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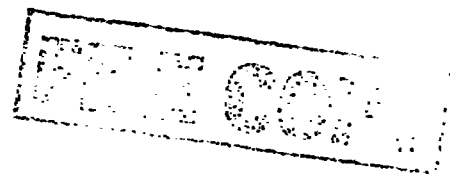
PROPINSI JAWA TIMUR  
PEMERINTAH DAERAH TINGKAT II  
KOTAMADYA SURABAYA



E134

# IUIDP

"SURABAYA  
URBAN  
DEVELOPMENT  
PROJECT"



# SURABAYA

Preparation of Integrated Urban Infrastructure  
Development Project in Surabaya Municipality

## ENVIRONMENTAL ASSESSMENT SUMMARY - WORLD BANK FORMAT



P.T. INDULEXCO  
in association with  
MOTT MACDONALD INTERNATIONAL  
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OCTOBER 1992

**SURABAYA URBAN DEVELOPMENT PROJECT**

**ENVIRONMENTAL ASSESSMENT SUMMARY**

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**Surabaya Urban Development Project (SUDP)**  
**Environmental Assessment Summary - World Bank Format**

**1. Introduction**

**1.1 Key Parties**

The Executing Agency for this project is the Directorate General of Human Settlements, Public Works Department. At central government level, it is assisted by the Directorate General of Highways, the Directorate General of Water Resources, the Directorate General of Land Transport and the Department of Home Affairs. The finance of the project is executed through the Department of Finance.

The Principal Implementing Agency is the Municipality of Surabaya (KMS). The City Water Company (PDAM) is the project implementing unit (PIU) for the water supply.

The Co-Financers of the project are the World Bank and the Overseas Economic Cooperation Fund.

**1.2 Policy and Administration**

The basic provisions of environmental management are formulated within Act No. 4 of 1982 which requires any proposed project which is likely to have a significant impact on the environment to be accompanied by an environmental impact assessment. There are sixteen subsequent regulations, decrees and guidelines relating to the environmental process for a project of this nature issued by the Minister for Population and Environment, the Minister of Public Works, the Governor of East Java and the Mayor of Surabaya.

The preliminary environmental examination (PIL) initiated in June 1990 and approved by the Vice Governor of East Java on October 30, 1990 recommended that an environmental impact assessment (ANDAL) be prepared for the Urban Roads, Drainage, Solid Waste and Sanitation components as well as environmental management and monitoring plans (RKL/RPL) for all components including water supply. Studies for the ANDAL were conducted from March 1991 to February 1992.

The ANDAL for all components was issued in April 1992 in English and in October 1992 in Bahasa Indonesia.

The RKL/RPL for Water Supply was issued in both languages in September 1991 and for the other components in May 1992 in English and in October 1992 in Bahasa Indonesia. The RKL/RPL is supplemented by a Compensation and Resettlement Plan issued in October 1992.

The documents were issued to the World Bank in July 1992. The East Java Regional Commission for the environment (KOMDA) are scheduled to review the documents in October 1992. It has been agreed that KOMDA are responsible for approval, with the National Commission invited to attend evaluation procedures as appropriate.

## 2. Project Description

The project is for integrated urban infrastructure development and environmental improvement in Surabaya and includes all expenditure in Surabaya for the next six years on urban roads and transport, urban drainage, water supply, solid waste management, sanitation and kampung improvement. It also includes improvements in urban management by institutional and human resources development, in financial management, in community participation and in land management, as well as technical assistance and training.

The list of components is:

- 200 km of new and improved urban roads
- 5 No traffic management schemes
  
- 92 km rehabilitated water pipelines
- 1020 km water distribution pipelines
- 146000 water connections
- 72 km transmission and primary water pipelines
- 2 pump stations and reservoirs
- Water leakage programme and computer systems upgrade
  
- 143 km of new and improved drains
  
- 197 new or rehabilitated solid waste depots or transfer sites
- 27 container trucks + 336 containers
- 14 compactor trucks + 1033 waste bins
- 350 hand carts for solid waste
- 11 new or overhauled landfill equipment
  
- 47 km of new sewers or pump mains
- 6200 house connections
- 2 pump stations
- 1 sewage treatment (Stabilisation pond) plant
- 1 septage treatment (digestion) plant + 4 No sludge vehicles
  
- 1200 ha of improved kampung
- 30000 septic tanks or pit latrines
- 15000 kitchen and bathroom improvements
- 110000 improved land certificate holdings in kampung areas
- 200000 building permits in kampung areas
  
- Community development programmes in at least 72 kampungs to encourage community participation in development, develop the role of women and small scale business ventures and improve awareness of health and welfare issues.
  
- Improved operation and maintenance for roads, drainage, water supply, solid waste and sanitation.
  
- Human resource development to strengthen KMS and PDAM.
  
- Training for 3000 government officials and 24000 community officials and inhabitants.

- Technical assistance for urban management, design and supervision, operation and maintenance, master planning, human resource development and training, revenue improvement, land management, community development and transport management.
- Environmental monitoring and management to ensure that project mitigations are carried out especially resettlement of persons displaced by roads and drains, monitoring of nearby wetlands and loss of irrigated areas.

The roads and drainage improvements directly affect 7185 properties by land acquisition and 2952 of these must be relocated. The road and transport components will improve access to and within the city, improve safety, pedestrian access and public transport. The drainage will provide flood free areas.

The water supply component will provide potable water to an additional 146000 properties.

The roads and drainage improvements will enable development close to coastal wet lands but not on the wetlands.

The drainage improvements will convert irrigation channels and cause irrigation to cease, a process which has been occurring rapidly as the city develops, but until now with already developed areas subject to regular flooding whilst the remaining irrigation continues.

The solid waste management and sanitation components will improve the environment in these sectors increasing solid waste collection to 90% coverage, introducing controlled landfill procedures and improving sanitation for 250000 people.

The proposed implementation schedule is shown on Figure 1.

### 3. Baseline Data.

#### 3.1 Location

The area is the Municipality of Surabaya which lies between latitude  $7^{\circ} 12'$  and  $7^{\circ} 21'$  South and between longitude  $112^{\circ} 36'$  and  $112^{\circ} 54'$  East.

The municipality is a lowland plain, 3 to 6 m above sea level, with two gently sloping hills in the south west rising up to 50 m above sea level. The whole municipality is 290.4 square kilometres. See Figure 2 for the intensively observed ecological borders of the project.

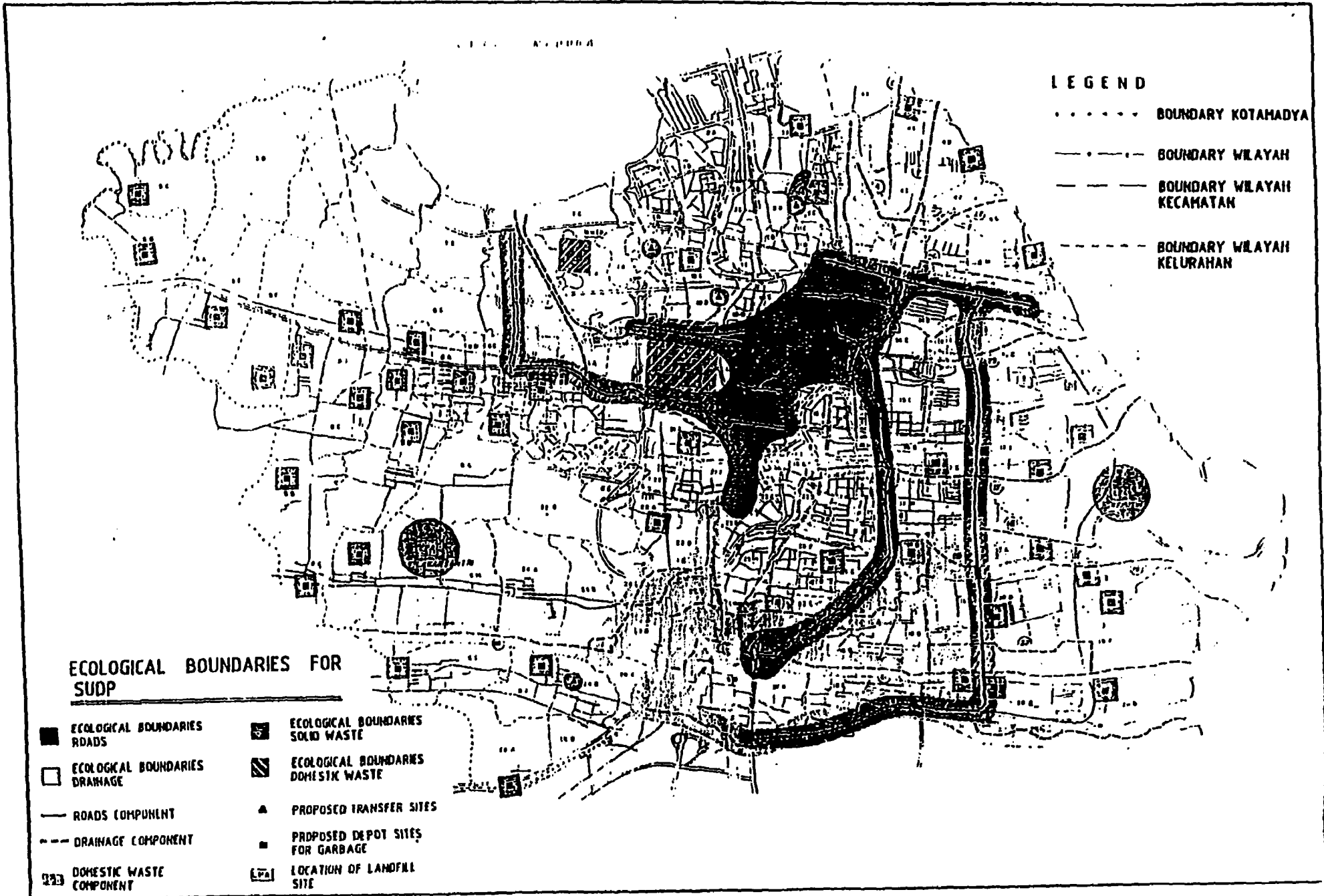
#### 3.2 Climate

The area enjoys a tropical climate with a wet season from November to April, May transitional, and a dry season from June to October. Rainfall is about 1860 mm per year with about 25 mm/month in the dry season peaking to 350 mm per month during January and February. Humidity is between 63 and 85%. Air quality is generally good and there is no major noise pollution.

Surabaya Urban Development Project - Implementation Programme - Figure 1

	93/4	94/5	95/6	96/7	97/8	98/9
<b>Urban Roads</b>						
Eastern Ring Road						
Jl. Kenjeran						
Jl. Banyu Urip						
Inner Ring Road						
Traffic Management						
<b>Other Roads</b>						
<b>Drainage</b>						
Stage 1						
Stage 2						
Stage 3						
Stage 4 Morokrembangan						
Stage 5 Rungkut						
Stage 6						
Other Drains						
Central Funded Drains						
<b>Solid Waste</b>						
Buildings						
Containers Trucks Bins						
Disposal sites						
<b>Human Waste</b>						
<b>MCK</b>						
Sludge Collection & Treatment						
Sewerage Pilot Project						
<b>Kampung Improvement</b>						
All aspects						
<b>Water Supply</b>						
Wonocolo - P.Gede Transmission						
North Link Main						
West Ring Main						
East Ring Main						
Secondary & Tertiary						
Rehabilitation						
Pump Station & Structures						
<b>Human Resources &amp; Training</b>						
All aspects						
<b>Technical Assistance</b>						
All assignments						

# ECOLOGICAL BOUNDARIES



### 3.3 Geology

The low land plain is alluvial soil consisting of clay, sandy clay and sand covered shell. The hilly areas are formed from old alluvial soil also consisting of clays and sand.

### 3.4 Hydrology

Kali Surabaya flows to the north and divides into two, namely Kali Wonokromo which flows to the east and Kali Mas which continues to the north. Kali Surabaya has a flow between 20 m<sup>3</sup>/s and 370 m<sup>3</sup>/s at Mirip Outfall. At Gunungsari Dam, the water surface can be kept up to 4.7 m above sea level to divert flow to Gresik and West Surabaya but as Gunungsari channel has insufficient fall there has been zero flow diverted for several years. There are also dams at Ngagel to divert water to the water treatment works, and at Gubeng to retain water for flushing and local irrigation.

The land east of Kali Mas and Kali Surabaya drains directly to the east coast via many parallel drains. The land south of the hills drains to K. Kedurus and into K. Surabaya. The land north of the hills drains directly to the north coast. Consequently the catchment for the K. Mas is very narrow.

Generally soils have very low permeability, about  $5 \times 10^{-4}$  cm/sec and wells have very limited capacity. Groundwater is about 3 to 8 m and 0.5 to 3 m below ground level in the dry and wet season respectively.

Water quality of the rivers and groundwater is very poor with heavy pollution from human waste.

### 3.5 Biology

a. Flora: Most of Surabaya is an artificial ecosystem consisting of housing, industry, warehousing, ricefields, upland fields and fish ponds. Only a small strip (1 to 30 m wide) is natural mangrove swamp along the north and east coast. There are 42 sq km of rice fields, 25 sq km of which is rain fed and many of the designated irrigated areas cannot receive irrigation water at any time. The reported crop (1989) for rice is 26000 tonnes per year. Secondary crops such as maize and cassava give over 700 tonnes per year. Vegetables and fruit are also produced. Most animals are domestic.

b. Fauna: Several types of wild birds occupy the coastal wetlands, resting in the mangrove at night. Seven species are protected. Fishing occurs at sea and in fish ponds producing 4585 tonnes and 5132 tonnes respectively. Fishing in fresh and general waters is minimal.

### 3.6 Socio economic

Most people are employed in merchandising, hotels and restaurants (33%) and many in social services (27%). Manufacturing and Industry (21%) and transport (10%) are the other major sectors.



Surabaya people are relatively healthy, the most common diseases being diarrhoea and skin diseases.

The 1990 population was 2.6 million, 51% of which were female. The most populous age range is 20 to 24 years old.

The people directly affected by the project have been identified and are as shown in Table 1.

The future trend without the project would lead to the economic stagnation of Surabaya. The trend for many years has been for urban infrastructure expenditure to increase but still it has not caught up with demand. Roads and transport expenditure at this stage is considered vital to avoid future major congestion being experienced by other cities. Flooding is a major problem in Surabaya and improvements are long overdue. Water supply is also a major problem which is holding back development in many parts of the city. Solid waste expenditure is a continuation of major improvements made in the past few years and the sewerage pilot project enables a start to be made to reduce pollution from the city centre. The kampung improvement programme will build on the successes of the past twenty years involving the community even more and improving sanitation and land rights.

#### 4. Impacts

##### 4.1 Urban Roads

The urban road and transport improvements will improve access to and within the city, improve public transport facilities, decrease through traffic, improve traffic management and improve freight transport. It will improve safety, improve the pedestrian environment and guide sound land use. Other benefits include improved operation and maintenance and work opportunities.

Major adverse impacts include the resettlement necessary due to land acquisition, the problems during construction in existing narrow roads for traffic and the possibility of road construction encouraging development in adjacent or nearby wetlands. These are discussed below.

Other possible adverse impacts studied were extraction of sand and gravel for construction, loss of green verge areas, changes in air quality and noise, and the possibility of new roads causing changes to drainage patterns. These were evaluated and found not to be major problems for this project.

##### 4.1.1 Land Acquisition for the Roads

By far the greatest adverse impact is caused by the land acquisition. Full surveys have been carried out to calculate the scale of the impact. A complete (100%) enumeration of each property affected was implemented during 1991. Each property has a one page survey sheet. The results were logged and analysed and are summarised in Table 2.

**Table 1  
People Directly Affected by the Project**

<b>Component</b>	<b>Beneficially Affected</b>	<b>Adversely Affected</b>
<b>Roads</b>	<ul style="list-style-type: none"> <li>- The Whole population will benefit from the improved road and transport system.</li> </ul>	<ul style="list-style-type: none"> <li>- 8080 family members and 5728 servants, workers and others in 2471 properties must resettle as their property will be demolished.</li> <li>- 8201 family members and 13300 servants, workers and others in 2549 properties must move back on their property as the property will be partially demolished.</li> </ul>
<b>Drainage</b>	<ul style="list-style-type: none"> <li>- 154725 people benefit in the currently flooding areas and 2 million benefit within the catchment areas. Most of the people in flooding areas are low income.</li> </ul>	<ul style="list-style-type: none"> <li>- 1813 family members and 785 servants, workers and others in 481 properties must resettle as their property will be demolished.</li> <li>- 7076 family members and 7489 servants, workers and others in 1684 properties must move back on their property as their property will be partially demolished.</li> <li>- 510 ha of ricefield will change to rain fed or non gravity fed irrigation.</li> </ul>
<b>Water Supply</b>	<ul style="list-style-type: none"> <li>- Over 700000 people of all incomes in 146000 properties will be connected to city water.</li> </ul>	<ul style="list-style-type: none"> <li>- Possible minor interruptions to various people will occur during construction.</li> </ul>
<b>Solid Waste</b>	<ul style="list-style-type: none"> <li>- Over 470000 people will have improved service. 170000 of these are low income.</li> </ul>	<ul style="list-style-type: none"> <li>- The people near 77 new transfer stations/depots may suffer nuisance if operations and management are insufficient. About 1000 people will be affected.</li> </ul>
<b>Human Waste</b>	<ul style="list-style-type: none"> <li>- Over 55000 people equivalent will be connected to the new sewerage system.</li> <li>- 200000 people will have improved septic tank emptying and sludge treatment.</li> </ul>	<ul style="list-style-type: none"> <li>- No one is adversely affected except for minor interruptions during construction.</li> </ul>
<b>Kampung Improvement</b>	<ul style="list-style-type: none"> <li>- Over 600000 people will have improved living conditions, land holding and community participation.</li> </ul>	<ul style="list-style-type: none"> <li>- There is nuisance during construction only.</li> </ul>
<b>Training</b>	<ul style="list-style-type: none"> <li>- Over 3000 officials and 24000 inhabitants will receive training.</li> </ul>	<ul style="list-style-type: none"> <li>- No one is adversely affected.</li> </ul>

**Table 2  
Roads Land Acquisition and Resettlement**

Property	Number of		
	Properties	Family Members	Servants Workers Others
1. Completely Demolished (Must resettle)	2471	8080	5728
2. Partially Demolished (can move back)	2549	8201	13399
<b>Total</b>	<b>5020</b>	<b>16281</b>	<b>19127</b>
		<b>35408</b>	

A further 5% questionnaire (five pages) was also carried out to ascertain peoples circumstances and attitudes to resettlement. Most people accept that the project is necessary and prefer fair monetary compensation for their properties.

**4.1.2 Traffic Disruption during Construction**

There are four locations in the city where vehicles will be unable to pass during construction and several roads where traffic will only be able to pass with difficulty. For most there are alternative routes but one road at Jl. Karang Tembok has no viable alternative and will cause problems unless special measures (night work) are taken to allow traffic to get through.

**4.1.3 Possibility of Change of Use or Partial Loss of Wetlands due to proximity of Eastern Middle Ring Road**

The Eastern Middle Ring Road together with improvements to water supply and drainage will enable development to proceed on the east side of the city up to the sea dyke. This in turn may encourage further development in the wetlands outside the sea dyke. The wetlands are already non natural having been developed for fish ponds and salt pans except for small coastal areas of mangrove. The further development of the wet lands in due course is probably inevitable. What must be done is to guide the development to ensure suitable land use and to retain what mangrove there is left.

**4.2 Drainage**

The drainage improvements will provide flood free areas for existing developments and for future development. There will be reduced losses caused by flood damage together with improved health and living conditions.

Major adverse impacts include the resettlement due to land acquisition, although not on such a large scale as the roads, and the loss of irrigation water where channels are to be converted to drains.

Other impacts which were anticipated could be major, but were not, include the effect on the downstream wetlands and the possibility of excavation and disposal of toxic sediments from existing drains which are to be deepened. All these impacts are summarised below.

Other possible adverse impacts studied were traffic interruptions during construction, changes in air quality and noise, disturbance to other utilities, erosion, disposal of spoil and loss of some greenery. These were evaluated and found to be not major problems for this project.

#### 4.2.1 Land Acquisition for the Drainage

This was studied in the same way as for the roads. The people affected by the drainage are summarised in Table 3.

**Table 3**  
**Drainage Land Acquisition and Resettlement**

Property	Number of		
	Properties	Family Members	Servants Workers Others
1. Completely Demolished (Must resettle)	481	1813	765
2. Partially Demolished (can move back)	1684	7076	7469
Total	2165	8889	8234
			17123

#### 4.2.2 Loss of Irrigation

The loss of irrigation is occurring rapidly due to urbanisation without the project. The subsequent developments are then subject to flooding as insufficient drainage is available. Much of the land designated as irrigated is also not actually receiving irrigation water. Nevertheless some still is irrigated and this is what will be lost when conversion takes place.

Conversion is the only economic solution to provide drainage as the corridors are the only ones available. It is estimated that all the irrigation will disappear even without the project within ten years and the project will only speed up the process slightly.

Most of the owners of the ricefields will benefit as they will be able to sell their land for development. However the rice farmers will lose their livelihood during the dry season only as they will be able to operate the fields as rainfed. Also downstream users may still be able to obtain gravity fed water if tide gates are kept closed during the dry season and the water is backed up. Upstream users will only be able to continue to irrigate by using hand or mechanical pumping.

#### 4.2.3 Downstream Wetlands

There will be no change to downstream wetlands as tidegates will be uprated but not moved. Concerns about the wetlands have led the project to design unlined channels through the wetlands and to ensure that watergates to ponds are left undisturbed or replaced.

#### 4.2.4 Possibility of Toxic Sediments

Testing of sediments in existing channels showed that there are no major concentrations of toxic substances. Only one high reading of DDT was found but not upstream or downstream of that reading. DDT has been banned in Indonesia for several years.

#### 4.3 Water Supply

No major adverse impacts occur due to the water supply component. There is a major beneficial impact in that water supplies to the city will almost double.

Other impacts considered and evaluated were interruption to water supplies, and other utilities, access restriction, traffic disturbance, safety hazards, destruction of vegetation, instability of structures, waterway flows and quality, and reduction of urban amenity. The evaluation showed that the water supply component has a very limited potential to affect the environment.

#### 4.4 Solid Waste

The solid waste improvements will improve collection, transfer and transport systems and upgrade disposal to controlled landfill through improved operation and management. Solid waste is under further study by JICA.

Significant impacts will be at Keputih and Kenjeran Beach landfills and at the transfer site/depot locations. No major leachate problems have been identified but this is being studied further by JICA as is long term capacity of the landfills and the need for new sites.

Recycling is at a high level and will be encouraged to continue.

##### 4.4.1 Keputih Landfill

Upgrading to controlled landfill as proposed by the project is urgently needed to minimise smell, smoke and rodent nuisance to adjacent areas.

#### 4.4.2 Kenjeran Beach

This landfill is causing pollution to the sea and is too close to a designated recreation area. It is not controlled by Kotamadya Surabaya as it is a private operation.

#### 4.4.3 Transfer Stations and Depots

If the new transfer stations and depots are not well managed, nearby homes will be affected with smells, dust and litter.

#### 4.5 Sanitation and Sewerage

The only significant adverse impact is disturbance to people and traffic during construction of the sewerage network.

Other aspects studied were all concluded to be positive except for the possibility of smell at the treatment works and pump stations. The treatment works is to be located at Tandes well away from residential areas and the pump stations will be designed to minimise smells.

#### 4.6 Kampung Improvement (KIP)

There is disturbance during construction of KIP when house fronts are demolished and moved back but otherwise there are no adverse impacts.

### 5. Analysis of Alternatives

#### 5.1 Urban Roads and Transport

Full studies of roads and transport requirements have been made. The locations of improved roads and new roads have been selected by checking traffic demands and road capacities using a computer model. Upgrading of roads will follow an approved road grid layout of arterial, collector and local roads designed to achieve the objectives of the project. The project forms part of the city transport strategy.

#### 5.2 Drainage

The drainage proposals are part of the drainage master plan. Most of the proposed drainage channels are on existing drainage alignments or are conversions of irrigation channels and will be at suitable levels to collect stormwater from adjacent land and there are no economic alternative alignments.

New channels in Kali Simo/Tandes area have been located to enable stormwater to be drained quickly and efficiently. The channels are located to coordinate with planning of adjacent land.

Benefits for each channel have been evaluated and the economic internal rate of return calculated. These are in the range 31% to 165%.

Additionally for each sub-project, the percentage of land value increase has been calculated in order to achieve an internal rate of return of 10% (and 15% and 20%). The land value increases required are in the range of 1.7% to 12%. These figures show that all the projects are economically viable as experience shows that the ratio of the value of well drained land to flooded land is well above the maximum value required.

### 5.3 Solid Waste

The locations of the landfill sites are existing and will be used to their maximum capacity. A new site is planned at Benowo. Additional studies will be required before this is brought on stream. These are on going funded by JICA.

The locations of the new transfer stations and depots have been agreed with the Lurah of each Kelurahan and sited in the most suitable location but away from any immediately adjacent residential land to minimize disturbance. Each transfer station must be located within 1 to 2 km of the collection area and be sufficiently close without causing nuisance. The locations can still be moved if any chosen location proves unacceptable.

The city wide solid waste system uses the least cost, environmentally acceptable alternatives and has been evaluated by financial analysis (as some of the benefits are economically difficult to place a value on) and the financial internal rate of return is about 20%.

### 5.4 Waste Water

The location of the pilot sewerage project has been carefully selected. Kelurahan Petemon was established as a sewerage pilot area for the following reasons :

- \* IUIDP integration : the SUDP drainage sector includes Gunungsari drainage channel which will eliminate periodic flooding in the western parts of the Kelurahan.
- \* Water supply is programmed to be upgraded in the Kelurahan.
- \* Income levels are sufficiently high to assist in cost recovery. Cross subsidisation is possible.
- \* Good location within reasonable distance of business/commercial district.

Similarly, the locations for the on-site sanitation facilities have been carefully analysed for suitability according to the following criteria :

- \* population density
- \* resident income
- \* percentage of septic tanks installed
- \* groundwater level and soil permeability
- \* flooding
- \* availability of water supply
- \* existing facilities

The criteria set are in accordance with the National strategy for sanitation.

## **5.5 Kampung Improvement**

KIP sites are selected using KMS criteria of flooding, water supply, sanitation facilities, accessibility, community attitude to development, population density, income, education, age of Kampung, physical condition, layout and estimated impact of KIP. These are scored and weighted and the kampungs then prioritised. It is proposed to improve 10 to 12 kampungs on a zonal basis each year.

## **6. Mitigation Plans**

These are set out clearly in the Environmental Mangement Plan (RKL) and are summarised below.

### **6.1 Land Acquisition and Resettlement - Road and Drains**

An improved land acquisition procedure will be followed in accordance with the law but which in addition gives those affected early consultation, improved (NGO) representation on the land aquisition committee and a choice of options on resettlement. This is fully detailed in the Compensation and Resettlement Plan which has been agreed by both Kotamadya Surabaya and the World Bank.

The main alternative option to monetary compensation is resettlement in sites and services schemes giving a total of 936 plots which will be capable of housing about 32% of those whose property is completely demolished. This is the proportion revealed by the questionnaire. The sites and services schemes will be implemented by the KIP unit of Kotamadya Surabaya and be confianced by World Bank.

Other alternatives to be offerred include :

- Fringe Kampung Improvement
- Housing by Perumnas
- Housing by YKP
- Private housing funded by BTN
- Walk Up Flats

Cost for the sites and services scheme (Rp. 4.1 billion) and for NGO assistance (0.2 billion) are allowed for in the medium term programme.

### **6.2 Traffic Disruption - Roads, Drains and Sewerage**

Traffic disruption plans will be made outlining alternative routes and traffic management arrangements with organisation agreed with the traffic authorities to publicise the arrangements.

Traffic flows will be monitored by traffic engineers.



### **6.3 Possibility of Change of Use or Partial Loss of Wetlands due to proximity of Eastern Middle Ring Road**

A land use study will be carried out and a land use plan will be prepared as part of the Regional Master Plan. This will determine how best to use, develop and protect the wetlands for the benefit of the whole city. The city authorities will then enforce it.

### **6.4 Loss of Irrigation due to Conversion of Channels to Drains**

Some monetary compensation and the provision of temporary pumping may be needed. It is necessary to identify in detail what areas still actually receive irrigation water and whether there are imminent plans to develop. No areas are designated to stay as irrigated rice fields in the Master Plan which has been available for over ten years. A baseline survey is to be carried out just prior to construction to ascertain areas, production and income and whether phasing of the conversions can be improved to minimise impacts. A further survey will be carried out after conversion takes place to determine that necessary compensation measures were taken and that they are fair.

### **6.5 Wetlands Management during Drainage construction**

A fisheries expert will be made available during construction to ensure that water flows are not unnecessarily disturbed by channel excavation.

### **6.6 Kenjeran Beach Landfill for Solid Waste Disposal**

This site should be closed as soon as possible. A management plan should be drawn up by KMS/JICA to enable effective management of the closedown. JICA are studying this in depth.

### **6.7 Transfer Stations and Depots for Solid Waste Management**

Rules for the siting, construction and operation of the stations/depots have been drawn up. Management of all solid waste management will be strengthened by provision of technical assistance.

## **7. Monitoring and Evaluation**

The environmental monitoring plan (RKL) sets out clearly what monitoring and evaluation is required and this is summarised below and is also shown clearly in Table 4.

### **7.1 Land Acquisition and Resettlement - Roads and Drains**

The questionnaire survey (5%) and complete enumeration survey provides a very substantial base line for monitoring the land acquisition and resettlement.

Impact	Mitigations	Monitoring
<b>ROADS</b>		
1. Resettlement of affected people.	Resettlement & Compensation Plan with alternative options.	Follow up socio economic survey based on ANDAL questionnaire survey.
2. Traffic disruption.	Traffic management and public information.	Observation surveys of traffic flows during construction.
3. Encouragement of Accelerated wetland development due to influence of nearby ring road.	Land use study and plan.	Aerial survey or land survey to determine that zoning regulations are being enforced.
<b>DRAINAGE</b>		
4. Resettlement of affected people.	Resettlement and Compensation Plan with alternative options	Follow up socio economic surveys based on ANDAL questionnaire survey.
5. Traffic Disruption.	Traffic management and public information.	Observation of traffic flows during construction.
6. Changes to Brackish water ponds in East Surabaya.	No lining to channels downstream of tidegates. Watergates to ponds left undisturbed or replaced.	Supervision by fisheries expert during construction.
7. Change to agriculture due to conversation of irrigation channels to drainage	Temporary pumping. Increase in value of land. Possible monetary compensation to farmers.	Baseline and follow up survey by irrigation engineer to determine extent and value of agricultural loss.
<b>SOLID WASTE</b>		
8. Expansion of Landfill at Keputih.	Operational improvements to upgrade to Controlled Landfill.	Regular checking by solid waste expert that operational rules are being followed together with air and water quality tests.
9. Continued Operation of Kenjeran Beach Landfill	Temporary closure whilst JICA and GOI/KMS study the possibility of reclamation and establish operating rules and legal issues. If closure made permanent JICA to provide guidance on rehabilitation.	Water quality testing and social survey to ensure nearby recreation area can operate satisfactorily. Surveys required are baseline, one year after and five years after closure.
10. Air pollution and health risks to residents near new depots or transfer stations.	Good design and construction. Strict operation rules. Containerisation.	Air and water quality testing and sociological survey of 10% sample based on ANDAL survey.
<b>SANITATION</b>		
11. Temporary traffic disruption, air and noise pollution due to digging sewer pipe trenches.	Traffic management plan, specification and control of equipment and spoil storage/transportation.	Regular traffic engineer inspections and construction supervision.

The random sample used for the questionnaire will be used for follow up surveys to be carried out just prior to the people being moved, six months after land acquisition is completed and then two years later to ascertain that arrangements were indeed fair and satisfactory. In this way it will be possible to monitor the social and economic situation of those displaced or partially displaced people and to adjust arrangements if necessary.

## **7.2 Traffic Disruption - Roads, Drains and Sewerage**

Traffic management for these components will be monitored independently by the traffic management technical assistance and recommendations made for improvements as necessary.

## **7.3 Possibility of Change of Use or Partial Loss of Wetlands due to proximity of Eastern Middle Ring Road**

A yearly survey of the wetlands will be carried out by an ecologist and a sociologist to monitor that land use zoning regulations are being followed.

## **7.4 Loss of Irrigation due to Conversion of Channels to Drains**

The baseline survey of irrigated areas is not yet determined as it is continually changing at a rapid pace. The baseline survey for each channel will be carried out by an irrigation engineer prior to construction and then after construction is completed. This will enable determination of actual changes in agricultural practice and income.

## **7.5 Solid Waste Disposal Sites**

All landfill sites operations will be monitored yearly, and air and water quality tested quarterly, by the solid waste management expert.

For Kenjeran Beach, additional monitoring will be carried out by a sociologist to determine that the recreation area does not suffer any health hazards, and by a marine ecologist to determine if there is continuing coastal pollution. This additional monitoring will be carried out prior to closure of the landfill and one year and five years after closure.

## **7.6 Transfer Stations and Depots for Solid Waste Management**

A baseline survey of 10% of the stations and depots was carried out for the ANDAL. This sample will be resurveyed one year after construction and monitored for sociological reaction and for air and water quality.

## **8. Institutional Needs**

The implementation arrangements for SUDP will also encompass the management and monitoring of environmental requirements. In particular each implementation unit will be responsible for management of its component to ensure that mitigation measures are fully implemented. Specific additional arrangements to carry out independent management advice and monitoring will

be made by Kotamadya Surabaya. In particular they will appoint Airlangga University to carry out continuing resettlement surveys as they were involved in the baseline survey, appoint the NGO for resettlement, preferably the one previously used for the KIP womens involvement survey, and appoint specialists such as the ecologist, sociologists, marine ecologist and irrigation engineer for monitoring. These specialists are in addition to specialists appointed under technical assistance for implementation who will also be monitoring in their disciplines as necessary.

Environmental management supervision will be by the Urban Management Unit of Kotamadya Surabaya, by the Provincial Planning Board (Bappeda Tk I) and by the Directorate General of Human Settlements (Cipta Karya).

Environmental training courses for City staff have been included in the project as part of the Human Resources Development and Training component.

Enforcement measures and legal strengthening is being carried out on a national and regional basis by the new BAPEDAL agency and these will be sufficient without further measures under this project.

#### 9. Public Participation.

To date, consultation has been by survey on an individual basis. Surveys have been carried out for :

- Land acquisition for Roads and Drains Survey - 1991
- Household survey - 1989
- Pilot Project Area Household & Commercial Sewerage Survey - 1991
- Solid Waste Industrial Survey - 1991
- Role of Woman in SUDP Survey - 1991

All these surveys have been questions to individuals to ascertain base data. An NGO carried out the Role of Women in SUDP Survey in conjunction with the preparation consultants.

The only group basis survey has been through the focus groups for the Role of Women in SUDP Survey.

There has been no further consultation yet and there will not be until funds are assured in order to avoid embarrassment. This is early enough as the project is on a 5 year programme basis.

Funds are now assured from OECF and it is planned to announce the project in November 1992 concurrently with appraisal by World Bank. The announcement will be to the press and public and will include release of this environmental assessment summary in the Indonesian language.

After that, group consultations will commence with the first and second year priority projects and will continue for the whole programme.

A public information centre is to be set up as part of the project to be the focus to disseminate information and receive complaints. NGOs will participate in SUDP for the land acquisition and resettlement and as part of the community development under the KIP sector but which has the aim of community development for the whole programme. Community participation will continue to have a high profile in the solid waste sector and there will be special community programmes drawn up and carried out for the sewerage pilot project.

