

*Case Study*

**UNDERGROUND SEWERAGE SYSTEM  
ALANDUR**

*Sewerage*

## CASE OVERVIEW

**Country:** India

**ULB:** Alandur, Chennai Metropolitan Area in Tamil Nadu

**Sector:** Urban Basic Services      **Sub-Sector:** Sewerage

**Award Date:** 2000

**Type and Period of concession:** Composite Engineering-Procurement-Construction (EPC) and Build-Operate-Transfer (BOT) Contract for 14 years

### **Stakeholders:**

|                              |  |
|------------------------------|--|
| <b>Contracting Authority</b> | Alandur Municipality<br>Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) as nodal agency   |
| <b>Concessionaire</b>        | Joint Venture (JV) between IVRCL Infrastructure and Projects Limited and Blacke Durr & Wabag Technologies Limited  |
| <b>Oversight Arrangement</b> | Through ULB on a weekly basis and through officials such as Commissioner of Municipal Administration, Chief Executive of TNUIFSL etc on a monthly basis<br>M/s Consulting Engineering Services Limited was appointed as Project Management Consultant (PMC) for detailed supervision and quality control |

**Present Status of Project:** Construction was completed in March 2005 and project has been operationalised.

### **PROJECT TIMELINE:**

|             |   |
|-------------|---|
| <b>1996</b> | <i>Conceptualization of the project by the Chairman of Alandur Municipality</i>   |
| <b>1997</b> | <i>Government of Tamil Nadu (GoTN) scheme for upgrading sewerage in 12 cities including Alandur<br/>Approval of the Alandur project (as proposed by the municipality) and handing over project development to TNUIFSL</i> |
| <b>1998</b> | <i>Government Order No. 69 permitting ULBs to undertake PPPs for service provision<br/>Resolution of Alandur Municipality to collect advance one time connection fees and monthly user charges for sewerage</i>           |
| <b>1999</b> | <i>Collection of one time advance connection fees from users<br/>Two stage bidding process for selection of Concessionaire</i>  |
| <b>2000</b> | <i>Award of the concession to a JV between IVRCL Infrastructure and Projects Limited and Blacke Durr &amp; Wabag Technologies Limited</i>   |
| <b>2005</b> | <i>Completion of construction of the underground sewerage system and a part of the Sewage Treatment Plant (STP)</i>   |

## **1. PPP CONTEXT**

### **1.1 ENABLING ENVIRONMENT**

1. The Government of Tamil Nadu (GoTN) prepared a scheme in 1997 for undertaking improvement of sewerage in 12 cities, in order to address its appalling condition in the State – only 1/5<sup>th</sup> of the urban population in the State had access to formal sewerage and the remaining had to depend on septic tanks or other night soil disposal methods. Alandur was one of the identified cities and this expedited the sanctioning process when the Alandur Sewerage Project was submitted by the municipality for approval.
2. GoTN issued Order No 69 in May 1998, allowing ULBs to deliver services through PPPs, subject to conditions such as use of competitive bids, no retrenchment of existing staff and regulation of cost of delivery (should not increase unduly due to private interests).

### **1.2 SECTORAL CONTEXT**

1. At the time of the sewerage concession, Alandur Municipality was comprised of 19,800 households, and 98% of the households had water-based sanitation facilities – latrines had septic tanks or holding tanks.
2. The municipality collected sewage periodically in tankers and disposed it in low lying areas outside the municipal limits. Sullage and sewage overflow from household septic tanks was let out into the open storm water drains, accumulating eventually in a stagnant pond on the south-eastern corner of the town.
3. Both of these disposal systems led to extremely unhygienic conditions (mosquito infestation and spread of diseases) and to contamination of ground water in the area.

## **2. PROJECT DEVELOPMENT**

### **2.1 PROJECT CONCEPTUALIZATION**

The project envisaged two components: the underground sewerage system (UGS) and a STP and was initially intended to be achieved through a regular EPC contract. The following considerations prompted the use of a PPP arrangement:

1. Previous instances of Sewage Treatment Plants (STPs) operated by public agencies had run into problems due to inefficiency of the staff and relative lack of experience of handling the technology involved.
2. Allocating both components on a Build-Operate-Transfer basis would have increased the investment risk for the private operator substantially and led to possible discouragement of bidders. However, it was important to execute both components through the same agency (whether as a BOT or otherwise), so as to ensure that the UGS and STP were developed/integrated simultaneously.
3. A mixed contract could be developed, wherein part of the investment risk was allocated to the Concessionaire, reducing the overall costs and resultant debt liabilities of the Alandur Municipality.

The project was thus innovatively structured into two components:

- A. A regular EPC contract for construction of the underground sewerage system, with a maintenance obligation for the contractor of 5 years (upfront investment to be borne by Alandur Municipality)
- B. BOT contract for finance, construction and long term operation & maintenance (O&M) of a Sewage Treatment Plant (STP) for 14 years (annuity-like payment by ULB).

The Municipality paid the Concessionaire (BOT component) on the basis of per unit of sewage treated, and in order to further de-risk the project committed to a 'take-or-pay' arrangement, obligating the Municipality to deliver a minimum quantum of sewage or pay for it. It should however be noted that this obligation was tied-back to the Concessionaire's liability under the EPC component to complete a certain proportion of the UGS within a given time. Upfront capital costs for undertaking such a large project (annual municipal budget of Alandur was only about 7% of the expected project costs during project preparation) were met (at least partially) through beneficiary contributions in terms of connection fees collected at the outset of the project.

The final system was to be designed to serve an ultimate population of 300,000 persons in 2027 – receiving an intermediate flow of 12 million litres per day (MLD) in 2012 and an ultimate flow of 24 MLD by 2027.

## **2.2 PROJECT DEVELOPMENT**

1. The Chairman of Alandur municipality, Mr. R S Bharati initiated the project in 1996, obtained the approval of the council and submitted the project to the Commissionerate of Municipal Administration (CMA) for approval. CMA and GoTN approved the project (refer 1.1) and appointed TNUIFSL as the nodal agency for developing the project, considering the lack of capacity at the ULB level to develop a project of this magnitude.
2. TNUIFSL conducted background studies in 1997-98 through M/s Consulting Engineering Services Limited, including engineering studies, project design, location of facilities, user willingness to pay etc.
3. TNUIFSL structured the funding mechanism through soft loans from the Tamil Nadu Urban Finance and Infrastructure Development Corporation (TUFIDCO) and from the TNUIFSL under the World Bank initiated Tamil Nadu Urban Development Fund (TNUDF), grants from GoTN and beneficiary contribution in the form of user deposits.
4. The contractual structure was formulated by TNUIFSL along with their Transaction Advisor<sup>1</sup>, who also managed the bid process. The final contract was approved by the World Bank (part of the loans were from the World Bank funded TNUDF).
5. At the request of TNUIFSL, Alandur Municipality vide resolution dated 28 July, 1998 resolved to collect advance one time connection charges and levy monthly user charges after completion of the project.
6. In order to encourage one time connection fee payment, the municipality issued public notices in September 1999. Meetings were also conducted to allay public fears regarding privatization and a

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<sup>1</sup> M/s Kirloskar Consultants Limited

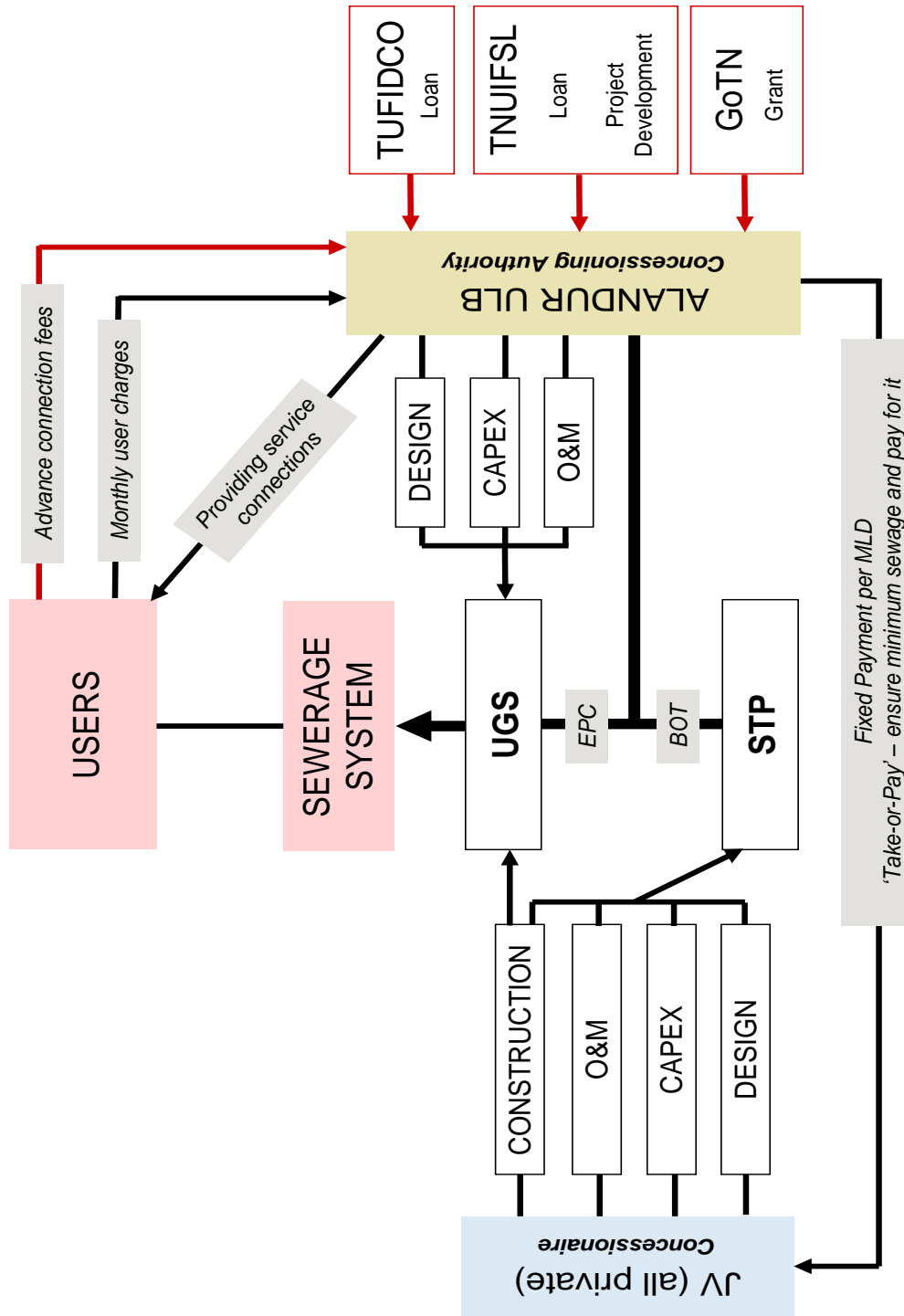
special account was created for administering the funds of the project in order to ensure transparency. The fund was to be monitored through a monitoring committee comprised of the Mayor, Chairman of Alandur Municipality and 3 representatives from Resident Welfare Associations (RWAs).

### **2.3 PROCUREMENT PROCEDURE**

Procurement of Concessionaire for the project was based on a competitive bid. Tender submission for technical proposals ended in October 1999 and that for financial proposals ended in December 1999. The contract – composite contract including both the EPC and BOT components for a total period of 14 years - was awarded to a JV between IVRCL Infrastructure and Projects Limited and Blacke Durr & Wabag Technologies Limited, based on a cumulative score of two bid parameters: fixed price for construction of sewerage network and lease period for operating the STP. Within the consortium, IVRCL was entrusted the responsibility of carrying out construction works for both the UGS and the STP and Wabag was entrusted with the task of conducting electro-mechanical works. Wabag was also responsible for O&M of the STP throughout the lease period.

### 3. CONTRACTUAL ARRANGEMENTS

#### 3.1 PROPOSED CONTRACTUAL STRUCTURE



### **3.2 OPERATOR OUTPUT OBLIGATIONS**

The obligations of the Concessionaire were as follows:

- |  |   |
|--|---|
| <i>As part of EPC Component (5 years)</i>        | <ol style="list-style-type: none"><li>1. Construct all main sewer lines, 50 km of branch sewer lines and, commission and test all sewers, pumping stations, pump sets and pumping mains with a period of 3 years (March 2000 to March 2003).</li><li>2. Construct the remaining 50 km of branch sewer lines within the next 1 year and undertake O&amp;M of the entire system for a defect liability period of 1 year thereafter (March 2003 to March 2005).</li></ol>  |
| <i>As part of BOT Component (14 years lease)</i> | <ol style="list-style-type: none"><li>1. Finance and construct the first part of the STP (12 MLD capacity – half of 24 MLD total as specified within contract) and integrate the facility with the newly laid UGS system within a period of 3 years (March 2000 to March 2003 to coincide with the construction of first phase of UGS).</li><li>2. Finance and Construct the remaining 12 MLD facility when the inflow of sewage reached 9.6 MLD or 1 and a half years prior to completion of lease period whichever came earlier.</li><li>3. Conduct O&amp;M of the entire STP facility for the entire lease period of 14 years in accordance with treatment norms and specifications set out by the Tamil Nadu Pollution Control Board (TNPCB).</li></ol> |
- Period for this phase includes period for EPC phase*

### **3.3 OBLIGATIONS OF THE CONCESSIONING AUTHORITY**

Obligations of the Concessioning Authority included:

1. Provision of design (completed before bidding) for the UGS system
2. Operation of the UGS system so as to ensure a minimum inflow of sewage to the STP as agreed within the contract (minimum inflow commitments increased every year and was specified in the contract)
3. Obtaining and handing over land free of encumbrances to the Concessionaire for the STP.

### **3.4 REGULATORY AND MONITORING ARRANGEMENTS**

M/s Consulting Engineering Services Limited was appointed as Project Management Consultant (PMC) with funding from a grant fund from TUFIDCO for detailed supervision and quality control.

Alandur municipality undertook review of progress on a weekly basis in addition to a monthly review by officials such as the Commissioner of Municipal Administration, and Chief executive of TNUIFSL.

### **3.5 PROJECT FINANCIALS**

1. Investments by the Concessionaire (except land acquisition) were restricted to the BOT component of the contract. The Concessionaire was to be remunerated on a per MLD basis by the Alandur Municipality. The Municipality was obligated to deliver a minimum quantum of sewage or pay for it, subject to the system working through its 'take-or-pay' commitment. Treatment of sewage above the minimum specified was paid extra on the fixed per MLD basis.

2. The minimum guaranteed sewage inflow gradually increased (annually) and the price per MLD decreased as the volume of flow increased. Values in year 1, year 7 and the last year of the lease are as given below:

| Year | Minimum Guaranteed flow of sewage (MLD) | Price per MLD (INR) |
|------|---|---------------------|
| 1    | 5.97                                    | 4932                |
| 7    | 8.52                                    | 3772                |
| 14   | 10.15                                   | 3587                |

3. For the construction of the UGS system the Alandur Municipality was liable to bear the cost of Rs.250 million as per the bid amount.
4. Part of the public funding required for the project was obtained through one-time advanced collection of connection fees as user deposits – Rs.5,000 per household and Rs.10,000 from non-domestic entities. Overall public funding for the project was structured as follows:

| No | Item   | Amount<br>INR' 00,000 | Percentage |
|----|--|-----------------------|------------|
| 1  | Rupee Term Loan from TUFIDCO                     | 1600                  | 47.1       |
| 2  | Rupee Term Loan from TNUIFSL (under TNUDF)       | 400                   | 11.8       |
| 3  | Deposit Collection (one time connection charges) | 800                   | 23.5       |
| 4  | Gap funding by GoTN                              | 300                   | 8.8        |
| 5  | Interest from deposits                           | 200                   | 5.9        |
| 6  | Grant fund for supervision from TUFIDCO          | 100                   | 2.9        |
|    | <b>TOTAL</b>                                     | <b>3400</b>           | <b>100</b> |

5. Revenue from monthly user charges accrued directly to the Alandur Municipality and the municipality had to escrow a proportion of such revenues for debt servicing of TUFIDCO and TNUIFSL debts. Following user charge structure was adopted:

| No | Domestic Connections |                      | Commercial and Industrial connections |                      |
|----|----------------------|----------------------|---------------------------------------|----------------------|
|    | Plinth Area (sq.ft)  | Monthly Tariff (INR) | Plinth Area (sq.ft)                   | Monthly Tariff (INR) |
| 1  | Less than 500        | 60                   | Less than 500                         | 200                  |
| 2  | 500 - 1500           | 80                   | 500 - 1500                            | 400                  |
| 3  | 1500 - 3000          | 100                  | 1500 - 3000                           | 600                  |
| 4  | More than 3000       | 120                  | More than 3000                        | 1000                 |

### 3.6 PROJECT RISKS AND ALLOCATION

**Investment Risk** Borne by the Concessioneing Authority through fixed payments for construction of the UGS system and through minimum guaranteed payment in the case of the BOT component. Additional guarantees were provided by the GoTN and TNUIFSL in case of Alandur municipality not being able to pay as per commitment.

**Design Risk** Design risk for the system was borne by the Municipality since the system had to be constructed as per design specifications evolved before the bidding process

**Construction Risk** The Concessioneing Authority bore the risk of land acquisition and timely handover to the Concessionaire for the STP.

All other time and cost overruns were borne by the Concessionaire



|                         |  |
|-------------------------|--|
| <b>Performance Risk</b> | The Concessionaire bore all risks for maintenance and operations (in case of STP) and had to ensure specified performance, for the municipality to honour its ‘take-or-pay’ commitment |
|-------------------------|--|

### **3.7 DISPUTES RESOLUTION MECHANISM**

All disputes were to be resolved amicably through direct discussion between the parties involved. In the event of non resolution the dispute was to be settled through arbitration processes as prescribed under the Arbitration and Conciliation Act, 1996.

## **4. PARTNERSHIP IN PRACTICE**

### **4.1 PROJECT OUTCOMES**

1. The project has been successful in developing a comprehensive sewerage solution for the municipality and has been able to achieve most of its targets.
2. The project has provided the city with a cost-effective and affordable sanitation solution, since the graded tariff system has allowed even poor residents to obtain connections. 43% of the contributions to the user deposits came from slum dwellers seeking connections.
3. The STP has been operationalised and is running as per norms resulting in indirect environmental and health benefits for the city.

### **4.2 PROJECT SHORTCOMINGS**

1. While the project execution has been proceeding smoothly, the Alandur Municipality has not been able to keep pace as envisaged in the form of delays in providing service connections to users. This would affect the committed sewage inflow to the STP resulting in redundant public expenditure due to the ‘take-or-pay’ commitment.
2. The ULB has also been facing problems regarding public unwillingness to pay monthly user charges, even though the arrangement was well publicized and endorsed by the users earlier.

### **4.3 LEGAL/CONTRACTUAL ISSUES**

Most contractual issues emerging in the form of delays in completion due to delays in TNPCB approvals and inadequate provision of service connections to users by the Alandur Municipality have been resolved through discussions and negotiation.

## **5. LESSONS LEARNT**

1. Alandur Sewerage Project was the first for its kind in the sector undertaken on a PPP basis. The STP developed under the project is also the first STP to be built through a BOT arrangement.
2. The success of the PPP essentially lies in its innovative structuring. The composite contract structure (mixed EPC and BOT) allowed sharing of the investment risks - encouraging private participation on

one hand and reducing the financial burden for the ULB on the other. The project was also able to bring in necessary efficiency and technological skill for handling of the STP facility.

3. The project was path breaking in its participatory interface between the ULB and the community, collecting a substantial part of the upfront investment requirements from advance beneficiary contribution. Proper IEC and development of transparent and credible structures such as the separate project account monitored through a committee with representations from not only the ULB but also the political wing and the citizens played a crucial role in ensuring the success of the beneficiary contribution drives. In fact the beneficiary deposits were almost double than was expected initially (80 million instead of 40 million) reducing the loan component from TNUIFSL by half.