

# APPENDICES



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**APPENDIX C.2.1 THE PROHIBITION OF EMPLOYMENT AS MANUAL SCAVENGERS AND  
THEIR REHABILITATION ACT, 2013**

रजिस्ट्री सं० डी० एल०—(एन)04/0007/2003—13

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असाधारण

EXTRAORDINARY

भाग II — खण्ड 1

PART II — Section 1

प्राधिकार से प्रकाशित

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इस भाग में भिन्न पृष्ठ संख्या दी जाती है जिससे कि यह अलग संकलन के रूप में रखा जा सके।  
Separate paging is given to this Part in order that it may be filed as a separate compilation.

MINISTRY OF LAW AND JUSTICE

(Legislative Department)

*New Delhi, the 19th September, 2013/Bhadra 28, 1935 (Saka)*

The following Act of Parliament received the assent of the President on the 18th September, 2013, and is hereby published for general information:—

**THE PROHIBITION OF EMPLOYMENT AS MANUAL SCAVENGERS  
AND THEIR REHABILITATION ACT, 2013**

No. 25 OF 2013

[18th September, 2013.]

An Act to provide for the prohibition of employment as manual scavengers, rehabilitation of manual scavengers and their families, and for matters connected therewith or incidental thereto.

WHEREAS promoting among the citizens fraternity assuring the dignity of the individual is enshrined as one of the goals in the Preamble to the Constitution;

AND WHEREAS the right to live with dignity is also implicit in the Fundamental Rights guaranteed in Part III of the Constitution;

AND WHEREAS article 46 of the Constitution, *inter alia*, provides that the State shall protect the weaker sections, and, particularly, the Scheduled Castes and the Scheduled Tribes from social injustice and all forms of exploitation;

AND WHEREAS the dehumanising practice of manual scavenging, arising from the continuing existence of insanitary latrines and a highly iniquitous caste system, still persists in various parts of the country, and the existing laws have not proved adequate in eliminating the twin evils of insanitary latrines and manual scavenging;

AND WHEREAS it is necessary to correct the historical injustice and indignity suffered by the manual scavengers, and to rehabilitate them to a life of dignity.

BE it enacted by Parliament in the Sixty-fourth Year of the Republic of India as follows:—

## CHAPTER I

### PRELIMINARY

Short title,  
extent and  
commence-  
ment.

1. (1) This Act may be called the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013.

(2) It extends to the whole of India except the State of Jammu and Kashmir.

(3) It shall come into force on such date as the Central Government may, by notification in the Official Gazette, appoint:

Provided that the date so notified shall not be earlier than sixty days after the date of publication of the notification in the Official Gazette.

Definitions.

2. (1) In this Act, unless the context otherwise requires,—

(a) “agency” means any agency, other than a local authority, which may undertake sanitation facilities in an area and includes a contractor or a firm or a company which engages in development and maintenance of real estate;

(b) “appropriate government”, in relation to Cantonment Boards, railway lands, and lands and buildings owned by the Central Government, a Central Public Sector Undertaking or an autonomous body wholly or substantially funded by the Central Government, means the Central Government and in all other cases, the State Government;

(c) “Chief Executive Officer”, in relation to a Municipality or Panchayat, means, its senior-most executive officer, by whatever name called;

(d) “hazardous cleaning” by an employee, in relation to a sewer or septic tank, means its manual cleaning by such employee without the employer fulfilling his obligations to provide protective gear and other cleaning devices and ensuring observance of safety precautions, as may be prescribed or provided in any other law, for the time being in force or rules made thereunder;

(e) “insanitary latrine” means a latrine which requires human excreta to be cleaned or otherwise handled manually, either *in situ*, or in an open drain or pit into which the excreta is discharged or flushed out, before the excreta fully decomposes in such manner as may be prescribed:

Provided that a water flush latrine in a railway passenger coach, when cleaned by an employee with the help of such devices and using such protective gear, as the Central Government may notify in this behalf, shall not be deemed to be an insanitary latrine.

(f) “local authority” means,—

(i) a Municipality or a Panchayat, as defined in clause (e) and clause (f) of article 243P of the Constitution, which is responsible for sanitation in its area of jurisdiction;

(ii) a Cantonment Board constituted under section 10 of the Cantonments Act, 2006; and

(iii) a railway authority;

(g) “manual scavenger” means a person engaged or employed, at the commencement of this Act or at any time thereafter, by an individual or a local authority or an agency or a contractor, for manually cleaning, carrying, disposing of, or otherwise handling in any manner, human excreta in an insanitary latrine or in an open drain or pit into which the human excreta from the insanitary latrines is disposed of, or on a

railway track or in such other spaces or premises, as the Central Government or a State Government may notify, before the excreta fully decomposes in such manner as may be prescribed, and the expression “manual scavenging” shall be construed accordingly.

*Explanation.*—For the purpose of this clause,—

(a) “engaged or employed” means being engaged or employed on a regular or contract basis;

(b) a person engaged or employed to clean excreta with the help of such devices and using such protective gear, as the Central Government may notify in this behalf, shall not be deemed to be a ‘manual scavenger’;

(h) “National Commission for Safai Karmacharis” means the National Commission for Safai Karmacharis constituted under section 3 of the National Commission for Safai Karmacharis Act, 1993 and continued by Resolution of the Government of India in the Ministry of Social Justice and Empowerment *vide* No.17015/18/2003-SCD-VI, dated 24th February, 2004 and as amended from time to time;

64 of 1993.

(i) “notification” means a notification published in the Official Gazette and the expression “notify” shall be construed accordingly;

(j) “occupier”, in relation to the premises where an insanitary latrine exists, or someone is employed as a manual scavenger, means the person who, for the time being, is in occupation of such premises;

(k) “owner”, in relation to the premises where an insanitary latrine exists or someone is employed as a manual scavenger, means, the person who, for the time being has legal title to such premises;

(l) “prescribed” means prescribed by the rules made under this Act;

(m) “railway authority” means an authority administering railway land, as may be notified by the Central Government in this behalf;

24 of 1989.

(n) “railway land” shall have the meaning assigned to it in clause (32A) of section 2 of the Railways Act, 1989;

(o) “sanitary latrine” means a latrine which is not an ‘insanitary latrine’;

(p) “septic tank” means a water-tight settling tank or chamber, normally located underground, which is used to receive and hold human excreta, allowing it to decompose through bacterial activity;

(q) “sewer” means an underground conduit or pipe for carrying off human excreta, besides other waste matter and drainage wastes;

(r) “State Government”, in relation to a Union territory, means the Administrator thereof appointed under article 239 of the Constitution;

(s) “survey” means a survey of manual scavengers undertaken in pursuance of section 11 or section 14.

41 of 2006.

(2) Words and expressions used and not defined in this Act, but defined in the Cantonments Act, 2006, shall have the same meanings respectively assigned to them in that Act.

(3) The reference to a Municipality under Chapters IV to VIII of this Act shall include a reference to, as the case may be, the Cantonment Board or the railway authority, in respect of areas included within the jurisdiction of the Cantonment Board and the railway land, respectively.

Act to have overriding effect.

3. The provisions of this Act shall have effect notwithstanding anything inconsistent therewith contained in the Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993 or in any other law, or in any instrument having effect by virtue of any other law.

46 of 1993.

## CHAPTER II

### IDENTIFICATION OF INSANITARY LATRINES

Local authorities to survey insanitary latrines and provide sanitary community latrines.

4. (1) Every local authority shall,—

(a) carry out a survey of insanitary latrines existing within its jurisdiction, and publish a list of such insanitary latrines, in such manner as may be prescribed, within a period of two months from the date of commencement of this Act;

(b) give a notice to the occupier, within fifteen days from the date of publication of the list under clause (a), to either demolish the insanitary latrine or convert it into a sanitary latrine, within a period of six months from the date of commencement of this Act:

Provided that the local authority may for sufficient reasons to be recorded in writing extend the said period not exceeding three months;

(c) construct, within a period not exceeding nine months from the date of commencement of this Act, such number of sanitary community latrines as it considers necessary, in the areas where insanitary latrines have been found.

(2) Without prejudice to the provisions contained in sub-section (1), Municipalities, Cantonment Boards and railway authorities shall also construct adequate number of sanitary community latrines, within such period not exceeding three years from the date of commencement of this Act, as the appropriate Government may, by notification, specify, so as to eliminate the practice of open defecation in their jurisdiction.

(3) It shall be the responsibility of local authorities to construct community sanitary latrines as specified in sub-sections (1) and (2), and also to make arrangements for their hygienic upkeep at all times.

*Explanation.*—For the purposes of this section, “community” in relation to railway authorities means passengers, staff and other authorised users of railways.

## CHAPTER III

### PROHIBITION OF INSANITARY LATRINES AND EMPLOYMENT AND ENGAGEMENT AS MANUAL SCAVENGER

Prohibition of insanitary latrines and employment and engagement of manual scavenger.

5. (1) Notwithstanding anything inconsistent therewith contained in the Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993, no person, local authority or any agency shall, after the date of commencement of this Act,—

46 of 1993.

(a) construct an insanitary latrine; or

(b) engage or employ, either directly or indirectly, a manual scavenger, and every person so engaged or employed shall stand discharged immediately from any obligation, express or implied, to do manual scavenging.

(2) Every insanitary latrine existing on the date of commencement of this Act, shall either be demolished or be converted into a sanitary latrine, by the occupier at his own cost, before the expiry of the period so specified in clause (b) of sub-section (1) of section 4:

Provided that where there are several occupiers in relation to an insanitary latrine, the liability to demolish or convert it shall lie with,—

(a) the owner of the premises, in case one of the occupiers happens to be the owner; and



(b) all the occupiers, jointly and severally, in all other cases:

Provided that the State Government may give assistance for conversion of insanitary latrines into sanitary latrines to occupiers from such categories of persons and on such scale, as it may, by notification, specify:

Provided further that non-receipt of State assistance shall not be a valid ground to maintain or use an insanitary latrine, beyond the said period of nine months.

(3) If any occupier fails to demolish an insanitary latrine or convert it into a sanitary latrine within the period specified in sub-section (2), the local authority having jurisdiction over the area in which such insanitary latrine is situated, shall, after giving notice of not less than twenty one days to the occupier, either convert such latrine into a sanitary latrine, or demolish such insanitary latrine, and shall be entitled to recover the cost of such conversion or, as the case may be, of demolition, from such occupier in such manner as may be prescribed.

6. (1) Any contract, agreement or other instrument entered into or executed before the date of commencement of this Act, engaging or employing a person for the purpose of manual scavenging shall, on the date of commencement of this Act, be terminated and such contract, agreement or other instrument shall be void and inoperative and no compensation shall be payable therefor.

Contract, agreement, etc., to be void.

(2) Notwithstanding anything contained in sub-section (1), no person employed or engaged as a manual scavenger on a full-time basis shall be retrenched by his employer, but shall be retained, subject to his willingness, in employment on at least the same emoluments, and shall be assigned work other than manual scavenging.

7. No person, local authority or any agency shall, from such date as the State Government may notify, which shall not be later than one year from the date of commencement of this Act, engage or employ, either directly or indirectly, any person for hazardous cleaning of a sewer or a septic tank.

Prohibition of persons from engagement or employment for hazardous cleaning of sewers and septic tanks.

8. Whoever contravenes the provisions of section 5 or section 6 shall for the first contravention be punishable with imprisonment for a term which may extend to one year or with fine which may extend to fifty thousand rupees or with both, and for any subsequent contravention with imprisonment which may extend to two years or with fine which may extend to one lakh rupees, or with both.

Penalty for contravention of section 5 or section 6.

9. Whoever contravenes the provisions of section 7 shall for the first contravention be punishable with imprisonment for a term which may extend to two years or with fine which may extend to two lakh rupees or with both, and for any subsequent contravention with imprisonment which may extend to five years or with fine which may extend to five lakh rupees, or with both.

Penalty for contravention of section 7.

10. No court shall take cognizance of any offence punishable under this Act except upon a complaint thereof is made by a person in this behalf within three months from the date of the occurrence of the alleged commission of the offence.

Limitation of prosecution.

#### CHAPTER IV

##### IDENTIFICATION OF MANUAL SCAVENGERS IN URBAN AND RURAL AREAS AND THEIR REHABILITATION

11. (1) If any Municipality has reason to believe that some persons are engaged or employed in manual scavenging within its jurisdiction, the Chief Executive Officer of such Municipality shall cause a survey to be undertaken to identify such persons.

Survey of manual scavengers in urban areas by Municipalities.

(2) The content and methodology of the survey referred to in sub-section (1) shall be such as may be prescribed, and it shall be completed within a period of two months from its commencement in the case of Municipal Corporations, and within a period of one month in the case of other Municipalities.

(3) The Chief Executive Officer of the Municipality, in whose jurisdiction the survey is undertaken, shall be responsible for accurate and timely completion of the survey.

(4) After completion of the survey, the Chief Executive Officer shall cause to be drawn up a provisional list of persons found to be working as manual scavengers within the jurisdiction of his Municipality and fulfilling the eligibility conditions as may be prescribed, shall cause such provisional list to be published for general information in such manner, as may be prescribed, and shall invite objections to the list from the general public.

(5) Any person having any objection, either to the inclusion or exclusion of any name in the provisional list published in pursuance of sub-section (4), shall, within a period of fifteen days from such publication, file an objection, in such form as the Municipality may notify, to the Chief Executive Officer.

(6) All objections received in pursuance of sub-section (5), shall be enquired into, and thereafter a final list of persons found to be working as manual scavengers within the local limits of the municipality, shall be published by it in such manner, as may be prescribed.

(7) As soon as the final list of manual scavengers, referred to in sub-section (6) is published, the persons included in the said list shall, subject to the provisions of sub-section (2) of section 6, stand discharged from any obligation to work as manual scavengers.

Application by an urban manual scavenger for identification.

**12.** (1) Any person working as a manual scavenger in an urban area, may, either during the survey undertaken by the Municipality in pursuance of section 11, within whose jurisdiction he works, or at any time thereafter, apply, in such manner, as may be prescribed, to the Chief Executive Officer of the Municipality, or to any other officer authorised by him in this behalf, for being identified as a manual scavenger.

(2) On receipt of an application under sub-section (1), the Chief Executive Officer shall cause it to be enquired into, either as part of the survey undertaken under section 11, or, when no such survey is in progress, within fifteen days of receipt of such application, to ascertain whether the applicant is a manual scavenger.

(3) If an application is received under sub-section (1) when a survey under section 11 is not in progress, and is found to be true after enquiry in accordance with sub-section (2), action shall be taken to add the name of such a person to the final list published under sub-section (6) of section 11, and the consequences mentioned in sub-section (7) thereof shall follow.

Rehabilitation of persons identified as manual scavengers by a Municipality.

**13.** (1) Any person included in the final list of manual scavengers published in pursuance of sub-section (6) of section 11 or added thereto in pursuance of sub-section (3) of section 12, shall be rehabilitated in the following manner, namely:—

(a) he shall be given, within one month,—

(i) a photo identity card, containing, *inter alia*, details of all members of his family dependent on him, and

(ii) such initial, one time, cash assistance, as may be prescribed;

(b) his children shall be entitled to scholarship as per the relevant scheme of the Central Government or the State Government or the local authorities, as the case may be;

(c) he shall be allotted a residential plot and financial assistance for house construction, or a ready-built house, with financial assistance, subject to eligibility and willingness of the manual scavenger, and the provisions of the relevant scheme of the Central Government or the State Government or the concerned local authority;

(d) he, or at least one adult member of his family, shall be given, subject to eligibility and willingness, training in a livelihood skill, and shall be paid a monthly stipend of not less than three thousand rupees, during the period of such training;

(e) he, or at least one adult member of his family, shall be given, subject to

eligibility and willingness, subsidy and concessional loan for taking up an alternative occupation on a sustainable basis, in such manner as may be stipulated in the relevant scheme of the Central Government or the State Government or the concerned local authority;

(f) he shall be provided such other legal and programmatic assistance, as the Central Government or State Government may notify in this behalf.

(2) The District Magistrate of the district concerned shall be responsible for rehabilitation of each manual scavenger in accordance with the provisions of sub-section (1) and the State Government or the District Magistrate concerned may, in addition, assign responsibilities in his behalf to officers subordinate to the District Magistrate and to officers of the concerned Municipality.

**14.** If any Panchayat has reason to believe that some persons are engaged in manual scavenging within its jurisdiction, the Chief Executive Officer of such Panchayat shall cause a survey of such manual scavengers to be undertaken, *mutatis mutandis*, in accordance with the provisions of section 11 and section 12, to identify such person.

Survey of manual scavengers in rural areas by Panchayats.

**15.** (1) Any person working as a manual scavenger, in a rural area, may, either during the survey undertaken by the Panchayat within whose jurisdiction he works, in pursuance of section 14 or at any time thereafter, apply, in such manner, as may be prescribed, to the Chief Executive Officer of the concerned Panchayat, or to any other officer authorised by him in this behalf, for being identified as a manual scavenger.

Application by a rural manual scavenger for identification.

(2) On receipt of an application under sub-section (1), the Chief Executive Officer shall cause it to be enquired into, either as part of the survey undertaken under section 14 or when no such survey is in progress, within fifteen days of receipt of such application, so as to ascertain whether the applicant is a manual scavenger.

**16.** Any person included in the final list of manual scavengers, published in pursuance of section 14 or added thereto in pursuance of sub-section (2) of section 15 shall be rehabilitated, *mutatis mutandis*, in the manner laid down for urban manual scavengers in section 13.

Rehabilitation of persons identified as manual scavengers by a Panchayat.

## CHAPTER V

### IMPLEMENTING AUTHORITIES

**17.** Notwithstanding anything contained in any other law for the time being in force, it shall be the responsibility of every local authority to ensure, through awareness campaign or in such other manner that after the expiry of a period of nine months, from the date of commencement of this Act,—

Responsibility of local authorities to ensure elimination of insanitary latrines.

(i) no insanitary latrine is constructed, maintained or used within its jurisdiction; and

(ii) in case of contravention of clause (i), action is taken against the occupier under sub-section (3) of section 5.

**18.** The appropriate Government may confer such powers and impose such duties on local authority and District Magistrate as may be necessary to ensure that the provisions of this Act are properly carried out, and a local authority and the District Magistrate may, specify the subordinate officers, who shall exercise all or any of the powers, and perform all or any of the duties, so conferred or imposed, and the local limits within which such powers or duties shall be carried out by the officer or officers so specified.

Authorities who may be specified for implementing provisions of this Act.

**19.** The District Magistrate and the authority authorised under section 18 or any other subordinate officers specified by them under that section shall ensure that, after the expiry of such period as specified for the purpose of this Act,—

Duty of District Magistrate and authorised officers.

(a) no person is engaged or employed as manual scavenger within their jurisdiction;

(b) no one constructs, maintains, uses or makes available for use, an insanitary latrine;

(c) manual scavengers identified under this Act are rehabilitated in accordance with section 13, or as the case may be, section 16;

(d) persons contravening the provisions of section 5 or section 6 or section 7 are investigated and prosecuted under the provisions of this Act; and

(e) all provisions of this Act applicable within his jurisdiction are duly complied with.

Appointment of inspectors and their powers.

**20.** (1) The appropriate Government may, by notification, appoint such persons as it thinks fit to be inspectors for the purposes of this Act, and define the local limits within which they shall exercise their powers under this Act.

(2) Subject to any rules made in this behalf, an inspector may, within the local limits of his jurisdiction, enter, at all reasonable times, with such assistance as he considers necessary, any premises or place for the purpose of,—

(a) examining and testing any latrine, open drain or pit or for conducting an inspection of any premises or place, where he has reason to believe that an offence under this Act has been or is being or is about to be committed, and to prevent employment of any person as manual scavenger;

(b) examine any person whom he finds in such premises or place and who, he has reasonable cause to believe, is employed as a manual scavenger therein, or is otherwise in a position to furnish information about compliance or non-compliance with the provisions of this Act and the rules made thereunder;

(c) require any person whom he finds on such premises, to give information which is in his power to give, with respect to the names and addresses of persons employed on such premises as manual scavenger and of the persons or agency or contractor employing or engaging them;

(d) seize or take copies of such registers, record of wages or notices or portions thereof as he may consider relevant in respect of an offence under this Act which he has reason to believe has been committed by the principal employer or agency; and

(e) exercise such other powers as may be prescribed.

(3) Any person required to produce any document or thing or to give any information required by an inspector under sub-section (2) shall be deemed to be legally bound to do so within the meaning of section 175 and section 176 of the Indian Penal Code.

45 of 1860.

(4) The provisions of the Code of Criminal Procedure, 1973, shall, so far as may be, apply to any such search or seizure under sub-section (2) as they apply to such search or seizure made under the authority of a warrant issued under section 94 of the said Code.

2 of 1974.

## CHAPTER VI

### PROCEDURE FOR TRIAL

Offences to be tried by Executive Magistrate.

**21.** (1) The State Government may confer, on an Executive Magistrate, the powers of a Judicial Magistrate of the first class for the trial of offences under this Act; and, on such conferment of powers, the Executive Magistrate, on whom the powers are so conferred, shall be deemed, for the purposes of the Code of Criminal Procedure, 1973, to be a Judicial Magistrate of the first class.

2 of 1974.

(2) An offence under this Act may be tried summarily.

Offence to be cognizable and non-bailable.

**22.** Notwithstanding anything contained in the Code of Criminal Procedure, 1973, every offence under this Act shall be cognizable and non-bailable.

2 of 1974.

**23.** (1) Where an offence under this Act has been committed by a company, every person who, at the time the offence was committed, was in charge of, and was responsible to, the company for the conduct of the business of the company, as well as the company, shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly.

Offences by companies.

(2) Notwithstanding anything contained in sub-section (1), where any offence under this Act has been committed by a company and it is proved that offence has been committed with the consent or connivance of, or is attributable to, any neglect on the part of, any director, manager, secretary or other officer of the company, such director, manager, secretary or other officer shall be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly.

*Explanation.*—For the purposes of this section,—

(a) “company” means any body corporate and includes a firm or other association of individuals; and

(b) “director” in relation to a firm, means a partner in the firm.

## CHAPTER VII

### VIGILANCE COMMITTEES

**24.** (1) Every State Government shall, by notification, constitute a Vigilance Committee for each district and each Sub-Division.

Vigilance Committees.

(2) Each Vigilance Committee constituted for a district shall consist of the following members, namely:—

(a) the District Magistrate—Chairperson, *ex officio*;

(b) all members of the State Legislature belonging to the Scheduled Castes elected from the district—members:

Provided that if a district has no member of the State Legislature belonging to the Scheduled Castes, the State Government may nominate such number of other members of the State Legislature from the district, not exceeding two, as it may deem appropriate.

(c) the district Superintendent of Police— member, *ex officio*;

(d) the Chief Executive Officer of,—

(i) the Panchayat at the district level—member, *ex officio*;

(ii) the Municipality of the district headquarters—member, *ex officio*;

(iii) any other Municipal Corporation constituted in the district—member, *ex officio*;

(iv) Cantonment Board, if any, situated in the district—member, *ex officio*;

(e) one representative be nominated by the railway authority located in the district;

(f) not more than four social workers belonging to organisation working for the prohibition of manual scavenging and rehabilitation of manual scavengers, or, representing the scavenger community, resident in the district, to be nominated by the District Magistrate, two of whom shall be women;

(g) one person to represent the financial and credit institutions in the district, to be nominated by the District Magistrate;

(h) the district-level officer in-charge of the Scheduled Castes Welfare—Member-Secretary, *ex officio*;

(i) district-level officers of Departments and agencies who, in the opinion of the District Magistrate, subject to general orders, if any, of the State Government, have a significant role to play in the implementation of this Act.

(3) Each Vigilance Committee, constituted for a Sub-Division, shall consist of the following members, namely:—

(a) the Sub-Divisional Magistrate—Chairperson, *ex officio*;

(b) the Chairpersons and the Chief Executive Officers of Panchayats at intermediate level of the Sub-Division, and where Panchayats at intermediate level, do not exist, Chairpersons from two Panchayats at Village level to be nominated by the Sub-Divisional Magistrate—member, *ex officio*;

(c) the Sub-Divisional Officer of Police—member, *ex officio*;

(d) Chief Executive Officer of—

(i) the Municipality of the Sub-Divisional headquarters—member, *ex officio*; and

(ii) Cantonment Board, if any, situated in the Sub-Division—member, *ex officio*;

(e) one representative to be nominated by the railway authority located in the Sub-Division—member, *ex officio*;

(f) two social workers belonging to the organisation working for the prohibition of manual scavenging and rehabilitation of the manual scavengers, or representing the scavenger community resident in the Sub-Division, to be nominated by the District Magistrate, one of whom shall be a woman;

(g) one person to represent the financial and credit institutions in the Sub-Division, to be nominated by the Sub-Divisional Magistrate;

(h) the Sub-Divisional level officer in-charge of Scheduled Castes welfare—Member-Secretary, *ex officio*;

(i) Sub-Divisional level officers of Department and agencies who in the opinion of the Sub-Divisional Magistrate, subject to any general orders of the State Government or the District Magistrate, have a significant role to play in the implementation of this Act—member, *ex officio*.

(4) Each Vigilance Committee constituted at district and Sub-Divisional level shall meet at least once in every three months.

(5) No proceeding of a Vigilance Committees shall be invalid merely by reason of any defect in its constitution.

Functions of  
Vigilance  
Committee.

**25.** The functions of Vigilance Committee shall be—

(a) to advise the District Magistrate or, as the case may be, the Sub-Divisional Magistrate, on the action which needs to be taken, to ensure that the provisions of this Act or of any rule made thereunder are properly implemented;

(b) to oversee the economic and social rehabilitation of manual scavengers;

(c) to co-ordinate the functions of all concerned agencies with a view to channelise adequate credit for the rehabilitation of manual scavengers;

(d) to monitor the registration of offences under this Act and their investigation and prosecution.

**26.** (1) Every State Government shall, by notification, constitute a State Monitoring Committee, consisting of the following members, namely:—

State  
Monitoring  
Committee.

(a) the Chief Minister of State or a Minister nominated by him—Chairperson, *ex officio*;

(b) the Minister-in-charge of the Scheduled Castes Welfare, and such other Department, as the State Government may notify;

(c) Chairperson of the State Commissions for Safai Karamcharis, and Scheduled Castes, if any— member, *ex officio*;

(d) representatives of the National Commission for Scheduled Castes, and Safai Karamcharis—member, *ex officio*;

(e) not less than two members of the State Legislature belonging to the Scheduled Castes, nominated by the State Government:

Provided that if any State Legislature has no member belonging to the Scheduled Castes, the State Government may nominate the members belonging to the Scheduled Tribes;

(f) the Director-General of Police— member, *ex officio*;

(g) Secretaries to the State Government in the Departments of Home, Panchayati Raj, Urban Local Bodies, and such other Departments, as the State Government may notify;

(h) Chief Executive Officer of at least one Municipal Corporation, Panchayat at the district-level, Cantonment Board and railway authority as the State Government may notify;

(i) not more than four social workers belonging to organisation working for the prohibition of manual scavenging and rehabilitation of manual scavengers, or, representing the scavenger community, resident in the State, to be nominated by the State Government, two of whom shall be women;

(j) State-level head of the convener Bank of the State Level Bankers' Committee— member, *ex officio*;

(k) Secretary of the Department of the State Government dealing with development of the Scheduled Castes—Member-Secretary, *ex officio*;

(l) such other representative of Departments of the State Government and such other agencies which, in the opinion of the State Government, are concerned with the implementation of this Act.

(2) The State Monitoring Committee shall meet at least once in every six months and shall observe such rules of procedure in regard to the transaction of business at its meetings as may be prescribed.

**27.** The functions of the State Monitoring Committee shall be—

Functions of  
the State  
Monitoring  
Committee.

(a) to monitor and advise the State Government and local authorities for effective implementation of this Act;

(b) to co-ordinate the functions of all concerned agencies;

(c) to look into any other matter incidental thereto or connected therewith for implementation of this Act.

**28.** Every State or Union territory Government and Union territory administration shall send such periodic reports to the Central Government about progress of implementation of this Act, as the Central Government may require.

Duty of  
States or  
Union  
territories to  
send periodic  
reports to the  
Central  
Government.

**29.** (1) The Central Government shall, by notification, constitute a Central Monitoring Committee in accordance with the provisions of this section.

Central  
Monitoring  
Committee.

(2) The Central Monitoring Committee shall consist of the following members, namely:—

(a) The Union Minister for Social Justice and Empowerment—Chairperson, *ex officio*;

(b) Chairperson of the National Commission for Scheduled Castes—member, *ex officio*;

(c) Minister of State in the Ministry of Social Justice and Empowerment—member, *ex officio*;

(d) Chairperson, National Commission for Safai Karamcharis— member, *ex officio*;

(e) the Member of the Planning Commission dealing with development of the Scheduled Castes—member, *ex officio*;

(f) three elected members of Parliament belonging to Scheduled Castes, two from the Lok Sabha and one from the Rajya Sabha;

(g) Secretaries of the Ministries of,—

(i) Social Justice and Empowerment, Department of Social Justice and Empowerment;

(ii) Urban Development;

(iii) Housing and Urban Poverty Alleviation;

(iv) Drinking Water and Sanitation;

(v) Panchayati Raj;

(vi) Finance, Department of Financial Services; and

(vii) Defence,

members, *ex officio*;

(h) Chairman, Railway Board—member, *ex officio*;

(i) Director-General, Defence Estates— member, *ex officio*;

(j) representatives of not less than six State Governments and one Union territory, as the Central Government may, notify;

(k) not more than six social workers belonging to organisation working for the prohibition of manual scavenging and rehabilitation of manual scavengers, or, representing the scavenger community, resident in the country, to be nominated by the Chairperson, two of whom shall be women;

(l) Joint Secretary, Department of Social Justice and Empowerment in the Ministry of Social Justice and Empowerment, looking after development of Scheduled Castes—Member-Secretary, *ex officio*;

(m) such other representatives of Central Ministries or Departments and agencies which, in the opinion of the Chairperson, are concerned with the implementation of this Act.

(3) The Central Monitoring Committee shall meet at least once in every six months.

**30.** The functions of the Central Monitoring Committee shall be,—

(a) to monitor and advise the Central Government and State Government for effective implementation of this Act and related laws and programmes;

(b) to co-ordinate the functions of all concerned agencies;

(c) to look into any other matter incidental to or connected with implementation of this Act.



**31.** (1) The National Commission for Safai Karamcharis shall perform the following functions, namely:—

(a) to monitor the implementation of this Act;

(b) to enquire into complaints regarding contravention of the provisions of this Act, and to convey its findings to the concerned authorities with recommendations requiring further action; and

(c) to advise the Central and the State Governments for effective implementation of the provisions of this Act.

(d) to take *suo motu* notice of matter relating to non-implementation of this Act.

(2) In the discharge of its functions under sub-section (1), the National Commission shall have the power to call for information with respect to any matter specified in that sub-section from any Government or local or other authority.

**32.** (1) The State Government may, by notification, designate a State Commission for Safai Karamcharis or a State Commission for the Scheduled Castes or such other statutory or other authority, as it deems fit, to perform, within the State, *mutatis mutandis*, the functions specified in sub-section (1) of section 31.

(2) An authority designated under sub-section (1) shall, within the State, have, *mutatis mutandis*, the powers of the National Commission for Safai Karamcharis as specified in sub-section (2) of section 31.

Functions of National Commission for Safai Karamcharis.

Power of State Government to designate an appropriate authority to monitor the implementation of this Act.

## CHAPTER VIII

### MISCELLANEOUS

**33.** (1) It shall be the duty of every local authority and other agency to use appropriate technological appliances for cleaning of sewers, septic tanks and other spaces within their control with a view to eliminating the need for the manual handling of excreta in the process of their cleaning.

(2) It shall be the duty of the appropriate Government to promote, through financial assistance, incentives and otherwise, the use of modern technology, as mentioned in sub-section (1).

Duty of local authorities and other agencies to use modern technology for cleaning of sewers, etc.

**34.** No suit, prosecution or other legal proceeding shall lie against an appropriate Government or any officer of the appropriate Government or any member of the Committee for anything which is in good faith done or intended to be done under this Act.

Protection of action taken in good faith.

**35.** No civil court shall have jurisdiction in respect of any matter to which any provision of this Act applies and no injunction shall be granted by any civil court in respect of anything, which is done or intended to be done, by or under this Act.

Jurisdiction of civil courts barred.

**36.** (1) The appropriate Government shall, by notification, make rules for carrying out the provisions of this Act, within a period not exceeding three months from the date of commencement of this Act.

Power of appropriate Government to make rules.

(2) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:—

(a) the obligation of an employer, under clause (d) of sub-section (1) of section 2;

(b) the manner in which the excreta fully decomposes under clauses (e) and (g) of sub-section (1) of section 2;

(c) the manner of carrying out survey of insanitary latrine and publishing list thereof under clause (a) of sub-section (1) of section 4;

(d) procedure of giving notice and recovering cost of demolition of an insanitary latrine under sub-section (3) of section 5;

(e) content and methodology of the survey under sub-section (2) of section 11;

(f) the eligibility conditions for identification of manual scavengers and publication of provisional list of persons found to be working as manual scavengers under sub-section (4) of section 11;

(g) publication of final list of persons found to be working as manual scavengers under sub-section (6) of section 11;

(h) manner of application to be made to the Chief Executive Officer of the municipality, or to an officer authorised by him in this behalf, under sub-section (1) of section 12 or, as the case may be, sub-section (1) of section 15;

(i) provision of initial, one time, cash assistance under sub-clause (ii) of clause (a) of sub-section (1) of section 13;

(j) such other powers of Inspectors under clause (e) of sub-section (2) of section 20; and

(k) any other matter which is required to be, or may be, prescribed.

(3) Every rule made under this Act by the Central Government shall be laid, as soon as may be after it is made, before each House of Parliament, while it is in session, for a total period of thirty days which may be comprised in one session or in two or more successive sessions, and if, before the expiry of the session immediately following the session or the successive sessions aforesaid, both Houses agree in making any modification in the rule or both Houses agree that the rule should not be made, the rule shall thereafter have effect only in such modified form or be of no effect, as the case may be; so, however, that any such modification or annulment shall be without prejudice to the validity of anything previously done under that rule.

(4) Every rule made under this Act by the State Government shall, as soon as may be after it is made, be laid before each House of State Legislature, where there are two Houses and where there is one House of State Legislature, before that House.

Power of Central Government to make model rules.

**37.** (1) Notwithstanding anything contained in section 36 of this Act:—

(a) the Central Government shall, by notification, publish model rules for the guidance and use of State Governments; and

(b) in case the State Government fails to notify the rules under section 36 of this Act within the period of three months specified therein, then the model rules as notified by the Central Government shall be deemed to have come into effect, *mutatis mutandis*, in such State, till such time as the State Government notifies its rules.

(2) The model rules made by the Central Government under this Act shall be laid, as soon as may be after they are made, before each House of Parliament while it is in session, for a total period of thirty days which may be comprised in one session or in two or more successive sessions, and if, before the expiry of the session immediately following the session or the successive sessions aforesaid, both Houses make any modification in the rule, the rule shall thereafter have effect only in such modified form; so, however, that any such modification shall be without prejudice to the validity of anything previously done under that rule.

Power to remove difficulties.

**38.** (1) If any difficulty arises in giving effect to the provisions of this Act, the Central Government may, by order published in the Official Gazette, make such provisions, not inconsistent with the provisions of this Act, as may appear to it to be necessary or expedient for the removal of the difficulty:

Provided that no such order shall be made in relation to a State after the expiration of three years from the commencement of this Act in that State.

(2) Every order made under this section shall, as soon as may be after it is made, be laid before each House of Parliament.

**39.** (1) The appropriate Government may, by a general or special order published in the Official Gazette, for reasons to be recorded, and subject to such conditions as it may impose, exempt any area, category of buildings or class of persons from any provisions of this Act or from any specified requirement contained in this Act or any rule, order, notification, bye-laws or scheme made thereunder or dispense with the observance of any such requirement in a class or classes of cases, for a period not exceeding six months at a time.

Power to  
exempt.

(2) Every general or special order made under this section shall be laid, as soon as may be after it is made, before each House of Parliament or each House of State Legislature, where there are two Houses and where there is one House of State Legislature, before that House.

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P.K. MALHOTRA,  
*Secy. to the Govt. of India.*

**APPENDIX C.2.2 THE GOA SEWERAGE SYSTEM AND SANITATION SERVICES MANAGEMENT ACT, 2008 & RULES, 2010**

**The Goa Sewerage System and Sanitation Services Management Act, 2008**

The Goa Sewerage System and Sanitation Services Management Act, 2008 (Goa Act 14 of 2009) [25-06-2009] published in the Official Gazette, Series I No. 14 (Extraordinary) dated 2-07-2009.

The Goa Sewerage System and Sanitation Services Management Rules, 2010 published in the Official Gazette, Series I No. 26 dated 23-09-2010.

1	Short title, extent and commencement
2	Definitions
3	Management of sewerage system and sanitation services
4	Prohibition of nuisance
5	Exemptions
6	Taking over sewerage systems and sanitation facilities developed by other
7	Dispute Redressal Authority
8	Appeal
9	Offences and Penalties
10	Act to have effect in addition to other Acts
11	Protection of action taken in good faith
12	Power to make rules

GOVERNMENT OF GOA  
Department of Law & Judiciary  
Legal Affairs Division

—  
Notification  
7/29/2008-LA

The Goa Sewerage System and Sanitation Services Management Act, 2008 (Goa Act 14 of 2009), which has been passed by the Legislative Assembly of Goa on 27-8-2008 and assented to by the Governor of Goa on 25-06-2009, is hereby published for general information of the public.

*D. S. Raut Dessai*, Under Secretary (Legislative Affairs).  
Porvorim, 2nd July, 2009.

**The Goa Sewerage System and Sanitation Services Management Act, 2008**

(Goa Act 14 of 2009) [25-06-2009]

AN

ACT

*to make provision for management of sewerage system and sanitation services in the State of Goa and for matters connected and incidental thereto.*

Be it enacted by the Legislative Assembly of Goa in the Fifty ninth Year of the Republic of India, as follows:-

**1. Short title, extent and commencement**

1. This Act may be called the Goa Sewerage System and Sanitation Services Management Act, 2008.
2. It shall extend to the whole of the State of Goa.
3. It shall come into force on such date as the Government may, by notification in the Official Gazette, appoint.

**2. Definitions — In this Act, unless the context otherwise requires:**

- a. “consumer” means an individual, firm, company, society, Corporation or an association, who/ which has obtained piped water connection from the PWD, or has his own arrangements for potable and non-potable water for domestic, commercial or industrial purposes resulting in generation of sewage or waste water and includes all those who generate sewage or waste water even without having any such arrangement for potable or non-potable water;
- b. “dispute” means the dispute or difference arising out of any order, decision or documents issued or taken under this Act or the rules framed thereunder;
- c. “Dispute Redressal Authority” means an authority constituted under Section 7 of this Act;
- d. “Government” means the Government of Goa;
- e. “management” means administration, control, designing, planning, execution, implementation, operation and maintenance of sewerage system and sanitation services.
- f. “notification” means a notification published in the Official Gazette of the Government.
- g. “nuisance” means anything injurious or obnoxious to the community or to any individual and includes sewage or waste water or filth accumulation which in the opinion of the Executive Engineer of the PWD/Health Officer or any other authority authorized in this behalf, breed or likely to breed mosquitoes or otherwise injurious to health or property unless treated or disposed of effectively to prevent such accumulation;
- h. “Official Gazette” means the Official Gazette of the Government;

- i. “prescribed” means prescribed by rules made under this Act;
- j. “public sewer” means a pipe or underground conduit or such other device meant to carry untreated sewage and contaminated or polluted water generated from the existing building or construction site, existing in or under the adjoining street, lane or any kind of road or pathway and forming component of the sewerage system controlled by the PWD;
- k. “PWD” means Public Works Department of the Government;
- l. “sanitation services” means developing, operating and maintaining the facilities like pour flush water seal latrines, public toilets for educational institutions, community health centers, contaminated or polluted water treatment and safe disposal systems and other such facilities resulting out of programs in public health and sanitation sector implemented by the PWD for the State or any other authority authorized in this behalf;
- m. “sewage” means night-soil and other contents of water closets, latrines, urinals, cess-pools, drains and polluted water from sinks, bathrooms, stables, cattle-sheds, discharges of filth, trade effluents, industrial effluents of specified standards from any kind of building as well as from public conveyances, markets, public places, religious places and educational institutions;
- n. “sewerage system” means the system developed and constructed for facilitating collection, conveyance, pumping, if so warranted, of sewage and includes facilities of the treatment of sewage as per the standards specified by the Goa State Pollution Control Board and safe disposal of treated effluents and non-harmful sludge on land, water bodies or non-potable use, all under control of the PWD;
- o. “State” means the State of Goa;
- p. “Technical Committee” means a committee appointed by the Government consisting of prescribed officers entrusted with the functions as prescribed for the purposes of the Act.

### **3. Management of sewerage system and sanitation services**

1. On and from the date of coming into force of this Act, sewerage systems and sanitation services for the consumers in the State shall be managed and controlled by the PWD, whenever and wherever such facilities are operational and developed by the PWD in accordance with the provisions of this Act and rules framed thereunder.
2. Except as otherwise provided by the rules made in this behalf, any consumer intending to avail the facility of sewerage system or use of sanitation services managed by the PWD, shall make an application in writing to prescribed authority for grant of authorization or permission in such for along with such documents and a fee as prescribed.
3. On receipt of application under sub-section (2), the prescribed authority may subject to provisions of the Act, make such inquiry as it deems fit and if it is satisfied that the consumer is possessing necessary infrastructure to avail the facilities in accordance with the rules,—

- grant the permission unconditionally; or
  - grant the permission subject to such general or special conditions as it may impose; or
  - refuse the permission for reasons to be recorded in writing, after giving a reasonable opportunity of being heard to the applicant.
4. Every application for grant of permission shall be disposed of by the prescribed authority within a period of 90 days from the date of receipt of the application.
  5. The prescribed authority may cancel or suspend the permission, as the case may be, for reasons to be recorded in writing if the consumer has failed to comply with any provision of the Act or rules or condition of permission granted thereof:

Provided that no permission shall be cancelled or suspended without giving a reasonable opportunity to the consumer of being heard.

#### **4. Prohibition of nuisance**

1. On and from the date of enforcement of this Act, no person shall cause any nuisance injurious to health or property.
2. Every person shall avail the facility of sewerage system and sanitation services, wherever feasible, in order to prevent nuisance.

#### **5. Exemptions**

wherever, in the opinion of the Government reasonable grounds exist in doing so, the Government may, by notification and subject to such conditions and restrictions as may be specified, exempt any category of consumers from all or any of the provisions of this Act or the rules made thereunder, either throughout the State or for any specified period or occasion, with the advice of the Technical Committee.

#### **6. Taking over sewerage systems and sanitation facilities developed by other**

The PWD, may subject to prior approval of the Government and the Technical Committee, take-over, the sewerage and sanitation facilities developed by municipal councils, corporations, panchayats, autonomous bodies, industrial estates, Government undertakings, private developers or charitable institutions etc., constructive and overall development of sewerage system and sanitation services in the State and its management.

#### **7. Dispute Redressal Authority**

1. The Government may, by notification in the Official Gazette, appoint such member of Dispute Redressal Authorities as may be required for redressal of the disputes.
2. The Dispute Redressal Authority shall comprise three members including a Chairman, each of them shall have knowledge and experience in one or more fields of engineering, medical, health, environment, sanitation, administration, law, finance keeping in view the nature of dispute.

3. The Dispute Redressal Authority shall pass orders after giving a reasonable opportunity of being heard to the parties to the dispute.

## **8. Appeal**

1. Any person aggrieved by an order passed by the Dispute Redressal Authority or the prescribed authority may file an appeal in the prescribed manner to the Appellate Authority to be appointed by the Government, under this Act.
2. The Appellate Authority shall pass orders after giving a reasonable opportunity of being heard to the parties to the appeal.
3. The Order of the Appellate Authority shall be final and binding on the parties.

## **9. Offences and Penalties. —Any person, who has, —**

- a. made a connection to sewerage system without any approval of PWD.
- b. allowed discharge of the characteristics of sewage or polluted water other than those specified by the Government by rules, by any means whatsoever, into the sewerage system managed by the PWD.
- c. caused disruption to sewerage system or sanitation service giving rise to nuisance or likely to cause nuisance.
- d. committed nuisance or abetted commission of nuisance shall be deemed to have committed an offence under this Act and be punished with a fine which may extend up to rupees fifty thousand along with the actual cost of restoration of sewerage system or sanitation service, as the case may be, as determined by the Technical Committee.

## **10. Act to have effect in addition to other Acts**

The provision of this Act shall be in addition to, and not in derogation of the provisions of any other law for the time being in force.

## **11. Protection of action taken in good faith**

No suit, prosecution or other legal proceedings shall lie against the Government, the prescribed authority, the Dispute Redressal Authority, the Appellate Authority, or any other officer or servant in the employment of Government for anything which is in good faith done or intended to be done in pursuance of this Act or any rule or order made thereunder.

## **12. Power to make rules**

1. The Government may, by notification in the Official Gazette, make rules to carry out the provisions of this Act.
2. In particular and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters namely: —



3. The categories of consumers who could avail different types of services under this Act;
  4. Fees, tariffs, service connection charges and any other applicable charges, penalty and fines for non-payment thereof for different categories of consumers;
  5. Form of application to be made under sub-section (2) of section 3, form of affidavits, undertaking, no objection certificates or other documents, if any to be accompanied with application, form of agreement to be made with PWD for use of sewerage system or to avail sanitation services under this Act;
  6. The methods for payment of bills including billing cycles and period for payment and grace period, if any, recovery of arrears, grant of concessions for any charges or effecting the payments in particular manner;
  7. Procedure to be followed by Dispute Redressal Authority for redressal of disputes;
  8. Technical parameters for building sewerage system and characteristics of sewage or polluted water that can enter the sewerage system;
  9. Composition of technical Committee and allocation of specific functions to it for the purposes of this Act;
  10. Manner of making an appeal against the order passed by the Dispute Redressal Authority or prescribed authority, as specified in section 8;
  11. Restricting the entry of sewage, trade effluent, polluted water and other such liquid or solid waste in public sewer;
  12. Any other matter which is required to be provided by rules by the Government.
3. Every rule made by the Government under this section shall be laid as soon as may be after it is made, before the State Legislature.

Secretariat,  
Porvorim-Goa. Dated: 02-07-2009.

V. P. SHETYE,  
Secretary to the Government of Goa,  
Law Department (Legal Affairs).

**Department of Public Works**  
Office of the Principal Chief Engineer

—  
**Notification**

1-05/PCE-PWD-EO/10-11/102

In exercise of the powers conferred by section 12 of the Goa Sewerage System and Sanitation Services Management Act, 2008 (Goa Act 14 of 2009), the Government of Goa hereby makes the following rules, namely: —

**1. Short title and commencement**

1. These rules may be called the Goa Sewerage System and Sanitation Services Management Rules, 2010.
2. They shall come into force on such date as the Government may, by notification in the Official Gazette, appoint.

**2. Definitions — In these rules, unless the context otherwise requires,**

- a. 'Act' means the Goa Sewerage System and Sanitation Services Management Act, 2008 (Goa Act 14 of 2009);
- b. 'building sewerage' shall mean the system of pipes, channels, conduits, chambers, gully traps and manholes conveying wastewater from the building to the nearest inspection chamber or manhole on public sewer;
- c. 'person' shall include consumer, occupier and owner;
- d. 'public places' shall include bus stands, railway stations, markets, hospitals, clinics, health institutions, educational institutions, libraries, court buildings, recreational and sports complexes, places of worship, religious institutions, dairies, slaughter houses, dhobi-ghats, hotels, theatres, auditoria, concert halls, public offices where the general public have free access, eating places;
- e. 'section' means section of the Act;
- f. 'wastewater' shall include sewage, liquid or liquefied discharges from public places, leaches and commercial or trade effluents from shops and buildings.

Words and expressions used herein, but not defined shall have the same meaning as assigned to them in the Act.

**3. Procedure for availing facility of sewerage system, form of application etc.**

1. Every person intending to avail the facility of sewerage system or use of sanitation services managed by PWD, shall make an application in Form I hereto to the concerned Assistant Engineer with the following documents and fee as specified in rule 5 hereto,

- a. Location sketch with landmarks in the vicinity of applicant's premises.
- b. Site plan showing boundaries, layout of building sewerage showing relative levels of manholes and locations, plumbing lines supplying drinking water, also indicating any other source of water in the premises, duly certified by the plumber holding valid registered license issued by PWD.
- c. Documents concerning ownership e.g. sale deed, order of tenancy/mundcar, etc.
- d. Occupation certificate.
- e. Document asking to avail sewerage connection issued by the Municipality or Panchayat.
- f. Affidavit and undertaking in Forms III and IV, respectively, hereto.

Nearest consumer's details regarding water supply, sewerage connection, electricity supply, telephone connection and certified copy of latest bill paid by him.

2. After verifying the documents and making inquiry regarding feasibility of providing the sewerage connection at site, the Assistant Engineer may advise the applicant regarding modifications required in the sewerage and plumbing lines of the building. He shall ask the applicant to pay the security deposit and then release the connection after compliance of his advice and on signing the agreement in Form II hereto.
3. Every application received under sub-rule (1) shall be disposed by the concerned Assistant Engineer as per provisions of sub-sections (3) and (4) of section 3 of the Act.

#### **4. Categories of Consumers**

Categories of Consumers who could avail the services under the Act shall be as specified below:

##### **1. Domestic Category:**

- i. Consumers having treated piped water supply connection lawfully obtained from water supply systems controlled by PWD; and
- ii. Consumers having their own arrangements, partly or fully, for potable water or otherwise, resulting into the generation of wastewater/sewage.

##### **2. Commercial Category:**

- i. Consumers having treated piped water supply connection for commercial use lawfully obtained from water supply systems controlled by PWD; and
- ii. Consumer availing water supplied by PWD or other person through a tanker to make up their demand for commercial use or otherwise, resulting into generation of wastewater/sewage.

##### **3. Industrial Category:**

Small industrial establishments engaged in fabrication, manufacture, or process industry having any kind of water supply arrangement, permanent or otherwise, which results into generation of wastewater / sewage.

#### 4. Public Places:

Public places generating wastewater/sewage.

### 5. Sewerage Charges

All consumers generating wastewater/sewage and are availing facility of having connection to sewerage and sanitation system developed by the Government shall pay the following charges:

#### i. Domestic Category:

Rupee 1/- (Rupee one only) per cubic meter of wastewater/sewage generated.

Quantity of wastewater/sewage generated shall be computed @ 100 lpcd or 80% of water consumed as measured through water meter and other sources as well, whichever is higher.

#### ii. Commercial Category:

Rupees 5/- (Rupees five only) per cubic meter of wastewater/sewage generated.

#### iii. Industrial Category:

Rupees 5/- (Rupees five only) per cubic meter of wastewater/sewage generated.

#### iv. Public Places:

Rupees 3/- (Rupees three only) per cubic meter of wastewater/sewage generated.

1. In cases of category (ii), (iii) and (iv) above, quantity of wastewater/sewage generated shall be computed as 80% of water consumed through the water meter, tanker water supplied from PWD and or any other source including own source of any kind of water all taken together making up the demand as declared by the consumer. The Executive Engineer shall examine and assess the wastewater/sewage generation as and when felt necessary by him and his decision as to the quantum of wastewater/sewage generation shall be final and binding on the consumer.

In case of variation in the quantum of generation of wastewater/sewage is likely to last for more than three months, the consumer shall intimate the same to the concerned Executive Engineer.

2. The consumer who is already having connection for sewerage system and sanitary services developed by the Government shall be liable to pay the aforesaid charges on expiry of 180 days from the date of coming into force of these rules.

### 6. Connection Charges

The following connection charges shall be paid by a person while availing connection to sewerage system developed by P.W.D.

#### a. Domestic Category:

- i. Rs. 200/- per connection upto 150 mm dia.

- ii. Rs. 350/- per connection above 150 mm dia.
  - iii. Rs. 100/- per flat/house if in-group joining with one connection.
- b. Commercial Category:
- i. Rs. 500/- per connection upto 150 mm dia.
  - ii. Rs. 750/- per connection above 150 mm dia.
  - iii. Rs. 250/- per consumer if in-group joining with one connection.
- c. Industrial Category:
- i. Rs. 1000/- per connection upto 150 mm dia.
  - ii. Rs. 2000/- per connection above 150 mm dia.
  - iii. Rs. 500/- per industry if in-group joining with one connection.
- d. Public Places:
- i. Rs. 1000/- per connection upto 150 mm dia.
  - ii. Rs. 2000/- per connection above 150 mm dia.

## **7. Delayed payment charges, penalties and fine**

1. The delayed payment charges @ 2% of billed amount shall become due and payable if bill amount is not paid within the due date. Delayed payment charges shall be rounded off to next higher rupee.
2. The water supply connection shall be liable for disconnection without notice if three consecutive bills remain unpaid.
3. The re-connection of water supply will be effected only on payment of entire outstanding bill with 10% fine over and above the delayed payment charges as well as sewerage charges on receiving specific application for re-connection with proof of payment. The concerned Executive Engineer shall approve the re-connection.

## **8. Inspection Charges**

In case any party is affected by any act or omission by the consumer availing the services under the Act or these rules, he shall approach to the Executive Engineer for inspection of the sewerage system of the building of said consumer, on payment of Rs. 500/- (Rupees five hundred) for domestic category and Rs. 1000/- (Rupees one thousand) for other categories. The charges are not refundable.

## 9. Security Deposits.

The security deposit payable at the time of taking connection to the sewerage system shall be as under:

- i. Domestic category: Rs. 500/-
- ii. Commercial category: Rs. 1000/-
- iii. Industrial category: Rs. 3000/-
- iv. Public places: Rs. 1000/-.

## 10. Inspection of sewerage system, etc.

1. The Chief Engineer may cause inspection of building, construction site or public place, and take up additional sewerage network if the public sewer is not available for effective conveyance of wastewater/sewage from such building, construction site or public place, within a distance of 30 metres from boundary of such building, construction site or are public place, so as to facilitate better wastewater/sewage management to improve sanitation and public health standards, in any part of the State.
2. The Chief Engineer may cause inspection of building sewerage, wastewater/sewerage systems of public places causing nuisance and pollution posing threat to sanitation and public health and order for rectification of defects and disconnect if so warranted. Sewerage connection and/or water supply connection from the sewerage system and/or water supply distribution network respectively, until such time the nuisance or pollution is removed by the consumer at his cost to the satisfaction of the Chief Engineer.
3. The Chief Engineer, on receiving special or general order from the Director of Health Services or any other authority in pursuance of any Acts or rules framed there under, suggesting measures necessary for improving public health administration and sanitation facilities shall to undertake the works related to such measures as soon as possible.
4. In the event of any developmental activity is undertaken by the authorities / department or agencies of Government of Goa, Government of India, private developers, Government undertakings, which will affect existing or proposed sewerage system and sanitation services under control of P.W.D. The Chief Engineer should invariably be consulted by the respective authority department or agency before commencement of such developmental activity and the actual cost involved in restoring, repairing or reconstruction of sewerage and sanitation services affected shall be borne by the concerned authority/department or agency as determined by the Chief Engineer. The funds to cover the cost restoration should be deposited with the Chief Engineer before commencement of the work.
5. If, in the opinion of the Executive Engineer, any premises is without effective sewerage system, or its sewerage system is not functioning or malfunctioning, causing overflow or stagnation of sewage or wastewater resulting into nuisance or health hazard and also if the septic tanks are not maintained scientifically causing non--absorption of effluent from soak pits and

further if public sewer is very much available within the distance of 30 meters from external boundary of the premises, he may by notice direct the owner, occupier, consumer or the in-charge person of public place, as the case may be, to construct suitable sewerage system leading the wastewater/sewage to the public sewer system effectively and avail the sewerage connection and related services within the time limit mentioned in the notice. As soon as the sewerage facility is made available within 30 meters from the premises, the Executive Engineer shall issue a notice to avail sewerage facility developed by P.W.D. and the owner/occupier shall immediately connect his sewerage system to the sewerage system developed by P.W.D. at his own cost within the period mentioned in the notice, failing which, the essential services like water supply, electricity shall be liable for disconnection at any time after expiry of the period mentioned in the notice.

6. If it is detected by the Executive Engineer concerned, that leakage or damage to the sewerage system of any building, has resulted into contamination of ground water, piped water, or any other source of water being used by the consumer or others the Executive Engineer shall immediately order disconnection of water supply to the said building and order the person responsible to maintain the same, to repair the same, within 24 hours. In the event no steps are taken by the consumer to stop leakage or restore damage caused within 24 hours of its occurrence, the Executive Engineer shall himself take such steps and recover the cost thereof from the persons responsible thereof.
7. If it is detected by or brought to the notice of Executive Engineer that public sewerage system is malfunctioning or choked due to any reasons whatsoever, resulting into nuisance, accumulation of filth, he shall cause to inspect the site immediately and take steps to restore the functioning of sewerage system. He shall recover the cost involved, if in his opinion the cause is attributable to the consumer, by giving suitable notice, to effect the payment within the period specified in the notice.

## **11. Bills and Payments**

1. The bills for the services under the Act may be clubbed with the bills for water supply wherever possible. It will be treated as one bill for all the purposes of payments, recoveries, penalties and fines imposed under the Act.
2. The bill may be issued normally every month in Form V hereto and shall be paid within the due date specified therein failing which it will attract delayed payment charges to be levied and subsequent actions as provided herein above.
3. Bills will be issued as per the billing cycle and the consumers are advised to watch for timely receipt of bill. If the bills are not received within a period of seven days from normal date of issue of bill, the consumer should enquire about it at the local office where the bills are prepared. The Assistant Engineer, on payment of Rs. 5/- (Rupees five) shall issue duplicate bill. The fact that a consumer has not received the bill or received the bill after due date of payment will/shall absolve his liability for payment.
4. The arrears of unpaid bills, penalties, fines, inspection charges, cost of repairs and restoration of sewerage system and any other dues from the consumer shall be recovered as arrears of land

revenue, if payments are not effected by the consumer within the date specified in the notice of demand.

5. The bills may be paid through the authorised financial institutions like banks, as specified by the Chief Engineer.
6. The Assistant Engineer who has issued the bill may correct a bill on getting written complaint or request from the consumer, after verification of records, meters and inspection of site if necessary. The Assistant Engineer shall effect necessary corrections in the bill in respect of clerical or arithmetical errors arising out of wrong meter reading or arrears shown wrongly. The Assistant Engineer shall correct all other kinds of errors in the bill which are attributable to any other reasons including due to faulty meter as found after testing but such error should be reported on receiving first wrong bill, subject to the condition that net financial implications of such bill shall not exceed Rs. 15000/- (Rupees fifteen thousand only).
7. The Executive Engineer shall effect corrections in the bill in the same manner as mentioned above wherein financial implications are not exceeding Rs. 2,00,000/- (Rupees two lakhs only).

## **12. Procedure for Dispute Redressal Authority for Redressal of Disputes**

1. The Dispute Redressal Authority, on receiving the reference of disputes between the parties, shall immediately issue notice to the parties to dispute and instruct them to appear before it in person or through duly authorized representative on a specified date, time and venue.
2. For the purpose of these rules, the Dispute Redressal Authority shall have the same powers as are vested in a civil court under Code of Civil Procedure, 1908 (5 of 1908), in respect of the following matters, namely:
  - i. summarising and enforcing the attendance of any defendant or witness and examining the witness on oath;
  - ii. the discovery and production of any document or other material object producible as evidence;
  - iii. the reception of evidence on affidavits;
  - iv. issuing of any commission for the examination of any witness;
  - v. any other matter which may be specified by the Government.
3. Every dispute shall be heard as expeditiously as possible and endeavour shall be made to decide the same within a period of six months from the date of receipt of notice by opposite party.
4. The Dispute Redressal Authority shall not hear any reference made after expiry of 180 days from arising of dispute.



**13. Appeal.**

1. Every appeal to be filed to the Appellate Authority shall be in the form of Memo of Appeal accompanied by the order against which the appeal is preferred and fee in the form of Court fee stamp of Rs. 100/-. (Rupees one hundred only).
2. The Appellate Authority shall immediately give notice to both parties and instruct them to appear before it, either in person or through duly authorized representative, on a specified date, time and venue.
3. The Appellate Authority shall give full opportunity to the parties to present their case.
4. Every appeal shall be heard as expeditiously as possible and endeavour shall be made to decide the same within a period of six months from the date of receipt of notice by opposite party.

**14. Composition and functions of Technical Committee.**

1. 'Technical Committee' shall consist of following members, namely:
  1. Chief Engineer, P.W.D. in-charge of Sewerage and Sanitation Services — Chairperson
  2. Director of Health Services, Government of Goa — Member
  3. Chairman, Goa State Pollution Control Board — Member
  4. A member who is considered as an expert in the subject in the opinion of the Chairperson — Member
  5. Superintending Surveyor of Works P.W.D. will function as — Member Secretary.

The Technical Committee shall advise the Government on measures to be taken for improvement of sewerage system and sanitation services in the best interests of public. It will also decide the terms and conditions for taking over the sewerage and sanitation facilities developed by other bodies as provided in terms of section 6 of the Act.

**15. Technical parameters and specifications**

1. The sewerage system of building shall join the public sewer at angle not exceeding 60 degrees with reference to alignment of public sewer and in the direction of flow. Any variation will be the exception compelled by the site conditions, which will not give rise to any problems detrimental to the public sewer.
2. The sewerage system of building joining the public sewer shall not include the septic tank and soak pits existing, if any. The alignment of pipes and location of manholes, inspection chambers, gully traps, as well as additions, modifications and specifications thereof, required for the sewerage system of buildings proposed to be joined by sewerage connection shall be all as advised and approved by the Assistant Engineer concerned.

3. The sewer immediately at the upstream of manhole on the public sewer shall not be at a gradient flatter than 1:90 and steeper than 1:15 as far as possible.
4. The Executive Engineer shall decide about the location, specifications and other technical parameters of the manhole or inspection chamber, in the event more than one building sewerage systems are to be joined with one and the same manhole on public sewerage system. This manhole or inspection chamber shall not be constructed in any of the privately owned premises of the parties or consumers concerned. The Executive Engineer shall connect or extend the sewer line to any other premises to facilitate additional connections to the manhole or inspection chamber, so constructed by other consumer. No cost adjustment shall be effected for the previous consumers in such cases.
5. The characteristics of the wastewater/sewage, which can join the sewerage system, shall be as per the Schedule appended to these rules. Relaxation or tightening of these standards for entry of wastewater/sewage into the public sewer shall be as per the advice to the Government by the Technical Committee in respect of specific cases. The Government may approve or reject the recommendations of the Technical Committee for the reasons recorded in writing.
6. Unless otherwise advised by the Technical Committee, the following categories of wastewater/sewage shall not be connected to the public sewer system, notwithstanding the fact that they meet the standards/specifications/characteristics as laid down hereinabove.
  - a. Storm water, surface water, ground water, roof run-off, or sub-surface polluted water.
  - b. Liquid or liquefied wastewater/sewage resulting from all categories of hazardous wastes specified in the Schedule to the Hazardous Waste (Management and Handling) Rules, 1989 and amendments thereof.
  - c. Industrial effluents not treated to the standards laid down by the Goa State Pollution Control Board.
  - d. Bio-medical wastes in liquid or liquefied form and wastewater/sewage resulting out of liquid ash after incineration.
  - e. Leachet or any liquefied discharges from the process on solid waste.
  - f. Any other wastewater/sewage causing disruption or nuisance by virtue of its entry into the public sewer system.

By order and in the name of the Governor of Goa.

*J. J. S. Rego*, Principal Chief Engineer and ex officio Additional Secretary (P.W.D).

Panaji, 17th September, 2010.

SCHEDULE  
[ See rule 15 (5) ]

**Characteristics of wastewater/sewage discharging into the public sewer**

Sr. No.	Parameter	Standard
1	2	3
1	Suspended solids (max) mg/1.	600
2	Dissolved solids (Organic), (max).	2100
3	PH value.	5.5 to 9.0
4	Temperature (max) 0 C.	45 at the point of discharge
5	Oil and grease (max) mg/1.	20
6	Ammonical nitrogen (as N), (max) mg/1.	50
7	Biochemical oxygen demand (5 days at 20o C), (max).	350
8	Arsenic (as As), (max) mg/1.	0.2
9	Mercury (as Hg) (max) mg/1.	0.01
10	Lead (as Pb) (max) mg/1.	0.1
11	Cadmium (as Cd) (max) mg/1.	1.0
12	Hexavalent chromium (as Cr. + 6) (max) mg/1.	2.0
13	Total chromium (as Cr) (max) mg/1.	2.0
14	Copper (as Cu) (max) mg/1.	3.0
15	Zinc (as Zn) (max) mg/1.	15
16	Selenium (as Se) (max) mg/1.	0.05
17	Nickel (as NI) (max) mg/1.	3.0
18	Boron (as B) (max) mg/1.	2.0
19	Per cent sodium (max).	60
20	Cyanide (as CN) (max) mg/1.	2.0
21	Chloride (as Cl) (max) mg/1.	1000
22	Fluoride (as F) (max) mg/1.	15
23	Sulphate (as So4) (max) mg/1.	1000
24	Pesticides	Absent
25	Phenolic compounds (as C6H5OH) (max) mg/1.	5.0
26	Radioactive materials	
	(a) Alpha emitters (max) MC/ml	10-7
	(b) Beta emitters (max) MC/ml.	10-8

Note-1: All efforts should be made to remove colour and unpleasant odour as far as practicable.

Note-2: The standards mentioned above shall apply to all the effluents, discharges, such as, industrial, mining and mineral processing activities, municipal sewage, etc.

Note-3: The relaxation or hardening of these characteristics, for wastewater/sewage to be discharged into public sewer shall be subject to the recommendation of the Technical Committee and approval of the Government.

FORM – I  
[See rule 3(1)]

To,

The Assistant Engineer,  
Sub-Division.....Division.....,  
Public Works Department,  
Panaji/Margao/Vasco-da-Gama.

**Sub.: Requisition for sewerage connection.**

Sir,

I, the undersigned, intend to avail sewerage connection to the sewerage system under control of PWD, for the premises mentioned below. I am furnishing requisite details for availing the sewerage connection.

- i. Name of the applicant.
- ii. Status of the applicant. (Owner/Tenant/Mundcar/Authorized signatory)
- iii. Address for correspondence.
- iv. Address of premises/building to be connected to the sewerage system.
- v. Location/sketch of the premises/building mentioned above.
- vi. Document in support of occupancy.
- vii. Certified copy of occupation certificate issued by local authority.
- viii. Certified copy of latest paid bill in the name of applicant, for water supply/telephone/electricity, etc.
- ix. Certified copy of latest bill paid by nearest consumer of electricity/water supply/telephone, etc.
- x. Number of persons who will be connected with applied sewerage connection.
- xi. Total requirement of water for all purposes for 30 days in Cu. M. (Average of 12 months preceding the month in which application is submitted)
- xii. Sources of water for meeting the requirement mentioned above:
 

a. Metered Water Supply	Cu. M.
b. Own sources like well, tube well, etc	Cu. M.
c. Other sources like tanker water supply	Cu. M.
Total (a) + (b) + (c)	Cu. M.

- xiii. Line sketch of building sewerage and water lines and location of public sewer.
- xiv. Certificate by the plumber registered with P.W.D. who executed plumbing and building sewerage work proposed to be connected with public sewer.

I, undertake to carry out necessary modifications in the building sewerage and plumbing system for water supply, in the premises under my control and possession, at my cost as per your advice, to facilitate sewerage connection. I also undertake to pay requisite charges and security deposit within 10 days from receiving the intimation from you and enter into the agreement with the officer authorised by the Government of Goa as per the provisions of the relevant Act and rules thereunder.

Place:

Date:

Enclosures: As above (... Sheets)

Yours faithfully,

(.....)

**For official purpose**

Date of receiving the application	.....
Date of site inspection and advice to the applicant	.....
Date of submitting documents	.....
Date of intimation to the applicant for effecting payment	.....
Date of signing the agreement by the applicant	.....
Date of sewerage connection effected at site	.....
Category allotted	.....
Total wastewater/sewage joining the public sewer as assessed	.....
Remarks by the Assistant Engineer with date	

---

Reference of intimation to billing authority:

---

Date: Assistant Engineer

Seal

FORM – II  
[See rule 3(2)]  
AGREEMENT

THIS AGREEMENT is made on.....day of .....of the year Two thousand.....between

Shri/Ms.....aged.....year.....

son/wife of.....residing at.....

(hereinafter referred to as 'consumer') which expression shall include his/her heirs, executors, successors, administrators, legal representative and assignees of the ONE PART and Governor of Goa (hereinafter referred to as the "Government") of the OTHER PART;

1. WHEREAS the Government has developed and made operational, the sewerage system in the town of and facility of public sewer is made available;
2. And WHEREAS the consumer has approached the Government with an application dated..... with requisite details with an intention to connect his building sewerage system with the public sewer, and whereas the parties hereto have agreed to the said proposal on the terms and conditions hereinafter contained.
3. Now, therefore, it is hereby agreed by and between the parties hereto as follows:
4. That the Government will control, operate and maintain the sewerage system in the ..... town as per the provisions of the Goa Sewerage System and Sanitation Services Management Act, 2008 (Act 14 of 2009) and rules framed thereunder and that the Consumer is aware, has understood and agreed to be bound by the same.
5. That the Consumer will be entitled to connect his building sewerage to public sewer within ten days after execution of this agreement as well as compliance to the advice of the concerned Assistant Engineer.
6. That the Consumer shall pay to the Government the requisite charges, deposits, penalties and fines as notified from time to time in accordance with the said Act and rules thereunder, and shall also be subjected to the penalties, recoveries of dues and penal actions, if any, as per said Act and rules thereunder.
7. That if the Consumer contravenes any of the provisions of said Act and rules thereunder, he will be subjected to action as per said Act and rules as well as other laws in force.
8. That the officer of P.W.D. shall be entitled to inspect, examine and take action as he deems fit as per the provisions of said Act and rules thereunder.
9. That in the event of any question, disputes or differences arising in connection with the conditions herein contained or touching or concerning the meaning, operation or effect thereof or of any matter contained therein or as to the rights, duties and liabilities of the parties hereto respectively or otherwise howsoever connected with the agreement, the same shall be referred to the person

appointed by the Government for adjudication and decision in accordance with the provisions of the said Act and rules thereunder.

10. That the Consumer shall not cause discharge of any other wastewater/sewage having characteristics other than those specified in the schedule to the Goa Sewerage System and Sanitation Service Management Rules, 2010.

11. That the Consumer shall not act in a manner which will result disruption of sewerage system or cause nuisance or health hazard for him as well as for others in the vicinity of premises.

12. That the Consumer will/shall have any objection if the Government affects extension of sewer line with appurtenances constructed by him at his cost, to facilitate sewerage connection to others in future and that he will not claim any share of cost from the party so benefited.

13. The application dated of the consumer shall be deemed to be part and parcel of this Agreement.

FORM – III  
[See rule 3(1)]  
AFFIDAVIT

I the undersigned.....son/daughter of  
.....aged.....years, Indian national, residing  
at..... do hereby solemnly state and affirm as under:

1. I say that I am an occupant of the premises situated in the property surveyed under survey No. ....of.....
2. I say that I have applied to the Assistant Engineer, P.W.D. for sewage connection vide my application dated. ....
3. I say that the premises to which the connection be made belongs to me/my...../..... and the request of mine for the grant of sewage connection being purely from the angle of hygiene and health, I shall not use the proof of such connection to claim any right, including right of possession, ownership, etc., to the said premises to which connection is sought and the land beneath it.
4. I say that I shall bear all the cost of the connection, etc., and shall not tamper with the Government property once the connection is made.
5. I say that I am making the Affidavit in order to produce it to the Competent Authority for availing sewage connection.

I say that whatsoever has been stated hereinabove is true to the best of my knowledge and belief and that no part of it is false.

Solemnly affirmed at.....on this day of.....2010.

Deponent

FORM- IV  
[See rule 3(1)]  
UNDERTAKING

I, hereby declare that for releasing the sewerage connection to the house/building bearing No..... and standing in the property surveyed under No.....of.....as applied by me vide my application dated ....., the pipeline will not cross any other person's property. The pipeline do cross the property of Shri/Smt. .... and his/her N.O.C. is attached to the application.

.....  
Signature of the Applicant.....

Name: .....

Address: .....

Date:.....

FORM – V  
[See rule 11 (2)]  
Office/Bank/Consumer's Copy  
**GOVERNMENT OF GOA**

Public Works Department (PHE)  
Bill for sewerage and sanitation services  
Works Division  
Sub-Division  
Consumer code  
Consumer category

Bill No  
Bill Date  
Consumer's Name & Address

From Date

Details of consumer

To Date

1. Number of persons in the premises connected to sewerage system

Issue date

2. Wastewater generation @ 100 lpcd  
3. Water requirement as per application

**Disconnection notice**

The water supply connection will be liable for disconnection without notice if three consecutive bills remain unpaid. Water supply will be restored on payment of all dues including arrears, delayed payment charges and reconnection charges as per rules.



**Last Date of Payment**

Total wastewater generated during the billing period:

1. Total water supply availed	
(i) Metered water consumption	Cu. M.
(ii) Tanker water supply	Cu. M.
(iii) Own sources (Balance to make up the requirement)	Cu. M.
	Total: Cu. M.
2. Hence wastewater generated @ 80% of total water supply	Cu. M.
3. Billed wastewater generation	Cu. M.
4. Billed amount at applicable tariff	Rs.
5. Other charges	Rs.
6. Arrears/Credits	Rs.
7. Gross amount payable on or before last date of payment	Rs.
8. Surcharge for delayed payment	Rs.

HELP PROTECT CLEAN ENVIRONMENT TO IMPROVE UPON HEALTH AND SANITATION

**NOTES**

1. In case the payment is effected by cheque or demand draft the same should be drawn in favour of the Executive Engineer, Works Division P.W.D. as per the Works Division mentioned in the bill and payable at place of respective office. Outstation cheques or DD are not acceptable.
2. Payment of bill will also be accepted by the authorised banks/institutions.
3. The fact that the consumer has not received a bill will not absolve his liability for payment of charges including delayed payment charges, fines and penalties, if any, as per the rules. Therefore every consumer who does not receive the bill regularly should in his own interest, enquire about it from local office where the bill is prepared. Duplicate bill may be obtained on payment of Rs. 5/-per bill copy.
4. Bill must be presented by the consumer at the time of payment. Please insist on official receipt of payment and preserve the same carefully. Receipt will be valid only on realisation of cheque.
5. Any complaint regarding accuracy of the bill must be made within due date of payment with the local office who has issued the bill.

6. It is the responsibility of the consumer to effect the payments due, in the event the bill is subjected to corrections by the Assistant Engineer as per rules, within due date of payment to avoid delayed payment charges, other charges including fines and penalties etc., or other actions such as disconnection.
7. A disputed bill should be paid under protest to avoid delayed payment charges or other actions such as disconnection.
8. The consumer shall have to report to the Assistant Engineer of his/her intention of vacating the premises at least 15 days in advance.

**TARRIF****SECURITY DEPOSIT**

- |   |  |                          |
|---|--|--------------------------|
| 1. Domestic category  | Re. 1/- per Cu. M. of wastewater generated | Rs. 500/- per connection |
| 2. Commercial category  | Rs. 5/- per Cu. M. of wastewater generated | Rs. 1000/-per connection |
| 3. Industrial category  | Rs. 5/- per Cu. M. of wastewater generated | Rs. 3000/-per connection |
| 4. Public places  | Rs. 3/- per Cu. M. of wastewater generated | Rs. 1000/-per connection |
| 5. Surcharge for delayed payment 2% of billed amount. Rounded to next higher rupee. |  |                          |

Note: If one sewerage connection is availed by the consumers of same category but joining as a group, the security deposit will be @ 50% of respective category per unit in the group.

**SEWERAGE CONNECTION CHARGES**

	Up to 150 mm dia	Above 150 mm dia	Per unit ingroup
1. Domestic category	Rs. 200/- per connection	Rs. 350/- per connection	Rs. 100/- per unit
2. Commercial category	Rs. 500/- per connection	Rs. 750/- per connection	Rs. 250/- per unit
3. Industrial category	Rs. 1000/- per connection	Rs. 2000/- per connection	Rs. 500/- per unit
4. Public places category	Rs. 1000/- per connection	Rs. 2000/- per connection	Not applicable

HELP PROTECT CLEAN ENVIRONMENT TO IMPROVE UPON HEALTH AND SANITATION

### APPENDIX C.3.1 CHENNAI METROWATER TRAINING CENTRE

#### 1. METROWATER TRAINING CENTRE

Training of engineering staff has been given priority soon after the formation of CMWSS Board. Accordingly, the training project was finalised in collaboration with the National Water Council of U.K. with financial assistance from the Overseas Development Administration (ODA) of the British Government. Metro water as part of capacity building exercise has established its staff Training Centre as early as 1980.

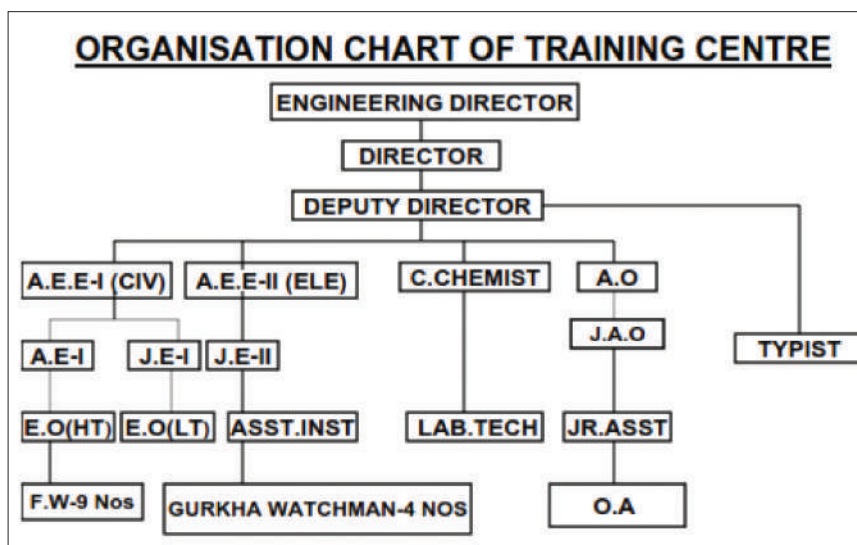
At present the Training Centre headed by Superintending Engineer/Director is functioning from the Training Centre campus at No.56, Raji Street, Ayanavaram, Chennai 600 023 (adjoining the Kilpauk Water Treatment Plant campus) under the control of the Engineering Director.

The Training Centre conducts the following modules for the year 2012-13:

1. O&M Module
2. Water quality module
3. Sewage disposal module
4. Human Resource Development
5. Project Management module
6. Financial management module

The above training courses are offered to various categories of staff viz. EEs, AEEs, AEs, JEs, SAOs, AOs, JAOs, Assistants, Junior Assistants, Electrical Operators, Depot Managers, Water Analysts and Field Workers.

Apart from the above, a special training program on 'Demonstration of utilisation of safety equipments in maintaining the sewerage system and safe working was conducted to all the Field workers and Field Engineers of CMWSS Board from April'12 to July'12 and the training was well received by the participants.



## **2. CPHEEO COURSES**

Besides conducting training programmes for the staff of Chennai Metropolitan Water Supply and Sewerage Board the following five CPHEEO sponsored training programmes viz., Corrosion Control, Sewage Works Supervisor, Filter Operation, Laying of Water Mains and Care and use of Chlorinators are being conducted every year for Public Health Engineers across India during the period from November to February.

## **3. SPECIAL TRAINING PROGRAMMES CONDUCTED**

1. The training programme on Water and Waste Water management for the Engineers from the various Municipalities (Bhopal, Gwalior, Indore) of Madhya Pradesh has been successfully completed on 10.08.2007. The training was well received by the participants.
2. a) Basic Course (Junior level): Technical operators who are certified in Industrial Training Institutes in mechanical or electrical trades and with minimum two (2) years of experience in the field of operation and maintenance of sewage treatment plants, basically from the southern and western parts of India such as Tamil Nadu, Karnataka, Andhra Pradesh, Goa and Maharashtra. supported under Japan International Co-operation Agency (JICA) in association with National River Conservation Directorate (NRCD).

The five days Basic Training Course on "O&M of Sewerage Facilities and sewage Treatment Plant" for 13 persons from Southern & Western States of India was conducted from 24.03.2008 to 28.03.2008.

b) Intermediate Course (Middle level):

This course was conducted for the Assistant Engineers, Assistant Executive Engineers and Executive Engineers with degree/diploma in Engineering and with minimum two (2) years experience in the field of operation and maintenance of sewage treatment plants.

The five days Intermediate Training Course on "O&M of Sewerage Facilities and Sewage Treatment Plant" for 15 persons from Southern & Western States of India was conducted from 10.03.2008 to 14.03.2008.

## **4. TNUDP-III – TRAINING PROGRAMMES**

The G.O.Ms.No.293, MAWS, dt.26.11.2010 imposed a ban on entry of workers into the sewerage system and septic tanks. In this connection Directorate of Municipal Administration (DMA) has requested CMWSS Board to conduct the training programme on Maintenance of sewerage system and the precautionary measures to be taken during cleaning of sewerage. Accordingly 331 Nos. of Public Health staff and 171 Nos. of Engineers of various Municipalities/Corporations was given the above training programme between 3.12.2010 to 25.01.2011 and the same was very well received by the participants.

**5. GOVERNING COUNCIL:**

The policies relating to the functioning of the Training Centre are approved by a Governing Council consisting of the following members:

1. Managing Director – Chairman
2. Executive Director - Vice Chairman
3. Finance Director – Member
4. Engineering Director – Member
5. Director - (Training Centre)

**6. FACILITIES:**

A. The facilities available at the Training Centre are listed below

1. Air conditioned Class Rooms (3 Nos)
2. Meeting hall
3. Hostel (8 rooms)
4. Demonstration Laboratory for both water and sewage analysis.
5. Training Workshops -2 Nos
6. Demonstration manholes
7. Water pipe lines with specials

**B) Library:**

There is a modern library at the Training Centre. It has a collection of about 2,860 books covering Engineering, Technology, Management, Training, Finance disciplines, Computers, as well as operational manuals, specifications and ISI codes.

**7. IMPROVEMENTS WORKS TO THE TRAINING CENTRE**

The Government has allotted Rs.170 Lakhs as grant for the improvement works to the Training Centre under Part-II Schemes. The following works are covered under this scheme.

1. Conversion of Existing library into meeting hall
2. Conversion of Computer room into library including provision of computers and internet facilities
3. Improvement works for Administrative office by enlarging the Director (TC) chamber and providing cubical enclosures for Dy. Director (TC), A.E.E'S S.A.O and A.E'S/J.E'S
4. Providing Gardening and Landscaping work at Training Centre campus
5. Conversion of existing workshop into Exhibit Hall

6. Renovation of civil works to the existing hostel building at Training Centre

7. Renovation of the electrical items at the Hostel building Training Centre

All the works have been completed.

## **8. DEPARTMENTAL EXAM**

To improve the potentiality and the personal assessment for promotion of the staff, the training centre conducts departmental tests for all the specific 11 subjects.

## **9. FIELD VISIT**

Permission will be accorded for Students/Faculty members of Institutions/Universities, who wish to visit any of the Board's Treatment Plants viz.,

1. Water Treatment Plants -

Kilpauk

Chembarambakkam (530 MLD)

Puzhal (300 MLD)

2. Sewage Treatment Plants -

Kodungaiyur

Koyambedu

Nesapakkam

Perungudi

On payment of Rs.20/- head / plant/ day subject to the minimum of Rs.1000/- per batch per plant. The payment may be made either through Demand Draft payable at Chennai in favour of "Resource Centre, CMWSSB" or cash payments vide Current A/c No.8439201000239 in any branches of Canara Bank. Please enclose the original counterfoil for according approval. On receipt of payment, permission will be accorded.

## **10. IN PLANT TRAINING/PROJECT WORK/DATA COLLECTION**

Permission will be accorded for students of Institutions / Universities who wish to attend in plant training / project work / data collection at any of the Board's WTP / STP or at Administrative / Finance / Technical wings at Head office @ Rs.200/- per head/plant + 12.36% Service taxes. This payment may be made either through Demand Draft payable at Chennai in favour of "Resource Centre, CMWSSB" or cash payments vide Current A/c No.8439201000239 in any branch of Canara Bank. Please enclose the original counterfoil for approval. On receipt of payment, permission will be accorded.

**Metrowater Training Centre-Calendar of Training Programme for the Year 2012-2013**

Code	Module Title	Days	2012					2013		
			8	9	10	11	12	1	2	3
TS01	O&M Concepts & Principles	1	1		1		5		4	
TS02	O&M of Pumping Stations	2	6							11
TT01	O&M of Equipments	1			15		7			
TT02	Safety Practices	1		5			6	10	1	
TS03	Water Quality Assurance & Monitoring	2	2	25	16			30		18
TS04	Rain Water Harvesting	1	8	12	31		27	9		
<b>Sewage Disposal Module</b>										
TS05	Design & Maintenance of Water & Sewer System	2		6		15			6	
TS06	First Aid & Safety Practices	1				21	31		5	4
TS07	Computer Aided Design of STP&WTP	2				6				5

Source: CMWSSB <http://www.chennaietrowater.com/departments/consultancy/mwrcentre.htm>

**APPENDIX C 3.2 REFRESHER COURSES BY CPHEEO, MoUD**

Table C3.2.1 List of refresher courses sponsored by the MoUD

Sr. No.	Course Category	Name of Course	Level of Participation	Duration
1	WATER	Waterworks Supervisor Course	Junior/Middle Level	4 weeks
2		Waterworks Management	Junior/Middle Level	3 weeks
3		Water Supply System Management	Middle/Senior Level	7-10 days
4		Pipes & Conduits	Junior/Middle Level	9-12 days
5		New Development in Water Treatment	Middle/Senior Level	10 days
6		Structural Design of Water Treatment Plants and Other Related Structures	Middle/Senior Level	1 week
7		Water Treatment Plant Design	Middle/Senior Level	1 week
8		Filter Operation	Junior/Middle Level	10-12 days
9		Care and Use of Chlorinators	Junior/Middle Level	1 week
10		Water Analysis	Junior/Middle Level	4 weeks
11		Chemical Analysis of Water	Junior/Middle Level	7 days
12		Preventive Maintenance and Leak Detection in Water Supply Distribution System	Middle/Senior	7-10 days
13		Cathodic Protection	Junior/Middle Level	1 week
14		Maintenance & Management Related to Municipal Water Works	Middle/Senior Level	1 week
15		Treatment of Arsenic, Iron & Fluoride in Drinking Water	Middle/Senior Level	1 week
16		Water Quality Surveillance	Middle Level	12 Days
17		Pumping & Non Pumping Mains for Water Supply System - Design, Operation & Maintenance	Junior/Middle Level	1 week



Sr. No.	Course Category	Name of Course	Level of Participation	Duration
18	WATER	Water Supply from Ground Water Sources - Quantity/Quality and Ground water Recharge	Junior/Middle	1 week
19		Recent Water Treatment Technology and Quality Surveillance	Middle/Senior	1 week
20		Water Quality Management	Junior/Middle	5 days
21		Testing of Chemicals required for water treatment	Junior/Middle	4 days
22		Recent Development in Water Treatment Technology	Middle/Senior	10 days
23	SEWERAGE	Waste Stabilization Pond Practices	Junior/Middle Level	1 week
24		Wastewater Analysis	Junior/Middle Level	1 week
25		Sewage Works Supervisors	Junior/Middle Level	2 week
26		Low Cost Sanitation	Junior/Middle Level	1 week
27		Sewer Cleaning & Maintenance	Junior/Middle Level	9 days
28		Surface drainage in small and medium towns	Middle/Senior Level	1 week
29		Low Cost Techniques for Sanitation, Composting and Wastewater Treatment	Junior/Middle	1 week
30		Chemical Analysis of Sewage	Junior/Middle	7 days
31	COMMON COURSE	Public Health Engineering Structures	Middle/Senior Level	9 days
32		Water & Wastewater Analysis	Junior/Middle Level	4 weeks
33		Corrosion Control	Middle/Senior	1 week
34		Scientific Source Finding	Middle/Senior Level	1 week
35		Laying of Water mains and Sewer Lines	Middle/Senior Level	1 week
36		Operation and Maintenance of Water Supply and Sanitation projects	Middle/Senior Level	10 Days
37		Positive preventive Maintenance of Water Supply and Sewerage system	Junior/Middle	1 week
38		Pumps & Pumping Machinery for Public Health Engineering Job	Junior/Middle	1 week

Sr. No.	Course Category	Name of Course	Level of Participation	Duration
39		Bacteriological and Biological Examination of Water	Junior/Middle	5 days
40	WATER CONSERVATION	Rain Water Harvesting	Junior/Middle Level	1 week
41		Ground Water	Middle/Senior Level	1 week
42	MUNICIPAL SOLID WASTE	Solid Waste Management	Junior/Middle Level	7-10 days
43		Solid Waste Management	Middle/Senior	1 week
44	SOFTWARE (INFORMATION TECHNOLOGY)	Computer Aided Design of Pipelines and Pipe Networks for Water Supply and Sewerage Systems	Middle/Senior	1 week
45		Computer Application in PHE Structures Design	Middle/Junior Level	10 days
46		Computer Application for Water Distribution System Management and Water Treatment Plant Design	Junior/Middle Level	9 days
47		Computer Aided Design of Water Supply and Sewerage Network	Junior/Middle Level	10 days
48		Computer Application for Water Distribution System Management	Junior/Middle Level	10 days
49		Computer Aided Design of Water and Wastewater treatment plants	Junior/Middle Level	1 week
50		MANAGEMENT	Total Quality Management	Middle/Senior
51	Total Quality Management in Water Supply System		Junior/Middle	1 weeks
52	Preparation of Water Supply Projects		Junior/Middle	1 week
53	Tenders & Contract		Junior/Middle	1 week
54	Governance of Urban Water Supply & Sanitation		Middle/Senior	1 week

Source: JICA & MoUD, 2011

Table C3.2.2 List of proposed refresher courses in the PHE training programmes

Sr. No.	Course Name
1	Standard Service Level Benchmarks in respect of Water supply, Sewerage & Sewage Treatment, Solid Waste Management & Storm Water Drainage
2	Preparation of City Sanitation Plan under National Urban Sanitation Policy (NUSP)
3	Septage Management Plan
4	Operation and Maintenance of STPs
5	Decentralized Wastewater Management
6	Rainwater harvesting, water conservation and reuse of wastewater
7	Policy & Regulatory aspects of Water Supply & Wastewater Management
8	Technological options for Municipal Solid Waste Management
9	Emerging technologies in Sewerage & Sewage Treatment
10	GIS Mapping
11	24x7 Water Supply
12	SCADA in Water Supply & Sewerage System
13	Mapping of Infrastructure Networks and Hydraulic Modelling for Water Supply, Sewerage and Storm Water Drainage
14	Demand Side Management of Water Supply through Pricing(Tariff) and Metering, etc.
15	Pressure Management in Water Supply Networks for Diurnal Variations
16	GIS – GPRS based monitoring of MSWM
17	International Quality Standards for Water Supply & Sewage Treatment - Effluent and Re-use Standards
18	Economic Pricing of Water Supply & Sewerage Services
19	Economic Impacts of Lack of Sanitation
20	Desalination Technologies for Water Supply & related Issue
21	Water borne Diseases & Health Effects
22	Maintenance of Conservancy Machinery including Crematoria & Incinerators for Electrical & Mechanical Engineers Environmental Impact Assessment
23	Energy Saving in Public Health Engineering & Related Works for Electrical & Maintenance Engineers
24	Orientation Training Programme for Trainers of WTP Operators
25	National Mission of Sustainable Parameters in a)Water Supply b)Sewerage c)Solid Waste Management and d)Strom Water Drainage
26	Mechanization of cleaning of Sewerage & Drainage & Septic tank systems

Source: CPHEEO, MoUD, 2012

Table C3.2.3 List of some of the institutions that may undertake refresher courses

Sr. No.	Name of Institutions
1	Motilal Nehru National Institute of Technology (MNNIT), Allahabad, Uttar Pradesh
2	All India Institute of Hygiene and Public Health, Kolkata, West Bengal
3	Centre for Environmental Studies, Anna University, Chennai, Tamil Nadu
4	Sri Jayachamarajendra College of Engineering, Mysore, Karnataka
5	Sri G.S. Institute of Technology and Science, Indore, Madhya Pradesh
6	Gujarat Jalseva Training Institute, Gujarat Water Supply & Sewerage Board, Gandhinagar, Gujarat
7	Visvesvaraya National Institute of Technology, Nagpur, Maharashtra
8	Civil Engineering Department, Indian Institute of Technology
9	TWAD Board, Chennai, Tamil Nadu
10	Public Health & Preventive Medicine, Institute of Public Health, Chennai, Tamil Nadu
11	Kerala Water Authority, Thiruvananthapuram, Kerala
12	Institute of Public Health Engineers, Kolkata, West Bengal
13	Research & Training Centre, Maharashtra Jeevan Pradhikaran, Nasik Road, Nasik, Maharashtra
14	All India Institute of Local Self Government, Bhopal, Madhya Pradesh
15	Public Health Department, Government of Orissa, Bhubaneswar, Orissa
16	Rajasthan Institute of Local Self Government, Jaipur, Rajasthan
17	All India Institute of Local Self Government, Mumbai, Maharashtra
18	P.H.E. Department, Government of Rajasthan, Jaipur, Rajasthan
19	Municipal Corporation of Greater Mumbai, Civic Training Institute & Research Centre, Mumbai, Maharashtra
20	Resource Centre, Metro Water Training Centre, Chennai Metropolitan Water Supply & Board, Chennai, Tamil Nadu
21	All India Institute of Local Self Government, New Delhi
22	Banaras Hindu University, Varanasi, Uttar Pradesh

Note: The above list is not exhaustive.

Source: CPHEEO, MoUD, 2012

### APPENDIX C.3.3 NEED FOR APPLIED R&D IN SPECIFIC ASPECTS

#### 1. Time and Motion Study of Sewer Cleaning

Sewer cleaning involves focus on localised preferences of staffing, equipments and affordability. For example, the staffing pattern for sewer cleaning in a given habitation depends on the key factors of;

- a. Type of sewers used being whether they are of vitrified clay, salt glazed stoneware, synthetic materials, composites of concrete, cast iron, ductile iron, etc. as in turn dictating the applicability or otherwise of sewer jet rodding and suction machines. With the need to phase out manual entry into sewer systems and thereby improving the mechanized sewer cleaning methods, this becomes all the more challenging. At the same time, the financial aspects of ULBs in regard to revenue from sewerage is extremely limiting in many ULBs that it is becoming difficult to procure and own equipments like the jet rodding and suction machines. This is the paradox in that while everyone accepts there is the compelling need to switch over to these, there are no norms to decide on which capacities of machines and at what numbers is needed. This triggers the infirmity on budgeting for the procurement and O&M of these equipments and more critically the hierarchy of staff needed and their training needs. A crude way of getting over these is to invite tenders for privatized contractors to carry out these sewers cleaning using the machines and accept the lowest evaluated tender as the basis for funding. Here again, if the tender is for the contractor procuring these equipments or for the ULBs to procure them and lease to the contractor. It is obvious that the procedure of the ULB procuring these and leasing to the contractor will be financially much more economical. At the same time, the contractor will not be careful enough in the day to day usage of the machines and this may result in frequent breakdowns and repetitive expenditures. It may appear better to entrust such contracts to the equipment manufacturer himself so that the required supervisory care on a day to day operation and the positioning of operating staff with requisite experience may become available. All the same, there are sewer materials like vitrified clay or salt glazed stoneware in which the sewer jet rodding cum suction machines may not be possible and instead the bucket cleaning machines as also mechanized rodding machines are indicated.
- b. The depths at which the sewers are laid and the densities of population where the sewers are laid as also the activities like, domestic, commercial or industrial are also vital in deciding on the above issue of machineries. In older cities the required space for positioning equipment itself may not be possible in the narrow roads and the cleaning has to be continued manually only.
- c. The health condition of the labour who will be otherwise continually exposed to the atmosphere in the sewer cleaning and the cut off deployment duration by which the staff needs to be redeployed in other sectors like water etc.
- d. There is the associated aspect of accidents and compensations to be paid for in such cases for which financial allocations are called for.

Considering all these, an applied R&D study is urgently needed and which will encompass the above in regard to the nature of the habitation, the densities of habitation, the materials and depths of sewers, staff needs, qualifications etc. The metropolitan cities are reasonably equipped with these machines and such a study would be covering the class I & II cities. The actual work needed during the study will be the compilation and correlation of available data by being resident in the chosen cities for at least two months in a city, talk to operators, staff, public and managers to start with and then to verify these for sustainability with equipment vendors and finally bring out a model that will enable a factual budgeting of these activities.

This study is critically needed to be completed in the coming financial year and the institution to be entrusted with this can be based on availability of the infrastructure in sewerage in the locality. The CMWSSB is the pioneer in these mechanized cleaning having launched it in 1980's and has the longest span of experience. There are also the Japanese agencies which have established the norms for that country. Thus, a joint study led by the relevant Japanese organization with the IIT Madras as their counterpart in India could be the optimal entity and if possible to be funded by JICA.

## **2. Disinfection of Secondary Treated Sewage when Discharged to Water Bodies**

This is an area crying for attention. Right now, the only authentic study on this is "nil". The only related basis is the report of the Central Pollution Control Board in its publication titled Performance of Sewage Treatment Plants-Coliform Reduction-CUPS / 69 / 2008-CPCB which concludes that "One of the best methods of achieving 100% faecal microbes removal is coagulation-flocculation followed by chlorination after secondary treatment". From a practical point of view, this appears sustainable both physically and financially. However, the lobby on Trihalomethane and Total Organic Carbon argues against bringing any form of chlorine in contact with sewage even if treated. The lobby for UV and Ozone are also pitching in with their penchant for sales. There are many forums of debates reaching a crescendo. There is a need to put in a fair amount of effort without getting biased because the discharges reach the aquatic environment and disasters if detected later cannot be reversed that easily and the consequences are shuddering even to think of. Mutations of life forms can also be set in motion over a period of time.

The applied R&D in this aspect requires the availability of well-equipped microbiological laboratories and well trained staff. Clearly, institutions like CPCB with their regional laboratories alone seem equipped and also as continuity to their earlier studies. As far as proving the infrastructure at the site of the STPs, these are to be made available and maintained by the concerned ULBs. Thus, a joint applied R&D by CPCB and selected ULBs are required to take up this study. There is an USEPA manual itself available on this subject, but then given the status of treated sewage in their STPs Vis a Vis our STPs the reliability of the findings in that manual are to be accepted as not directly applicable and the intuition to endorse the same should be resisted at all costs.

## **3. Fate of Ground Seeded Microbial Pollution in Hilly Regions & Hard rock Areas**

Septic tanks are almost the norm of the country for almost all locations where a ready connection to a sewer collection system is not available. The effluent of the septic tank is accepted to be discharged through leach pits, leach dispersion trenches, up flow filters etc. before it reaches the soil.

There are no measurable parameters for the final treated sewage accessing the soil. This results in a stage where, as long as the soil has the ability to assimilate the organic pollutants, things are under control. But then, the exceptions are hilly regions especially in the North East and the rocky terrain like in Kerala. In the case of North East, the rainfall is severely intense and the hill slopes add to the challenge. The microbial pollutants get almost directly washed down day in and day out into the river courses and these become the sources of potable water supply intakes eventually. In Kerala, where it is more or less hard rock everywhere the organic pollutants can travel through the crevices in the rocks and given the fact that the source of water in those regions scattered among the hills is again the wells driven into these rocky areas, a situation is fast approaching whereby the assimilative self-purification capacity of the aquatic body may get exceeded and a variety of dermatic and gastro-intestinal infections may become sporadic to start with and build up to endemicity. Some studies in the country report on detection of a chosen parameter in its pathway rather than a comprehensive modelling of the fate of ground seeded pathogens. This manual specifies as follows

### **3.1 Safe Distance from Drinking Water Sources**

In dry pits or unsaturated soil conditions, i.e. where the height between the bottom of the pit and the maximum ground water level throughout the year is 2 m and more.

- a. The pits can be located at a minimum distance of 3 m from the water sources such as tube wells and dug wells if the effective size (ES) of the soil is 0.2 mm or less, and
- b. For coarser soils (with ES greater than 0.2 mm) the same distance can be maintained if the bottom of the pit is sealed off by an impervious material such as puddle clay or plastic sheet and 500 mm thick envelope of fine sand of 0.2 mm effective size is provided around the pit.

In wet pit saturated soil conditions, i.e. where the distance between the bottom of the pit and the maximum ground water level during any part of the year is less than 2m,

- a. The pits can be located at a minimum distance of 10 m from the water sources such as tube wells and dug wells if the ES of the soil is 0.2 mm or less, and
- b. For coarser soils (with ES more than 0.2 mm), minimum distance of 10 m can be maintained if the pit is sealed off by an impervious material such as puddle clay or plastic sheet and 500 mm thick envelope of fine sand of 0.2 mm effective size is provided all round the pit.

### **3.2 Safe Distance from Water Supply Mains**

Lateral distance between the leach pit and the water mains should be at least 3 m provided the water table does not rise during any part of the year above the pit bottom and the inlet of the pipe or drain to the leach pit is below the level of water main. If the water table rises above the bottom of the pit, the safe lateral distance should be kept as 8 m. If this cannot be achieved, the pipes should be completely encased to a length of at least 3 m on either side of the pit. When the pits are located either under the foot path or under the road, or the water supply main is within a distance of 3 m from the pits, the invert of the inlet pipe should be kept at least 1 m below the ground level.

This would ensure that the liquid level in the pits does not reach the level of the water main as the mains are generally laid at 0.9 m depth.

The water pipe should not cut across the pit, but where this is unavoidable; the water pipe should be completely encased for length of 3 m on either side of the pit including the portion across the pit to prevent infiltration or exfiltration.

A study is reported by National Institute of Technology (NIT), Calicut, Kerala in respect of safe distance in laterite type of soils (An investigation into the safe distance between well and onsite waste disposal systems: A case study from Kerala, India, M. S. Biju, Irfan Khursheed Shahb and George K. Varghese, IJCEES Vol 2(1):11-15, 2011). The study area had houses with either the septic tank-soak pit system or pit latrines, the latter being more common with open wells as the source of water at 1.2 m to 2.4 m below ground in lateritic soil. The horizontal distance between well and the soak pit / pit latrines SWWTS varied from 5 m to 31 m. The MPN of total coliform from nearly 35 wells was studied and it was found that the number of total coliform correlated with the length of a specific parabolic curve connecting the soak pit / pit latrine and the well. This relationship was used to calculate the safe distance between the soak pit / pit latrine and open well so that the total coliform was not exceeding the MOEF classification of class "A" water in the well water and which is "Drinking water source without conventional treatment but after disinfection" at total coliform of not exceeding 50/100 ml and the distance evaluated was 21 m where the water table rises to the level of soak-pit/ pit latrine and the well.

The uncertainty in the foregoing for adoption becomes a matter of concern. Going by the findings of the NIT study, the spacing between a septic tank and abstractable water well needs to be as much as 31 m, which is impossible given the densification of population and real estate costs coupled with security issues in hilly areas.

Thus, an applied R&D is needed to be instituted to devise technologies which would address the quelling of water borne pathogenic organisms in septic tank effluents by means of affordable and viable methods. These will be actually pilot plants which are constructed and added as downstream units of existing septic tanks at selected centres and the evaluation of their efficiencies and bringing our a reliable type design. Institutions like NIT, Kerala who have already initiated the study and identifiable institutions in the North East are to be recognized for this.



**APPENDIX C. 4.1: EXTRACT FROM THE 1985 DOCUMENT OF UNEP TEST MODEL FORMAT  
APPRAISAL OF FUNDING OF 4 CHENNAI STPs**

Document prepared by United Nations Environment Programme, Bangkok, Anna University, Chennai and Chennai Metropolitan Water Supply and Sewerage Board

**ENVIRONMENTAL ANALYSIS AND ASSESSMENT OF  
WASTE WATER TREATMENT PLANTS OF MADRAS CITY**

**By**

Prof. P. Sivalingam, Principal Investigator  
Vice-Chancellor, Perarignar Anna University of Technology (PAUT), Madras, India

Project team:

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Prof. T. Damodara Rao	Centre for Environmental Studies PAUT, Madras
Thiru S. Sundaramoorthy	Chennai Metropolitan Water Supply and Sewerage Board
Dr. M. Swaminathan	Corporation of Madras
Dr. N. Ramaswamy	Agricultural Expert

The study was a sponsored study by the United Nations Environment Programme (UNDP) based at its Bangkok office. The UNDP at that time developed an Environment Impact Assessment (EIA) Text Model Format which was considered as offering a much needed tool to evaluate the EIA issues of a proposed project and more importantly develop a procedure to arrive at a justification for funding of proposed infrastructure projects by establishing a quantified argument of (a) Environmental Cost / Benefit of the Proposed Project and (b) Economic Cost / Benefit of the Proposed Project. A series of test model formats were identified as follows.

- RESOURCES USED
- PRODUCTS AND RESIDUES CREATED
- RESOURCES EXHAUSTED/DEPLETED/DETERIORATED
- RESOURCES ENHANCED
- REQUIRED ADDITIONAL PROJECT COMPONENTS – FOR RESOURCE RESTORATION, MAINTENANCE, EXPANSION
- SUMMARY – DECISION MAKING
- ENVIRONMENTAL COST/BENEFIT

II. Resources Directly Used/Indirectly Affected/ Products and Residues Created

II (a) RESOURCES USED

1. Directly used / consumed

The resources mentioned overleaf, directly used in the project, are economic and measurable.

Description	Quantity	Cost, Million Rs.
Land area for treatment plants	176 hectares	184.8
Machinery and equipment (including civil works)	5 plants	142.22
Electrical energy	5 plants	788.28
Labour		
Maintenance		
Wastewater	222 mld	-

## 2. Directly affected

These resources may or may not be measurable; the value of the impact of the project on them can only be imputed. It does not have a market price.

Description	Quantity	Cost, Million Rs.
Nil	-	-

## II. (b) PRODUCTS AND RESIDUES CREATED

These are goods and services which confer a benefit or involve a cost.

## 1. Directly from the development process:

Description	Quantity	Value Million Rs.
Treated effluent	222 mld	525.0
Grit and humus	6000 tons/yr	0.75
Digester gas from sludge digestion	22000 m <sup>3</sup> /day	185.0
Improvement in fodder grass yield	12540 tons/yr	43.9

## 2. Indirectly

Description	Quantity	Value Million Rs.
NIL	-	-

## III. RESOURCES EXHAUSTED/DEPLETED/DETERIORATED

(By Projects as now implemented)

ITEM	HOW	COST	QUANTUM	VALUE
Nil	Entire project is an environmental enhancement project. No resource is depleted/exhausted/ deteriorated	-	-	-

## IV. RESOURCES ENHANCED/1 (By Project now implemented)

ITEM	HOW	COST	QUANTUM	VALUE MILLION RUPEES
1	2	3	4	5
a) Sewage farm raising cattle fodder	Sewage treatment prevents sewage sickness to the soil and improves health of farm workers resulting in 5% increase in production	No extra input except treatment to sewage	Additional 5% of grass production	1.756 p.a.
b) Land adjoining	Treated sewage reduces smell and other unaesthetic conditions for a width of approximately 18 m on either bank of stream concerned. This results in land enhancement.	No extra input except treatment to sewage	5,04,000 m <sup>2</sup>	5.04 m
c) Gas generated in sludge digestion at wastewater treatment plant	Gas produced can be used as fuel and thus fetch a revenue	No extra input except treatment to sewage	Supply for 19,700 families at Rs. 1/- per family per day	7.4 p.a.
d) Grit and humus produced at sewage treatment plant	The material can be used on land and would fetch a price	No extra input except treatment to sewage	60,000 tons Rs. 5/- ton	0.03 p.a.
e) Health of people in sewerage area	The sewerage area shows less incidence of gastro-enteric disease numerically. The benefit associated with this reduction in cases is quantified.	No extra input except treatment to sewage	Rs. 840/- per 1,000 persons per year for 3.147 million	2.643 p.a.
f) Siting of Fisheries Harbour at Madras	The sewage outfall in the sea is relocated further north and this will ensure avoidance of sea pollution. This makes possible siting a fisheries harbour at Kasimode.	Shifting outfall will cost Rs. 6.00 million	Benefit from fish yield in proportion to cost of diversions	12.08 p.a.
g) Treated effluent W.W.T. plant at four places	Reclaimed sewage after tertiary treatment is used for higher quality requirement in industry and fetches Rs. 1.40/- per 1000 litres.	No extra input except sewage treatment	40 mld @ Rs. 1.40 per 1,000 litres	21.0 p.a.

IV. REQUIRED ADDITIONAL PROJECT COMPONENTS – FOR RESOURCE RESTORATION, MAINTENANCE, EXPANSION (POTENTIAL ACTIVITIES)

Suggested Activity Item and Description	HOW	COST	GAINS(+)/LOSSES(-)	
			QUANTUM	VALUE
	Not applicable, since there is no resource depletion/deterioration and no scope for expansion of sewage farm			

VI. SUMMARY – DECISION MAKING

Suggested Activity Item and Description	HOW	COST	Value Rs. (Million)
The Project	Mainly concerning habitat/ settlement with regard to Madras City Total Cost – Over 25 years Products: Fodder grass, methane gas, grit and humus, fish yield, land enhancement, health improvement and treated sewage effluent for industrial purposes.		1115.30 1128.94
Resources used/affected/ created	Apart from land, machinery and equipment, and electrical energy which are used, raw sewage is also converted to treated sewage for present and potential use. Main residues are gas, treated effluent, grit and humus		1115.30 710.75
Resources Exhausted/ Depleted/ Deteriorated	Nil		-
Resources Enhanced	Increase in fodder crop, improvement in land value adjoining stream carrying excess flow from wastewater treatment plant, gas generation, grit and humus generation, improvement in health of people and increase in fish yield revenue.		418.19
Required additional Project components for resource restoration	Nil		

### ENVIRONMENTAL COST/BENEFIT

- A. 1. The economic cost/benefit on the investment as initially planned is 1115.30:1128.94 i.e. 1:1.01
2. The resource depleted is nil. Accordingly, the result net benefit will be Rs. 1128.94 million.
- B. 1. The cost of resources enhanced is not separate from the project costs (Rs. 1115.30 million) and hence is not separately stated.
2. Since all the project resources are indigenous, the GDP equivalent is the net benefit from the project (Rs. 1128.94 million)
- C. 1. The total cost of project (that is the original economic investment cost plus the cost of resources enhanced) equals Rs. 1115.30 million.
2. The total project activities output of the original economic investment plus the result of resources enhanced equal Rs. 1128.94 million
- D. 1. Since the entire project envisages environmental improvement, the environment cost / benefits is Rs. 1115.30 : 1128.94, i.e. 1: 1.01
2. There is no separate enlarged cost/benefit ratio other than 1:1.01 for this environmental improvement project.

THE COST/BENEFIT ASSESSMENT ON THE PREVIOUS PAGE MAY ALSO BE PRESENTED IN TABULAR FORM AS FOLLOWS

#### COST BENEFIT PRESENTATION

Parameter	Costs		Benefits		Cost / Benefit (C/B)
Economic Cost /Benefit	Original Cost	1115.30	Original Benefit	1128 94	1128.94 / 1115.30 = <b>1.01</b>
			Less output depleted if any		
Environmental Cost/Benefit	No separate cost is attributed for resource enhancement, since the project itself is for environmental improvement		Less output depleted if any		
Enlarged Cost Benefit	Total Costs	1115.30	Total Benefit	1128 94	1128.94 / 1115.30 = <b>1.01</b>

**APPENDIX C. 6.1 SAMPLE OF DRAFT CONCESSION AGREEMENT ON PPP PROJECT****DRAFT CONCESSION AGREEMENT**

Shimla Water supply and Sewerage System Project

to

Build, refurbish, Operate and Maintain the Water supply and Sewerage System of Shimla City,

Himachal Pradesh (India)

on Public Private Partnership (PPP) Mode

Shimla Municipal Corporation, Shimla

(<http://shimlamc.gov.in/page/Tenders.aspx>)

**ARTICLE 5 : OBLIGATIONS OF THE CONCESSIONAIRE****5.1 Obligations of the Concessionaire**

5.1.1 Subject to and on the terms and conditions of this Agreement, the Concessionaire shall at its cost and expense procure finance for and undertake the design, engineering, procurement, construction, operation and maintenance of the Water Supply and Sewerage System and observe, fulfil, comply with and perform all its obligations set out in this Agreement or arising hereunder.

5.1.2 The Concessionaire shall comply with all Applicable Laws and Applicable Permits (including renewals as required) in the performance of its obligations under this Agreement.

5.1.3 Subject to Clauses 5.1.1 and 5.1.2, the Concessionaire shall discharge its obligations in accordance with Good Industry Practice and as a reasonable and prudent person.

5.1.4 The Concessionaire shall, at its own cost and expense, in addition to and not in derogation of its obligations elsewhere set out in this Agreement:

(a) make, or cause to be made, necessary applications to the relevant Authority Instrumentalities with such particulars and details, as may be required for obtaining all Applicable Permits (other than those set forth in Clause 4.1.2) and obtain and keep in force and effect such Applicable Permits in conformity with the Applicable Laws;

(b) procure, as required, the appropriate proprietary rights, licences, agreements and permissions for materials, methods, processes and systems used or incorporated into the Water Supply and Sewerage System;

(c) perform and fulfil its obligations under the Financing Agreements;

(d) make reasonable efforts to maintain harmony and good industrial relations among the personnel employed by it or its Contractors in connection with the performance of its obligations under this Agreement;

(e) make reasonable efforts to facilitate the acquisition of land required for the purposes of the Agreement;

(e) ensure and procure that its Contractors comply with all Applicable Permits and Applicable Laws in the performance by them of any of the Concessionaire's obligations under this Agreement;

(g) not do or omit to do any act, deed or thing which may in any manner be violative of any of the provisions of this Agreement;

(h) support, cooperate with and facilitate the Authority in the implementation and operation of the Project in accordance with the provisions of this Agreement; and

(i) transfer the Water Supply and Sewerage System to the Authority upon Termination of this Agreement, in accordance with the provisions thereof.

## 5.2 Obligations relating to Project Agreements

5.2.1 It is expressly agreed that the Concessionaire shall, at all times, be responsible and liable for all its obligations under this Agreement notwithstanding anything contained in the Project Agreements or any other agreement, and no default under any Project Agreement or agreement shall excuse the Concessionaire from its obligations or liability hereunder.

5.2.2 The Concessionaire shall submit to the Authority the drafts of all Project Agreements or any amendments or replacements thereto for its review and comments, and the Authority shall have the right, but not the obligation to undertake such review and provide its comments, if any, to the Concessionaire within 15 (fifteen) days of the receipt of such drafts. Within 7 (seven) days of execution of any Project Agreement or amendment thereto, the Concessionaire shall submit to the Authority a true copy thereof, duly attested by a Director of the Concessionaire, for its record. For the avoidance of doubt, it is agreed that the review and comments hereunder shall be limited to ensuring compliance with the terms of this Agreement. It is further agreed that any failure or omission of the Authority to review and/or comment hereunder shall not be construed or deemed as acceptance of any such agreement or document by the Authority. No review and/ or observation of the Authority and/ or its failure to review and/ or convey its observations on any document shall relieve the Concessionaire of its obligations and liabilities under this Agreement in any manner nor shall the Authority be liable for the same in any manner whatsoever.

5.2.3 The Concessionaire shall not make any replacement or amendments to any of the Financing Agreements without the prior written consent of the Authority if such replacement or amendment has, or may have, the effect of imposing or increasing any financial liability or obligation on the Authority, and in the event that any replacement or amendment is made without such consent, the Concessionaire shall not enforce such replacement or amendment nor permit enforcement thereof against the Authority. For the avoidance of doubt, the Authority acknowledges and agrees that it shall not unreasonably withhold its consent for restructuring or rescheduling of the Debt Due.

- 5.2.4 The Concessionaire shall procure that each of the Project Agreements contains provisions that entitle the Authority to step into such agreement, in its sole discretion, in substitution of the Concessionaire in the event of Termination or Suspension.
- 5.2.5 Notwithstanding anything to the contrary contained in this Agreement, the Concessionaire agrees and acknowledges that selection or replacement of an O&M Contractor and execution of the O&M Contract shall be subject to the prior approval of the Authority from national security and public interest perspective, the decision of the Authority in this behalf being final, conclusive and binding on the Concessionaire, and undertakes that it shall not give effect to any such selection or contract without prior approval of the Authority. For the avoidance of doubt, it is expressly agreed that approval of the Authority hereunder shall be limited to national security and public interest perspective, and the Authority shall endeavour to convey its decision thereon expeditiously. It is also agreed that the Authority shall not be liable in any manner on account of grant or otherwise of such approval and that such approval or denial thereof shall not in any manner absolve the Concessionaire or its Contractors from any liability or obligation under this Agreement.
- 5.3 Obligations relating to Change in Ownership
- 5.3.1 The Concessionaire shall not undertake or permit any Change in Ownership, except with the prior written approval of the Authority.
- 5.3.2 Notwithstanding anything to the contrary contained in this Agreement, the Concessionaire agrees and acknowledges that:
- (i) all acquisitions of Equity by an acquirer, either by himself or with any person acting in concert, directly or indirectly, including by transfer of the direct or indirect legal or beneficial ownership or control of any Equity, in aggregate of not less than 15% (fifteen per cent) of the total Equity of the Concessionaire; or
  - (ii) acquisition of any control directly or indirectly of the Board of Directors of the Concessionaire by any person either by himself or together with any person or persons acting in concert with him shall be subject to prior approval of the Authority from national security and public interest perspective, the decision of the Authority in this behalf being final, conclusive and binding on the Concessionaire, and undertakes that it shall not give effect to any such acquisition of Equity or control of the Board of Directors of the Concessionaire without such prior approval of the Authority. For the avoidance of doubt, it is expressly agreed that approval of the Authority hereunder shall be limited to national security and public interest perspective, and the Authority shall endeavour to convey its decision thereon expeditiously. It is also agreed that the Authority shall not be liable in any manner on account of grant or otherwise of such approval and that such approval or denial thereof shall not in any manner absolve the Concessionaire from any liability or obligation under this Agreement.



For the purposes of this Clause 5.3.2:

(a) the expression “acquirer”, “control” and “person acting in concert” shall have the meaning ascribed thereto in the Securities and Exchange Board of India (Substantial Acquisition of Shares and Takeover) Regulations, 1997 or any statutory re-enactment thereof as in force as on the date of acquisition of Equity, or the control of the Board of Directors, as the case may be, of the Concessionaire;

(b) the indirect transfer or control of legal or beneficial ownership of Equity shall mean transfer of the direct or indirect beneficial ownership or control of any company or companies whether in India or abroad which results in the acquirer acquiring control over the shares or voting rights of shares of the Concessionaire; and

(c) power to appoint, whether by contract or by virtue of control or acquisition of shares of any company holding directly or through one or more companies (whether situate in India or abroad) the Equity of the Concessionaire, not less than half of the directors on the Board of Directors of the Concessionaire or of

(d) any company, directly or indirectly whether situate in India or abroad, having ultimate control of not less than 15% (fifteen per cent) of the Equity of the Concessionaire shall constitute acquisition of control, directly or indirectly, of the Board of Directors of the Concessionaire.

#### 5.4 Employment of foreign nationals

The Concessionaire acknowledges, agrees and undertakes that employment of foreign personnel by the Concessionaire and/or its contractors and their subcontractors shall be subject to grant of requisite regulatory permits and approvals including employment/residential visas and work permits, if any required, and the obligation to apply for and obtain the same shall and will always be of the Concessionaire and, notwithstanding anything to the contrary contained in this Agreement, refusal of or inability to obtain any such permits and approvals by the Concessionaire or any of its contractors or sub-contractors shall not constitute Force Majeure Event, and shall not in any manner excuse the Concessionaire from the performance and discharge of its obligations and liabilities under this Agreement.

#### 5.5 Employment of trained personnel

The Concessionaire shall ensure that the personnel engaged by it in the performance of its obligations under this Agreement are at all times properly trained for their respective functions.

#### 5.6 Sole purpose of the Concessionaire

The Concessionaire having been set up for the sole purpose of exercising the rights and observing and performing its obligations and liabilities under this Agreement, the Concessionaire or any of its subsidiaries shall not, except with the previous written consent of the Authority, be or become directly or indirectly engaged, concerned or interested in any business other than as envisaged herein.

**ARTICLE 6: OBLIGATIONS OF THE AUTHORITY****6.1 Obligations of the Authority**

6.1.1 The Authority shall, at its own cost and expense undertake, comply with and perform all its obligations set out in this Agreement or arising hereunder.

6.1.2 The Authority agrees to provide support to the Concessionaire and undertakes to observe, comply with and perform, subject to and in accordance with the provisions of this Agreement and the Applicable Laws, the following:

(a) Upon written request from the Concessionaire, and subject to the Concessionaire complying with Applicable Laws, provide all reasonable support and assistance to the Concessionaire in procuring Applicable Permits required from any Government Instrumentality for implementation and operation of the Project;

(b) Hand over the operation and maintenance of the Project Facilities to the Concessionaire for implementation of the Project;

(c) Undertake that the alignment of the existing pipelines and the location of the Existing Assets and the design thereof are of fundamental importance to the Project and undertakes that it or any Government Agency within its jurisdiction or control or acting on its behalf shall not require the alteration of such alignment and/or location during the Concession Period;

(d) Assist the Concessionaire in procuring Police assistance for ensuring safety of the Project Facilities, removal of trespassers and security on the Water Supply and Sewerage System;

(e) Assign its employees to the Concessionaire to assist the Concessionaire in the discharge of its duties during the Concession Period. However, the Concessionaire shall be required to bear all the costs and expenses i.e. salaries etc. of the employees, as assigned by the Authority;

(f) Support, cooperate with and facilitate the Concessionaire in the implementation and operation of the Project in accordance with the provisions of this Agreement; and

(g) Upon written request from the Concessionaire and subject to the provisions of Clause 5.4, provide reasonable assistance to the Concessionaire and any expatriate personnel of the Concessionaire or its Contractors to obtain applicable visas and work permits for the purposes of discharge by the Concessionaire or its Contractors their obligations under this Agreement and the Project Agreements.

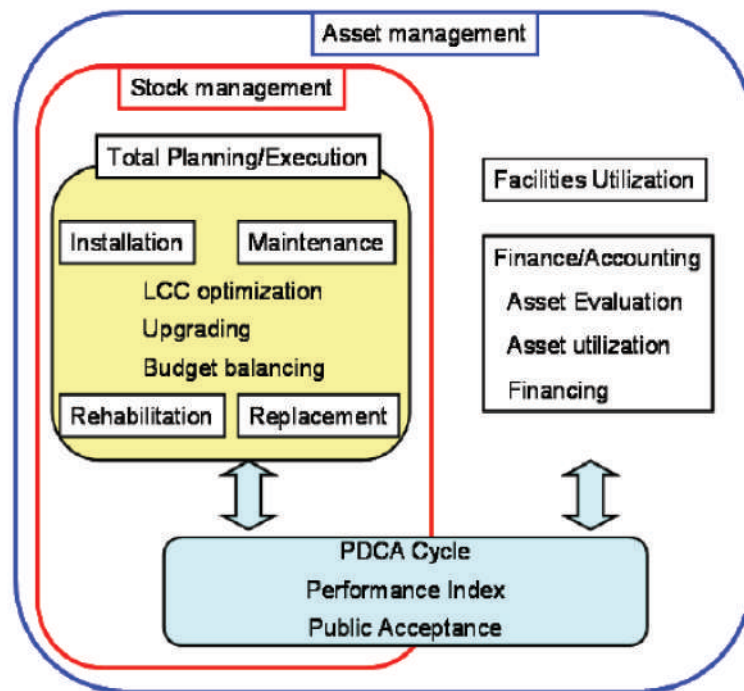
**6.2 Maintenance obligations prior to Appointed Date**

During the Development Period, the Authority shall maintain the Water Supply and Sewerage System, at its own cost and expense, so that its operational worthiness and safety are at no time materially inferior as compared to its condition 7 (seven) days prior to the last date for submission of the Bid, and in the event of any material deterioration or damage other than normal wear and tear,

undertake repair thereof, or pay to the Concessionaire the cost and expense, as determined by the Independent Engineer, for undertaking such repair after the Appointed Date. For the avoidance of doubt, the Authority shall undertake only routine maintenance during the Development Period, and it shall undertake special repairs only for ensuring safe operation of the Water Supply and Sewerage System, or in the event of excessive deterioration or damage caused due to unforeseen events such as floods or earthquakes.

### APPENDIX C.8.1 EXAMPLE OF ASSET MANAGEMENT IN JAPAN

The scope of asset management in sewerage projects is shown in Figure C8.1-1. The Committee (formed by the Ministry of Land, Infrastructure, Transport and Tourism, Japan) lays stress on investigating the basis for developing asset management. Concretely, the Committee aims to “understand the present status of the vast sewerage systems”, “predict mid-to long-term conditions of the systems”, and “maintain the sewerage systems systematically and efficiently” in order to balance the projects and minimize the life cycle costs by considering new construction, maintenance and reconstruction as one process.

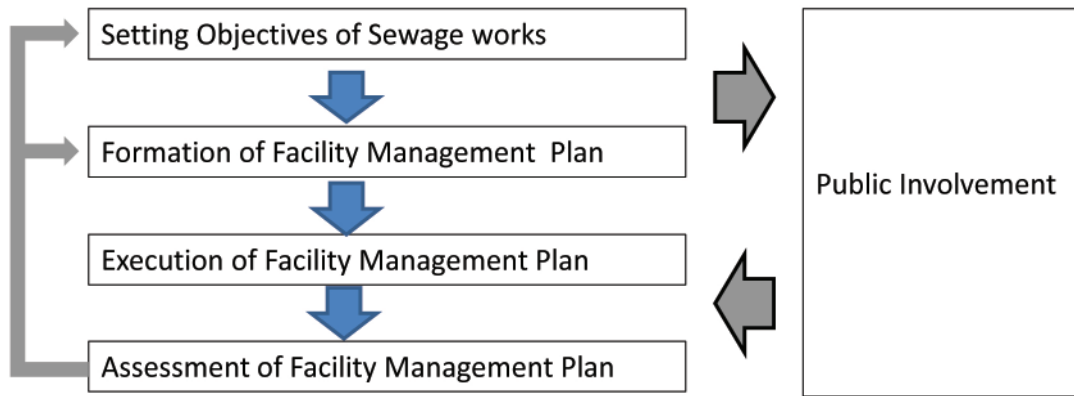


Source: MLIT, 2008a

Figure C8.1.1 Asset Management in Sewerage Project

#### 1. Stock Management and Facility Management Plan

Setting concrete plan based on specific objectives, periodical monitoring of implementation and assessment are necessary in stock management process as in Fig.C8.1.2 When setting and assessing the plan, public involvement is necessary.



Source:MLIT, 2008a

Figure C8.1.2 Procedure of Facility Management Plan

### 1.1. Setting Objectives of Sewage Works

In order to implement sewage works, the administrator should decide the objectives (Objectives A for sewage works, and Objectives B for each facility to fulfil Objectives A) considering regulations, municipal objectives, sewage roles for achieving the objectives of upper-level municipal plans and specific characteristics of sewage facilities. The objectives are decided taking into consideration variation of social conditions and advanced functions for establishing sustainable sewerage system involving public opinion. The example of objective of sewage works are shown in Table C8.1-1 overleaf.

Table C8.1-1 Example of Objectives of Sewage Works

Objectives of sewage works (Objective A)			Objectives of sewage works (Objective B)		
Item	Objective	Performance Level	Item	Objective	
Ensuring Safety	Reduction of cave-in roads	Road cave-in accident; 0.001 per annum or less	SF	Sewer Reconstruction	Sewer Survey 1000km/year
					Sewer Renewal 30km/year Sewer Repair 70km/year Trouble shooting rate 100%/year
Ensuring Service Level	Development of sanitary sewer	Coverage of sewer network; 100%	SF	Sanitary Sewer	New Development of Sewer 10km/year
	Sustainable sewage treatment	Level of aging facilities; Reduction of unknown water: 15%→10% Over service-year facility: 10& or less	CS/M&E	STP	Working Rate of STP 80%/year
				Sewer Redevelopment	Inspection of Sewer 100km/year Trouble shooting rate 100%/year
	Improvement of water quality in public bodies	Water quality of effluent BOD 20mg/l or less SS 20mg/l or less	CS/M&E	Introduction of advanced treatment	Coverage rate of advanced treatment population 30% or more Treated effluent 1000ML/year

Objectives of sewage works (Objective A)		Objectives of sewage works (Objective B)	
Item	Objective	Performance Level	Item
Eco-friendly sewage system	Reuse of effluent: 10% or more	Promotion of reuse of effluent	CS/M&E
		Renewal of Energy efficient equipment	
Minimizing Life Cycle Cost (LCC)	Reduction of Carbon foot print: 20% or more	Use of digestion gas & sludge	CS/M&E
	Construction, O&M, Renewal cost:	Introduction of method of cost reduction	Generation of digestion gas
	15 % or more		Use of sludge
	Reduction of LCC	Introduction of method of cost reduction	Use of sludge rate 10% or more
			Cost reduction of construction and renewal introduction of renewal method, shallow sewer, curved pipe
		Introduction of method of cost reduction	Cost of construction and renewal 5% or more reduction
			Cost of construction , maintenance, renewal 5% or more reduction
		Introduction of method of cost reduction	Cost Reduction of construction and renewal introduction of Lining method
			Cost of construction , renewal 5% or more reduction

Legend: SF: Sewer Facility, CS: Civil Structure in STP, M&E: Mechanical and Electrical equipment

Source: MLIT, 2008a

## 1.2. Formation and Implementation of Facility Management Plan

Facility management plan consists of three plans: facility management plan for sewer, facility management plan for civil structures in STP, and facility management plan for M&E equipment in STP. These three facility plans should set objectives (Objective B) and establish “New Construction Plan, “Inspection and Survey Plan” and “Repair and Replacement Plan” for achievement of the objectives. The purposes of ‘Inspection and Survey Plan’, and ‘New Construction Plan’ & ‘Repair and Replacement Plan’ are to understand the conditions of facilities and size of services, respectively. After establishing plans, periodical review is necessary. Furthermore, database is necessary as a tool for optimising stock management. The components of each facility management in the case of sewer is shown in Figure C8.1-3.

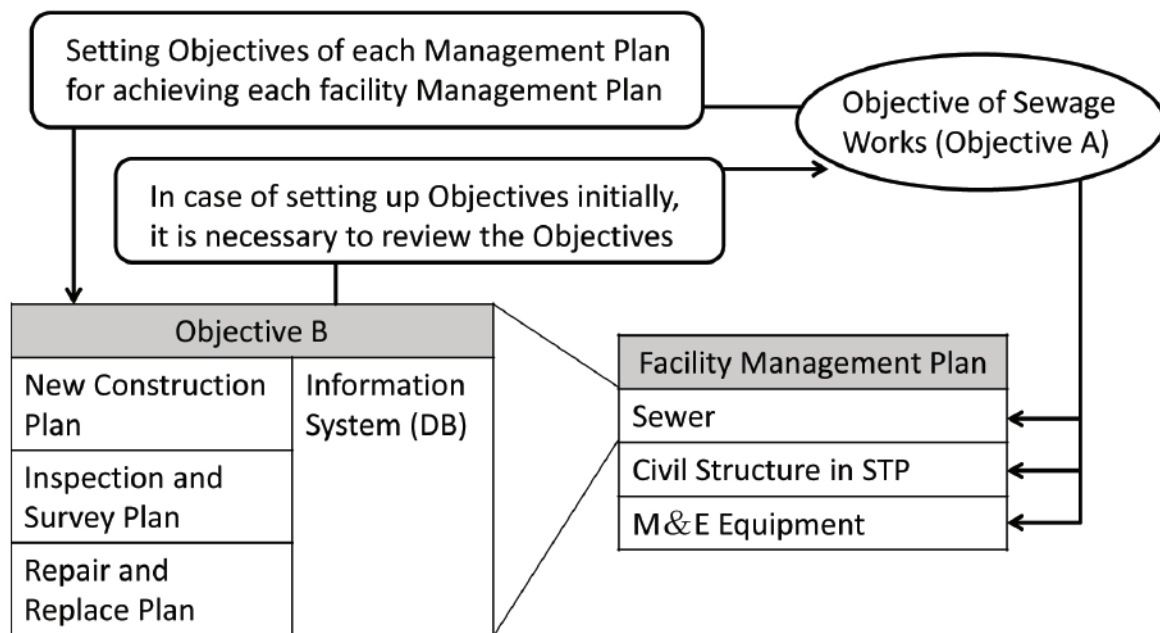


Figure C8.1.3 Components of each Facility Management (in case of sewer)

Three categories of Facility Management Plans are for: Sewer, Civil Structure in STP, and M&E equipment in STP.

Each Facility Management Plan includes following: New Construction Plan, Inspection and Survey Plan, and Repair and Replacement Plan.

- New Construction Plan: To plan and implement the expansion plan to increase the coverage of sewage services
- Inspection and Survey Plan: To plan and implement the plan to get information on soundness of the facilities
- Repair and Replacement Plan: To plan and implement the repair and replacement plan to formulate remedy, schedule and cost of repair and replacement of facilities.



The considerations of facility management plan are as follows:

- Facility management plan for sewer network:

The sewer network occupies a major portion of the sewerage capital. It is located largely underground in a complex manner. So, considerable costs and time are required to gather information on conditions of the facility. Traffic load and soil condition affect sewer failure, which has large impact on the society due to cave-in of roads and groundwater pollution. Therefore, considering the impact on living environment, soil conditions, physical features and age of facility, the area should be prioritised and inspection, survey should be conducted systematically in highly prioritised areas.

- Facility management plan for civil structures in STP:

The civil structures in STP generally have a long service period. Corrosion of structures in STPs has adverse effect on the concrete and reduces life of the facility. In consideration of social impact by facilities due to corrosion of concrete induced by the hydrogen sulphide gas (H<sub>2</sub>S) and timing of renewal of M&E equipment, priority should be given to facilities and inspection, and survey of highly prioritized facility should be conducted systematically.

- Facility management plan for M&E equipment in STP:

The STP has the important function of sewage treatment. In case of failure, sewage may cause the pollution of water bodies. STP consists of many M&E equipment having complicated structures, and their service periods are rather short. Hence, maintenance of the equipment would be classified as preventive maintenance and corrective maintenance. The required frequency and contents of inspection should be decided according to this classification. The functions and energy efficiency of M&E equipment should be fully investigated in case of the replacement because of the rapid progress in the R&D of M&E equipment. The procedure of facility management plan is shown in Figure C8.1-4 overleaf.

### **1.3. Assessment and Selection of Method for New Construction Plan**

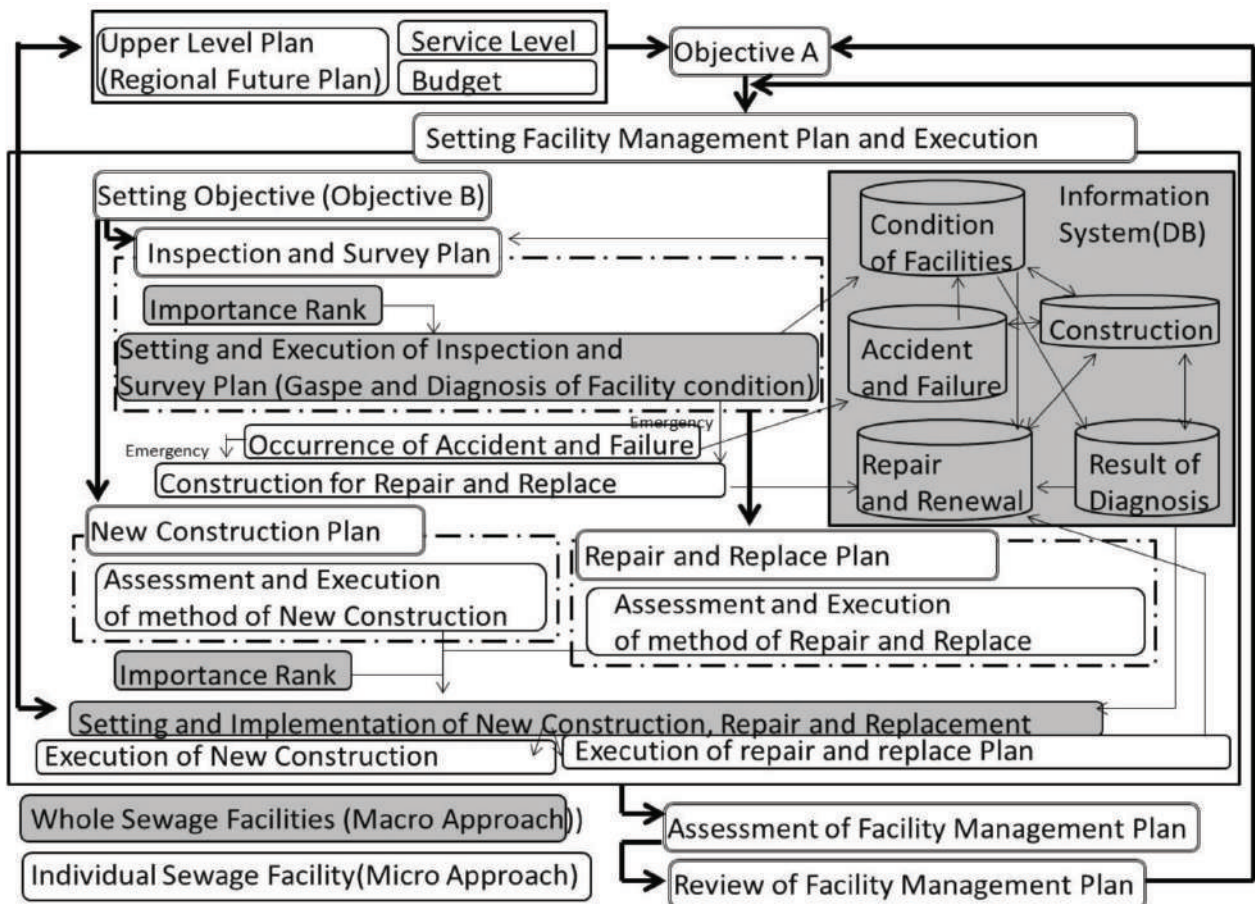
A new construction plan should be prepared giving attention to selection of the most cost effective method for each facility (Sewer network, civil structures in STP, M&E in STP) considering the social conditions and roles of the sewerage system.

#### **1.3.1. Inspection and Survey Plan and their Execution**

Inspection and survey are carried out to understand the conditions and diagnose each facility.

##### **a) Understanding of the condition of facility**

In this plan, priority should be given to inspection and investigation of the facility by taking into consideration the importance of the facilities. The inspection and survey plan include a list of the target facilities, items and frequency of inspection (Refer to Section 4).



Source: MLIT, 2008a

Figure C8.1.4 Procedures of Facility Management Plan

## b) Diagnosis

In this case, diagnosis is performed to assess quantitatively to what extent the existing facility is sound (or deteriorated) and to predict when it will fail. In the assessment stage, clear definition of soundness is important so that assessors can clearly assess results.

Clear definition of soundness is also important for recording data which can be used to understand historical changes and for future analysis.

### i) Assessment of facility by probability of accident and failure using historical data

- The facilities are assessed using failure factors and accident factors using data on the conditions of facilities (Refer to criteria described in Sections 4 and 5).
- The failure can be predicted using decay curve by analysing failure factors and accident factors from historical data.

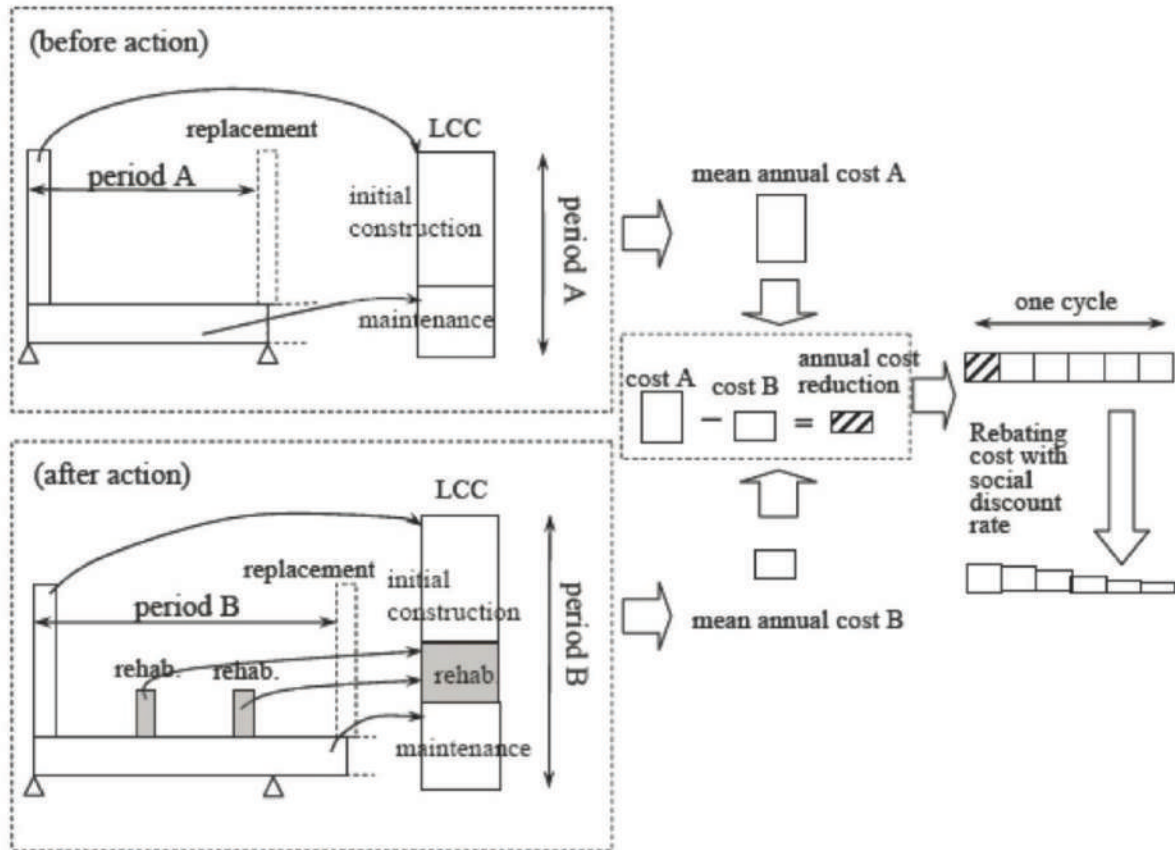
### ii) Assessment of probability of accident and failure with no existing historical data

When historical data on conditions of the facility is not available, the soundness of the facilities is decided by age of facilities, materials, environment, construction methods, etc.

Soundness = f (age of facility, materials, environment, construction methods, etc.)

**1.3.2. Assessment of Repair or Replacement for a Facility**

Plan should be drawn up on measures for renewal and rehabilitation based on inspections and surveys on the deterioration of sewerage systems to project prolonged life of facilities, and action should be selected. This assessment aims to prevent accidents and minimize the life cycle cost (Refer to Section 4). The method of calculating the life cycle cost reduction is in Figure C8.1-5.



Source: MLIT, 2008b

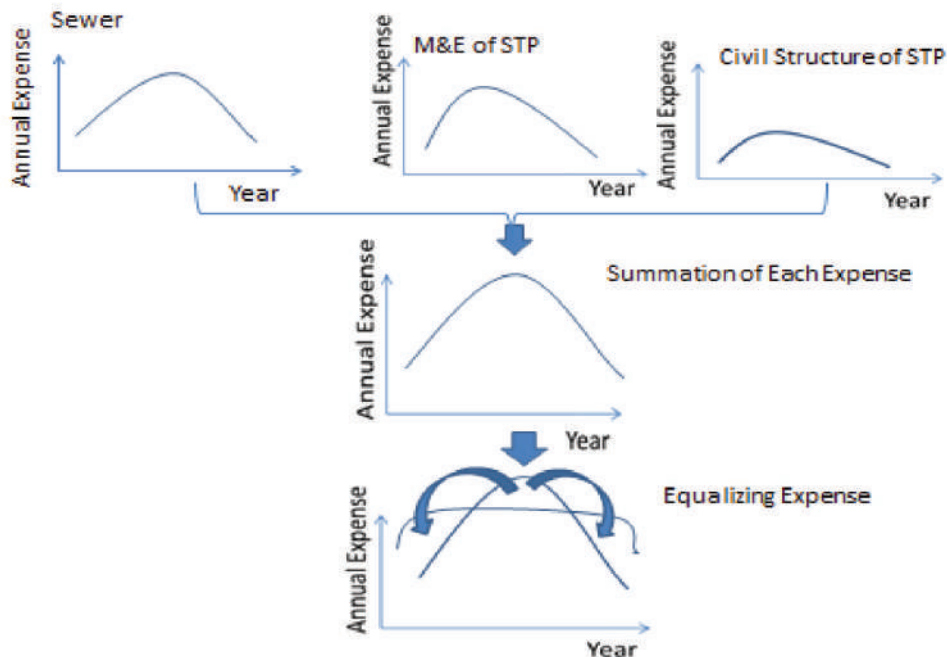
Figure C8.1.5 Method for Calculating Life Cycle Cost Reduction

The procedure is described below:

- Decide the assessment periods prior to and after the action.
- Calculate the life cycle costs generated within the assessment periods and the mean annual costs before and after the action.
- Calculate the cost reduction in each fiscal year by subtracting the mean annual cost before the action from the mean annual cost after action.
- Calculate the improved life cycle costs by rebating the improved costs for each year into the time of assessment using social discount rate and summing up.

### 1.3.3. Establishment and Execution of New Construction, Repair and Renewal Plan

To begin with, the annual budget base of the three facility management plans should be calculated considering minimisation of life cycle cost and should be summed up. As a follow up, the budget should be reallocated to each plan considering in the order of importance the probability of accident and failure and their consequence in the future. The procedure for new construction, O&M and renewal plan is shown in Figure C8.1.6.



Source: MLIT, 2008a

Figure C8.1.6 Procedure for New Construction, O&M and Renewal Plan

### 1.3.4. Building up Information System and Execution

Sustainable facility management plan requires information on construction, conditions of facilities, results of diagnosis, maintenance and rehabilitation, accidents, failures, and consumer complaint records to be maintained systematically. Setting up of an information system is important for effective use of these data.

### 1.3.5. Organisation

It is essential to disseminate the importance and concept of the AM for enhancement of the organisation. The concept of the AM may vary from person to person in an organisation. Development of human resources is vital for promoting the AM concept.

## 2. Asset Documentation and Disclosure

Users are not only beneficiaries of sewerage services, but also the main players because they are the users of sewer connections and pay the tariff. Accountability to local residents should be fulfilled using the stock management method that regards new construction, maintenance and reconstruction and rehabilitation as one process. Therefore, public involvement is needed as follows:

- Initial stage of AM: When the service level of AM plan is decided, public involvement is necessary. After completing the AM, documentation should be disclosed to the public by Internet, information bulletin or relevant counter at the city hall.
- Assessment stage of AM: When AM plan is assessed, public involvement is necessary. After assessing AM plan, documentation should be disclosed by Internet, information bulletin or relevant counter at the city hall.

For public officials, AM documentation enables easy communication with the users.

### 3. Periodical Asset Assessment

The AM is a long or middle term plan and is based on many assumptions. It is necessary to periodically check and assess the progress of the plan on the basis of plan-do-check-act (PDCA). If there is some deviation, the AM plan needs to be modified by the cause analysis. In addition, periodical asset assessment is essential to cope with the social needs and changes toward sewage works. Since the prepared AM plan is based on assumption such as asset risk and estimation of necessary budget, periodical review and fine tuning of the plan is necessary.

## 4. Asset Management for Sewage Treatment Plant and Pumping Station

### 4.1. Outline of Method of AM for Sewage Treatment Plant and Pumping Station

#### 4.1.1. Civil Structures in STP

- Civil structures in STP are located on the ground surface and hence are visible.
- Concrete structures are damaged by chemical corrosion induced by hydrogen sulphide (H<sub>2</sub>S).
- H<sub>2</sub>S is produced from sewage or sludge under anaerobic conditions and eventually could become sulphuric acid and react with concrete and other materials to corrode them.
- Confined places with high hydrogen sulphide need precautions to be taken.
- $D = k \times \sqrt{C} \times T$  where D= depth of corrosion (mm), C: Average concentration of Hydrogen sulphide (ppm), T: Service years, k: constant
- Diagnoses in future are based on accumulation of inspection and survey data and soundness of civil structures in the future is predicted. Table C8.1-2 shows example of class of condition of soundness of civil structures. Table C8.1-3 shows example of evaluation sheet for civil structure.

### 4.2. M&E Equipment

Objectives:

- a) Quantitatively understand the conditions of facilities in terms of “soundness” to ensure the safety of the facilities and maintain them in good condition.

Table C8.1.2 Example of Classification of Condition of Soundness of Civil Structures

Grade	State of structure	Action
5	No functional problem when installed first	No measures are needed.
4	State indicates that although the structure is functional, sign of deterioration have appeared.	No measures are needed. (ordinary maintenance is adequate)
3	State indicates that though deterioration has progressed, the structure is functional.	Deterioration has progressed. Recover function of the structure is by repair.
2	State indicates that though deterioration is severe, the structure is functional.	Large scale repairs are needed such as reconstruction or rehabilitation.
1	State indicates the structure is non-functional. (non-functional and cannot withstand long term use )	Reconstruction or rehabilitation is necessary.

Source: MLII, 2008a

Table C8.1.3 Example of Evaluation Sheet (civil structure)

Item	Aging Phenomenon		Aging Range		Assessment		Class of Condition
					Aging Phenomenon	Aging Range	
Crack	A	Hair crack	a	10% or less of whole area			
	B	0.2 mm or less	b	10% to 50%			
	C	0.2 mm or over	c	50% or more			
Looseness	A	Confirmed by test hammer	a	10% or less of whole area			
	B	Confirmed visually	b	10% to 50%			
	C	Flaking	c	50% or more			
Water Leakage	A	Bleed	a	0-1 in visual field			
	B	Dripping	b	2-4 in visual field			
	C	Gush	c	More than 5 in visual field			
Rebar Corrosion	A	Spot rust, partially rust fluid	a	Not continuous			
	B	Rust, no loss of cross-section, plenty rust fluid	b	Continuous			
	C	Noticeable rust, loss of cross section, noticeable rust fluid (what is strain??)	c				

Source: MLIT, 2008a

- b) Minimise the life cycle costs of the entire facility by keeping it in a good condition to enable rational reconstruction and repair plans to be drawn up.
- c) Draw up project plans in which balancing of expenses and prioritisations are considered to actualise sound management of sewerage projects.

Macro management is a “strategic” level for preparing a long (middle)-term plan of repair and reconstruction in a STP.

Micro management is a “tactical and operational” level of preparing a plan for repair and reconstruction of each facility. Results of micro management should be fed back to macro management.

Criteria: Plant managers can easily know a suitable time of replacing or improving aging facilities at their STPs, thanks to a classification scheme (class 1-5) of conditions of facilities.

The PDCA Cycle is an essential element of AM. These Plan-Do-Check-Act stages are to be carried out in a cyclic way as follows:

- Plan: Plan an action aimed at improvement
- Do: Check regularly and carry out detailed survey
- Check: Evaluate condition of facilities with data obtained in the Do stage
- Act: Implement measures and improvements

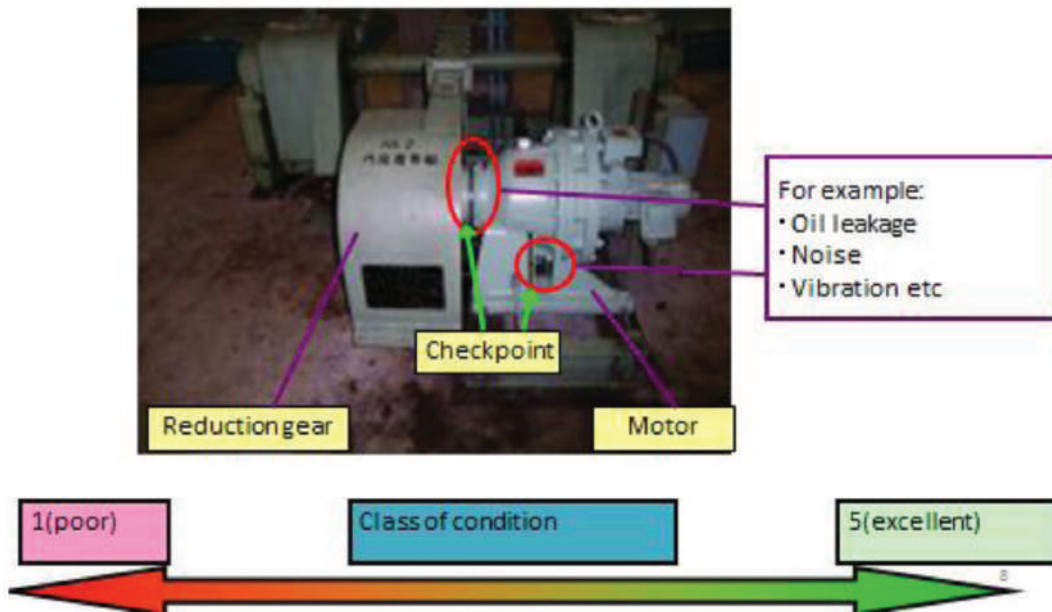
#### **4.2.1. Micro Management**

Regular check and detailed survey for each facility at STP is carried out. The level of condition (soundness) is selected from 1 (as poor) to 5 (as excellent), based on oil leakage, noise, vibration, etc. The survey for condition assesment is shown in Figure C8.1.7.

The level of condition is assessed by the prepared evaluation sheet Figure C8.1-8. The example of scenarios for management is shown in Figure C8.1-9.

Storing the data of “Class of condition” enables improvement in correlation curves of individual facilities. The more data is obtained, the more accurate the prediction of the future condition of individual facilities. Figure C8.1-10 shows the prediction of the future condition of individual facilities. These data are fed to a specific database (DB) system for AM.

Example : reduction gear and motor of sludge collector)



Source: Matsui, 2009

Figure C8.1.7 Survey for Condition Assessment

(Example : sludge collector)

Check device	Check parts	Check item	Aging phenomenon	Aging Area	Value of each item
Driving gear	Reduction gear	wear	Not found/ Found	Not found/ A little broad/ Broad	3.5
		rust	Not found/ Rust as dots/ Rust on surface/ corrosion	Not found/ A little broad/ Broad	2.9
		time	23 years	—	3.1
Main shaft	...	...	...	...	...

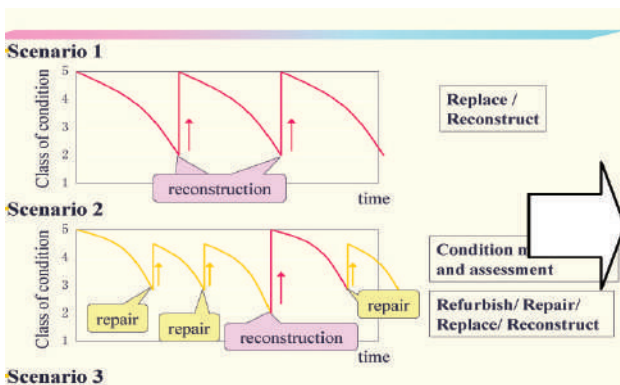
Source: Matsui, 2009

Condition Assessment

(Example : sludge collector)

Check device	Check parts	Check item	Value of each item	Class of parts condition	weight ratio	Class of condition
Driving gear	Reduction gear	wear	3.5	2.9	10%	2.9
		rust	2.9			
Motor	Motor	temperature	4.5	3.2	10%	
		time	3.2			
Main shaft	Shaft	...	...	2.8	40%	
		Bearing	...	4.0	10%	
...	...	...	...	...	...	...

Figure C8.1.8 Example of Evaluation Sheet



Source: Matsui, 2009

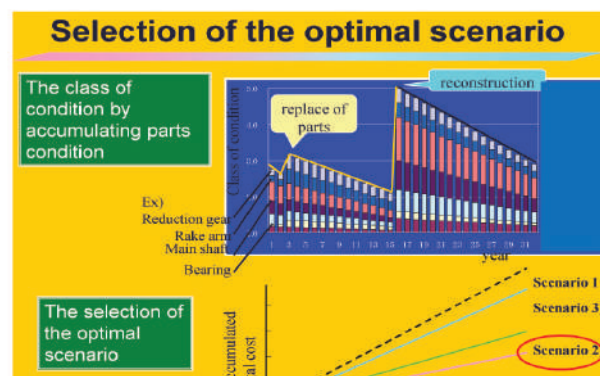
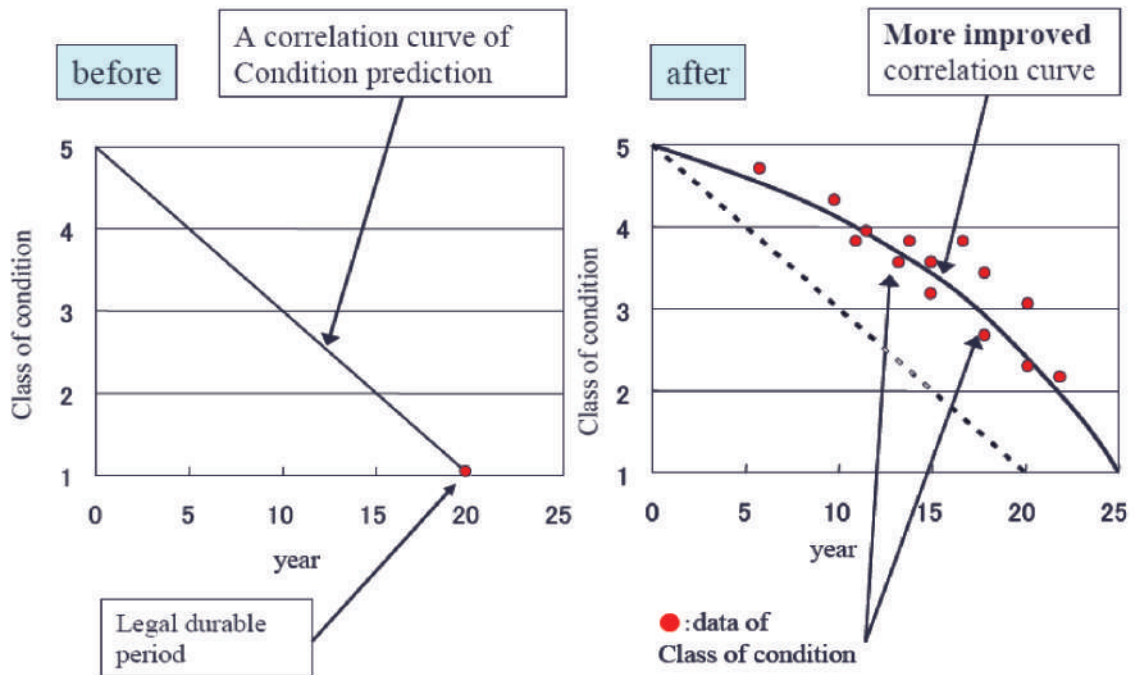


Figure C8.1.9 Examples of Scenarios for Management



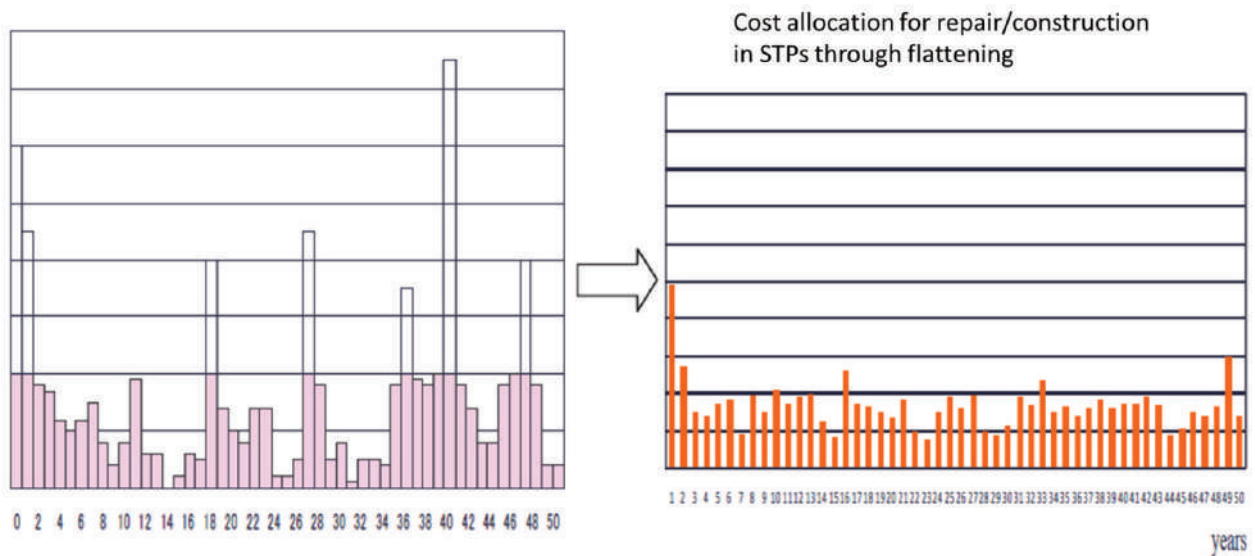


Source: Matsui, 2009

Figure C8.1.10 Prediction of the Future Condition of Individual Facilities

**4.2.2. Macro Management**

Macro management is undertaken at the “strategic” level and includes preparation of a long (middle)-term plan of repair and reconstruction in case of a STP. Data related to all facilities will be integrated and used for reviewing budgets of local governments and equalizing budget of repair and reconstruction considering the risk. Figure C8.1-11 shows the benefits of AM in strategic planning.



Source: Matsui, 2009

Figure C8.1.11 Benefits of AM in strategic planning

## **5. Asset Management for Sewer**

### **5.1. Outline of Method of AM for Sewer (Example Practised by NILIM)**

This concept of AM for sewers was developed by the National Institute for Land and Infrastructure Management (NILIM), which is a national research and experimental institute under the Ministry of Land, Infrastructure, Transport, and Tourism, Japan (MLITTJ) NILIM performs comprehensive surveys, testing, research, and development concerning the planning and drafting of policies regarding technology for the provision of infrastructure. The results of research enable provision of high quality infrastructure through planning and implementing projects in the relevant sector.

Objectives:

- a) Quantitatively understand the conditions of facilities as “soundness” to ensure the safety of the facilities and maintain them in good condition.
- b) Minimise the life cycle costs of the entire facility by keeping it in a good condition to enable rational reconstruction and repair plans to be drawn up.
- c) Draw up project plans in which balancing of expenses and prioritisations are considered to actualise sound management of sewerage projects.
- d) Fulfil the accountability to local residents using the stock management method that regards new construction, maintenance and reconstruction and rehabilitation as one process.

Methods:

- a) Preparation of a database on sewers, road sinkholes, and pictures from CCTV cameras to understand the present condition of sewers and compilation of data.
- b) Drawing up of mid- and long-term financial plans for securing project funds.
- c) Drawing up of mid- and long-term maintenance plans for deciding priority projects so as to minimise risks.

### **5.2. Macro Management and Micro Management**

#### **5.2.1. Macro Management Scope**

The survival ratio prediction formula to be used for predicting future project costs was investigated as a study topic on financial stock management. The formula should be used for deciding the following items for drawing up plans for future projects:

- How long is the malfunctioning sewer that needs to be reconstructed at that point of time,
- How fast will the length increase,
- What length of sewer will need to be reconstructed or repaired every year?

Grading criteria for sewer span and criteria of sewer condition assessment are shown in Table C8.1-4 and Table C8.1-5.

Table C8.1.4 Example of Grading Criteria for Sewer Span

Emergency	Category	Criteria of Assessment	Timing of Necessary Action
I	Critical	A dominant	Immediate
II	Bad	Few A & B dominant	Within 5 years after makeshift repair
III	Not well	No A, few B & C dominant	In 5 years or later after makeshift repair

Source: Sakakibara, 2009

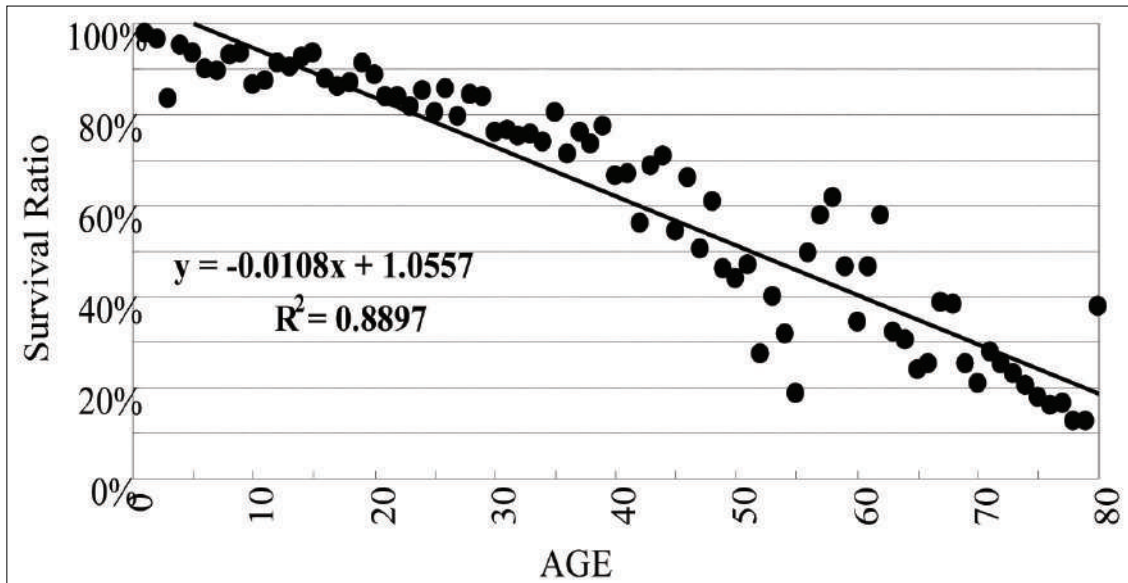
Table C8.1.5 Example of Criteria of Sewer Assessment

Mode by Span Basis	A	B	
Corrosion	Exposed metal bar	Exposed gravel	Rough wall
Sag	Diameter or over	Half diameter or ver	Below half diameter

Mode by pipe basis	a	b	c
Fracture	Partially missing or longitudinal crack of 5 mm or over	Longitudinal crack of 2 mm or over	Longitudinal crack of below 2 mm
Crack circumferential	5 mm or over	2 mm or over	Below 2 mm
Joint	Displaced	70 mm or over	Below 70 mm open
Leak	Splashing	Running	Surface stain
Lateral projection	Half diameter over	1/10 diameter or over	Below 1/10 diameter
Root intrusion, grease slime	Half diameter or over blocked	Below half diameter blocked	Na
Mortar	30 % diameter or over blocked	10 % diameter or over blocked	Below 10 % diameter blocked

Source: Sakakibara, 2009

The approximated equation, i.e.,  $y = -0.0108x + 1.0557$  shows that the survival ratio after correction becomes 50% after 51 years of service. Figure C8.1-12 shows the survival ratio prediction formula. This means that a half of the entire sewer system deteriorates after 51 years of service and requires reconstruction and/or repairing. The approximated slope of minus 0.0108 shows that 1.08% of sewers deteriorates every year, or in other words, 1.08% of sewers require reconstruction and/or repairing every year. Life cycle costs will need to be calculated based on this or similar concept.

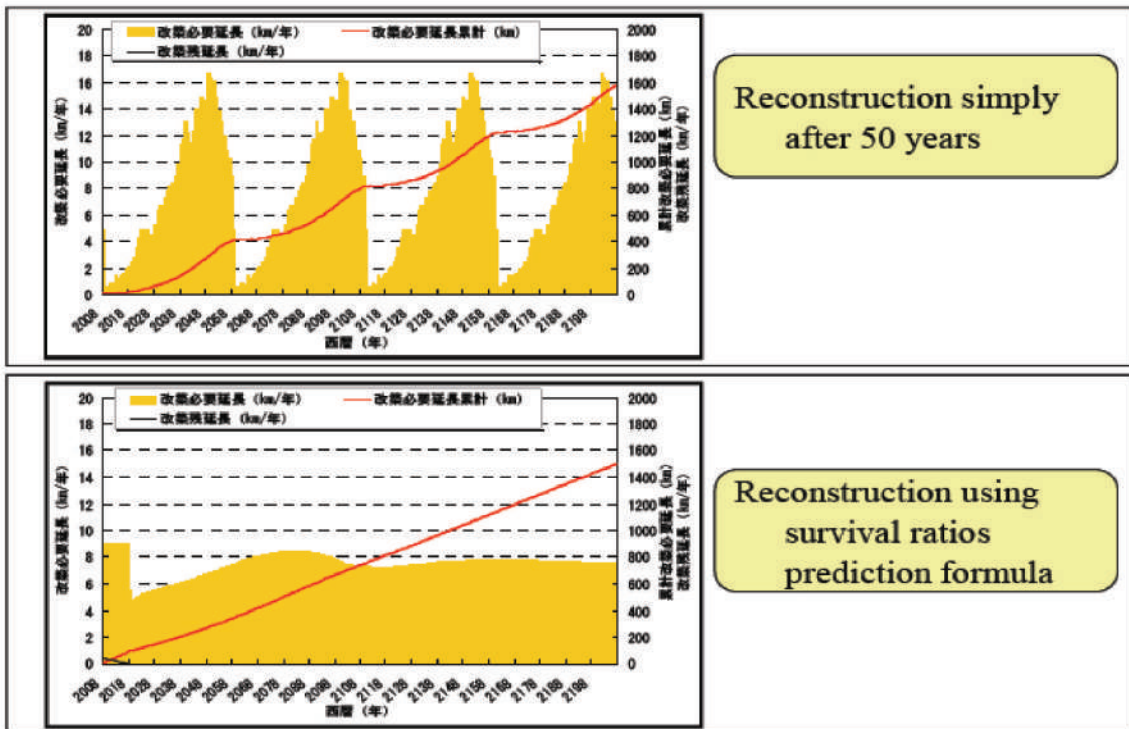


Source: Sakakibara, 2009

Figure C8.1.12 Survival Ratio Prediction Formula

Definition of ‘Dead’ sewers for Survival Curve using Survey data (SCS) is given as:  
 Dead: Emergency I+II because most municipalities rehabilitate Emergency I+II sewers in Table C8.1-4.

The future reconstruction volume in a model city is estimated using ASR formula as in Figure C8.1-13  
 The prediction of the upper chart of Figure C8.1-13 shows simple case of reconstruction of 50-year old sewers. The lower chart shows application of ASR formula. The lower chart is much flatter than the upper one. The peak reconstruction reduced half from 16 km to 8 km annually.



Source: Sakakibara, 2009

Figure C8.1.13 Prediction of Future Reconstruction Volume

### **5.2.2. Micro Management Scope**

The tools are to be used for deciding the following items for drawing up plans for deciding project priority to cope with limited funds:

- Where to start surveying, reconstructing and repairing sewers,
- Which sewer is vulnerable to malfunction,
- How large is the damage caused by malfunction such as road sinkhole.

### **5.2.3. Overview of Nationwide Survey on Road Sinkholes**

In FY2006, 4,411 cases of road sinkhole occurred in Japan. The frequency of road sinkhole was calculated by using the age of main sewers and the data of sewer length constructed in each fiscal year and by computing the number of sinkhole cases per 100 km of sewer for each causal part. The age of main sewers was limited to 75 years or newer.

The frequencies were in an exponential relationship with the age of the main sewer for all causal parts. Approximation curves for sewers older than 30 years showed large differences among the parts, with an especially high frequency for lateral sewers. This suggested that the frequency of road sinkhole can be predicted for each causal part by the age of the sewers. Combining this method with the assessment of social impact by road sinkhole, will enable comprehensive risk assessment to be made and a priority-based stock management method to be established. In general the number of damages to sewers by way of cave in type of failures were the highest incidence for lateral sewers and lowest for manhole related.

**APPENDIX 9.1 SERVICE LEVEL BENCHMARKS DESCRIBED IN MOUD HANDBOOK**

Table C9.1-1 Indication of Service Level Benchmark (Sewerage Management)

No.	Indicator	Method of Calculation	Remark
2.2.1	Coverage of toilets (%)	Coverage of toilets = $[b / a + b] * 100$	a) Total number of properties having access to individual toilets or community toilets within individual toilets or community toilet within walking distance in the service area (number) b) Total number of properties without individual toilet or community toilet within walking distance (number)
2.2.2	Coverage of wastewater networks (%)	Coverage of waste water network services = $[b / a] * 100$	a) Total number of properties in the service area (number) b) Total number of properties with direct connection to the sewerage network (number)
2.2.3	Efficiency in collection of waste water (%)	Collection efficiency of waste water networks = $[c / ((a+b) * 0.8)]$	a) Total water produced (mld) (or) month (mld) (or) month b) Estimated water use from other sources (mld) (or) month (mld) (or) month c) Wastewater collected (mld) (or) month
2.2.4	Adequacy of treatment capacity (%)	Adequacy of treatment capacity = $[c / ((a+b) * 0.8)]$	a) Total water consumed (million litres per day (or) month) b) Estimated water use from other sources (million litres per day (or) month) c) Treatment plant capacity (million litres per day (or) month)
2.2.5	Quality of treatment (%)	Quality of treatment = $[b/a] * 100$	a) Total number of wastewater samples in a month b) Number of samples that pass that specified secondary treatment standards
2.2.6	Extent of recycling or reuse of waste water (%)	Extent of waste water recycled or reused = $[b/a] * 100$	a) Wastewater received at the treatment plants (million litres per day (or) month) b) Wastewater recycled or reused (million litres per day (or) month)
2.2.7	Extent of Cost recovery in waste water management (%)	Cost recovery = $[b/a] * 100$	a) Total annual operating expenses (Rs Crores) b) Total annual operating revenues (Rs Crores)
2.2.8	Efficiency in redressal of complaints (%)	Efficiency in redressal of complaints = $[b / a] * 100$	a) Total number of sewerage related complaints (Number per month) b) Total number of complaints redressed within the month received per month (Number per month)
2.2.9	Efficiency in collection of sewerage charges (%)	Collection Efficiency = $[(a / b) * 100]$	a) Current revenues collected in the given year (Rs. crores per annum) b) Total operating revenues billed during the given year (Rs. crores per annum)

Source: CPHEEO, MoUD, Handbook On Service Level Benchmark

Table C9.1-2 NMSH Indices for Sanitation (sewage part) (distinct from Indicators in SLB framework)

S. No.	Index	Sector of sustainability / Vulnerability reduction	Climate Change Issue	Calculation	Suggested Values for Index			Explanation	Reporting by
					Ideal	Sustainable	Range		
1	Financial sustainability Index in sewage management sector	Overall health of sewage management services	Adaptation & Mitigation	(Revenue from sewage related charges + sale of treated / untreated waste water) / Total O&M cost of sewage management services	>1.00	1.00	1.00 and above	This is a reciprocal of operating ratio but also accounts for revenues from sale of sewage/ treated sewage	City
2	Safe Septage Management Index	Vulnerability reduction	Adaptation & Mitigation	(Septage collected & safely treated in a day/ month/year)/ (Total Septage sludge cleared/ extracted in a day/month/ year)	1.00	0.90	0.90-1.00	Safe septage management mitigates GHG emissions besides reducing disease burden. It is also an adaptive measure for treating human excreta with lesser capital costs than full-fledged water carriage and treatment systems Safe septage management mitigates GHG emissions besides reducing disease burden. It is also an adaptive measure for treating human excreta with lesser capital costs than full-fledged water carriage and treatment systems	City
3	Resource recovery Index for sewage		Adaptation & Mitigation	(energy generated from STPs)/ (energy consumed in STPs)	-----	-----	0.5-1.0	by resource recovery, climate change can be mitigated and also improve financial health of utility	City
4	Energy Efficiency in Sewage Sector	Efficiency in energy utilisation	Mitigation	$\sum(\text{power factor recorded X connected load at a station... summation of all stations}) / \sum(\text{contracted power factor X connected load at a station... summation of all stations})$	0.98	0.90	0.9-0.98	Improving energy efficiency has all-round salutary effect- such as reducing GHG emissions; reducing energy costs for utilities; reducing energy shortages and making energy available for more economic activities	City (from power bills)

S. No.	Index	Sector of sustainability / Vulnerability reduction	Climate Change Issue	Calculation	Sustainable			Explanation	Reporting by
					Ideal	Range	Range		
5	Flood Vulnerability Index for STPs	Overall health of sewage management services	Adaptation & Mitigation	$\Sigma$ (treatment capacity lower than local HFL line) / Total Treatment Capacity	.....	Should show improving trend every year	Treatment facilities are usually built in the lower topography. Hence vulnerable to flooding/ sea water rise in CC scenarios. They have to be built/retrofitted to function fully under such scenarios to prevent disease and protect water supply in downstream areas, besides preventing pollution of water bodies and ground/sea etc.	City	
6	School Sanitation Index	Awareness Generation & Behavioural Change		(No. of Schools rated for sanitation this year) / (No. of Schools rated for sanitation last year)	.....	Should show improving trend every year	This can indicate the future societal changes that can be brought about by students who are aware & practice good sanitation	City	
7	Public Toilet Sanitation Index	Behavioural Change & Citizen Services		(No. of Public Toilets rated for sanitation this year) / (No. of Public Toilets rated for sanitation last year)	.....	Should show improving trend every year	This can be a measure of preventing not only open defecation but making the cities friendly to vulnerable sections and tourists etc.	City	
	Training & Capacity Building Index in sewage sector	Capacity Building		(Expenditure incurred in Training & Capacity Building—sewage Sector) / (Total expenditure in sewage sector or total municipal expenditure)	.....	0.25% to 0.50%	Climate Change issues can be institutionalized through training and capacity building of personnel engaged in sewage management services	City	
9	Awareness Generation Index	Social awareness & citizen responsibility	Adaptation	(Expenditure incurred on IEC etc. on WS issues) / (Total expenditure in Water supply sector or total municipal expenditure)	.....	0.25% to 0.50%	Developing partnerships with citizens in mitigating effects of climate change	City	

Source: CPHEEO, MoUD, Report of the Committee set up to frame National Sustainable Habitat Standards for the Urban Water Supply and Sanitation sector



## APPENDIX C.9.2 PERFORMANCE INDICATORS (PI) FOR ENHANCEMENT OF SEWERAGE

### 1. SERVICE

Performance indicators (PIs) can be considered as a management tool to evaluate the degree of an undertaking's efficiency and effectiveness. Efficiency is the extent to which the resources of an undertaking are utilised to provide the services, e.g. maximising services delivery by the minimum use of available resources. Effectiveness is the extent to which declared OI imposed objectives, such as levels of services, are achieved. PIs can also be used for quantitative comparative assessment of performance. This quantitative comparison can be conducted between undertakings, or historically within an undertaking comparing the past and present or actual performance against the pre-defined target.

International Water Association (IWA) developed PIs for water- supply services and published "Performance Indicator for Water Supply Services" in the year 2000 and wastewater services namely "Performance Indicator for Wastewater Services" in the year 2003, respectively. International Organisation for Standardization (ISO) developed international standards regarding activities related to drinking water and wastewater services and published "Guidelines for the Assessment and for the Improvement of the Service to Users: ISO 24510". "Guidelines for the Management of Wastewater Utilities and for the Assessment of Wastewater Services: ISO 24511" and "Guidelines for the Management of Drinking Water Utilities and for the Assessment of Drinking Water Services: ISO 21512" in 2007. ISO 21500s are guidelines for evaluation of entire wastewater services, and their aim is to enhance the efficiency of undertakings and services. PIs used for evaluation are key factors.

Performance of an undertaking can be evaluated from various aspects and wastewater services are composed of numerous complicated activities. Therefore, a number of PIs have been developed and made available. Wastewater services in different countries have different histories, and they have different roles. Therefore, selection of proper PIs for each undertaking is most desirable.

In Japanese national guideline namely "Guideline for Improving O&M of Wastewater Systems", 2007 Japan Sewage Works Association, PIs are composed of Context Information (CI) for undertaking, system and district, Performance Indicators (PI) for operation, users, services, management and environment and References. CIs and PIs of the Japanese guideline are shown in Table C9.1-3.

### 2. Context Information (CI)

Context information means background information of a district about legal framework, geological conditions, population, and capacity of facilities, conditions for operation and maintenance and environment, CIs are composed of 25 items and categorized as follows.

#### i) Characteristics of an undertaking

9 items (name of undertaking, application of local public entity law, name of project, scale of project, number of employee, etc.)

#### ii) Characteristics of a project

12 items (population in administrative district, served population, population density, service ratio, etc.)

iii) Characteristics of a district

4 items (annual rainfall, average temperature, future population (100 in 2000), classification of receiving water body, etc.)

### Performance Indicators (PI)

Performance indicator means indicator to evaluate quantitatively results and levels of operation and maintenance service. PIs are composed of 56 items, and categorized as follows.

Table C9.1-3 PIs

Category	Performance Indicator (PI)	Calculation Formula	Improvement
Improvement			
Op10	Ratio of age of facility (sewer)	Total length of sewers exceeding life time / Total length of sewers maintained × 100	↓
Op20	Ratio of inspected sewer	Total length of inspected sewers / Total length of sewers maintained × 100	↑
Op30	Ratio of repaired sewer	Total length of repaired sewers / Total length of sewers maintained × 100	↑
Op40	Ratio of inspected house connection	Number of inspected house connection / Total number of house connection × 100	↑
Op50	Number of repaired house connection (per 100,000)	Number of repaired house connection / Total number of house connection × 100,000	↑
Op60	Number of collapse per 1 km of sewer	Number of collapse / Total length of sewers maintained	↓
Op70	Maintenance cost per 1 m of sewer	(km) Maintenance cost for sewers / Total length of sewers (m)	↓
2. Operation (wastewater treatment) (12 Items)			
Ot10	Ratio of age of main equipment	Total age of main equipment / Total average life time of main equipment × 100	↓
Ot20	Ratio of marginal wastewater treatment capacity	(1 - Daily maximum DWF / Design capacity for DWF) × 100	↑
Ot30	Ratio of emergency power source security	Number of WWTPs with emergency power source / Total number of WWTPs × 100	↑
Ot40	Ratio of earthquake-resistant facilities	Number of earthquake-resistant buildings / Number of buildings to be earthquake-resistance × 100	↑
Ot50	Compliance with discharge standard (BOD)	Number of tests complied with standard (BOD) / Total number of tests (BOD) × 100	↑
Ot60	Compliance with standard (COD)	Number of tests complied with standard (COD) / Total number of tests (COD) × 100	↑
Ot70	Compliance with standard (SS)	Number of tests complied with standard (SS) / Total number of tests (SS) × 100	↑
Ot80	Compliance with standard (T-N)	Number of tests complied with standard (T-N) / Total number of tests (T-N) × 100	↑

Category	Performance Indicator (PI)	Calculation Formula	Improvement
Ot90	Compliance with standard (T-P)	Number of tests complied with standard (T-P) / Total number of tests (T-P) × 100	↑
Ot100	Compliance with standard of odor	Number of tests complied with standard of odor / Total number of tests of odor × 100	↑
Ot110	Unit power consumption (wastewater treatment)	Power consumed (wastewater treatment) / Total wastewater treated	↓
Ot120	Unit disinfection chemical usage	Annual consumption of chemical / Total wastewater treated	↓
3. User Service (17 Items)			
U10	Provision of storm water drainage	Area with storm water drainage / Total planning area × 100	↑
U20	Compliance with legal water quality standard for water body (BOD)	Number of samples complied with legal standard (BOD) / Total number of legal tests (BOD) × 100	↑
U30	Compliance with legal water quality standard for water body (COD)	Number of samples complied with legal standard (COD) / Total number of legal tests (COD) × 100	↑
U40	Compliance with legal water quality standard for water body (SS)	Number of samples complied with legal standard (SS) / Total number of legal tests (SS) × 100	↑
U50	Compliance with legal water quality standard for water body (T-N)	Number of samples complied with legal standard (T-N) / Total number of legal tests (T-N) × 100	↑
U60	Compliance with legal water quality standard for water body (T-P)	Number of samples complied with legal standard (T-P) / Total number of legal tests (T-P) × 100	↑
U70	Compliance with legal water quality standard for water body (E-coli)	Number of samples complied with legal standard (E-coli) / Total number of legal tests (E-coli) × 100	↑
U80	Sewer Blockages (per 100,000 persons)	Number of sewer blockages / Served population × 100,000	↓
U90	Third party accidents (per 100,000 persons)	Number of third party accidents Served population × 100,000	↓
U100	Complaints (per 100,000 persons)	Number of complaints/ Served population × 100,000	↓
U110	Response to complaints	Number of complaints responded within one week / Total number of complaints × 100	↑
U120	Service charge (residential)	According to local government	—
U130	Unit operating cost per person (O&M)	Operating cost (O&M) / Served population	↓
U140	Unit capital cost (capital)	Capital cost (wastewater) / Served population	↓
U150	Unit cost (O&M + capital)	Cost (wastewater) / Served population	↓
U160	Unit revenue per staff	Revenue / Number of staff	↑
U170	Unit revenue water per staff	Annual volume of revenue water / Number of staff	↑
4. Management (13 items)			
M10	Unit revenue water per person per day	(Annual revenue water / number of days) / Served population	↑
M20	Accounted-for water	Annual accounted-for water / Total treated wastewater × 100	↑
M30	Current balance	Gross earning / Total cost × 100	↑
M40	Transfer ratio (profitable earning)	Transfer / Profitable earning × 100	↓
M50	Transfer ratio (capital earning)	Transfer / Capital earning × 100	↓
M60	Unit revenue	Total revenue / Total accounted-for water	↑
M70	Unit wastewater treatment cost	Wastewater treatment cost / Total accounted-for water	↓
M80	Unit wastewater treatment cost (O&M)	Wastewater treatment cost (O&M) / Total accounted-for water	↓

Category	Performance Indicator (PI)	Calculation Formula	Improvement
M90	Unit wastewater treatment cost (capital)	Wastewater treatment cost (capital) / Total accounted-for water	↓
M100	Cost covering ratio	Service charge revenue / Wastewater treatment cost × 100	↑
M110	Cost covering ratio (O&M)	Service charge revenue / Wastewater treatment cost (O&M) × 100	↑
M120	Cost covering ratio (capital cost)	Service charge revenue / Wastewater treatment cost (capital) × 100	↑
M130	Working accidents (per 1 million m <sup>3</sup> treated wastewater)	Number of accidents which caused 4 days of absence or more / Total wastewater treated × 1,000,000	↓
5. Environment (7 items)			
E10	Pollutant reduction ratio in dry weather (BOD)	(1 - Effluent BOD / Inflow BOD) × 100	↑
E20	Wastewater reuse	Wastewater reused / Total wastewater treated by advanced treatment × 100	↑
E30	Sludge recycle ratio	Sludge recycled / Total sludge generated × 100	↑
E40	GHG emission per person	GHG emission by sewerage service in terms of CO <sub>2</sub> / Served population	↓
E50	Compliance with standard for discharge to sewerage	Number of compliance with standard / Total number of samples × 100	↑
E60	Service ratio of advanced treatment for environmental standard	Population served by advanced treatment / Served population × 100	↑
E70	Improvement of combined sewer system	Area for which combined sewer system was unproved (ha) / Total area of combined sewer system (ha) × 100	↑

There are also indicators that are utilised for determination of higher policy or measure such as fulfilment of environmental policy, and enhancement of accountability and understanding of customers. References are composed with 34 items and categorised as follows.

i) Indicators for management analysis

8 items (Annual facility improvement ratio, total cost coverage ratio, average depreciation ratio, etc. indicators required when local public entity act is applied)

ii) Indicators for high degree analysis

12 items (Rehabilitation of aged sewer, ratio of earthquake resistant sewers, cost for countermeasures against flooding, etc., indicators for enhancement of various users understanding)

iii) Other indicators

14 items (energy cost, qualification holding ratio, repair cost for wastewater treatment plant, etc. indicators for more detailed management analysis)

Source: Guideline for improving O&M of wastewater systems Japan Sewage Works Association

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