# TAMIL NADU WATER SUPPLY AND DRAINAGE BOARD

**ABSTRACT**

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**TWAD BOARD - LESSONS LEARNT BASED ON THE IMPLEMENTATION OF UNDER GROUND SEWERAGE SCHEMES (UGSS).**

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**(PM WING)**

**B.P. Ms. No. 6** **Dated : 09.02.2011**

**Board's resolution No. 2.1/dated 12.01.2011**

**Order :**

The Government of Tamil Nadu has undertaken a number of UGSS under NRCP, NLCP, JnNURM, TNUDP III, etc, the status of which is given below:

**Status of UGSS in District Head Quarter Towns**

| | | |
|---|---|---|
| **Completed** | : | 7 Nos |
| (Tiruchirapalli, Karur, Tirunelveli, Thanjavur, Madurai, Udhagamandalam,Tiruppur,) | | |
| **Under Implementation** | : | 23 Nos |
| (Kancheepuram, Dindigul, Salem, Vellore, Erode, Coimbatore, Virudhunagar, Ramanathapuram, Namakkal, Thoothukudi,Cuddalore, Pudukottai, Sivaganga, Tiruvarur, Tiruvannamalai, Dharmapuri, Perambalur, Thiruvallur, Krishnagiri, Theni, Nagapattinam, Villupuram & Ariyalur ) | | |
| **Total** | **:** | **30 Nos** |

**Status of UGSS in other-than-District Head Quarter Towns**

| | | |
|---|---|---|
| **Completed** | : | 5 Nos |
| (Inam Karur, Mayiladuthurai, Alandur, Valasaravakkam & Kumbakonam) | | |
| **Under Implementation** | : | 13 Nos |
| (Pallavaram, Tirumazhisai, Ullagaram-Puzhuthivakkam, Maduravoyal, Tiruvottiyur, Madhavaram, Avadi, Ambathur Phase – I & III, Chinnamanur, Maraimalai Nagar, Udumalpet, Mamallapuram, Thiruchendur & Kodaikanal Lake) | | |
| **Total** | **:** | **18 Nos** |

Most of these UGSS have been implemented by TWAD Board and a few others by CMWSSB and the ULBs themselves. A number of key learning lessons have been learnt in the course of implementation of the various UGSS. It is necessary to document these lessons so that future projects are taken up / implemented in a better manner. The lessons learnt are relevant not only to TWAD Board, but also to CMWSSB and ULBs and they may be communicated to these agencies after the Board's approval.

The lessons learnt in the implementation of UGSS over the past 10 years (2000-2010) are set out below:

**(1) Selection of Urban Local Bodies:**

The prioritization & selection of Urban Local Bodies (ULBs) for undertaking UGSS was not done by TWAD Board or the other implementing agencies but is still worthy of analysis and review. While the first batch of UGSS under NRCP and NLCP were rightly taken up in cities and towns located on the banks of major rivers, and the second batch of UGSS under TNUDP III were rightly taken up in District Headquarters Towns and the suburban towns adjoining Chennai (with Chinnamanur, a small town, being an exception), the choice of some of the towns taken up under JnNURM seems to have been based more

on the “readiness of DPRs” than on considerations of public demand, ULBs’ financial capability, public capacity to pay, etc. Nearly 25 proposed UGSS in such smaller towns were rightly cancelled pursuant to a mid-term review by the Hon. Chief Minister in 2008. The public’s lack of interest is manifest in the form of numerous hurdles put in by way of agitations and litigation at every stage of implementation of the UGSS in several towns. The financial condition of almost all these ULBs has become critical because of the heavy borrowings related to UGSS. The roads in these towns have been completely spoilt as is inevitable when UGSS is implemented, and require a huge investment of about Rs.3,000 crores for full and permanent restoration which the ULBs are unable to fund. Improvement of road works is kept in abeyance for several years in towns where UGSS is proposed. This, along with the fact that UGSS implementation can take 6 years or more, and the ULBs do not have adequate funds for permanent restoration means that the public are put to hardship by way of poor roads for up to 10-12 years. There are limitations of contractual capacity with the same set of contractors taking up multiple UGSS and slowing things down. There are also limitations of monitoring capacity on the part of the implementing agencies as UGSS is a long-gestation and very difficult scheme to implement requiring very close monitoring. All the deserving towns (river side towns, district headquarters towns, major towns) have already been covered under UGSS with Nagercoil alone pending sanction under JnNURM in GoI. Further, taking up UGSS in smaller towns leads to a scenario where the (individual) house service connection deposit charges and monthly user charges become uneconomical due to the higher per capita investment and O & M expenses. This is iniquitous because people of smaller towns in general have to pay higher deposits and higher monthly user charges than the people of larger towns. The ULBs try to get over this problem by arbitrarily reducing the deposits and monthly user charges which jeopardises the economic viability of the project and imposes higher subsidy burden on the Government. While the Government may subsidise the capital cost of UGSS, no subsidy should be encouraged for the Operation & Maintenance (O &M) of

UGSS by the ULBs, the cost of which should be borne by the respective ULBs from their own funds and from the general devolution of Governmental grants.

Owing to these reasons, the Board resolved to recommend to Government **a self-imposed moratorium for at least 5 years from taking up UGSS in any more <u>new</u> towns,** with a review after 5 years as to whether the moratorium should be extended further.

If at all UGSS has to be taken up in the coming years, it should be only only in the **<u>uncovered areas of existing towns</u> where the UGSS is already completed or is under implementation** based on the following order of priority:

i. Corporations whose boundaries have been extended recently.

ii. Other Corporations.

iii. District Headquarters Municipalities, whose boundaries have been extended recently, and which are located on the banks of major rivers.

iv. District Headquarters Municipalities which are located on the banks of major rivers.

v. Other District Headquarters Municipalities.

vi. Other Municipalities which are located on the banks of major rivers.

**(2) Avoidance of multiple packages while tendering:**

At today's prices, a UGSS typically costs about Rs.50 lakhs per kilometre of street length inclusive of the cost of the Sewage Treatment Plant and excluding the cost of full road restoration. The total cost of a UGSS depends upon the total length of the streets covered and varies from Rs.3.75 crores (Maraimalai Nagar) to Rs.80 crores (Thoothukudi). As UGSS is a long-gestation and very difficult scheme to implement, it requires contractors with proven track record, excellent technical skills and sound finances. Ideally, the Collection System and the Sewage Treatment Plant(s) should have

been clubbed together as a single package and tendered out to attract the best of contractors, with a provision for 1 or 2 Joint Venture partners if needed. Instead, in almost all the UGSS so far taken up including the small ones, the Collection System alone has been divided into 2 to 6 packages and each STP has been made a separate package. This has had the effect of not only increasing the avoidable paper work relating to tendering and post-tendering but also of attracting mediocre contractors. There are serious problems in coordinating and synchronising the works of multiple contractors. There are also huge time over-runs and cost-overruns. Therefore the Board resolved that henceforth the entire Collection System and STP(s) of a proposed UGSS should be clubbed together **as a single package** and tenders called for in order to attract only competent bidders.

**(3) Avoidance of simultaneous digging up of roads throughout the town causing hardship to the public:**

There are 4 broad steps involved in the implementation of the Collection System of a UGSS:

(i) construction of manholes at approximately 30 metre intervals,

(ii) digging of trench and laying of sewerline connecting the manholes,

(iii) providing house service connections (HSCs) on either side of the road from each manhole, and

(iv) temporary restoration of the roads.

At present, the practice of the contractor is to dig up the manholes and trenches for sewerlines throughout (or a major part of) his package area rendering the roads unmotorable and causing enormous hardship to the public. The provision of house service connections is done after a considerable time lag (even 1 or 2 years) and followed up almost immediately with the temporary restoration of roads without proper consolidation of the filled up portions. Having multiple packages with several contractors digging from different points further aggravates this problem, and this is one more

justification for going in for a single big package. **Ideally, only a few roads (say 10) in a given locality – not contiguous roads but only alternate roads so that traffic is not disrupted – should be taken up at a time, and all the four steps listed above should be completed for these select roads, and only thereafter a new set of roads should be taken.** As regards step 4, it is not so much the time factor as the proper consolidation of the filled up portions roads that is necessary, and this should be done by the application of required quantity of water and the ramming of the filled up portions. **The contractor should be paid for this set of roads only when all the four steps have been completed.** The Board resolved that henceforth the contractor should be asked to submit a half-yearly action plan with month-wise break-up of the roads where he proposes to implement the Collection System keeping the above guidelines in mind and he should move on to the next set of roads only after the previous set is completed in all respects and he should be paid only after all the four steps have been completed. Part payment, if at all, can be done only for fully completed streets. (*Illustration:* If the contractor has proposed to complete 10 streets in a month and has completed only 6 streets, then part-payment can be made only for the 6 completed streets and not for the 4 incomplete streets).

**(4) Special care to be taken while digging up Bus route roads and in crowded areas:**

The procedure prescribed in (3) above is not suitable for bus-route roads and roads in crowded areas such as markets, hospitals, educational institutions, religious places, Government office complexes, etc. In order to minimise traffic disruption and hardship to the public, a set of roads or even a full road cannot be taken up at a time in such cases. Only the stretch of such roads between three manholes (about 60 metres) should be taken up at a time, and for this stretch too all the four steps listed in (3) above should be completed before moving on to the next stretch of the road between three manholes. In this case also, the contractor should be paid only after he completes all the four steps in the stretch taken up. Part payment,

if at all, can be done only for a fully completed portion between two manholes. (*Illustration*: If the contractor has proposed to do a 60 metres stretch between 3 manholes in a month and has fully completed only a 30 metre stretch between 2 manholes, then he should be paid only for this fully completed 30 metre stretch and not for the (remaining) incomplete 30 metre stretch).

It is important to advise the contractor to submit his half-yearly action plan with month-wise break-up in a such a way that important roads in crowded areas are not taken up during peak seasons. (*Illustration*: The road in the vicinity of a temple or market should not be proposed in the action plan during a festival month).

**(5) Building the cost of Permanent Road Restoration into the DPRs:**

The action of digging manholes and trenches for sewerlines/house service connections leaves a road taken up under UGSS completely destroyed. The temporary restoration which involves filling up the trenches and concreting at the top still leaves the road virtually un-motorable, more so after a spell of rains. Improvement of road works is kept in abeyance for several years in towns where UGSS is proposed. This, along with the fact that UGSS implementation can take 6 years or more, and the ULBs do not have adequate funds for permanent restoration can mean that the public are put to hardship by way of poor roads for up to 10-12 years. A number of public demonstrations have been witnessed in several UGSS towns in the recent past due to the unmotorable condition of the roads affected by UGSS. The ULBs, whose financial condition has worsened due to loans taken for UGSS, are not in a position to mobilise funds for the permanent restoration of the roads. Given the poor financial condition of most ULBs, it would have been prudent to have included the estimated cost of permanent restoration of the roads affected by UGSS in the original DPR itself, especially in those schemes like TNUDP III, JICA, KfW where this could have been accommodated. As a thumb rule, it costs about Rs.50 lakhs per kilometre of street length for a UGSS (inclusive of the cost of the STP) at today's prices. What is

needed is to provide a further Rs.20 lakhs per kilometre on an average for the permanent restoration of the roads in the DPR itself. This may have reduced the number of UGSS taken up to some extent but it is preferable any day to implement UGSS properly with the roads fully restored and save the public from hardship than leave the roads badly damaged in the vain hope that the ULBs will somehow find the requisite funds for full and permanent restoration of the roads which they will not. Even if the agency funding UGSS is not willing to fund the permanent restoration of roads component, the fact remains that the roads have to be permanently restored in order to save the citizens from the hardship of non-motorable roads and avert public agitations, and the State Government (to a larger extent) and the ULBs (to a lesser extent) will have to find the necessary funds for permanent restoration. This is another reason why new UGSS should be taken up sparingly. The Board resolves to recommend to Government that the funds required for the permanent restoration of the roads affected by UGSS should be placed in a separate account at the State level at the disposal of the Commissioner of Municipal Administration, who will release the funds to the concerned ULB/Highways Dept./NHAI for implementation. The permanent restoration need not wait for the UGSS to be fully completed in the town. As and when a set of roads is temporarily restored and handed over to the ULB, the CMA can release the funds for permanent restoration for these roads.

**(6). Clearances:**

**Tendering process to commence only after getting enter-upon permission and TNPCB clearance for the STP and Pumping Station lands:**

There are many instances where the Collection System works were partly or fully completed and then stopped due to the non-availability of the initially identified sites for Pumping Stations and/or STPs – due to litigation or public agitation or denial of TNPCB clearance – with the risk of rendering the expenditure already incurred infructuous and

inviting serious audit objections. For example, in Sivaganga and Tiruvallur Municipalities, over 80% of the Collection System works have been completed, but the lands for STPs are not yet taken possession of. Ideally the administrative sanction should be given for UGSS works only after the sites for STP and Pumping Stations are identified and enter-upon permission obtained from the authorities concerned and TNPCB clearance has been obtained wherever necessary. On no account, should the tenders for UGSS works be called for unless the sites for the STP and Pumping Stations are in actual possession of the Local Body concerned and TNPCB clearances for the site have been obtained.

**No tendering before getting CRZ clearance**: In the case of Nagapattinam Municipality, the ULB is unable to start the STP works for which the work order was issued in September 2009 itself, since the CRZ clearance has been delayed. Where CRZ clearance is required, a ULB should not call for tenders for UGSS unless the CRZ clearance has first been obtained.

**Consultation with TNPCB about choice of STP site**: A lot of delays occur in getting clearances from Tamil Nadu Pollution Control Board (TNPCB) for the STP works. For example, in Nagapattinam and Ramanathapuram, such clearances are not yet got though the Collection System works are already under way and is nearing completion in Ramanathapuram. The STP works in Villupuram and Cuddalore UGSS were abnormally delayed for want of clearances from TNPCB while Collection System works were well under way. It is desirable to have the lands selected for STP and Pumping Stations vetted in advance (informally) by the District Environmental Engineer(DEE) Tamil Nadu Pollution Control Board so that problems pertaining to Environmental clearances for the sites are avoided at a later stage.

**Judicious selection of sites for STPs and Pumping Stations**: There have been many instances of works at STP and Pumping Station sites having to be suspended after crores of rupees had been spent

due to public agitation about the choice of sites. This is the case, for example, with Thoothukudi Corporation despite getting TNPCB clearance. One reason for this is not doing the public consultation properly in both letter and spirit. It is always better to keep the public aware of the location of the STP and Pumping station sites as the problem will not go away but only get postponed if the public objects to the location after the works are commenced. Necessary IEC activity should be taken up and suitable provision should be made in the estimate for this item of work.

**Selection of appropriate technology for STP**: As land is scarce in every town, modern technology like Activated Sludge Process (ASP), Sequential Batch Reactor (SBR) etc., for waste water treatment should be adopted. Waste Stabilisation Ponds (WSP) should not be considered as land requirement is large.

**Land use Certificate from ULB**: The ULB should obtain appropriate land use certificate for STP site from Director of Town and Country Planning (DTCP) before completion of the tendering process itself in order avert possible legal challenges.

**Avoid Forest Lands**: The Forest lands should be avoided for locating STP and Pumping Stations for UGSS. In case of no other alternative, necessary clearances from the Forest Department should be obtained at the time of preparation of DPR itself. In any case, the permission should compulsorily be obtained before calling for tenders.

**Need to apply well in advance for road cut permissions from Line Departments:** Even while tendering is on, applications for permission for road cuts in National Highways (NH), National Highways Authority of India (NHAI), State Highways (SH), Railways, etc., for implementing UGSS should be made and effectively followed up. The practice of applying for road cut permission only when the particular stretch is about to be taken up is wrong and leads to avoidable delays. Such delays have been noticed in almost all UGSS, and especially in Cuddalore, Pudukottai and Tiruvallur where

applications for clearances of Line Departments were made after a delay of several years and after 80% of the Collection System works were over.

**Realistic provisions to be made in DPRs for cost of land and road cuts**: One of the reasons for UGSS projects getting delayed and for repeated proposals being made for Revised Administrative Sanctions is the provision of arbitrary, unrealistic rates in the DPRs towards the cost of land acquisition, road cuts and road restorations, and permissions from Railways authorities. Henceforth, it should be ensured that the correct costs are incorporated in the DPRs on the basis of the actual payments made towards such items in recent schemes and suitably indexing the same.

**(7) Design Sewerline capacities taking FSI Norms into account**:

In Corporations and other rapidly growing cities, there is a tendency toward replacement of individual houses/bungalows with multi-storeyed apartment blocks. When this happens, not only the number of house service connections increases but the capacity of the sewer line of the street on which the building is located becomes inadequate. While the collection system of the UGSS may have been designed for the projected population of the city as a whole for the ultimate stage (30 years), the rate of development tends to be highly uneven across individual streets and the sewer lines in many streets will be found inadequate if a large number of individual houses are converted into apartment blocks in such streets. This will result in sewage overflows and accumulations, and the cost of replacing the sewer lines at a future date will be much greater. It is therefore important to take into account the notified Floor Space Indices (FSI) for each street/area and design the sewerline capacity assuming the maximum FSI for the street/area.

**(8) Fund Release Schedule by ULBs to TWAD Board:**

At present, there is no prescribed schedule for release of funds towards UGSS to TWAD Board by the ULBs concerned. In many

instances (e.g. Ramanathapuram and Perambalur Municipalities), there have been undue delays on part of the ULBs in releasing funds to TWAD Board and the Board is compelled to make bill payments out of its own funds. Hence, the Schedule of fund releases will be as follows- Once the tenders are finalized, the ULBs concerned should deposit 10% of the tendered amount as initial advance to TWAD Board immediately after the issuance of work order. As and when 70% of this amount is spent, TWAD Board should give a Statement of Expenditure (SoE) to the ULB concerned, and the ULB should release the second instalment of 20% of the tendered amount. The 3rd, 4th and 5th instalments shall also be 20% each and the condition for the release of the next instalment is submission of SoE for 70% expenditure of (Opening Balance at the time of submission of the last SoE + the latest instalment).

**(9) Construction period**:

The decision about the total time period to be given for construction of UGSS should not be left to the local engineers itself. The construction period should be carefully decided by the Board/implementing agency, primarily based on the length of the streets where the sewer lines are to be laid. In general, the construction period should be between 36-72 months as is prescribed in the CPHEEO guidelines.

**(10) Issues to be followed up during the construction process:**

**Manholes:** In order to ensure that the manholes are not damaged in NH/SH roads and in other heavy traffic roads, brick manholes should be avoided, and only RCC manholes should be provided in these sections.

**Register of Manholes, Sewers**: A register should be maintained at site showing Street-wise details of manholes, sewers, HSCs, and levels as executed.

**Trenchless Technology**: Trenchless Technology should be used in place of the existing conventional open-trench method for such sections along NH/ NHAI/ SH /Major Municipal Roads, where the sewer

line is to be taken along, and no house service connections are there en-route. For example, this technology should be used for laying the pumping mains along such longitudinal sections of the roads where there is no further road cutting involved due to house-service connections. This technology should also be used for all the crossings across NH/NHAI/SH/Major Municipal Roads. This would avoid inconvenience to the public in these critical areas.

**Compound Walls in STP sites:** It is always preferable to safeguard the STP and Pumping Stations by putting up appropriate compound walls/fencing around them. Hence, once the land is finalized for STP and Pumping Stations, compound walls on the 3 sides should be put up and in the remaining one side, fencing should be put up for movement of machinery and materials. These works should form part of the DPR itself.

**Testing of sewer lines**: Flow-tests and funnel–tests should compulsorily be undertaken in the pipes laid across each man hole in order to ensure correctness of levels and leak proof connectivity.

**Provision of bailing out of water**: Water seepage during the trench cutting has been a major obstacle in the speedy implementation of UGSS. There has to be an adequate provision in the Detailed Project Report (DPR) for bailing out the seepage water during the trench-cutting in order to enable the contractor do expeditious work. Hence, provision for multiple-point bailing out of water should be given not exceeding 20% of the earthwork in river-side and coastal towns and not exceeding 10% of the earthwork in other towns.

The Board **resolved** to convey the above lessons learnt to the officials of TWAD Board, CMWSS Board and Municipalities involved in implementation of UGSS.

**(By order of the Board)**

Sd ..09.02.2011
**Gagandeep Singh Bedi,**
**Managing Director, TWAD Board**

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Sd.....
for Managing Director
TWAD Board, Chennai-5