverlapping institutional setup—to contribute to improved organizational autonomy and organizational efficiency;
- (iii) enacting service delivery standards defining acceptable service levels—to promote equitable supply of potable water, easy access, continuity, and reliability at affordable prices;
- (iv) legal framework—to create an enabling environment in the sector and for the service operator;
- (v) cost recovery and tariff structure—to achieve long-term financial sustainability of the sector with simple mechanisms for tariff administration and within the affordable limits of various consumer segments;
- (vi) access to services for financially disadvantaged groups; and
- (vii) transparency and consultation with consumers.

2. These strategies will be in accordance with the broader National Water Supply and Sanitation Sector Policy, 1998.

B. National Water Supply and Sanitation Sector Policy

3. Decentralization of services and utility management; users involvement; private sector participation in management and development of utilities; implementation of an appropriate cost recovery mechanism; and formulation of necessary acts, rules, and regulations, etc. are the major highlights of the National Water Supply and Sanitation Sector Policy, 1998. The sector policy fully supports the current plan of establishing a private operator for the operation and maintenance of the Kathmandu Valley water supply system and a regulatory organization to monitor the operator.

C. Objectives

4. Development and long-term sustainability of adequate and affordable water supply and sanitation services for Kathmandu Valley are the main objectives of this strategy.

D. Strategies

1. Sector Planning and Infrastructure Improvement

a. Water Demand Management

5. A water use optimization study will be conducted for Kathmandu Valley in 2001. This will refine the analysis related to population, migration, use of sources, and water demand. It will also explore possibilities of demand management through rainwater harvesting, wet season storage, recycling of wastewater, trading of water rights, public awareness, etc., and analyze the investment timings for the Yangri and Larke diversions. The study will establish a dynamic

computer-based model for monitoring the water resources and their use against the population and demand changes. The demand management strategy will analyze technical, social, economic, financial and institutional aspects of various alternatives, to set priorities and describe their sequencing and implementation. They include

- (i) conjunctive use of surface and groundwater sources, to ensure sustainability of yield from groundwater sources;
- (ii) interbasin transfer of water from surrounding areas, which comprise the diversion of Melamchi, Yangri, and Larke rivers of the Indrawati basin; the first phase of this program, which involves diversion of about 170 million liters of water per day from the Melamchi River is expected to be commissioned in 2006;
- (iii) reduced system losses;
- (iv) optimizing water use by increasing public awareness as well as appropriate pricing for domestic, industrial, and commercial uses and volumetric pricing of consumption;
- (v) nonconventional measures like relocation of water from agriculture to urban use, rainwater harvesting at the household and community level, wet season storage, wastewater recycling; and
- (vi) effective enactment of economic and regulatory instruments to manage industrial water demand and water pollution abatement, as well as to provide incentives for relocating water intensive and water polluting industries outside of Kathmandu valley.

b. Groundwater Management

6. The groundwater use in Kathmandu valley will be primarily conjunctive with surface water use. After considerable augmentation of the public water supply by surface source is realized to meet the demand in the post-Melamchi period, an abstraction ceiling for groundwater will be defined and abstraction permits issued only within this ceiling.

7. A monitoring system will be developed to properly monitor the abstraction, the water table, and the water quality in both shallow aquifers and deep aquifers. All deep aquifer extractions and commercial extractions from shallow aquifers will be licensed, metered, and charged. A driller's license will be introduced in 2002 to regulate drilling practices.

c. Sanitation Services

8. Activities will include the following:

- (i) The number and capacity of the existing treatment plants will be increased, and the laying and extension of interceptors, collector mains, and collector laterals will be undertaken in a phased manner.
- (ii) Onsite systems and treatment plants employing natural treatment technology will be promoted at community levels in peri-urban areas, possibly coupled with small bore community sewers, to intercept the wastewater near the origin.
- (iii) Industries will be required to install pretreatment units. The quality and quantity of effluent and sludge discharges to land and natural watercourses will be monitored against predefined standards.
- (iv) Public toilets will be promoted with due care in maintenance. Municipalities concerned will participate actively in the provision and maintenance of such services. Private sector participation will be encouraged in managing collection, treatment, and disposal of on-site system sludge and in construction and maintenance of public toilets.

- (v) Public awareness campaigns will be undertaken for water conservation and hygiene education.

2. Service Delivery Standards

9. Service delivery levels will be continuously upgraded to attain increased coverage of 24-hour potable piped water supply under adequate pressure. Individual connections will be promoted to allow increased access to services. National water quality standards will be defined and enacted by 2002. In the post-Melamchi period these will be considered mandatory standards and an adequate monitoring and surveillance mechanism will be developed to monitor compliance by the operator with these standards.

10. The operator will be required to publish annual operations report for the public review and will be specifically monitored against service delivery indicators including

- (i) reduction of physical and commercial water losses,
- (ii) equitable distribution of water,
- (iii) maintenance of computerized consumer accounts,
- (iv) increase in number of connections,
- (v) maximization of revenue collection,
- (vi) increase in public awareness,
- (vii) improvement of sanitation services,
- (viii) training of personnel,
- (ix) customer service performance indicators, and
- (x) mapping of the physical system.

11. Discharge standards will be defined and monitored for industrial discharges. The quality and quantity of effluent and sludge discharges to land and natural watercourses will be monitored. Appropriate and cost-effective technology will be promoted, such as sewerage systems in dense urban areas and on-site systems and small-bore community sewers coupled with natural treatment technologies in peri-urban and other low-density areas.

3. Institutional Framework Reorganization

12. The present institutional framework will be revisited to clarify and separate the policy formulation, planning, service provision, and regulatory functions in the water sector, with the aim of improving coordination and organizational efficiency, which will be measured against explicitly defined performance indicators. A comprehensive study will be undertaken in 2001. The proposed framework will incorporate organizational autonomy and will be allowed to operate under appropriate incentive regimes. Responsibilities of each organization will be clearly delineated to avoid duplication and conflict in work spheres.

13. An enabling environment will be created to allow the management of the water and sanitation services through a private operator. Required legislative reforms will be undertaken to provide the operator with required autonomy for operating the system, billing and collecting water charges, withdrawing services from defaulters, and insulation from external interference.

a. Ministry of Physical Planning and Works

14. The Ministry of Physical Planning and Works (MPPW) will be the central agency for coordination, policy formulation, standard-setting, and monitoring at the national level. The proposed study will define the appropriate asset-holding organization, and MPPW will assume the asset-holding function until an organization as prescribed by the study is set up.

b. Kathmandu Valley Water Authority

15. An independent and autonomous Kathmandu Valley Water Authority (KVWA) will be established. The KVWA board will primarily be constituted with local government representatives and some line ministry representatives. It will be responsible for comprehensive water resources management, including allocation, use, and protection of water resources, and the introduction of river basin management approaches in Kathmandu Valley. The proposed institutional study will define the roles and responsibilities of KVWA as a planning, implementing, monitoring, and management agency, but not an operating agency. It will maintain a small professional staff and let contracts to consultants for related works.

c. Private Operator

16. The frontline operation and management of the water and wastewater services in the urban areas of Kathmandu Valley will be contracted to a private operator, on the basis of competitive bidding as a lease contract, initially for 10 years starting 2001. The contract will be continued as a lease or extended as a concession contract after this period through a competitive bidding process.

17. The private operator will act as an implementing agency to undertake rehabilitation and improvements related to the production and distribution of drinking water and wastewater disposal in Kathmandu Valley. The Melamchi water supply system from source to consumer will be operated and maintained by the operator after its commissioning.

d. National Water Supply Regulatory Body

18. A national water regulatory body (NWRB) will be established, prior to the award of the lease contract, to protect the consumer interests and monitor the performance of the operator against set performance indicators. The NWRB will monitor contract compliance by the private operator and will approve the tariff adjustments in accordance with the predefined tariff policy of the Government. It will also annually undertake consumer surveys and publicize the results. The NWRB will initially be established to monitor the Kathmandu Valley supply, but it may expand its activities to regulate other water supply and sanitation systems in the country.

4. Legal Framework

19. Legal frameworks will be enacted for

- (i) private sector management of drinking water and wastewater services and utilities;
- (ii) establishment and functioning of KVWA;
- (iii) establishment and functioning of NWRB;
- (iv) definition, monitoring, and surveillance of standards of drinking water quality, groundwater quality, and wastewater discharges;
- (v) licensing and charging of groundwater abstractions; and
- (vi) payment of a levy by the water consumers of Kathmandu Valley to the peoples of Melamchi, Yangri, and Larke valleys for the use of their water.

5. Cost Recovery and Tariff

20. To allow public transparency in tariffs and to minimize the use of discretion, the Government will announce a tariff policy, to define the terms for setting the tariffs. The tariff

policy will build in the principles of (i) demand management, (ii) cost recovery, (iii) services to the poor, and (iv) easy payment of water bills:

- (i) The tariff structure for water supply will, on commissioning of the Melamchi water supply project, be based on recovering all operation and maintenance costs and debt service. By 2010, it will cover all operation and maintenance costs, regulatory fees, debt servicing needs, any levy to be paid for water abstraction, and a portion of the future investments. The tariff policy will adopt full metering and volumetric pricing concepts with due considerations to the welfare of the urban poor.
- (ii) The capital investments for Melamchi will be calculated for recovery on the basis of 50 percent loan and 50 percent grant ratio.
- (iii) Tariffs for nondomestic uses will be charged at uniform rates on volumetric basis of consumption and will take into account the costs of alternatives.
- (iv) Nondomestic groundwater abstraction will be licensed and metered, and volumetrically charged at levels that will encourage connections to the public water supply system.
- (v) Wastewater will be charged to attain financial sustainability for at least the operation and maintenance of facilities plus 10 percent of capital cost recovery.
- (vi) Wastewater charges for industries will be progressively enforced according to the polluter pays principle.
- (vii) Tariffs will be maintained in real terms by periodically adjusting for inflation.

6. Access to services for the financially disadvantaged

21. Access to the connections will be simplified by allowing incentives for connection charges and payment schedules. Connection requirements will be simplified, and the distribution network expanded to reach the poor. Incentives will be built into the operator's contract to motivate the operator to address financially disadvantaged households and groups. Bulk selling of water to smaller independent vendors will be allowed provided the price to the end consumer is not higher than the rates for the piped water supply.

7. Transparency and Consultation with Consumers

22. Transparency and participation will be promoted by adopting a consultative process, recognizing the importance of people's participation and the value of their role in ensuring a well-functioning water sector. This will ensure the full and timely disclosure of information, including reporting of key performance indicators to the press each year, and consultation with all socioeconomic groups in Kathmandu Valley.

EXTERNAL ASSISTANCE TO THE WATER SUPPLY AND SANITATION SECTOR

1990 - 1999						
Project Name	Type of Assistance	Source	Year		Amount \$ million	
			Start	End		
A. Water Supply and Sanitation in Rural Areas						
1. 1st RWSSSP ^a	Loan	ADB	1985	1993	9.60	
2. 2nd RWSSSP	Loan	ADB	1989	1995	14.22	
3. 3rd RWSSSP	Loan	ADB	1992	1997	21.24	
4. 4th RWSSSP	Loan	ADB	1997	2001	20.00	
5. RWSSP Lumbini Phase I-III	Grant	DIDC	1990	2003	22.82	
6. CWSS/WI ^b MPO 88-92	Grant	UNICEF	1987	1992	9.50	
7. CWSS/WI MPO 1992-96	Grant	UNICEF	1992	1996	16.00	
8. CWSS/WI MPO 1997-2001	Grant	UNICEF	1997	2001	2.56	
9. Family Environmental Condition MPO	Grant	UNICEF	1997	2001	13.17	
10. CWSS/WI in Hills	Grant	JRCS	1998	1997	1.43	
11. CWSS/WI	Grant	Water Aid	1995	1996	4.10	
12. SRDWSP ^c	Grant	SDC Helvetas	1995	1997	1.15	
13. CWSSP	Grant	SDC Helvetas			1.00	
14. JAKPAS	Grant	JGF	1994	1996	1.50	
15. RWSSFDB ^d - Phase I	Loan	WB-IDA	1996	2000	20.00	
16. Mechi & Karnali Hills Development Programs	Grant	SNV	1992	1997	1.00	
17. IRDP Gulmi- Arghakhanchi	Grant	EU	1993	1997		
18. Bagmati Watershed Development Project	Grant	EU	1993	1997		
19. Gurkha Welfare Scheme Phase I - III	Grant	DFID	1989	2005	14.85	
20. Mid and Far West Rural Water Supply and Sanitation (NEWAH)	Grant	DFID	1999	2005	4.45	
21. Small Towns Water Supply and Sanitation Sector Project	Loan	ADB	2000		35.0	
22. Community Water Supply and Sanitation – Institutional Support	Grant	WHO	1990	2001	6.0	
Subtotal (A)					219.59	
B. Water Supply and Sanitation in Urban Areas						
23. Various Programs	Grant	UNDP	1992	1996	5.01	
24. Leak detection and Water Control Programme	Grant	Norway	1993	1995	2.40	
25. Urban WSS Rehabilitation Project	Loan	WB-IDA	1991	1999	16.1	
26. Kodkhu Water Supply Project - TA	Grant	Thailand	1991	1994	0.80	
27. Four Urban Terai Towns Water Supply	Grant	ODA	1992	1993	5.59	
28. Kathmandu WSFIP ^e Phase I and II	Grant	JICA	1992	1995	28.00	
29. Nine Urban Centers Water Supply Improvement	Grant	JICA	1989	1992	34.4	
Subtotal (B)					92.3	
Total					311.89	

ADB: Asian Development Bank; DFID: Department For International Development; DIDC = Department of International Development Cooperation; EU: European Union; GTZ: Deutsche Gesellschaft für Technische Zusammenarbeit; JGF: Japanese Grant Facility; JICA: Japan International Cooperation Agency; JRCS: Japanese Red Cross Society; ODA: Overseas Development Agency; SDC Helvetas: Swiss Association for Development and Cooperation; SNV: Dutch Volunteer Organization; UNDP: United Nations Development Programme; UNICEF: United Nations Children's Fund; WB-IDA: World Bank – International Development Association; WHO: World Health Organization.

^a Rural Water Supply and Sanitation Sector Project.

^b Community Water Supply and Sanitation with Women's Involvement.

^c Self Reliant Drinking Water Supply and Sanitation Program.

^d Rural Water Supply and Sanitation Fund Development Board.

^e Water Supply Facility Improvement Project.

PROJECT HISTORY

1. To satisfy the ever-increasing demand for water in Kathmandu Valley, the Government commissioned the preparation of a water supply and sewerage master plan. Prepared in 1973, it was followed by several development projects involving sources of water inside the valley. For various reasons, water supply remained inadequate and further studies were commissioned.

2. **Prefeasibility Study.** This study (undertaken in 1988) investigated three types of surface water supply schemes: pumped, storage, and gravity, and studied 20 schemes. Pumping schemes would involve high operating costs with stringent maintenance criteria, while storage schemes would be feasible, but would have a higher operating cost than Melamchi and less economic expansion opportunity. Of the gravity options, Melamchi had the best combination of economy and yield to meet the design target of 2 cubic meter (m^3)/s (second) and be expandable. The basic Melamchi concept was to have a low diversion weir (no storage) on the Melamchi Khola and divert through a tunnel to a storage area in the Kathmandu Valley. The initial idea was to have a 5 million m^3 storage on the flood plain just below the proposed water treatment plant. Subsequently, the World Bank proposed the modified Melamchi proposal, which involves a 15 million m^3 flood plain storage, eliminating the need for construction of the expensive 27 kilometers (km) transfer tunnel. The study, however, recommended adoption of the basic Melamchi scheme to provide 2 m^3 /s with expansion to tap the Yangri and Larke kholas to give a total of 5 m^3 /s. This scheme included water treatment at Mahankal and a bulk distribution system to serve Kathmandu and Lalitpur.

3. **Feasibility Study.** The basic Melamchi scheme was adopted as the basis of the full feasibility study in 1992. The study's objective was to assess feasibility of the basic and modified Melamchi schemes and recommend a preferred option. Citing the danger of founding a significant dam on the floodplain sediments in a highly earthquake-prone region, Snowy Mountain Engineering Corporation (SMEC) proposed the Sundarimai Dam inside the Shivapuri Watershed and Wildlife Reserve. The economic analysis showed Sundarimai Dam to be expensive for its yield, and therefore, it does not enter into the water resource expansion plan until after the Yangri and Larke sources are tapped. The scheme comprising an intake at Nakotegaon, tunnel to Sundarimai, pipeline to Sundarimal, and a water treatment plant and bulk distribution was determined to be the most desirable option. The study recommends: (i) carrying out an investigation to show whether Sundarimai Dam would enter the least cost expansion plan after tapping the Larke Khola; (ii) if not, investigating a lower level tunnel alignment; (iii) subject to the findings, proceeding to the detailed design of the adopted scheme; and (iv) only considering in-valley storage if there is confidence that downstream irrigators will not be able to increase their water use at the expense of municipal customers.

4. **Bankable Feasibility Study.** Bhutwal Power Corporation's (BPC) study (1996) covered the access roads, the intake on the Melamchi Khola, the transfer tunnel, and a 15 megawatt surface power station at the downstream end of the tunnel. The intake was slightly upstream from the site chosen by SMEC. BPC adopted a free-flow tunnel with dimensions 3 m high and 2.8 m wide giving a cross-sectional area of 7.6 m^2 . BPC proposed a public-private partnership to finance the scheme, and to minimize costs, Nepali construction methods were to be used.

5. **The Melamchi Water Supply Development Board.** The board was formed in September 1998 to implement the Melamchi Water Supply Project. Its board members comprise the secretary of the Ministry of Physical Planning and Works as chair, a representative from each of the Ministry of Finance and Ministry of Water Resources, the mayor of Kathmandu Metropolitan City, and a full-time executive director. Its specific functions are to (i) execute the Melamchi Drinking Water Project; (ii) make project-specific policy decisions; (iii) approve the program and budget, and (iv) report to the Government through MPPW.

6. **Melamchi Water Supply (Engineering) Project (February 1999).** Funded by the Asian Development Bank (ADB), the project's objective was to assist in preparing an investment project. The components included (i) 170,000 m³/d diversion works on the Melamchi Khola, (ii) a 7.5 m² and 28 km long tunnel to Sundarijal, (iii) a 15 megawatt hydropower station, (iv) a 170,000 m³/d water treatment plant, (v) a bulk distribution system, and (vi) distribution network improvements. There were three tasks: (i) project management including financial, economic, environmental, and social analyses of the investment project; (ii) engineering for the bulk distribution system; and (iii) implementation of a groundwater artificial recharge pilot project.

7. **Diversion Scheme Final Design Study.** The Norplan terms of reference required the optimization of the water transfer system as a dual-purpose water supply and hydropower scheme. Norplan retained the pressure tunnel concept but proposed a deeper tunnel profile. The tunnel size was increased to 12 m² for about half the tunnel and to 16 m² for the rest of the tunnel with steeper grades. Norplan also proposed an underground power station. The study (1999) reported negligible economic advantage by adding the hydropower component.

8. **Review of Melamchi Diversion Final Design Study.** Nippon Koei reviewed the Norplan report (2000) and concluded that a water supply only project with an 8 m² free-flow tunnel and a lower intake on the Melamchi Khola would be more economical. The advantages were (i) a greater catchment area; (ii) elimination of a tunnel construction adit and its access road; (iii) shorter access roads; (iv) easier inspection and maintenance of a free-flow tunnel; and (v) reduced environmental impact.

9. **ADB Mission Recommends Exclusion of Hydropower (April 2000).** A high-level mission from ADB visited Nepal to discuss with the Government the possibility of excluding the hydropower component. Based on the additional adverse environmental impacts associated with hydropower, which included the increased depletion of water from the river and the major quantities of water to be transferred from Melamchi Khola to the Bagmati River, the Government decided to exclude hydropower from the Project.

COST ESTIMATES AND FINANCING PLAN

Table A5.1: Detailed Cost Estimates
(\$ million)

Item	Foreign Exchange	Local Currency	Total Cost
A. Base			
1. Infrastructure Improvements			
a. Melamchi Diversion Scheme			
Civil Works	48.75	22.25	71.00
Equipment and Supplies	2.50	0.00	2.50
Land Acquisition	0.00	0.79	0.79
Subtotal (a)	51.25	23.04	74.29
b. Access Roads			
Civil Works	4.02	15.43	19.45
Equipment and Supplies	0.00	0.00	0.00
Land Acquisition	0.00	1.20	1.20
Subtotal (b)	4.02	16.63	20.65
c. Water Treatment Plant			
Civil Works	17.28	5.52	22.80
Equipment and Supplies	14.00	0.00	14.00
Land Acquisition	0.00	2.53	2.53
Subtotal (c)	31.28	8.05	39.33
d. Bulk Distribution System			
Civil Works	16.27	1.81	18.08
Equipment and Supplies	23.53	0.00	23.53
Land Acquisition	0.00	6.86	6.86
Subtotal (d)	39.81	8.67	48.47
e. Distribution Network Improvement			
Civil Works	18.84	17.77	36.60
Equipment and Supplies	28.00	0.00	28.00
Land Acquisition	0.00	1.35	1.35
Subtotal (e)	46.84	19.12	65.95
f. Kathmandu Valley Water Source			
Civil Works	5.00	4.80	9.80
Equipment and Supplies	4.00	0.00	4.00
Land Acquisition	0.00	0.27	0.27
Subtotal (f)	9.00	5.07	14.07
g. Waste Water System Improvements			
Civil Works	8.52	1.79	10.31
Equipment and Supplies	2.32	0.00	2.32
Land Acquisition	0.00	1.00	1.00
Subtotal (g)	10.84	2.79	13.63
Subtotal (1)	193.03	83.36	276.39

Item	Foreign Exchange	Local Currency	Total Cost
2. Social and Environment Support			
a. Social Uplift Program	0.60	3.60	4.20
b. Resettlement Action Plan	0.00	3.54	3.54
c. Environmental Management Plan	0.00	1.84	1.84
d. Hygiene Education	0.00	0.34	0.34
e. Public Awareness/Relations	1.50	0.77	2.27
f. Social & Environmental Monitoring	0.00	0.25	0.25
Subtotal (2)	2.10	10.34	12.44
3. Institutional Reforms	1.80	0.76	2.56
4. Project Implementation Support			
a. Project Management Unit	5.66	3.09	8.75
b. Design and Contract Supervision	17.03	0.97	18.00
c. Panel of Experts	2.00	0.00	2.00
d. Incremental Administration	0.00	3.21	3.21
e. Training	0.20	0.47	0.67
Subtotal (4)	24.89	7.74	32.63
Subtotal (A)	221.80	102.20	324.00
B. Contingencies			
Physical ^a	22.20	10.20	32.40
Price ^b	21.40	9.40	30.80
Subtotal (B)	43.60	19.60	63.20
C. Interest During Construction and Fees	7.60	33.20	40.80
D. Taxes and Duties	0.00	36.00	36.00
Total	273.00	191.00	464.00
Percent	58.8	41.20	100.0

^a 10 percent of base cost.

^b 2.4 percent per annum on foreign and local costs. IDC – 8 percent interest on 50 percent of project costs including taxes and duties and price contingencies. Taxes and duties – 10 percent on all expenditures plus 1 percent project duty on foreign costs.

Table A5.2: Financing Plan
(\$ million)

Item	Foreign Exchange	Local Currency	Total	Government Total	External Total	ADB ^a	WB ^b	JBIC ^c	Japan ^d	NORAD ^e	Sida ^f	NDF ^g	OPEC Fund ^h
Melamchi Diversion Scheme	72	50	122	35	87	25				28	25	9	
Access Roads	9	19	28	14	14								14
Social Uplift Program	1	5	6	1	5	5							
Kathmandu Valley Water Source Improvements	14	9	23	5	18				18				
Water Treatment Plant	44	20	64	12	52			52					
Bulk Distribution System	52	25	77	20	57	57							
Distribution Network Improvement	48	33	81	16	65		65						
Private Operator Distribution Improvements	11	8	19	4	15		15						
Wastewater System Improvement	12	6	18	5	13	13							
Project Management	9	9	18	4	14	14							
Other Environment and Social Improvement	1	7	8	2	6	6							
Total	273	191	464	118	346	120	80	52	18	28	25	9	14
	59%	41%	100%										

Note: All amounts are based on "commitments in principle" as of October, 2000. \$1 = NRs73.25

ADB = Asian Development Bank, JBIC = Japan Bank for International Cooperation, NDF = Nordic Development Fund, NORAD = Norwegian Agency for Development Cooperation, OPEC Fund = Fund for International Development, Sida = Swedish International Development Cooperation Agency, and WB = World Bank.

^a Loan terms are 32 years with 8 years grace period and 1% per annum interest during the grace period and 1.5% per annum thereafter.

^b Loan terms are 40 years with 10 years grace period, 0.75% service charge and 0.5% commitment fee. First credit of \$15 is scheduled for approval in September 2001 and the second credit of \$65 will depend on satisfactory performance of management contract after two years.

^c Loan terms are 30 years with 10 years grace period and 1% interest per annum. Agreements are expected to be signed after ADB approval of the loan.

^d The Government has requested Japan to finance this component as a grant.

^e December 2000 approval is anticipated from the grant.

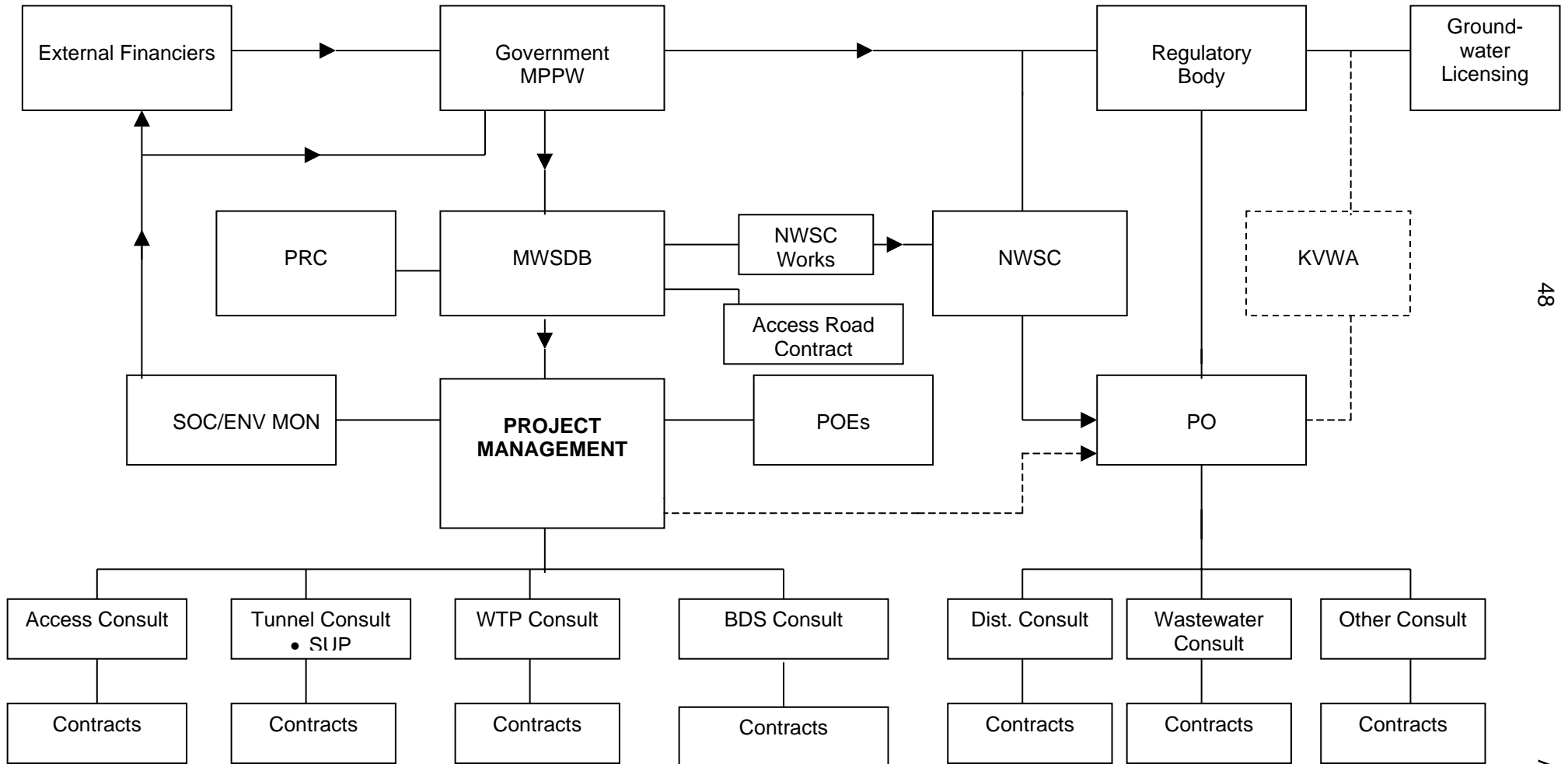
^f A mixed credit has been indicated: half as grant and the other half as loan. Loan terms are 10 years, no grace period and 10% per annum interest rate. December 2000 approval is anticipated.

^g Loan terms are 40 years with 10 years grace period, 0.75% service charge, and 0.5% commitment fee.

^h Loan terms are 20 years, 5 years grace period, 1% per annum interest, and 1% per annum service charge.

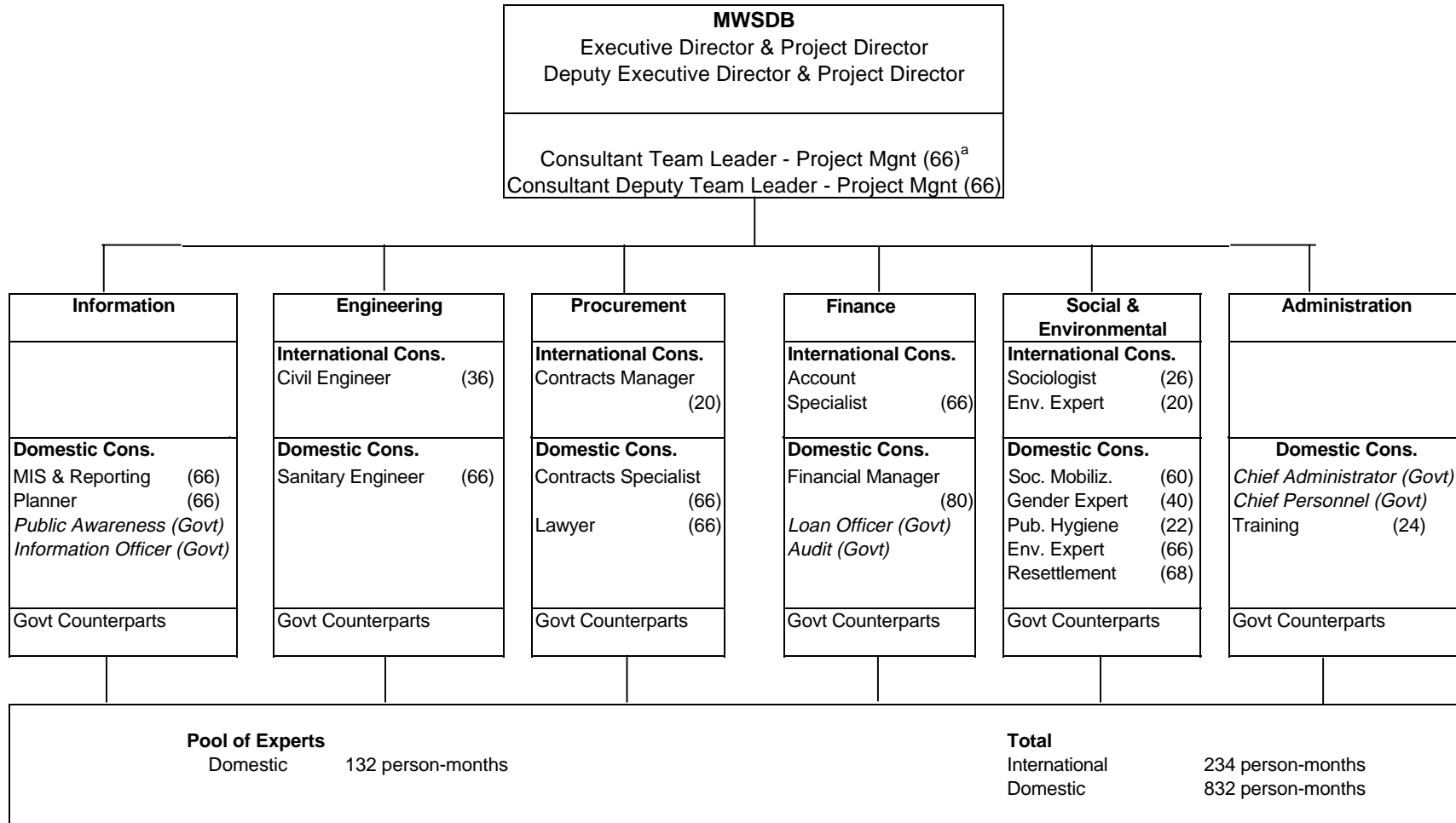
ORGANIZATION CHARTS

Figure A6.1: Tentative Organization Chart for Implementation



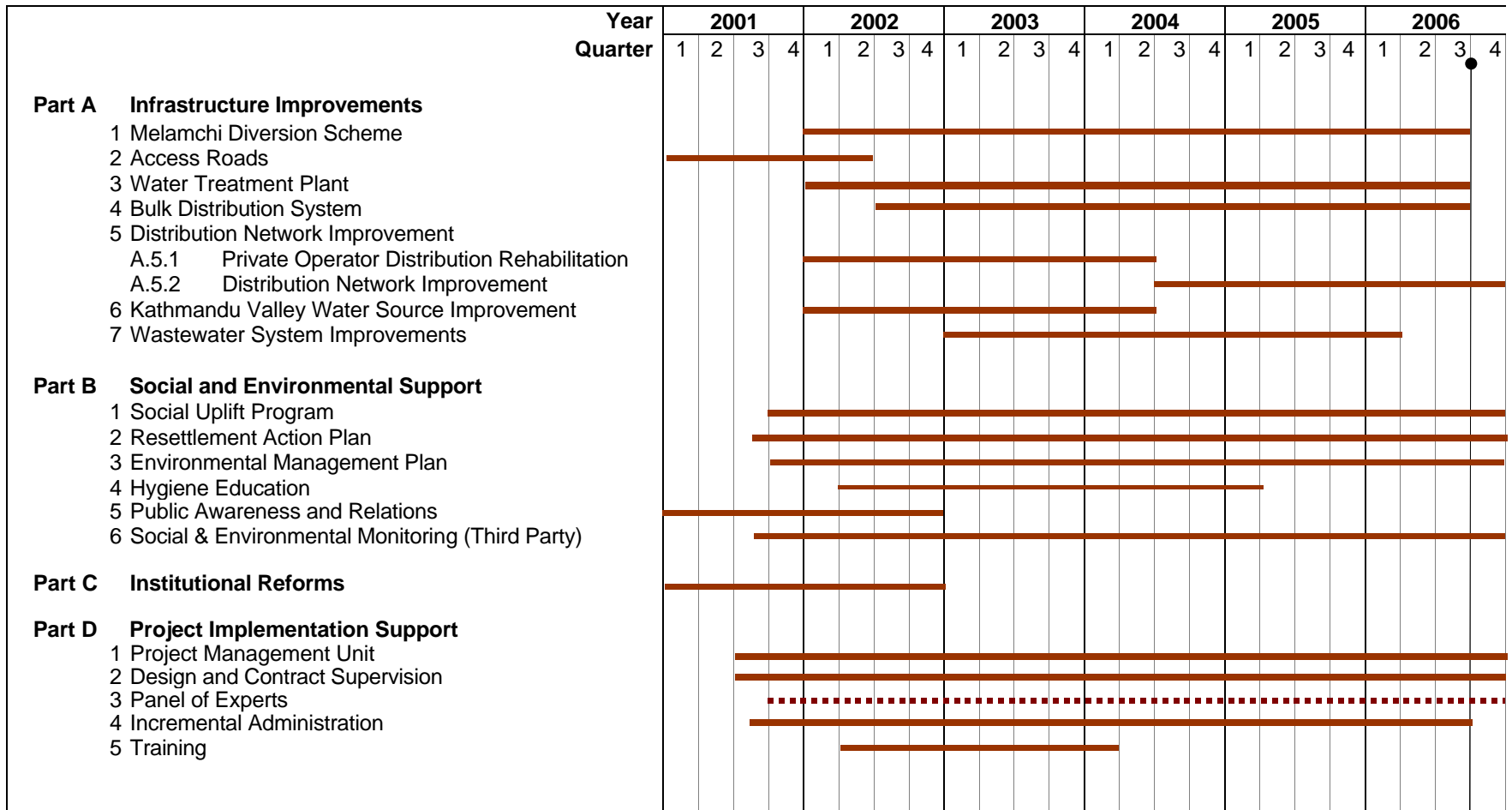
BDS = bulk distribution system, KVWA = Kathmandu Valley Water Authority, MPPW = Ministry of Physical Works and Planning, MWSDB = Melamchi Water Supply Development Board, PO = private operators, POE = panel of expert, PRC = public relations consultant, SUP = social uplift program, WTP = water treatment plant.

Figure A6.2: Organization Chart for the Project Management Unit



^a Person-months are in parenthesis.

IMPLEMENTATION SCHEDULE



Commissioning

INDICATIVE PROCUREMENT PACKAGING

Component / Contract	Contract value (\$ million)	Mode of Procurement	Origin of Funds
A. Access Roads			
1. Adit Access Roads	10.05	ICB	OPEC Fund
2. Public Road Upgrading	2.00	ICB	OPEC Fund
3. Main Access Roads	2.50	LCB	Government
B. Melamchi Diversion Scheme			
1. Power Line	2.24	NORAD and Sida	NORAD and Sida
2. Intake and Tunnel (Ambathan)	15.00	ICB	ADB
3. Tunnel (Remainder)	52.22	NORAD and Sida	NORAD and Sida
C. Water Treatment Plant			
1. Civil Works and Electrical and Mechanical Plant	36.00	ICB	JBIC
D. Bulk Distribution System			
1. Civil Works Contract BDS/01	11.34	ICB	ADB
2. Civil Works Contract BDS/02	7.91	ICB	ADB
3. Pipes Supply	21.94	ICB	ADB
4. Valves Supply	2.69	ICB	ADB
5. Flowmeters Supply and Install	0.43	IS	ADB
E. Distribution Network Improvement			
1. Rehabilitation Works	4.00	ICB	WB
2. Civil Works Contract	20.00	ICB	WB
3. Pipes and Fittings Phase I	4.00	ICB	WB
4. Pipes and Fittings Phase II	20.00	ICB	WB
F. Wastewater Improvement			
1. Interceptor Sewers	8.05	ICB	ADB
2. Septage Trucks	0.25	IS	ADB
3. Sewer Cleaning Equipment	0.06	IS	ADB
4. Public Toilets	0.11	LCB	ADB
5. Septage Treatment Plant	0.77	LCB	ADB
6. Rehabilitation and Extension of WWTP	1.44	ICB	ADB
G. Project Management Unit			
1. Supply Vehicles	0.32	IS	ADB
2. Supply Office Equipment	0.13	LCB	ADB
H. SUP			
1. Equipment	0.50	LCB	ADB
2. Civil Works	0.50	LCB	ADB

ADB = Asian Development Bank, ICB = international competitive bidding, IS = international shopping, LCB = local competitive bidding, NORAD = Norwegian Agency for International Cooperation, OPEC Fund = OPEC Fund for International Development, Sida = Swedish International Development Cooperation Agency, SUP = social uplift program, WWTP = wastewater treatment plant, WB = World Bank.

CONSULTING SERVICES FINANCED BY ADB

Table A9: Consulting Requirements

Component / Position	Consultants (person-months)	
	International	Domestic
A. Project Management Unit		
1. International		
Team Leader	66	
Civil Engineer Construction	36	
Social Development Specialist	26	
Environmentalist	20	
Contracts Management Specialist	20	
Accountant	66	
Subtotal	234	
2. Domestic		
Deputy Team Leader		66
MIS & Reporting Specialist (Information Division)		66
Planner (Information Division)		66
Sanitary Engineer (Engineering Division)		66
Social Mobilization Specialist (Social & Environ. Div.)		60
Gender Specialist (Social & Environment Div.)		40
Public Hygiene Specialist (Social & Environ. Div.)		22
Environmentalist (Social & Env. Division)		66
Resettlement Specialist (2) (Social & Env. Div.)		68
Contract Specialist (Contract / Legal Division)		66
Lawyer (Contract / Legal Division)		24
Training (Administration Division)		24
Financial Manager (Accounting Division)		80
Pool of Experts		132
Subtotal		846
B. BDS Supervision		
1. International		
Team Leader	42	
Pipeline Engineer	40	
Reservoir Engineer	6	
Contract Specialist	8	
Structural Engineer	4	
Geotechnical Engineer	7	
Electrical Engineer	3	
Witness Tests	3	
Subtotal	113	
2. Domestic		
Implementation and Contract Supervision		750
C. Wastewater Improvements		
Design	19	38
Construction Supervision	16	150
Subtotal	35	188

Component / Position	Consultants (person-months)	
	International	Domestic
D. Panel of Experts		
Hydraulics Specialist	6	
Geotechnical Engineer	12	
Tunnel Contracting Specialist	12	
Environmental Specialist	12	
Social Specialist	12	
Dispute Resolution Specialist	6	
Subtotal	60	
E. Social Uplift Program		
Coordinator	12	
Deputy Coordinator		66
Local Facilitators		330
Subtotal	12	396
F. Hygiene Education		132
G. Social & Environmental Monitoring, Third Party		
Social experts		40
Environmental experts		40
Subtotal		80
H. Public Awareness	12	160
I. Training	8	
Total	474	2,552

Terms of Reference for Consultants for Project Management Unit (PMU)

A. General

1. This consultancy involves no direct supervision of contracts. The role is supervision and coordination of consultancies. The consultancy objectives are (i) to assist Melamchi Water Supply Development Board (MWSDB) with the efficient coordination of the various consultancies, and effective implementation of the various project components; (ii) to monitor project progress, and keep MWSDB and funding agencies informed; (iii) to monitor project expenditure, and keep MWSDB and funding agencies informed of current and forecast disbursements; (iv) to ensure that no person suffers net disadvantage from project implementation; and (v) to ensure that all project activities, and particularly construction contracts, maintain the highest standards of environmental protection.

B. International Consultants

1. Team Leader

2. The team leader will have the following responsibilities:

- (i) Take overall responsibility for the effective working of the project management unit (PMU).
- (ii) Set up an effective organizational structure for the PMU catering for both MWSDB and consultant staff.
- (iii) Liaise closely with MWSDB, the funding agencies, and the consultants for the various components, and ensure that all parties are kept informed of relevant issues.
- (iv) Hold monthly coordination/progress meetings with MWSDB and the consultants for the various components, at which each consultant will make a short presentation on progress, problems, remedial action proposed, interface issues, and any other matter considered by the meeting. Prepare the minutes of the meeting and issue them to all parties within one week of the meeting.
- (v) Provide advice to MWSDB as required.
- (vi) On behalf of MWSDB, prepare reports for submission to higher authorities and the funding agencies. Ensure that such reports highlight any impediments to the quality and progress of the works, and provide a plan for remedial action.

2. Civil Engineer Construction

3. The consultant's responsibilities include the following:

- (i) Maintain a photographic record of construction activities and progress.
- (ii) Assist MWSDB to ensure that funding agency construction supervision guidelines and requirements stipulated in the Loan Agreement are followed.
- (iii) Coordinate technical interfaces between project components supervised by different consultants.
- (iv) Monitor supervision of civil construction works.

3. Environmentalist

4. The consultant will have the following responsibilities:

- (i) Maintain a photographic record of construction activities and environmental impact.

- (ii) Ensure compliance with the environmental management plan for the Project, and generally ensure that the Project is constructed in an environmentally sound manner.
- (iii) Monitor the implementation of environmental mitigation measures.
- (iv) Ensure that future tender documents include all required environmental mitigation requirements.

5. Social Development Specialist

6. Responsibilities include the following:

- (i) Assist the MWSDB/PMU implement the Project's social and poverty strategy as a leader of the social team of the social and environment unit.
- (ii) Assist the MWSDB/PMU monitor the social and poverty impact of the Project.
- (iii) Supervise the work of domestic consultants of the Social team/PMU and the SUP team.
- (iv) Develop, in consultation with the training specialist, and carry out training of the Project staff and other necessary stakeholders on social and poverty issues, including resettlement, ethnicity/caste/indigenous peoples, gender participation, NGO partnerships, and others.

6. Contracts Management Specialist

7. The consultant will have the following responsibilities:

- (i) Provide advice as required to the contracts management engineers in each consultancy.
- (ii) Be a troubleshooter in the event of disputes over claims, variations, etc.
- (iii) Review tender documents for Project components where design is not yet complete.
- (iv) Advise MWSDB on any issues related to variations, claims, and extensions of time.

7. Accountant

8. The consultant will undertake the following:

- (i) Monitor the consultant-endorsed progress payment certificates. Keep a record of financial commitment by each funding agency. Keep a summary record of overall project financial commitment. Each month, provide one month and three month forecasts of disbursements for Government and each funding agency, and totals of these for MWSDB.
- (ii) Prepare an annual budget for the Government and each funding agency.
- (iii) Monitor accounting procedures at all levels of the Project.
- (iv) Monitor approved contract variations, and keep an up-to-date record of contract prices.

C. Domestic Consultants

1. Deputy Team Leader

- (i) deputize for the team leader when required;
- (ii) liaise with, monitor, and coordinate interfaces with, other project parties such as the private operator, the Groundwater Resources Development Board, the regulatory body, and the Kathmandu Valley Water Authority (KVWA);

- (iii) track the performance of the private operator;
- (iv) take overall responsibility for the hygiene education program;
- (v) take responsibility for providing information to the public dialogue consultant;
- (vi) coordinate with the technical assistance (TA) team for Optimizing Water Use in the Kathmandu Valley; and
- (vii) organize meetings, workshops, and seminars as required.

2. MIS and Reporting Specialist

10. The specialist will

- (i) prepare monthly, quarterly, and annual progress reports;
- (ii) provide inputs to the team leader's reports for submission to higher authorities and the funding agencies;
- (iii) assist the chief administrator to prepare and implement all administrative systems and procedures needed to ensure the effective coordination of the project consultancies;
- (iv) plan and implement a system of communication to and between stakeholders;
- (v) maintain and upgrade project hardware and software systems;
- (vi) develop, maintain, and update an MWSDB project web site;
- (vii) prepare a liquid crystal display board demonstrating project operation; and
- (viii) liaise with the public dialogue consultant over presentation of information to the media and the public.

3. Planner

11. The specialist will

- (i) for all consultancies, review proposed contractor's programs for critical path and interface impacts;
- (ii) monitor the consultants' reports on contractor progress, and prepare / amend bar charts summarizing overall project progress; and advise to MWSDB and the relevant consultant if there is slippage in the progress of critical path activities;
- (iii) monitor approved time extensions, and keep an up-to-date record of contract completion dates;
- (iv) coordinate timing interfaces between project components supervised by different consultants; and
- (v) ensure that future tender documents make suitable provision for timing interfaces between project components supervised by different consultants.

4. Sanitary Engineer

12. The consultant will

- (i) monitor and review the design of the wastewater system improvement; and
- (ii) coordinate with the private operator for the design and programming of the wastewater system improvements.

5. Public Hygiene Specialist

13. The specialist will

- (i) supervise the hygiene education program consultant;
- (ii) in conjunction with sociologist, monitor effectiveness of the pilot program;

- (iii) learning from the pilot program, amend terms of reference for a follow-up program; and
- (iv) prepare a benefit monitoring and evaluation program for the follow-up hygiene program.

6. Environmentalist

14. Monitor the implementation of environmental mitigation measures.

7. Resettlement Specialist

15. Assist MWSDB in the implementation of the resettlement action plan.

8. Lawyer

16. The lawyer will

- (i) help draft groundwater licensing documents; and
- (ii) help MWSDB provide input to the legislation and regulations relating to the water sector, and to the regulatory body and KVWA;
- (iii) prepare draft legislation for implementing levy to be paid to residents of Melamchi, Yangri and Larke Valleys;
- (iv) advise on legal aspects of construction contracts.

9. Training

19. The training specialist will

- (i) in conjunction with other team members, nominate MWSDB and PMU staffing required, and establish statements of duties for key staff;
- (ii) assess the qualifications of potential employees
- (iii) determine training curricula and investigate potential training institutions;
- (iv) in conjunction with such institutions, elaborate curricula into course content;
- (v) determine the most suitable timing for training;
- (vi) monitor course implementation and maintain records of staff trained; and
- (vii) monitor private operator staff training.

10. Gender Specialist

20. The specialist will

- (i) prepare and facilitate the implementation of the project's gender strategy to ensure women's participation, and incorporation of their needs and concerns;
- (ii) prepare mechanisms of and carry out the monitoring of the Project's gender impact, including women and trafficking of girls;
- (iii) develop and carry out gender training programs for project staff and other key stakeholders as necessary.

11. Social Mobilization Specialist

21. The specialist will

- (i) facilitate the activities involving social mobilization, community participation, and consensus building in all the project components;

- (ii) coordinate and supervise NGO-involved activities, including the hygiene education and promotion program, social uplift program, and public relations; and
- (iii) plan and carry out workshops, community meetings, beneficiary training and other means to promote beneficiary participation as necessary.

12. Contract Specialist

22. Advise on claims for contract variations.

13. Financial Manager

23. Maintain up-to-date computerized accounts for the project and projected contract awards and disbursements.

SUMMARY RESETTLEMENT PLAN

A. Introduction

1. The Project involves diverting water from the Melamchi River by gravity to Kathmandu Valley at Mahankal (Sundarijal). This will involve construction of a tunnel, access roads, and transmission lines in the Melamchi Valley, and a water treatment plant, reservoir sites, and a bulk distribution system in Kathmandu Valley. Pipelines will be run along road rights-of-way (ROW) and across private land. An estimated 40,913 persons will be variously affected by the Project.

Table A3:1: Households Affected by Loss of Agricultural Land and Residential and Commercial Structures

Project Component	Agricultural Land		Structures on Private Land	House/Shop on Public Land	Shops on Public Land	Total Families and Persons Affected	
	PAF	SPAF	SPAF	SPAF	SPAF	PAFs	PAPs
MDS							
Permanent	1,295	200	118	7		1,620	9,072
Temporary	502					502	2,811
BDS							
Permanent	1,555	478	127		230	2,390	13,384
Temporary	2,684					2,684	15,030
WTP							
Permanent	30	48	1			79	616
Total	6,066	726	246	7	230	7,275	40,913

BDS = bulk distribution system, MDS = Melamchi Diversion Scheme, PAF = project-affected families, SPAF - severely project-affected families; WTP = water treatment plant.

Source: Consultant Reports.

2. The overall impact of the Project is limited. The majority (83 percent) of project-affected families (PAFs) will be marginally affected by loss of agricultural land, while only 10 percent (726 households) will be severely affected by loss of agricultural land. Three percent of PAFs (253 households) will lose their houses, 7 of which have shops attached. Another 3 percent (230 vendors) have encroached into road ROW along the bulk distribution system pipeline route.

3. A total of 253 households, or 1,428 project affected persons (PAPs) will be displaced when their houses are affected. The incomes of 230 households (1,288 persons) will be affected when their temporary shops are cleared from public ROW.

4. The resettlement action plan (RAP) identifies the (i) extent of losses; (ii) number of PAPs in various categories; (iii) policies and legal framework applicable; (iv) arrangements made for compensation payments, relocation, and income restoration assistance; and (v) responsibilities for delivering and monitoring the implementation measures.

B. Socioeconomic Impacts on the Affected People

5. A census survey of 100 percent of affected households is being carried out as detailed designs become available for each component. This survey will serve as the cut-off date for eligibility for entitlements. The census survey combines an inventory of losses, ownership, and land tenure status with a collection of baseline socioeconomic data on each household as well as preferences for compensation and rehabilitation assistance.

C. Objectives, Legislation, Policy Framework, and Entitlements

6. Land acquisition for public purposes in Nepal is largely governed by the Land Acquisition Act 2034 (1977), which sets out compensation standards and benefits such as compensation for lost assets at market value, provision for alternative land, and compensation for standing crops and trees. However, the provisions are inadequate. To cover resettlement-related needs of the PAPs, Melamchi Water Supply Development Board (MWSDB) has prepared a resettlement policy framework that was approved by the Government. The framework provides benefits to nontitled persons such as encroachers and squatters, displacement allowances for relocation, and income restoration assistance. In summary, the policy framework for resettlement affecting the Project is similar to the Asian Development Bank's policy on resettlement. Basic principles of the project resettlement policy include (i) avoidance of land acquisition and involuntary resettlement where feasible or minimization to the extent possible through the incorporation of social considerations into project design options, and (ii) where population displacement is unavoidable, payment of full compensation and assistance to people losing assets, livelihood, and other resources so that they can improve or at a minimum restore their former economic and social conditions.

7. The RAP contains 11 compensation categories: for land, crops and trees, loss of house and/or commercial enterprises, compensation for damages caused during construction, mitigation for loss of water due to diversion of the Melamchi River, displacement allowances, rehabilitation measures, loss of community facilities and resources, and group losses. These categories are listed in an entitlement matrix.

D. Consultation, Participation, and Grievance Mechanism

8. Public consultation for the Project began with the census survey of each PAF during which focus group discussions have served as a forum for participation and consultation. Coordination meetings were also held with local nongovernment organizations (NGOs) and local governments. MWSDB senior management have carried out an information campaign and consultation with area residents in the Melamchi Valley.

9. A public relations consultant is being hired by MWSDB to keep project area residents fully informed about the Project and to make sure that public concerns are communicated to MWSDB. The Board will prepare and distribute brochures outlining the resettlement policy and compensation packages for PAPs and will involve community-based organizations and PAPs in the information campaign, and implementation and monitoring of the resettlement plan.

10. The PAPs and other people in the project areas will be able to make complaints or queries to MWSDB and know that they will be heard and addressed fairly. The field office of the Project in the Melamchi valley and the Resettlement and Social Development Division of the Project Management Unit will be responsible for handling initial grievances of the PAPs, with the assistance of the local consultative groups and particularly the local community liaison assistants who will help the PAFs to file their complaints and concerns to the MWSDB.

E. Relocation of Housing and Settlements

11. A total of 253 houses will be displaced and require relocation, as well as 230 shops with very temporary structures of bamboo poles and plastic roofs. The house owners prefer to receive cash, and they will make their own arrangements to rebuild, either on their remaining land or elsewhere. Group resettlement sites will not be required. For the vendors whose shops are illegally encroaching within the ROW, MWSDB will assist the local governments to find permanent market sites in which they can rent stalls.

F. Income Restoration Strategies

12. Severely project-affected families (SPAFs), including households fully affected by loss of houses and/or commercial establishments, and households severely affected by loss of agricultural land, will be entitled to allowances to restore their household incomes during the transition period. They will also be assisted to restore their income levels in the longer term through skills training, assistance to establish new income-generating activities, and access to microfinance. SPAFs and vulnerable groups (e.g., households headed by women, ethnic minorities, disabled, elderly, and special interest groups) will be given priority in all income restoration or creation measures. SPAF farmers will be provided with agricultural extension services to increase productivity on their remaining land.

G. Institutional framework

13. The implementation of the RAP will be carried out by the Social and Environmental Division of the Project Management Unit, assisted by the compensation determination committees and local consultative groups at the ward level. MWSDB will be responsible for ensuring the necessary cooperation of contractors, government departments, and PAPs.

H. Resettlement Budget and Financing

14. The estimated cost of land acquisition and resettlement is about \$15.80 million. The resettlement cost estimate includes all costs related to resettlement including compensation, relocation, transfer costs, displacement allowances, rehabilitation costs, administrative costs, resettlement training, and costs of monitoring and evaluation. MWSDB will allocate appropriate funds on the basis of construction priorities and resettlement needs for the different components.

I. Implementation Schedule

15. An implementation schedule for the RAP has been prepared to ensure the completion of resettlement activities before the beginning of the relevant civil works of the Project. Resettlement preparation activities have started. Land acquisition has already begun and will continue until the end of 2004. Monitoring and evaluation of the impacts of RAP implementation will continue into 2005.

J. Monitoring and Evaluation Plan

16. The resettlement process will be monitored both internally and externally. The Social and Environmental Division will be responsible for internal monitoring and preparation of monthly and trimesterly progress reports on the progress of resettlement implementation. MWSDB will hire a qualified independent external monitoring agency to conduct external monitoring annually during Project implementation. The monitoring and evaluation process will involve the participation of affected people, communities, and/or NGOs. A postresettlement evaluation will be carried out by the external monitoring agency to assess whether the resettlement objectives have been met, and lessons learned identified for future policy formulation and planning.

SUMMARY OF THE FINANCIAL AND ECONOMIC ANALYSES

A. Financial Analysis

1. Supply Assessment

1. Water supply projections assume that in the preproject period supply may increase as a result of a reduction of losses and some rehabilitation or expansion of groundwater and surface water sources. Current losses of 40 percent are assumed to decrease to 35 percent by 2007, to 30 percent by 2011, and to 25 percent by 2021. An extra 21 million liters per day (MLD) is assumed to come from Manohara from 2004. The Project will supply an average 180 MLD, bringing the total availability of supply in 2007 to 304 MLD as compared with 111 MLD in 2000. The water supply projections do not consider the timing of the Yangri and Larke river water supply options from valleys adjoining the Melamchi, but these additional water supplies may be required during 2012 to 2021.

2. Demand Assessment

2. Projections of water demand assume a population of 1.5 million in 2000 and a growth rate of 4.0 percent in 2001, falling to 2.8 percent in 2016, and remaining steady at that level thereafter. From project commissioning, 80 percent of the population is assumed to be served, rising to 95 percent in 2021. Estimates of household demand based on a weighted average increase range from 62 liters per capita per day (lpcpd) in 2000 to 95 lpcpd in 2007, and to 105 lpcpd in 2011. This assumes demand management by pricing (and public awareness). Households with full plumbing are assumed to increase from 26 percent currently, to 46 percent in 2007, and to 68 percent in 2021. The proportion of households using standposts is expected to decline from 22 percent currently, to 14 percent in 2007, and to 2 percent in 2021. The balance are assumed to have yard taps and represent 52 percent in 2000, 40 percent in 2007, and 30 percent in 2021. The majority of households are assumed to have full plumbing and higher water consumption by 2021. Projections of commercial, industrial, and institutional piped water supply demand as a proportion of domestic demand increases from 5 percent currently to 14 percent in 2007, but then declines to 12 percent by 2011 and remains at this level thereafter due in part to assumed relocation of industry outside Kathmandu Valley.

3. Relending to Utility

3. Relending terms in local currency (NRs) from the Government to the Nepal Water Supply Corporation (NWSC) are assumed to be on the basis of 50 percent grant and 50 percent loan. The loan will be at an interest rate of 8 percent per annum, over 20 years with a grace period on principal repayments up to 2008.

4. Cost Recovery Policy and Assumptions

4. Based on the objective for the sector to meet cash expenses up to 2006, average tariffs pre-Project rise from NRs6.6/m³ in 2000 to around NRs12.8/m³ in 2006. This is based on a policy of meeting cash operating and maintenance costs as well as private sector contracting and regulatory costs. Over this period, tariffs are not expected to recover investment costs or service debt on past investments. The financial projections assume that the private sector management contract will improve collection efficiency from the current 75 percent of billings to 97.5 percent of billings by 2005. Standpipes will be metered and charged at the lifeline rate. Groundwater charges for commercial and industrial consumers will be at 50 percent of the

maximum rate for piped water supply users. Wastewater will continue to be charged at 50 percent surcharge on water tariff for those households connected to a sewer.

5. In the postproject period, the objective is to meet operation and maintenance costs including those from source to consumer for the Project, debt servicing costs of the lease funds re-lent to the utility, the regulatory costs, and the private sector lease contract on-going costs. Tariffs are set to meet a debt service ratio (DSR) of 1.1 in 2007 and 1.2 in 2010 and each year thereafter. All commercial and industrial use of groundwater is assumed to cease with such users connecting to the piped water supply over 2007 and 2008. The average tariff post-Project in FY2009 is estimated at NRs23/m³ (in 2000 prices) based on 50:50 loan:grant relending. The recommendation is to keep the 50:50 loan:grant relending, but debt servicing would commence in FY2007 with interest payments and principal payments phased over 2008 and 2009. The average tariff would be NRs18/m³ in 2007, rising to NRs23/m³ in 2009. In practice, the increase over 2006 to 2009 could be smoothed and would require real increases of 21 percent per annum for three years.

5. Affordability

6. Median household income in Kathmandu Valley is estimated at NRs14,000 per month, and the lowest quartile median at NRs6070 per month. Prior to project commissioning, water tariffs as a percentage of household income for a low income household consuming 60 lpcpd increases from 0.7 percent of household income in 2000 to 1.1 percent in 2006. Post-Project this rises to 1.9 percent in 2009 and remains around that level. Where a low-income household is also connected to the sewerage system, affordability represents 2.8 percent of household income in 2008.

7. For a median income household, water tariffs as a percentage of household income in 2000 and assuming 125 lpcpd consumption will amount to 1.2 percent. Where they are connected to the sewerage system this will be about 1.8 percent of household income. By 2006, this will have increased to 1.9 percent of household income for a water only connection and 2.9 percent of household income incorporating the sewerage surcharge. Following project commissioning, the water only tariff would equate to 2.6 percent of household income in 2007 rising to 3.2 percent in 2009. Adding the sewerage surcharge, in 2009 tariffs are equivalent to 4.8 percent of household income; it remains at this level over the balance of the forecast period to 2012.

8. Commercial consumers will pay the same charges as domestic consumers, but above 30 m³ per month all consumption will be charged at the highest rate. This means that by 2008 most commercial consumers will be paying around NRs77/m³ for their water requirements and an additional NRs39/m³ for sewerage. These charges are in line with the average incremental financial cost of NRs88/m³ at 12 percent discount rate.

6. Willingness-to-Pay

9. A survey conducted in August 2000 of 100 potential consumers from all cross-sections of society, showed 90 percent willing to pay NRs500 per month for a 24-hour supply of piped potable water. This compares with a current average of NRs150 per month. The financial projections assume a monthly charge of NRs555 per month (in 2000 prices) for 19.1 m³. This would be 39 percent more water than is being received by average fully plumbed customer at the present time.

7. Financial Internal Rate of Return

10. The overall financial internal rate of return (FIRR) for the Project is 4.7 percent. This may be compared with a weighted average cost of capital of 0 percent, where the lending rate is 8 percent and domestic inflation is 8 percent resulting in a real interest rate of 0 percent. Sensitivity analysis shows the FIRR falling to 3.4 percent when capital costs increase by 10 percent and revenue decreases by 10 percent. The FIRR for this Project is not dissimilar to those for many other urban water supply projects in developing countries.

8. Past Financial Performance of NWSC

11. Over the past five years, the NWSC's performance has been characterized by high water losses (estimated at 40 percent of production), poor service (often only 1-2 hours every other day), low tariffs (around 1 to 2 percent of household income) and low collection efficiencies. Debtors have risen to the level of 311 days of sales equivalent in 2000. Consequently, NWSC has only been able to maintain a positive cash flow by deferring debt service payments to Government.

12. This has resulted in a weak financial position with NWSC unable to generate sufficient funds to carry out adequate levels of repairs and maintenance, let alone meet its debt service obligations or make any meaningful contribution to the sector's capital requirements. In fact the first two World Bank (IDA) credits have been converted to equity, while NWSC is unable to meet interest payments on the IDA Third Water Supply and Sewerage Project with no schedule agreed for loan repayment. In the case of the fourth IDA credit, which has been rescheduled and reduced in size and scope from some \$60 million to \$38 million, it had been agreed that 65 percent will be passed on to NWSC as a grant, with 35 percent to be lent and repaid by NWSC.

13. Past financial performance of NWSC shows that net profit has declined steadily from NRs40 million in FY1995 to a loss of NRs42 million in FY1999, and a provisional loss in FY2000 of NRs72 million. Also over this period, while the results provided for the payment of interest to the Government, no interest was actually paid. However, there was some offset of the Government revenues owing on stand posts with interest owed by NWSC.

14. At the current levels of net profit and operating losses, NWSC will not be able to meet any ongoing capital expenditure out of retained earnings. In practice, the level of operating and maintenance costs has not been sufficient to keep the NWSC water and sewerage systems operating properly.

15. This poor financial performance has led to proposals to have Kathmandu water supplies managed by a private operator through a lease arrangement. The proposed lease is for 10 years, and the private operator is assumed to be in place by September 2001, prior to the finalizing of the Melamchi tunnel contract. This is expected to result in improved operational performance and a reduction in water losses and improved collection efficiencies. Financial projections and assumptions for inside Kathmandu Valley for a Kathmandu water utility and private operator are set out in Supplementary Appendix A.

B. Economic Analysis

1. Demand Assessment

16. The economic analysis uses demand curves based on income and price to evaluate nonincremental and incremental benefits. The concepts underlying the curves were originally developed in Kathmandu studies (SMEC 1992) and further refined with analysis of information from the ADB *Water Utilities Data Book for the Asian and Pacific Region* (November 1993).

2. Without Project

17. The without-project option has been considered. Without an increase in water availability and without improvement in management, the water scenario for Kathmandu is bleak. NWSC is unable to meet demand. Delivery is limited to less than two hours every two days. Pressures are poor and water quality is poor. Tariffs are low, encouraging high demand from those who do get water. Many consumers at high elevations or distant points receive little or no water. NWSC revenues are too low to sustain the system, let alone expand to meet the demands of a growing population. Shallow wells are becoming increasingly polluted and the deep aquifers mined. The risk of serious health problems is increasing. The poor suffer the most — fetching and carrying, using shallow wells and polluted streams, or relying on public standpipes. Many only get water in the middle of the night or rely on purchasing it from their neighbors. Higher income consumers are relying on tanker deliveries, bottled water purchase, and deep wells. If nothing is done, the situation will continue to deteriorate. Income, welfare, and the environment suffer. The increasing economic cost of shortage in the without-project case is illustrated by the economic price of water rising from about NRs40/m³ currently to about NRs110/m³ in 2012.

3. Alternative Designs

18. Options to augment water supply in Kathmandu Valley have been studied at length for the last two decades. In-valley surface water options include storage and reallocation of water use. In-valley storage in the foothills has high cost and low yield because of the steep slopes and limited catchments. Storage lower in the valley have high social costs and water quality problems due to population density and land use. In-valley options do not compete with the Melamchi in terms of cost or social disruption. The possibility of reallocating water from low economic value to water supply has been considered but is subject to social and legal difficulties. Alternative sources from outside the valley have been considered at length but eliminated on the grounds of high pumping costs and/or low capacity for future expansion. Alternative arrangements for the Melamchi have been examined including high and low tunnels, with and without reservoir, and with and without hydropower. The arrangement now proposed, with low level tunnel, no impoundment storage, and no hydropower is the least cost and least environmentally disruptive. Furthermore, the option for low cost gravity expansion of supply from the Yangri and Larke rivers and in-valley storage in the future is retained.

4. Subsidies

19. The Government has agreed that full cost recovery for the water supplies in Kathmandu will be phased in by 2010, which is about three years after commissioning of the Project. Nevertheless, a number of subsidies are provided despite the full cost recovery concept:

- (i) **Subsidy provided to NWSC.** The funds to develop the Project are passed on to the NWSC as 50 percent grant and 50 percent loan. This is comparable to the current policy for capital works in Greater Colombo Water Supply, but it is expected to be terminated in consideration of any new water supply works necessary for Kathmandu Valley after 2010.
- (ii) **Subsidy for all capital works for wastewater improvements.** This is being provided as a grant. This follows policy adopted elsewhere in Asia and in many parts of the developed world.
- (iii) **Subsidy to users of groundwater in Kathmandu Valley.** Industrial and commercial users in particular take this water for free, although the cost of extraction by pumping is significant. By December 2002, this subsidy is expected to be phased out with the introduction of licensing and charging for major groundwater extraction.
- (iv) **Subsidy to farmers within Kathmandu Valley.** This is a social issue that will be addressed over the next few years under the Project as part of a technical assistance optimizing water use in Kathmandu Valley.
- (v) **Subsidy to industries in Kathmandu Valley.** This subsidy will be phased out through legislation and institutional controls introduced under the Project whereby the polluting industries will be given assistance to relocate and provide appropriate treatment of their effluents.
- (vi) **Cross-subsidy.** Perhaps the most important, this is the subsidy provided by other water users to the urban poor to enable them to have equitable access to adequate and clean water. Ideally, this should be paid to the NWSC by the Government as a separate social subsidy; but as all water users enjoy some subsidies, it is reasonable to accept the concept of a cross-subsidy whereby the better-off users subsidize the poor.
- (vii) **Subsidy to a private operator to manage the water supply.** This is expected to be eliminated after the first three years of the lease contract when sufficient revenues from tariffs should be generated to cover these costs.

5. Economic Internal Rate of Return

20. For the economic evaluation of the Project, costs with the Project less costs without the Project, have been taken as \$322 million and a standard conversion factor of 0.9 applied. Incremental operation and maintenance costs are considered to be 1 percent of the Melamchi costs plus \$0.04/m³ of water produced. Economic benefits are evaluated using the demand curves and associated income and price parameters to calculate nonincremental and incremental benefits for each year. To the extent that the consumer recognizes the benefits and this is reflected in the price paid for water, the approach internalizes the benefits associated with health, welfare, and convenience. It shows benefits of around NRs1500 million per year in the first years after the Project is commissioned. The benefits then increase to about NRs6000 million per year from 2020.

21. The economic internal rate of return (EIRR) for the Project is 13.5 percent. The EIRR for the Project at full development is 15.3 percent. The total cost of the Project is high because of the need to provide a sound basis for expansion in the future. Much of the costs now will reduce future expansion costs. Sensitivity analysis of the EIRR shows that it is sensitive to the level of tariff. If real tariff levels remain unchanged, the EIRR would be 8.9 percent. If water loss remains at 40 percent, the EIRR would be 10.1 percent. If real income growth were to be only 1 percent per year, the EIRR would be 11.9 percent. Due to the price elasticity of demand, increasing the nondomestic tariff by 50 percent lowers the EIRR to 12.9 percent. If capital costs are 10 percent higher than estimated, the EIRR will fall to 12.6 percent. The EIRR is not sensitive to delays in implementation. The detailed economic analysis is set out in Supplementary Appendix B.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Actions	Beneficial Impacts	Adverse Impacts	Mitigation Measures
1. Extraction of water from Melamchi Khola via diversion weir	<ul style="list-style-type: none"> • Eliminates current groundwater mining, which if continued would cause land subsidence • Enables 24-hour potable piped water to all in Kathmandu Valley (KV) 	<ul style="list-style-type: none"> • 45% of residual flow left in river during worst month of dry season • Diversion weir will marginally affect fish population. Residual flows downstream will be adequate to maintain habitats suitable for fish breeding. River fisheries are already overexploited. 	<ul style="list-style-type: none"> • No inundated area involved due to steep river gradient • Existing demands of water for irrigation, water mills, and domestic use can be met in the dry season. • Water extraction volume will be controlled, and water will be used for water supply purposes only. • Social uplift program will be implemented in Melamchi Valley during construction and maintained permanently through a royalty payment from the KV consumers. • Permanent river water use and fisheries management program
2. Construction of access roads to tunnel	<ul style="list-style-type: none"> • Provides access to markets for Melamchi Valley inhabitants 	<ul style="list-style-type: none"> • Slope stability endangered • Resettlement needed • Trees to be cut down • Construction noise and pollution • Requires permanent maintenance 	<ul style="list-style-type: none"> • Balanced cut and fill design; spoil will be compacted and stabilized by planting; upslope and downslope gabions will be used; careful attention will be paid to drainage • Compensation will be paid • Replacement trees will be planted • Limited construction hours and watering of dust-prone areas • Royalty from KV consumers will pay for road maintenance
3. Disposal of spoil from tunnel excavation	<ul style="list-style-type: none"> • Rock available from excavation can be crushed to make aggregate for use in KV 	<ul style="list-style-type: none"> • Unstable spoil slopes will endanger human and ecological life • Pollution of river by erosion • Visual scar for trekkers • Use of arable land 	<ul style="list-style-type: none"> • Preparation of spoil site to affect stable foundation on stable geology • Compaction of spoil and effective drainage of spoil site • Landscaping of completed site • Site selection of barren land where feasible
4. Construction of 33KV transmission main	<ul style="list-style-type: none"> • Will serve as permanent electrification for the inhabitants of Melamchi Valley as well as for construction 	<ul style="list-style-type: none"> • Visual pollution in the countryside 	Nil
5. Use of explosives in construction	<ul style="list-style-type: none"> • Main means of tunnel excavation 	<ul style="list-style-type: none"> • May be used for insurgency or for dynamiting fish • People may be accidentally injured or killed 	<ul style="list-style-type: none"> • 24-hour security will be provided to the storage bunker and cradle to grave accounting for all explosives • Training of tunnel workers

Actions	Beneficial Impacts	Adverse Impacts	Mitigation Measures
6. Establishment of construction camps	<ul style="list-style-type: none"> • Employment of local labor • Income from sale of agriculture products 	<ul style="list-style-type: none"> • Security problem including prostitution • Disturbance of community life • Local resources over-taxed 	<ul style="list-style-type: none"> • Social uplift program • Constant collaboration with leaders of affected communities including their involvement in project management
7. Construction near parks and reserves	Nil	<ul style="list-style-type: none"> • Potential damage to protected ecological region • Potential for illegal wildlife hunting 	<ul style="list-style-type: none"> • Minimized during design by elimination of the hydropower component • Control of contractor workforce • Liaison with wardens
8. Construction of tunnel	<ul style="list-style-type: none"> • Major local employment 	<ul style="list-style-type: none"> • May dry up springs used by farmers • Workers may be injured or killed in construction accidents 	<ul style="list-style-type: none"> • Lining of tunnel to prevent infiltration at key locations; compensation where necessary • Permanent safety officer
9. Construction of water treatment plant	<ul style="list-style-type: none"> • Provides potable piped water to KV • Provides permanent employment 	<ul style="list-style-type: none"> • Land acquisition and resettlement • Tree cutting • Permanent noise • Construction spoil runoff to river • Danger to wildlife in Shivapuri Watershed and Wildlife Reserve. • Sludge disposal 	<ul style="list-style-type: none"> • Compensation • Landscaping with large boundary trees • Riverbank buffer zone tree planting and contractor controls • Fenced enclosures of transformers and ring enclosures of power poles • Drying of sludge before use in reclamation and landfill
10. Construction of bulk distribution	<ul style="list-style-type: none"> • Distributes water equitably around KV • Provides temporary employment 	<ul style="list-style-type: none"> • Land acquisition and resettlement • Tree cutting • Construction noise and pollution • Temporary lack of access to properties 	<ul style="list-style-type: none"> • Compensation • Replacement of trees • Restricted construction hours and watering of dust-prone areas • Liaison with property owners and public relations program
11. Construction of wastewater improvements	<ul style="list-style-type: none"> • Will improve sanitary environment in KV • Public toilets will provide convenience 	<ul style="list-style-type: none"> • Land acquisition and resettlement • May be inadequate to cope with all the extra wastewater created when the new water supply is commissioned 	<ul style="list-style-type: none"> • Compensation • Further wastewater improvements are planned for 2007; meanwhile the effect of added wastewater will be closely monitored and interim improvements introduced if needed
12. Private sector management of water supply and sewerage in KV	<ul style="list-style-type: none"> • Increased efficiency in delivery of water supply and sanitation services • Increased capacity to implement water supply and sanitation development in KV 	<ul style="list-style-type: none"> • Loss of jobs for Nepal Water Supply Corporation (NWSC) employees • Higher tariffs perceived to be the result of private sector intervention 	<ul style="list-style-type: none"> • Options are being given to NWSC staff, including golden handshake, working for NWSC outside KV, and working for private sector management contractor • Regulatory body will monitor performance parameters and tariff; a public relations and public awareness program will be implemented this year

Actions	Beneficial Impacts	Adverse Impacts	Mitigation Measures
13. Increased water tariffs	<ul style="list-style-type: none"> • Is an effective demand management tool • Helps to ensure sustainable service • Should provide a better service 	<ul style="list-style-type: none"> • Willingness to pay and affordability are questioned • Urban poor may be vulnerable 	<ul style="list-style-type: none"> • Several surveys have shown that for the projected tariffs consumers are willing to pay and the tariffs are affordable; a public relations and public awareness program will help and increases will be staged • Special studies are currently being undertaken to see how some 20,000 very poor people living in KV can be given access to water supplies under the private sector contract

SOCIAL DIMENSIONS¹

A. Methodology

1. The Project's social assessment derives from many different sources. As part of project preparation, it comprises (i) resettlement census/surveys for the Melamchi diversion scheme main access road (i.e. Sindhupalchok District, 114 households, 1999), Mahankal water treatment plant area (56 affected households, 1999), and bulk distribution system (2000); (ii) socioeconomic surveys in Kathmandu Valley (128,000 households in 1996/97 and another 1,100 households in 1999); (iii) surveys, participatory rural appraisals, and public consultations in the Melamchi Valley; (iv) nongovernment organization (NGO) consultations in Melamchi and Kathmandu valleys; and (v) hygiene surveys (550 households) and PRA exercises (20 sites) in Kathmandu Valley. Major outside sources include a study on the water supply and sanitation services for the urban poor by the World Bank/United Nations Development Programme (UNDP) Water and Sanitation Program, and other statistics and studies.

B. Socioeconomic and Poverty Profiles of Project Impact Areas

1. Kathmandu Valley

2. **Demographic Profile.** Kathmandu Valley (500 square kilometer) with a population of 1.5 million comprises five municipalities, including the three major ones (i.e. Bhaktapur, Kathmandu, and Lalitpur). Its population grew by 2.4 times over the last two decades (5.0 percent per annum). The average household size is 7.1 with variation among municipalities (6.7 in Lalitpur and 8.3 in Bhaktapur). In terms of ethnicity/caste, the Newars are dominant (72 percent), followed by the Brahmins (13 percent), the Chhetris (8 percent), and many other groups. The Project will not adversely impact on a specific ethnic/caste group.

3. **Socioeconomic Profile.** The livelihood pattern in Kathmandu Valley is that of urban; 86 percent of the households are engaged in urban-based employment (31 percent employed, 55 percent self-employed) such as manufacturing, construction, commerce, transport, communication, finance, and other businesses. Only 10 percent work in agriculture. Most households have more than one income source. Access to health, education, services, and basic infrastructure is better than the national average, although overcrowding and poor maintenance and deterioration of facilities are widely observed.

4. **Poverty.** About 45 percent of the population in Nepal live below poverty line, using NRs4,400 per capita per annum as the poverty threshold. The country is ranked 144th among 174 countries in the UNDP's 1997 human development index, reflecting its low performance in the human development sector. Poverty incidence in Kathmandu Valley is unclear, but the most recent estimate shows around 12-15 percent (Water and Sanitation Program, 2000). Average income level also varies across municipalities; 41 percent of total households in Kathmandu municipality have monthly incomes of NRs12,000 and above, whereas only 22 percent of households in Bhaktapur municipality have this much income.

5. Kathmandu Valley has many pockets of poverty, mostly found in slums (established legal settlements), squatter settlements,² or rented accommodation. Of these, the poor living in the slums are generally low caste, while the squatter population tends to be more heterogeneous. Rental accommodation is occupied by a range of low-income groups such as day laborers, hawkers, and un/semiskilled factory workers. The poor usually live in small settlements scattered

¹ For project impacts, see the main text, paras. 123-125 and Appendix 10 (Summary Resettlement Plan).

² A 1996 survey by an NGO, Lumanti, found 47 squatter settlements with 1,783 households, 20 percent of which were headed by women.

around the valley, adjacent to higher-income settlements, and therefore, it is difficult to locate them, especially individual low-income renters. Street children are also a growing concern for their vulnerability.

2. Melamchi Valley

6. **Demographic Profile.** The Project's zone of impact in Melamchi Valley includes 14 village development committees (VDCs) in Sindhupalchok (79 VDCs altogether; 11 directly affected and three indirectly affected) and three VDCs in Kabhre Palanchok District (marginally indirectly affected). The population of the direct impact zone in Sindhupalchok District is about 40,000, with an average household size of 6.8 persons. The districtwide ethnic/caste composition is: Tamangs (33 percent) who are dominant in the hills, Chhetris (19 percent) and Brahmins (12 percent) who are dominant in the valleys and lowlands, Newars (12 percent), and others. Among them, the Tamangs (usually marginal landholders) and lower castes (usually landless) are economically disadvantaged.

7. **Poverty and Livelihood.** The poverty incidence of Sindhupalchok District is estimated to be 50-55 percent. The economy is predominantly rural, with 90 percent of the population engaged in farming and fishing activities, and 85 percent living at subsistence level. The average landholding size in the district is small at 0.62 ha, and the land fragmentation and the topography in the hills, combined with lack of access to agricultural inputs, extension, technology, credit, and markets, are impediments to improving agricultural productivity. In much of the Project zone of impact, there is a lack of basic educational facilities and teachers. The illiteracy rate in direct impact zone was 11 percent for males and 25 percent for females (NORPLAN, 1999). The health situation and sanitary condition in the zone of impact is poor, and malnutrition is common especially among women of reproductive age and children. Basic health facilities are lacking. Women are disproportionately affected by the daily hardship of poverty due to their multiple tasks in the domestic and productive arenas.

8. **Trafficking of girls.** Sindhupalchok District, especially Tamang communities, is historically known for trafficking of girls. The push factors are complex, encompassing the established recruitment syndicate over time, alleged backing by high-ranking officials and politicians, specific exotic appearance of certain ethnic groups favored by the market, poverty, cultural perceptions and low status of women, and lack of awareness by the communities. Over the last five years or so, assistance agencies and NGOs have made significant investments in antitrafficking activities. The results to date are mixed; while the level of community awareness appears to have been raised, the actual prosecution cases are still limited (about 5 percent). In addition, a number of NGOs are working in a poorly coordinated manner, though efforts are being made by the district development committee (DDC) Task Force to improve the situation.

C. Practices, Perceptions and Needs

1. Kathmandu Valley³

9. **Access to Water Supply.** The present water supply by the Nepal Water Supply Corporation (NWSC) shows that an average person in the valley receives only 40 percent of their potential demand in the dry season and 60 percent in the wet season. Currently, 86 percent of Kathmandu Valley population are the registered customers of NWSC-supplied water, through about 100,000 private connections and/or 1,300 community standposts; 76 percent have meters.

³ This section draws heavily from the Nippon Koei survey (1999). Analysis of the urban poor primarily draws upon: *Meeting the Water and Sanitation Needs of the Kathmandu Poor: Issues and Options for Service Delivery* (Water and Sanitation Program – South Asia, June 2000).

Among them, only one third of customers have fully plumbed household connections and most rely on a shared supply (i.e., yard tap and standpost). In the dry season many have to resort to expensive tankered supply. Moreover, 82 percent of the NWSC customers are dissatisfied with the current NWSC services, due to (i) insufficient quantity; (ii) poor quality; (iii) unreliability of supply, especially in the dry season (on average 2 hours per day, every other day); 35 out of 112 wards in the valley not having any NWSC water supply in the last two to three months of the dry season); and (iv) difficulties paying water bills (e.g., cumbersome procedures, long lines). However, 55 percent of survey respondents thought the cost was reasonable. Twenty percent took away the water meter, a sign of refusal to pay bills. Most (86 percent) NWSC customers also use diverse secondary sources, including (from the highest) tubewell/rowing pump, well, *Hiti* (traditional spring fed water spout), neighbor, water vendor, public standpipe, and others. The most common storage type is roof tank (52 percent), followed by pumped underground tank (34 percent), complemented by pots and buckets.

10. **Non-NWSC Water Supply.** Non-NWSC customers (14 percent of population) in general belong to lower income groups than the customers. Fifty-two percent claimed that they do not have access to enough water. The major water sources used by the noncustomers are similar to those by the customers, though reliance on public stand pipe is the highest (54 percent in the wet and 36 percent in the dry seasons). Water vending is not an option due to the high cost. For noncustomers, the frequency of water collection is four times a day on average.

11. **Poverty and Gender.** The most disadvantaged group in terms of access to water are the individual low-income renters, as they depend on their landlords for water services and are not supported by community services. On the other hand, poverty/income level *does* affect the pattern of water and sanitation management practices. Hardship in water management is more severe among the poorer households, and mostly among women who bear the predominant responsibilities of water collection, storage, and treatment. The average time spent on water collection in squatter and slum settlements in the same study was 58 minutes. NWSC water supply is often at odd hours (e.g., midnight to 3 a.m.), which could jeopardize women's safety; some cases of young women being attacked by local gangs while collecting water from the community taps have been reported.

12. **Hygiene and Sanitation.**⁴ Water-borne diseases due to the poor water quality are common in Kathmandu Valley, especially among children; diarrhea, stomach pain, dysentery, skin diseases, eye infections, hepatitis, malaria are widely observed. However, 90 percent of the population did not think they were frequently suffering from water-related disease, indicating a need for hygiene awareness raising. Water quality is worsened by contamination from polluted shallow groundwater and leaky distribution pipes. Seventy-two percent reported the practice of domestic water treatment but boiling was only 20 percent. Of those who did not use any treatment, 87 percent thought it unnecessary. The prevalence of latrines is low: according to United Nations Children's Fund (UNICEF) estimates: 16 percent in rural and 51 percent in urban Kathmandu Valley in 1996/97. The reasons for not having a toilet were costs, lack of space, no water, no sewer, and no perceived need. Among water users, only 27 percent are connected to the sewage system, most of which discharges straight into the Bagmati River. The valley has a limited capacity of sewage treatment. Drainage is poorly developed, which causes frequent flooding of septic tanks and other sanitation facilities. Kathmandu Valley's solid waste problem is well known. Of the households surveyed, 26 percent reported disposing of solid waste in the street. Much of it is also disposed of along river banks, contributing to water contamination. Hygiene is also poor; for example, 29 percent of survey respondents did not know that the poor water quality was harmful to health.

⁴ Mainly drawing from Hygiene Survey (Nippon Koei, 2000).

13. **Sanitation for the Poor.** Among the low-income communities, latrine coverage is increasing with the assistance of local authorities and NGOs, but toilets tend to be unhygienic especially in squatter settlements. Where pay-and-use toilets are found, they are relatively well functioning and maintained. Solid waste disposal is a great concern, though there is a case for community-based service functioning on a user payment basis. Drainage is a major problem in many low-income settlements. With NGO support, there are also cases of savings and credit, providing potential for user investment in sanitation infrastructure upgrading. As in water management, hygiene management is also considered a primary responsibility for women.

14. **Water Supply.** Results from various surveys and studies indicate strong needs and demands among the current NWSC customers for better water services with more quantity, better quality, more reliability (i.e., every day, whole day supply) and user-friendliness (e.g., methods of payment, service agents' attitudes). Among the non-NWSC customers, 63 percent responded that they would like to be registered with NWSC. The reasons for not registering include availability of other water sources, costs, poor service of NWSC, and no water distribution pipe. In general, NWSC does not project a good corporate image among customers and noncustomers. A high interest in the formation of water user committees was expressed (83 percent).

15. **Willingness to Pay.** About 82 percent of all respondents (both customers and noncustomers of NWSC service) showed willingness to pay more, on average NRs167 per month, ranging from NRs93 per month (for the income group below NRs3,999 per month) to NRs229 per month (for the income group above NRs12,000 per month), on condition that they are given sufficient information on what the supply will be like. The willingness to pay for public standpipes was much lower at 43 percent.

16. **Hygiene and Sanitation.** Both the awareness and practice of basic hygiene were low; these influence and are influenced by the inadequacy of sanitation-related infrastructure and systems (e.g., latrines, drainage, sewage, solid waste management) and weak commitment and consensus by the public administration on the investment in such infrastructure/service improvement. However, experience elsewhere shows that beneficiaries, including the poor, have the capacity of maximizing the benefits of improved infrastructure and services, if they are provided with intensive awareness raising support involving not only public campaigns but also community-based participatory learning. Nevertheless, awareness raising is only effective if it goes with the actual improvement of water supply and sanitation services.

2. Perceptions and Needs of the Melamchi Valley

17. In general, Melamchi Valley will be an environmentally (e.g., reduced water for irrigation and domestic use, noise and pollution by the construction, negative impact on biological environment) and socially (e.g., resettlement and land acquisition, potential conflict with incoming outsiders) adversely affected area by the Project, although improved infrastructure (e.g. access roads) and the expanded local markets with the incoming construction and other workers will also benefit its population.

18. From the early stage of project conceptualization, the local communities and leaders have raised concerns of such adverse impacts. A series of public consultations and NGO consultation workshops have taken place to identify the perceptions and needs of Melamchi Valley communities and explore ways to transform the mitigation measures into sustainable development opportunities. A major concern of the communities is not the project design itself but the Government's commitment to deliver, including the compensation and mitigation packages. Affected communities of the valley wish to see tangible service delivery and the Government's

physical presence (instead of consultants) in the affected areas so they can confirm the Government's sincerity and commitment. Therefore, the Project identified the importance of (i) sequencing assistance (i.e., simple physical assistance such as school rehabilitation first, under the social uplift program [SUP]); (ii) starting the land acquisition/compensation process without delays; and (iii) ensuring Melamchi Water Supply Development Board (MWSDB) representation in all consensus building meetings.

D. Social and Poverty Strategy

19. **Resettlement Action Plan and Social Uplift Program.** Social mitigation and rehabilitation measures will be implemented under the RAP and the SUP. The SUP will include development activities for the Melamchi Valley covering five areas: buffer zone development, rural electrification, health, education, and income generation/community development. Women's special needs for reproductive health, adult literacy, skills development and income generation, legal awareness raising, and antitrafficking of women and girls will also be addressed. To ensure ownership and sustainability, the SUP will (i) take a participatory approach through community mobilizers; (ii) utilize the institutional structure of the ongoing Local Governance Program whereby capacity building for DDC and VDCs will be conducted through the programs, assisted by experts; and (iii) be run by the levy paid by Kathmandu Valley water users in the postconstruction stage.

20. **Stakeholder Participation.** The Project has been prepared with extensive participation of stakeholders from all sides, including beneficiaries, adversely affected people, VDC and ward representatives, DDC/municipality officials and representatives, concerned ministries and MWSDB, NGOs, the private sector, financing agencies, and consultants. The Project will address direct participation of beneficiaries through (i) the SUP implementation (through community groups); (ii) representation of adversely affected people in the compensation determination committee; (iii) representation of Kathmandu Valley beneficiaries in final environmental impact assessment stakeholder meeting; (iv) water user groups and forest user groups in both valleys; and (v) implementation of the hygiene education and promotion program.

21. **Consensus Building.** Consensus building is necessary at all levels, especially at the start of the Project. Key issues for consensus building include: the amount of the water levy, access to water (e.g., quantity, distribution), water tariff, private sector management, environmental and social mitigation, compensation, and employment. A dispute resolution expert, to be assisted by PMU and other project staff, consultants and NGOs, will be hired to facilitate this process. For adversely impacted communities, local consultative groups will be established in each affected VDC. The signing of a memorandum of understanding between the affected VDCs and the Project will be a condition for the civil works contract award.

23. **NGO Participation Plan.** An NGO participation plan was developed in close consultation with NGOs working in the Melamchi and Kathmandu valleys. NGOs will act as facilitators to strengthen the capacity of local government bodies by implementing the SUP, hygiene awareness raising in Kathmandu Valley, and project monitoring and evaluation. An inventory of 56 NGOs has been made and the selection criteria developed. Independently from the NGO participation plan, a third party will be contracted to undertake external monitoring for the resettlement and compensation activities.

24. **Employment Strategy.** Based on the consultations and review of existing studies, it was decided that setting a quota for local employment for construction works would be very difficult, due to the contractors' unwillingness because of the higher wages demanded by the local laborers and their unavailability throughout the year (because of agricultural and other demands). However, people severely affected by the Project and the identified vulnerable groups will have highest priority access to such employment opportunities, as part of their entitlement.

25. **Hygiene Education and Promotion Program (HEPP).** The program was developed based on the survey, PRAs, and a good practice model in urban Nepal (e.g., Pokhara, Bhaktapur). Comprehensive hygiene awareness raising activities will be conducted in two phases: a pilot phase (10 sites for one year) and a full-fledged stage (valley-wide for two years).

26. **Water Supply and Sanitation for the Poor.** Under the private sector lease contract, various targeted mechanisms are currently proposed on financial (e.g., affordable user charge, equitable tariff structure), institutional (e.g., NGO support, user groups), and technical (e.g., better access to piped water, appropriate technology, easy maintenance) aspects. Discussions with stakeholders will determine specific approaches taken by the Project. These include the formation of a low-income customer service and education unit.

27. **Public Relations.** The Project will launch a proactive public relations campaign, given the Project's high profile and potential public concerns that could jeopardize project implementation. The campaign will (i) inform the beneficiaries and affected people about the Project to counter misinformation; (ii) develop public support for the Project; (iii) identify any potential conflict area at an early stage (to feed into the consensus building activities); (iv) assist in problem solving between the Project and local communities; and (v) manage public expectation on compensation and the SUP. A web site will be developed and maintained.

28. **Training.** Various training activities for the project staff, Ministry of Physical Planning and Works, and beneficiaries are proposed under the Project. In addition to a number of women-specific training courses, joint (i.e., men and women) training courses will target at least 40 percent women's participation. Gender training will be conducted for the project staff, given the prominent role played by women in water supply and sanitation. The SUP will include relevant training, including hygiene education. Contractors will be required to provide both operating manuals and suitable training to the operators of the plant and equipment provided under their contract. Consultants will be required to provide both structured and on-the-job training to their government counterpart staff.

29. **Implementation Arrangements.** To coordinate activities to ensure that the project components are implemented adequately and appropriately and address social concerns, an environment and social development division will be established in the project management unit (PMU) assisted by various consultants. For community-based activities, NGOs will be mobilized to assist local government agencies with implementation. NGO activities in the Melamchi Valley will be managed by the SUP implementation team, to be supervised by the PMU. The panel of experts will also include a social expert.

30. **Social Monitoring and Evaluation.** NGOs will be mobilized to monitor the progress of community-based activities. Benefit monitoring and evaluation indicators will be gender-disaggregated wherever possible, and also include the poverty reduction impact of the SUP and the water services for the poor in Kathmandu Valley. Resettlement monitoring will be conducted both internally (by the Project) and externally (third party). Monitoring of the public relations and consensus building activities will be by the MWSDB and PMU and the panel of experts.