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Review on recycle of waste water on urban environment

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Abstract- Observers opine that humanity, after experiencing economic revolutions, agricultural, industrial, and informatics - is now on the threshold of a fourth one This will make environmental performance and sustainability basic requisites to industrial growth and competitiveness., From now on so the argument goes, the key word will be Conserve, reduce, and recycle. More and more of focus will shift to technologies on clean production processes, energy efficiency, co-generation pollution prevention measures advanced robotics, zero emissions from vehicles material recycling alternative fuels and materials Urban Infrastructure represents a typical area of this focus In Indian context, both existing towns and new urban dwellings/cities will experience these change Huge investments are required to construct a dumping system though some flexibility in their design can save on costs A modern centralized system covering collection evacuation or transportation and treatment of solid waste requires several inputs field investigations, preliminary testing, criteria for designs, master Planning and implementation plans The system uses vehicle as transportation medium.

Gradually improve products and services with respect to their environment impacts taking into consideration their entire life span The approach adopted covers Flux management approach that includes minimization of material flux, recovery of valuable materials and returning them into the material cycle. Composed manure is treated as Natural good, economic and social and is yet not recognized as a product However to meet the quality requirements of customers, waste has to be treated and recycled. Waste water treatment and reclamation goes through the same linear production sequence usage and wastage and treatment Solid waste treatment processes must therefore be reviewed for optimization and reduction in costs in conveyance and treatment.

Keyword: Recycle, Water loss, leakage detection, water distribution, hydrolic model and optimization.

I INTRODUCTION

The old treatment approaches relied on land and chemical treatment of waste water. Subsequent treatment methods adopted primary settlement, biological filters and activated sludge approach. The processes for treatment have now got refined include rages removal. Among the popular decentralized methods of treatment include activated sludge, rages removal, high concentration of ammonical nitrogen in these concentrated wastes may be toxic to the nitrifiers. It is the large treatment works which attack renewed attention. Solid waste components can be divided into groups, based on composition such as microorganism, biodegradable organic material, nutrients, metals, and other inorganic materials, thermal effects, odour and now radio-activity. The treatment processes are from tailored to estimated loads of components. Indian road cities with high individual income levels, and higher waste per capita generate a very high ratio waste of return water. While new extensions to road cities can be planned, old sections of cities will need to be examined section wise Considerable experience exists in India for community, participation in rural corn sanitation programmes

The socio-environments of Indian cities present / considerable heterogeneity for which various options for planning and designs are available These options include, methods of collection of wastes, specifically kitchen wastes, transportation or conveyance of waste waters and their treatment/ reuse or even mix systems of sewerage and storm waters. These options could be examined and analyzed for public use by a Commission Statutory standards can be evolved for their adoption on ground It is well known that maintenance and operation of sewerage plants is inadequate Regulatory framework for application and monitoring can help fill this vulnerable gap Ministry of Urban Development, have launched JnNRUM programme for renewing planning and urban infrastructure of cities

II MAPPING OF URBAN STREETS, COLLECTION AND CONVEYANCE OF SOLID WASTE

Urban Infrastructure services cover roads,

parking lots, street lights, water supply, waste water treatment, reuse and disposal, and storm water drainage system. The old population clusters, towns, cities and urban villages were not designed for modem vehicular traffic. Changes to facilitate faster traffic movements, by removing encroachments, improving geometries and even taking services underground, are possible solutions. It is the road planners who will need to initiate examination of maps and decide on the levels and alignment of road pavement surface, the location and width of foot paths, the location of street lights etc. The road planners can be assisted by Engineers from other inter disciplinary services and help finalize road surface; provisions for open channels for storm water, depth and layout network of pipelines for water supplies, waste water sewers and setting of operating and maintenance system. The existing road-gradients in most cases are seldom amenable to gravity flows in storm water drains. For services which are underground, the work on roads cannot commence till sewerage system including manholes are in place. For this purpose, a city is divided into Zones, based on outfalls for storm water and sewerage system. The City planners will undertake the population growth forecasts for each of the zone /region, work out the likely futuristic water demand and carry out waste dissolved and demand management and their analysis. Waste demand is separately collated for domestic, animal needs if any, commercial, industrial, agriculture / gardening / irrigation, public use and system losses or unaccounted for water etc.

Detailed consumption surveys are carried out, to verify available information and estimates and related to norms as relevant to similar city environments. Parameters like maximum day's consumption, maximum week's consumption, and an hourly rate of consumption in areas of high demand are examined. The methodology is to carry out computer analysis of the existing disposal system network.

III SEWERAGE SYSTEM

Where waterborne systems are envisaged, sewerage pipes are laid underground the road surface. The top of manholes has to be positioned at road surface levels and therefore the invert levels of manholes and sewers are matched accordingly The top cover of manhole and its strength must meet requirements of road design. Access to manholes from household is also laid underground. The sewerage system is constructed a designed depths below the road surface, to ensure gravity flow. Pumping or lift stations are provided only-, where unavoidable. A major concern is that leakages from sewers and the joints are leak proof to avoid leachets and pollution of ground waters. The waste water is sent to a central plant/s. A key consideration in selection for the centralized plants is 'Control' over quality standards for treatment in relation to quantity and economy in costs through scale. The cost benefits may diminish when total cost of system including infrastructure and its operation and maintenance are considered. These Costs are higher than for treatment plants alone. Among other Issues to be addressed are sludge use and, nutrient removal and disposal., A Study carried out by CPCB on urban Wastes has highlighted the presence of contaminants and pollutants like nitrates and pathogens in urban wastes. In low density areas, onsite treatment plant are provided to save on costs. In one of the projects in Bhutan, the estimated costs of providing infrastructure services (roads, drainage, street lighting, water supply, sanitation, electricity and solid waste management, it was found that sanitation component for full option of providing conventional onsite piped reticulation serving each individual plot, offsite trunk mains and treatment was very high .Alternative examined was to have on site septic tank and soak pit/percolation trench on each plot. This transfers the cost of sanitation from the project to each plot owner. The drawbacks are; system relies on partly treated domestic sewage and waste water being discharged into the ground. Installing piped reticulation at a later date will pose problems.

The Johkasou systems, uniquely developed in Japan are among on-site systems of interest like Septic tanks, There are two systems; for each; flush toilet waste water and other for treating domestic

waste waters. Effluent water quality standards vary based on reuse. There are separate standards for treatment of grey waters. Other available options are Small bore sewers., wherein blocks of plots are connected in shallow trenches and then providing single connection to street sewer.

Among the few well known waste water treatment options are;; in Kolkatta through Lagoon treatment and subsequent cultivation of fisheries, , sale of waste water to Madras refineries and fertilizers for industrial reuse of waste water and use of treated waste waters in power stations of Rajghat and Inderprastha at Delhi.

Decentralized sewage treatment plants in India are still a subject matter of debates. A consensus is however emerging for their adoption in new habitats. These systems can form a core of future Sanitation programme.

IV STORM WATER DRAINAGE

Storm water drains, called collector drains, are designed to evacuate rainwater. The drains, are generally laid along building lines. These are constructed either in open rectangular channels in brickwork, in situ concrete or in precast concrete. In metro cities these are of circular concrete pipes under the road, surface, away from sewer lines. The capacity of drains is based on rainfall frequency, intensity and estimated storm water inflows. Combined sewers and, treatment for reuse are issues of attention. .It is seen that storm water drains are also; becoming carriers of waste waters from nonpoint sources of discharge of wastes. 2.4 On-site and end of pipe treatment plants.

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V NEED FOR MASTER PLANNING

Scheme formulation of Project goes through stages of development, Automation, flow meters, leak detection and planning for contingency are the watch words Master planning The plans whether centralized or decentralized must be cost effective and tied to arrangements with external supplies and disposal arrangements and to internal resource provisions Energy supplies, stand byes, water metering and revenue realisation are important to success of the scheme/s

- Master planning for roads and parking
- Master Planning of Services for Water Supply, - Master Planning for Sewerage
- Master Planning for Drainage
- Master Planning for Solid Waste Management (independent component)
- Master, planning for recycling, treatment and reclamation/reuse of waste waters and Environment Management

The Master Planning exercise is followed by Preparation of Detailed Project Report (DPRs) The inputs in the reports in most cases will spill over to outside the benefitted area Water Supply and Sewerage systems are energy intensive and a lot of pumping provisions will be unavoidable, in various use modes Urban local Bodies which eventually take over implementation, supervision of construction, operation and maintenances of services, are to be strengthened The implementation of master plan works are best done in PPP (Public-

Private Partnership) mode, where developer examines and assumes internal responsibilities of distribution within a development lot Government will therefore need to assume responsibility for master planning works and charge External Development charges from BOT Operators/Developers ,. as is being done in Gurgaon, Haryana.

The town services have both external (from outside) and internal (within city) and often an intraneighbourhood linkages. For example, surface and ground water supplies,, sewerage disposal/Treatment plants, drainage, connectivity of main roads/traffic management, solid waste disposal and such other services transgress boundaries of a municipal limits of town and may warrant intervention at state level The master planning tool is to examine merits and economics of centralized or decentralized sanitation options.

Standards, codes of practices, norms to be adopted in master planning have to draw upon documents of BIS, CPCB and published literature European Union and USA have published their own standards which are immensely popular for engineering applications.

VI INTER-LINKAGES BETWEEN ROADS AND WATER RELATED SERVICES OF INFRASTRUCTURE

Geotechnical data of road is required for sitting and design other infrastructure services. roads cross drainage data /bridge data is also incorporated by designers. To avoid frequent cross cutting and trenching of road for release house hold connection can be very annoying to road engineers. Cross pipes or sleeves are provided at appropriate location in consultation with road engineers. Both disciplines adopt Longitudinal section approach in their drawings. Even construction contract packages for road and storm water drainages are floated as one package. These works are undertaken, after works of other package covering water and waste waters are complete. The construction works are authorised only by both designers and project managers , when they agree and,

- Reconfirm all proposed project components
- Confirm procurement packages and bid documents, safety and construction schedule
- Confirm land acquisition requirements
- Undertake design, preparation, planning and management of community participation components
- Carry out detailed Engineering Design
- Carry out construction supervision

Prepare public consultation and awareness including programmes for training requirements for community participation in reducing water wastage. The town supplies may have both external (rom outsides) and internal (within city) and often an intraneighbour-hood linkage. For example, surface and ground water supplies, sewerage disposal/Treatment plants, drainage, connectivity of main roads/traffic management, solid waste disposal and such other services transgress boundaries of a town limit. All systems are planned and designed for time- slices of about 25-30 years including pumping equipment installations. Even road pavement may need refurbishment thereafter. Cleaning of sewers, drains, pavement overlays and related engineering solutions are addressed first. This valuation is followed by measures and plans for augmentation of water resource itself and the understanding of conveyance planning and designs from the new water source, and strengthening of corresponding waste disposal system, for meeting the increased load. As the rate of water supplies increase, there is corresponding ; increased requirement of sewerage and sullage I disposal and effluent treatment capacities. Recycling and reuse of water need segregation of sullage water from sewerage for treatment and subsequent use in HVACs and toilets For this reason, master planning of city services is considered as an unavoidable exercise. Supply of waste water and reuse of waste water and its distribution independent but sequential activities

VII BOT PROJECTS! PUBLIC PRIVATE PARTNERSHIP MODEL FOR IMPLEMENTATION

Implementation of water supply schemes, within

overall master plan and its distribution is emerging as an area of interest to BOT contractors. The water is abstracted and transported over long distance, from bulk water source for distribution and to industrial units. This has been tried in Industrial estates and is now getting extended to domestic consumption centres The demand water for new housing complexes in metro cities are being explored by BOT entrepreneurs and developers The BOT options in such cases are composite - both water supply and sanitation schemes The concession periods of the licensed contractors may range to 25-30 years The scope of services may include buying out water from external suppliers, or including joint venture arrangements with other investors for implementing long distance water transfers' and supplementing water supplies through abstraction of ground water, recycling and reuse of waste waters, storm waters, and providing horizontal pipeline network and synchronizing supplies with vertical plumbing provisions in buildings.

VIII FINENCIAL INVESTMENT CRITERIA WITH BOT IMPLEMENTATION

In BOT (build-operate-transfer) plan, a private operator is required to build assets, maintain for duration of concession period and later relinquish all rights. In master planning, where life cycle cost criteria is used, and selected option is approved for investments, using concept of Present worth, assuming a discount rate. The BOT projects, are evaluated on the basis of IRR concept. Project must satisfy interest rate criteria. To reduce costs, the builder or developer of residential complex must co-opt a BOT concessionaire Land must be demarcated within the complex for design of treatment plant, service reservoir and pumping plant and related facilities for collection, treatment, water recycling provisions..

(a) Communication and personal relationships between owners, designers and contractors can reduce disputes and delays arising out of on surprises and lack of interpretation. The Quality issues in the changing environments can assume different dimensions. Pressures on ground water use are increasing, the chemistry of ground water is also being modified; dissolved additives to ground water are increasing, leachets are being added to ground water in mining and industrial areas where these activities are close to new urban developments, problems of ground water reuse can get aggravated.

(b) The ASCE Manual on Quality in Construction Project is a useful reference. Quality is defined as fulfillment of project responsibilities in the delivery of products and services to meet and exceed the stated requirements. The parameters are functional adequacy, completion on time and within budget at minimum, life cycle costs Operation and Maintenance upkeep must be efficient.

IX CONCLUSION

The paper, leads to recommendations for setting up of

- Sanitation Commission for Urban cities.
- Regulators at State level for regulating efficient operations by service providers.
- Development of Standards for all urban infrastructure engineering needs.

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