

Creating the Alandur Sewerage System: Project Structuring and Risk Management

Mr. B. Subramaniam,¹ the Mayor of the municipality of Alandur was a relieved man. His dream of providing a sewerage system to the entire town of Alandur was on the verge of becoming a reality. The municipality was about to sign a contract with a consortium of private engineering and development companies headed by IVRCL Infrastructure & Projects Ltd., for the provision of a town-wide sewerage system as well as a sewage treatment plant (STP) for Alandur. Getting this far had not been easy and had involved years of planning as well as several rounds of negotiations with interested companies. Preparatory work on this project had started in 1996 and it was only now, in February of 2000, that the municipality was ready to sign a contract. Municipal officials and their consultants had spent the last few years structuring and restructuring the project in order to mitigate the risks involved and to improve the project's feasibility. Finally they had reached a stage where all of the project's risks seemed to have been addressed to the satisfaction of both the municipality and the private operators who had come forward to bid on the project – or had they?

¹ Actual names have been replaced by fictitious ones to preserve confidentiality.

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This was the concern that now gnawed mildly on Mr. Subramaniam's mind. Would the project be successful if awarded to the IVRCL consortium? Had all risks truly been taken care of, or would unforeseen issues raise their head over the course of the project? Should he go through with the award of the contract? If he did not, it would be a massive loss of face for the municipality. However, if he did sign, and if the project ran into trouble, a stigma of failure might be attached to the municipality. Mr. Subramaniam could not help wondering about these questions as he prepared to award the contract.

The Rationale behind the Sewerage System

The town of Alandur is situated in the Southern Indian state of Tamil Nadu, at a distance of 15 km from Chennai, the state capital – see **Exhibit 1**. Alandur was home to 146,000 people in the year 2000. Due to its close proximity to both the metropolis of Chennai and the Chennai international airport, Alandur had slowly transformed itself into an integral suburb of Chennai city, albeit with its own municipal administration. Alandur Municipality comprised an elected and an administrative wing. The elected wing comprised a body of councilors headed by a chairman or a mayor, who were directly elected by the citizens for a period of five years. The administrative wing was headed by a commissioner – a non-elected civil service representative – and implemented decisions on behalf of the elected committee. The administrative wing was further subdivided into various departments such as the personnel department, revenue department, engineering department, accounts department, town planning department and the public health department. These departments handled the actual implementation and delivery of municipal services.

In the late 1990s, an increase in the rate of urbanization all across India led to an increase in the demand for urban infrastructure services. Alandur was unable to cater to the demands of this migrant population. In the early 1990s, most households in Alandur had installed their own septic tanks to treat the wastewater that they produced. However, towards the middle of the decade, sewage often overflowed from these septic tanks and made its way into the streets, posing health hazards. In 1996, municipal elections were held in Alandur and the provision of an integrated sewerage system was a vital component of the manifestos of various political parties including that of the incumbent mayor, Mr. B. Subramaniam. Mr. Subramaniam was duly re-elected to his post and took

on the challenge of providing an integrated sewerage system for the municipality of Alandur during his term in office.

First Steps in Shaping the Project

Upon re-entering office in 1996, Mr. Subramaniam first presented his vision for a new sewerage system to the new municipal council. The council unanimously approved this project. The municipality's engineers then prepared a project proposal that consisted of two components – the creation of a sewerage network and the setting up of a sewage treatment plant. This proposal was once again presented to and approved by the municipal council in 1997. The municipality then presented this proposal to the Commissionerate of Municipal Administration (CMA) – a state-wide body whose approval was required in order to proceed with the project.

Coincidentally, the Government of Tamil Nadu (GoTN) had identified Alandur as one of the cities that needed to upgrade its sanitation infrastructure. Upon receiving Alandur's proposal, the CMA and GoTN approved the project and entrusted the responsibility of coordinating the engineering studies required for this project to the Tamil Nadu Urban Development Fund (TNUDF). This decision was taken on account of the fact that Alandur Municipality was deemed not to possess the required capability to develop such a complex, integrated project on their own.

The Tamil Nadu Urban Development Fund (TNUDF)

The World Bank has long advocated the setting up of Municipal Development Funds in Indian states that can lend to local governments or fund infrastructure investments. In 1998, the Government of Tamil Nadu followed the World Bank's suggestion and set up the Municipal Urban Development Fund (MUDF), which was highly successful. According to TNUDF's website:

“The successful track record of MUDF encouraged Government of Tamil Nadu to broaden the scope of the Fund, with a view to attracting private capital into urban infrastructure and facilitate better performing ULBs to access capital markets.”

Thus the MUDF was broadened and the Tamil Nadu Urban Development Fund was established in November 1996, for the development of urban infrastructure in Tamil

Nadu. TNUDF is capitalized through contributions from the Government of Tamil Nadu, ICICI Bank Limited, Housing Development Finance Corporation Limited and Infrastructure Leasing and Financial Services Limited – the latter three of which are private financial institutions of national standing. TNUDF is therefore a public-private partnership that provides long term non-recourse debt for urban infrastructure. However, beyond purely providing funding for infrastructure projects, TNUDF's objectives also included facilitating public-private partnerships for the delivery of urban infrastructure, improving the financial management of urban local bodies (ULBs) so as to enable them to access debt finance from capital markets, helping urban local bodies develop projects and project monitoring and cost recovery.²

Project Development under TNUDF

In Tamil Nadu (and in many other Indian states) there are often multiple agencies that have a role to play in the approval and implementation of urban infrastructure services. Failure to coordinate between these agencies and align their goals can therefore lead to project failure. For instance a sanitation project in the Chennai municipal area might require inputs and approvals from the Chennai Metropolitan Water Supply and Sanitation Board (CMWSSB), the municipality in question and perhaps even from the Tamil Nadu Pollution Control Board (TNPCB) and the Tamil Nadu Water Supply and Drainage Board (TWAD). TNUDF was well aware of these complexities and duly constituted a steering committee consisting of the Commissioner of Municipal Administration, the Engineering Director of the TWAD board, the Superintending Engineer of the CMWSSB, a technical advisor from the Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) – the fund managers for TNUDF, and the Commissioner of Alandur Municipality, to streamline the project implementation process. TNUDF initiated a dialogue with the steering committee members and incorporated their inputs into the project development process so as to ensure that each of these agencies were aware of the developments within the project and would be able to provide their approvals when needed.

In August, 1998, TNUDF appointed a consultant to prepare a detailed engineering report and cost estimates for implementing a sewerage system in Alandur. The consultant identified locations for pumping stations and for the sewage treatment plant, and also the

² <http://www.tnudf.com/tnudf.html> accessed on April 21st, 2009.

route through which underground sewerage lines would pass. The consultant also submitted designs for each of these engineering systems. At the conclusion of this exercise the cost of the project was estimated at INR 453,130,000. The detailed cost break-up is shown in **Exhibit 2**.

Alandur's annual municipal budget was merely of the order of INR 30,000,000 – less than a fifteenth of the cost of the project. As a result, Alandur's ability to supply funds through their own revenues, or to raise funds from borrowings based on their balance sheet to implement this project, was well short of what was required. It was clear that traditional modes of financing could not be used to raise funds for this project. The municipality consequently approached TNUDF for assistance in raising funds for the project. After analyzing various financial options available, and after rejecting most of them as being infeasible, TNUDF decided to explore the possibility of mobilizing funds directly from the users of the project – the citizens of Alandur.

Although this strategy was theoretically sound, there were several operational issues that needed to be considered. Urban Local Bodies in India had historically not been given much independence and were heavily dependant on state and central government agencies for funding and implementing projects. This had led to an erosion of the capabilities and competencies of the urban local bodies and a migration of the urban talent pool to other organizations. This had in turn resulted in slow and poor implementation of projects handled by municipal officials and a consequent decrease in the confidence reposed in the urban local body by its residents. Raising funds from skeptical citizens to directly fund a municipal undertaking was therefore a difficult task in these conditions. Nevertheless, TNUDF decided to pursue this approach and restructure the project.

Restructuring the Project

TNUDF divided the project into two components – the sewerage network and the sewage treatment plant. TNUDF then worked on creating a sustainable financial model based on the financial capacity of the municipality; and the availability of various municipal funding schemes organized by the state and central governments. The proposed final structure of the project involved a combination of loans, grants and user deposits.

Loans

Apart from TNUDF, the Tamil Nadu Urban Finance and Infrastructure Development Corporation (TUFIDCO), established in 1990, is another institution that provides financial assistance for the implementation of urban infrastructure projects in Tamil Nadu. TUFIDCO agreed to provide a “soft loan” at an interest rate of 5%. The loan conditions featured a principal moratorium for a period of two years and eight further years over which the loan was to be paid back. Given the extremely favorable rate of interest provided, Alandur Municipality decided to obtain the maximum possible loan from TUFIDCO, which amounted to 50% of the project cost. TNUDF also planned to disburse a loan to the municipality, albeit at a rate of 16%, with a principal moratorium for the first five years followed by a repayment schedule over the next 15 years.

Grants

The Government of Tamil Nadu stepped in to fund deficits over the life of the project and pledged to contribute INR 30 per sewerage connection per month as a grant, to bridge the gap in Operations and Maintenance (O&M) expenses. Furthermore, TNUDF applied for grant assistance from the Tamil Nadu Urban Development Grant Fund to meet the costs for appointing a Project Management Consultant (PMC) to oversee the implementation and operation of the project.

User Deposits

TNUDF requested that Alandur Municipality collect one-time connection deposits from its residents. TNUDF proposed that tariffs be set at INR 5,000 per household and INR 10,000 for non-households or commercial users.

Exhibit 3 provides the initial financial structure for the project. The debt component of the project comprised an INR 204,709,000 borrowing from TUFIDCO and an INR 132,327,000 borrowing from TNUDF. Both loans would be drawn out over a three year period between 2001 and 2004. The government of Tamil Nadu would provide gap funding of INR 21,416,000 for project implementation and O&M expenses. The Tamil Nadu Urban Development Grant Fund would provide a grant of INR 27,010,000 to be used towards appointing a PMC. Of the User Deposits obtained, nearly 50% of these deposits equating to an amount of INR 26,886,000 that would be collected in the year 1999-2000 would be used for project expenses while the remaining INR 30,591,000

which would be collected over the next three years would be used to pre-pay the high interest loans from TNUDF, thereby reducing the debt burden on the municipality. Finally, land acquisition costs to the tune of INR 2,500,000 would be borne by Alandur Municipality themselves. All surpluses generated by the project would be used towards debt servicing expenses.

Exploring the Use of Public-Private Partnerships

At the end of this process, TNUDF had arrived upon a financial structure for the project that had the approval of Alandur Municipality, and met the municipality's debt servicing capacity. At this point, both TNUDF and the municipality had envisaged that the project be procured through a standard item-rate contract, wherein bidders would quote a fixed rate for every item in the contract, and the contract for construction of the sewerage network and the STP would be awarded to the bidder with the lowest overall cost. After construction, the project would be turned back over to the municipality, who would then either maintain the project themselves, or would offer a separate maintenance contract to a capable service provider.

Although this was the traditional and most frequently opted for mode of project procurement, past evidence indicated that municipalities were often incapable of operating Sewage Treatment Plants. Several STPs currently run by Urban Local Bodies in Tamil Nadu were prone to flooding and frequent breakdowns due to a lack of operation and maintenance skills within the ULBs. Given this scenario, TNUDF officials suggested that the STP component of the project be implemented via a Public-Private Partnership (PPP) through a Build-Operate-Transfer (BOT) model wherein a private operator with expertise in this area would undertake the construction and maintenance of the STP for a fixed period, after which the fixed assets would revert back to the municipality. The provision of the sewer lines would, however, continue to be procured in the traditional fashion.

This suggestion was quite a bold one in the prevailing context. PPPs in STPs had hardly ever been implemented in India and therefore there was no evidence to show that the PPP route would be beneficial to the project, the municipality and the community. Furthermore, PPPs in municipal services themselves had only rarely been undertaken in India, and the state government's orientation towards PPPs was merely lukewarm.

Finally, the worldwide experience on urban PPP projects was mixed and there was no clear consensus on whether the benefits popularly attributed towards PPPs – viz. reducing the financial burden of the state and providing operational efficiencies, outweighed the costs of PPPs – viz. raises in prices, reduced levels of employment and inequitable distribution of services.³

In order to establish the merits of PPP in this case, TNUDF engaged in the meticulous task of identifying the pros and cons of using a BOT model to implement and operate the STP in Alandur. Their analysis included comparing the original 'Bill of Quantities' (BOQ) approach with the newly proposed BOT approach, and performing sensitivity analysis in both models for a variety of factors including interest rates, loan amounts, operational expenses, tariffs and so on. This analysis and comparison revealed that the PPP approach offered several advantages as compared to the traditional BOQ approach. In addition to bringing in private sector expertise to better manage the operations of the STP, the PPP approach led to a reduction in debt financing and the debt servicing requirements of the municipality.

TNUDF's efforts in advocating PPPs for this project were aided by a Government Order (G.O No. 69) issued by the Government of Tamil Nadu on May 4th 1998, which allowed municipalities to open up their services for private participation, subject to conditions such as the following:

- All services opted for private participation should go through open and competitive bidding;
- There should not be any retrenchment of existing staff; and
- The cost of service delivery should be such that there is no increase due to Private Sector Participation.

Armed with the G.O and their analysis, TNUDF revised the cost of the project, keeping in mind that the STP would be implemented via a BOT. **Exhibit 4** indicates the modified cost. The revised cost estimates, the justification for PPPs and the modified plan were then first presented to the project's steering committee. Members of this committee

³ See for instance, Harris,C. (2003), "Private Participation in Infrastructure in Developing Countries: Trends, Impacts, and Policy Lessons", *World Bank Working Paper No. 5*, Washington DC, USA.

readily agreed to the modified project structure. Next, Mr. Subramaniam presented this project structure to the municipal council, and described in detail the rationale behind using a PPP model to implement and operate the sewage treatment plant. In 1999 the proposal to build a sewerage system through the BOQ model and the STP through a BOT model were unanimously approved by Alandur's municipal council. With this approval, Alandur was now empowered to implement this project.

Assessing the Willingness to Pay

Even before the project was restructured to accommodate PPPs, Mr. Subramaniam and his team realized that one of the key prerequisites for project success would be the ability to mobilize deposits and payments from the users. Accordingly, in 1997, a 'Willingness to Pay' (WTP) survey was undertaken among the residents. The findings of the survey were quite revealing. On the one hand, the survey highlighted the fact that there was a clear demand for the project, with 97% of residents surveyed voicing their desire to dispose domestic waste into an integrated sewerage system. However, there was widespread variance with regards to the tariffs that residents were willing to pay, both for obtaining connections (a one-time fee) and for recurring monthly O&M payments.

29% of residents surveyed were willing to pay one-time connection deposits of below INR 500, 50% were willing to pay deposits between INR 500-2,000 and only 21% of residents were willing to pay deposits of greater than INR 2,000. This was in stark contrast to the connection fees that TNUDF had assumed in their financial model – viz. INR 5,000 for households and INR 10,000 for commercial connections.

With respect to recurring monthly payments, most households currently paid between INR 21-50 per month for water charges, while most non-households paid between INR 51-100 for water. Most of these users desired to pay similar charges for the sewerage connections, and 86% of the respondents expressed their willingness to pay between INR 21-50 as monthly charges for the maintenance of the sewerage network.

The conclusions drawn from this study were quite straightforward. The assumptions made by TNUDF in their financial model were optimistic in the prevailing scenario, as a result of which the current financial structure itself was untenable, and the project was not viable. Therefore, there was an overwhelming need to convince residents to pay

higher connection charges in order to maintain the viability of the project. Otherwise, the project would have to be abandoned. Alandur Municipality therefore decided to launch a campaign to educate their citizens on why they would need to pay higher deposit charges.

Once the municipal council had approved the development of the STP on a BOT model, TNUDF re-worked the financial structure for the sewerage component of the project, keeping in mind the change in project costs as a result of a reduction in the municipality's scope. Based on these revised calculations, the municipality needed to mobilize a total of INR 340,000,000 for the creation of the integrated sewerage network. Of this, Alandur Municipality hoped to raise INR 240,000,000 as debt funding through loans from TUFIDCO and TNUDF. INR 40,000,000 would be raised through user deposits, still keeping in mind the original tariff estimates of INR 5,000 and INR 10,000 for households and non-households respectively; while the remaining INR 60,000,000 would be raised through grants and government support. In 1999, TNUDF presented this revised financial structure before the municipal council in order to obtain their approval, before commencing their campaign to convince users to pay higher one-time deposits for the sewerage system. The municipality approved the revised financial structure. However, the councilors asked for a reduction of tariffs for the poorer sections of society, claiming that it would be unfair to ask all households to pay connection charges of INR 5,000, irrespective of their economic condition. TNUDF then came up with a system of graded connection charges based on the plinth area of the property, as shown in **Exhibit 5**. In this system, the poorer sections of society, who were likely to reside in smaller houses, would pay reduced amounts for the sewerage connections. The municipal council accepted this revised tariff structure.

Mobilizing Funds from the Community

After receiving the council's approval, the municipality then planned a systematic campaign to mobilize public support and participation for the project. A team of municipal officials constituting representatives from both the elected and administrative wings of the municipality was formed for this purpose. This team was directly headed by the mayor himself. The campaign primarily focused on educating the residents on the benefits of the integrated sewerage system, on the rationale for involving the private sector as a concessionaire in the development of the STP, and on assuring the residents

that international best practices would be followed to create a world class system that would bring about continued societal benefits to the residents of Alandur. Consequently the campaign stressed the fact that such a project would not be possible without the participation of the residents and impressed upon the residents the need for larger up-front deposits than what they were willing to pay, keeping in mind the costs and the intended quality of the project.

In order to disseminate this message, the mayor and his team crafted an elaborate plan that involved several consultations with the public at various levels and fora. The team met with representatives and members of a few local Resident's Welfare Associations (RWAs) to discuss the project, sensitize the citizens, and obtain their feedback if any. RWAs were informal, legally registered organizations that were community led, represented the voice of the citizens, and were responsible, as the name suggests, for ensuring that the residents' rights were protected in their interactions with both the public and private sectors. Consequently, from the perspective of the project, they were a very important organization to bring on board, since they also had the potential to organize social protests against the project if they did not feel that it was in the interests of the citizens. At meetings with the RWAs, the municipal team stressed the health benefits that the project would bring to the society, thereby improving the well-being of the residents. The municipal team also gave detailed explanations on the financial structure of the project and explained the methodology by which user tariffs were arrived at. The municipal officials then went on to explain that if users did not pay the suggested tariffs, the feasibility of the project would be compromised, and the residents would not be able to benefit from the integrated sewerage and sewage treatment system.

In addition to targeted meetings with the RWAs, municipal officials also undertook door to door visits to individually educate residents, and sent out a variety of notifications, press releases and newsletters on the project. All of these communications stressed the fact that the municipality did not have the funds to directly implement the sewerage project, and did not have the technical capability to operate an integrated sewer network and a state-of-the-art Sewage Treatment Plant. To provide transparency, allow for inclusivity and to enable residents to corroborate these details, Alandur's municipal accounts and budget were kept available for public scrutiny at the municipality's office. Through these measures, the municipal team spearheading the campaign hoped to

convince the users of the need for the project, the necessity for users to contribute funds for the construction of the sewerage network, and the rationale behind procuring the STP on a BOT contract.

In addition to the municipal officials who were a part of this team, technical consultants and TNUDF officials also made the rounds and attended these meetings in order to be able to answer detailed technical or financial questions that the residents might have. The most noteworthy part of the campaign, however, was the role played by the mayor, who truly led from the front. Having conceptualized the project, Mr. Subramaniam stepped in to the role of a 'Project Champion' during the awareness campaign phase. With a microphone in hand, he drove through the streets, announcing and explaining the details of the project at street corners, and attended most meetings with citizens and RWAs. As a municipal engineer described:

He would get into a car at 6:30 in the morning and actively campaign for this project until late in the evening.

The mayor's leadership and proactive involvement in this campaign motivated and enthused his other municipal colleagues, which in turn imbibed the citizens with the confidence that the municipality was truly serious and sincere about undertaking the sewerage project and delivering a world class facility.

From the perspective of the residents, the complexity of the project, and the nature of the campaign to raise user deposits, was quite unique. This threw up a variety of issues that the citizens wanted clarified, making most of the campaign meetings quite lively and interactive. An oft-recurring question on the part of the residents was whether the high tariff being deposited was justified. In several instances, at the insistence of the residents, municipal officials calculated and demonstrated how the user charges and the connection fees had been kept to the barest minimum in order to ensure the economic feasibility of the project.

Residents also frequently raised a series of concerns regarding the financial management of the collected funds. They wanted assurances on how potential misuse of these funds would be curtailed and how the municipality would ensure that the project

would be completed in a timely manner. The municipal officials responded to these concerns with a series of measures. First, a separate bank account was opened in the name of the 'Alandur Municipality Underground Sewerage System' in order to ensure accountability for funds collected. A monitoring committee was created to monitor this account, comprising Mr. Subramaniam the mayor, the municipal commissioner (head of the administrative wing) and three representatives from the Resident's Welfare Associations. In order to further improve the transparency of the fund collection and management process, two RWA representatives were invited to audit the project's bank account and expenditure of funds. In order to ensure timely completion of the project, the municipality applied for and received a grant worth INR 10,000,000 from TUFIDCO for appointing a project management consultant for the project, who would ensure that the project was built to time and to acceptable standards of quality.

This intense awareness campaign started showing results as residents slowly trickled in to deposit checks for their one-time connection fees. Municipal officials in charge of collecting taxes encouraged citizens to pay their deposit fees along with their taxes. Names of residents who had already paid the deposits were publicized all over the town, in the hope that this would inspire and encourage other residents to step forward and pay the fee for their sewerage connections.

Slowly but surely, the volume of funding coming in from the citizens built up and gained momentum. A trickle transformed itself into an avalanche and at the end of the process, INR 80,000,000 had been deposited into the project account – roughly double of what the municipality had expected to raise!

The mayor and his colleagues were not prepared for this level of public response to their proposal. Taking advantage of the increase in supply of funds, TNUDF further restructured the project. The debt component of the project, originally estimated at INR 240,000,000, was reduced to INR 200,000,000, with the balance being made up from the increased funds available through user deposits. This restructuring had significant benefits for the project in terms of the municipality's debt service requirements. The loan obtained from TNUDF at a high interest rate of 16% was reduced by half, from INR 80,000,000 to INR 40,000,000, greatly reducing the interest payments that the municipality was required to pay. The INR 160,000,000 loan received from TUFIDCO at

the nominal 5% rate of interest was maintained as-is. **Exhibit 6** presents the revised financial structure of the project.

Project Procurement

The unprecedented response from the residents greatly improved the morale of the municipal officials as they worked towards preparing the project for implementation. Alandur Municipality approached the state government of Tamil Nadu for technical sanction for the project. This sanction was obtained in January 1999, and the project then entered its procurement phase.

TNUDF hired Kirloskar Consultants Ltd. to prepare the contract documents and manage the bid process. The consultant prepared two sets of contractual documents – one for the sewerage system and one for the sewage treatment plant (STP).

Contractual Provisions

The construction contract for building the underground sewerage system was relatively straightforward. The contractor was expected to lay the sewerage pipelines, build the mains and sub mains, and provide service connections and meters as per the designs given by the municipality. The contractor would be required to maintain these assets over a defect liability period of one year.

The entire project was split over two phases. Phase 1, which would commence in March 2000, would involve the complete construction of all the main sewer lines, construction of 50 km of branch sewer lines, and the construction, commissioning and testing of the sewers, pumping stations, pump sets and pumping mains. This phase was scheduled to be completed in March 2003.

Thereafter, Phase 2 would be undertaken wherein the remaining portion of the branch sewers (estimated to be an additional 50 km) would be built, commissioned and tested. This phase was scheduled to be completed in March 2005.

The Build-Operate-Transfer (BOT) agreement for the Sewage Treatment Plant was much more involved. The selected concessionaire was expected to finance, construct, operate and maintain the STP in accordance with treatment norms and specifications set

out in existing government guidelines, or rules laid out by the Tamil Nadu Pollution Control Board (TNPCB). The concessionaire was also expected to integrate the STP with the newly laid underground sewerage network.

The design risk would be borne by Alandur Municipality, who would directly supply the design and specifications of the STP to the concessionaire. In this case, the municipality had fixed the total capacity of the STP to be 24 MLD⁴ and had designed two STP modules of 12 MLD each. The first module would be built starting March 2000, and was expected to be completed by March 2003, around the time of completion of Phase 1 of the sewerage network. Construction on the second module was expected to start when the inflow of sewage in the first STP module exceeded 9.6 MLD, or one and a half years prior to the completion of the lease period, whichever came earlier.

Payments would be made to the concessionaire based on the amount of sewage that they treated. Here again, Alandur Municipality bore the downside demand risk, by entering into a minimum guarantee sewage flow agreement with the concessionaire. The municipality guaranteed payments for a minimum inflow of 5.97 MLD in the first year. If the amount of sewage treated in the first year was below this threshold, the concessionaire would still receive payment on the bases of the minimum flow promised by the municipality. The concessionaire would earn an amount equal to the product of the amount of sewage treated (either the minimum amount or the actual amount treated if the actual amount treated was greater than the minimum threshold) multiplied by the price per million liters of sewage. For the first year this price was fixed at INR 4,932. The minimum guaranteed inflow gradually increased every year for a period of 14 years, while, the price per million liters of sewage gradually decreased as the volume of flow increased. In the fourteenth year, the minimum guaranteed inflow stood at 10.15 MLD while the price per million liters of sewage was INR 3,587. **Exhibit 7** represents the minimum guaranteed flow vs. payment schedule for the first 14 years of the project.

In terms of the other risks, the concessionaire bore risks related to construction, operations, maintenance and cost overruns. The municipality bore the risk of land acquisition in locating a suitable site for the installation of the STP. In order to safeguard the lenders and mitigate the debt repayment risk, a portion of the municipality's revenue

⁴ Million liters per day

receipts were to be escrowed. TNUDF would be allowed to access these funds and deduct payments periodically as per the debt repayment schedule. Furthermore, Alandur Municipality would need to seek special permission from TNUDF to obtain other loans during the loan repayment period for this project, in order to ensure that they did not overstretch their borrowing capabilities, compromising their ability to repay their debt on the sewerage project. Despite this, if the municipality of Alandur defaulted on its loan, TNUDF was then authorized to deduct an equivalent sum from the Government of Tamil Nadu's devolution of funds to the municipality.⁵ Finally, the Government of Tamil Nadu and TNUIFSL provided guarantees to the concessionaire to mitigate the risk of Alandur Municipality not being able to pay the STP concessionaire for treated sewage.

A Framework for Bid Evaluation

Alandur Municipality and TNUDF were faced with two approaches for project procurement. They could either: award both contracts separately, and allow different firms to deliver the sewerage network and the STP; or they could combine both contracts and award the entire project to a single firm. The former approach promised to encourage competition among firms, cater to firms with varying capabilities and result in lower bids overall. However, TNUDF's past experiences in projects where separate contracts were awarded for constructing an STP and laying a sewerage system was that, more often than not, the STP would be finished earlier and would be idle, waiting for work on the sewerage system to be completed. Even though there would be no resultant inflow into the STP until the sewerage lines were completed, the STP contractor would still be eligible for periodic payments as per the minimum guarantee agreement. For these reasons, TNUDF recommended that the consultant integrate both parts of the contract and award the entire project of developing the sewerage network and the STP to one entity, who would receive a fixed payment for the sewerage network and hand over the asset upon completion of its construction, but would remain responsible for the operation and maintenance of the STP for the duration of the lease period.

The two bid variables that were selected for the project were the fixed price quoted by prospective bidders for the construction of the sewerage systems, as well as the lease period quoted by bidders for which they wished to operate the STP. Bidders were

⁵ Municipal governments in Indian states generated revenues internally through taxes, and also received grants and devolutions from their respective state governments.

expected to quote values for both these variables, and the bids would then be evaluated by combining both these parameters.

With respect to the sewerage system, the bidder with the lowest bid price for the construction of the sewerage network would be awarded a score of 90 for the sewerage portion of the contract. Every other bidder with a higher fixed price for the construction of the sewerage network would be awarded a lower score based on the extent of deviation from the lowest bid submitted. Their score would be calculated using the following formula:

$$\text{Bidder's Score}_{\text{Sewerage}} = 90 * (\text{Fixed Construction Price of Lowest Bidder}) / (\text{Bidder's Fixed Price})$$

With respect to the STP, the bidder with the lowest proposed lease/concession period would be awarded a score of 10. Every other bidder with a higher lease period for operating the STP would be awarded a lower score based on the extent of deviation of their proposed lease period from the lowest bid submitted. Their score would be calculated using the following formula:

$$\text{Bidder's Score}_{\text{STP}} = 10 * (\text{Minimum Bid Lease Period}) / (\text{Bidder's Lease Period})$$

The Bidders Overall Score would then be a simple arithmetic sum of both of these scores, with the maximum overall score being 100. The bidders would then be ranked in decreasing order of their overall score and the bidder with the highest score would be selected. TNUDF and Kirloskar Consultants Ltd. felt that this approach would lead to the selection of an organization that would deliver the entire integrate sewage network and treatment facility at a competitive price, in turn ensuring that both the STP and the sewerage lines would be integrated and simultaneously made operational.

Selecting the Concessionaire

The bidding process involved a series of steps. The transactions advisors in charge of bid process management were Kirloskar Consultants Ltd., who undertook a two-stage bidding process. The first stage, which commenced in October of 1999, was an open

invitation for bids. At this stage, bidders were expected to submit a technical proposal. Fifteen firms purchased the bid documents, displaying an interest in the project. However, when the first stage bids were opened, only three consortia submitted bids that contained a valid technical proposal. These consortia were:

1. A Joint Venture between General Utilities, Mahindra Reality & Infrastructure Developers Ltd., and Larsen & Toubro Ltd.
2. A Joint Venture between Subash Projects and Marketing Limited and Batliboi Ltd.
3. A Joint Venture between IVRCL Infrastructure & Projects Ltd. and Blacke Durr & Wabag Technologies Ltd.

The transactions advisor then undertook a process of clarifying the contents within each of these bids with the respective consortium members, and clarifying any deviations that the bids might have in comparison with the designs given by, or construction practices envisaged by TNUDF and Alandur Municipality.

After this process of clarification, all three of these firms were deemed to have passed the first stage and were invited to submit second stage bids. Second stage bids were to be commercial in nature and would comprise price proposals from the bidders. The bidders were expected to indicate their fixed price bid for the construction of the sewerage network and their intended lease/concession period for operating the STP. The three shortlisted consortia were requested to send in their second stage bids in November 1999.

Of the three shortlisted firms, only two firms – the Joint Venture headed by Subhash Projects, and the Joint Venture headed by IVRCL Infrastructure & Projects Ltd. submitted second stage commercial bids. The transactions advisors opened and scrutinized each of these bids. Having found them to be of acceptable quality, they then applied the scoring formula described in the previous section. On completion of this exercise, the Joint Venture consortium headed by IVRCL Infrastructure & Projects Ltd. received the highest score. This consortium had bid a fixed price of INR 270,000,000 for the construction of the sewerage network and had requested a lease period of 14 years to operate the STP. Within the consortium, IVRCL was entrusted with the responsibility of executing the civil works, whereas Wabag was entrusted with the responsibility of

executing the electro-mechanical works. Wabag would also be responsible for the operation and maintenance of the sewage treatment plant throughout the lease period.

TNUDF had also scrutinized these bids, and in February 2000, had recommended to Alandur's municipal council that the consortium headed by IVRCL Infrastructure & Projects Ltd. be awarded the project. The mayor and the municipal council had accepted this recommendation.

Concluding the Project Preparation Phase

After several years of project preparation, Alandur Municipality was now ready to award a contract for the construction, operation and maintenance of an integrated sewerage and sewage treatment facility. Mr. Subramaniam was quite happy with the outcome of the project preparation process. Several experts had been involved, and many potential risks had been anticipated and mitigated. Unanticipated concerns had reared their head over the last few years, but each of them had been systematically dealt with and resolved. Would this first-of-its-kind project now proceed as planned and deliver the societal benefits that were envisaged? Would this project serve as a model PPP project that other municipalities might hope to emulate? Or were there hidden concerns and risks that had not been dealt with, that might stymie the implementation and successful operation of the project? Only time would tell.

Exhibit 1: Location Map of Alandur



Source: www.maps.google.com

Exhibit 2: Initial Project Cost

Item	Costs (INR '00,000)
Sewer Lines	1,403.24
Terminal Pumping Station	
- <i>Land</i>	25.00
- <i>Civil</i>	66.67
- <i>Electrical and Mechanical</i>	81.00
- <i>Diesel Generation Set</i>	30.00
Sewage Treatment Plant	667.79
Pumping Main	231.27
Low Cost Sanitation	200.00
Base Cost	2,704.97
Physical contingency (5%)	135.25
Base Cost with physical contingency	2,840.22
Supervision charges (5%)	142.00
Base cost with physical contingency and supervision charges	2,982.23
Price contingency (10% pa over five year period)	1,094.10
Capital Cost	4,076.33
Interest during construction	454.97
Estimated Project Cost	4,531.30

Source: Project Documents from TNUDF

Exhibit 3: Initial Financial Structure

Sr. No.	Item	Cost (INR '00,000)
1	Rupee Term Loan from TUFIDCO	2,047.09
2	Rupee Term Loan from TNUDF	1,323.27
3	Deposit collection	268.86
4	Gap Funding by GoTN	214.16
5	Accruals from project	240.81
6	Grant Fund for LCS (including price contingency)	270.10
7	Land acquisition to be funded by local body	25.00
8	Grant Fund for Supervision	142.01
Total		4,531.30

Source: Project Documents from TNUDF

Exhibit 4: Modified Project Costs Taking the PPP Component of the STP into Account

Item	Costs (INR '00,000)
Sewer lines	1,860.79
Pumping station	
- <i>Civil works</i>	93.04
- <i>Electrical works</i>	75.57
- <i>Mechanical works</i>	76.29
Pumping main	594.31
House service connections	225.00
Base cost	2,925.00
Physical contingency (5%)	146.25
Price contingency (10%)	304.12
Capital Cost	3,375.37

Source: Project Documents from TNUDF

Exhibit 5: Tariff Structure for Sewerage Services

Sr. No.	Domestic Connections		Commercial & 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 – 1,500	80	500 – 1,500	400
3	1,500 – 3,000	100	1,500 – 3,000	600
4	More than 3,000	120	More than 3,000	1,000

Source: Project Documents from TNUDF

IWP

Exhibit 6: Modified Financial Structure Taking the PPP Component of the STP into Account

Sr. No.	Item	Amount (INR '00,000)
1	Rupee Term Loan from TUFIDCO	1,600
2	Rupee Term Loan from TNUDF	400
3	Deposit collection	800
4	Gap Funding by GoTN	300
5	Interest from deposits	200
6	Grant Fund for Supervision	100
Total		3,400

Source: Project Documents from TNUDF

Exhibit 7: Minimum Guaranteed Flow vs. Payment Schedule

Year	Min. Guaranteed Flow in MLD	Price per million liters in INR
1	5.97	4,932
2	7.63	3,975
3	7.80	3,927
4	7.97	3,883
5	8.15	3,843
6	8.33	3,805
7	8.52	3,772
8	8.71	3,742
9	8.91	3,715
10	9.11	3,692
11	9.36	3,659
12	9.62	3,630
13	9.88	3,607
14	10.15	3,587

Source: Project Documents from TNUDF