FINAL REPORT

Asian Development Bank
National Capital Region Planning Board

Capacity Development of the National Capital Region Planning Board
Package 2 Component B
TA No. 7055-IND

Volume VI: Capacity Building Activities

July 2010
Capacity Development of the National Capital Region Planning Board (NCRPB) – Component B (TA No. 7055-IND)

FINAL REPORT
Volume VI: Capacity Building Activities

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I. INTRODUCTION

A. Background

1. The National Capital Region Planning Board, constituted in 1985 under the provisions of NCRPB Act, 1985, is a statutory body functioning under the Ministry of Urban Development, Government of India. NCRPB has a mandate to systematically develop the National Capital Region (NCR) of India. It is one of the functions of the Board to arrange and oversee the financing of selected development projects in the NCR through Central and State Plan funds and other sources of revenue.

2. On Government of India’s request, Asian Development Bank (ADB) has formulated the technical assistance (TA) to enhance the capacities of National Capital Region Planning Board and its associated implementing agencies. The TA has been designed in three components: Component A relates to improving the business processes in NCRPB; Component B relates to improving the capacity of the implementing agencies in project identification, feasibility studies and preparing detailed engineering design; and Component C relates to urban planning and other activities.

3. ADB has appointed M/s Wilbur Smith Associates to perform consultancy services envisaged under Component B. In the context of this contract, the first deliverable – Inception Report, was submitted in October 2008. The second deliverable – Interim Report comprising Master Plan for sewerage in Hapur, Master Plan for Water Supply for Panipat, Master Plan for Drainage for Hapur, Master Plan for Solid Waste management for Ghaziabad, Traffic and Transport analysis for Ghaziabad, Socio-Economic base line survey result in 3 sample project towns and proceedings of workshop 1 was submitted in January 2009. The four Master Plans as stated above are also made available on NCRPB web site for use of the implementing agencies.

4. The third deliverable Draft Final Report (DFR) comprising Detailed Project Report (DPR) for water supply in Panipat, DPR for sewerage in Hapur, DPR for drainage in Hapur, DPR for drainage in Sonipat, DPR for solid waste management in Ghaziabad, DPR for four selected transport components (Flyover, Road widening, Multi-level Parking and Bus Terminal) in Ghaziabad, and a Report on Capacity Building Activities performed till DFR Stage.

5. Now, this is the Final Report (FR) and is the fourth and final deliverable. The comments/feedback on Draft Final Report received from ADB, NCRPB and respective implementing agencies were duly incorporated and final DPRs for components of Water Supply, Sewerage, Drainage, Solid Waste Management, and Transport are submitted as part of this Final Report. This the Volume VI of the FR, compiled with the activities performed under the Capacity Building component of the TA.
B. Overview of this ADB TA

5. **Objectives.** The objective of this Technical Assistance (TA) is to strengthen the capacity at NCRPB, state-level NCR cells, and other implementing agencies in the area of planning for urban infrastructure and to impart necessary skills to conceive, design, develop, appraise and implement good quality infrastructure projects for planned development of NCR. The increased institutional capacity of the NCRPB and the implementing agencies will lead to effective and time scaling-up of urban infrastructure to (i) improve quality of basic urban services in the NCR; (ii) develop counter magnet towns; (iii) reduce in migration into Delhi and orderly development of NCR; and (iv) accelerate economic growth in the NCR.

6. The TA – Capacity Development of the NCRPB, Component B focuses on strengthening the capacities of NCRPB and implementing agencies relating to project feasibility studies and preparation, and detailed engineering design in the implementing agencies. Specifically this component B of the TA will support the project preparation efforts of the implementing agencies by preparing demonstration feasibility studies that include all due diligence documentation required for processing of the project in accordance with best practices, including ADB’s policies and guidelines.

7. **Scope of Work.** According to the terms of reference of the TA assignment, the following activities are envisaged in component B of the TA:

   (i) Conduct technical, institutional, economic and financial feasibility analysis of identified subprojects in the six sample implementing agencies;
   (ii) Conduct safeguards due diligence on the subprojects, including environmental assessment report and resettlement plan for all subprojects covered in the sample implementing agencies;
   (iii) Prepare environmental assessment framework and resettlement framework; and
   (iv) Develop a capacity building and policy reform program for the implementing agencies, including governance strengthening, institutional development and financial management.

8. Besides, this component of the TA will also:

   (i) help in assessing the current practices and procedures of project identification and preparation of detailed project reports including technical, financial, economic and social safeguard due diligence;
   (ii) support preparation of standard procedure manuals for project identification and preparation of detailed project reports including technical, financial, economic and social safeguard due diligence;
   (iii) train the implementing agencies in the preparation of detailed project reports by using the sample subprojects, reports on deficiency of current practices and standard protocol manuals; and
   (iv) help in developing a user-friendly web-page where different manuals and guidelines for preparation of DPRs will be made available for the implementing agencies.
C. Organization of Final Report Volume VII Report

9. The Final Report of the TA Component B is organized in following Seven Volumes.

- **Volume I**: Detailed Project Report for Rehabilitation and Augmentation of Water Supply System in Panipat
- **Volume II**: Detailed Project Report for Rehabilitation and Augmentation of Sewerage System in Hapur
- **Volume III**: Detailed Project Report for Rehabilitation of Major Drains in Hapur
- **Volume IV**: Detailed Project Report for Improvement of Solid Waste Management System in Ghaziabad
- **Volume V**: Detailed Project Reports for Four Transport Components in Ghaziabad
- **Volume VI**: Capacity Building Activities
- **Volume VII**: Detailed Project Reports for Construction Storm Water Drains in Sonipat

10. *Volume VI: Capacity Building Activities*. As part of the capacity development activities under this TA component B, three workshops, three on-job trainings and three nation study tours were conducted. Details of these capacity building activities have been presented in this **Volume VI**:

- Section 1 Introduction;
- Section 2 defines the scope and objectives of the Training Program;
- Section 3 describes the ‘on-job training’ process carried out so far;
- Section 4 presents the details about the completed workshops;
- Section 5 presents the details about the completed Technical Lectures;
- Section 6 describes the completed site visits and study tours;
- Section 7 presents activities carried out towards the preparation of tool-kits and other relevant materials;
- Section 8 presents details of the training activities to be conducted during the remaining TA period; and
- Section 9 summarizes the conclusions and recommendations.
II. TRAINING PROGRAMS

A. Overview

11. The objective of all the training programs is to enable the staff of NCRPB and other projects implementing agencies to perform their tasks in accordance with their responsibilities in the project preparation activities including project design. This will ensure that the preparation / implementation of the subprojects will not be handicapped through lack of trained staff. The three basic topics to be addressed in the training program are:

(i) Project Identification Process;
(ii) Project Feasibility and Preparation; and
(iii) Safeguard Due Diligences. The training as part of the capacity building to be provided has been tailored to suit the different management levels at NCRPB and Implementing Agencies (IAs).

12. In the existing organisation structure of IAs, mostly their internal staff carries out a critical role of project identification and preparation and few cases outside experts are involved under the supervision of internal staff. The role of the senior level staff is mostly in identification of subprojects and supervision of project preparation. In NCRPB, the technical proposals seeking fund assistance need to be scrutinized before loan sanction stage and the implementation of subprojects need to be monitored after the loan sanction. In scrutinizing the technical proposals from IAs, technical advises of specialized national institutions are utilised. Any training that is given to the officials of NCRPB and other project implementing agencies must reflect their present role responsibilities in the loan seeking/appraisal process.

13. As per the requirement of the scope of services for TA (Component B), following four types of training modules under training activities are formulated:

14. On-Job Training. In this module, identified ‘Resource Persons’ from the Sample Implementing Agencies / NCRPB will be involved in the sample subproject preparation and work along with the TA Consultant during the present study, at all stages.

15. Structured Training through Workshops, Lectures etc. In this module, identified ‘Senior / Middle Management Staff’ from the Sample Implementing Agencies NCRPB will be given training through workshop, presentations etc along with important deliverables. This will aim at appraising the procedures involved in the preparation of project identification and preparation so as to help them in taking management decisions along with better supervision control.

16. Under the ‘workshops’ module, identified ‘Senior / Middle Management Staff’ from the Implementing Agencies NCRPB will be given training through workshop, presentations etc along with important deliverables. This will aim at appraising the procedures involved in the preparation of project identification and preparation so as to help them in taking management decisions along with better supervision control.
17. **Site Visits / Study Tours.** In this module, identified elected heads of ULBs, senior administrative officials from departments and ULBs, ‘Senior / Middle Management Staff’ from the Implementing Agencies and NCRPB will be taken to the identified ‘best practice’ urban infrastructure projects around the country. This will help to observe, study and understand in implantation of such successful projects and to interact with those responsible for implementation for understanding the issues encountered.

18. Present Final Report focus on the preparation of ‘Model’ Detailed Project Reports (DPR) for selected urban infrastructure projects, selected through the city level Sector Plans / Master Plans prepared in the TA. In these processes of both the preparation of Master Plan and DPRs, appropriate arrangements were made to cover all aspects of training including i) on-job training ; ii) structured training process; iii) study tours; and iv) preparation of toolkits.. Regular Project Review Meetings held at NCRPB, frequent meetings/discussions held with the sample project implementing agencies, field surveys, the workshops / lectures organized at New Delhi and the study tours organized during this period were adequately utilized to share and interact with the officials on project identification process, DPR preparation process and project evaluation under different sectors.

**B. Scope and Objectives**

19. The objective of all the training programs is to enable the staff of NCRPB and other projects implementing agencies to perform their tasks in accordance with their responsibilities in the project preparation activities including project design. This will ensure that the preparation / implementation of the subprojects will not be handicapped through lack of trained staff. The three basic topics addressed in the training program are: (i) Project Identification Process; (ii) Project Feasibility and Preparation; and (iii) Safeguard Due Diligences. The training as part of the capacity building provided was tailored to suit the different management levels at NCRPB and Implementing Agencies (IAs).

20. In the existing organisation structure of IAs, mostly their internal staff carries out a critical role of project identification and preparation and few cases outside experts will be involved under the supervision of internal staff. The role of the senior level staff will be mostly in identification of subprojects and supervision of project preparation. In NCRPB, the technical proposals seeking fund assistance need to be scrutinized before loan sanction stage and the implementation of subprojects need to be monitored after the loan sanction. In scrutinizing the technical proposals from IAs, technical advises of specialized national institutions are utilised. Any training that is given must reflect the use and application that will be made of the topics covered in accordance with the staff level within the organisations and their responsibility in project preparation. This Activity on Training Programs is organized into the following three tasks

21. **Training Needs Assessment.** The training needs assessment was based on the anticipated duties and responsibilities of NCRPB and Implementing Agencies staff with respect to subprojects identification, preparation including feasibility requirements. For the training needs assessment purpose, the officials from NCRPB, ULBs and IAs are grouped as follows as the training requirements will be varying among these groups like (i) Elected heads of ULBs (ii) Administrative heads of ULBs (iii) Senior Management / Technical Officials from IAs and government departments involved in decision making process (iv) Junior / Middle Technical Level Officials from ULBs and IAs. Indicative training requirements, based on the identified groups, are given in the following Table 1.
Table 1: Indicative Training Requirements

<table>
<thead>
<tr>
<th>Groups</th>
<th>Likely Skills Needed</th>
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<tbody>
<tr>
<td>Elected heads of ULBs</td>
<td>Policy level decisions and support to project identification</td>
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<tr>
<td></td>
<td>and selection process</td>
</tr>
<tr>
<td>Administrative Heads of ULBs / Senior</td>
<td>Project identification and preparation monitoring and</td>
</tr>
<tr>
<td>Management Level</td>
<td>decision making using the proposed project guidelines</td>
</tr>
<tr>
<td>Senior Technical Level Officials</td>
<td>Project identification, preparation procedures and techniques</td>
</tr>
<tr>
<td></td>
<td>for better monitoring and reporting</td>
</tr>
<tr>
<td>Junior / Middle Technical Level</td>
<td>Data requirements &amp; collection, planning, carrying out project</td>
</tr>
<tr>
<td></td>
<td>identification, design and preparation activities</td>
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22. **Identification of Resource Persons**: Identification of the Resource Persons is a critical one as they will act as the future trainers to enhance the capacity building in the project preparation process in IAs and better supervision in NCRPB. As indicated earlier, any training that is given must reflect the use and application that will be made of the topics covered in accordance with the staff level within the organizations. Also they must have the required minimum skill level to absorb the preparation process. In identifying the Resource Persons, along with the suggestions from NCRPB the following parameters are also considered:

**Implementing Agencies**
- Lower Management Level
  - With technical knowledge and skills relevant to the identified subproject
  - Involved with the responsibilities with respect to the sample sub-project sector
  - Required computer literacy
- Middle / Senior Management Level
  - With technical knowledge and skills relevant to the identified subproject
  - Involved with the management responsibilities with respect to the sector in which the subproject falls

**NCRPB**
- Technical and Planning Level
  - With technical knowledge and skills relevant to the identified subprojects
  - Involved with the technical evaluation responsibilities with respect to the sector in which the subproject falls

**Management Level**
- officials involved in management responsibilities with respect to the sector in which the subproject falls

23. **Conduct Training Programs**: During the present project the capacity building task was carried through the following four types of training modules. Detailed training methods and program is presented in Figure 1.

**On-job Training**
- Structured Training through Workshops etc
- Site visits/study tours
- Preparation of training materials like guidelines, toolkits etc
Figure 1: Detailed Methodology and Program for Training

On Job Training
  - Involvement in TA activities
    - Resource persons (middle & junior level technical officials) of
      State NCR Cells
      ULBDAs
      Line Departments
    - Active involvement in TA in following activities
      - Data needs identification
      - Data collection & surveys
      - Demand forecasting & subproject
      - Feasibility studies
      - Detailed design
      - Tool kits preparation
  - WS 1: Introductory
  - WS 2: Master Plan Preparation
  - WS 3: Municipal Solid Waste Management
  - WS 4: Project Design & Due diligence activities
  - WS 5: Use of tool kits & sample project for preparation

Structured Training
  - Workshops
    - Elected representatives of ULBs
    - Administrators
    - All technical officers
    - Accounts officials
    - WS 1: Introductory
    - WS 2: Master Plan Preparation
    - WS 3: Municipal Solid Waste Management
    - WS 4: Project Design & Due diligence activities
    - WS 5: Use of tool kits & sample project for preparation
  - Lectures – case studies
    - Middle/junior level technical officers
    - Accounts and admin. officials
    - LS 1: DPR Review
    - LS 2: General Issues
    - LS 3: Sewage Treatment Options
    - LS 4: Integrated Water Management: Singapore Experience
    - LS 5: Project design & quality assurance
    - LS 6: Procurement procedures
  - Best Practice Field Visits (best practice projects, PPP projects & ongoing projects)
    - Elected representatives of ULBs
    - Administrators
    - All technical officers
    - Accounts officials
    - Visit 1: Elected representatives & administrators
    - Visit 2: Technical staff
    - Visit 3: Technical staff
III. ON-JOB TRAINING

24. On-job training a ‘hand-hold training’ process in which the target group to be trained will be involved in various activities of the TA including sector plan/master plan preparations, identification of subprojects for DPR preparation; data collection procedures including different types of surveys and preparation of DPRs. Through this mode of training, ADB TA consultant had involved officials from NCRPB, NCR Cells and the officials from the ULBs and IAs from the project towns at different stages.

25. Participation of senior and middle level officials from NCRPB in TA activities was excellent. During the periodical review meetings, regular interactions were there through presentations on different TA activities and discussions followed in which all the technical and management officials had active participation. With regard to the project towns, the participation and involvement level were found with mixed and overall encouraging. Methods adopted for ‘on-job’ training include presentations, joint visit to project sites, discussions on data requirements and data collections; participation in various surveys and investigations, stakeholders meetings, review of master plans, selection of subprojects for DPR preparation etc.

26. Major activities under ‘on-job’ training carried out by the TA Consultant include:

**NCRPB**

(i) Presentations and discussions on various technical activities during the periodical review meetings
(ii) Informal discussions with concerned individual officers on data availability, master plan / DPR preparation, etc
(iii) Planning, arrangements and conduct of workshops, technical lectures, study tours etc in co-ordination with NCRPB officials;
(iv) Technical and due-diligence Review of available DPRs submitted to NCRPB for funding.

**Ghaziabad**

27. Involvement of Ghaziabad Development Authority (GDA), Ghaziabad Nagar Nigam (GNN) and NCR Cell officials in data collection, selection of survey locations, presentation of Sector Plan findings and identification of four typical subprojects for Model DPR preparations all pertaining to the urban transport component;

28. Involvement of Ghaziabad Development Authority (GDA), Ghaziabad Nagar Nigam (GNN) and NCR Cell officials in secondary data collection, conduct of SWM field surveys with the participation of health department officials, presentation of Sector Plan findings and discussions over that, conduct of ward level stake holders meeting involving councillors to assess the present status of SWM, identification process for landfill site and participation in design related aspects in DPR preparation all pertaining to the SWM component.
Panipat

(i) Assessment of existing water supply facilities through joint field visits.
(ii) Identification of data availability and data gap through discussions.
(iii) Involvement of PHED, Panipat Division officials in reconnaissance, data collection, engineering surveys, demarcation of zones, phasing for Master Plan, identification of sites for OH tanks, treatment plants etc, suggestions in design during DPR preparation etc all pertaining to the water supply component.

Hapur

(i) Assessment of existing sewer supply facilities through joint field visits.
(ii) Identification of data availability and data gap through discussions.
(iii) Involvement of Hapur Municipality and HUDA officials in reconnaissance, data collection, engineering surveys, demarcation of zones, phasing for Master Plan, identification of sites for STP, trunk and other network components, suggestions in design during DPR preparation etc all pertaining to the sewer and storm water components.
IV. WORKSHOPS

A. WS1: Introductory Workshop

29. As part of the series of workshops planned during the TA, the ‘Introductory Workshop’ (WS 1) was organized by the TA Consultant in co-operation with NCRPB. The purpose of this workshop was to brief about the TA activities to all stakeholders including NCRPB, NCRPB Stare Cells, development authorities, ULBs and implementing agencies involved in urban infrastructure. Main objectives of the workshop include: (i) Provide an overview of the NCRPB activities including the Regional Plan 2021 and project financing to the stakeholders; (ii) discuss the present issues in the preparation of DPRs in project financing; (iii) Provide an overview of ADB participation through the present TA in capacity development program; (iv) Strategic issues and emerging trends in urban infrastructure planning for water supply, waste water, traffic planning, solid waste management and general; (v) Obtain an involvement and commitment from participants to support the present TA process; and (vi) Allow participants to provide their input into the DPR preparation in loan preparation process.

30. The Introduction Workshop was conducted on December 10, 2008 at Magnolia Hall, India Habitat Centre, New Delhi. Dr. Noor Mohammed, Member Secretary, NCRPB had inaugurated the workshop and delivered the inaugural address. Photos of the Workshop proceeding are presented in Appendix 1.

31. The workshop was attended by 72 participants with interest in contributing to the improvement and maintenance of the urban infrastructure in the NCR. Participants had representation from NCRPB, State NCR Cells, development authorities, ULBs, implementing agencies, academic institutions, Consultants from TA components (Component A & C.) and TA (Component B) Consultants. List of participants is attached in Appendix 2.

32. The Agenda and Process. In the opening session, Member Secretary, NCRPB provided an overview of the NCRPB, its existing and proposed activities, components of the TA and its processing schedule in the capacity development program. This was followed by a workshop overview. In the first session of the workshop, the topics covered include:

- NCRPB’s Regional Plan 2021
- NCRPB Funding for urban infrastructure projects
- Issues in DPR Preparation by National Reviewing Agencies

33. In the second session, emerging issues in the urban infrastructure planning in the following sectors were presented by the TA Team:

- Water supply
- Sewer & Waste Water
- Solid Waste Management
- Transport planning
- General Issues
34. In the subsequent Open House Session, participants raised few questions and clarifications on the presentations and NCRPB / AD TA activities which were clarified by NCRPB officials. Finally, the Workshop was concluded with the vote of thanks delivered by Shri R K Karna, Director (A&F), NCRPB. Details of presentations are attached in Appendix 3.

B. WS2: Workshop on Urban Infrastructure Master Plan Preparation Process

35. As part of the series of workshops and Technical Lectures planned during the TA, the present ‘Workshop on Urban Infrastructure Master Plan Preparation Process’ (WS 2) was organized by the TA Consultant in co-operation with NCRPB. The purpose of this workshop was to share the experiences of the master plan / sector plan process the TA Team had during the sector plan preparation for the identified sample subprojects for water supply, sewerage and drainage sectors with all stakeholders including NCRPB, NCRPB State Cells, development authorities, ULBs and implementing agencies involved in urban infrastructure. As a separate workshop and technical lecture is planned subsequently for Solid Waste Management (SWM) with more focus, as suggested by NCRPB in one of the Review Meeting, SWM Sector is not included in the workshop.

36. Main objectives of the workshop include:

(i) To appraise City level Master plan/ Sector Plan need and preparation processes for urban core sectors and train the stakeholders
(ii) To discuss the findings of the ‘Interim Report’ in the area of Sector Plan preparation for the identified urban core sectors (water supply, sewer, and drainage) and get their feedback towards improving the prepared sector plans
(iii) To share the experiences of the developments happening around in the areas of planning and selection of technology options for the urban core sectors through invited technical lectures
(iv) Strategic issues and emerging trends in urban infrastructure planning for urban core sectors
(v) Obtain an involvement and commitment from participants to support the present TA process
(vi) Allow participants to provide their input into the DPR preparation in loan preparation process

37. The Workshop was conducted on April 9, 2009 at Amaltash Hall, India Habitat Centre, New Delhi. Dr. Noor Mohammed, Member Secretary, NCRPB had inaugurated the workshop and delivered the inaugural address. Photos of the Workshop proceeding are presented in Appendix 4.

38. During the inaugural keynote address, the Member Secretary, NCRPB had explained the role of NCRPB in the areas of planning and development of urban core sectors in the National Capital Region. Preparation of the Functional Plans, Integrated Mobility Plan for all the major cities and towns in the NCR and City Development Plans (CDPs) for all the Metro and Regional Centres identified in Regional Plan-2021, details of the on-going sector specific studies, need for the planned approach with scientific approach for project identification for the controlled and desired development of the region, the role of Asian Development Bank (ADB) for the regional development through the present technical assistance and the proposed financial support, the role of the present TA towards the capacity development in the areas of bankable DPs were the topics covered in the keynote address. A detail of the keynote address is presented in Appendix 5.
39. The workshop was attended by 44 participants with interest in contributing to the improvement and maintenance of the urban infrastructure in the NCR. Participants had representation from NCRPB, State NCR Cells, development authorities, ULBs, implementing agencies, academic institutions, Consultants from TA components (Component A & C.) and TA (Component B) Consultants. List of participants is attached in Appendix 6.

40. During the morning session, a presentation on ‘Master Plan Concept and its relevance in Urban Core Sectors Planning’ by the TA Team Leader followed by master plan / sector plans prepared by the TA Team were presented. Each presentation was followed by an open discussion in which active participants was witnessed from the delegates.

- Water Supply Sector Plan for Panipat
- Sewerage Sector Plan for Hapur
- Drainage Sector Plan for Hapur

41. In the second session, the following special technical lectures were delivered by the subject specialists, focusing the planning aspects of urban core infrastructures.

- DSS Technology for Wastewater Treatment Options
- Integrated Water Resource Management: Singapore’s Experience

42. First technical lecture on ‘DSS Technology for Wastewater Treatment Options’ was delivered by Mr Subhash Verma, a renowned Sewerage Expert who had specialized in designing sewerage treatment plants. The lecture had focused on the objective and need for Decision Support System (DSS) on selection of treatment options, different technologies available including emerging onrs and their details, their relevance to different conditions, their pros and cons, cost implications, all with the reference to the requirements of NCR Region.

43. Second Technical lecture on ‘Integrated Water Resource Management: Singapore’s Experience’ was delivered by Mr. Rajeev Malhotra, Chief Regional Planner (CRP), NCRPB. During this technical lecture, CRP had shared his experience of recent visit to Singapore and his observation on water resource management activities of Singapore Government in managing the available limited water resources with future perspective. Also the presentation had focused the areas like water recycling process, integration of different demand areas, demand-supply management, cost recovery system, user charges etc that are more relevant to the Indian urban water supply management.

44. Both technical lectures were found to be informative and mind provoking and resulted in more intensive interaction from the participants. Most of the participants had participated in the discussions in which Mr Subhash Verma and Mr. Rajeev Malhotra, Chief Regional Planner (CRP), NCRPB had explained for the queries from the participants.

45. Finally, the Workshop was concluded with the vote of thanks delivered by Shri R K Karna, Director (A&F), NCRPB. Details of presentations on master plans are attached in Appendix 7.
C. WS3: Workshop on Municipal Solid Waste Management

46. As part of the series of workshops and Technical Lectures planned during the TA, the present ‘Workshop on Municipal Solid Waste Management’ (WS 3) was organized by the TA Consultant in co-operation with NCRPB. The purpose of this workshop was to share the experiences of the master plan / sector plan process the TA Team had during the sector plan preparation for the identified sample subproject for solid waste management (SWM) and sensitize the importance of SWM with all stakeholders including NCRPB, NCRPB State Cells, development authorities, ULBs and implementing agencies involved in urban infrastructure. Being the present workshop had focus on SWM only, ULBs who have the civic responsibility of SWM were given more importance and accordingly elected representatives, administrative heads and the officials responsible for SWM from 25 ULBs having population more than 50,000 (2001 Census) were targeted.

47. Main objectives of the workshop include:

(i) To appraise City level Master plan/ Sector Plan need and preparation processes for SWM and train the stakeholders
(ii) To share the experiences of the developments happening around in the areas of planning and selection of technology options for the urban core sectors through invited technical lectures
(iii) To sensitize the importance of SWM among the ULBs who have the responsibility
(iv) To share the Strategic issues and emerging trends in SWM
(v) To familiarize the concept of Clean Development Mechanism (CDM) and its relevance in SWM
(vi) Obtain an involvement and commitment from participants to support the present TA process
(vii) Allow participants to provide their input into the DPR preparation in loan preparation process

48. The Workshop was conducted on May 22, 2009 at Casuarina Hall, India Habitat Centre, New Delhi. Dr M Ramachandran, Secretary to Govt, Ministry of Urban Development, Govt of India had inaugurated the workshop and delivered the keynote address. Dr. Noor Mohammed, Member Secretary, NCRPB had delivered the inaugural address. Keynote Address was followed by the Technical Lecture by Mr PU Asnani on ‘Prevalent good practices and recent developments in India for processing of solid waste’. Second session was witnessed by the following two presentations. Photos of the Workshop proceeding are presented in Annexure 8.

- Planning to develop SWM in cities by Mr SK Goyal, SWM Expert, ADB TA Team
- Clean Development Mechanism – Carbon Credit Potential in SWM sector by Mr Vinaya Bansal

49. The workshop was attended by 92 participants with interest in contributing to the improvement and maintenance of the solid waste maintenance infrastructure in the NCR. Participants had representation from Asian Development Bank, NCRPB, State NCR Cells, development authorities, ULBs, implementing agencies, academic / research institutions, Consultants from ADB TA components (Component A & C.) and TA (Component B) Consultants. List of participants is given in Appendix 9.
50. During the inaugural address, the Member Secretary, NCRPB had welcomed the chief guest and other participants and subsequently explained the urban status in NCR and the existing scenario of SWM in NCR cities. The relevance of the Regional Plan 2001 in approaching the solid waste management issues in NCR He explained the need for sector plans for individual towns for which the required capacity to ULBs to be improved and added the NCRPB efforts towards this objective. Identification of landfill sites and if required common sites for geographically feasible grouped small towns are the other major areas highlighted in the inaugural address. A detail of the inaugural address is presented in Appendix 10.

51. During the keynote address, the Secretary, Ministry of Urban Development, Govt. of India had highlighted the importance of the SWM which is the prime responsibility of the ULBs along with the present status in terms of their physical efficiency levels and expenditure pattern at cities and other urban centers. Intervention by the Supreme Court through Expert Committee and the emergence of Municipal Solid Waste Management Rules, 2000 that had became mandatory for Class I cities and level of adherence to this rule by Class I cities were highlighted. His address further concentrated in the areas like the present activities and support provided by the Government of India for SWM like Jawaharlal Nehru National Urban Renewal Mission (JNNURM), provisions under National Urban Sanitation Policy(NUSP) etc, lessons learned from the success stories in adhering the MSW Rules and the opportunities and areas available for private sector participation in SWM. In general, the keynote address was an inspiring one in sensitizing the importance of SWM among the ULBs and other stakeholders. A detail of the keynote address is presented in Appendix 11.

52. All the three presentations (Appendix 12) were followed by discussion sessions in which most of the participants had participated actively. Both presenters as well subject experts had clarified the doubts raised by the participants. A summary on the discussion session is presented in Appendix 13. At the end of the morning session, Mr. Rajeev Malhotra, Chief Regional Planner, NCRPB had delivered the vote of thanks.
V. TECHNICAL LECTURES

53. As part of the structured training, training to the invited officials of the stake holders in NCR infrastructure development through specialised technical lectures was carried out by the TA Consultant. Nine technical lectures were arranged in which the relevant topics and technological issues pertaining to the urban development but not necessarily relevant to the present TA were covered. Covered topics include NCR Regional Plan 2021; Issues in reviewing DPRs submitted to NCRPB for funding; general strategy issues and emerging trends in urban infrastructure; waste water treatment options; Singapore experience in water management; SWM practices; and Clean Development Mechanism. For convenience purpose, the technical lectures were integrated with the workshops conducted. This training through technical lectures was aimed at appraising the procedures involved in the preparation of project identification and preparation so as to help the officials involved in urban infrastructure development in taking management decisions along with better supervision control. List of the technical lectures conducted are summed up below in Table 2 and Table 3.

54. During the remaining the period during September 2009 – March 2010, ADB TA has proposed to conduct further more technical lectures in which project design aspects, quality assurance, procurement issues etc will be focused.

Table 2: Details of Technical Lectures Conducted in Workshops

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| A | ‘Introductory Workshop’ in Magnolia Hall at India Habitat Centre on 10 Dec 2008  
Regional Plan 2021-Thrust areas for implementation: Shri Rajeev Malhotra, CRP, NCRPB  
Financing of Infrastructure projects by NCRPB: Shri PK Jain FAO & Shri Abhijet Samanta, AD PMC, NCRPB  
DPR Review Issues – Water & Sanitation Projects: Sh. JK Bassin, Scientist and Head, National Environment Engineering Research Institute (NEERI),  
DPR Review Issues – Transportation Projects: Shri Amit Sen Gupta, DGM, Engineers India Ltd (EIL)  
Urban Infrastructure Strategic Issues & Emerging Trends: Shri NS Shekhawat, Team Leader, TA Comp. B |
| B | ‘Workshop on Urban Infrastructure Master Plan Preparation Process’ at Amaltash Hall, India Habitat Centre, New Delhi on 9 April 2009  
DSS Technology for Wastewater Treatment Options: Mr Subhash Verma, Sewerage Expert  
Integrated Water Management: Singapore Experience: Mr. Rajeev Malhotra, Chief Regional Planner, NCRPB |
| C | ‘Workshop on Solid Waste Management’ at Casuarina Hall, India Habitat Centre, Lodhi Road Delhi, 22 May 2009  
Prevalent good practices and recent developments in India for processing of solid waste: Mr. P U Asnani, SWM Expert  
Clean Development Mechanism – Carbon Credit Potential in SWM sector: Mr. Vinaya Bansal, CDM Expert |
<table>
<thead>
<tr>
<th>Technical Session</th>
<th>Hand-on training for preparation of SWM Master Plan</th>
<th>Hand-on training for preparation of Sewerage Master Plan</th>
<th>Environmental Safeguards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective</td>
<td>Train participants in preparation of SWM master plan through actual data from respective town of the participant</td>
<td>Train participants in preparation of Sewerage master plan</td>
<td>Apprise the participants in environmental issues, laws, and mandatory requirements of urban infrastructure projects</td>
</tr>
<tr>
<td>Participants</td>
<td>15; IAs</td>
<td>12; IAs and NCRPB</td>
<td>15; NCRPB and IAs</td>
</tr>
<tr>
<td>Topics presented/discussed</td>
<td>Review of collected data Assessment of existing system Project population &amp; waste generation Norms/guidelines for MSWM plan Prepare plan for 20 years</td>
<td>Review of collected data Assessment of existing system Project population &amp; waste generation Norms/guidelines for Sewerage plan Prepare plan for 20 years</td>
<td>Environmental Legislation in India ADB Environmental Policy NCRPB Projects &amp; Applicability of Legislations EA Process Project Appraisal – Environmental Considerations Capacity Building for EM at NCRPB</td>
</tr>
</tbody>
</table>
VI. SITE VISITS & STUDY TOURS

A. Site Visits

55. On 22 May, 2009 afternoon, field visit to the following two SWM sites was arranged in New Delhi in which about 60 participants had participated. This visit was followed by the Workshop on Solid Waste Management held during the forenoon Session. Field visit helped the workshop participants to understand the operational system of the plants that are being operated by the private sector under PPP mode. During the field visit, the operators took the pain to explain and demonstrate the process and clarify the doubts raised by the participants. A brief note about the following SWM sites visited by the participants is presented in Appendix 14.

- Transfer Station near ISBT in New Delhi operated by M/s Anthony Waste Handling Cell Private limited, Mumbai
- Compost Plant at Okhla operated by M/s IL&FS

B. Study Tours

56. As a part of capacity building initiative, three Study Tours had been organized in which visits to ‘best practice urban infrastructure facilities’ in various cities in the country have been conducted. The main objective of the study tours was to create awareness about prevalent good practices and recent developments in India in the urban infrastructure, mainly in the areas of Solid Waste Management, Water Supply, Sewerage and Urban Transport. Also help in understanding the prevalent developments in improving the urban infrastructure facilities in terms of technology used, issues encountered during implementation, procurement practices, involvement of private sector participation etc which will be helpful for improving the civic service levels in NCR Towns.

57. **Study Tour 1.** The First Study Tour for five days was organized between 17 August 2009 (Monday) and 21 August 2009 (Friday). Places covered during the First Tour include Ahmedabad (2 days), Tiruppur (one day) and Chennai (2 days). Tour was organized in such a way that each destinations will have i) meetings with the ULBs/Govt. departments / implementing agencies who are implementing the ‘show case’ urban infrastructure projects; and ii) field visits to the identified ‘show case’ projects. In identified ‘show case’ projects, representation to water supply, sewerage, SWM, urban transport and other infrastructure projects was given.

58. Size of the Study Team was 14 members consisting of elected Mayor / Chairpersons of ULBs; and top level officials from state Urban Development Departments, Haryana PHED and Deputy Commissioners / Superintending Engineer from ULBs, officials from NCRPB all dealing with NCR development. Detailed tour program is given in Table 4. Details of the list agencies identified for meetings and projects included for field visits are presented in Error! Reference source not found.. List of participants and photographs of first tour is presented in Appendix 15.
**Table 4: Program of the First Study Tour**

<table>
<thead>
<tr>
<th>Place</th>
<th>Date</th>
<th>Activity</th>
<th>Transport Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmedabad</td>
<td>17 August 2009 (1/2)</td>
<td>Travel (Del-Ahmed)</td>
<td>Air (Spice Jet 0725 - 0905 Hrs)</td>
</tr>
<tr>
<td></td>
<td>17 August 2009 (1/2)</td>
<td>Meetings - 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17 August 2009 (2/2)</td>
<td>Field Visits - 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 August 2009 (1/2)</td>
<td>Meetings - 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 August 2009 (1/2)</td>
<td>Field Visits - 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 August 2009 (Evening)</td>
<td>Travel (Ahmed-Mumbai - Coimbatore)</td>
<td>Air 1, Ahmed - Mumbai (Jetlite 1450 - 1610 Hrs); 2, Mumbai - Coimbatore (Jetlite 1755 - 1945 Hrs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Travel (Coimbatore - Tiruppur)</td>
<td>Luxury Coach</td>
</tr>
<tr>
<td>Tiruppur</td>
<td>19 August 2009 (1/2)</td>
<td>Meetings - 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19 August 2009 (2/2)</td>
<td>Field Visits - 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19 August 2009 (2/2)</td>
<td>Shopping</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19 August 2009 (Night)</td>
<td>Travel (Salem - Chennai)</td>
<td>Train (Around 2200 hrs)</td>
</tr>
<tr>
<td>Chennai</td>
<td>20 August 2009 (1/2)</td>
<td>Meetings - 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 August 2009 (2/2)</td>
<td>Field Visits - 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 August 2009 (2/2)</td>
<td>Site Visit (Mahabalipuram &amp; Kanchipuram)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 August 2009 (1/2)</td>
<td>Meetings - 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 August 2009 (2/2)</td>
<td>Field Visits - 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 August 2009 (Night)</td>
<td>Travel (Chennai - Delhi)</td>
<td>Air - Chennai - Delhi (Air India 2000 - 2230)</td>
</tr>
</tbody>
</table>

**Table 5: Details of Meetings & Field Visits – First Study Tour**

<table>
<thead>
<tr>
<th>Place</th>
<th>Date</th>
<th>Activity</th>
<th>Transport Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmedabad</td>
<td>17 August 2009 (1/2)</td>
<td>Travel (Del-Ahmed)</td>
<td>Air (Spice Jet 0725 - 0905 Hrs)</td>
</tr>
<tr>
<td></td>
<td>17 August 2009 (1/2)</td>
<td>Meetings - 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17 August 2009 (2/2)</td>
<td>Field Visits - 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 August 2009 (1/2)</td>
<td>Meetings - 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 August 2009 (1/2)</td>
<td>Field Visits - 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 August 2009 (Evening)</td>
<td>Travel (Ahmed-Mumbai - Coimbatore)</td>
<td>Air 1, Ahmed - Mumbai (Jetlite 1450 - 1610 Hrs); 2, Mumbai - Coimbatore (Jetlite 1755 - 1945 Hrs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Travel (Coimbatore - Tiruppur)</td>
<td>Luxury Coach</td>
</tr>
<tr>
<td>Tiruppur</td>
<td>19 August 2009 (1/2)</td>
<td>Meetings - 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19 August 2009 (2/2)</td>
<td>Field Visits - 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19 August 2009 (2/2)</td>
<td>Shopping</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19 August 2009 (Night)</td>
<td>Travel (Salem - Chennai)</td>
<td>Train (Around 2200 hrs)</td>
</tr>
<tr>
<td>Chennai</td>
<td>20 August 2009 (1/2)</td>
<td>Meetings - 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 August 2009 (2/2)</td>
<td>Field Visits - 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 August 2009 (2/2)</td>
<td>Site Visit (Mahabalipuram &amp; Kanchipuram)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 August 2009 (1/2)</td>
<td>Meetings - 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 August 2009 (2/2)</td>
<td>Field Visits - 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 August 2009 (Night)</td>
<td>Travel (Chennai - Delhi)</td>
<td>Air - Chennai - Delhi (Air India 2000 - 2230)</td>
</tr>
</tbody>
</table>

**Table 4:** Program of the First Study Tour

**Table 5:** Details of Meetings & Field Visits – First Study Tour

<table>
<thead>
<tr>
<th>Place</th>
<th>Proposed Meetings</th>
<th>Likely Field Visit Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ahmedabad</td>
<td>1. Gujarat Infrastructure Development Board (GUIDB) – implementing many urban infrastructure projects under PPP format</td>
<td>1. Landfill Site</td>
</tr>
</tbody>
</table>
2. Ahmedabad Municipal Corporation –  
- implementing all the urban infrastructure projects;  
- Implementing many administrative reform measures;  
- Town Planning Schemes through land pooling

2. BRTS  
3. River Front Development  
4. E-governance Centre  
5. Sanjay Nagar Slum Networking (implemented under JNNURM)  
6. Konkaria Lake Development Program

2. Trippur  
1. New Trippur Area Development Corporation Ltd (NTADCL)  
- Implementation of WS under PPP - Lessons learned;  
- Project structure

1. Site visit to Plant (with state of art technology)

2. Tamil Nadu Urban Infrastructure Financial Services Ltd (TNIFSL)  
- Infrastructure Financing to ULBs;  
- Implementation of Adayar Poonga Project (Environment Park)

1. integrated SWM at Pammal Municipality (operated by Civic EXNORA with PepsiCo)

3. Chennai  
2. Directorate of Municipal Administration  
- Collection and management of data on municipal services for all Municipalities towards ‘Bench marking’;  
- Implementation of improved accounting system;  
- CDP Preparations for all Municipalities

2. Metro Water - Sewer Treatment Plant (under Private Sector Operation)  
3. Integrated Compost Plant at Venkatamangalam (common for three Municipalities of Alandur, Pallavaram & Tambaram)  
4. Power generation from Vegetable Market Waste (Koyambedu)  
5. Adayar Poonga (Environment Park)  
6. Alandur STP Site (under Private Operation)

59. During the five day visit, identified project sites in urban infrastructure representing the ‘best practice’ show case projects covering different sectors like water supply, sewerage, solid waste management, urban transport, urban land development, ground water recharging through rain water harvesting etc were visited mainly to understand the procedures involved / problems faced / failures encountered during the design, implementation and operation stages. Thus the site visits to the identified show case projects helped the Team Members to interact with the concerned officials about the projects on site.

60. Study tour was planned in such a way that meetings were arranged with the departments / agencies who are dealing with the identified best-practice show case projects in which detailed discussions on these projects were explained to the Team Members through presentation and interaction process. These meetings were followed by field visits to the
identified project sites accompanied by project officials who further clarified Team Members clarifications.

61. Show case projects visited include projects implemented under PPP mode like Tiruppur Industrial Water Supply, Sewer Treatment Plant in Alandur Municipality, sanitary landfill site in Ahmedabad, SWM operation in Pammal Municipality operated by an NGO (EXNORA), etc. This helped the participants to understand the financing, procurement, cost recovery concepts of urban infrastructure projects.

63. Team members had meaningful interactions with the officials of the identified ‘show case’ project sites in understanding the implementation and maintenance aspects and issues encountered, involvement of private sector participation in construction and maintenance aspects including PPP model projects, procurement issues etc. In particular the common landfill site for more than one ULBs, participation of NGOs, private sector involvement in SWM for smaller ULBs, implementation of STPs in PPP mode, e-governance aspects in maintaining the ULBs data base, benchmarking of municipal services among different ULBs etc. This exposure to the team members representing the NCR will help in improving the civic infrastructure service facilities in the NCR.
64. **Study Tour 2.** The Second Study Tour for five days was organized between 4 January 2010 (Monday) and 8 January 2010 (Friday). Places covered during the Second Tour include Nagpur (2 days) and Bangalore (3 days). Although Hyderabad was included initially, it has been cancelled due to some disturbances in the city at that time. Size of the Study group was 17 members consisting of top level officials from states, Haryana PHED, UP Jal Nigam, Officers from ULBs, Planners from NCR Cells and officials from NCRPB all dealing with NCR development and officials from NCRPB (list of participants and photographs of second tour is presented in Appendix 16).

65. During the five day visit, identified project sites in urban infrastructure representing the ‘best practice’ show case projects covering different sectors like water supply, sewerage, solid waste management, urban transport, urban land development, financing arrangements for urban infrastructure etc were visited mainly to understand the procedures involved / problems faced / failures encountered during the design, implementation and operation stages. Thus the site visits to the identified show case projects helped the Team Members to interact with the concerned officials about the projects on site.

66. Study tour was planned in such a way that meetings were arranged with the departments / agencies who are dealing with the identified best-practice show case projects in which detailed discussions on these projects were explained to the Team Members through presentation and interaction process. These meetings were followed by field visits to the identified project sites accompanied by project officials who further clarified Team Members clarifications. Show case projects visited include Water Supply and Sewer Treatment Plant in Nagpur, water supply, municipal reform centre, transport terminal etc in Bangalore. This helped the participants to understand the financing, procurement, cost recovery concepts of urban infrastructure projects. Detailed tour program is given in **Table 6.** Details of the list agencies identified for meetings and projects included for field visits are presented in **Table 7.**

**Table 6: Program of the Second Study Tour**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time From</th>
<th>Time To</th>
<th>Program/Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Jan-10</td>
<td>19.45</td>
<td>21.15</td>
<td>Delhi – Nagpur (Air Travel -6E 137)</td>
</tr>
<tr>
<td></td>
<td>21.30</td>
<td>22.00</td>
<td>Local Travel: To Hotel</td>
</tr>
<tr>
<td>4-Jan-10</td>
<td>10.15</td>
<td>10.45</td>
<td>Local Travel: Hotel-Nagpur Municipal Office</td>
</tr>
<tr>
<td></td>
<td>11.00</td>
<td>12.30</td>
<td>Meeting at Municipal Office</td>
</tr>
<tr>
<td></td>
<td>12.30</td>
<td>14.00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td></td>
<td>14.00</td>
<td>17.00</td>
<td>Field visits to STP &amp; SWM Sites</td>
</tr>
<tr>
<td></td>
<td>17.00</td>
<td>17.30</td>
<td>Local Travel: Back to Hotel</td>
</tr>
<tr>
<td></td>
<td>17:30</td>
<td></td>
<td>End of day business</td>
</tr>
<tr>
<td>5-Jan-10</td>
<td>9.00</td>
<td>9.30</td>
<td>Hotel Checkout</td>
</tr>
<tr>
<td></td>
<td>9.30</td>
<td>10.00</td>
<td>Local Travel: Hotel – Airport</td>
</tr>
<tr>
<td></td>
<td>11.15</td>
<td>12.30</td>
<td>Air Travel : Nagpur– Pune (Air Travel -6E 136)</td>
</tr>
<tr>
<td></td>
<td>14.15</td>
<td>15.30</td>
<td>Air Travel : Pune – Bangalore (Air Travel -9W2352)</td>
</tr>
<tr>
<td></td>
<td>15:30</td>
<td>16:00</td>
<td>Arrival, Bangalore Airport</td>
</tr>
<tr>
<td></td>
<td>16:00</td>
<td>17:00</td>
<td>BMTC Varja Bus Ride from Airport to Hotel (Cunningham Road)</td>
</tr>
<tr>
<td>Date</td>
<td>Time From</td>
<td>Time To</td>
<td>Program/Schedule</td>
</tr>
<tr>
<td>----------</td>
<td>-----------</td>
<td>----------</td>
<td>-------------------</td>
</tr>
<tr>
<td>17:00</td>
<td>End of day business</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-Jan-10</td>
<td>9:00</td>
<td>10:00</td>
<td>Local Travel: from Hotel to MRC, Rajaji Nagar</td>
</tr>
<tr>
<td></td>
<td>10:00</td>
<td>10:30</td>
<td>Visit: MRC</td>
</tr>
<tr>
<td></td>
<td>10:30</td>
<td>11:45</td>
<td>KUIDFC Presentation (KUIDFC Overview, activities, fund pooling, projects, 24X7 water supply experiences sharing on urban infrastructure implementation (tendering &amp; PPP), MRC &amp; CMAK)</td>
</tr>
<tr>
<td></td>
<td>11:45</td>
<td>12:00</td>
<td>Break</td>
</tr>
<tr>
<td></td>
<td>12:00</td>
<td>13:00</td>
<td>BBMP Presentation (Overview, initiatives, zero waste management, slum improvement, city beautification, etc)</td>
</tr>
<tr>
<td></td>
<td>13:00</td>
<td>14:00</td>
<td>Lunch (to be organized by BBMP/KUIDFC)</td>
</tr>
<tr>
<td></td>
<td>14:00</td>
<td>15:00</td>
<td>Local travel: MRC to Mandur Integrated SWM Facility. City beautification initiatives (painting on walls) can be shown on the way</td>
</tr>
<tr>
<td></td>
<td>15:00</td>
<td>16:30</td>
<td>Visit: Mandur Integrated SWM Facility</td>
</tr>
<tr>
<td></td>
<td>16:30</td>
<td>17:30</td>
<td>Local travel: Mandur to Hotel</td>
</tr>
<tr>
<td></td>
<td>17:30</td>
<td></td>
<td>End of day business</td>
</tr>
<tr>
<td>7-Jan-10</td>
<td>8:00</td>
<td>14:30</td>
<td>TK Halli WTP Visit (lunch break on the way or at Bangalore)</td>
</tr>
<tr>
<td></td>
<td>14:30</td>
<td>16:00</td>
<td>BWSSB Presentation at Cauvery Bhavan (overview, initiatives, reforms, user charges &amp; recovery, GIS) and visit to GIS cell</td>
</tr>
<tr>
<td></td>
<td>16:00</td>
<td>18:00</td>
<td>Visit to Cubban Park/Yalahanka STP</td>
</tr>
<tr>
<td></td>
<td>18:00</td>
<td></td>
<td>End of day business</td>
</tr>
<tr>
<td>8-Jan-10</td>
<td>9:00</td>
<td>10:00</td>
<td>Hotel Check Out</td>
</tr>
<tr>
<td></td>
<td>9:00</td>
<td>10:00</td>
<td>Local travel: Hotel to Yashwantpur TTMC</td>
</tr>
<tr>
<td></td>
<td>10:00</td>
<td>10:45</td>
<td>Visit: Yashwantpur TTMC</td>
</tr>
<tr>
<td></td>
<td>10:45</td>
<td>11:30</td>
<td>Local travel: Yashwantpur TTMC to BMTC Central Office</td>
</tr>
<tr>
<td></td>
<td>11:45</td>
<td>13:00</td>
<td>BMTC Presentation (overview of organization, operations, new initiatives, projects &amp; reforms, financial status, user charges, any other innovatives)</td>
</tr>
<tr>
<td></td>
<td>13:00</td>
<td>14:00</td>
<td>Lunch</td>
</tr>
<tr>
<td></td>
<td>14:00</td>
<td>15:00</td>
<td>Free Time</td>
</tr>
<tr>
<td></td>
<td>15:00</td>
<td>15:50</td>
<td>Local Travel: To Airport</td>
</tr>
<tr>
<td></td>
<td>16:50</td>
<td></td>
<td>Departure to Delhi (9W 816 Bangalore –Delhi 16.50 -19.30 Hrs)</td>
</tr>
</tbody>
</table>

67. **Nagpur Visit.** A meeting was held in the Standing Committee Hall of Nagpur Municipal Corporation on 4 Jan 2010. The Deputy Commissioner NMC informed briefly the developmental works, reforms and new initiatives taken up by the NMC. Mr Shashi Kant Hastan Executive Engineer described in detail the work of implementation of 24x7 water supplies in one zone of Nagpur and ongoing tendering for implementing 24x7 water supply in complete Nagpur city. Shri. Md. Israil Deputy Engineer explained initiatives taken up under JNNURM and proposed reuse of 245 MLD treated waste water for
industries in MIDC, Maharastra State Power Generation Co. (MSPGCL) - 110 MLD, Institutes in city such as Railways, city and state transport, gardens, forest, nursery, vehicle service centres, Irrigation water for all crops including those eaten raw -70 MLD etc. Mr Israil also explained construction of 240 MLD water treatment plant with pulsater clarification and high rate filtration. Power point presentations were made by Mr Rathi Project Consultant and Mr Rahul Lohakare project Manager VEOLIA (The contractor for 24 x 7 and rehabilitation of WTP)

68. Site visits were conducted to see sewage treatment plant 100 MLD capacity at Bhandewadi, 24 x 7 water supply implementation and a lake proposed for environmental protection.

69. **Bangalore Visit.** The Team’s visit to Bangalore (5-8 Jan 2010) was highly successful as an eye-opener to the team members. Various initiatives taken by Karnataka Urban Infrastructure Development Finance Corporation (KUIDFC), Bangalore Mahanagara Palike (BBMP), Bangalore Water Supply and Sewerage Board (BWSSSB) and Bangalore Metropolitan Transport Corporation (BMTC) were highly appreciated by one and all. The presentations made by respective organizations provided an opportunity to the team to learn various initiatives taken and the visit to the sites provided firsthand information on how the best infrastructure facilities are built and operated.

70. **Karnataka Urban Infrastructure Development Finance Corporation (KUIDFC).** The presentation by KUIDFC provided an opportunity to learn on how the large scale urban sector projects are implemented, fund mobilization and pooled funds, project execution and monitoring, bid process management, and utilization of IT in project implementation and monitoring. The idea of arranging the meeting at sophisticated and modern MRC office itself was a very good idea. This has show-cased an appropriate working environment of a modern government office. Team consisting of Dr. Nandan Kumar, Mr. Pratinidhi, and Mr. KM Ramesh provided useful interaction and presentation to the Team.

71. Team benefitted highly from experience visit to **Municipal Reforms Centre (MRC),** the various reforms implemented and utilization of IT in data management and dissemination. The management, monitoring and accessibility of data from over 200 ULBs in entire state is something everybody should learn from. Bangalore – a truly IT capital in every sense. Similarly, the initiatives taken by CMAK and its active approach were highly appreciated. Mr. Ziya Ullah and his team at MRC supported the presentation and visit to MRC.

72. **Bruhat Bangalore Mahanagara Palike (BBMP):** Its initiatives such as ‘zero garbage zone’ were learning experience to the team. This pilot project demonstrated how the local bodies can achieve highest standards in the sanitation in urban areas. Team felt that if this can be implemented and achieved so well in a highly congested mixed activity area of Gandhinagar, then it can be replicated elsewhere easily. The Gandhinagar success story of this initiative was published by ‘the Hindu’ in its Bangalore edition recently. The IT initiatives undertaken by BBMP in its various activities were highly appreciated. GIS, Green Ambassador, e-procurement were few of the best initiatives BBMP show cased to the team. In the solid waste treatment and disposal sector, the team felt the BBMP is way-ahead of others. Its initiatives through PPP and gradual change from tipping fee based arrangement to return tipping fee were a learning point to the team. Team consisting of Dr. Khandre (PRO), Mr. Sheshadri (IT Advisor), Mr. MG Srinivas (CE), Mr. Parameswara (SE), Mr. Ramesh (EE) helped in interaction, site visit and presentation to the Team.
73. **The Bangalore Water Supply and Sewerage Board (BWSSB):** Its initiatives in UFW reduction, revenue management system, GIS based data management system, MIS, kiosks, tertiary sewage treatment and supply of recycled water were a learning lesson for the team. This showcased how a government-owned water supply and agency can run efficiently and on no-profit and no-loss basis. Team’s visit to Cubban Park STP (MBR based) and TK Halli WTP (with pulsators) was a great experience. Both plants are working at maximum efficiency, and the campuses are very well maintained. This is where the team gained firsthand experience on modern sewage and water treatment facilities. Mr. GM Shivaraju (EE), VC Kumar (AEE), Ranga Swamy (AEE), Laxmikant (Maintenance Engineer), and Nagaraju (Cashier) helped in interaction, site visit and presentation to the Team.

74. **Bangalore Metropolitan Transport Service (BMTC):** On the last day of the visit, the Team visited BMTC central office and TTMC (under construction) at Shanti Nagar. The team gained good experience the way the TTMCs were conceived and built. Probably BMTC is one of the few agencies utilizing the JNNURM funds to a maximum extent. The team learnt, first-hand, how the BMTC achieved the impossible and became a profit making public sector urban transport agency. Its various measures in cost cutting, efficiency improvement including automated driving test to drivers to reduce accidents, initiating highly successful Vajra airport service were a great learning experience to the team. BMTC Team consisting of Mr. Palanetra Naik (CE), Mr. Rajashekhar (PA to MD), Mr. Nagaraj (EE), Mr. Narendrakumar (EE) and Vijay Chandapur (AEE) helped the study team in presentations and site visits.

### Table 7: Details of Meetings & Field Visits – Second Study Tour

<table>
<thead>
<tr>
<th>Date</th>
<th>Organizations</th>
<th>Projects Visited</th>
<th>Meetings &amp; Presentations</th>
</tr>
</thead>
</table>
| 4-5 January, 2010 | Nagpur Municipal Corporation (NMC), Maharashtra State | • Water supply project with Leak Deduction Initiatives and Implementation of 24x7 supply  
• Sewer Treatment Plant with the planning of recycling facility for industrial use | • Meeting with Dy. Commissioner and other Officials of NMC  
• Presentation on BRTS, Sabarmati River Front Development, and Slum Networking Projects followed by discussion |
| 6-8 January, 2010 | Karnataka Urban Infrastructure Development Finance Corporation (KUIDFC) |                                                                              | • Meeting with KUIDFC Officials  
• presentation by KUIDFC provided an opportunity to learn on how the large scale urban sector projects are implemented, fund mobilization and pooled funds, project execution and monitoring, bid process management, and utilization of IT in project implementation and monitoring followed by discussion |
|               | Bruhat Bangalore Mahanagara Palike (BBMP)          | • Municipal Reform Centre (MRC)                                                    | • Meeting with BBMP Officials  
• Presentation on initiatives such as ‘zero garbage zone’ Model, followed by discussion |
### Table 8

<table>
<thead>
<tr>
<th>Date</th>
<th>Organizations</th>
<th>Projects Visited</th>
<th>Meetings &amp; Presentations</th>
</tr>
</thead>
</table>
|               | Bangalore Water Supply and Sewerage Board (BWSSB) | • Cubban Park STP (MBR based)  
• TK Halli WTP (with pulsators)                                                  | • Meeting with BWSSB Officials  
• Presentation on the initiatives in UFW reduction, revenue management system, GIS based data management system, MIS, koisks, tertiary sewage treatment and supply of recycled water |
|               | Bangalore Metropolitan Transport Corporation (BMTC) | • TTMC (under construction) at Shanti Nagar                                      | • Meeting with BMTC Officials  
• Presentation on various measures in cost cutting, efficiency improvement including automated driving test to drivers to reduce accidents, initiating highly successful Vajra airport service etc followed by discussions |

75. **Study Tour 3.** The Third Study Tour for five days was organized between 19 April 2010 (Monday) and 23 April 2010 (Friday). Places covered during the Third Tour include Indore (1 day), Kochi (2 days) and Chennai (2 days). Size of the Study Team was 15 members consisting of top level officials from state Urban Development Departments, Haryana PHED and Deputy Commissioners / Superintending Engineer from ULBs, officials from NCRPB all dealing with NCR development (list of participants and photographs of third tour is presented in Appendix 17). The details of tour program are given in **Table 8**.

76. During the five day visit, identified project sites in urban infrastructure representing the ‘best practice’ show case projects covering different sectors like water supply, sewerage, solid waste management, urban transport, urban land development, ground water recharging through rain water harvesting etc were visited mainly to understand the procedures involved / problems faced / failures encountered during the design, implementation and operation stages. Thus the site visits to the identified show case projects helped the Team Members to interact with the concerned officials about the projects on site.

77. Study tour was planned in such a way that meetings were arranged with the departments / agencies who are dealing with the identified best-practice show case projects in which detailed discussions on these projects were explained to the Team Members through presentation and interaction process. These meetings were followed by field visits to the identified project sites accompanied by project officials who further clarified Team Members clarifications.

78. Show case projects visited include projects implemented under Asian Development Bank finance like Indore water Supply, Road and Slum development projects in Kochi; projects implemented under PPP mode like Sewer Treatment Plant in Chennai, sanitary landfill site in Kochi; projects implemented under JNNURM like SWM Transfer Stations in Chennai; projects implemented by Municipal Corporations including Mareena Beach Corridor Development in Chennai etc. This helped the participants to understand the financing, procurement, cost recovery concepts of urban infrastructure projects. Details of organizations and projects covered during the trip are given in **Table 9**.
### Table 8: Program of the Third Study Tour

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td><strong>INDORE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 April 2010</td>
<td>- Evening</td>
<td>Travel (Del-Indore)</td>
</tr>
<tr>
<td>19 April, 2010</td>
<td>8AM – 5PM</td>
<td><strong>Indore Municipal Corporation</strong> Field Visit &amp; Meeting – Recently completed Water Supply Project with ADB Support with source from Narmada River</td>
</tr>
<tr>
<td></td>
<td>8.45PM –</td>
<td>Travel (Indore - Mumbai)</td>
</tr>
<tr>
<td></td>
<td>9.55PM</td>
<td></td>
</tr>
<tr>
<td><strong>KOCHI</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 April, 2010</td>
<td>8.40AM-10.40AM</td>
<td>Travel (Mumbai-Kochi)</td>
</tr>
<tr>
<td></td>
<td>2.00PM – 5PM</td>
<td><strong>Kochi Corporation</strong> Meetings - 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Courtesy meeting with Mayor &amp; Other higher officials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interaction with Technical Officials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Presentations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Kochi Corporation Activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Implementation of Solid Waste Management Project under JNNURM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• KUDUMBASREE (their role in urban development &amp; mainly in SWM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• KSUDP (implementation in Kerala &amp; Kochi)</td>
</tr>
<tr>
<td>21 April 2010</td>
<td>9AM – 11AM</td>
<td>Field Visit 1 – ADB funded KSUDP Project Sites</td>
</tr>
<tr>
<td></td>
<td>11AM – 1PM</td>
<td>Field Visit 2 - Solid Waste Site implemented under JNNURM</td>
</tr>
<tr>
<td></td>
<td>3PM – 5PM</td>
<td>Field Visit 3 - Backwater Boat ride (for about 1 – 2 hours)</td>
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<tr>
<td><strong>CHENNAI</strong></td>
<td></td>
<td></td>
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<tr>
<td>22 April, 2010</td>
<td>7.50AM – 8.55AM</td>
<td>Travel (Kochi-Chennai)</td>
</tr>
<tr>
<td></td>
<td>11.30AM – 1.30PM</td>
<td><strong>Chennai Corporation</strong> Meetings - 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Courtesy meeting with Mayor, Commissioner &amp; Other higher officials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Presentations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• General on Chennai Corporation focusing on the best practices like Rain Water Harvesting, On-line Building plan Approval Program etc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solid waste Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Marina Beach Corridor Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interaction with Technical Officials</td>
</tr>
<tr>
<td></td>
<td>2.15PM – 3.30PM</td>
<td>Field Visit 1 – Recently completed Solid Waste Transfer stations</td>
</tr>
<tr>
<td></td>
<td>4.00PM – 5.00PM</td>
<td>Field Visit 2 – On-going Marina Beach Corridor Development Activities</td>
</tr>
</tbody>
</table>

*ADB*: Asian Development Bank  
*JNNURM*: Jawaharlal Nehru National Urban Renewal Mission  
*SWM*: Solid Waste Management
<table>
<thead>
<tr>
<th>Date</th>
<th>Organizations</th>
<th>Projects Visited</th>
<th>Meetings &amp; Presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 April, 2010</td>
<td>Indore Municipal Corporation (IMC), Indore, Madhya Pradesh</td>
<td>Recently completed Water Supply Project with ADB Support with source from Narmada River</td>
<td>Meeting with Project officials at Project Site</td>
</tr>
<tr>
<td>20 &amp; 21 April, 2010</td>
<td>Kochi Municipal Corporation, Kochi, Kerala</td>
<td>ADB funded KSUDP Project Sites (SWM Implementation, Slum Development, Road improvements) Solid Waste Site implemented under JNNURM Marine Drive Area development</td>
<td>Meeting with Mayor, Secretary and other Officials of Kochi Corporation Presentations Kochi Corporation Activities Implementation of Solid Waste Management Project under JNNURM KUDUMBASREE (their role in urban development &amp; mainly in SWM) KSUDP (implementation in Kerala &amp; Kochi City) followed by discussion</td>
</tr>
<tr>
<td>22 April, 2010</td>
<td>Chennai Municipal Corporation, Chennai, Tamil Nadu</td>
<td>Field visits Recently completed Solid Waste Transfer stations On-going Marina Beach Corridor Development Activities</td>
<td>Presentations General on Chennai Corporation focusing on the best practices like Rain Water Harvesting, Online Building plan Approval Program etc Solid waste Management Marina Beach Corridor Development Interaction with Technical Officials</td>
</tr>
<tr>
<td>23 April, 2010</td>
<td>Chennai</td>
<td></td>
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</tr>
<tr>
<td>Year</td>
<td>Organization</td>
<td>Description</td>
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<tr>
<td>2010</td>
<td>Metropolitan water Supply and Sewerage Board (CMWSSB) Chennai, Tamil Nadu</td>
<td>Field Visit to KK Nagar Sewer Treatment Plant</td>
<td>Meetings - 2 Presentations on General aspects focusing on water supply and sewerage program for Chennai City on the best practices like Rain Water Harvesting, private sector participation in maintenance, external funding etc Interaction with Technical Officials</td>
</tr>
</tbody>
</table>
VII. PROJECT PREPARATORY TOOLKIT

79. Tool Kit for project preparation (water supply, sewerage, solid waste management and storm water drainage) has been developed to provide guidance to implementing agencies (IAs)/ULBs in preparation of urban infrastructure projects that will meet the minimum requirements in quality aspects for the funding agencies like NCRPB and ADB. Accordingly, this also is being used as one of the training modules under the present capacity building process.

80. Tool Kit is meant to be more of a reference material to be used with necessary discretion as per requirement than a manual to be followed literally. Thus Tool Kit can be used by implementing agencies for project preparation. This would be particularly useful in deciding on the sequence of activities and their implementation protocol. This could be carried by officials presently preparing projects for referencing in situations where they do not already know what is to be done. That is exactly why all the tasks in the project preparation are sequentially structured in a how to do manner to facilitate informed decision making by the officials. Any chapter of the tool kit could be used for the related activity separately as per requirement, without necessarily following the steps related to other activities in other chapters, though it would be useful to refer to them as well.

81. Generally the Tool Kit defines all major tasks and sub-tasks in sequentially arranged in chapters/sections. All the major tasks that have to carry out during the DPR preparation will be explained in separate chapters. Each chapter will have three sections viz., (i) Tasks (ii) Steps and (iii) Indicative Outputs. Officials in ULBs and IAs who have responsibility of project preparation can use this Tool Kit as a guidebook. All reports prepared under the TA are unloaded on this web-based toolkit as reference material. This toolkit website will be available through NCRPB website, which is under development. An image of the tool kit website is shown in Figure 2. The Toolkit is appended to this report in a Compact Disc (CD).
Figure 2: Image of Toolkit Website
Appendix 1

National Capital Region Planning Board, Asian Development Bank

Introductory Workshop in Magnolia Hall at India Habitat Centre on 10 Dec 2008

Views of Workshop

Discussion with the Chief Guest before start of Workshop

Registration in progress

Welcome Address by Shri NS Sekhawat, Team Leader, Wilbur Smith Associates

Facilitating the Chief Guest
Inaugural Address by the Chief Guest, Dr Noor Mohammed, Member Secretary, NCRPB

Presentation by Shri Rajeev Malhotra, CRP, NCRPB

Presentation by Shri PK Jain FAO & Shri Abhijeet Samanta, AD PMC, NCRPB

Presentation by Shri M Boominathan, Dy. Team Leader/Economist, Wilbur Smith Associates

Presentation by Sh. JK Bassin, Scientist and Head, NEERI

Presentation by Shri. Amit Sen Gupta, DGM, EIL
Reply to the queries by NCRPB Officials during the Open House

Vote of Thanks by Shri R K Karna, Director (A&F), NCRPB
# Appendix 2

National Capital Region Planning Board, Asian Development Bank  
Introductory Workshop in Magnolia Hall at India Habitat Centre on 10 Dec 2008

## List of Participants

<table>
<thead>
<tr>
<th>S.N o</th>
<th>Name of the Agency</th>
<th>Name of the Officer</th>
<th>Address of the Officer</th>
<th>Contact No</th>
</tr>
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<tbody>
<tr>
<td>A. Haryana Sub Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Chief Administrator Haryana Urban Development Authority</td>
<td>Sh Amreek Singh, Addl (CE)</td>
<td>Sec-6, HUDA Complex, Panchkula - 134109</td>
<td>9910840548</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Sh SK Singhla, SE (Storm Water Drainage)</td>
<td>Sec-6, HUDA Complex, Panchkula - 134109</td>
<td>9810052965</td>
</tr>
<tr>
<td>3</td>
<td>Secretary Haryana Slum Clearance Board</td>
<td>Sh. Satyawan, Municipal Engineer,</td>
<td>SCO No. 6-7, Sec - 17B, Chandigarh</td>
<td>941605513</td>
</tr>
<tr>
<td>4</td>
<td>Municipal Corporation of Faridabad</td>
<td>Sh. NK Kataria, Chief Engineer</td>
<td>Faridabad Haryana</td>
<td>9871171100</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Sh. Amit Kumar, AO</td>
<td>Faridabad Haryana</td>
<td>9868200555</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Sh. SS Bida, Chief Engineer (Urban) H.O</td>
<td>New Secretariat, Opp - Sec 17, Bus Stand, Chandigarh</td>
<td>9417207881</td>
</tr>
<tr>
<td>7</td>
<td>The Commissioner &amp; Principal Secretary Haryana PWD (Water Supply &amp; Sanitation)</td>
<td>Sh. Asheem Khanna, EE Panipat</td>
<td>New Secretariat, Opp - Sec 17, Bus Stand, Chandigarh</td>
<td>9416070727</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Sh. Sujana Ram Bishnoi, SE (Urban) HO</td>
<td>New Secretariat, Opp - Sec 17, Bus Stand, Chandigarh</td>
<td>9466162001</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Sh. Paramjeet Singh, Executive Engineer (Urban) HO</td>
<td>Bay No. 13-18, Sector 4, Panchkula, Chandigarh</td>
<td>9417506345</td>
</tr>
<tr>
<td>10</td>
<td>The financial Commissioner &amp; Principal Secretary Haryana PWD (B&amp;R)</td>
<td>Sh. Rajeev Yadav, DGM, HSRDC</td>
<td>New Secretariat, Opp - Sec 17, Bus Stand, Chandigarh</td>
<td>9868113500</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Sh RK Rathi, DGM, HSRDC</td>
<td>New Secretariat, Opp - Sec 17, Bus Stand, Chandigarh</td>
<td>98183-46633</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Sh. Abhishek, Manager, HSRDC</td>
<td>New Secretariat, Opp - Sec 17, Bus Stand, Chandigarh</td>
<td>97177-52229</td>
</tr>
<tr>
<td>13</td>
<td>NCR Planning &amp; Monitoring Cell Haryana</td>
<td>Sh. Raj Vir Singh, Chief Coordinator Planner</td>
<td>NCR Planning and Monitoring Cell, 3rd Floor, 1st Block, HUDA Complex, Sec-6, Panchkula, Haryana</td>
<td>9815006338</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Sh. JP Sihag, DTP</td>
<td>NCR Planning and Monitoring Cell, 3rd Floor, 1st Block, HUDA Complex, Sec-6, Panchkula, Haryana</td>
<td>9312415504 0772-2581737</td>
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<tr>
<td>15</td>
<td>Chief Executive Officer</td>
<td>Mr. Bhagwan Singh</td>
<td>H-169, Sector Gama, G Noida</td>
<td>9810554881</td>
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<td>16</td>
<td>Greater NOIDA Industrial</td>
<td>Mr. Vaibhav Gupta</td>
<td>H-169, Sector Gama, G Noida</td>
<td>9717499856</td>
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<tr>
<td>17</td>
<td>Development Authority</td>
<td>Mr. Dinesh Tomar, AE</td>
<td>Ghaziabad, UP</td>
<td>9711305021</td>
</tr>
<tr>
<td>18</td>
<td>The Vice chairman</td>
<td>Sh. Jyoti Prasad, Town Planner</td>
<td>Ghaziabad, UP</td>
<td>9711305019</td>
</tr>
<tr>
<td>19</td>
<td>Ghaziabad Development Authority</td>
<td>Sh. Trivbhuvan Singh, Chief Town Planner</td>
<td>Preet Vihar Extn, Delhi Road, Hapur, UP</td>
<td>09760108508</td>
</tr>
<tr>
<td>20</td>
<td>The Vice chairman Hapur Pilkhua Development Authority</td>
<td>Sh. DR Yadav, Chief Engineer</td>
<td>Preet Vihar Extn, Delhi Road, Hapur, UP</td>
<td>9760008507</td>
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<tr>
<td>21</td>
<td>The Vice chairman</td>
<td>Sh. ML Mitra, AE</td>
<td>Yamunapuram Complex, Bulandshahr - 203001</td>
<td>9899141888</td>
</tr>
<tr>
<td>22</td>
<td>Bulandshahr Khurja Development Authority</td>
<td>Sh. AK Singh</td>
<td>Yamunapuram Complex, Bulandshahr - 203001</td>
<td>9997194909</td>
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<tr>
<td>23</td>
<td></td>
<td>Sh. Sanjay Vashisth, Town Planner</td>
<td>Yamunapuram Complex, Bulandshahr - 203001</td>
<td>9997194928</td>
</tr>
<tr>
<td>24</td>
<td>The Vice chairman Meerut</td>
<td>Sh. Praveen Gupta, AE</td>
<td>Meerut, UP</td>
<td>9412784091</td>
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<tr>
<td>25</td>
<td>Development Authority</td>
<td>Sh. Shashi Shekhar Singh, Addl MD</td>
<td>Transport Bhawan, Tedi Kothi, Lucknow - 226001</td>
<td>945000450</td>
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<tr>
<td>26</td>
<td>NCR Planning &amp; Monitoring Cell</td>
<td>Sh. HN Aggarwal, Chief GM (Operations)</td>
<td>Transport Bhawan, Tedi Kothi, Lucknow - 226001</td>
<td>9868396301</td>
</tr>
<tr>
<td>27</td>
<td>Chief Engineer</td>
<td>Sh. Suresh Chander, SE</td>
<td>R-1, Raj Nagar, Ghaziabad</td>
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</tr>
<tr>
<td>28</td>
<td>Ghaziabad zone</td>
<td>Sh. RK Kansal, Ex Eng</td>
<td>R-1, Raj Nagar, Ghaziabad</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>UP Jal Nigam</td>
<td>Sh. Arvinder Kumar Tyagi, Asst Planner</td>
<td>Govt of UP, 2nd Floor, Nagam Nigam Office, Navyug Market, Gh bd</td>
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<td></td>
<td>Sh. Hitesh Kumar, Asst Architect Planner</td>
<td>Govt of UP, 2nd Floor, Nagam Nigam Office, Navyug Market, Gh bd</td>
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<td>NOIDA Authority</td>
<td>Sh. RP Kaushik, Sr. Town Planner</td>
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### C. Rajasthan Sub-region

<table>
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<tr>
<td>32</td>
<td>Managing Director RIICO</td>
<td>Sh. Rajinder Singh, Sr. Regional Manager</td>
<td>Udyog Bhawan, Tilak Marg, Jaipur-302005</td>
<td>9414049484</td>
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<tr>
<td>33</td>
<td>Secretary Urban Improvement Trust Alwar</td>
<td>Sh. LN Gupta, Sr. Regional Manager</td>
<td>Udyog Bhawan, Tilak Marg, Jaipur-302005</td>
<td>9414047948</td>
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<td>34</td>
<td>NCR Planning &amp; Monitoring Cell</td>
<td>Sh. PK Jain, EE</td>
<td>Alwar, Rajasthan</td>
<td>9413389952</td>
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<td>35</td>
<td></td>
<td>Sh. Bhim Singh, AE</td>
<td>Alwar, Rajasthan</td>
<td>9929611196</td>
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<tr>
<td>36</td>
<td>Superintending Engineer Public Health Engineering Dept</td>
<td>Sh. Laxman Prasad Bairwa, EE (Behror)</td>
<td>Manu Marg, Alwar (Raj)</td>
<td>9413304322</td>
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<tr>
<td>37</td>
<td>NCR Planning &amp; Monitoring Cell</td>
<td>Sh. Manohar Singh, EE &amp; TA (Alwar)</td>
<td>Manu Marg, Alwar (Raj)</td>
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### D. Counter Magnat Areas (CMAs)

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<tr>
<td>39</td>
<td>Special Area Development Authority (SADA), Dept. of Housing &amp; Environment, Gwalior, Madhya Pradesh</td>
<td>Mr. Pradeep Kumar Chaturvedi, EE</td>
<td>12-City Centre, Gwalior, MP</td>
<td>094257-09902</td>
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<tr>
<td>40</td>
<td>Special Area Development Authority (SADA), Dept. of Housing &amp; Environment, Gwalior, Madhya Pradesh</td>
<td>Mr. Arun Kumar Shukla, Asst Eng</td>
<td>12-City Centre, Gwalior, MP</td>
<td>094257-09903</td>
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### E. National Agencies Reviewing NCRPB DPRs

<table>
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<tr>
<td>41</td>
<td>National Environment Engineering Research Institute (NEERI)</td>
<td>Sh. JK Bassin, Scientist and Head</td>
<td>4 B India Habitat Centre first floor Lodi Road New Delhi</td>
<td>9873038089</td>
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<tr>
<td>42</td>
<td>National Environment Engineering Research Institute (NEERI)</td>
<td>Ms. Bhavana</td>
<td></td>
<td>9871891025</td>
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<tr>
<td>43</td>
<td>National Environment Engineering Research Institute (NEERI)</td>
<td>Mr. Amit Sen Gupta, DGM</td>
<td></td>
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### F. National Capital Region Planning Board (NCRPB)

<table>
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<th>Position</th>
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<tr>
<td>44</td>
<td>National Capital Region Planning Board (NCRPB)</td>
<td>Dr. Noor Mohammed, Member Secretary</td>
<td>4 B India Habitat Centre first floor Lodi Road New Delhi</td>
<td>0112464228 4, 87</td>
</tr>
<tr>
<td>45</td>
<td>National Capital Region Planning Board (NCRPB)</td>
<td>Sh. RK Karna, Director (A&amp;F)</td>
<td>4 B India Habitat Centre first floor Lodi Road New Delhi</td>
<td>0112464228 4, 87</td>
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<td>46</td>
<td>National Capital Region Planning Board (NCRPB)</td>
<td>Sh. Rajeev Malhotra, Chief Regional Planner</td>
<td>4 B India Habitat Centre first floor Lodi Road New Delhi</td>
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<td>47</td>
<td>National Capital Region Planning Board (NCRPB)</td>
<td>Sh. JN Barman, JD (T)</td>
<td>4 B India Habitat Centre first floor Lodi Road New Delhi</td>
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<td>48</td>
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<td>49</td>
<td>National Capital Region Planning Board (NCRPB)</td>
<td>Sh. Jitendra Agarwal, DD (Admn)</td>
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<td>50</td>
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<td>Sh. Nabil Jafri, DD (GIS)</td>
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<td>52</td>
<td>Smt. Anjali P. Roy</td>
<td>AD (Tech)</td>
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<td>53</td>
<td>Ms. Meenakshi Singh</td>
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<td>Sh. Syed Aqeel Ahmad</td>
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<td>55</td>
<td>Sh. Abhijeet Samanta</td>
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<td>56</td>
<td>Sh. DK Verma</td>
<td>AD (Finance)</td>
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<td>57</td>
<td>Smt. Satnam Kaur</td>
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<td>58</td>
<td>Sh. Harsh Kalia</td>
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<td>Sh. SK Katariya</td>
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<td>Sh. Shireesh Sharma</td>
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<td>61</td>
<td>Mr. Atul Choudhari</td>
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<td>Mr. Kartar Singh</td>
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<td>63</td>
<td>Mr. Rakesh</td>
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**G. ADB TA 7055 (Components A & C) Consultants**

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<td>64</td>
<td>Mr. Roshan Bhatnagar</td>
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<td>65</td>
<td>Mr. Ian Hamilton</td>
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<td>Infrastructure Professionals Enterprise (P) Ltd C-2 Green Park Extn New Delhi – 110 016</td>
<td>011 - 40755900</td>
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**H. ADB TA 7055 (Component B) Consultants**

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<td>66</td>
<td>Mr. Shekhawat</td>
<td>Team Leader</td>
<td>WSAPL</td>
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<tr>
<td>67</td>
<td>Mr. OP Goyal</td>
<td>Water &amp; Sewer Specialist</td>
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<tr>
<td>68</td>
<td>Mr. Boominathan</td>
<td>Team Leader / Economist</td>
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<td>69</td>
<td>Mr. Arup Khan</td>
<td>Social Development Specialist</td>
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<td>70</td>
<td>Mr. N Seshadri</td>
<td>Transport Specialist</td>
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<td>71</td>
<td>Mr. R. Krishnan</td>
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<td>72</td>
<td>Mr. Sreekumar</td>
<td>CAD</td>
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Regional Plan-2021 for NCR: Thrust Areas

Aims & Objectives

To promote growth and balanced development of the National Capital Region through
- Providing suitable economic base for future growth in identified regional settlements to absorb economic impulse of NCT-Delhi
- Promoting sustainable development
- Providing rational land use pattern
- Developing urban infrastructure facilities
- Providing efficient and cost effective rail and road based transport network
- Minimizing adverse environmental impact
- Innovative methods of resource mobilization and attracting private investments

Thrust Areas

- Lays down Land Uses at the Regional level in terms of a harmonious pattern emerging from a careful examination of natural features including susceptibility to natural disasters and socio-economic activities
- Proposes Development of Metro and Regional Centres as powerful growth nodes to attract major activities
- Provide regional transport linkages and Mass Commuter System
- Construction of peripheral expressways and orbital rail corridor around Delhi
- Development of core urban infrastructure (transport, power, water supply, sewerage, drainage etc.) in NCR towns
- Facilitate development of the region’s economy through Model Industrial Estates, Special Economic Zones etc. outside NCT-Delhi
- Develop critical Project Plans which are integral elements of the development vision
Transport

- To provide faster and efficient transport linkages amongst Metro/Regional Centres in NCR and with Delhi
- To interlink Sub-regional Centres and higher order settlements to facilitate fast movement of traffic
- Unrestricted movement of buses, taxis, and auto-rickshaws within NCR
- Decongest Delhi by diverting through traffic
- To create a Unified Metropolitan Transport Authority for NCR

Transport – Road Network

- KMIP (Western Peripheral) Expressway
- KMIP (Eastern Peripheral) Expressway
- GRV (Greater Road Network) Expressway
- To be widened depending upon traffic volumes
- To be widened to at least 6 lanes

Transport – Peripheral Expressway

- Western: 135 km
- Eastern: 134 km

Benefits
- Through traffic will not enter Delhi
- Connectivity with CNCR & other towns of NCR
- Facilitate shifting of industries and other economic activities outside Delhi
- Improvement of environment

Transport – Rail Network

- Delhi Metro Rail
- IRRTS
- RRTS
- Dockyard

Legend
- Existing Rail Network
- DMRC Corridors (Operational)
- DMRC Corridors (Under Construction)
- DMRC Corridors (Proposed)
- RRTS Corridors
- IRRTS Corridors
- Dockyard Corridors

Power

- Additional 23,344 MW of power to be generated by 2021
- State govt. to arrange for power with power generation companies to makeup shortfall. If required, States can plan dedicated power plants in the region for the balance demand.
- Improvement in T & D, Load management through creation of Islanding Scheme for NCR as 2nd level of island after NDMC/Delhi.
- Promotion for non-conventional energy resources.
- Sub-component plan by the ministry of power.
- Public private partnership and commercial approach.

Demand Supply Gap in Installed Capacity to meet

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<th>Supply (MW)</th>
<th>Gap (MW)</th>
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Regional Plan-2021 for NCR: Thrust Areas
Drinking Water Supply
- Preparation of integrated regional scheme to augment drinking water supply in the region (UA/District/Sub-region)
- Construction of upstream reservoirs to store excess water during monsoon for use in lean period
- Augment underground water resources through rain water harvesting
- To protect & reserve 2-5% area under water bodies
- Water charges to cover at least O&M cost
- No intensive development in ground water shortage areas identified by CGWB
- Emphasis on quality of water as per standards

Sewerage
- Sewerage Master Plans for all towns
- 100% sewerage and treatment facilities in Metro/Regional Centres
- All other towns/villages to initially have low cost sanitation
- Land allocation in master plans for such facilities
- 50% of the waste water to be recycled for non drinking uses
- Sewage Cess to cover the O&M replacement cost of the system

Solid Waste
- Solid waste management plans for all towns
- Land allocations in Master Plans/Development plans for SWM
- Emphasis on alternative technologies like composting, pelletisation etc. and Recycling
- Not more than 50% of SW to be disposed off through sanitary landfill

Social Infrastructure
- Uniform standards for social infrastructure.
- Encouragement for private participation.
- Provision for good quality education, medical facilities outside Delhi in NCR.
- Private and government institutions to be encouraged to set up their branches in NCR towns.
- Alternative systems of medicines to be encouraged.
- Plan for police modernization in entire NCR.

Environment and Heritage & Tourism
- Protection and conservation of good agricultural land
- Land suitability analysis in Master/Development Plans for land use allocations
- To increase the area under forest from 4% to 10%
- Environmentally sensitive areas such as forests, wetlands, water bodies etc. to be protected
- Regular monitoring of air, water, noise & land pollution by the respective state pollution control boards
- Protection of identified natural and manmade heritage sites for the protection of bio-diversity and culture
- Development Plan to be prepared for the protected areas
- Promote tourism as an important source of employment and preparation of Tourism Development Plan
Disaster Management

- Vulnerability & Risk Assessment, Prevention, Preparedness, Response and Post Disaster Management Plan for mitigation of the impact of natural hazards: earthquakes, floods, high winds & fire
- Amendments in the respective Acts, Bye-laws and Development Control Regulations
- Seismic micro-zonation for important settlements and flooding trends for major rivers be prepared
- Enforcement of national building code be given priority by the participating States

Regional Plan-2021 for NCR: Thrust Areas

Current Initiative: Development of New Townships

- Initiated innovative measures to boost and to act as a catalyst for development in NCR.
- Develop new towns/townships by attracting investments and by providing high quality infrastructure, employment generating activities, efficient transportation system, communication linkages, residential areas, industrial areas and commercial complexes etc.
- New townships to be along key transport corridors including expressways or any other suitable locations on virgin land to be identified and developed by the State Government.
- Government of Rajasthan has identified the location of new township on NH8 which is Shahjahanpur-Neemrana-Behror complex.
- Government of Haryana has identified four locations i.e. Sampla on NH10, Samalkha-Ganaur on NH1, an education city near Sonepat-Kundli on NH1 and Jahangirpur-Badli on expressway.
- Government of U.P. is developing Greater Noida Phase-II.

Regional Plan-2021 for NCR: Thrust Areas

Priority Areas

- Mass Commuter System (Regional Rapid Transit System) for NCR prepared by the Northern Railway should be implemented by Ministry of Railways on priority. Simultaneously, Orbital Rail proposed in the RPl-2021 should also be constructed on priority parallel to Peripheral Expressway.
- The construction work of Delhi-Meerut Expressway should be taken up on priority.
- All the towns with population more than five lakhs should have their own intra-urban transport system (Public transport system) on priority.
- Large scale employment generating activities within Delhi should be controlled.
- Proposal for construction of Dam in the upper reaches of river in the Himalayas for providing water to Delhi should also make provision of drinking water for the NCR constituent States also as a long term solution. Construction should be expedited.
- Allocation of water for NCR should be made in the proposed Sharda-Yamuna link canal and its construction should be expedited.
- NCR States should constitute Sub-regional Area Development Authority for their respective Sub-regions for the effective development of the NCR.

Regional Plan-2021 for NCR: Thrust Areas

Planning Process

- Regional Plan
- Functional Plans
- District Plans
- Sub-Regional Plans
- Master/Development Plans
- Project Plans

To be prepared by NCRPB
To be prepared by the State Government
To be prepared by the State Government or Local Body/Authority

Regional Plan-2021 for NCR: Thrust Areas
### Project Financing by NCRPB: Level & Type of financial assistance

- **Section 8 (e), NCRPB Act, 1985** empowers the Board to select and approve development schemes and provide assistance for the implementation of these schemes (PSMG-I & PSMG-II).

- **Financial assistance in the form of interest bearing loans of the total estimated cost of projects**
  - Loan upto 75% of the project cost
  - State Government/Implementing agency contribute minimum 25% of the project cost

- **Types of projects financed**
  - Power Sub-sector: Generation, Transmission, Distribution, Sub-Stations
  - Water Sub-sector: Bulk Water Supply, Water Distribution and Conservation
  - Sanitation, Effluents, LCS
  - Solid Waste Disposal: Sewage Treatment Plants, Sewage Lines, Storm Water Drainage, Low Cost Sanitation & Public Toilets, Effluent Treatment and Solid waste disposal
  - Social Infrastructure: Dispensaries, hospitals, schools etc.
  - Transportation: Transport facilities, Roads, ROBs, and Flyovers etc.
  - Industrial Estates and Technology Parks etc.
  - Miscellaneous: Parks, Greens, Monument conservation and Tourism

### Project Financing by NCRPB: Status

(Up to September 2008)

- **Total Projects**: 214
- **Completed Projects**: 154
- **Ongoing Projects**: 60
- **Total Estimated Cost**: Rs. 13942 Crore (Rs.139.42 billions)
- **Loan Sanctioned**: Rs. 5299 Crore (Rs.52.99 billions)
- **Loan Released**: Rs. 3490 Crore (Rs.34.90 billions)
- **Expenditure incurred by States**: Rs. 5302 Crore (Rs.53.02 billions)

**Sector-wise infrastructure projects financed in terms of Loan Sanctioned up to September 2008**
WORKSHOP on ADB-TA objectives, strategic issues & emerging trends in Urban Infrastructure Planning & NCRPB Funding

Pre-Tea Break Session
Financing of Infrastructure Projects by NCRPB

Presenters:
• Abhijeet Samanta
• P.K Jain

SCHEME OF PRESENTATION

• Background to Financial Assistance by Board
• Present day Scenario
• Project Suitability and pre-requisites
• Financial Parameters pre and post sanctioning
• Why NCRPB for financial assistance...

Background to Financial Assistance by Board

NCRPB- Objectives

• National Capital Region Planning Board (NCRPB), a Statutory Body under Ministry of Urban Development, Govt. of India was set up in 1985 under an Act of Parliament with the following objectives
  > Preparing a Perspective Plan for development of the National Capital Region (NCR) along with complementary Functional Plans relating to key elements of infrastructure; monitoring implementation of these plans and facilitating the preparation of Sub-Regional Plans, Development Plans and Project Plans by the constituents of the Region.
  > Arrange for and oversee the financing of selected development projects

Background to Financial Assistance by Board

OUR MANDATE

“...the Board selects and approves comprehensive projects, call for priority development and provide such assistance for the implementation of those projects as the Board may deem fit...”

As appended from section 8 of the National Capital Region Planning Board Act 1985

Background to Financial Assistance by Board

NCR Coverage-Demographics and Settlements

• The National Capital Region covers an area of 33,578 sq. kms spread over four states including NCT of Delhi. It includes
  > 8 districts of Haryana (Faridabad, Gurgaon, Mewat, Rohtak, Sonipat, Rewari, Jhajjhar & Panipat) constituting 40% of the NCR;
  > 5 districts of U.P (Meerut, Ghaziabad, Gautam Budha Nagar, Bulandshahr, and Baghpat) constituting 32% of the NCR;
  > Alwar District of Rajasthan constituting 23% of the region; and
  > NCT of Delhi, about 5% of the region

• In addition, NCRPB also extends support to Five Counter Magnet Areas of Hisar (Haryana), Kota (Rajasthan), Bareilly (U.P), Gwalior (M.P) and Patiala (Punjab)

Background to Financial Assistance by Board

Background to Financial Assistance by Board

Background to Financial Assistance by Board

Background to Financial Assistance by Board

Background to Financial Assistance by Board

Background to Financial Assistance by Board

Background to Financial Assistance by Board

Background to Financial Assistance by Board
NCRPB’s Financial Support for Infrastructure Development

- The NCR Planning Board funds selected projects with in the NCR and Counter Magnets (CMAs) by providing Loans to the State Govts or to ULBs and other parastatals of the said governments.
- The Board selects only those projects for financing which are in conformity with the Regional Plans and Functional Plans.
- The Loaning Pattern is maximum 25:75; the borrowing agency contributes minimum 25% and the NCRPB gives a loan of maximum 75% of Total Cost.

WHAT WE FINANCE

- The Board provides financial assistance in the form of interest bearing loans to State Govt/Implementing Agencies for projects pertaining to:
  - Sanitation, Effluents, LCS and Solid Waste Disposal: Sewage Treatment Plants, Sewage Lines, Storm Water Drainage, Low Cost Sanitation & Public Toilets, Effluent Treatment and Solid waste disposal.
WHAT WE FINANCE.... CONT...

- Social Infrastructure: Dispensaries, hospitals, schools etc.
- Transportation: Transport facilities, Roads, ROBs, and Flyovers etc.
- Industrial Estates and Technology Parks etc.
- Power Sub-sector: Generation, Transmission, Distribution, Sub-Stations.

PRESENT DAY SCENARIO

Since its inception, the Board has provided loan assistance for 230 infrastructure projects with an estimated cost of Rs. 149.29 Crores, out of which an amount of Rs. 59.95 Crores has been sanctioned as a loan. The Board has released a loan amount of Rs. 34.91 Crores till 30th November, 2008.

In the financial year 2007-08, loans amounting Rs. 705 crore were released which was 69% higher than the loan advanced in the previous financial year.

The Board has received only Rs. 850 crore as capital grant from MoUD and another Rs. 300 crore from the GNCTD since its inception.

The Board had raised an amount of Rs. 1100 crore as Bond from the capital markets. As on date, debt outstanding against the Board is Rs.200 crore .

It has no NPA and has a record of 100% recovery.

NCR Project Summary
### Present day Scenario

**Who can avail the financial assistance....**

### Project Suitability and pre-requisites

**PROJECT SUITABILITY AND PRE-REQUISITES**

- Our Borrowers
  - Any of the agencies mentioned below are eligible to apply for a loan support, provided they are operating in any town within the National Capital Region or in any of the counter magnet areas.
  - State Govt. Dept of Urban Development/Housing or any settlement related infrastructure - power, water, sewerage, transport or public health
  - Development Authorities/urban improvement trust
  - State Industrial Development Corporations
  - State power authorities and distribution agencies
  - Municipal Corporations/ Municipal Councils/Notified area committees/Nagar Panchayats/Nagar Palikas/ Nagar Nigams

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### Project Suitability and pre-requisites

- Board selects only those projects for financing which are in conformity with the Regional Plans and Functional Plans.
- Projects need to be a step towards attaining the objectives of the Regional / Sub Regional / Functional plan.
- The projects need to have government approvals and should be technically, financially and environmentally feasible and viable.

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### Present day Scenario

**How to proceed...**

- All requests for loan assistance made by constituent State Governments, ULBs and other parastatals of the State Governments of the NCR, are to be accompanied by three sets of Final Detailed Projects Reports and a soft copy, routed to NCRPB, Delhi via its respective NCR Cells constituted in each of its sub regions.
### Project Suitability and prerequisites

**How to proceed...**
- The broad methodology thus includes:
  - Submission of three sets (hard copy) of Detailed Project reports (DPRs) with soft copy to the NCR Cells with a loan request as per the loan application form downloadable from our website (www.ncrpb.nic.in). *(Broad DPR Contents...)*
  - The DPRs received are forwarded to empanelled appraisal agencies and Planning Department of the Board.
  - Presentation of the project submitted by the Implementing agency

### Project Suitability ad prerequisites

**How to proceed...**
- The preliminary observations obtained are forwarded to Implementing agencies for incorporation/revision of DPRs.
- Replies submitted by implementing agencies are discussed with Appraisal agency and Implementation Agency for arriving at mutual agreement on the contents /revisions required in DPRs

### Project Suitability ad prerequisites

**How to proceed...**
- Appraisal by the NCRPB empanelled National Institutes (NIs)
  - Interactive process (amongst implementing agency making the loan request, NCRPB officials, National Institutes appraising the Detailed Project Report of the Project)
  - On receipt of final appraisal report from NIs the projects are taken up in the Project Sanctioning & Monitoring Group (PSMG) meeting under the chairmanship of Secretary, Ministry of Urban Development.

### Project Suitability ad prerequisites

**How to proceed...**
- Post sanctioning
  - the implementing agencies have
    - to regularly submit the Monthly Progress reports (format downloadable from our site)
    - Keep the Board updated on the project progress ad related issues if any via NCR Planning and Monitoring Cells
    - Make Timely Requests for project completion date extensions (if necessary)
    - Submit Reasons for delays if any as and when the situation arises with concurrence from HQ/State government

### Project Suitability ad prerequisites

**How to proceed...**
- Common issues w.r.t DPRs and loan application submitted
  - Report submitted is generally 'Broad cost estimates' with note on the project
  - Unsigned documents compilation/missing maps & drawings
  - Unbound
  - Not routed through proper channel i.e implementing agency head quarters to send to NCRPB, Delhi via our NCR Planning and Monitoring Cells
  - Various necessary approvals are still pending or on A/F stage leading to delays
  - Discrepancies ad mismatch between information provided in DPR and Loan application
  - Implementation plans/schedules (financial & Physical) missing

### Financial Parameters pre and post sanctioning

**FINANCIAL PARAMETERS PRE AND POST SANCTIONING**
Financial Parameters pre and post sanctioning

Financial analysis of Project

- To appraise a project from financial angle the following information is required:
  - Cost of Project
  - Means of financing
  - Estimates of Revenue
  - Estimates of Expenditure Phasing
  - Working Capital Requirement and its Financing
  - Projected Cash Flow Statement
  - Projected Balance Sheet

Financial Parameters pre and post sanctioning

Financial analysis of Project-contd

- Security proposed against loan:
  - State Govt. Guarantee or
  - Bank Guarantee or
  - Mortgage of property and
  - Tripartite Escrow Agreement

Project Suitability ad pre-requisites

- After sanctioning of the project in the PSMG meeting, loans are released on submission of various documents such as Loan Agreement, Security Document viz. State Govt. Guarantee, Bank Guarantee and Escrow Agreement and Mortgage of Property in lieu of State Government/Bank Guarantee.
- In case of loan to the State Government, an undertaking is obtained for providing adequate budget allocation towards repayment of loan installment and interest thereon every year till the payment of final installment is made by them.

Why NCRPB for financial assistance...

- WHY NCRPB FOR FINANCIAL ASSISTANCE...

Financial highlights

- Rating by CRISIL: AAA/Stable
- Projects financed: Rs.14000 crore plus
- Loan recovery Position: 100%
- Current Debt: Rs.200 crore

Financial highlights

- No application fee
- No processing fee
- Lowest rate of interest
- Expedious Approvals for project
- Single window System
- Prepayment facility available
- Rationalization of Guarantee procedure
- Well defined monitoring System
- Well defined incentive scheme in place
Comparision of ROI

- **PFC**: 13% to 13.75%
- **REC**: 13.5% to 14%
- **HUDCO**: 13.75% to 16%
- **BANK (PLR)**: 13.75%
- **NCRPB**: 7% to 8%

(proposed revised rates: 8.25% to 9.50%)

PFC, REC, HUDCO charged interest on Quarterly basis whereas NCRPB Charges on Annual Basis.

---

General Terms and Conditions

- Maintenance of separate Receipt and Payment accounts for each project
- Books of Accounts available for scrutiny
- No diversion of funds to other projects
- Monthly and Quarterly progress reports to be submitted to NCRPB
- Utilisation certificates to be submitted to NCRPB
- Completion certificate

---

Phases of Loan release

- Ist installment at time of project sanctioning subject to conditions applied while sanction in PSMG
- IInd and subsequent installments on submission and verification of Utilisation Certificate and desired progress as indicated in monthly progress reports (to be as per DPR at time of project sanctioning)
- Submission of Completion certificate with a note on achievements in terms of physical and financial terms along with infrastructure created and benefits from the project completion.

---

General Observations noticed during verification

- UCs not furnished in the prescribed format
- UCs are not supported by physical & financial progress
- Records/Accounts not maintained separately
- Expenditure incurred prior to sanction by the Board not reported to the Board
- Adoption of different technology than the approved in the DPR
- Delay in land acquisition process causing time & cost overrun
- Deviation in scope of work being implemented
- Implementation schedule not being adhered

---

In order to play a more effective role to realize the vision of the NCR to develop as region of global excellence, NCRPB intends to substantially scale up its operation

- By undertaking financing of large number of and also mega infrastructure projects in the thrust areas identified in the Regional Plan-2021
- For the 11th Plan period NCRPB’s proposed to finance projects involving outlay of Rs. 15000 crore during 2007-12. This translates to NCRPB providing loan assistance amounting to Rs. 11000 crore for various infrastructure development projects. 

---

Why NCRPB for financial assistance...

**NCRPB’s Financial Support for Infrastructure Development — contd...**

- The Rate of interest on loans are determined on the basis of nature of project and shall be applicable as prevailing on date of release of each loan installments.
- The present interest rate is 7% to 8% p.a. without incentives.
- The effective interest rate can become further low if the borrower is able to claim incentives on following:
  - timely repayment of principal and interest
  - for timely completion of the project
  - for completion of a project within sanctioned cost
  - for preparing Master Plans, District Plans and getting them approved by the Board and for conformity with the Regional Plan and Functional Plan.

---

**Summing Up…**

**Scaling Up of the Loan Portfolio during 11th Plan**
Focus areas for financing during for 11th Plan

- The Main Thrust areas for financing Projects during 11th Plan are:
  - Water supply, sewerage, improvement of road network, education sector, health care & power transmission and distribution etc
  - The Board has already sanctioned 59 projects involving outlay of around Rs. 2700 crore with loan component of about Rs. 1600 crore so far in the first two years of the 11th Five Year Plan till date

Summing Up…

Seeking ADB’s support for streamlining DPR preparation
- ADB Consultants to prepare model DPRs which shall be uploaded on website for implementing agency’s benefit in posing projects to NCRPB for assistance.

Initiatives from the Board

- The Sources of Funds are
  - Budgetary Grants from MoUD
  - Internal & Extra Budgetary Resources
  - Repayment of Loans
  - Internal Accruals, mainly interest income
  - Contribution from GNCT of Delhi
  - Market Borrowing

- The Govt. Grant received by the Board has been used to leverage high cost debt.
- Because of low cost of capital, we have been able to offer loans at cheaper rates.
- Therefore, the challenge is to keep Cost of Capital low.

Resource Planning for 11th Plan

- The Board has identified following two sources of funds which will enable the Board to keep its cost of capital low
  - Concessional Loan from the ADB/World Bank
  - Market Borrowings in the form of 54 EC Bonds

- The Board has proposed to raise resources from above two sources in following proportion over a period of five to seven years
  - World Bank/ADB- Rs. 8000 crore (Rs. 4000 crore each)
  - Market Borrowings- Rs. 5000 crore (Additional Amount has been sought for to cushion against shortfall in borrowing from the ADB and World Bank)

- The Planning Commission has since given its “in-principle” approval for borrowing from the ADB and World Bank as above.
NCRPB – Jurisdiction

- NCRPB Constituted in 1985 under NCRPB Act with a mandate to systematically develop National Capital Region (NCR) of India
- Total Area - 33,578 sq km (spreading over in 14 districts of three states and National Capital Territory of Delhi)
- Also includes following counter magnet areas (CMAs): Gwalior, Patiala, Hissar, Kota, Bareilly
- Population – 37.1 million (2001)

NCRPB – Functions

- Project Development & Financing by NCRPB
  - NCRPB Fund created for financing development projects
  - Finance development projects in NCR and CMAs
  - Projects are identified by NCRPB/participating State governments and its Implementing agencies
**Project Financing Cycle**

- **NCRPB Project Cycle**
  - Project Proposal for Funding
  - Appraisal
  - Approval
  - Disbursement

  Project Implementation Monitoring
  - Loan recovery

**ADB Technical Assistance**

**ADB Formulated TA in following three Components**

- **Component A: Business Process Reengineering & Capacity Building**
- **Component B: Capacity Building in Project Preparation**
- **Component C: Urban Planning and other activities**

**Component B - TA Objectives**

- Strengthen the capacity at NCRPB, State NCR Cells & Implementing Agencies in the area of planning for urban infrastructure, and
- Impart skills to conceive, design, develop, appraise and implement good quality infrastructure projects for planned development of NCR

**TA Component B: Scope**

- Assess current practices in project preparation procedures
- Prepare ‘City level Sector Plans’ for Subprojects identification
- Prepare demonstration project reports (DPRs) with due diligence documentation
- Standard procedure manuals for project identification & preparation, Economic, Financial, Environmental, Resettlement analysis
- Train the implementing agencies
- User-friendly web page with different manuals and guidelines

**TA Component B: Outputs**

- Demonstration project reports with due diligence documentation of identified sample subprojects
- Standard Procedure Guidelines/ Tool Kits for project identification & preparation, and economic and financial analysis
- Environmental Assessment Framework and Resettlement Framework
- An user-friendly web page for project preparation incorporating tool kits

**TA Component B: Activities**

- Preparation of Sector level Master Plan
- Project Identification Procedures
- Preparation of DPRs for Demonstration Sample Subprojects
- Due diligence documentation for DPRs
  - Institutional; Economic & Financial Analysis
  - Social & Environmental Safeguard Framework
- Tool kits
- An user-friendly web page for project preparation incorporating tool kits
- Training Programs
  - Workshops, Technical Lectures and Study Tours
Workshops

<table>
<thead>
<tr>
<th>Objective</th>
<th>Focus area</th>
<th>Likely Schedule &amp; Location</th>
<th>Participants</th>
<th>Resource persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop 1</td>
<td>To introduce NCRPB activities &amp; the present ADB TA</td>
<td>NCRPB funding, ADB TA objectives, Strategic issues in planning infrastructure</td>
<td>1 day, December 2008</td>
<td>75 - 100 nos</td>
</tr>
<tr>
<td>Workshop 2</td>
<td>To apprise on need and preparation process</td>
<td>Water supply, sewerage &amp; drainage, solid waste management, transport plan</td>
<td>1 day, February 2009, Delhi</td>
<td>50 nos</td>
</tr>
</tbody>
</table>

Technical Lectures

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Objective</th>
<th>Focus area</th>
<th>Likely Program</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture 1</td>
<td>To train in project preparation</td>
<td>Data requirements, data sources &amp; collection, surveys &amp; investigations</td>
<td>1 day, March 2009, 2/3 locations outside Delhi</td>
<td>25 nos, all technical officers</td>
</tr>
<tr>
<td>Lecture 2</td>
<td>To train in project preparation</td>
<td>Design criteria &amp; best methods, software applications, quality aspects</td>
<td>1 day, September 2009, 2/3 locations outside Delhi</td>
<td>25 nos, all technical officers</td>
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<tr>
<td>Lecture 3</td>
<td>To train in procurement processes</td>
<td>Procurement packages, tender preparation, specifications, bidding process</td>
<td>1 day, October 2009, Delhi</td>
<td>50 nos, all technical, finance &amp; accounts officials</td>
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</table>

Sample Subprojects

<table>
<thead>
<tr>
<th>TA</th>
<th>Town</th>
<th>Sector</th>
<th>Subproject</th>
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</thead>
<tbody>
<tr>
<td>PHED</td>
<td>Faridabad</td>
<td>Solid Waste Management</td>
<td>Collection</td>
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<tr>
<td>GCD</td>
<td>Ghaziabad</td>
<td>Water Supply</td>
<td>STP</td>
</tr>
<tr>
<td>HUDA</td>
<td>Gaziabad</td>
<td>Storm Water Drainage</td>
<td>LFS</td>
</tr>
<tr>
<td>HUDA</td>
<td>Gaziabad</td>
<td>Drainage</td>
<td>Minor Drainage</td>
</tr>
<tr>
<td>HUDA</td>
<td>Hapur</td>
<td>Transport</td>
<td>Road Widening</td>
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</tbody>
</table>

TA Consultants: Wilbur Smith Associates

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Support Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shekhwat NS</td>
<td>Team Leader &amp; WS Sp</td>
<td></td>
</tr>
<tr>
<td>M. Bhoopathi</td>
<td>Dy. T &amp; Financial Sp</td>
<td></td>
</tr>
<tr>
<td>Goyal, OP</td>
<td>Water Supply &amp; Sewerage Sp</td>
<td>Support Engr - 2</td>
</tr>
<tr>
<td>Goyal, SK</td>
<td>Solid Waste Management Sp</td>
<td></td>
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<tr>
<td>Seshadri, N</td>
<td>Transport Planning Sp</td>
<td>Tran. Planner - 2</td>
</tr>
<tr>
<td>Harsha Vardhan</td>
<td>Roads &amp; Drainage Sp</td>
<td></td>
</tr>
<tr>
<td>Prema Kumar, A</td>
<td>Roads &amp; Bridge (Transport Sp)</td>
<td>Support Engr - 1</td>
</tr>
<tr>
<td>Arup Khan</td>
<td>Social &amp; Resettlement Sp</td>
<td></td>
</tr>
<tr>
<td>Achyutha Rao, A</td>
<td>Environment Specialist</td>
<td></td>
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</table>

Deliverables & Timelines

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>Mobilization</td>
<td>15 Sept 2008</td>
</tr>
<tr>
<td>Inception Report</td>
<td>16 Oct 2008</td>
</tr>
<tr>
<td>DPR for identified Sample Subprojects</td>
<td>Feb 2009 – Aug 2009</td>
</tr>
<tr>
<td>Preparation of Guidelines &amp; Toolkits</td>
<td>Sep 2009</td>
</tr>
<tr>
<td>Training Programs</td>
<td>Oct 2009 – Mar 2010</td>
</tr>
</tbody>
</table>
THANK YOU
CAPACITY DEVELOPMENT OF
THE NCRPB
DPR APPRAISAL PROCESS

J.K. BASSIN
DY. DIRECTOR & HEAD
NEERI, Delhi
December 10, 2008

National Environmental Engineering Research Institute
Nehru Marg, Nagpur 440 020, INDIA
(Established in 1958)
Under CSIR New Delhi

Prime Minister
Ex-Officio President
CSIR

Director
F & A
Tech Services

Research and Development groups
Environmental Knowledge & Technologies

Divisions
(Headquarters)

Zonal Laboratories

National Environmental Engineering Research Institute

Water Resources Management

Water conservation and environmental protection of water bodies
Eco-restoration of impounded surface water bodies & downstream system
Limnological studies of surface water bodies
Assessment of groundwater contamination from anthropogenic stresses
Development of technique & methodology for exploration, assessment & management of ground water in hard rock areas
Delineation of contaminated region by geophysical methods
Non-invasive methods in characterization of water and land environment
**Water Quality Assessment and Treatment**

- Surveillance of drinking water quality
- Performance evaluation of water treatment facilities
- Technology development for improvement of water quality
- Development of analytical techniques for water quality assessment
- Monitoring and management of priority organic pollutants (POPs) and other pollutants
- Evaluation of water resources for health-related water quality parameters
- Water quality management for pesticides contamination

**Advanced Treatment Technologies**

1. The design and implementation of Common Effluent Treatment Plants (CETPs) for clusters of small scale industries
   - Chemical industries in Vapi, Gujarat.
   - Textile industries in Pali and Balotra, Rajasthan.
   - Heterogeneous industrial clusters in NCT of Delhi.

2. Appropriate wastewater management for small scale tanneries in Tamil Nadu.

3. Application of appropriate wastewater management with recourse to resource recovery, viz., biogas and biofertilizers in distilleries in Tamil Nadu.

4. Wastewater management through application of membrane processes to produce recyclable effluent from textile units at Tirupur.

5. Upgradation and effective recommissioning of the non-functional ETPs, CETPs and STPs suggesting viable treatment alternatives to improve treated effluent quality to comply with the discharge standards. Major industries includes,
   - Gujarat Refinery, Baroda
   - ITC Paper Board Ltd., Bhadrachalam
   - Madura Fabrics, Ambassamudram
   - Bank Note Press, Dewas
   - Hindustan Antibiotics, Pune
   - Bokaro Thermal Power Plant, Bokaro
   - Bokaro Steel Plant, Bokaro
   - Dankuni Coal Complex, Dankuni

6. Societal mission projects—Providing technical support on environmental related issues to the Hon'ble Supreme Court and Hon'ble High Courts of various States by undertaking adequacy and efficacy assessment of sewage treatment plants (STPs) and effluent treatment plant (ETPs) in various industries.

**Why Do We Discuss Water? (Importance)**

Water is fundamentally important resource because
- It is a basic human need & essential for survival
- Its use underlies all agriculture & industrial processes
- It is one of the most precious gifts of Nature to mankind with NO technological substitute available
- Benign & life-supporting normally, Menacing during floods
- Desperately sought after in times of droughts

Owing to this importance
- It is worshipped as life-giving & life-sustaining in religions
- Human settlements centered around good sources of water e.g., the Ganges
- 22nd March is observed as World Water Day since 1994
**Is Enough Water Available? (m^3/PC-NatAvg)**

- Water Availability (m^3/capita/year)
  - 1951: 5177
  - 1991: 3209
  - 2001: 1820
  - 2025: 1241
  - 2050: 1140

- Water Stress Line
- Water Scarcity Line

**Why DPR Review Activity?**

NCR covers 14 districts in Haryana, U.P., Rajasthan & NCT of Delhi besides five Counter Magnet Towns.

NCRPB is a statutory body under the MoUD (GOI) set up under the Act of Parliament in 1985. Board provides loan assistance up to 75% of the project cost to the State Govts.

Board receives ~15-20 projects every year under following categories:

- **Power Sub-sector**: Generation, Transmission, Distribution, Sub-stations
- **Water Sub-sector**: Water Supply, Water Distribution & Treatment
- **Sanitation, Effluents, LCS and Solid Waste Disposal**: STP, WCS, Storm water Drainage, LCS & Public Toilets, SWM
- **Social Infrastructure**: Dispensaries, hospitals, schools etc.
- **Transportation**: Transportation facilities, Roads, ROBs and Flyovers etc.
- **Industrial Estates and Technology Parks** etc.
- **Miscellaneous**: Parks, Greens, Monument conservation and Tourism

**What is DPR Appraisal?**

Detailed inspection and scrutiny of DPRs related to Infrastructure development in ‘Water’ sub-sector and ‘Sanitation, Effluents, LCS and Solid Waste Disposal’ sector, in a professional manner so that all Planning, Technical and Financial aspects are thoroughly reviewed before loan assistance is provided for its implementation.

**Scope of Work**
- Technical Feasibility, Soundness of Design, Quality of Structural Design, etc.
- Reasonableness of Cost Estimates & Financial Viability
- Impact on Environment
- Rehabilitation and statutory compliances

**NEERI’s Role in Review Process – APPRAISAL OF DPR**
- Water Supply Projects
- Sanitation and Sewerage Projects
- Municipal Solid Waste Disposal / Management projects

**Project Proposal Stages**

- Pre-Feasibility Report
- Feasibility Report
- Pre-Design Estimates
- Detailed Design
- Engineering Design
- Detailed Project Report

**Project Preparation Guidelines**

**Investigate**
- Technical Feasibility
- Financial Sustainability
- Commercial Viability
- Environmental Compatibility
- Social & Political Acceptability
- Legal & Regulatory Frameworks

**Steps to Follow**
- Clearly define ToR for required outputs and timeframe
- Procure & appoint consultants through a fair & transparent process
- Devolve project components design & detailing with DPR as per implementation format
- Undertake financial analysis for feasibility & sustainability
- Finalise financing & implementation structures

**Contents of a Typical DPR**

- Introduction and Need of the Project
- Background of Implementing Agency & Implementation Framework
- Project Area Description
- Project Overview and Methodology – Revenue / tariff etc.
- Field Investigations and Technical reports
- Environmental Risk & Social Assessment
- Project Components – PopH, Projection, Design Norms, Basic Schedule of Rates, Rate analysis, Quotations, etc.
- Detailed Design; Engineering Design; Abstracts of BoQ / BoM
- Costing and Cost Estimates (As per BSR Item Nos.)
- Economic & Financial Analysis
Water Supply / Sewerage Project

Executive Summary & Salient Features
Table of Contents; Page Nos.
General Abstract of Costs; Sub-Work Costs
Main Report (Chapter 1 ... 10)
Annexures
Maps / Drawings / L-sections / Survey Reports
Check List

Typical Contents of DPR ...

Chapter 1. Introduction & Need of the Project
- Background & Need: Justification; TOR; Scope; Limitations, etc.

Chapter 2. Background of Implementing Agency
- Capabilities, Strengths, Outsourcing, Preparedness, etc.

Chapter 3. Project Area Description
- Physiography, Topography, Climate and rainfall, Hydrology, Geology, Seismicity, etc.
- Other related studies e.g. Water availability, Source analysis, etc.

Chapter 4. Project Overview & Methodology
- Project area, Geographical setting, Climate, Geology and structure, Environmental setting, Social setting, etc.
- Demand studies - Existing scenario, Projected demand, Future scenario, Availability
- Design Norms / Guidelines (CPHEEO); Design Methodology; Software Employed; Checks of Design, etc.

Chapter 5. Field Investigations
- Scope of work; Survey; Existing System description, etc.
- Previous & Present investigations; Chem. Analysis Reports, etc.
- Site Description – Land Acquisition (Govt./Private), Deforestation, Human Resettlement, Evacuation, Encroachment, etc.

Chapter 6. Environmental & Social Impact Assessment
- Compliance with MoEF Guidelines
- NCRPB Proforma – Detailed Information
- Water Safety Plans for WS Projects

Chapter 7. Project Components
- Distinct Sub-Works; Scope of Each sub-work; Itemised Description of sub-works, Excavation; Earth Moving; etc.
- BSR, Market Survey; Departmental Rates; Special Rates; Rate Analysis;
- Basis of Cost estimation (Actual Design/ Pro-rata)
- Separate Electrical Sub-station

Chapter 8. Detailed Design / Engg. Design
- CPHEEO Manuals – Optimization; Economic Rising Main Design;
- Civil components, Mechanical (e.g. Pumps, Inlet valves, Aerators), Instrumentation, Electrical equipment (e.g. Generator, transformer, Lightning arrestors, Power line equipments, etc.)
- Road / Rail Crossings; Special Conditions; etc.

Chapter 9. Costing & Cost Estimates
- Basis of cost estimates; Basic rates of labour / manpower, material; Equipment cost, etc.; Rate Analysis (reference to Annexures)
- Abstract of Costs including Land, Works, Building (Lab, WS), Special T&P, Power Plant & Electrical Equipment, Misc. items (Lab: inst. chem, glassware)
- LS Cost Items – Basic description of item (Minimize)
- Cost estimates Supported with Detailing (with Sketch / Drawing)
- Costing based on Actual design / Pro-rata basis (Non-linear function)

Chapter 10. Economic / Financial Analysis
- Analysis of Sources of Funds; Activity Bar chart; Loan Drawal & Repayment Schedule; etc. (NCRPB v/s State Govt. Share), CAPEX & OPEX Recovery.
- Review of Pricing & Cost Recovery Options; Willingness to Pay
- Review of Financial Performance of Agency / Department – 5Yr Income / Expenditure Statements
- Assessment of and recommendations for alternative resource mobilization strategies; Linkages with other schemes.

Annexures
- Rate Analysis – WDS & WTP / (WCS & STP)
- Various Permits / Various Notifications of State Govt. in support of design norms and Deviations; Land Acquisition record; State Govt. Approvals;
- Details of Design Software - WDS & WTP / (WCS & STP)
DESIGN NORMS / GUIDELINES

- Water Source, its Suitability, Dependability & Protection;
- Popn Projection; Design Flow; Base Year; Design Period; Component Life; Component Material; etc.
- Pump Type & Configuration (Avg, Qtr, Half, Full); Sump well / Pump House (Expansion); Future Expansion – Modular Design of STP; etc.
- LPCD; UFW (Leakage 15%); Sewage Return ratio (85%); Min. Pipe size; RH, Min. Vel. (Self cleaning); Min. Cover; Max. Depth; Distance between Manholes; Design of Manholes; Bedding Details; Optimal Rising Main design; etc.
- STP Technology – Low Cost WSP
- Plant Campus: Access; Protection; Lighting; Internal Roads; Residential Quarters; Landscaping; Fire Safety; Manpower/Equipment Safety; etc.
- List & Inventory of Essential Spares;

GUIDELINES

- CPHEEO Manuals
- NRCD Guidelines
- JNURM Guidelines
- MoEF / CPCB Standards
- BIS Codes / Material Specs.

We are running out of time! We have to join & act fast!!

Thank you!
NATIONAL CAPITAL REGION PLANNING BOARD

PRESENTATION ON “DPR REVIEW: ISSUES”

BY ENGINEERS INDIA LTD

A. REPORT

REPORT SHOULD CONTAIN THE FOLLOWING CHAPTERS

- EXECUTIVE SUMMARY
- INTRODUCTION
- SOCIO-ECONOMIC PROFILE
- TRAFFIC SURVEYS AND TRAFFIC FORECAST
- ENGINEERING SURVEYS/INVESTIGATIONS
- ANALYSIS AND PROPOSED ROAD FEATURES
- PAVEMENT DESIGN STUDIES
- DESIGN STANDARDS AND SPECIFICATIONS
- DRAINAGE FACILITIES
- ENVIRONMENTAL AND SOCIAL CONSIDERATIONS
- MATERIALS, LABOUR, EQUIPMENT
- RATE AND COST ESTIMATES
- ECONOMIC ANALYSIS AND COST ANALYSIS
- CONSTRUCTION CONSTRAINTS AND PROGRAM
- MISCELLANEOUS
- CONCLUSIONS AND RECOMMENDATIONS

I. EXECUTIVE SUMMARY

EXECUTIVE SUMMARY SHOULD CAPTURE THE TOTAL REPORT IN A NUTSHELL FOR PERUSAL/DICTION-MAKING AT THE EXECUTIVE LEVEL.

II. INTRODUCTION

INTRODUCTION SHOULD CONTAIN THE FOLLOWING HEADS:

- NAME OF WORK
- SCOPE OF WORK
- AUTHORITY AND PLAN PROVISIONS
- HISTORY, GEOGRAPHY, CLIMATE ETC.

III. SOCIO-ECONOMIC PROFILE

SOCIO-ECONOMIC PROFILE SHOULD PROVIDE THE FOLLOWING HEADS:

- ECONOMIC PROFILE DATA FOR THE STATE.
- ECONOMIC PROFILE DATA FOR THE PROJECT INFLUENCE AREA.
- STATISTICAL ANALYSIS OF DATA.
ECONOMIC PROFILE DATA MUST CONTAIN THE QUANTIFIED PROFILE ON THE FOLLOWING:

* Population
* Agriculture Production
* Industrial Production
* Mining Production
* Tourism Potential
* Input/Output Movement by Road
* Major Planned Development Projects with Capacity.

ECONOMIC PROFILE DATA FOR PROJECT INFLUENCE AREA SHOULD INCLUDE QUANTIFIED PROFILE ON THE FOLLOWING:

* Population
* Agriculture Production
* Area Under Crops
* Industrial Production
* Mining Production
* Tourism Potential
* Input/Output Movement by Roads
* Major Planned Development Projects with Capacity.

STATISTICAL ANALYSIS OF DATA:

* Determination of growth trends and elasticity of traffic from historical data.
* Planned future rates of growth for above indicators.

IV. TRAFFIC SURVEYS AND FORECAST

Traffic surveys and forecast should have the following heads:

- Classified Traffic Volume Count
- Origin Destination Survey
- Speed-Delay Studies
- Traffic Survey at Road Junctions
- Special Pedestrian Survey
- Axle Load Survey
- Accident Records

CLASSIFIED TRAFFIC VOLUME COUNT STUDIES MUST INCLUDE THE FOLLOWING:

* Selection of location
* Duration of Studies (7 Days)
* Period (Peak and Lean)
* Establishment of Average Daily Traffic
* Establishment of Annual Average Daily Traffic
* Traffic Census Data from Existing Count Stations
* Axle Equivalency and Vehicle Damage Factor
* Traffic Demand Forecasting
* Capacity Analysis
* Lane Requirement

AXLE LOAD SURVEY SHOULD INCLUDE THE FOLLOWING:

* Location
* Duration
* Period
* Past Axle Load Spectrum
* Annual Variation in Commercial Vehicles
* Optimistic and Pessimistic Future Generation of Traffic
* Generation of Changing VDF Factor During Project Period
V. ENGINEERING SURVEYS, INVESTIGATIONS AND PROPOSED ROAD FEATURES

This chapter should include the following heads:
- Alignment
- Roadland, roadway, carriageway, and cross-section elements
- Road inventory
- Road condition survey
- Geo-technical investigations
- Bridge inventory studies
- Bridge/ culvert condition survey

VI. PAVEMENT DESIGN STUDIES

Pavement design studies should include:
- Road design
- Pavement design
- Other designs

VIII. ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

This chapter must include the following:
- Environmental impact analysis
- Environmental design
- Environmental management action plan
- Resettlement and rehabilitation

IX. MATERIALS, LABOUR, EQUIPMENT

This must include the following heads:
- Sources of all construction materials
- Test result of all materials
- Transportation arrangement
- Labour availability, amenities
- Equipment

X. RATES AND COST ESTIMATES

This chapter must include the following heads:
- Schedule fo rates
- Rate analysis
- Escalation
- Contingency
- Quantity assurance

XI. ECONOMIC ANALYSIS

This chapter must include the following heads:
- Vehicle operation cost
- Time costs
- Accident costs
- Economic costs and benefits
- Shadow pricing
- Sensitivity analysis
- Conclusions
ECONOMIC AND COST BENEFITS ANALYSIS SHOULD CONSIDER THE FOLLOWING:
* BENEFIT MINUS 15%
* BASE COST PLUS 15%
* BASE BENEFITS MINUS 15% PLUS BASE COST PLUS 15%
* IMPLEMENTATION DELAY OF ONE YEAR

CONSTRUCTION CONSTRAINTS AND PROGRAM MUST INCLUDE THE FOLLOWING:
* WORKING SEASON AND PERIODS OF LOW WATER LEVELS OF RIVERS/ CANALS
* SCHEDULE FOR PROJECT IMPLEMENTATION
* LOAN REPAYMENT SCHEDULE WITH MORATORIUM

THE CHAPTER ON "MISCELLANEOUS" MUST INCLUDE THE FOLLOWING:
* WAYSIDE AMENITIES
* PARKING SAFETY
* TRAFFIC SAFETY
* SAFETY AUDIT
* TOLL PLAZAS
* DUMPING GROUNDS
* ASSESSMENT OF REQUIREMENT OF
  * MISCELLANEOUS ITEMS LIKE REST HOUSES/
  TEMPORARY WORKSHEDS ETC.

THE CHAPTER ON CONCLUSIONS MUST INCLUDE:
* GENERAL
* IMPROVEMENT PROPOSALS
* GEOMETRIC IMPROVEMENTS
* WIDENING PROPOSALS

PAVEMENT DESIGN MUST INCLUDE THE FOLLOWING:
* SOIL INVESTIGATION DATA IN TABULAR FORM
* BENKLEMAN BEAM DEFLECTION DATA
* PAVEMENT DESIGN PROPOSALS

VI. DESIGN STANDARDS AND SPECIFICATIONS

This chapter should provide reference of all standards and specifications to be followed for the project.

This should also categorically clarify on modifications proposed on standards and specifications.

A list of all standards and specifications must be provided.
B. ESTIMATE

Estimate should contain the following chapters:

- General Abstract of Cost
- Detailed Estimate for Each Major Head
- Tables/Others for Labour Rates/P&M Rates/ SOR/Analysis/Quarry Charts

Major Heads should include the following:

- Land Acquisition
- Site Clearance
- Earthwork
- Sub-Bases & Bases
- Bituminous Works
- Cement Concrete Pavement
- Cross Drainage Works
- Miscellaneous Items
- Shifting Utilities
- Aboriculture
- Removal of Trees and Compulsory Afforestation
- Contingencies
- Quality Control

C. DRAWINGS

Drawings should include the following:

- Locality Map Cum Site Plan
- Land Acquisition Plans
- Sources of Construction Materials
- Plan & Longitudinal Sections
- Typical Cross-Sections
- Detailed Cross Section
- Cross Drainage Works
- Road JUNCTIONS
- Wayside Amenities
- Road Signs
WATER & WASTE WATER

WATER IS LIFE

Millennium Development Goal-7

Target – 10

Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation

Status of Water Supply

<table>
<thead>
<tr>
<th>Year</th>
<th>Rural (%Population)</th>
<th>Urban (%Population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>65</td>
<td>90</td>
</tr>
<tr>
<td>2000</td>
<td>77</td>
<td>94</td>
</tr>
<tr>
<td>2006</td>
<td>86</td>
<td>96</td>
</tr>
</tbody>
</table>

Status Sanitation

<table>
<thead>
<tr>
<th>Year</th>
<th>Rural (%Population)</th>
<th>Urban (%Population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>4</td>
<td>44</td>
</tr>
<tr>
<td>2000</td>
<td>13</td>
<td>49</td>
</tr>
<tr>
<td>2006</td>
<td>18</td>
<td>52</td>
</tr>
</tbody>
</table>

Waste Water Generation & Treatment 2003-2004

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Class I cities (MLD)</th>
<th>Class II cities (MLD)</th>
<th>Total (MLD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Water Generated</td>
<td>23826</td>
<td>2428</td>
<td>26254</td>
</tr>
<tr>
<td>Waste Water Treated</td>
<td>6955</td>
<td>89</td>
<td>7044</td>
</tr>
<tr>
<td>Waste Water Untreated</td>
<td>16871</td>
<td>2339</td>
<td>19210</td>
</tr>
</tbody>
</table>
Status Water Supply in NCR

Water Supply in diff. Sub-Regions of NCR (2005)

<table>
<thead>
<tr>
<th>Sub Region</th>
<th>Domestic (BCM)</th>
<th>Industrial (BCM)</th>
<th>Irrigation (BCM)</th>
<th>Total (BCM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haryana</td>
<td>0.227</td>
<td>0.0077</td>
<td>4.929</td>
<td>5.1637</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>0.017</td>
<td>0.0046</td>
<td>1.855</td>
<td>1.8766</td>
</tr>
<tr>
<td>U.P.</td>
<td>0.208</td>
<td>0.0608</td>
<td>4.259</td>
<td>4.5278</td>
</tr>
<tr>
<td>NCT</td>
<td>1.586</td>
<td>0.3308</td>
<td>0.366</td>
<td>2.2828</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2.038</td>
<td>0.4039</td>
<td>11.409</td>
<td>13.8509</td>
</tr>
</tbody>
</table>

Drinking WATER SUPPLY STATUS (NCR area)

<table>
<thead>
<tr>
<th>Town</th>
<th>Installed Capacity mld</th>
<th>Present Production mld</th>
<th>Present supply Rate lpcd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faridabad</td>
<td>115.33</td>
<td>115.33</td>
<td>100</td>
</tr>
<tr>
<td>Gurgaon</td>
<td>17.52</td>
<td>17.52</td>
<td>95</td>
</tr>
<tr>
<td>Panipat</td>
<td>38.4</td>
<td>38.4</td>
<td>146</td>
</tr>
<tr>
<td>Rohtak</td>
<td>22.39</td>
<td>22.39</td>
<td>80</td>
</tr>
<tr>
<td>Sonepat</td>
<td>14.63</td>
<td>14.63</td>
<td>80</td>
</tr>
<tr>
<td>Gohana</td>
<td>2.82</td>
<td>2.82</td>
<td>70</td>
</tr>
<tr>
<td>Gurgaon</td>
<td>1.20</td>
<td>1.20</td>
<td>45</td>
</tr>
</tbody>
</table>

Drinking WATER SUPPLY STATUS NCR area (contd)

<table>
<thead>
<tr>
<th>Town</th>
<th>Installed Capacity mld</th>
<th>Present Production mld</th>
<th>Present supply Rate lpcd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awar</td>
<td>32.5</td>
<td>29.5</td>
<td>98</td>
</tr>
<tr>
<td>Behror</td>
<td>1.10</td>
<td>1.40</td>
<td>75</td>
</tr>
<tr>
<td>Ghaziabad</td>
<td>145</td>
<td>125</td>
<td>130</td>
</tr>
<tr>
<td>Meerut</td>
<td>150</td>
<td>150</td>
<td>142</td>
</tr>
<tr>
<td>Bulandsahar</td>
<td>14</td>
<td>12</td>
<td>75</td>
</tr>
<tr>
<td>Muradnagar</td>
<td>3</td>
<td>2.88</td>
<td>40</td>
</tr>
<tr>
<td>NCT Delhi</td>
<td>2865</td>
<td>2024</td>
<td>225</td>
</tr>
</tbody>
</table>

Issues in Urban Water Supply

- Depletion of Ground Water source
- High Level of UFW
- Intermittent Water Supply
- Inadequate Service Level and Terminal Pressures
- Lack of O&M culture
- Water Quality contd.
Issues in Urban Water Supply (contd.)

- Inadequate cost recovery and consequent inadequate provisions for O&M
- Grossly inadequate logistics support to executing & O&M agencies
- Erratic Power Supply
- Poor coverage in slums
- Low efficiency

Low Level Equilibrium Trap

Low Service Level → Investment → Low level Investment

Low Willingness to Pay →Low tariff & cost recovery

Vision for Water Supply & Sanitation sector

- QUALITY Water Supply and Sanitation for all based on Efficiency, SUSTAINABILITY, Equity, Affordability and accountability
- To make water utilities emerge as Financially, Technically and Managerially professionalized

Strategy

1. Source sustainability:
   a. Conservation and efficient use of existing sources:
      - Reducing water losses
      - Universal Meterization
      - Demand Management
      - Waste water management and prevention of pollution of water resources

Strategy (contd.)

b. Strengthening of water sources
   - Rain Water Harvesting
   - Recycling and reuse of waste water

Strategy (contd.)

2. Enhancing Efficiency
   a. 24x7 continuous water system
      - Water & Energy audit
      - Water loss management and reducing NRW
      - Cost recovery
      - Investment in distribution network
   b. Customer relation management
      - IEC
      - Redressal of complaints
      - Regulation
3. Equity & Financial sustainability
   • Extending network to Slums
   • Community participation for cost effective services
   • Cost to include O&M expenses, Waste water management cost and asset replacement cost
   • Telescopic tariff with focused subsidy for poor
   • Effective recovery of water charges

4. PPP (Public Private Partnership)
Possible Options: Part A

Capital Investment Plan

- Option 1
  - Broad Capital Investment plan provided by Client
  - Maximum value of Capital Investment plan fixed
  - Detail Capital Investment plan to be worked out by operator
  - Expenses on Capital Investment at actual
  - Predetermined percentage of expense paid to Operator

- Option 2
  - Broad Capital Investment plan to be worked out by Client
  - Bill of Quantity for Capital Investment plan provided in the tender
  - Detail Capital Investment plan worked out by Operator
  - Operator paid based on actual work done as per BOQ rates

Possible Options: Part A

- Option 3
  - Broad Capital Investment plan to be worked out by Client
  - Bidders to quote fixed sum on EPC basis
  - Detail Capital Investment plan worked out by Operator
  - Extras (Scope of work not covered in Plan of Client)
    - Design Engineering: Operator paid a % of Extra work
    - Project Management: Operator paid a % of Extra work

Possible Options: Part B

- Option 1
  - Pure Management Contract: Fixed Fee paid to Operator

- Option 2
  - Performance Based Management Contract
    - 40% Fixed fee
    - 60% Variable fee
    - UFW reduction incentive fee
    - Service coverage incentive fee
    - Energy Saving incentive
    - Collection efficiency

Possible Options: A + B

- Option 1 (Deferred Annuity Model)
  - Part Capital Investment Plan financed by Operator
  - Operator paid Management Fee & Annuity to cover the sum financed by operator

- Option 2 (Lease)
  - Part Capital Investment Plan financed by Operator
  - Utility handed over to Operator at a guaranteed Lease fee

Possible Options: A + B (contd.)

- Option 3 (Partial Concession)
  - Part Capital Investment Plan financed by Operator for viability gap
  - Utility handed over to Operator at a predetermined tariff in the future
  - Escrow account will need to be created for payment collection
24X7 WATER SUPPLY

NEED OF THE DAY

Framework for 24x7 Water supply

| Environmental Sustainability | Proper recharge of water resources and aquifers and water extraction rights for all projects |
| Financial Sustainability    | Cost Recovery to meet O&M and Capital Costs |
| Reliability                 | Availability of Safe and clean water on continuous basis |
| Affordability               | Cost of water supply and sanitation services to be measured against public services |

Benefits

- Continuous Systems shall eliminate the possibility of ingress of contaminated water, leading to reduction in Health risks.
- With Continuous availability of water, the time spent on fetching water shall be eliminated, particularly for urban poor, leading to reduction of coping costs.
- Financial and Environmental Sustainability of water supply systems lead to more direct and indirect benefits to the people.
- Provision of safe & pure water shall reduce “point of user” purification, thereby eliminating hidden costs.

Aapni Yojna

Average water consumption in liters per capita per day

(from Feb.03 to Feb.04)

THANK YOU

O.P. GOYAL
Main Provisions of MSWM Rules, 2000

- Prohibit littering on the streets - storage of waste at source
- Collection of waste from the door steps
- Daily street sweeping
- Abolition of open waste storage sites
- Transportation of waste in covered vehicles
- Processing of Waste By Composting or Any Other Useful Conversion
- Disposal of non-biodegradable only at sanitary land fill site

Timelines Prescribed

<table>
<thead>
<tr>
<th>Compliance Criteria</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting up of waste processing and disposal facilities</td>
<td>by 31-12-2003 or earlier</td>
</tr>
<tr>
<td>Monitoring the performance of waste processing and disposal facilities</td>
<td>once in six months</td>
</tr>
<tr>
<td>Improvement of existing landfill sites as per provisions of these rules</td>
<td>by 31-12-2001 or earlier</td>
</tr>
<tr>
<td>Identification of landfill sites for future use and making site(s) ready for operation</td>
<td>by 31-12-2002 or earlier</td>
</tr>
</tbody>
</table>

Present Status

- Solid waste collection is 50-60% of the waste generated
- Waste collection is not daily
- Drains are filled with waste making drainage system ineffective & create unsanitary conditions
- Waste is dumped along roads, at open places, streets, in drains, open plots causing degradation of surface, ground water & air

Factors Responsible for Poor Performance

- Acute shortage of financial resources in ULBs
- Land not available for disposal of waste
- ULBs lack institutional capacity
- ULBs not able to recover operational cost
- Management of SWM is looked as inferior function and gets low priority

Factors Responsible for Poor Performance

- SWM services looked after by junior level officers with low technical and managerial skill
- Equipment and tools in shortage & not compatible
- Waste quantity increasing rapidly due to - high urban population growth, buoyant economy, changed food habits but resources of ULBs are not increasing proportionately
What Should be Done???

- Zero waste: implemented by NGO in Chennai
- Segregation of waste at source
- Recycle waste
- Public awareness to reduce, recycle and segregate waste

What Should be Done???

- Door to door collection of waste through NGOs/private sector
- Outsource collection of medical waste
- Outsource transportation of waste

What Should be Done???

- Acquire land for disposal of waste
- Composting & sanitary land fill site through PPP/turnkey contracts
- Involve public, NGOs and private sector
- Procure equipment, bins & tools to mechanize system
- Compatible system & design
- Land for transfer system

What Should be Done???

- Visits to see good cases of SWM
- Biodegradable waste to be processed for compost/energy
- Inert material to be disposed at sanitary landfill sites
- Carbon credit for SWM
- Land fill sites developed at Ahmedabad are very neat & clean
- Common land fill for nearby towns

Remarks

- Solid waste management is one of the primary and most important functions of municipal bodies
- Substantial amount of municipal budget is spent on this sector
- Degree of satisfaction of citizens - low
- Inefficient SWM system is causing heavy burden on municipal finances
- This inefficiency is one of the reasons for non-payment of municipal taxes

THANK YOU
URBAN TRANSPORT PLANNING CONCEPTS
CAPACITY DEVELOPMENT OF NCR PLANNING BOARD
WORKSHOP

A presentation
By
N. Seshadri
Transport Planner
Wilbur Smith Associates
December 2008

Urban Transport Planning
• To understand the travel behaviour of people within the urban area
• To find out the relationships between the travel and the factors affecting it in terms of quantifiable parameters
• To predict the future travel behaviour
• To prepare plans for alleviating traffic problems like congestion, delays, reduced safety and environmental pollution

Population Scenario
Today and Tomorrow

METROPOLITAN CITIES
PRESENT
Population 2001 1027 million
Urban Share 285 million (27.78 %)
Metropolitan cities 35

PROSPECTS
Population 2025 1228.5 million
Urban Share 658 million (53.56%)
Metropolitan cities 70

Need for Urban Transportation Planning
Traffic problems are normally realized only after development reaches certain level and problem becomes perceptible.

Problems in Urban Areas
• Alarming Growth of Personal Vehicles
• Congestion, Delays, Driver Frustration
• Crawling Speeds and Longer Travel Times
• Increasing Accident Rates
• Environmental Degradation
• Overall Deterioration of Quality of Urban Life

Why do people travel?
Residential Activity
Educational Activity
Commercial Activity
Recreational Activity
Employment Activity
URBAN MOBILITY – A Vicious Circle

There is an inseparable relationship between Land use and Transportation.

How to measure Travel demand?

A Trip is a fundamental unit of travel. A trip is one directional movement of a person.

Travel Demand is measured in terms of trips per day.

Characteristics of a Trip

1. Origin
2. Destination
3. Route
4. Mode
5. Purpose

<table>
<thead>
<tr>
<th>Trip</th>
<th>Origin</th>
<th>Destination</th>
<th>Production</th>
<th>Attraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Home</td>
<td>Office</td>
<td>Home</td>
<td>Office</td>
</tr>
<tr>
<td>2</td>
<td>Office</td>
<td>Market</td>
<td>Office</td>
<td>Market</td>
</tr>
<tr>
<td>3</td>
<td>Market</td>
<td>Home</td>
<td>Home</td>
<td>Market</td>
</tr>
</tbody>
</table>
MODE CHOICE
A Mode is the means of the travel in an urban area. The available modes can be:
- Bus
- Car
- Metro
- Two wheeler
- Three Wheeler
- Bicycle
- Walk

ROUTE CHOICE
- Home
- Office
- School

Comprehensive Urban Transportation Planning Process
- A survey and analysis stage that involves the collection of data regarding present day travel behaviour and various causal factors and development of the relationships between the two.
- A prediction and plan formulation stage, which predicts for some future date the likely travel patterns and formulates strategies to meet this demand.
- An evaluation stage which attempts to assess whether the proposals put forward satisfy the projected demand for travel with adequate safety, capacity and level of service and whether they provide the urban community the expected benefits.

STUDY AREA AND TRAFFIC ZONES

Four Steps Travel Demand Forecasting
- Step 1: Trip Generation
- Step 2: Trip Distribution
- Step 3: Mode Split
- Step 4: Network Assignment
Four Steps Travel Demand Forecasting

Step 1: TRIP GENERATION
This stage involves predicting future travel for a target year. In other words, estimation of productions and attractions of all the zones in the urban area for a future date is called Trip generation.

Step 2: TRIP DISTRIBUTION
This step involves predicting inter zonal travel. How will the trips produced at a zone get distributed to all other zones at a future date is the point of analysis in this stage.

Step 3: MODE SPLIT
The third stage in travel demand estimation is modal split. In order to plan a better transportation system, the planner should have an understanding of how people choose different modes for their travel needs. Modal split is the process of estimating the share of different modes in serving the inter-zonal travel. In simple terms, it means estimating how many trips will make use a car, how many trips will make use a local train etc. between a given pair of zones.

Step 4: NETWORK ASSIGNMENT
By completing the three stages up to modal split, the planner can know, between a given pair of zones how many trips will be there for the design year and what is the share of each mode. These pair of zones may be having a number of alternative routes connecting each other. Network assignment is the process of understanding the choice of route by the projected travel demand and allocation of trips to different routes accordingly.

A Simple Network To Understand the UTP Process

Trip Generation

Trip Distribution

Assignment

Mode 1
100

Mode 2
50

Mode 3
50
Study Area and Traffic Zones

The study area is usually decided on the basis of "Commuter shed" associated with urban center. The area within and beyond is divided into "Traffic Zones" for the purpose of grouping Origins and Destinations and other data.

Surveys to be Carried Out

- Home Interview Survey
- Cordon Counts
- Screen line Counts
- Commercial vehicle surveys
- IPT surveys
- Road Side interviews
- Speed and Delay Surveys
- Public Transport surveys
- Inventory of Transportation Facilities

Travel Information

- Number of trips made in a day
- Purpose
- Starting point and end point
- Mode of travel
- Time components
- Cost components
- Time of day
- Route travelled

Transport System Characteristics

- Capacity
- Speeds
- Frequency
- Comfort
- Reliability
- Time of Travel
- Modal Integration

Activity Information

- Industrial employment
- Educational employment
- Administrative employment
- Whole sale and retail employment
- Service employment
- Informal sector employment

Socio-Economic Data

- Demographic information
- Income levels
- Vehicle ownership levels
- Occupation
- Education
- Family structure
- Employment
Network Characteristics
- Roads by classification
- Road properties
- Road geometry
- Railway system properties
- Other Network properties

Land use Characteristics
- Residential Areas
- Industrial Areas
- Commercial Areas
- Educational Areas
- Recreational Areas
- Developable Areas
- Other land uses

Types of Movements
- External-Internal
- External-External
- Internal-External
- Internal-Internal

Most Important Outcomes of Home Interview Survey Analysis
- Origin-Destination matrix
- Desire Line Diagram

Desire Line Diagram of Hyderabad City
ROAD NETWORK PLANNING

CLASSIFICATION OF HIGHWAYS
- National Highways
- State highways
- District Roads
- Village Roads

CLASSIFICATION OF URBAN ROADS
- Freeways
- Expressways
- Major Arterials
- Collector Streets
- Local Roads

FUNCTIONAL CLASSIFICATION
- Freeways
- Expressways
- Major arterials
- Collector streets
- Local streets

EXPRESSWAY
- Deceleration Lane
- Acceleration Lane
- Grade Separation
- Ramp

ARTERIAL
- Service Road
WHAT IS THE USE OF TRANSPORTATION PLANNING PROCESS?

- SHORT TERM PLANS FOR IMMEDIATE IMPLEMENTATION
  - Location Specific
  - Micro Level
  - Low Capital Investment
  - Stop Gap Arrangements

EXAMPLES FOR SHORT RANGE PLANS
- Junction Geometry Improvements
- Signalization
- Signage and Markings
- Parking Prohibition
- One-way Street System

- MEDIUM RANGE PLANS
  - Network Capacity Building
  - Considerable Capital Investment
  - Need To Be Integrated With Long Term Plans
EXAMPLES FOR MEDIUM RANGE PLANS
- Fly Over Construction
- Addition of links
- Bridges, ROBs, RUBs
- Pedestrian Subways

LONG TERM PLANS
- Overall Development Of Urban Area
- Comprehensive And Macro Level
- High Capital Investment
- Dictate The Urban Area Growth Pattern

EXAMPLES FOR LONG RANGE PLANS
- Bypass Roads
- Development of Terminals
- Shifting of Activities
- Truck Terminals
- New Transport Systems like MRTS

URBAN TRANSPORT PLANNING TEAM
- Transport Planner
- Traffic Engineer
- Transport Economist
- Urban Planner
- Mass Transit Specialist
- Transport Modeler
- Environmental / Social Specialist
- Financial Expert

Thank You
Why Urban Infrastructure???

- Improvement in quality of life
- Improvement in the environment
- More benefit to poor & vulnerable people
- Planned and systematic growth of cities/infrastructure
- In absence of city infrastructure, individuals make their own system which is more in initial cost and in O & M cost and national waste
- Improvement in health

Economic Perspective

- Cities are focal points of economic activity and the engines for economic growth;
- Higher is level of urbanization higher is GDP of country (Korea 80% urbanites GDP 10000 $ per capita versus Nepal 15% urbanites GDP is 200$ per capita);
- Productivity per capita is more in towns
- Better infrastructure stimulates economic growth
- India's high economic growth will not sustain unless infrastructure keeps pace with increasing population
- Better infrastructure more productivity per person
- In India 60% GDP and 90% revenue is from cities
- Urbanization promotes human development

Planning Considerations

- Design projects with low operational, maintenance and energy costs. Consider life cycle cost
- Prioritize investments to have maximum benefits in least cost
- Civic services cannot be improved unless citizens/users are involved

Construction Quality

- Reduces O & M cost and renewal costs
- More reliable system
- Poorly laid water pipe line results in water loss continuously for ever
- Economy not at cost of quality
- Use of good quality material and equipment even at more cost
- Good quality does not cost more, but benefits are very high
- Quality assurance and quality control procedures should be stipulated and strictly followed
Outsourcing

- Outsource some of the O & M activities
- In outsourcing cost may be less & service provided better
- Services which can be outsourced can be: Billing & revenue collection, Door to door collection of waste, Collection of medical waste, market waste, O & M of pumping stations, STPs, WTPs
- Involve NGOs, Private sector and community

Contract Documentation & Administration

- Standardize contract conditions, specifications, bidding process, evaluation method, construction drawings etc
- Quick decision on contract issues
- Electronic schedule of Rates
- Time overruns delays benefits, increase cost and interest. Project loses significance.
- Timely completion of contract is national pride
- E-bidding for transparency & quickness

Turnkey Contracts

- Turnkey contracts can be taken up. This reduces design work.
- Turnkey contracts can be for STPs, WTPs, Pump houses, Land Fill sites, Composting etc
- Some of the work contracts can be with O & M for 3/5 years. This improves quality of construction

Carbon Credit

- Reduction of CO2/Carbon from emissions can be encashed
- This can be done by Sanitary Land Fill site, composting, Replacing old pump sets to increase efficiency, replacing conventional road lights by energy saving lights etc
- Process seems complicated but by outsourcing it can be done more easily

PPP

- Public Private Partnerships in Urban Infrastructure, though having immense potential, is in a nascent stage & yet to take-off in a big way
- Water supply has managed to attract private sector participation at Tiruppur and Visakhapatnam
- Significant Private Sector participation has taken place to fund projects relating to roads, sea ports, power & shopping complexes
- Recently, lot of initiatives seen in the area of developing Special Economic Zones, Industrial parks, etc.
- Parallels can be drawn from the telecom sector and the urban housing sectors where Private Sector Participation has proved beneficial

Let us commit to provide good and sustainable infrastructure in NCR area covering all citizens particularly the poor so as to improve quality of life and provide better environment
THANK YOU
Appendix 5

Key Note Address by the Member Secretary, NCRPB

Workshop on Master Plan Preparation Process for Urban Infrastructure
(April 9, 2009, Amaltas, India Habitat Centre, New Delhi)

Experts, Ladies and gentlemen

It is my pleasure to be with you in today’s seminar on “Master Plan preparation process for urban infrastructure development”.

A planned development is a well recognized strategy to achieve development objectives in a shorter time and in a more effective manner. NCR Planning Board is mandated under Section 7 of the NCR Planning Board Act, 1985

(i) To ensure proper and systematic programming by the participating States in regard to project formulation, determination of priorities in the NCR and phasing of development of the Region in accordance with stages indicated in the Regional Plan and

(ii) To arrange for, and oversee, the financing of selected development projects in the NCR through Central and State Plan funds and other sources of revenue.

To fulfill this mandate the Board has adopted a planned strategy and has prepared Regional Plan 2021 which is a macro plan for development of the region. It is now in the process of developing a Business Plan, which goes to micro levels, to implement the policies and proposals of the Regional Plan. A number of initiatives have been taken to meet the challenge.

Till now the Board lacked good projects for financing and was constrained to fund those presented before it by the NCR constituent states. Now the Board has initiated steps to plan and develop shelf of projects that are in sync with the overall development of the region. The more notable of these steps are:

New Plans:

(i) Preparation of Functional Plan on Tourism in the NCR because well designed tourism circuits in NCR have substantial potential to create jobs in the region.

(ii) Preparation of Integrated Mobility Plan for all the major cities and towns in the NCR.

Preparation of City Development Plans (CDPs) for all the Metro and Regional Centres identified in Regional Plan-2021. Model CDPs for two centres are being prepared through ADB assistance and the rest will be got prepared by NCRPB through out-sourcing.
Expediting on-going studies:

Study on the Integrated Transportation Plan for NCR was expedited. The consultant has submitted Draft Final Report which was extensively discussed in a Seminar organized for this purpose. The draft report has identified a number of priority investments that need to be implemented for creating an efficient transportation system in the NCR. The matter has been taken up with the Transport Secretaries of the constituent states to fix priority among these projects and reserve land well in advance for projects to be implemented in the future. In addition, dialogue has been initiated with funding agencies such as ADB, JICA etc. to find funds for these projects.

Study on Augmentation of Water Supply in NCR was expedited and a seminar has been organized to invite suggestions of the stake holders. The consultant is preparing Draft Final Report and it is expected to be submitted soon. In the meantime, the concerns highlighted by the consultant, particularly the one regarding the ground water recharge, have been taken on board. A dialogue has been initiated to find funds to address the problem and a tentative proposal has been submitted to KFW for considering funding of ground water recharge projects in the NCR.

Studies on Power sector and Drainage in NCR are being done at a pace slower than desired. Efforts are underway to expedite these studies so that issues concerning Power and Drainage can be addressed in a planned manner.

New studies on social infrastructure, handicraft and household industries and socio-economic study are being undertaken to prepare functional plans for development of these sectors.

It is intended that these planned efforts bear desired fruits and for that to happen the required capacities have to be developed. This seminar aims to emphasize importance of planned development and disseminate the knowledge regarding preparation of sector Master Plans. The Master Plan will take into account sustainable development and sustainability with the recognition that current consumption and living habits may be leading to problems such as

(i) deficiency in service delivery for basic infrastructure  
(ii) the overuse of natural resources,  
(iii) un-optimal use of available scarce resources due to lack of co-ordination in planning  
(iv) ecosystem destruction,  
(v) pollution,  
(vi) growing social inequality and  
(vii) large-scale climate change.

The Master Plan Approach, while keeping sustainability issues in mind, involves making choices among the options that appear open for the future, and then securing their implementation, which depends upon allocation of necessary resources. Thus Master plan is
a tool to guide and manage the growth of cities in a planned manner.

The master plan helps to arrest the ugliness and haphazard growth of big cities and guides the future development in a planned planner. It also facilitates phased developments to achieve the single development vision of ‘optimum utilization’ of available scarce resources.

Approach to the city level / regional level infrastructure development should be premised on sector level master plans. In its comprehensive approach the first focus shall be on sector level analysis limiting to the

(i) service area (city/development authority area), appraising the existing system performance and
(ii) identifying the problems,
(iii) projecting the future demands and
(iv) Improvements/ augmentations required to achieve the acceptable levels.
(v) Subsequently, the priority projects and components shall be identified for detailed (vi) studies from the Sector Master Plans prepared.

It is, therefore, evident that a planned development is needed to implement the policies and proposals of the Regional Plan of NCR.

Asian Development Bank Technical Assistance for NCRPB

The objective of the present Asian Development Bank (ADB) Technical Assistance (TA) is to strengthen the capacity at NCRPB, state-level NCR cells, and other implementing agencies in the area of planning for urban infrastructure. This will help to

(i) improve quality of basic urban services in the NCR;
(ii) to develop counter magnet towns;
(iii) to reduce in migration into Delhi and orderly development of NCR; and
(iv) to accelerate economic growth in the NCR.

Component B of this ADB TA focuses on to impart necessary skills to conceive, design, develop, appraise and implement good quality infrastructure projects for planned development of NCR, through demonstration process of preparing model projects. This component of the TA will produce outputs like:

(i) Bankable Detailed Feasibility Study Reports of identified projects including all due diligence documentation required for processing of projects for funding purpose;
(ii) Standard Procedure Manuals for project identification and preparation

Present Workshop on Master Plan Preparation Process
Initial Outputs of the TA, in terms of Mater plan for the identified sectors (water supply, sewerage, drainage, solid waste management and transport) for the sample towns, are prepared through the systematic approach. Experiences and the process of Sector level Master plans prepared for the water supply (Panipat Town), sewerage (Hapur Town) and drainage (Hapur Town) sectors are shared with the stakeholders as part of the capacity development program in this workshop.

**The Way forward**

Stakeholders and their officials consisting of planners and engineers participating in this workshop can benefit by sharing the experiences of the TA Team in approaching the projects identification for DPR preparation through sector level master plan approach. Detailed presentations to be followed on the Sector Plans prepared for water supply, sewerage and drainage sectors can explain the components, process, outputs required for a typical sector plan with futuristic approach for a city development. By having appropriate interaction through discussion process, this experience can be transplanted in your towns, in your sectors for project identification.

In the subsequent workshops, the experiences of the DPR preparation along with the required due-diligence activities (technical, environmental, social rehabilitation, economic and financial) will be shared with you by the TA Team.

Demonstration of planning and implementation process for urban infrastructure projects through ‘lessons learned’ format by visiting successful projects will also have more positive impact on the urban development. ADB TA has also proposed for few field visits to such representative successful projects across the country for the benefit of the stakeholders in NCR.

I hope this seminar will benefit all the participants and stakeholders engaged in development of NCR.

Thanks.
### List of Participants – WS-2

**National Capital Region Planning Board**  
*(ADB TA 7055 – IND, Component B)*

**Workshop on Urban Infrastructure Master Plan Preparation Process**  
at Amaltash Hall, India Habitat Centre, New Delhi on 9 April 2009

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<td>2</td>
<td>Ashish Shanker</td>
<td>Town Planners</td>
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<td>Sunil Verma</td>
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<td>Ashwin Khane</td>
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<td>Yogendra Singh XEN</td>
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<td>10</td>
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<td>11</td>
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<td>Amil Mehra</td>
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### NATIONAL CAPITAL REGION PLANNING BOARD

(ADB TA 7655 – IND, COMPONENT B)

**Workshop on Urban Infrastructure Master Plan Preparation Process**

at Amaltash Hall, India Habitat Centre, New Delhi on 9 April 2009

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<td>Mr. Subhash Verma</td>
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Capacity Development of the NCRPB
ADB TA 7055 IND Component B

Master Planning for Urban Infrastructure
NCRPB, New Delhi
April 9, 2009

Urbanization-boom for economy

- In India 60% of GDP and 90% of revenue comes from urban although population is 30%
- Higher is level of urbanization higher is GDP per capita of country
- Higher city size – more is productivity per capita
- Cities have greater output / productivity per capita than rural areas
- Migration to urban – more wealth of nation
- Productivity of city / nation would further increase if cities function more efficiently

Urbanization : Provides Better Life

- Urbanization promotes human development
- Cities are centers of excellence for education, health care, innovations, entrepreneurship, business, commerce, industry, culture and social services
- Cities are large markets for all types of products, goods and services
- Cities are primary centers for jobs, employment & livelihood opportunities

Infrastructure Situation

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<td>(Piped water in house)</td>
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<td>Households having water toilets</td>
<td>46%</td>
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<td>Connected to public sewerage system</td>
<td>28%</td>
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<td>Garbage collection Municipal Authorities</td>
<td>60%</td>
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<td>Living in squatter settlements</td>
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Urban Infrastructure: need

- Rakesh Mohan Committee: Rs 28000 Crore
- As per PM’s speech in 2004: US$150b in next 10 years
- In terms of GDP 8% of GDP including 2% Pvt
- Present spending
  i) 2.8% of GDP(Govt.)
  ii) 0.8% of GDP(Private)
- China is spending appx. 7 times(US$150b/year) as compared to India(US$20b/year)
Urban Infrastructure situation
- Inadequate Water Supply and sanitation system, Unsafe Water Supply
- Severe traffic congestion
- Proliferation of low grade housing including slums & informal settlement
- Environmental degradation of air, land and water
- Solid Waste not collected completely & improper disposal
- Lack of financial, technical, managerial & administrative capacity
- Lack of political will
- Unplanned and Uncontrolled growth of towns

Urban Infrastructure Situation
- Inappropriate land management
- High level of urban poverty
- Low quality of life indicated by poor health standards
- Serious social problems as shown by increasing incidence of crime, violence and vandalism
- Continued urban growth is expected to compound these problems
- Low motivation of staff, no ownership no sense of care
- Poor governance
- Inefficient and leaking water supply systems
- Ad hoc and temporary solutions

Urban Infrastructure : Planning
- Investment for Urban Infrastructure is cost effective- more benefits
- Plan nuts and bolts
- Take adequate time in planning
- Plan for Long Period
- More area
- Planning for Region, Sub-Region, Cluster, City
- Sustainable Planning (environmentally & financially)
- Quality of construction

Urban Infrastructure : Master Plan
- Planning Stages
  - Master Plan, Development Plan, Sector plan
  - Phasing of Master Plan Investments
  - Concept report, Prefeasibility Report, Feasibility Report, DPR, Detailed Engineering Report
  - Report required for approval of loan
  - Report required for implementation
Urban Infrastructure Situation

- Optimum solution
- Conceive vision, goal, objective
- Consider local conditions
- Consider policies, guidelines and applicable regulations

Thank You
What is Master Plan?

- It defines broad picture of Infrastructure requirement of:
  - A defined Geographical area
  - Over a defined period of time
  - Should address all components of particular Infrastructure
  - Provide for phasing of activities, as reqd.

Requirements for Master Plan

- Details of existing infrastructure
- Detailed Land use Plan for the projected period of planning with boundary limits
- Details of likely developments in the proposed geographic area affecting migration of population
- Status of existing and proposed developments of other infrastructures

Process of M.P. preparation

- Analyze existing water supply system
- Evaluate alternative sources of water from techno-economic points of view
- Make Demographic projections
- Fix the Design Criterias
- Make water demand projections
- Divide the development area in Zones for water distribution system design

continued:

- Demographic history with ward-wise/area-wise break-up of the town
- Alternative sources of water
- Detailed topographic map of the development area
- Problems experienced in O&M of existing system and deficiencies, if any

continued

- Design the water production system from the source selected
- Design distribution system
- Design the O&M system
- Define the Institutional set up for Execution and O&M
- Prepare block cost estimates
Prioritise different components of the Master Plan from the points of view of technical and physical requirements
Prepare an investment plan for Phase-wise implementation
Get Environmental, Social and Economical analysis done

AREAS OF DIFFERENT LIMITS

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Population Growth Panipat (1951 – 2001)

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<th>Area (ha)</th>
<th>Density (ppha)</th>
<th>Growth Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>54981</td>
<td>778</td>
<td>71</td>
<td>-</td>
</tr>
<tr>
<td>1961</td>
<td>67206</td>
<td>778</td>
<td>87</td>
<td>21.9</td>
</tr>
<tr>
<td>1971</td>
<td>87981</td>
<td>778</td>
<td>114</td>
<td>31.3</td>
</tr>
<tr>
<td>1981</td>
<td>137927</td>
<td>1987</td>
<td>69</td>
<td>56.8</td>
</tr>
<tr>
<td>1991</td>
<td>191000</td>
<td>1987</td>
<td>96</td>
<td>38.5</td>
</tr>
<tr>
<td>2001</td>
<td>261740</td>
<td>1987</td>
<td>132</td>
<td>37.0</td>
</tr>
</tbody>
</table>

Population Projections (2011 – 2041)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mathematical Projections</th>
<th>Projected Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arithmetic Method</td>
<td>Exponential Method</td>
</tr>
<tr>
<td></td>
<td>Develop Plan 2021</td>
<td>by Increase Method</td>
</tr>
<tr>
<td>2011</td>
<td>5,06,866 (43%)</td>
<td>4,42,864</td>
</tr>
<tr>
<td>2021</td>
<td>7,09,612 (40%)</td>
<td>7,01,302</td>
</tr>
<tr>
<td>2031</td>
<td>6,20,296</td>
<td>9,59,740</td>
</tr>
<tr>
<td>2041</td>
<td>7,09,012</td>
<td>1,450,591</td>
</tr>
</tbody>
</table>
### Population Adopted

<table>
<thead>
<tr>
<th>YEAR</th>
<th>POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>5 Lac</td>
</tr>
<tr>
<td>2026</td>
<td>8.05 Lac</td>
</tr>
<tr>
<td>2041</td>
<td>12.70 Lac</td>
</tr>
</tbody>
</table>

### Present Water Supply sources

<table>
<thead>
<tr>
<th>System</th>
<th>Production Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>115 TW within Municipal Area</td>
<td>56.31 MLD</td>
</tr>
<tr>
<td>39 TW outside Municipal Area</td>
<td>9.07 MLD</td>
</tr>
<tr>
<td>41 TW in HUDA Area</td>
<td>15.66 MLD</td>
</tr>
<tr>
<td><strong>Total capacity</strong> 195 TW 81.05 MLD</td>
<td></td>
</tr>
</tbody>
</table>

### Panipat-Existing Water Supply Distribution System

### Location of Tube Wells (Municipal Area)

### WATER SUPPLY LEVEL

- Total Production Capacity 81.05 MLD
- Likely UFW 40%
- Net Water Supply 48.63 MLD
- Population 2008 (Appox) 4.86 lac
- Present Service Level 100 lpcd

### Ground Water Exploitation status Panipat District

<table>
<thead>
<tr>
<th>Block</th>
<th>Exploitation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bapoli</td>
<td>186 %</td>
</tr>
<tr>
<td>Isama</td>
<td>16 %</td>
</tr>
<tr>
<td>Madlauda</td>
<td>129 %</td>
</tr>
<tr>
<td>Panipat</td>
<td>137 %</td>
</tr>
<tr>
<td>Samalkha</td>
<td>181 %</td>
</tr>
<tr>
<td>Average level for District</td>
<td>156 %</td>
</tr>
</tbody>
</table>
Ground Water Drop in Panipat District
June 1974 – June 2007

<table>
<thead>
<tr>
<th>Block</th>
<th>SWL June 74</th>
<th>SWL June 07</th>
<th>Drop in Water Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panipat</td>
<td>3.81</td>
<td>21.2</td>
<td>17.39</td>
</tr>
<tr>
<td>Madlauda</td>
<td>4.57</td>
<td>9.49</td>
<td>4.92</td>
</tr>
<tr>
<td>Samalkha</td>
<td>5.16</td>
<td>20.09</td>
<td>14.93</td>
</tr>
<tr>
<td>Isarna</td>
<td>3.87</td>
<td>7.43</td>
<td>3.56</td>
</tr>
<tr>
<td>Bapoli</td>
<td>5.39</td>
<td>13.01</td>
<td>7.62</td>
</tr>
</tbody>
</table>

GROUND WATER FLUCTUATION - PANIPAT

Tube Wells, Panipat

Industrial Waste flowing in Drains

Water Demand Forecast
- Designed Rate of Water Supply: 160 lpcd
- UFW Provision: 15%
- Demand 2011 with UFW 40%: 112.5MLD
- Demand 2026: 130 MLD
- Demand 2041: 196 MLD

OBJECTIVES
- PROVIDE GOOD QUALITY POTABLE WATER IN ADEQUATE QUANTITY AND WITH DESIRED TERMINAL PRESSURE
- PROVIDE 24X7 WATER SUPPLY
- REDUCED UFW
- IMPROVED CUSTOMER SATISFACTION
- IMPROVED COST RECOVERY
Proposed Water Supply Zones - Panipat

ALTERNATIVE WATER SOURCES
- LOCAL GROUND WATER
- DELHI PARALLEL BRANCH CANAL
- YAMUNA RIVER

Munakh Regulator

Delhi Link Channel at Munakh Regulator

YAMUNA RIVER

Salient Features
- Water Treatment Plant: 200 MLD
- Clear Water Pumps: 8nos. 590lps 46m
- Raw Water Pumps: 6nos. 625lps 8m
- Pumping mains: 700mm 29500m, 500mm 2750m, 400mm 9870m, 350mm 9400m, 300mm 8500m
- Clear Water Reservoir: 20 ML
- Total OHSRs capacity: 64 ML
Salient Features (Contd.)

- Rehabilitation & Extension of Distribution system
- Providing Water Meters 800mm  4 nos.
- Zonal  32 nos.
- Consumer Meters  33000 nos.
- Change of all Consumer Service pipe lines with MDPE pipes
- UFW reduction Program through DMA method
- Training Center

Cost Estimates

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Cost (Rs. million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production system</td>
<td>804.13</td>
</tr>
<tr>
<td>Pumping main pipe lines</td>
<td>593.56</td>
</tr>
<tr>
<td>Zonal Reservoirs</td>
<td>640.00</td>
</tr>
<tr>
<td>Distribution system</td>
<td>170.63</td>
</tr>
<tr>
<td>Water Meters</td>
<td>183.30</td>
</tr>
<tr>
<td>Tube Wells Improvement</td>
<td>46.63</td>
</tr>
<tr>
<td>Misc. Items</td>
<td>200.00</td>
</tr>
<tr>
<td>Physical contingency @10%</td>
<td>275.88</td>
</tr>
<tr>
<td>Total</td>
<td>2902.00</td>
</tr>
</tbody>
</table>

Cost Estimate (Phase wise)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Phase - I</th>
<th>Phase - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production system</td>
<td>523.45</td>
<td>280.68</td>
</tr>
<tr>
<td>Pumping pipe lines</td>
<td>207.86</td>
<td>385.70</td>
</tr>
<tr>
<td>Zonal Reservoirs</td>
<td>420.00</td>
<td>220.00</td>
</tr>
<tr>
<td>Distribution system</td>
<td>124.10</td>
<td>46.53</td>
</tr>
<tr>
<td>Water Meters</td>
<td>183.30</td>
<td>-</td>
</tr>
<tr>
<td>Tube Wells Improvement</td>
<td>46.63</td>
<td>-</td>
</tr>
<tr>
<td>Misc. Items</td>
<td>100.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Physical contingency @10%</td>
<td>177.30</td>
<td>98.58</td>
</tr>
<tr>
<td>Total</td>
<td>1765.88</td>
<td>1136.20</td>
</tr>
</tbody>
</table>

Operation & Maintenance

- SCADA FOR OPERATION OF RWPS, WTP, CWPS, BOOSTER PS, TUBE WELLS & CONTROL OF OHSR LEVELS
- O & M OF PRODUCTION SYSTEM UP TO OHSR TO BE PLACED UNDER MANAGEMENT CONTRACT
- BILLING & REVENUE COLLECTION TO BE PRIVATISED
THANKS
Capacity Development of the NCRPB
ADB TA 7055 IND Component B

Preparation of Master Plan for sewerage
Specific Reference for Hapur
NCRPB, New Delhi
April 9, 2009

 existing sewerage system in hapur

Existing Sewerage System in Hapur

- Sewage system laid in 1972
- Covers 20% area
- 15 KM sewers 150-850 mm dia
- One pumping station 4 turbine pumps of 30 KW each
- Rising Main 450 mm Cast Iron and 450 mm RCC NP2
- No STP
- Pumped sewage earlier used for irrigation but now due to urbanization no takers

Existing sewerage system in hapur

- Existing sewers are blocked
- Sewers are overflowing
- Sewers discharge waste in drains
- Man holes filled with solid waste
- Sewage Pumping Station is very old, in bad condition and pumps lived there normal life
- One pump operates 2 hours a day against installation of 4 pumps- Indicate 5% flow reaches SPS

Existing Sewage System in Hapur

EXISTING SEWERAGE SYSTEM HAPUR

UP Jal Nigam initiated proposals for sewerage scheme but the State Government decided to take up sewerage schemes for district head quarters and as such at present scheme preparation is on hold

HPDA insist that special approval for sewerage scheme for Hapur shall be taken from state government

HPDA is laying sewers in the sectors being developed by them but finding problem of final disposal and comprehensive planning

Proposals for Sewerage Scheme
Planning: Horizon

BASE YEAR 2011
PLANNING HORIZON 2041
PLANNING HORIZON OF 30 YEARS TAKEN TO MATCH DESIGN PERIOD OF 30 YEARS FOR MOST OF THE ELEMENTS

Planning: Project Area

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>Area in ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Municipal Corporation Area</td>
<td>1401</td>
</tr>
<tr>
<td>2</td>
<td>Master Plan 2005 Area</td>
<td>4633</td>
</tr>
<tr>
<td>3</td>
<td>Master Plan Area 2005 recently extended</td>
<td>5822</td>
</tr>
<tr>
<td>4</td>
<td>Land Use 2007</td>
<td>9733</td>
</tr>
</tbody>
</table>

Planning: Zones

TOPOGRAPHY
FLAT TOPOGRAPHY - GROUND LEVELS VARY 211 M-213 M, LEVEL NEAR STP 210 M

MAJOR PHYSICAL FEATURES
RAIL LINE/NATIONAL HIGHWAY/MUNICIPAL BOUNDARY/HPDA DEVELOPMENT
Sewerage Zones - Hapur

Population Forecast

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Year Projected Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>0.49</td>
<td>2011 2.78</td>
</tr>
<tr>
<td>1961</td>
<td>0.55</td>
<td>2021 3.65</td>
</tr>
<tr>
<td>1971</td>
<td>0.71</td>
<td>2031 4.79</td>
</tr>
<tr>
<td>1981</td>
<td>1.03</td>
<td>2041 6.28</td>
</tr>
<tr>
<td>1991</td>
<td>1.46</td>
<td>2001 2.12 Geometric Increase</td>
</tr>
</tbody>
</table>

All figures are in lakhs. UP Jal Nigam projected population of 425331 in year 2034, NCR plan 2021 proposed population for Hapur & Pilkhua of 450000 in 2021 and 350000 in 2011.

Population Density

<table>
<thead>
<tr>
<th>Location</th>
<th>Population year 2041</th>
<th>Area in Hectares</th>
<th>Population Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal Boundary</td>
<td>364631</td>
<td>1401</td>
<td>260</td>
</tr>
<tr>
<td>Area outside municipality but within project area</td>
<td>263671</td>
<td>4121</td>
<td>64</td>
</tr>
<tr>
<td>Total Area</td>
<td>628302</td>
<td>5522</td>
<td>114</td>
</tr>
</tbody>
</table>

Zonal Population

- The wards with high density will now grow at a lesser rate and wards with low density will have high growth.
- Ward populations have been projected up to year 2041.
- Zone population has been worked out from ward population.

Design Criteria

- Flow generation 80% of water supply @135 LPCD.
- Ground water infiltration if sewers below ground water level.
- Peak factor 3 to 1.6 as per contributing population.
- Minimum velocity 0.6 m/sec in beginning for peak flow.
**Design Criteria**

- Maximum velocity 2.75 m/sec
- Sewer flow 0.8 full at ultimate peak flow
- Man hole at each change of direction
- Depth size & spacing of man hole as per IS
- Minimum pipe dia 150 mm
- RCC NP3/NP4 pipe with sulphate resistant cement
- PVC/HDPE pipe in shallow streets & for house connections

**Design Criteria**

- Minimum cover 1 meter
- Maximum depth 8-10 meter
- Pumping Main: Economic dia, maximum velocity 3 m/sec
- Pipe DI/PSCC
- Pumping Station: Sump 5 minute storage, Non clog submersible pump, pumps to take peak flow and minimum flow

**Design Criteria**

- Sewage treatment process: depend on land cost, method of disposal of waste, operational cost
- Waste stabilization process proposed due to low operation cost
- Provide 200 meter buffer plantation zone

**Design Criteria**

- Land requirement

<table>
<thead>
<tr>
<th>Treatment Process</th>
<th>Land required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activated Sludge process/Thickening Filter</td>
<td>0.5 Acre/MLD</td>
</tr>
<tr>
<td>Aerated Lagoons</td>
<td>1.2 Acre/MLD</td>
</tr>
<tr>
<td>Waste stabilization Plant</td>
<td>2.5 Acre/MLD</td>
</tr>
<tr>
<td>UASB</td>
<td>0.42 Acre/MLD</td>
</tr>
<tr>
<td>Extended aeration</td>
<td>0.35 Acre/MLD</td>
</tr>
</tbody>
</table>

**Phasing of Investment**

- Rehabilitate existing sewerage & Pumping Station and Extend sewerage in Municipal area and HPDA 9 Sectors in Phase 1
- Other areas in phase 2,3,4,5

**Proposals**

- Sewers at 125 m/hectare=650 km of which 90% will be laterals 150/200 mm dia
- Outfall sewer 1000 mm for zone 1, 1100 mm for zone 3 and 700 mm for zone 4
- PVC pipe to connect houses to sewer 410 km

<table>
<thead>
<tr>
<th>Sewage Pumps</th>
<th>For year 2026</th>
<th>For year 2041</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing SPS</td>
<td>4 No* 40 KW</td>
<td>4 No* 40 KW</td>
</tr>
<tr>
<td>SPS South</td>
<td>5 No* 40 KW</td>
<td>300 KW</td>
</tr>
<tr>
<td>South East</td>
<td>3 No* 20 KW</td>
<td>155 KW</td>
</tr>
</tbody>
</table>
Proposals

- Waste Stabilization Plants capacity proposed and land required are as follows:

<table>
<thead>
<tr>
<th>STP</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>land</th>
</tr>
</thead>
<tbody>
<tr>
<td>STP South</td>
<td>25 MLD</td>
<td>24 MLD</td>
<td>61 ha</td>
<td></td>
</tr>
<tr>
<td>STP East</td>
<td>5 MLD</td>
<td>14 MLD</td>
<td>19 ha</td>
<td></td>
</tr>
</tbody>
</table>

- Treated waste shall be used for irrigation. Area irrigated shall be as follows:

<table>
<thead>
<tr>
<th>STP</th>
<th>Year 2011</th>
<th>Year 2026</th>
<th>Year 2041</th>
</tr>
</thead>
<tbody>
<tr>
<td>STP South</td>
<td>102 ha</td>
<td>138 ha</td>
<td>219 ha</td>
</tr>
<tr>
<td>STP East</td>
<td>18 ha</td>
<td>33 ha</td>
<td>84 ha</td>
</tr>
</tbody>
</table>

Estimated Cost Lack Rs

<table>
<thead>
<tr>
<th>S No</th>
<th>Item</th>
<th>Phase 1 2009-2013</th>
<th>Phase 2 2014-2018</th>
<th>Phase 3 2019-2023</th>
<th>Phase 4 2024-2028</th>
<th>Phase 5 2029-2033</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rehabilitation of existing system</td>
<td>121.5</td>
<td>170.6</td>
<td>204.0</td>
<td>200.0</td>
<td>105.0</td>
<td>805.8</td>
</tr>
<tr>
<td>2</td>
<td>Laterals New</td>
<td>371.5</td>
<td>569.0</td>
<td>681.2</td>
<td>400.4</td>
<td>351.0</td>
<td>2,875</td>
</tr>
<tr>
<td>3</td>
<td>Trunk Mains New</td>
<td>1,251</td>
<td>569.0</td>
<td>681.2</td>
<td>400.4</td>
<td>351.0</td>
<td>3,311</td>
</tr>
<tr>
<td>4</td>
<td>Sewage Pump House</td>
<td>41</td>
<td>41</td>
<td>41</td>
<td></td>
<td></td>
<td>123</td>
</tr>
<tr>
<td>5</td>
<td>STP</td>
<td>800</td>
<td>600</td>
<td>540</td>
<td></td>
<td></td>
<td>2,040</td>
</tr>
<tr>
<td>6</td>
<td>Land Acquisition</td>
<td>1700</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1700</td>
</tr>
<tr>
<td>7</td>
<td>Low Cost Sanitation, Mfc Equip</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>8</td>
<td>Total</td>
<td>8,058</td>
<td>2,875</td>
<td>3,311</td>
<td>1,231</td>
<td>1,040</td>
<td>12,414</td>
</tr>
<tr>
<td>9</td>
<td>W&amp;H Contingencies</td>
<td>91,285</td>
<td>33,933</td>
<td>39,066</td>
<td>16,888</td>
<td>16,052</td>
<td>172,417</td>
</tr>
</tbody>
</table>

Contingencies

- The cost is based on current prevalent rates.
- The price contingency has not been taken.
- Provision for other contingencies taken as below:
  - Physical contingencies at 10% of the cost
  - Environmental mitigation at 1%
  - Social Interventions at 1%
  - Institutional Development Interventions at 1%
  - Design and supervision at 5%

O & M Cost (Additional in each phase) :Rs Lacks per Annum

<table>
<thead>
<tr>
<th>S No</th>
<th>Item</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
<th>Phase 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rehabilitation</td>
<td>0.89</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Staff</td>
<td>1.41</td>
<td>1.37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SPS</td>
<td>M &amp; E</td>
<td>32.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SPS Energy old</td>
<td>18.69</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>SPS Energy East</td>
<td>3.27</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SPS Energy South</td>
<td>18.69</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Civil-SPS</td>
<td>0.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>STP</td>
<td>4.5</td>
<td>3</td>
<td>2.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>STP Energy</td>
<td>60.46</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Total</td>
<td>221.3</td>
<td>56.69</td>
<td>38.88</td>
<td>4</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Thank You
Capacity Development of the NCRPB
ADB TA 7055 IND Component B

Preparation of Drainage Master Plan
NCRPB, New Delhi
9 April 2009

Drainage system - Broad Objectives

To remove storm water and sullage for minimizing:
- Public Health hazards
- Inconvenience to residents
- Deterioration of the Environment
- Prevention of flooding
- Interference to other Infrastructure Services

Drainage - Important Aspects

Retention basins
Importance of retention basins like lakes, tanks, parks etc to be considered.
- They store flood waters and prevent inundation of d/s areas
- They also aid in building up GWT
- Prevent flash floods
- Provide source of water supply
Encroachment in retention basins to be strictly prohibited

Drainage Systems

- Combined systems:
  - Storm flows are much higher than sewage flows. Much higher size sewers are required
  - High peak flow fluctuations in Wet and Dry seasons cause problems for Sewage treatment Plants
- Separate systems:
  Storm water and sullage are carried through open drains/pipe lines.
In general, Combined System not usually suitable for Indian conditions

Data Requirement

- A base map for the town with a contour overlay
- Short Duration Rainfall Data
- Natural Drains/ Streams
- Existing Drainage System
- Flood Prone Areas
Hapur - City Overview

- Hapur - situated in Ghaziabad district - 65 Km from Delhi.
- Almost flat topography. The general slope of the town is from North to South. RL varies from 213 to 210 m above MSL.
- The depth of sub-soil water in the town varies from 9 to 12 m during different seasons.
- No perennial surface source in and near the town.

Approach & Methodology

- Field Investigations - Existing storm drainage system
- Rainfall Analysis - Design intensities were estimated and intensity duration frequency (IDF) curves were plotted.
- Hydraulic Analysis & Capacity - Design flows based and hydraulic capacity of the drains were analyzed.

EXISTING DRAINAGE SYSTEM

Four major drains
- Drain No 1
- Drain No 2 (Choya nallah)
- Circular road drain
- Delhi Garh road drain.

All the drains ultimately flow into the Kali river - south of the town.
Drain No 1 and Choya Nallah converge at Rampur road near Haddi meel and flow in to the Kali river.

DRAIN NO 1

- Main drain of the Hapur city
- Enters at Hasoda village to Kali river
- Length of the drain - about 4Km.
- Most problematic areas and particularly in absence of the sewerage system the drain acts as sewer line.

DRAIN No 2 (CHOYA NALLAH)

- Main drain of the Hapur city
- Enters at Hasoda village to Kali river
- Length of the drain - about 4Km.
- Most problematic areas and particularly in absence of the sewerage system the drain acts as sewer line.
**DRAIN NO 2**

Hasoda to Dastoi road

Dastoi Road to Modinagar road crossing

**DRAIN NO 2**

Modinagar crossing to Delhi

Moradabad railway crossing

Railway crossing to chamri road crossing

**DRAIN NO 2**

Chamri road crossing to Delhi

Garh road crossing

Delhi Garh road crossing to Ramgarhi village

**DRAIN No 3 (CIRCULAR DRAIN)**

- Channeled Drain
  - At start - Delhi Garh Road - width - 0.3m
  - At Sikander Gate - 0.8m x 0.45 m
  - At Garh Ghati Chowki - 3m x 2.8m
  - Length - About 2.1 Km
  - Full of Sewer

**FLOOD PRONE AREAS**

- **Adarsh Nagar** - the choya nallah disappears and the water spreads in to the field and the colony. Habitation settled on the bed.
- **Ganesh Nagar & Lajja Puri** - Densely populated; drain restricted to about 2m width and flows in between the houses; drain acts as sewer and is blocked by solid waste.
- **Gol market** - at the Delhi Garh road; Due to break in the Delhi Garh drain
DESIGN PARAMETERS

Adopted - Guidelines of CPHEEO manual
Basic Design Parameters
- Frequency of storm / return period
- Depth -duration of storm
- Time of concentration
- Run off coefficient for the project area
- Flow in the channels

DESIGN PARAMETERS

The peak runoff - Rational formula

\[ Q_p = C I A / 360 \]

Where,
- \( Q_p \) - peak flow in m³/sec
- \( C \) - Runoff coefficient
- \( I \) - design rainfall intensity mm/hr
- \( A \) - Contributory area in hectares

DESIGN PARAMETERS

Time of Concentration
- Time required for rain water flow over ground surface from the extreme point of drainage basin to reach the point under consideration.
- Time of Concentration \( T_c = \text{Time of Entry } T_e + \text{Time of Travel } T_f \)
  \[ T_e = (0.87)(L^3)^{0.385}/H \]
  \( L \) = Distance of critical point to drain in Km
  \( H \) = fall in level from critical point to drain level in meters
- For design - intensity of rainfall corresponding to \( T_c \) from the graph

Runoff coefficient

<table>
<thead>
<tr>
<th>Type of area</th>
<th>Imperviousness (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial/Industrial</td>
<td>70 to 90</td>
</tr>
<tr>
<td>Residential area</td>
<td></td>
</tr>
<tr>
<td>i) High density</td>
<td>60 to 75</td>
</tr>
<tr>
<td>ii) Low density</td>
<td>35 to 60</td>
</tr>
<tr>
<td>Parks &amp; undeveloped areas</td>
<td>10 to 20</td>
</tr>
</tbody>
</table>

Runoff coefficient

- Mainly residential with high density to low density, imperviousness cover of 60% may be considered at master plan stage.
Rainfall Intensity

**STORM FREQUENCY**

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Type of area</th>
<th>Storm frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Residential areas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i) Peripheral area</td>
<td>Twice a year</td>
</tr>
<tr>
<td></td>
<td>ii) Central and comparatively high priced area</td>
<td>Once a year</td>
</tr>
<tr>
<td>2</td>
<td>Commercial and high priced area</td>
<td>Once in two years</td>
</tr>
</tbody>
</table>

Rainfall Intensity

**RAINFALL INTENSITY AND DURATION**

- Storm frequency has been adopted as once in a year.

**RAINFALL DATA ANALYSIS**

- RMSD calculation
  \[ i = \frac{a}{t^m} \]
  
  Where: \( i \) = Intensity of rainfall (mm/hr)
  \( a, m \) = Constant; \( t \) = Duration (min)

Rainfall Intensity

**INTENSITY DURATION FREQUENCY CURVE**

\[ y = \frac{6492}{(t)^{1.5}} R^2 = 1 \]

\[ i = 6492/(t)^{1.5} \]

Rainfall Intensity

**DESIGN PARAMETERS**

Hydraulic Modelling

- Estimate Run-off discharges - as above.
- Compared with the carrying capacity of the existing drains.

\[ V = \frac{1}{n} R^{0.5} S^{0.5} \]

Where,

- \( V \) = Velocity (m/s);
- \( n \) = Friction Factor;
- \( R \) = Hydraulic Radius (m);
- \( S \) = Channel Slope (m/m)

Capacity (Q) = A x V
Short Term measures for year 2009-2011:
- De-silting and garbage removal in all drains;
- Removing of weeds from Drain 1 with minor repair, such as repair of damaged work masonry, coping, plastering etc;
- Slab covers to be provided in Industrial Drain i.e for section 1 of choya nallah containing industrial waste water;

Long Term measures for year 2011-2014:
- Augmentation of existing drains;
- Major rehabilitation, such as construction of retaining walls, flooring, and top cover;
- Construction of complete new drains;
- Elimination of cross-connections with sewers and industrial discharges;

Rough Cost Estimates...

<table>
<thead>
<tr>
<th>S. No</th>
<th>Component</th>
<th>Length</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remodeling and channelization with construction of missing link</td>
<td>20.0</td>
<td>3,70.00</td>
</tr>
<tr>
<td>2</td>
<td>Provision of drain covers</td>
<td>3.0</td>
<td>25.00</td>
</tr>
<tr>
<td>3</td>
<td>Construction a new major drain</td>
<td>2.5</td>
<td>35.00</td>
</tr>
<tr>
<td>4</td>
<td>Construction/ remodeling of secondary &amp; tertiary drains</td>
<td></td>
<td>1,20.00</td>
</tr>
<tr>
<td>5</td>
<td>Sub Total</td>
<td></td>
<td>550.00</td>
</tr>
<tr>
<td>6</td>
<td>Physical contingencies (10% of sub total)</td>
<td></td>
<td>55.00</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>605.00</td>
</tr>
</tbody>
</table>
Workshop on Municipal Solid Waste Management
Casuarina Hall, India Habitat Centre, Lodhi Road Delhi
22 May 2009

Photo 1: Workshop Venue

Photo 2: Registration in Progress

Photo 3: Member Secretary, NCRPB and other Officials

Photo 4: Secretary, Ministry of Urban Development, GoI (Chief Guest) is received by Member Secretary, NCRPB

Photo 5: Team Leader ADB TA Component B is welcoming the Guests

Photo 6: Chief Guest is being honored.
Workshop on Municipal Solid Waste Management
Casuarina Hall, India Habitat Centre, Lodhi Road Delhi
22 May 2009

Photo 7: Member Secretary, NCRPB is delivering the Inaugural Address

Photo 8: Secretary, MoUD (GoI) is delivering the Keynote Address

Photo 9: A View of Participants

Photo 10: Another View of Participants

Photo 11: Presentation by Mr PU Asnani, the Guest Speaker

Photo 12: Discussions after Presentation
Workshop on Municipal Solid Waste Management
Casuarina Hall, India Habitat Centre, Lodhi Road Delhi
22 May 2009

Photo 13: Discussions after Presentation

Photo 14: Reply to the participants quarries

Photo 15: Tea Break

Photo 16: Presentation by Mr SK Goyal, SWM Expert, ADB TA Team (Component B)

Photo 17: Presentation by Mr Vinaya Bansal on Clean Development Mechanism

Photo 18: Interaction by the Participants on the Presentation
Appendix 9

Workshop on Solid Waste Management
Casuarina Hall, India Habitat Centre, Lodhi Road Delhi, 22 May 2009

List of Participants

1. Uttar Pradesh State
   I. Urban Local Bodies
      1. Mr. M P Singh Executive Officer, Nagar Palika Parisad Baraut,
      2. SWM In-charge, Nagar Palika Parisad, Baraut
      3. Mr K. Singh, ATP, Buland Shahar Development Authority
      4. Mr. Manik Chand, EE, Buland Shahar Development Authority
      5. Mr. Hemraj Executive Officer, Nagar Palika Parisad Dadri,
      6. Mr. Suresh CH Sharma SWM In-charge, Nagar Palika Parisad Dadri,
      7. Mr Ajay Shankar Pandey IAS, Commissioner, Municipal Corporation, Ghaziabad
      8. Dr R. S. D Sharma, SWM Incharge, Municipal Corporation, Ghaziabad
      9. Mr Md. Masood Ahmad, Executive Officer, Municipal Council, Hapur
     10. Mr. S. Siwan, EE, Hapur Pilkhua Dev. Authority, Hapur
      11. Mr. Faujdar Bhardwaj, SWM In-charge, Jahagirrabad
     12. Mr. Rajiv Bansal, Chairman, Municipal Council, Khurza,
     13. Mr. Ramakant Dixit, Executive Officer, Municipal Council, Loni
      14. Mr. Satyendra Kumar Tiwari, Executive Officer, Municipal Council, Modi Nagar
      15. Mr Mritunjay Yadav, Nagar Palika Parisad, Mawana
      16. Mr Indrapal, SWM In-charge, Mawana,
      17. Mr. Sanjay Krishna, Commissioner, Meerut Municipal Corporation Meerut
      18. Mr S. K. Srivastava, SWM In-charge Meerut Municipal Corporation Meerut
      19. Mr. Shamim Ahmad, Executive Officer, Municipal Council, Murad Nagar
      20. Mr Mahesh, SWM In-charge, Municipal Council, Murad Nagar
      21. Mr. Bharat Kumar, Chairman, Municipal Council, Pilkhua,
      22. Mr. Dharam Raj, SWM In-charge, Municipal Council, Pilkhua,

II. NCR Planning & Monitoring Cell, Ghaziabad
    1. Mr Santosh Yadav IAS, Commissioner,
    2. Mr S. K. Zama, Chief Coordinator Planner
    3. Mr A. K. Tayagi, Town Planner
    4. Mr N. K. Johari, Town Planner
    5. Mr Hitesh Kumar, Town Planner

III. UP Jal Nigam
    1. Mr. T. S. AroraProject Manager, Construction & Design Services. Unit 27, Noida
    2. Mr Bikram Singh, SRE, Noida
2. Haryana State
   I. Urban Local Bodies
      1. Mr. Partap Singh Executive Officer, Municipal Council, Bahadurgarh
      2. Mr Hemant Kumar, J. E., Municipal Corporation, Bahadurgarh
      3. Mr. Rajiv Sharma IAS, Commissioner, Municipal Council, Gurgaon
      4. SWM In-charge, Municipal Council, Panipat
      5. Mr. B. N. Bharti Executive Officer, Municipal Council, Rohtak
      6. SWM Incharge, Municipal Council, Rohtak
      7. Mr. N K. Katara, Chief Engineer, MC Faridabad
      8. Mr Yogesh Sharma, Add. GM, SWM Faridabad

   II. Haryana Urban Development Authority
      1. T. C. Gupta, Chief Administrator

   III. NCR Planning & Monitoring Cell,
      1. Sh. Rajvir Singh, Chief Coordinator Planner

   IV. Directorate of Urban Local Bodies
      1. Mr S. K. Sharma, SE
      2. Mr Satish Goel, EE

3. Rajasthan State
   I. Urban Local Bodies
      1. Mr. Anil Varshney, Commissioner, Municipal Council Alwar
      2. Mr, M. K. Mittal, JEN, NP, Alwar
      3. Mr S. K. Verman, UIF, Alwar
      4. Mr Pushpa Indoria, EO, Nagar Palika Tijara
      5. Mr Mukat Nath Kaushik, EO, B Behr
      6. Mr Hari Shankar Gupta, EO, NP, Rajarh
      7. Mr Mahesh Chand, EO, NP, Kheali
      8. Mr Subhash Kumar, EO, Kherthal

   II. Urban Improvement Trust
      1. Mr P. K. Jain, Xen UIT, Bhiwadi

   III. NCR Cell
      1. Mr S. C. Sethi, DTP, Jaipur

   IV. Rajasthan Industrial Investment Corporation (RIIO)
      1. Mr. A. K. Agarwal, Sr. DGM, Bhiwadi-II
      2. Mr Rajendra Singh Sr. RM, Bhiwadi-I

   V. Others
      1. Karni Singh, Ret. IAS, Jaipur

4. Delhi
   I. Ministry of Urban Development
      1. Dr M. Ramachadran, Secretary to Govt
      2. Dr. MM Kutty, Joint secretary (D&L)
      3. Mrs. Sujata Chaturvedi, Director-Delhi Division

   II. CPHEEO
      1. Shri M. Sankaranarayanan Dy. Advisor (P&E)
III. Municipal Corporation of Delhi (MCD)
1. Arun Kumar, EE, Spl. Prj

IV. Dept. Of Economic Affairs, Ministry of Finance, Govt. of India
1. Mr Dalbir Singh, Joint Secretary (ADB & Infrastructure),

V. National Institute of Urban Affairs
1. Prof. Chetan Vaidya, Director

5. Asian Development Bank
1. Dr Bonu Sekhar, Sr Urban Development Specialist

6. National Capital Region Planning Board
1. Dr. Noor Mohammad, IAS, Member Secretary
2. Mr. Rajeev Malhotra, Chief Regional Planner
3. Mr. R. K. Karna, Director (A&F)
4. Mr. J. N. Barman, Jt. Dir. Plg. Wing
5. Mr. R.C. Shukla, Jt. Dir. Plg. Wing
6. Mr. P. K. Jain, Finance & Accounts Officer
7. Mr. Nabil Jafri, Dy. Director (GIS)
9. Mr. Abhijeet Samanta, Assistant Director (Technical)
10. Mr. Harsh Kalia Assistant Director (Admn.)
11. Ms. Meenakshi Singh, Assistant Director (Technical)
12. Mr. Syed Aqeel Ahmad Assistant Director (Transport)
13. Mr. D. K. Verma, Assistant Director (Finance)
14. Mr. Shireesh Sharma, Assistant Director (Finance)
15. Mr. SK Katariya, Assistant Director (E)

7. Guest Lecturers
1. P U Ashwani, Consultant, SWM
2. Vinaya Bansal, CDM Specialist, Emergent Ventures India

8. ADB TA (7055-IND) Consultants
I. Component A & C
1. Ms. Sujatha Srikumar, Team Leader,
2. Dr. Gangadhar Jha, Dy. Team Leader and OD/HRD/Legal Expert
3. Mr. Sidartha Patnaik, Program Manager (Urban),
4. Ms. R Gayathri, Risk Management Expert
5. Mr. Ramesh S Arunachalam, MIS/ERP Specialist

II. Component B
1. Mr. NS. Shekhawat, Team Leader
3. Mr. Arup Khan, Social Expert
4. Mr. Acyhutha Rao, Environment Expert
5. Mr. O. P. Goyal, Water Supply and Sewerage Expert
6. Mr. S. K. Goyal, SWM Expert
7. Mr. Ran Vijay Kumar, Office Manager
Welcome Address
By
Dr. Noor Mohammad, Member Secretary, NCR Planning Board

Ladies and Gentlemen

On behalf of NCR Planning Board, ADB, Wilbur Smith Associates - ADB consultants and on my own behalf, I welcome you all to this workshop. I am thankful to all of you for sparing your valuable time for this workshop. Presence of our Chief Guest, Dr. M Ramachandran, Secretary, MoUD, Government of India has add to the stature of deliberations today. I welcome him and thank him for sparing his valuable time for this workshop. His presence today shows his concern and the importance GOI attaches to promoting Municipal Solid Waste Management.

Ladies and Gentlemen, today’s workshop is a part of the capacity development effort being made by NCR Planning Board with the ADB assistance. I welcome Mr. Shekhar Bonu of ADB who has contributed immensely to the ADB Technical Assistance Project and to this seminar. I thank him for attending this seminar.

We are aware that the NCR area has 108 towns of which NCT Delhi, Meerut and Faridabad have population above 10 lakhs and comprise 73.5% of urban population under the NCR – these cities are covered under the JNNURM. The remaining Class I cities which have population between 1 to 10 lakhs are 12 and comprise 16.5% of the urban population of the NCR. Similarly, Class II cities, having population between 50000 to 1 lakh are 9 and comprise 3% of urban population of NCR. Thus class I and class II cities are 26 with population share of 93% of the urban NCR. An effort to tackle the Municipal Solid Waste Management issues of these 26 cities amounts to solving problem of almost the entire NCR. In addition to this, there are 7528 rural settlements with a population of 162 lacs (Census 2001) which also generate solid waste and there is no appropriate means to collect and dispose off the solid waste in these rural settlements.

The solid waste generation in NCR cities at present is estimated to be nearly 15000 tons/day which is likely to increase to 47000 tons/day by 2031. Going by these estimates, it is clear that a proper planning and implementation to manage municipal solid waste is an urgent issue and its neglect will cause serious environmental problems.

However, our preparation to manage municipal solid waste in NCR is inadequate – the region lacks sanitary land fill sites for disposal of its waste. Day by day getting additional sites will become more and more difficult and therefore, this issue needs immediate action. Facilities to process wastes are also insufficient - the facility at Okhla comports only about 3% of waste of Delhi. The NCR towns do not have sufficient House to house collection facilities - the towns that have developed these facilities also don’t claim to have 100% coverage.

Burning of solid waste at source is widely prevalent and burning of PVC plastics, medical wastes, chlorinated paper etc produces Dioxins which are very harmful to health. The funds available with the ULBs are not adequate and almost the entire sum is spent on salary of the staff. There is hardly any
money left for maintenance of the SWM equipments available with the ULBs. Thus the ULBs are not in a position to provide the most basic service of providing the SWM.

The failure in managing the solid waste causes other problems as well. Due to inadequate solid waste collection, most of the drains are blocked. The capacities of drains are reduced significantly. Stagnant drains are places for mosquito breeding, unhygienic and insanitary conditions. Stagnant drains also cause pollution in water supply due to cross connections.

Realising the importance of Municipal Solid Waste Management, the Regional Plan 2021 examined various issues related to solid waste management and recommended various policies in this regard including 100% collection and management of the Municipal Solid Waste Management in the NCR. The issues which came to the notice of the study group constituted for the purpose are: lack of knowledge & technical staff in the local bodies, non-availability of suitable land for solid waste disposal/treatment in environmental friendly manner, lack of public awareness, non-availability of funds, piecemeal approach for handling of solid waste, dependence on departmental staff causing labour related problems, poor collection system, mix of domestic & hazardous waste, etc. The Regional Plan 2021 recommended the preparation of detailed Solid Waste Management Plan for each town in NCR, adoption of CPHEEO norms, identification of land for solid waste disposal & treatment in the Master Plans, resource recovery, promoting waste minimisation & recycling, creation of public awareness, resource mobilisation, institutional improvement & the capacity building, etc.

The Municipal Solid Waste Management rules 2000 also provide timelines for 100% collection of MSW by the year 2003. But a review of the existing scenario reveals that we are way behind in achieving the targets given in the Regional Plan 2021 and the MSW rules 2000. NCR Planning Board, under the ADB supported Technical Assistance Project, has initiated the process of capacity building of NCR ULBs to achieve higher level of Municipal Solid Waste Management. Sectoral Master Plan for Municipal Solid Waste Management in Ghaziabad has been prepared by the Wilbur Smith Associates and toolkits prepared by them will be used in preparation of Sectoral Master Plans for the remaining towns of NCR. This will be followed by DPR preparations and funding of these projects, if necessary.

We are negotiating with AMDA to help us, under a MoU, in preparation of these Sectoral Master Plans and in capacity building of the ULBs. An effort to involve PPP mode of funding these projects will be promoted. However, we are conscious of the fact that getting adequate landfill sites and funds required for arranging funds for the services that cannot be taken up under PPP are the major challenges, the NCR Planning Board has to face.

There is a need for the DDA, the ULBs and the Developing Authorities in the NCR, to reserve adequate land for landfill sites and also to initiate a dialogue for setting up common landfill sites in the regional context by providing suitable compensation for ULBs/ States which allow wastes from other ULBs/ States to be disposed in their landfill sites and by ensuring scientific disposal of waste using suitable technologies.

There is also need to provide special dispensation to the NCR towns, for instance by providing special component in the central schemes like UDISSMT, to ensure 100% of waste management in NCR towns. This suggestion also finds mention in the Regional Plan 2021. In addition, to raise resources, we may resort to earn carbon credit under CDM by encouraging scientific management of MSW.

I hope this workshop will deliberate on these issues and will prove to be a building block for the capacity building effort being pursued by the NCR Planning Board. I am sure your contribution to this seminar will help us in realising the vision of 100% Municipal Solid Waste Management in the NCR.

I welcome you all again to this workshop. Thank you.
Ladies and Gentlemen,

It is my pleasure to be able to attend this workshop on "Solid Waste Management Planning and Good Practices" for officials and elected representatives of 25 municipalities of NCR region. The objective of the workshop i.e creating awareness about prevalent good practices and recent development in India for processing of SWM and Clean Development Mechanism (CDM) in the SWM sector is indeed highly laudable.

Solid Waste Management is one of the basic services provided by municipal authorities. However, as we are well aware, the quality of service provided leaves much to be desired. It is estimated that of 115000 MT of municipal solid waste is generated daily in the country. The collection efficiency is only between 70 to 90% in major metro cities. In smaller cities, it is often below 50%. It has been estimated that the ULBs spend about Rs 500 to Rs 1500 per tonne on solid waste collection, transportation, treatment and disposal. About 60-70% of this amount is spent on street sweeping, 20-30% on transportation, and less than 5% on final disposal of waste, which shows that hardly any attention is given to scientific disposal of waste. Landfill sites have not yet been identified by many municipalities and in several municipalities, the landfill sites have been exhausted and the respective local bodies do not have resources to acquire new land. Due to lack of disposal sites and inadequate collection efficiency, city appears as virtual litter yards. It is obvious that urbanization will also aggravate the problem. Efforts towards waste recycling reuse and resource recovery for reduction in waste, adoption of more suitable scientific technological measures for effective waste management, economical and scientific disposal of municipal solid waste are the need of the hour.

As a result of a Public Interest Litigation, the Supreme Court set up an Expert committee which submitted its report in March 1999 making detailed recommendations which were circulated to all class-I cities and various stakeholders for implementation. To ensure compliance, the principal recommendations of the committee have been incorporated in the Municipal Solid Waste (Management and Handling Rules 2000) notified by the Ministry of Environment and Forests in September, 2000. The mandatory directions under the rules include storage and segregation of waste at source, primary collection from the doorstep and abolition of open waste storage sites, daily street sweeping, transportation for waste in covered vehicles, processing of waste to wealth i.e. (by composting, power generation), 3Rs principal (Recover, Reduce, Reuse), disposal of inert materials only at the sanitary landfill sites. The entire responsibility of implementation as well as
development of required infrastructure lies with Municipal authorities. They are directed to obtain authorization from the state Pollution Control Boards/committees for setting up waste processing and disposal facilities and furnish annual reports of compliance. 9 years down the line, complete compliance with the Supreme Court directions remains a distant dream. Streets are generally treated as receptacles of waste. Segregation of waste is at best partial. Transportation is not coordinated with primary collection resulting in multiple and manual handling of waste. Transportation is characterized by poorly maintained equipment which is inefficiently maintained. Waste is disposed off on the roadside or open spaces without compacting or covering. A survey of compliance with MSW rules at least to the extent of 50% in Class I cities in 2004 revealed that only 33% practiced segregation of recyclables, 9% carried out processing of waste and 1.4% had a landfill. It proves that most of the SWM are simply dumped with the site, resulting to the existing sites are being exhausted and no lands are available for landfilling process.

ULBs have not been able to deliver SWM services efficiently. In fact, SWM delivery can be safely stated to be one of the most poorly rendered services in the basket of the basic services that ULBs are providing in our towns and cities. We must know that Municipal Solid Waste Management is not just about sweeping of streets and transfer of waste from one place to another but is an integrated process chain comprising of segregation and storage waste in houses/ at source, primary collection from these sources/houses, street sweeping, secondary storage depot/transfer station, transportation of waste to disposal site, treatment of waste before disposal and final disposal at environmentally friendly landfill sites. Therefore, it is necessary to prepare a detailed solid waste management plan for the town/city focusing on all foregoing seven processes. The most difficult part in SWM is getting land for landfill site, which appears to be only method to deal with all kinds of waste material. Therefore, the Master/Development Plan for various towns/cities must earmark suitable land for treatment/disposal of solid waste. Further in view of unavailability of suitable land in each town, we should move towards implementing Regional Landfill solutions in which a cluster of small towns can share the facility or a large metropolitan area includes several contiguous localities. In view of the limited availability of land for use as landfill sites, there is an urgent need to find means of minimizing waste requiring disposal. Not more than 50% of the total solid waste generated should be disposed off through sanitary landfill. Public awareness and community participation can help a great deal in waste minimization and in running a successful solid waste management service.

**Efforts made by the Government of India**

You may be aware that my Ministry (Central Public Health Environment Engineering Organisation) has brought out the Manual on Municipal Solid Waste Management in May 2000, which is a guidebook for planning, design and implementation of solid waste management facilities in the cities and towns. The manual inter-alia gives an account of the typical urban waste in India such as, per capita generation of waste, its composition, physical and chemical characteristics, collection efficiency, transportation, processing and disposal of the wastes. You may be also aware that my Ministry constituted the 'Technology Advisory Group' in August 1999 and it submitted its report in May 2005. This report gives information relating to various proven
technologies on waste processing / treatment, waste handling equipment and vehicles, financial resources, sectoral lending by financial institutions and potential for private sector participation in this endeavor. The report also highlights the support rendered by the Central and State Govts. to the ULBs in capacity building, R&D and the role of NGOs, CBOs and public in the management of urban wastes. Pursuant to the affidavit filed by the Union of India in the Honourable Supreme Court of India in February 2003, the Ministry also constituted the 'Inter-Ministerial Task Force on 'Integrated Plant Nutrient Management using City Compost' to prepare a policy, strategy and action plan for promoting 'Integrated Plant Nutrient Management using City Compost' along with synthetic fertilizers in the areas of agriculture, horticulture and plantation crops etc. The task force has given its report in which many valuable recommendations have been made. The recommendations include action points pertaining to various Central Ministries, State Govts., ULBs, chemical fertilizer companies, role of the private entrepreneurs, funds required in setting of compost plants, quality of the organic fertilizers/ compost, design of compost plants of different sizes etc. the recommendations have been accepted by the Supreme Court and they have desired that all the stakeholders should implement these recommendations in toto. The copy of the Report is available in the Ministry's website www.urbanindia.nic.in. Under the Urban Infrastructure and Governance (UIG) component of the Jawaharlal Nehru Urban Renewal Mission (JNNURM), so far 40 projects for SWM have been sanctioned at a total cost of Rs.2186 crore. The Ministry has also formulated and circulated Service Level Benchmarks in water supply and sanitation sector including SWM for guidance and adoption. In respect of the SWM sector, the benchmarks cover household level coverage of Solid Waste Management services, collection efficiency, extent of source segregation at consumer level, extent of waste reused/recovered/recycled, extent of scientific disposal, extent of cost recovery, efficiency in redressal of customer complaints, efficiency in collection of user charges. A pilot project for implementation of the benchmarks has been launched in 26 cities covering 10 states. Further, under the National Urban Sanitation Policy (NUSP) support is available for drawing up the City Sanitation Plan and Detailed Project Reports (DPR).

The 12th Finance Commission had taken a very considered view for improving urban infrastructure and allotted Rs.5000 crores for supplementing the resources of the ULBs in the country. Out of this amount, 50% was earmarked for improving SWM Services. This amount is to be spent by March 2010.

**Success stories**

A case study of three small towns which have transformed service levels and have demonstrated better compliance with MSW rules i.e Suryapet in Andhra Pradesh, Panaji in Goa and Kanchrapara in West Bengal by WSP-SA has thrown up certain useful lessons:

- In all the three cases, the genesis lay in local drivers. Decision makers in the Municipality who had been exposed to alternative strategies for SWM services and who were aware of widespread public discontent over the status of SWM services were effectively able to translate public discontent into public cooperation and also built up political support for the programme.
• With elector corporator’s support, community involvement was synchronized in Municipality operations.
• In each of the three cases, success depended on a single champion who conceived the programme and propelled the required activities.
• It is essential to ensure the buy-in of all the stakeholders namely political representatives, workers, department officials, commercial establishments, schools etc.
• Public cooperation follows from programme credibility. For instance, free service was provided in the first few months to build up support.
• Programme outreach was part of a larger message related to health, child welfare etc. The target audience was the female member of the household and female volunteers were deployed to participate in door-to-door visits.
• Reform programmes for collection and transportation can be implemented and sustained using local finances. In all three cases, no financial support was received from the higher level of government.
• Part of the user charges levied were used to pay financial incentives to workers.

Another well-known success story is that of Namakkal, which is a small town located in Tamil Nadu which is the first municipality in the country which has successfully privatized all components in SWM. By institutionalization of door-to-door collection with segregation at source, manufacturing of vermi-compost from organic waste and sale of recyclable from inorganic waste, Namakkal has the distinction of becoming the only zero garbage town in the country. In order to achieve this, town has followed a 10 point charter which included extending the scheme of door to door collection with segregation to entire town and make the streets and roads garbage free, introducing night sweeping at bus stand and important roads etc., extending the scheme of door-to-door collection and sweeping on Holidays and Sundays and making the town clean on all days by continuous sweeping, making the parks and burial grounds beautiful and attractive through NGOs and voluntary agencies, removing encroachments on all roads and streets, levying service charges on hotels, Kalyanamandapams, commercial complexes and garbage generating industries, manufacturing of vermi-compost from organic waste through voluntary organization/private agencies on B.O.T. (Built-Operate & Transfer) basis, selling the inorganic recyclable garbage and converting the compost yard into a garden etc. Since door-to-door collection is being done by private groups, municipal safai karamcharis have been engaged for night sweeping on main roads, bus stand, markets and industrial areas. This activity is also being done on all Sundays and holidays. Sanitary inspectors have been appointed to impose spot fines upon those who resort to littering. For vermi-composting, a unit has been set up 2 kms outside the town over an area of 8.53 acres. The compost is either sold or utilised for parks/gardens under the supervision of the municipal authorities. This experiment has been successful due to a holistic approach with all agencies cooperating together under the leadership of the District Collector. The committee includes the district administration, the municipality, consortium of NGOs, women self-help groups, schools, market associations, industrial associations, RWAs and ragpickers. What makes the achievement even more remarkable is that it is the home of two major industries i.e body-building of 60 per cent of CNG tankers in the country and a very large and well-organised poultry industry. Hence, if no effort was made the
town would have virtually turned into a garbage ridden town. Now awareness has been created where every citizen accepts the responsibility of keeping the town clean and ensuring that nothing is thrown anywhere except in a bin.

Yet another success story is that of Kudumbashree in Kerala. Rough estimates indicate that Kerala generates about 2,800-3,000 tonnes of solid waste every day. It is estimated that only 50% of the waste generated is collected for disposal. To overcome the problem of poor solid waste management and promote segregation and primary collection at source, the State Poverty Eradication Mission- KUDUMBASHREE - has initiated an innovative enterprise namely, 'Clean Kerala Business' under which women from the financially backward families who are the members of the Community Based Organizations (CBOs) of Kudumbashree are engaged in door to door household waste collection and transportation to the transit points fixed by the Urban Local Bodies. The initiative provides a means of livelihood to the urban poor especially women, apart from better waste management and reduction in pollution. For collecting waste from the households, the entrepreneurs charge Rs 30/- per month from each household. The women entrepreneurs engaged in solid waste collection are earning Rs 3,000 to Rs 5,000 per month. Now 155 Kudumbashree solid waste management groups are in operation in 18 urban local bodies in the State.

Other initiatives in the area of source segregation and collection include Chandigarh Municipal Corporation which has started a novel 'dial-a-debris-removal scheme, Navi Mumbai which has been using debris to fill up low lying areas which are prone to breeding of mosquitoes and also for manufacture of bricks and tiles, Mumbai where 5 tonne of organic wastes from Dadar Market is processed by vermi-composting. The Corporation has allotted one acre land to a private company which brings segregated waste and processes the same through vermi-composting. It has the right to sell the compost. This is one of the four demonstration projects in Mumbai for popularizing vermin-composting at the point of bulk generation. In Mahabaleshwar, the Municipal Council collects plastic bottles and prepares granules using a crusher through people's participation. In Surat, roads are cleaned at night. In Kalyan, a facility has been constructed for processing of biodegradable waste collected from vegetable markets, hotels and marriage halls. It is run by a NGO (Stree Mukti Sangathan). An advance of Rs. 1 lakh was given for procurement of equipments and wages. The workers segregate plastics and other non-biodegradable material before spraying the waste with a culture and water. NGO has repaid the advance from the Corporation. In Kodagu (Coorg) district of Karnataka, a very successful drive required school children to bring all the dry recyclable waste from their homes to the school (plastic bags, rags, glass) once a week. Class wise sale to kabadi-walas is organized every week and the funds are used for Eco-Club activities. This has resulted in substantially increased segregation of dry and wet waste in the town. In Akola, the Corporation provided tricycles to local CBO who undertake to collect household waste. They cover the houses from 7.00 a.m. to 2.00 p.m. and empty the waste into community bins. They are allowed to sell the recyclables. The beneficiary households pay Rs. 10-15 per month as service charge. A part of this is used to repay the loan for the tricycle. Each volunteer earns approximately Rs. 1200-1500 per month under the scheme.

Following the principle of 'Polluter Pays', the Municipal Corporation of Ahmedabad & Surat have
passed a resolution vide which they levy cleaning charges on the spot for littering. These charges can be collected by the Sanitary Inspector on administrative charges ranging from Rs.500 - Rs.5000/- (higher for commercial establishments). The word 'penalty' is not used here since there is no legal provision for the ULB penalizing residents.

I suggest that NCRPB consider organizing exposure visits to some of these places so that one is in a better position to appreciate the efforts made.

**Private sector participation**

Experience the world over has shown that private sector participation (PSP) results in cost savings and improvement in efficiency and effectiveness in service delivery mainly due to financial and managerial autonomy and accountability in private sector operations. Besides, it brings in new investment and better technologies. In India by and large municipal authorities are providing solid waste management services. Of late, experiments to privatize certain solid waste management services are picking up and private sector participation has been attempted in door-to-door collection, street sweeping, secondary collection of waste, transportation of waste, composting of waste, power generation from waste and final disposal of waste at the engineered landfill. Bangalore, Chennai, Hyderabad, Ahmedabad, Surat, Guwahati, and Jaipur are few examples of successful PPP initiatives in SWM. The present capacity of municipalities in India to manage the privatization process is, however, extremely limited. There is a need for developing in-house financial and managerial capability to award contracts to the private sector and for monitoring services provided by the private operator since the onus of ensuring proper service delivery and compliance of standards lies with the local bodies. Some of the other steps that need to be taken for encouraging PPP are preparation of Standard bidding Documents (RFQ & RFP) to facilitate SWM projects through PPP, development of templates pertaining to various models of PPP for SWM, preparation of SWM plans for all individual towns, incentivizing source segregation, ensuring cost recovery, allotment of land for treatment and disposal free of cost, giving preference to the use of compost produced by ULBs within the state, provision of free supply of Garbage to the WTE plant or compost plant, power off-take agreements to instill a sense of confidence in the private operator setting up urban funds at State level for project development, long tenor loan on concessional rates and capacity building for PPP in urban sector, encouraging the concept of Tipping fee for Private Sector Participation in SWM and linking tipping fee to critical inputs like Diesel, WPI etc., state governments taking the responsibility for all permissions/ clearances, organizing capacity building programmes especially in the area of contract management.

Before ending, I would like to congratulate NCRPB on this initiative and sincerely hope that today's workshop will motivate all of you to approach the issue of solid waste management with missionary zeal once you return to your respective towns/cities so as to make their city Garbage free/clean city. If some city could able to achieve "clean city"/Garbage free city", why not other cities. I hope this workshop will endeavor the motivation of the participants/city managers.
Municipal authorities never practiced scientific systems of solid waste management.

- Partial Street sweepings and Disposal of waste at the dump yards in a crude manner was the order of the day.

PIL in supreme court in 1996

- Report of Supreme Court-appointed expert committee in March 99 and MSW Rules 2000 provided a focused attention on scientific treatment of MSW
- It also gave legal mandates to treat MSW in a given time frame.

- MSW Rules 2000 direct all municipal authorities to manage their municipal solid waste in terms of provisions contained in the Rules.
- The Rules mandate seven steps:
  - Storage of waste at source in a segregated manner.
  - Primary collection of waste from the door steps.
  - Sweeping of streets on a daily basis.
  - Secondary storage in covered bins.
  - Transportation in covered vehicles.
  - Treatment of organic matter by composting, waste to energy or any other state of the art technology.
  - Disposal of waste only at the engineered landfills.
Treatment of waste became mandatory:

As per the above rules each municipal authority is required to treat organic fraction of municipal waste by composting or through waste to energy or any other state of the art technology.

The deadline to set up such plant: 31-12-03.

Compliance till date: Less than 10%

- Municipalities are not sure what will work.
- They lack knowledge and technical assistance.
- Municipalities lack political commitment

TREATMENT TECHNOLOGIES IN VOGUE IN INDIA

1. Vermi Composting: for small towns up to 50,000 population
2. Anaerobic Composting: for large cities and towns (~700 mt/day)
3. Close vessel composting: A decentralized option at community level.
4. Refuse derived fuel based power plants: (6.5 MW)
5. Refuse derived fluff plants.
7. BARC technology for bio-gas recovery from organic waste.

Compost Plant (Trivandrum)

Case study
Decentralized systems of composting in Bangalore

Community based decentralized systems of composting has been successful in Bangalore.

Vermi-Composting

- Vermi-composting is a process in which earthworms consume organic matter with the help of bacteria in their gut, they excrete fine-grained soil-like vermi-castings rich in minerals and microbes very beneficial to plants and free of disease germs.
- It is best suited for segregated biodegradable wastes on a small scale in decentralized locations.
1. Extent of coverage
2. None of the above technologies have made any noticeable contribution in meeting the legal mandate nationally. The country has:
3. Just about 50 microbial compost plants
4. Little over 100 city level vermi compost plants
5. 4 RDF plants
6. 27 BARC plants
7. 1 city level bio methanation plant
8. A few plants are under construction

Factors Responsible -1
- Composting:
  - Lack of awareness among farmers about the high nutritional value of MSW derived compost.
  - High cost of production.
  - Very high sale price of compost.
  - No element of subsidy in the sale of compost on the lines of chemical fertilizer.
  - Poor marketing mechanism.
  - Absence of concept of tipping fee to keep compost sale price low.
  - Private sector disillusioned.
  - No uniform state policy.

Factors Responsible -2
- Allotment of land for treatment & disposal of waste a major constraint.
- Public agitation against setting up treatment & disposal facilities.
- Examples: Mumbai, Thane, Pune, Chennai.

Factors Responsible -3
- Refuse Derived Fuel:
  - The technology not in conformity with MSW Rules 2000.
  - Recyclable material when gets segregated at source as per MSW Rules 2000, the RDF plants will get a setback as burnable material will get reduced making the project unviable.
  - Power purchase agreements, environment clearances take long time.
  - Capital cost in quite high as compared to traditional power plants. (Example: Hyderabad, Vijnawada, Chandigarh, Delhi)
  - No uniform state policy on the subject.

Factors responsible -4
- Bio-Methanation plants
- No segregation of waste at source make bio-methanation process difficult.
- Large proportion of inert material in the waste on account of absence of door to door collection of organic matter make the feed stock poor and operation of the plant unviable. (Example: Lucknow plant)

Waste to Biogas – An Option for Treatment of municipal solid Waste - BARC model – Mumbai experience
Bhabha Atomic Research Centre, Mumbai, developed waste to biogas technology particularly suitable for small towns where a small quantity of waste is to be handled. Plants ranging from one ton to five ton capacity can be installed depending on the quantity of waste to be disposed off.

Major components of the plants are:
- Mincer/ pulper (5 HP motor) for crushing the solid waste, Pre-mix tank (5), Pre-digester tank, air compressor, slow water heater, main digestion tank, gas delivery system, manifold pit, tank for recycling for water and water pump and gas utilization system.
HOW TO IMPROVE THE SITUATION

1. Have a state policy on SWM in each state
2. Adopt a mission mode approach to implement the state policy and MSW Rules 2000
3. Create a nodal agency at the state level to implement MSW Rules.
   Example: Gujarat State
4. Mission mode approach has resulted in construction of vermi compost plants in more than 90 towns in a record time and all plants are functional.

4. Advocate and enforce segregation of organic matter at source if Bio methanation or composting technology is to be adopted.
5. Promote use of compost by the farmers through IEC on the nutritional value of compost using extension methods and existing network.
6. Have a policy to subsidise the sale of compost either by government on the lines on chemical fertilizers of Municipalities agree to pay tipping fees to private operator to keep the cost of compost low.
7. Rules may permit non segregation of burnable matter from MSW if W2E Technology such as RDF is to be allowed/promoted.
   - The socio economic issue of Rag pickers & other recyclers may be kept in mind.
8. Have standard terms & conditions for allotment of land, MSW/garbage and tipping fees to private sector willing to set up treatment facilities for municipal authorities.

9. Have a national policy on purchase of power derived from municipal waste.
10. Streamline the procedure for environmental clearance & making power purchase agreement.
11. Provide Soft loans and subsidies to private entrepreneur willing to set up treatment plants adopting proven technologies.

Sanitary Landfill

No development zones may be declared around the treatment and disposal facilities to avoid agitation & litigations in future.

THANK YOU
Workshop on Municipal SWM
Presentation on Planning for MSWM System

By SK Goyal, SWM Expert
22 May, 2009, India Habitat Centre, New Delhi

Presentation Structure
- Components of Municipal Solid Waste
- Present Scenario
- Importance of Door-to-Door Collection
- Governing Policies, Rules & Guidelines
- Ideal SWM Cycle
- Planning Objective & Approach
- Benchmarking in SWM

Classification of Wastes

<table>
<thead>
<tr>
<th>Biodegradable</th>
<th>Non-biodegradable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recyclable</td>
<td>Non-recyclable</td>
</tr>
<tr>
<td>Paper</td>
<td>Inert</td>
</tr>
<tr>
<td>Notebooks</td>
<td>Silt</td>
</tr>
<tr>
<td>Glass</td>
<td>Plastic bags</td>
</tr>
<tr>
<td>Plastic and glass</td>
<td>Wooden pieces</td>
</tr>
<tr>
<td>bottle</td>
<td>Tetra packs</td>
</tr>
<tr>
<td>Metal</td>
<td>Thermocol</td>
</tr>
<tr>
<td>Wires</td>
<td>etc</td>
</tr>
<tr>
<td>etc</td>
<td></td>
</tr>
</tbody>
</table>

Common Sources of Municipal Solid Waste

SWM Cycle Components
- Storage
- Collection
- Street Sweeping
- Transportation
- Processing
- Disposal

Present Scenario
Activities Performed
A- Normally
- Traditional beat working
- Street sweeping from few important roads
- Collection of mix waste from streets, community bins/points
- Transportation of waste and disposal at open disposal locations without any processing
- Leveling of waste and pressing

B- Occasionally
- Drain cleaning before monsoon
- Special sanitation drives for unserved areas

Activities Not Performed
- Street sweeping and other activities not uniformly in entire area
- No/less facility in new and peripheral
- No/less door to door collection, source segregation & formal recycling
- No/less processing and sanitary land filling
**Door-to-Door Collection (DTDC)**

No DTDC is responsible for:
- Poor Compliance of MSWM Rules
- Secondary Collection Points
- Poor Quality & Low Recovery of Recoverables
- Loss of employment opportunity and revenue
- Excessive burden on resources - landfill site etc
- Higher SWM Cost

**SWM Cycle – Ideal**

**Policy Implications**

- Municipal Solid Waste (Management & Handling) Rules, 2000
- Recycled Plastics Manufacture and Usage Rules, 1999 (Revised 2003)
- CPHEEO Manual on Solid Waste, 2000

**Main Provisions of MSW Rules 2000**

- Prohibit Littering on the streets-storage of waste at source
- Primary Collection of waste from the door steps
- Daily Street sweeping
- Abolition of Open waste storage sites
- Transportation of waste in covered vehicles
- Processing of waste by composting or any other useful conversion
- Disposal of non-biodegradable waste only at sanitary land fill site.

**Planning Objective**

Sweeping, collection, transportation and disposal of **segregated** municipal (biodegradable, recyclable & non-recyclable) waste resources in accordance with MSW (M&H) Rules,2000 in **integrated** manner.

**Integrated SWM**
Planning Approach

Planning Steps
- Assessment of existing system
- Design of appropriate system according to MSW Rules, 2000
- Identification of subprojects with justification
- Identification of suitable land
- Estimate, Specifications, drawings and Bid documentation
- Mechanism of operation & maintenance
- Routing plan
- Action plan

Data Requirements
- Maps
- Ward wise demography, land use details and available SWM infrastructure
- Data on existing sources and practice for industrial, bio-medical waste
- Budget, annual expenditure on different SWM components
- Waste generation per capita, quantity stored & transported (MT/d)
- Waste composition (Physical & chemical)

Design assumptions
- SWM on all seven days – add 17% worker strength and 25-30% equipment
- Design period 20 years
- Street Sweeping, Door to door collection and segregation to be increased in phased manner
- Collection System- Covered for 100%
- Transportation System- Covered for 100%
- Processing -Suitable for 100% generation
- Disposal- Only processed residual and non-biodegradable at SLF (100% residual+ non biodegradable)

Norms for Sweeping Staff
- 250-350 RMT for high density
- 400-600 RMT for medium
- 650-750 RMT for low
- Normally 150-250 houses coupled with above road length
- Waste qty. -0.5 cum/day or 250 kg
- Frequency as per importance

Norms for Primary Collection
- Individual generator to keep bins for bio/non/recyclables for 24 hour quantity
- Compatible equipment for segregated door to door collection
  - 1 pushcart/tricycle for one worker
  - 1 mini waste collector for 3000 House holds
  - 1 compactor for 5 mini waste collectors
  - Tippers for construction /horticulture

Some Equipment for Primary Collection
**Mini Waste Collector**

**Criteria for Storage**
- Till DTDC is in place, community bins as per utility and waste quantity
- Provision for storage of segregated waste
- Provide 100% more in numbers
- Distance of container from work place < 250 m
- Inter bin distance 500 m
- No bin in congested area
- Litter bins in market places and tourist places

**Norms - Transportation**

**Segregated transportation**
- Use appropriate equipment of optimum capacity for segregated waste
- DP/Tractor trolley with covered bins/Mini Waste Collector
- Ratio – 1 carrier/ 15 dumper placer bins
- If landfill > 10 km - Transfer Station (TS)
- At TS- large size containers 15-20 cum, work in two shifts (minimum)

**Transport Options**

**Option at Transfer Station (TS)**
**Option at TS**

**Processing Technology - Ideal**
- Should be suitable - physical and chemical characteristics, relative assessment of disposal options
- Should require - minimum space, least initial capital
- Should cause - least adverse impact on environment, least residual
- Should be sustainable - recovers maximum net energy/useful material, least O&M

**Options - Processing Technology**

<table>
<thead>
<tr>
<th>Method</th>
<th>Basic Principles</th>
<th>Important Parameter</th>
<th>Desired range</th>
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</thead>
<tbody>
<tr>
<td>Thermal chemical conversion</td>
<td>Decomposition of organic matter by heat</td>
<td>Moisture</td>
<td>&lt;20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Volatile</td>
<td>&gt;0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fixed carbon</td>
<td>&lt;15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inert</td>
<td>&lt;15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calorific value</td>
<td>&gt;1200 Kcal/Kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Density</td>
<td>low</td>
</tr>
<tr>
<td>Decomposition of organic matter</td>
<td>by microbial action</td>
<td>Moisture</td>
<td>&gt;50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Organic</td>
<td>&gt;40%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C/N</td>
<td>&gt;25-30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Density</td>
<td>high</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calorific value</td>
<td>&lt;1200 Kcal/Kg</td>
</tr>
</tbody>
</table>

**Processing Plant and New Site - criteria**
- Side by side
- Site should be sufficient for minimum 20 years
- Should not be part of ground recharge, mining, seismic risk, away from habitation, forest, monument, water body, national park, wetland, any important place of historical/cultural or religious nature
- Proper land use in Master plan

**Processing Plant and SLF site**
- Buffer zone of no development
- NOC from SPCB, Ground water Department, Airport authority
- Environment, social and geotechnical issues are also to be addressed
- 2-3 acre for 50-75 MT compost plant
- Cell area – 1.2 cum per MT & other area - 20-25% of cell area
- Prefer - DBOMT basis
Land Requirement

<table>
<thead>
<tr>
<th>Details</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
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<tr>
<td>Population</td>
<td>100,000</td>
<td>130,000</td>
<td>198,000</td>
<td>200,000</td>
<td>250,000</td>
</tr>
<tr>
<td>Waste generation (gram per-capita/Day)</td>
<td>450</td>
<td>480</td>
<td>512</td>
<td>546</td>
<td>583</td>
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<tr>
<td>Waste generation (MT per day)</td>
<td>45</td>
<td>62</td>
<td>81</td>
<td>109</td>
<td>148</td>
</tr>
<tr>
<td>Land capacity (sqm/day)</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Land capacity (sqm/year)</td>
<td>1206</td>
<td>1806</td>
<td>2092</td>
<td>2811</td>
<td>3741</td>
</tr>
<tr>
<td>Land requirement for 20 years</td>
<td>45698 sqm or say 11 Acre or 4.5 Ha</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Institutional

- Independent SWM section with exclusive authority and responsibility
- Proper work and resource distribution as per norms at the ward level
- Strengthening at ward level
- Training of staff
- Interdepartmental coordination
- Financial, legal and land related issues
- Proper supervision and monitoring mechanism

Sustainable

User Charge from
- Hotels/ Restaurants/ Marriage halls/eating joints
- Vegetable/fruit/fish yards, slaughter houses
- Exhibition, fair, religious and political assemblies, conferences etc
- Construction waste
- Societies, residential units, commercial shops

Cost saving by
- Segregation - at source, transportation and disposal
- Arranging bins from local sponsors
- Involvement of PSP judiciously

Private Sector Participation – (PSP)

Principles
- Right mix
- Newly developed and unserved area
- Facilities not provided by the ULB
- Requiring more capital investment and technical expertise
- Clear terms, conditions and properly designed document
- Sustainable

PSP – Potential Areas

- Collection
  - Primary Collection - DTDC
  - Sweeping
  - Sweeping and Collection
- Transportation
  - Supply of vehicles including O&M
  - Collection and Transportation
  - Transfer station – DBOMT on tipping fee
- Treatment & disposal facility

Stakeholder Involvement

- All – Households, Community, NGO & ULB
- Regular awareness campaign and training
- Segregation against littering, 3 Rs, disposal at designated place, decentralized processing
- Involvement of public representatives, NGOs/ RWAs/CBOs/associations/clubs
- Housewives/servants/students/workers
- Meetings/street plays/electronic & print media/workshops/essay competitions/rallies
**Waste Minimization**
- Recyclable to be collected near source
- Biodegradable to be processed before disposal
- Separate collection and processing of bulk
- Responsibility of producer for entire life cycle
- Decentralized processing units
- User charges on basis of quantity and quality
- Payment to operator on performance basis
- Follow 3 Rs: Reduce, Reuse and Recycle

**Requirement of Benchmarking**
- Underlines the required service standard under different components
- Helps to assess and compare the present service level
- Identify the shortcoming areas and plan for improvement measures
- Components where benchmarking feasible
  - Household level coverage of SWM services
  - Efficiency of collection
  - Extent of segregation
  - Extent of MSW recovered
  - Extent of scientific disposal
  - Extent of cost recovery in SWM services
  - Efficiency in redressal of customer complaints
  - Efficiency in collection of SWM related charges

---

**GDA – Findings of Master Plan Report**

<table>
<thead>
<tr>
<th>Type</th>
<th>GNN</th>
<th>Dasna</th>
<th>Murad Nagar</th>
<th>Modi Nagar</th>
<th>Loni Nagar</th>
<th>GDA</th>
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<tbody>
<tr>
<td>Push carts</td>
<td>2589 (1406)</td>
<td>58</td>
<td>303</td>
<td>181</td>
<td>426</td>
<td>3657</td>
</tr>
<tr>
<td>DP container</td>
<td>925 (425)</td>
<td>21</td>
<td>108</td>
<td>65</td>
<td>142</td>
<td>1261</td>
</tr>
<tr>
<td>DP carrier</td>
<td>77 (19)</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>9</td>
<td>105</td>
</tr>
<tr>
<td>Mini compactor</td>
<td>75 (6)</td>
<td>2</td>
<td>9</td>
<td>5</td>
<td>12</td>
<td>102</td>
</tr>
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</table>

**GDA – Findings Of MPR (Continued)**

<table>
<thead>
<tr>
<th>Type</th>
<th>GNN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment for processing plant</td>
<td>3 loader backhoe, 6 tippers, 3 tractor tippers, 3 water tankers, 3 W.B. (one for each site)</td>
</tr>
<tr>
<td>Land and capacity for processing plant</td>
<td>0 Ha 650 MT - 900 MT 900MT-1200 MT</td>
</tr>
<tr>
<td>Equipment for SLF site</td>
<td>3 Bulldozer, 3 land fill compactors, 3 loader backhoe, 6 tippers</td>
</tr>
<tr>
<td>Land for SLF site</td>
<td>38 Ha 52 Ha</td>
</tr>
<tr>
<td>Total land requirement</td>
<td>44 Ha 80 Ha</td>
</tr>
</tbody>
</table>

---

**Thanks**
CDM Opportunities in Municipal Solid Waste Management

Emergent Ventures India

Climate Change
- GHG emissions contribute equally to climate change irrespective of where they occur
- CDM / VCM encourages investment in clean technologies in Developing Countries
- "Rewards" emissions reduction of the 6 key Green House Gas.

<table>
<thead>
<tr>
<th>GHG Source</th>
<th>Baseline Scenario</th>
<th>Project Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH4</td>
<td>21</td>
<td>-</td>
</tr>
<tr>
<td>N2O</td>
<td>310</td>
<td>-</td>
</tr>
<tr>
<td>PFCs</td>
<td>9,200</td>
<td>-</td>
</tr>
<tr>
<td>HFCs</td>
<td>11,700</td>
<td>-</td>
</tr>
<tr>
<td>SF6</td>
<td>23,700</td>
<td>-</td>
</tr>
</tbody>
</table>

Combating Climate Change
- Kyoto Protocol signatories such as the EU, Japan, Canada have caps on their emissions
- Clean projects, hence implementing a developing economies to generate CDMs
- Targets to reduce emissions by 5% of 1990 level by 2012
- Companies undertake voluntary initiatives for CDM and Green Image
- Very small projects - CDM pressure need is high
- Pre-CDM Projects
- Complex projects

Clean Development Mechanism
- Host Party/ Non Annex I
- Annex I

Understanding CDM: Baseline
- The baseline (scenario and emissions) for a CDM project activity is the scenario that reasonably represents GHG emissions that would occur in the absence of the proposed project activity.
- Difference between the baseline emissions and GHG emissions after implementing the CDM project activity (project emissions) is emission reductions.

Understanding CDM: Additionality
- The emissions reduced by the project are additional to those that would have occurred in absence of the CDM
- The project goes beyond the ‘business as usual’ scenario
- GHG emissions are lower with the project than they would have been without the project
- Additionality
  - Financial
  - Barrier Analysis
  - Common Practice
CDM Process - Players

- Project Proponent/Consultant
- DOE = Validators / Verifiers
- UNFCCC
- DNA - MoEF
- Buyer

Steps to Develop a CDM project

1. PDD Development
2. Approval from MoEF
3. Validation by DOE
4. Registration by UNFCCC
5. Verification by DOE
6. Issuance of CERs by EB
7. Transaction of CERs

Carbon Market

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>Total Market size in 2008</td>
<td>$125 billion</td>
</tr>
<tr>
<td>Growth rate expected in 2009</td>
<td>27%</td>
</tr>
<tr>
<td>Expected Market size in 2009</td>
<td>$150 billion</td>
</tr>
<tr>
<td>Expected Market size in 2020</td>
<td>$1.3 trillion</td>
</tr>
<tr>
<td>2020 price forecast for EU allowances and international offsets</td>
<td>€30-50 per tCO₂e</td>
</tr>
</tbody>
</table>

GHG Abatement : MSW

- The GHG emitter from solid waste is the organic component.
- Anaerobic degradation of solid organic matter generates methane. These conditions are typically observed in organic solid waste landfills.
- Methane is the primary GHG considered in solid waste degradation.
- The baseline for solid waste based emission is the presence of waste disposal in landfill where anaerobic decomposition of organic matter and the methane so generated is let off into the atmosphere.
- The abatement strategy for solid waste methane generation is to either
  - Capture the biogas generated in the landfill to burn or use it
  - Avoid generation of methane.

Opportunities in Solid Waste Sector

1. Methane Avoidance:
   - Biological treatment
   - Anaerobic digestion / Biogasification
   - Composting
   - Thermal treatment
   - Refuse Derived Fuel (RDF)
   - Incineration
   - Pyrolysis
   - Sanitary landfilling
   - Landfill gas recovery and combustion
2. Power Generation

MSW-CDM: Snapshot

<table>
<thead>
<tr>
<th>WORLD</th>
<th>320</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered Projects:</td>
<td>106</td>
</tr>
<tr>
<td>In Validation:</td>
<td>201</td>
</tr>
</tbody>
</table>

India - 23
- Registered Projects: 4
- In Validation: 16

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name</th>
<th>Meth</th>
<th>Date of reg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Methane Avoidance by MSW Processing in Chandigarh</td>
<td>MWS RE</td>
<td>04.09.06</td>
</tr>
<tr>
<td>2</td>
<td>Shajapur CDM Integrated waste to energy project</td>
<td>WW 35</td>
<td>02.11.07</td>
</tr>
<tr>
<td>3</td>
<td>1.5 T WwW MSW Based Power Project at Vijayawada &amp; Secunderabad</td>
<td>WW 41 T</td>
<td>15.04.07</td>
</tr>
<tr>
<td>4</td>
<td>MSW composting at Kolhapur Maharashtra</td>
<td>WW 41 T</td>
<td>01.04.09</td>
</tr>
</tbody>
</table>
Methodologies

Larger: 2
- AMS: Avoided emissions from organic waste through alternative waste treatment processes
- AMR: Methane emissions reduction from organic waste water and biosolids waste using co-composting

Consolidated: 1
- AMS: Consolidated baseline and monitoring methodology for landfill gas project activities

Small Scale: 4
- AMS: Avoidance of methane production from decay of biomass through controlled composting, gasification or mechanical/thermal treatment
- AMS: Avoidance of methane emissions through controlled biological treatment of biomass
- AMS: Landfill methane recovery
- AMS: Avoidance of methane production from biomass decay through controlled processes

Case Study – India RDF Processing of MSW

Methane Avoidance by Municipal Solid Waste Processing in the city of Chandigarh, India (Reference No. 510)

- Project proponent: Jalprakash Associates Ltd. (JAL)
- Project activity: MSW conversion to RDF pellets
- Treatment Capacity: 200 TPD
- Outputs: Fuel pellets (2500-5500kg)
- CER Potential: 65,000 CERs/annum
- Credit period: 15 Years
- Expected Revenue: @ 10 Euros/CoREs

Revenue from CDM

- 100 TPD typical landfills:
  - Carbon equivalent (CERs): 7,000 *
  - CER revenue, @ Euro10/t: 70,000
  - CER Revenue in INR @65: Rs. 45,50,000

- Electricity generation capacity ~ 1 MW
  - Carbon equivalent (CERs): 5,000
  - CER revenue, @ Euro10/t: 50,000
  - CER Revenue in INR @65: Rs. 32,50,000

- Total Revenue: Rs. 78,00,000 / annum

* CERs depends on baseline i.e., waste compositing and existing practice of waste reduction

Introduction EVI

Emergent Ventures India (EVI) is one of the leading carbon advisory firms delivering end to end environmental solutions and services

EVI's Credentials

- 26 Registered CDM projects with more than 150 in different stages of registration
- More than 200+ projects in pipeline
- Facilitated the first Wind project CDM registration in India
- Facilitated the first Municipal Solid Waste (MSW-RDF) project CDM registration in India
- Facilitated the registration of the Largest Hydro (192 MW) CDM registration in India
- Done the largest VER transaction in the world for a 400 MW Hydro Power Project
- Working on a few of the most complex areas such as Super Critical Thermal Power Plant, Bus Rapid Transportation System, Reforestation, Programmatic CDM etc.
- International Presence: Pakistan, Bangladesh, Thailand, Malaysia, Singapore, Australia, Tanzania, Nigeria & Indonesia

For further information, please contact:
vinay@emergent-ventures.com
+91 – 97170 92064
Presentation 1 on SW Treatment Technologies – Mr PU Asnani

A participant sought to know about the ADBs role for SWM in NCRPB. The Member Secretary, NCRPB clarified that ADB has provided technical assistance for capacity building of NCRPB and the implementing agencies for identification and project preparation under various sectors including SWM.

Another participant raised the issue of site identification for solid waste disposal facilities and public agitations and sought to know how these can be sorted out. Mr. PU Asnani gave an elaborate reply based on his experiences elsewhere. He has provided the example of Gujarat state and how the sites for solid waste landfills were identified using modern technologies like satellite imageries. He stressed on the need to identify government waste lands far from the habitations. He also informed that in master plans in Gujarat some areas have been designated for obnoxious activities such as land fill site, STPs, industries emanating bad smelling and dangerous gases so that builders/colonizers do not take up housing projects in nearby areas and in that case the resistance from builders/colonizers will not happen. Identification of government waste lands for LFS will avoid land acquisition and public opposition. He also stressed the need to develop regional landfills for a cluster of cities, and transportation by bulk carriers. This will be overall economical as smaller land fill sites have more initial cost per ton of waste and high operation cost. However the common land fill site should be located nearer to bigger town to reduce transportation costs.

During this discussion, Member Secretary, NCRPB had intervened and stressed the importance of having transfer stations for large size towns to reduce the cost in case of distant disposal sites.

One participant sought to know about the treatment technologies for industrial wastes and whether the technologies described here will suit industrial waste. Mr. PU Asnani indicated that the waste of one industry should be identified as raw material/resource material of other industry and this way waste recycle and reduction should be achieved. He indicated that the technologies presented here are mostly for organic waste (composting, biomethanation, etc) and therefore suitable for municipal solid waste.

To a quarry of ‘Are there any anaerobic processes for waste treatment?’, Mr. PU Asnani replied that waste can be treated aerobically or anaerobically, and provided a detailed explanation on aerobic and anaerobic treatment methods. Biomethanation is an anaerobic based process. While the composting can be carried out both by anaerobic and aerobic methods, due to its advantages like less odor, aerobic processes are advisable.

To another quarry of ‘Is there any way to treat non-hazardous industrial waste?’, Mr. PU Asnani responded that industrial waste, whether hazardous or non-hazardous, will have unique characteristics depending on the type of industry and the process employed. So suitability for treatment can be decided based on the characteristics.
Presentation 2 on ‘Planning to develop SWM in cities’ by Mr SK Goyal, SWM Expert, ADB TA Team

Advisor CPHEEO indicated that composite sampling survey shall be conducted to assess the characteristics of the municipal solid waste. He suggested that grab sampling method, which may not provide accurate assessment, shall not be employed. Intervening in the discussion, Mr. SK Goyal, the SWM Expert of WSA TA Team, clarified that composite sampling method was employed for Ghaziabad SWM study conducted under this TA.

In preparing the SWM Plan, long term changes in land use – at least 20 years, shall be taken into consideration. The SWM Expert agreed with this and indicated that SWM Plan prepared for Ghaziabad is for next 20 years.

Commissioner, Ghaziabad Nagar Nigam (GNN), stressed the social aspects such as public perception that taking solid waste to bin or self cleaning are inferior work, should be changed. He stressed importance of information-education-communication activities in the successful implementation of SWM Plan. He elaborated on GNN efforts in improving the SWM scenario in Ghaziabad, mainly related to creation of public awareness and participation.

Presentation 3 on ‘Clean Development Mechanism – Carbon Credit Potential in SWM sector’ by Mr Vinaya Bansal

CPHEEO Advisor indicated that there are issues in eligibility of SWM projects in India for CDM. Under JNNURM many SWM projects are approached for registration under CDM, but are rejected on the grounds that the treatment and disposal of solid waste is mandatory under the Indian Law and therefore are not eligible for CDM.

Mr. Vinaya Bansal clarified that at least 4 SWM projects in SWM are registered; therefore eligibility is not a problem. Although it is mandatory under Law, the currently compliance is at very low level of about 10 percent. He informed that when compliance is so low the projects can be taken even if mandatory under the law.

Mr. P U Asnani intervened and stated that SWM projects will be eligible on two grounds: (i) current compliance level of SWM legislation is far below at 10 percent, and (ii) the SWM projects like composting, biomethanation, etc, are not financially viable without additional support like CDM. He stressed on the need to approach the CDM Board positively with these eligibility criteria.

This presentation created lot of enthusiasm among participants, and realizing this Member Secretary, NCRPB, advised the participants to interact with Mr. Vinaya Bansal, after workshop personally.
Appendix 14
Note on SWM Sites Visited

I. Note on Transfer Station

Name of operating agency: M/s Anthony Waste Handling Cell Private limited, Mumbai

Location: Site near MCD Electric Cremetorium, Vijay Ghat on Ring Road, New Delhi

Objective: (1) To save the time, manpower, Operation and maintenance cost and life of the vehicle (2) to set up efficient/ economical/durable/ environmental friendly transportation system and (3) To remove significant traffic to landfill.

Mode of setup: PPP by Municipal Corporation Delhi and operating agency (land for transfer station is provided by the MCD; whereas the entire investment on construction of transfer station, procurement of required vehicles, operation and maintenance of vehicles etc is done by the agency)

Areas for activities: Collection and Transportation of waste from Sadar, Paharganj and Karol Bagh zones of MCD (covering 35 sq km area)

Expected generation: 600 MT per day

Capacity per day: 600 MT

Date and Year of Commencement: December 2005

Project Duration: 9 years

Work duration: Round the clock

Activities: The agency carries out following activities:

- Procurement of vehicles, operation and maintenance
- Construction of Transfer station on site allotted by MCD
- Collection of waste from dhalaos/ secondary collection points of three zones.
- Transferring the waste from low capacity vehicles like dumper placers/ compactors/ trucks to bulk containers through hoppers
- Compaction of waste through compaction units
- Transportation of waste

Facilities: Following facilities exist:

- Parking place for vehicles
- Workshop for repairing
- Unloading platform on grade separator
- Hoppers
- Charge box
- 2 imported heavy duty high compaction units (RJ-450)
- 10 hook lifters with 14 bulk containers of 12-14 MT capacity
- Vehicles for collection & transportation
Distances:

- From site to transfer station -15 to 20 Km
- Transfer Station to landfill site – 17 KM

Financial arrangement: MCD pays tipping fee to the agency @ Rs 682 per MT as per actual weighment carried out at landfill sites

Process: Refuse collection trucks from 2 – 12 tons are sent to the Transfer Station to tip their waste into the hopper. The hopper together with a charge-push-ram will transfer the waste into the opening of the compactor. This waste is compacted into the container until it is full (compactor has indicating status lights to signal for 80% full and 100% full container status). The waste is transported through bulk carriers up to landfill sites either to Ghazipur at Ghaziabad road or Bhalsawa, at Karnal road.

Investment: Rs 14 crore entirely by the agency

II. Note on Compost Plant

Name of operating agency: M/s IL&FS

Location: 13 acre site is situated at STP premise of MCD near CRRI, Mathura Road, New Delhi

Objective: To produce compost by aerobic microbial mechanical composting methodology adhering to quality standards

Mode of setup: on DBOMT (Design, Built, Operate, Maintain and Transfer of land basis) by the operating agency (land for compost plant is provided by the MCD; whereas the entire investment on construction of compost plant, procurement of required vehicles, equipment and machinery, operation and maintenance of plant site is done by the agency). Responsibility of producing the final product and marketing of same is the responsibility of the agency.

Areas for activities: Collection and Transportation of waste by MCD/NDMC vehicles

Capacity per day: 200 MT

Year of Commencement: 2008

Project Duration: 25 years

Work duration: Normally 2 shifts

Facilities: Following facilities exist:

- Weigh bridge 30 MT
- Parking place for vehicles
- Workshop for repairing
- Excavator cum loaders and dumpers for handling and internal transportation
- Compost pad
- Storage space for godown
- Office
• Quality testing laboratory
• Plant and machinery for pre-sorting, screening, curing, gravity separator and packaging section

Financial arrangement:

• Entire investment, approximately Rs 6-7 crores is made by the agency

Process: Following sequence is followed:

• Receipt of waste
• Visual inspection
• Weighment and record keeping (if found suitable)
• Pre-sorting
• Windrow formation
• Addition of culture
• Turning after every 5 days by maintaining temperature and moisture
• Coarse segregation through trammel 35/16 mm size
• Saturation for 15-21 days
• Vibro-screen 6/4 mm screen size
• Gravity separator for removing silt
• Magnetic separator for separating ferrous items
• Quality assurance
• Mixing of additives, packaging and storage
• Despatch for sale
• Rejects are sent to landfill site
First National Study Tour to Urban Infrastructure ‘Best Practice’ sites, ADB TA 7055 (Comp-B), 17 - 21 August, 2009

List of Participants

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Smt. Damyanti Goyal</td>
<td>Mayor, Municipal Corporation, Ghaziabad, Uttar Pradesh</td>
</tr>
<tr>
<td>2</td>
<td>Chander Prakash IAS</td>
<td>Addl. Commissioner, Municipal Corporation, Gurgaon</td>
</tr>
<tr>
<td>3</td>
<td>S S Bida</td>
<td>Chief Engineer, Urban PHED, Haryana</td>
</tr>
<tr>
<td>4</td>
<td>D C Sahu</td>
<td>Superintending Engineer, Faridabad Municipal Corporation, Faridabad</td>
</tr>
<tr>
<td>5</td>
<td>Rajiv Batish</td>
<td>Executive Engineer, Public Health Division No. 2, Rohtak</td>
</tr>
<tr>
<td>6</td>
<td>Ajit Jain</td>
<td>President, Municipal Council, Rohtak</td>
</tr>
<tr>
<td>7</td>
<td>Rohitas Sharma</td>
<td>President, Municipal Council, Panipat</td>
</tr>
<tr>
<td>8</td>
<td>R C Shukla</td>
<td>Joint Director, NCRPB</td>
</tr>
<tr>
<td>9</td>
<td>Anjali Pancholi</td>
<td>Deputy Director, NCRPB</td>
</tr>
<tr>
<td>10</td>
<td>Shireesh Sharma</td>
<td>Assistant Director, NCRPB</td>
</tr>
<tr>
<td>11</td>
<td>M Boominathan</td>
<td>Dy. Team Leader, ADB TA 7055 (Comp-B)</td>
</tr>
<tr>
<td>12</td>
<td>SK Goyal</td>
<td>SWM Expert, ADB TA 7055 (Comp-B)</td>
</tr>
<tr>
<td>13</td>
<td>Inder Pal Singh</td>
<td>Water Supply Engineer, Hapur Municipality, UP</td>
</tr>
<tr>
<td>14</td>
<td>Hitesh Kumar</td>
<td>Asst. Architect Planner, NCR Cell, Ghaziabad Nagar Nigam Office, Ghaziabad, Uttar Pradesh</td>
</tr>
</tbody>
</table>
Meeting with the Commissioner, Ahmadabad Municipal Corporation (AMC)

Lunch hosted by Ahmadabad Municipal Corporation (AMC)

Visit to City Civic Centre of AMC

Visit to Bus Rapid Transport System (BRTS) Corridors

Ahmadabad (Gyaspura) Sanitary Landfill

Discussion with the AMC Officials & Consultants on Sanitary Landfill Site
<table>
<thead>
<tr>
<th>Image 90x497 to 307x659</th>
<th>AMC Officials explaining about the Sabarmati River front Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image 314x495 to 534x659</td>
<td>Sabarmati River front Development under implementation by Ahmadabad MC</td>
</tr>
<tr>
<td>Image 90x319 to 310x471</td>
<td>Discussion with AMC Officials</td>
</tr>
<tr>
<td>Image 314x317 to 543x471</td>
<td>Slum Rehabilitation Project at Nawa Wadaj, Ahmadabad</td>
</tr>
<tr>
<td>Image 90x144 to 542x293</td>
<td>Visit to Slum Rehabilitation Project at Nawa Wadaj,</td>
</tr>
<tr>
<td></td>
<td>Discussion with AMC Officials on Slum Rehabilitation Project</td>
</tr>
</tbody>
</table>
Tiruppur Water Supply Project operation under PPP (by NTADCL) – WS Intake Point at Cauvery River 45 Km from Tiruppur Town

Automated Control System at WS Intake Point

Sh. S Sankar, COO, NTADCL explaining to the Delegates

Delegates visiting to the Treatment Plant

Project Expert explaining about the Project

Project Official explaining about the Operation
Meeting at Treatment Plant office

Delegates observing the SCADA System working

COO, NTADCL is giving presentation about the project

Visit to the Tiruppur Sewer Treatment Plant operated by NTADCL on PPP format

Tiruppur Sewer Treatment Plant

Tiruppur Sewer Treatment Plant
<p>| Meeting with Mr P Reddy IAS CEO, Tamil Nadu Urban Development Fund (TNUDF) at Chennai |
| Presentation on TNUDF activities and Urban Fund Management |
| Visit to Adayar Poonga (an Environment Park) under implementation at Chennai |
| Discussion with the Adayar Poonga officials |
| Another view during the Adayar Poonga visit |
| Meeting with Dr Senthilkumar IAS, Director of Municipal Administration, GoTN in which Venkatamangalam SWM (combined project for three ULBs) and Implementation of Rain water Harvest Project in TN were presented |</p>
<table>
<thead>
<tr>
<th>Activity</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting at Chennai Metropolitan Development Authority (CMDA)</td>
<td><img src="image1" alt="Meeting at CMDA" /></td>
</tr>
<tr>
<td>Presentation at CMDA on Chennai Development Initiatives</td>
<td><img src="image2" alt="Presentation at CMDA" /></td>
</tr>
<tr>
<td>Visit to Koyambedu Inter-City Bus Terminal operated by CMDA</td>
<td><img src="image3" alt="Visit to Koyambedu Bus Terminal" /></td>
</tr>
<tr>
<td>Visit to Alandur Municipal Office</td>
<td><img src="image4" alt="Visit to Alandur Municipal Office" /></td>
</tr>
<tr>
<td>Chairman, Alandur Municipality facilitates the Delegates</td>
<td><img src="image5" alt="Chairman facilitating" /></td>
</tr>
<tr>
<td>Meeting with EXONRA Officials who are operating SWM in Pammal Municipality</td>
<td><img src="image6" alt="Meeting with EXONRA" /></td>
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</table>
## Appendix 16: List of Participants – Second Study Tour

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name</th>
<th>Designation</th>
<th>E- Mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sh. Deepak Nandi</td>
<td>Secretary, Urban Improvement Trust (UIT), Bhiwadi, Rajasthan</td>
<td><a href="mailto:deepaknandi001@yahoo.com">deepaknandi001@yahoo.com</a></td>
</tr>
<tr>
<td>2</td>
<td>Sh. J. C. Adarsh</td>
<td>Vice Chairman, HPDA, Hapur, Uttar Pradesh</td>
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<td>3</td>
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</tr>
<tr>
<td>5</td>
<td>Sh. Lalit Arora</td>
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<td></td>
</tr>
<tr>
<td>6</td>
<td>Sh. Karambeer Singh</td>
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<tr>
<td>7</td>
<td>Sh. Pankaj Kumra</td>
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<td></td>
</tr>
<tr>
<td>8</td>
<td>Sh. NK Johari</td>
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<tr>
<td>9</td>
<td>Sh. RK Vijayvargia</td>
<td>Deputy Town Planner, Office of the Chief Town Planner (NCR), Nagar Nyojan Bhavan, JLN Marg, Jaipur</td>
<td><a href="mailto:rkvijayvargia_60@yahoo.co.in">rkvijayvargia_60@yahoo.co.in</a></td>
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<tr>
<td>10</td>
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<tr>
<td>11</td>
<td>Sh. JN Barman</td>
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</tr>
<tr>
<td>12</td>
<td>Sh. Abhijeet Samanta</td>
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</tr>
<tr>
<td>13</td>
<td>Sh. Atul Choudhary</td>
<td>Assistant (Fin.), NCRPB, New Delhi</td>
<td><a href="mailto:atul_ncr@yahoo.co.in">atul_ncr@yahoo.co.in</a></td>
</tr>
<tr>
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<td>Meeting with the Nagpur Municipal Corporation (NMC) Officials at Standing Committee Hall</td>
<td>Discussion with NMC Officials at STP Site Office</td>
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<td>Visit to STP Site, Nagpur</td>
<td>Another view of the STP Site, Nagpur</td>
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<td>Interaction with the NMC Officials at the Lake Site that is proposed for environmental improvements</td>
<td>Demonstration of products by the Contractor (M/s VEOLIA) used for 24 x 7 water supply in Nagpur</td>
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</table>
Municipal Reform Centre (MRC), Bangalore where presentations by KUIDFC, MRC, BBMP, and CMAK were made.

BBMP Officials presentation about the Compost Plant operated under PPP in Bangalore.

MRC Unit visited by the Team.

View of the Compost Plant.

Compost Plant Shed.

Study Team at Compost Plant.
Meeting with the officials of Bangalore Water Supply and Sewerage Board (BWSSB)

Layout of the 400 MLD WTP at TK Halli, for Bangalore City

Team visiting the WTP

WTP showing Alum Mixing in Hydraulic Jump

Aeration and Inlet Unit of the WTP

Clarifier (Pulseter) & Filter Beds
1.5 MLD STP with Membrane Filtration at Cubbon Park, Bangalore, the Team Visited

Interaction with the BWSSB Officials at STP Site

Fountain at STP with Treated Waste Water

Raw Sewage Wet Well

Fine Screen Unit at STP

Aeration Unit at STP
Mixing of Chemicals at STP

Treated Waste Water at STP

Visit to BMTC – Traffic Transit Management Centre (TTMC) at Shanti Nagar under construction

TTMC Project implemented under JNNURM

Study Team at the TTMC construction site

Discussion with the BMTC Officials at BMTC Central Office
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<th>S. No.</th>
<th>Name</th>
<th>Designation/Organization</th>
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Third National Study Tour to Urban Infrastructure ‘Best Practice’ sites, 19 - 23 April, 2010
ADB TA 7055 (Component B)

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ADB Funded Water Supply Project for Indore City with source from Narmada River

Study Team visit to Water Supply Source at Narmada River

View of the Source at Narmada River

Officials explaining the Operating System

Delegates observing the SCADA System working

Discussion with the Project Officials
Mayor, Kochi Corporation is addressing the Study Team

Visit to Slum Development & SWM Primary collection Project at Kochi City with ADB Support

View of the Meeting at Kochi Corporation

Study Team with Mayor and Secretary of Kochi Corporation

Visit to the Sanitary Landfill Site developed under JNNURM at Kakanadu in Kochi City
Meeting with officials at Chennai Corporation

Presentation on on-line Building Permit System and SWM Development

View of the Study Team during the Presentation at Chennai Corporation

Lunch Hosted by Chennai corporation

Visit to the Marina Beach Corridor Development Project implemented by Chennai Corporation

Dinner hosted by Wilbur Smith Associates
Visit to KK Nagar STP in Chennai arranged by Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB)

Delegates observing the STP Operation, maintained by Private Operators

View of the STP

Lab Facilities

Meeting at STP Site

Presentations at Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB)