Presentation from the

Workshop on Innovations for Scaling up to Citywide Sanitation

October 16-17, 2012, Ahmedabad

p a s performance assessment system

Organised by PAS Project, CEPT University

Costing Urban Sanitation Options

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16th November 2012

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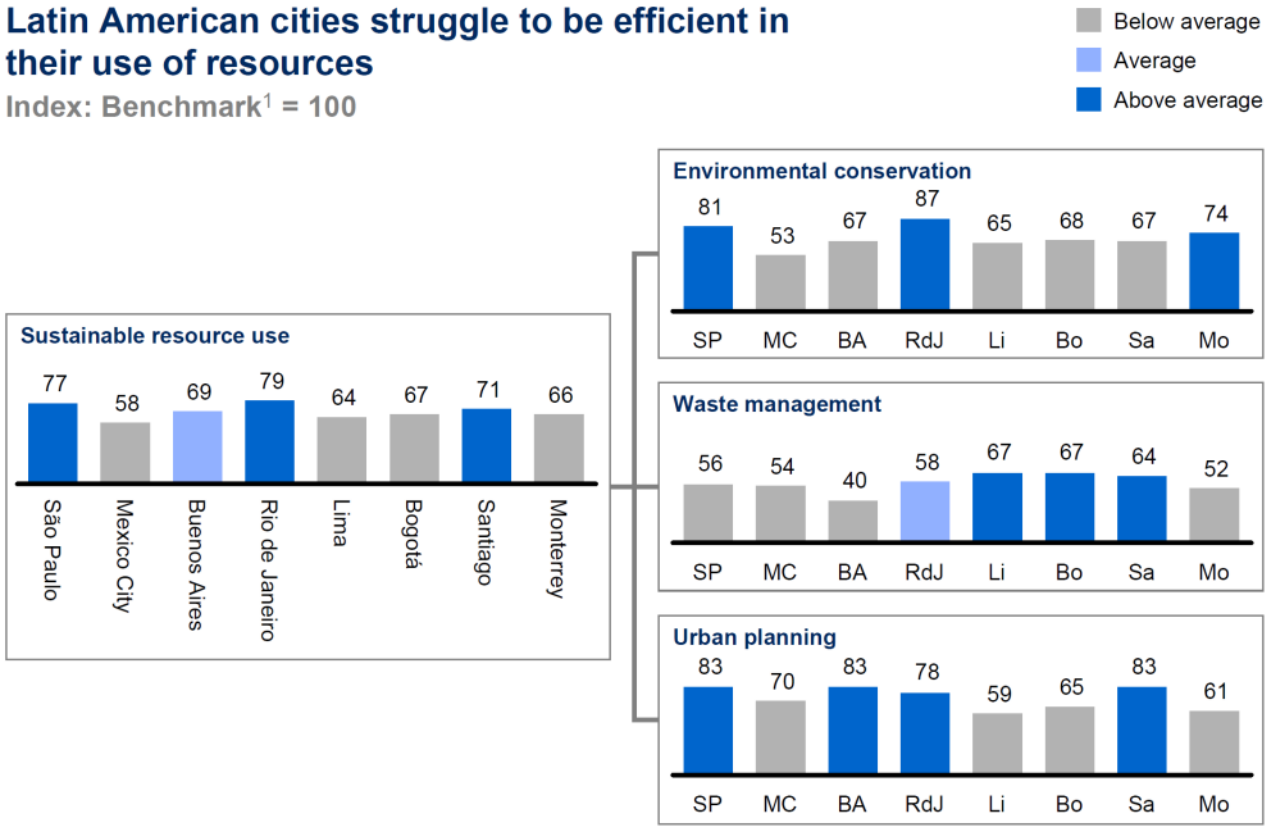
Latin American cities struggle to be efficient in their use of resources

Index: Benchmark[1] = 100



1 Benchmark defined for each measure as the average of Helsinki, New York, Singapore, and Toronto.

SOURCE: McKinsey Urban Performance Index

The Lifecycle costing project

Objectives:

- Establish an optimum approach to assessing lifecycle costs of sanitation options for cities (formal and informal areas)
- Develop tools which enable future changes in housing density and key prices to be taken in to consideration
- Provide information about long term costs of sanitation options for city planners in towns and cities.

Options that we have tended to consider

- Ventilated Improved Pit Latrines, Twin-pit Pour-flush latrines etc
- Toilets connected to septic tanks
- Urine Diverting Dry Toilets
- Simplified sewerage
- Conventional sewerage

- With and without treatment

Lifecycle costing

- Capital costs (materials, labour, energy)
- Maintenance costs (mostly labour, some materials)
- Operational costs (usually dominated by energy as electricity for pumping or fuel for desludgers, labour and chemicals in some treatment processes)
- Periodic replacement costs (depending on the technology)
- Costs of finance

- Lifecycle assumption of 25 years
- Amortised over the life of the project and spread between households to give us Annual average per household cost
- This is the annual financing cost per household

Typical capital cost components

- Promotional costs
- Concrete
- Steel
- Bricks
- Timber
- Mortar and plaster
- Conveyance of materials
- Labour (skilled and unskilled)
- Machinery
- Energy (direct only)

Typical operation and maintenance cost components

- Materials for repair
- Labour (skilled and unskilled)
- Machinery
- Energy

Soweto - Johannesburg

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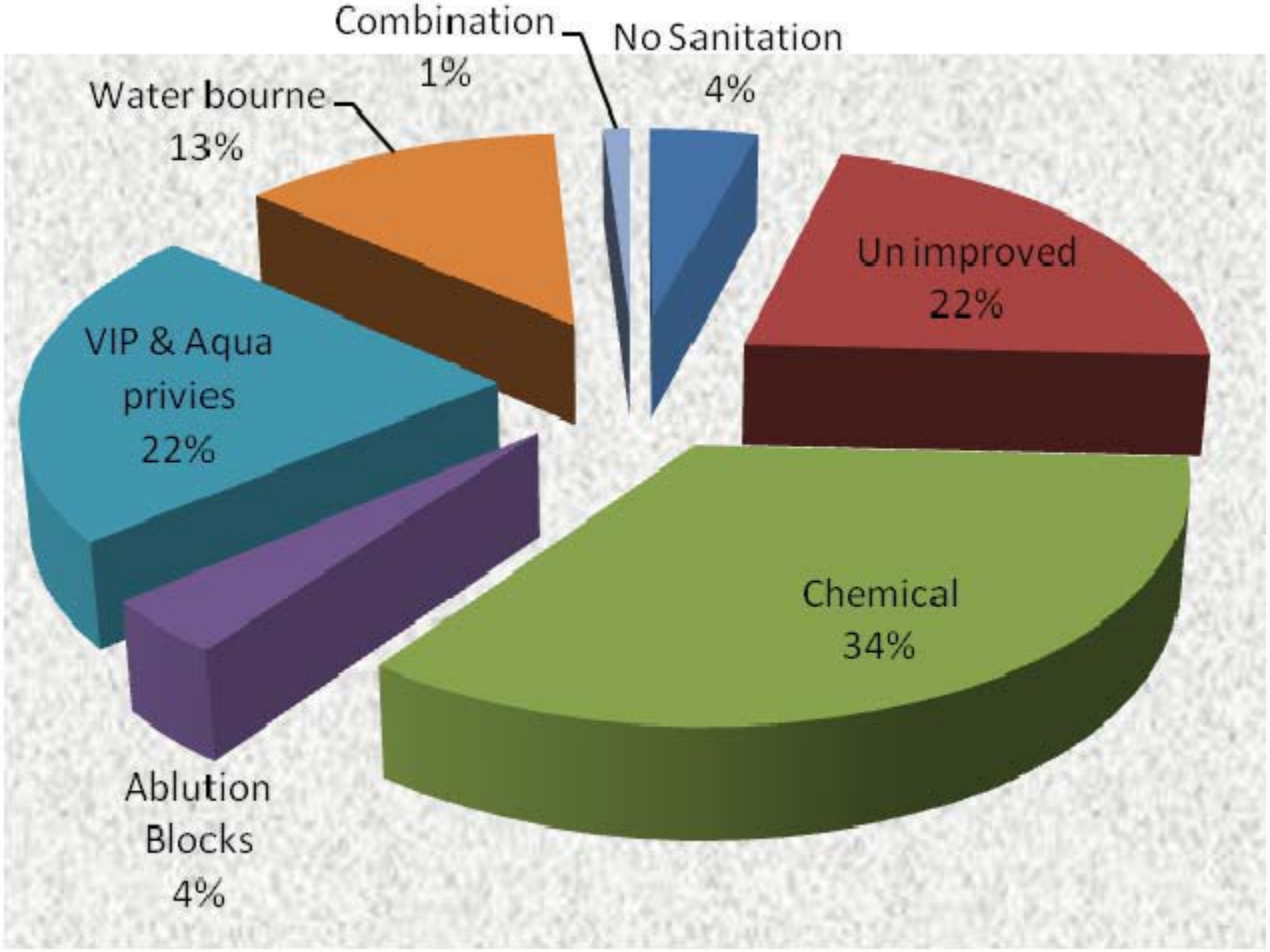
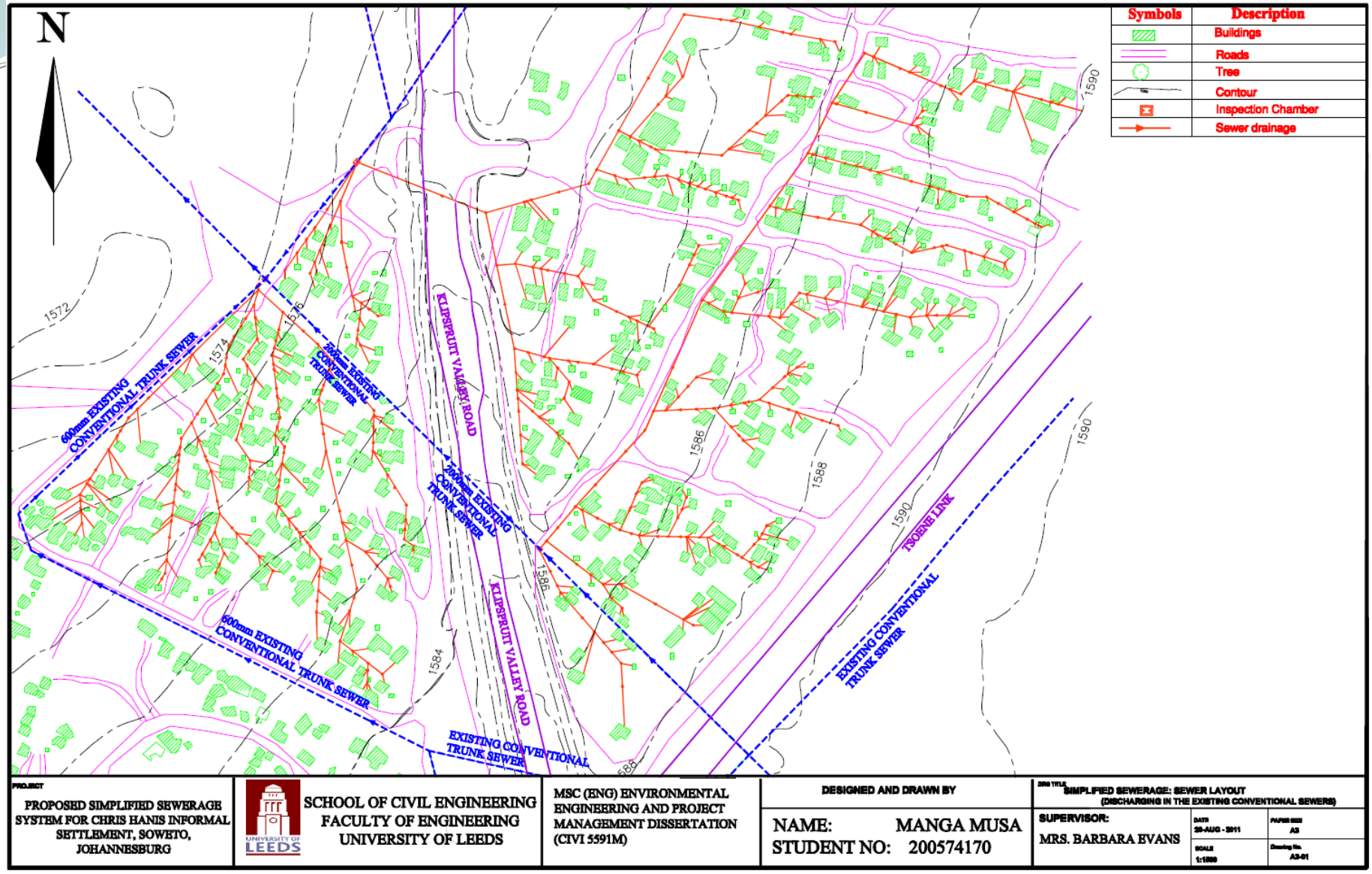
Sanitation services in informal areas of Soweto





PROJECT

PROPOSED SIMPLIFIED SEWERAGE SYSTEM FOR CHRIS HANIS INFORMAL SETTLEMENT, SOWETO, JOHANNESBURG

SCHOOL OF CIVIL ENGINEERING
FACULTY OF ENGINEERING
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MSC (ENG) ENVIRONMENTAL ENGINEERING AND PROJECT MANAGEMENT DISSERTATION (CIVI 5591M)

DESIGNED AND DRAWN BY

NAME: MANGA MUSA
STUDENT NO: 200574170

DRG TITLE
SIMPLIFIED SEWERAGE: SEWER LAYOUT
(DISCHARGING IN THE EXISTING CONVENTIONAL SEWERS)

SUPERVISOR:
MRS. BARBARA EVANS

DATE 29-AUG - 2011
PAPER SIZE A3
SCALE 1:1000
Drawing No. A3-01

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BOQs FOR THE PROPOSED SIMPLIFIED SEWERAGE SYSTEM FOR CHRIS HANIS INFORMAL SETTLEMENT, SOWETO, JOHANNESBURG (WHEN SYSTEM COLLECTED SEWERAGE DISCHARGED INTO THE EXISTING CONVENTIONAL TRUNK SEWERS (SCENARIO 1)		
	MAIN SUMMARY	
ITEM NO.	**DESCRIPTION**	**TOTAL (ZAR)**
1	Household Connection	**404,309.09**
2	Block and Street Collector Sewers	**235,628.57**
3	Inspection Chambers	**381,983.29**
	Sub Total - 1	**1,021,920.94**
	Add: 4% Over heads and profit	**40,876.84**
	Sub Total - 2	**1,062,797.78**
	Add: 2% Planning, design and supervision costs	**21,255.96**
	Total	**1,084,053.74**

Table 4.6: Simplified Sewerage System AIC for the four Designed Scenarios

Scenarios	TACH (US$ 2011)	
	11% OCC	14% OCC
System discharging in the existing conventional trunk sewer (Scenario 1)	57	64
Complete system with treatment plant and pumping station (Scenario 2)	92	104
Complete system excluding treatment plant cost (Scenario 3)	82	92
Complete system excluding pumping station costs (Scenario 4)	72	83

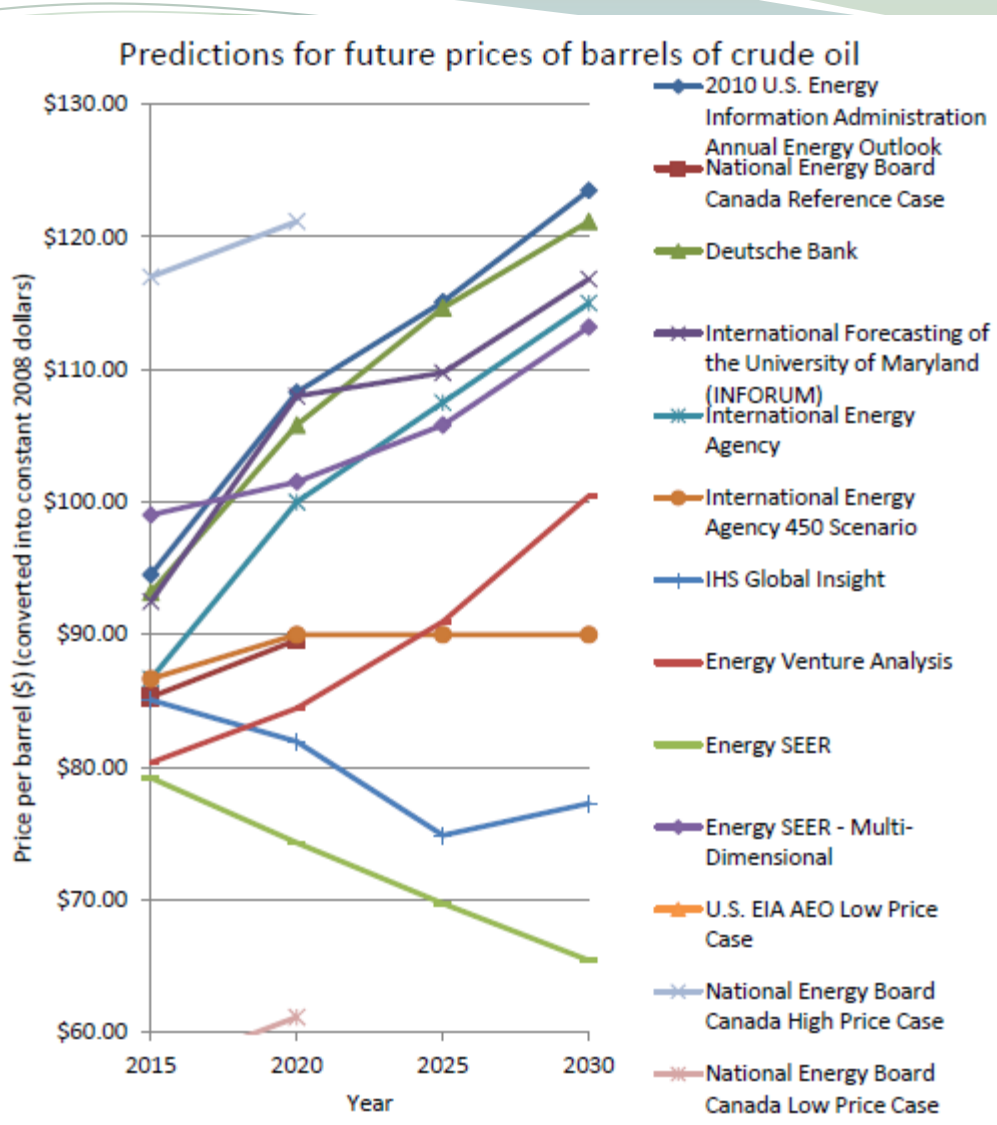
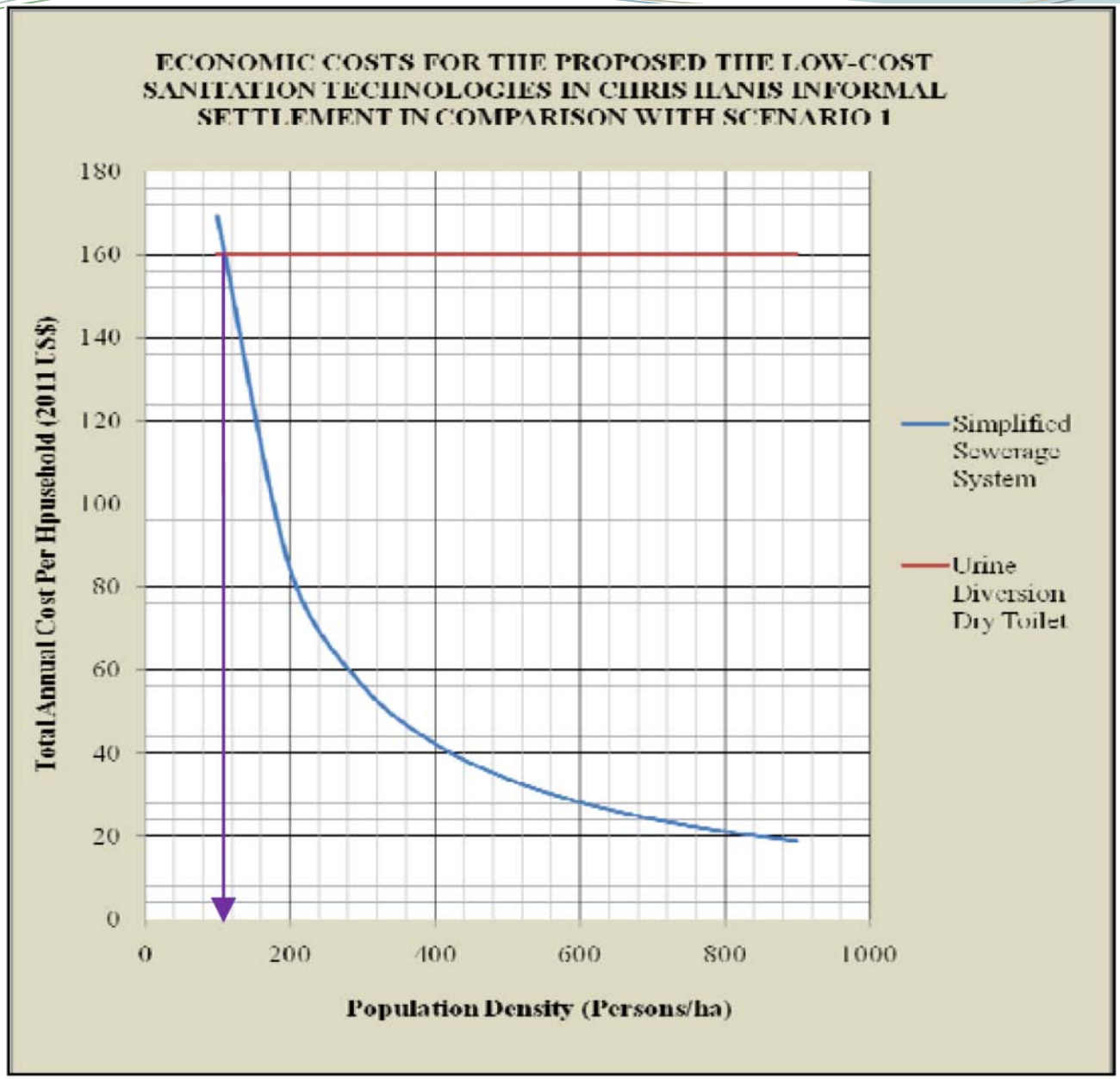


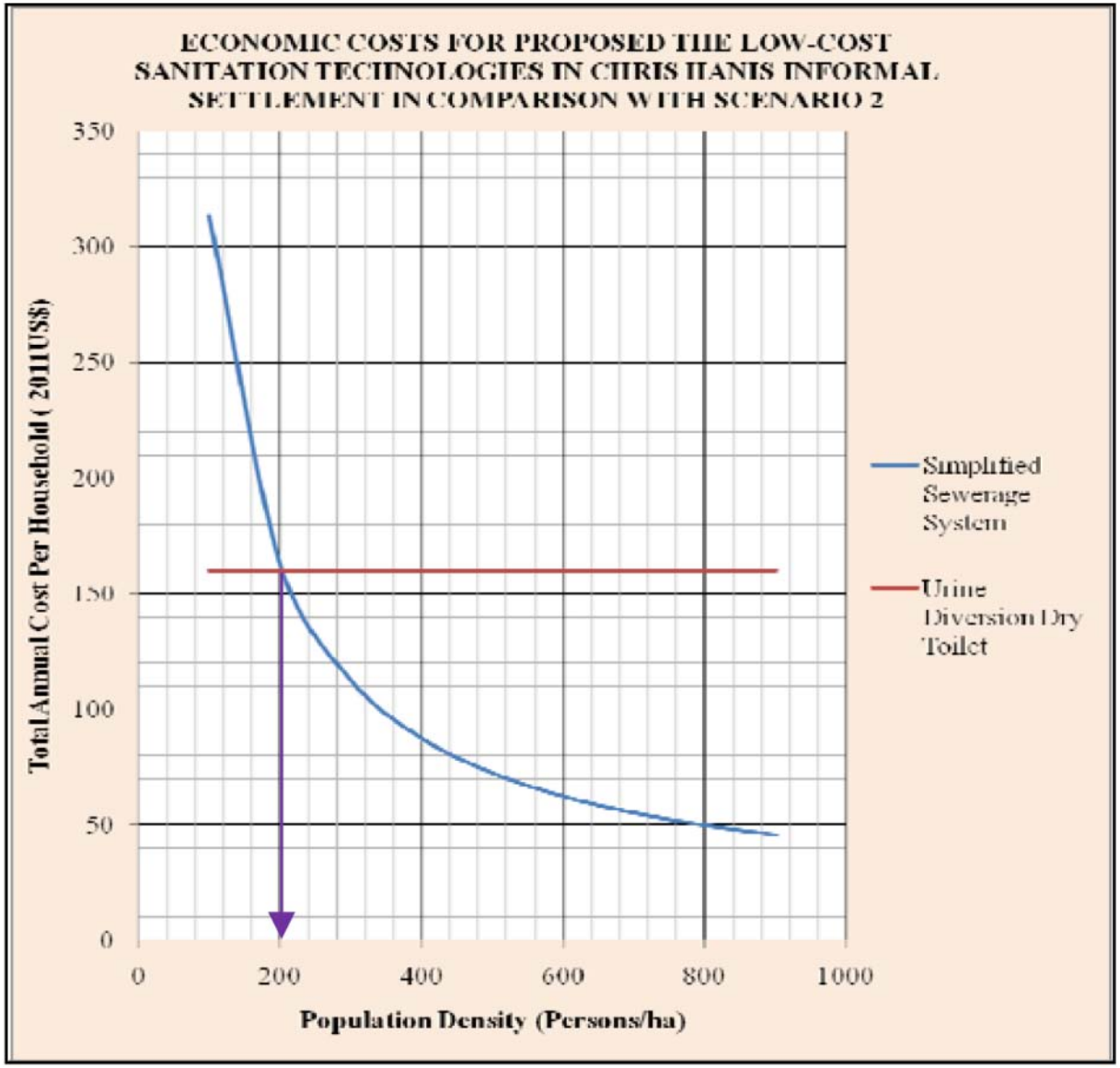
FIGURE 4-1 PREDICTED FUTURE PRICES FOR CRUDE OIL

DESIGNED SCENARIOS	MONTHLY SEWERAGE SURCHARGE PER HOUSEHOLD (US $ 2011)		
	Interest rate 5.5% and Inflation rate on fuel 0.5%	Only Interest rate changed to 9%	Only Inflation rate on fuel changed to 1.6%
Complete system with treatment plant and pumping station (Scenario 2)	6.7	7.6	19
Complete system with Treatment plant costs Excluded (Scenario 3)	6.2	6.9	18.5
Complete System with pumping station costs excluded (Scenario 4)	4.5	5.5	4.5
System discharging in the existing conventional trunk sewer (Scenario 1)	3.8	4.4	3.8

Table 4.7: Simplified Sewerage TACH for different Population Densities

Population Density (persons per hectare)	Total Annual Cost per household cost (US $ 2011) For Simplified Sewerage System			
	System discharging in the existing conventional trunk sewer (Scenario 1)	Complete system with treatment plant and pumping station (Scenario 2)	Complete system excluding treatment plant cost (Scenario 3)	Complete system excluding pumping station costs (Scenario 4)
100	169	314	277	240
200	85	163	145	126
281	**93**	**120**	**107**	**93**
300	56	113	101	88
400	42	87	78	69
500	34	72	65	58
600	28	62	56	50
700	24	55	50	45
800	21	50	45	41
900	19	46	42	37





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Gondia

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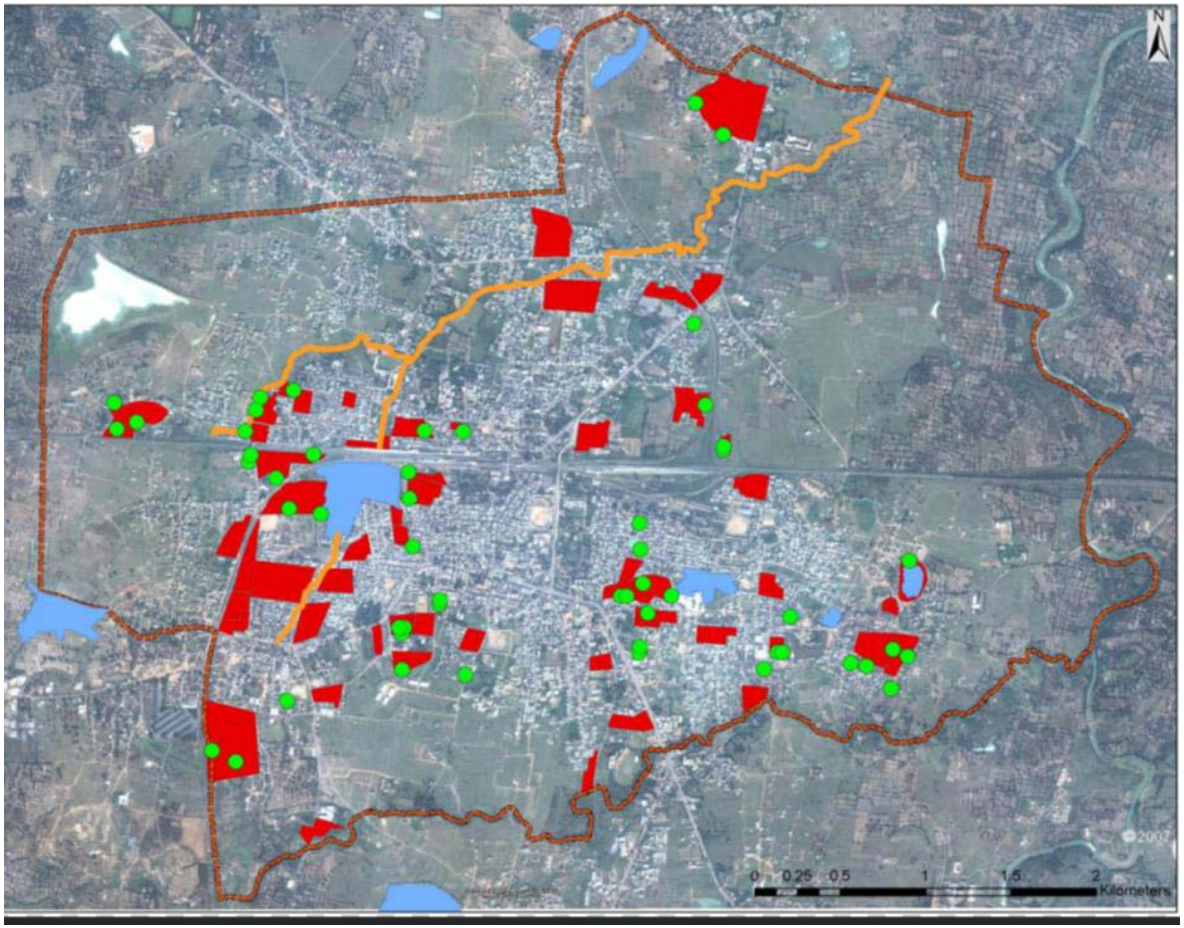
Slums, water bodies and public toilets



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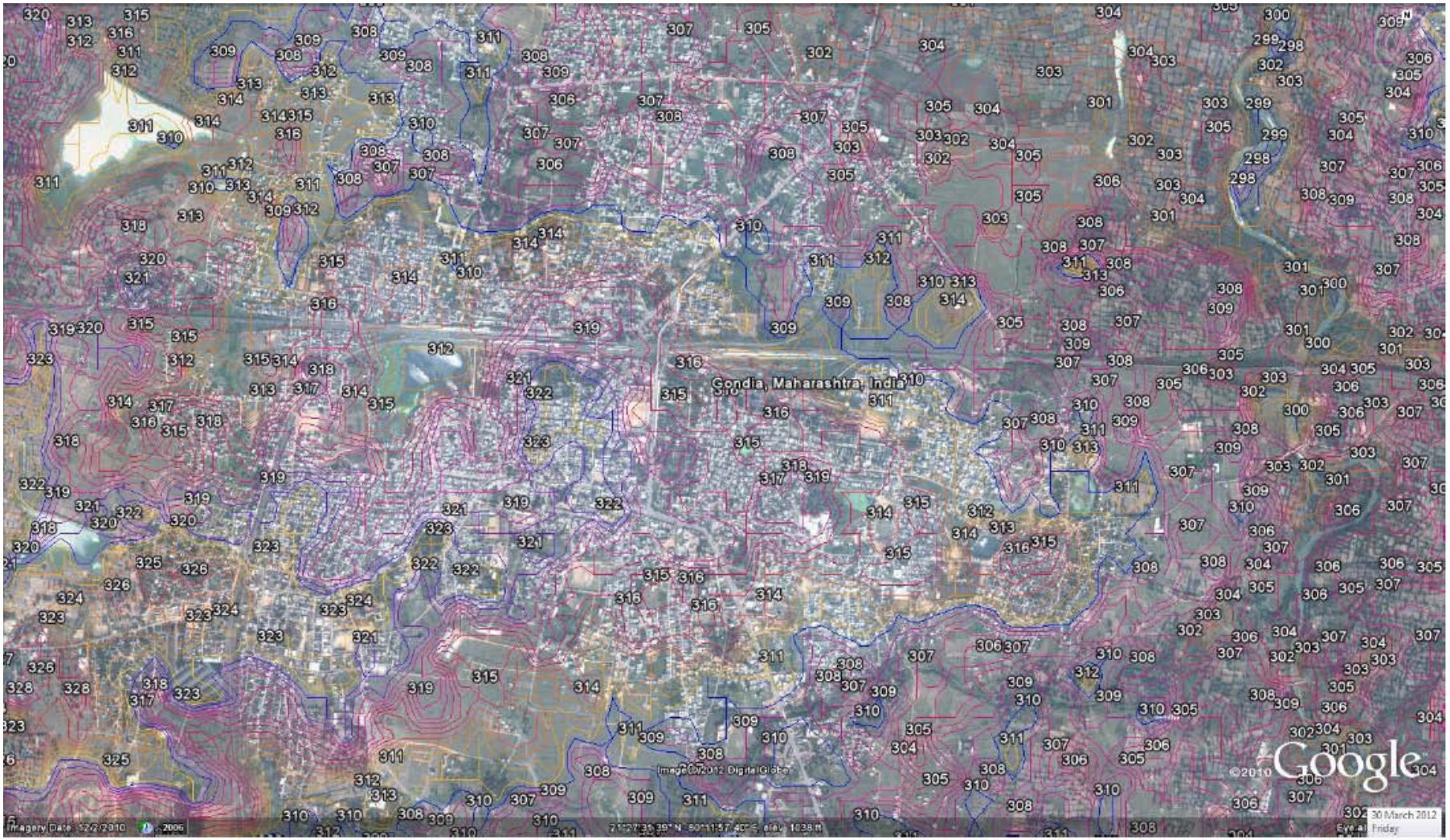

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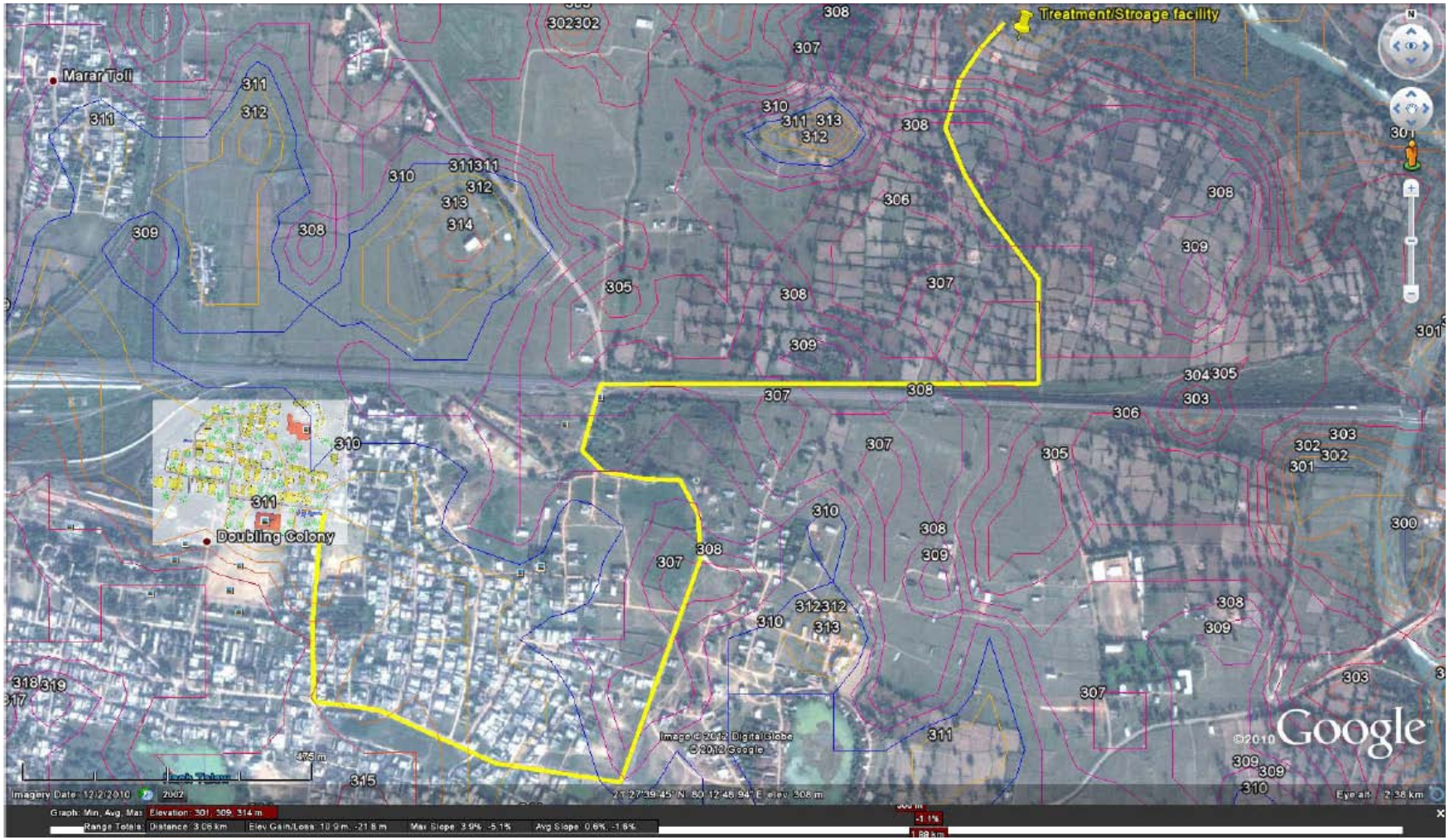

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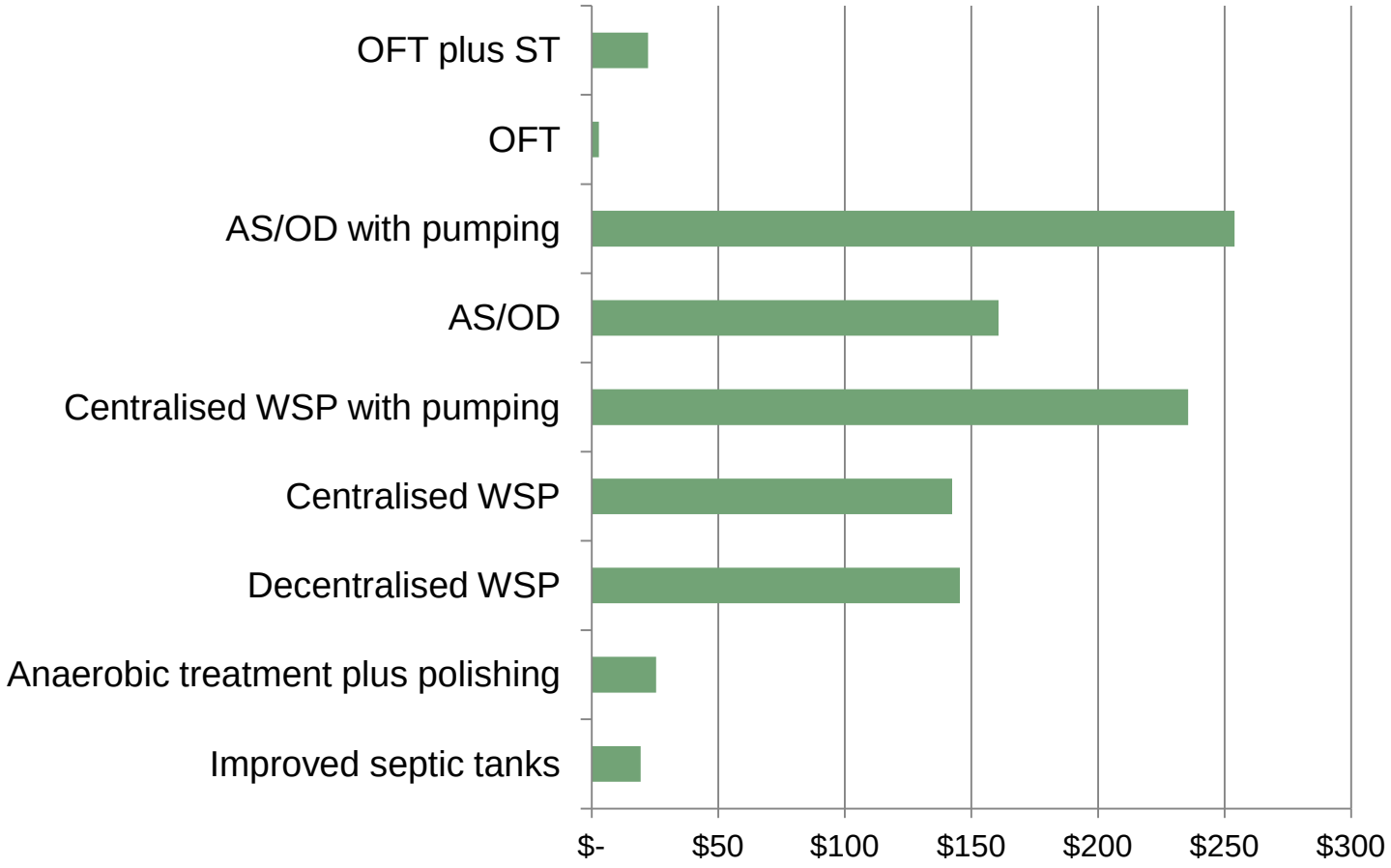
System	UDDT	Simplified Sewerage
Cost per Household facility (Rs.)	42,305.18	17,145.43
Total Cost of household facilities (116 properties) (Rs.)	4,907,400.34	1,988,869.45
Total cost to construct waste transportation system (116 properties) (Rs.)	N/A	4,064,189.72
Total Capital Costs (Rs.)	5,723,400.34	7,441,659.07
Total cost to Operate and Maintain waste transportation system for 25 years (116 properties) (Rs.)	25,055,431.61	678,513.78
Cost to treat waste for 25 years (116 properties) (Rs.)	N/A	2,242,933.85
Total Lifecycle cost for 5 years (Rs.)	7,816,554.20	7,588,420.87
Total Lifecycle cost for 25 years (Rs.)	29,962,831.94	8,974,506.80
Net present cash value (Rs.)	-13,401,366.38	-5,837,541.92
Net present economic value (Rs.)	28,124,004.21	35,687,828.66

TABLE 7-1 RESULTS FROM THE COST ANALYSIS AND NPV CALCULATIONS

Nile Delta, Egypt

- Lifecycle costing of wastewater treatment options
- Including options to network or truck waste from households
- Link this to downstream health impacts using Quantifiable Microbial Risk Assessment

NPV (US$) per capita
Total investment and O&M costs



WATER PARTNERSHIP PROGRAM

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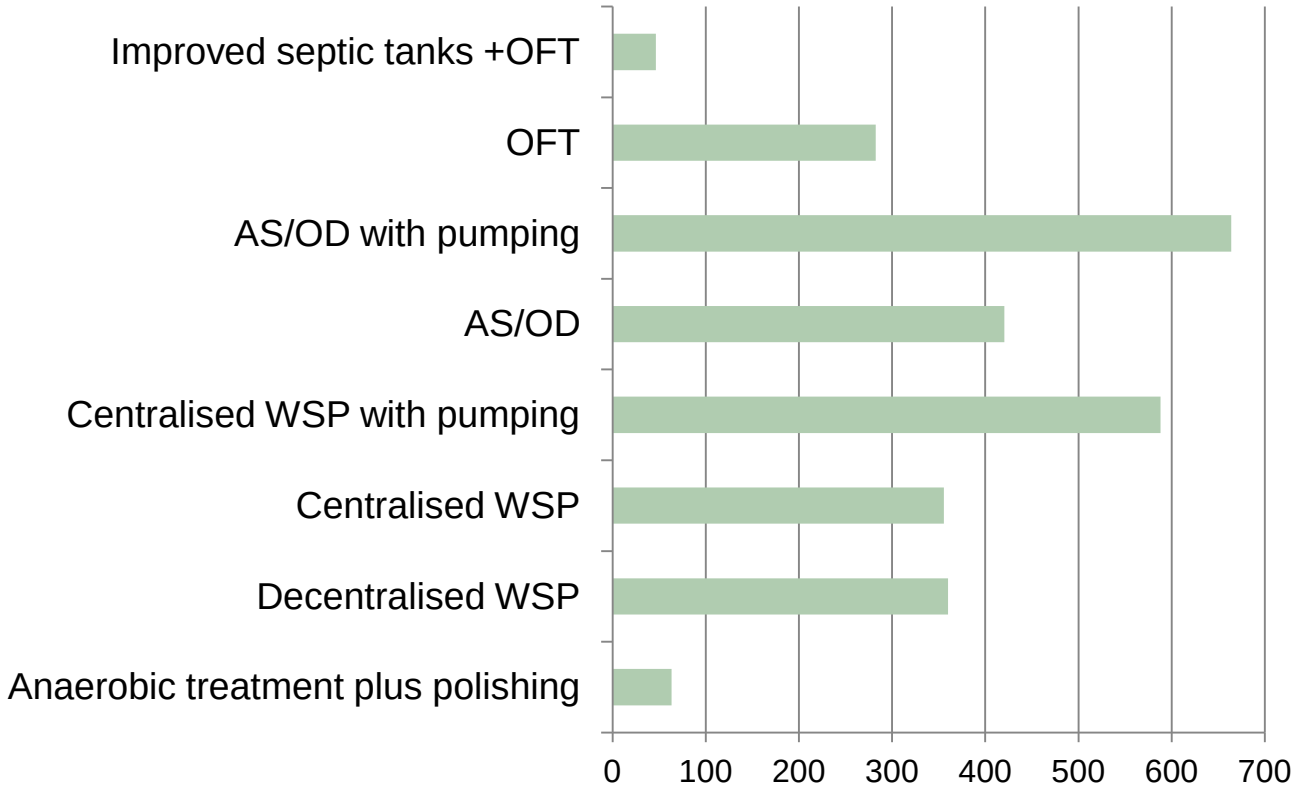
Cost Effectiveness
US$ per DALY avoided



WATER PARTNERSHIP PROGRAM

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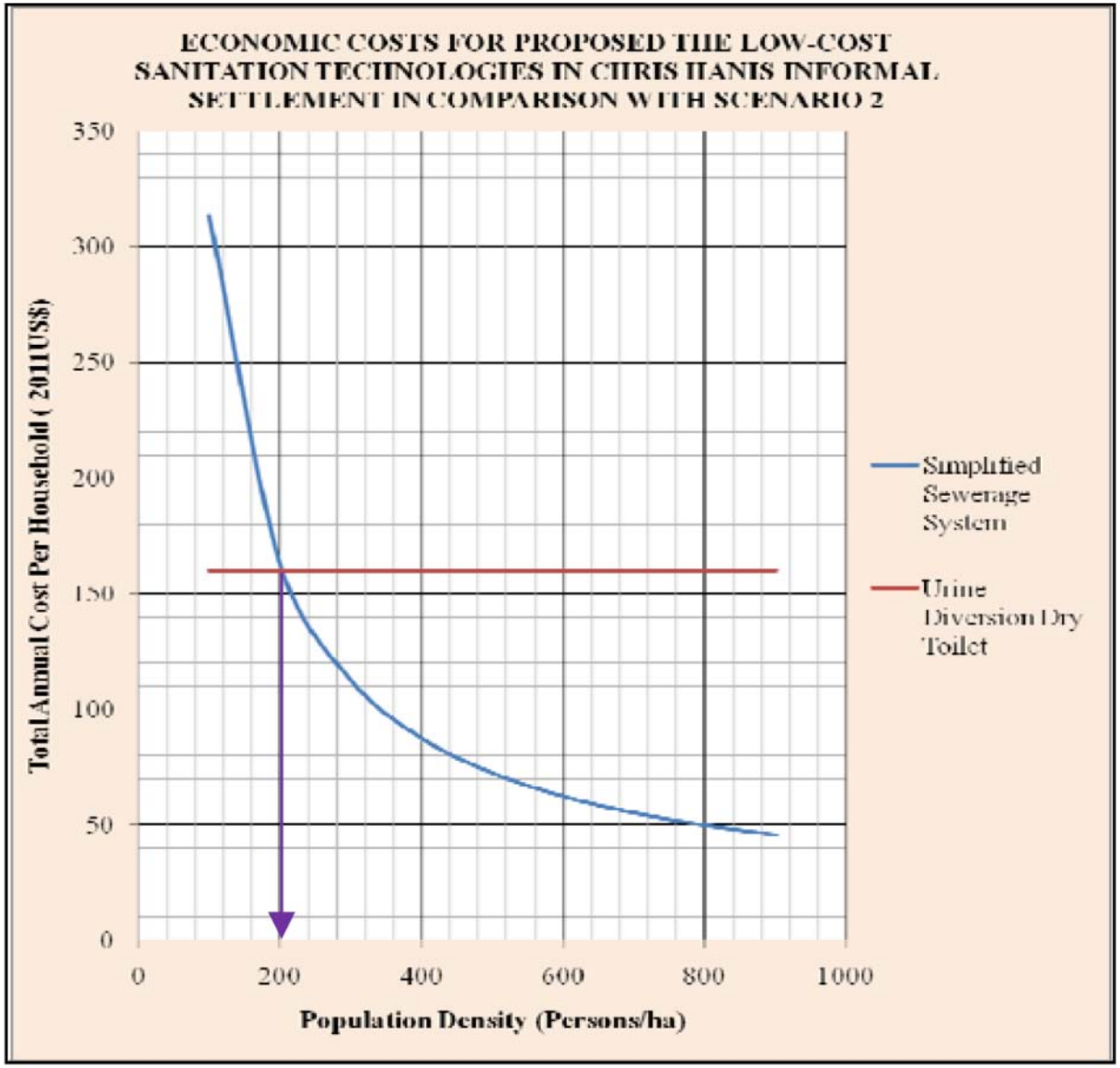

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Thankyou

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