



Government of India  
Ministry of Finance  
Department of Economic Affairs

# Public Private Partnership Projects in India

Compendium of Case Studies



Infrastructure Division  
Department of Economic Affairs  
Ministry of Finance, Government of India

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## Overview

This compendium presents case studies of select Public-Private-Partnership (PPP) projects in India. The case studies have been prepared to highlight the experience and lessons learnt so far and thereby influence the design of future PPP processes and structures to improve the quality of PPP projects.

The choice of case studies provides a representation across different sectors, covers different PPP project structures, includes projects at different stages of the PPP life-cycle and has projects with different levels of complexity.

These case studies include the following:

- a. A description of the project with project features;
- b. The project structure adopted with details of the roles and responsibilities of the private and public partners;
- c. The financing details of the project along with the current status
- d. A description of the PPP process adopted including project identification, project feasibility, structuring of the contract/concession and awarding projects to private partners. This includes details like the timing of major events like tendering and details like the level of response to the bid process;
- e. A detailed matrix of initial allocation of key risks across the public and private sector partners, along with details of subsequent changes, if any, and an assessment of the implications of the risk allocation;
- f. A concise assessment of the achievement of objectives originally set out for the project, viz., improvements in service delivery e.g., capacity, quality, coverage affordability with indicative parameters, to the extent possible;
- g. An assessment of the key benefits of the project to illustrate the benefits of following a PPP approach vis-à-vis the alternative of public procurement; and
- h. A summary of the key learning and observations from the project.

It is expected that the case studies will assist the public authorities in:

- Understanding the needs, challenges and risks associated with alternate PPP arrangements in specific sector.
- Improving quality of project identification, preparation, award and monitoring of PPPs and associated issues such as, for example, governance and fiscal implications.
- Managing the transition to a large scale PPP program to improve infrastructure services.

## Snapshot of Case Studies

The following table provides a snapshot of the select case studies presented in this compendium.

Sector	PPP Project Structure	State and year PPP contract signed	Government/ Public Sector Entity/Entities	Private Sector Promoter/ Sponsor/ Consortium Members	Project Cost	Concession Period
<b>1. Karnataka Urban Water Supply Improvement</b>						
Urban Water Supply	Operations & Management Contract	Karnataka 2005	Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC)	Veolia Water	INR 32 crores	59 months
<b>2. Tuni Anakapalli Annuity Road Project</b>						
Roads	BOT Annuity (includes Design and Finance)	Andhra Pradesh 2001	National Highways Authority of India	GMR Group, United Engineers Malaysia (UEM) Berhad Group	INR 315 crore	17.5 years
<b>3. Nhava Sheva International Container Terminal</b>						
Ports	BOT (includes Design and Finance)	Maharashtra 1997	Jawaharlal Nehru Port Trust	P&O Australia Ports Pty Limited, Konsortium Perkapalan Berhad and Trans Impex Private Limited (P&O Ports subsequently taken over by Dubai Ports World Limited (DP World))	INR 733 crore	30 years
<b>4. Coimbatore Integrated Municipal Solid Waste Management Project</b>						
Solid Waste Management	DBOOT	Tamil Nadu 2007	Coimbatore Municipal Corporation	Consortium of Bharuch Enviro Infrastructure Ltd and United Phosphorous Ltd	INR 96 crore	20 years
<b>5. Development of Grain Silo in Ujjain</b>						
Post-harvest storage infrastructure	DBFOT	Madhya Pradesh 2014	Madhya Pradesh Warehousing and Logistics Corporation	Adani Enterprise	INR 30.5 crore	30 years

## Key Learnings

This section highlights the key learnings from India's experience in PPPs as witnessed in the detailed case studies of select infrastructure PPPs in India. The objective of these learnings is to identify the typical issues that PPPs in India experience, how they may be dealt with and what mistakes could be avoided by PPP practitioners. They identify ways to mitigate various risks experienced by PPP projects, thus improving the overall value for money for the government.

This section may be read in conjunction with the detailed case studies for readers who may want to study the context of each issue in greater detail.

### Summary of Learnings with referenced case examples

The following table provides a summary of the learnings identified and the case examples referred to.

No.	Learning	Key Risks addressed	PPP examples to be emulated	PPP examples where problems were encountered
<b>Project Preparation</b>				
1	Clarity in determination of tariffs	Revenue Risk, Termination Risk	-	1. Nhava Sheva Integrated Container Terminal
<b>Procurement</b>				
1	Robust & Simple Bid Criteria	Default Risk, Termination Risk	-	1. Nhava Sheva Integrated Container Terminal
<b>Development</b>				
1	Handling of Land Acquisition	Land acquisition risk, Time and Cost Overruns Risks, Social Risk	1. Development of grain silo in Ujjain	-
2	Streamlining of Approvals & Clearances	Approvals risk, Time and cost Overruns risks	1. Development of grain silo in Ujjain	1. Karnataka Urban Water Supply Improvement Project
3	Financing Innovations	Financing Risk, Default Risk, Performance Risk	1. Tuni Anakapalli Road Project	-



## Learnings across the PPP Process

### Project Preparation

#### Clarity in Determination of Tariff

The tariff is a key determinant of returns for the private entity. It is important to have a clear understanding of the tariff determination process and the same should be fair to enable the private operator to earn a reasonable return. Lack of clarity can result in potential disputes between the private and public entity.

#### Examples of PPPs where problems were encountered

In the Nhava Sheva Integrated Container Terminal project, the lack of clarity in the concession agreement on whether the royalty payment was to be considered as a part of cost or a share in the profit in the SPV's accounts while determining the port tariff, became a serious issue between the public and the private sector. Measures were adopted to address these inconsistencies but with limited success.

*Key Risks Triggered: Revenue Risk, Termination Risk*

### Procurement

#### Robust and Simple Bid Criteria

Bid evaluation criteria need to be simple and robust so that capable entities are identified for the project and at the same time bids are not speculative. Speculative bids have the potential to derail a project during the operations stage if the private entity is unable to sustain its overstated commitments. Ambiguities in the bid criteria, on the other hand, can lead to disputes between the private and public entity during the operations stage.

#### Examples of PPPs where problems were encountered

In the Nhava Sheva Integrated Container Terminal, the bid evaluation criterion of the highest NPV of royalty payment was simple but insufficient. The lack of a methodology to assess the royalty payout to the licensor and the problems arising from the interaction of the royalty with the tariff level created a number of issues in the subsequent operations phase.

*Key Risks Triggered: Default Risk, Termination Risk*

### Development

#### Handling of Land Acquisition

The land acquisition process for PPP projects is no doubt the most challenging predevelopment activity in India. In most cases, the government commits provision of land free from encumbrances for the project before actually completing the necessary formalities.

#### Examples of PPPs to be emulated

In case of the grain silo project in Ujjain, the land for the site was provided by the government and the approach road was already constructed before the site was handed over to the private developer. The state government provided a Business Guarantee (guaranteed utilisation and payment of the silo facility) for the initial 10 years. The facilitation provided by state government ensured smooth implementation of the project.

*Key Risks Managed better: Land acquisition risk, Time and Cost Overruns Risks, Social Risk*

### **Streamlining of Approvals & Clearances**

Apart from land acquisition, obtaining numerous clearances and approvals has been the bane of Indian PPP projects. Typically, the concessionaire needs to obtain clearances from multiple government departments and apprise different departments about the progress of a project. These delays add to the cost of developing the PPP and thereby reduce the value for money to the public sector. Ideally a single interface for interactions or coordination on all such approvals should be setup by the government to prevent undue delays. This could be in the form of a lead entity taking up the responsibility or a common project steering/ empowered committee that is appointed to take care of all such formalities. With this, the concessionaire could focus on the core development issues rather than being entangled in administrative processes.

### **Examples of PPPs to be emulated**

Madhya Pradesh Warehousing and Logistics Corporation was responsible for obtaining all the clearances and permits related to environment protection, and forest. As the land belonged to state government and was neither in forest area nor in buffer zone of a forest area, so the perceived risk of Environment Clearances was low.

*Key Risks Managed better: Approvals risk, Time and cost Overruns risks*

### **Examples of PPPs where problems were encountered**

Karnataka Urban Water Supply Improvement project, experienced delays in obtaining permits from several departments due to the lack of co-ordination across the three Urban Local Bodies involved in the project.

*Key Risks Triggered: Approvals risk, Time and cost Overruns risks*

### **Financing Innovations**

While the government of India has provided financial support initiatives such as the Viability Gap funding (VGF) scheme or the Jawaharlal Nehru Nation Urban Renewal Mission, it is important for PPP projects to be financially independent to the extent possible and minimise reliance on such grants or schemes. This is possible through innovative financing structures that not only bring down the cost of funds but also tap new sources of funding. However, a fine balance needs to be maintained to ensure that such innovations in financing do not result in speculative bids during the procurement stage.

### **Examples of PPPs to be emulated**

The concessionaire for the Tuni Anakapalli Road project, during its operations stage, raised debt at very low interest rates by securitizing the annuity payments receivable from NHAI. This mode of funding enabled the concessionaire to repay the term loan taken for the project development by accessing to relatively lower cost funding.

*Key Risks Managed Better: Default Risk, Performance Risk*

# 1. Karnataka Urban Water Supply Improvement Project

## 1.1 Project Description<sup>1</sup>

In 2005, Government of Karnataka (GoK) initiated a water supply service delivery improvement programme with private sector participation at the local level. This initiative was part of a larger project developed by GoK to improve the performance of the urban water sector by providing high quality and sustainable services in all the Urban Local Bodies (ULBs) of the state. The project termed as Karnataka Urban Water Sector Improvement Project (KUWASIP) was designed and implemented with funding assistance from the World Bank through the Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC), the nodal agency for externally funding projects in Karnataka. These projects included both reform-based programmes aimed at strengthening of the water supply and sanitation sector of Karnataka and also specific projects for increasing the water availability and service delivery levels at the ULB level.

At the local government level, projects were identified and three ULBs, namely, Belgaum (now known as Belagavi), Gulbarga (now known as Kalaburagi) and Hubli (now known as Hubballi)-Dharwad were selected for implementation. These projects were aimed at augmentation of the bulk water supply and improvements to the distribution system. These objectives were to be met by provision of a 24\*7 water supply on a Public Private Partnership (PPP) basis for a defined project area.

A pilot project in five demonstration zones of the select three Municipal Corporations of Karnataka was taken up. The project involved refurbishment/rehabilitation of the existing distribution network of the select five demonstration zones in the three Urban Local Bodies, followed by the operation and management of water distribution systems in these zones on a PPP basis.

The project was structured such that a private developer was identified for undertaking the required rehabilitation works, and for undertaking the operation and maintenance (O&M) of the distribution network for the period of the contract. The funding for capital investment required that the rehabilitation works be compensated by the World Bank through KUIDFC, and the private developer be provided a fee for undertaking the O&M activity. The project was planned for a total time period of 3 years and 6 months inclusive of both rehabilitation works for the distribution networks and the operation and maintenance of the distribution system.

## 1.2 PPP Structure<sup>1</sup>

The PPP contract for the project was essentially a management contract involving the following institutions:

(a) Beneficiary: the three ULBs viz. Belgaum, Gulbarga and Hubli-Dharwad

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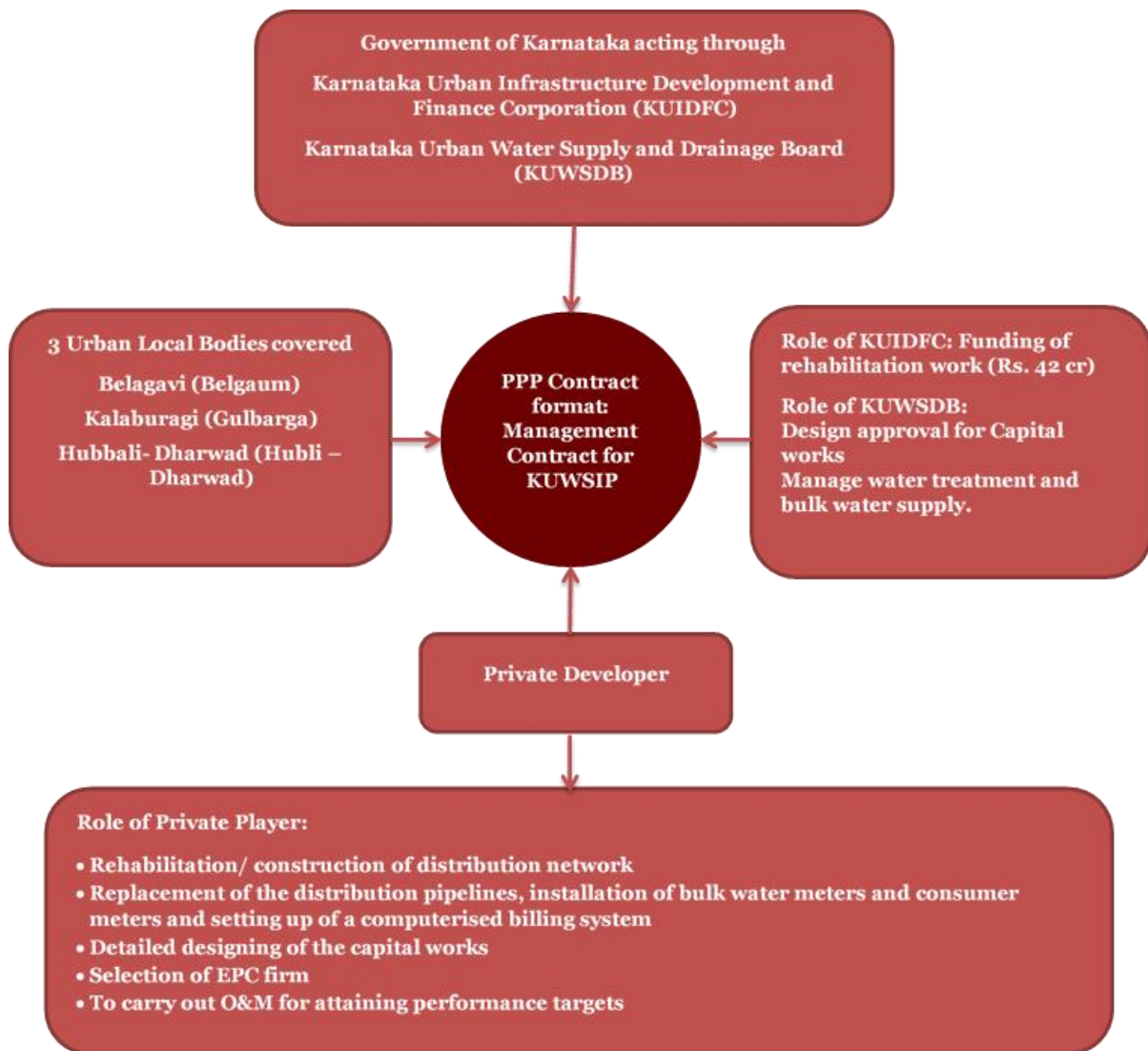
<sup>1</sup> Case Study 2: Karnataka Urban Water Supply Improvement Project, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

(b) Sponsor: the GoK through its two entities the Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC), and the Karnataka Urban Water Supply and Drainage Board (KUWSDB)

(c) Developer: the private developer responsible for rehabilitation and operations

Under the PPP structure, the private developer’s responsibility included replacement of the distribution pipelines, installation of bulk water meters and consumer meters, and setting up of a computerised billing system. The rehabilitation activity by the private developer was funded by KUIDFC as a capital grant amounting to INR 42 crores.

PPP structure of the project is shown in Figure 1:



**Figure 1: PPP Structure of the Project**

The detailed design of the capital works to be undertaken was part of the scope of work for the private developer. The designs had to be approved by KUWSDB and KUIDFC before implementation. The performance targets to be achieved by the private developer upon implementing the project were also set out in the contract by KUIDFC.

The private developer was responsible for identifying a suitable EPC firm through a competitive bidding process; subsequently, carry out O&M of the project, and demonstrate the

achievement of performance targets in the demonstration zones. The baseline was set through an efficiency audit of the existing distribution system in the demonstration zones. The activities including raw water supply, its treatment and supply till the treated bulk water distribution points was to be fully managed by KUWSDB. The tariff structure and the tariff to be levied were set by the ULBs in consultation with KUWSDB and KUIDFC.

During the O&M phase of the project, the private developer was required to meet the following performance targets:

- Ensure 100 per cent individual house service connections in the demonstration zones
- Supply treated water to all the customers
- Ensure reduction in distribution losses as per targets set
- Bill generation and distribution to consumers for payment as per the tariff set by the ULBs. Bill collection was the responsibility of the respective ULBs

The private developer was compensated through a management fee paid for the period of the contract. The fee included a fixed component of 60 per cent and a variable component of 40 per cent, with the latter based on meeting the performance targets.

In addition to this, further incentives were to be provided to the private developer for achievement of targets beyond a set level. This incentive was over and above the operator fee remuneration.

During the contract period, the asset ownership for the existing and the rehabilitated assets inclusive of pipelines, valves and meters fully remained with the respective ULBs. Post the rehabilitation phase, the private developer was only provided the right to operate and maintain the facilities. At the end of the tenure of the contract, the distribution network would have to be handed back to the respective ULBs for operations and maintenance.

### **1.3 Current Status**

The contract was awarded in 2005 to Compagnie Generale des Eaux, Paris, France (now known as Veolia Water). The chosen bidder was required to undertake both the rehabilitation, and the operation and maintenance activity of the distribution network for the identified zones in the three ULBs. The distribution network rehabilitation activity was completed by April, 2008, and the operation and maintenance contract which became effective soon after the rehabilitation was continued until March, 2010.

The O&M contract with Veolia Water was renewed for a period of 2 years until March, 2012<sup>2</sup>. Subsequent, contract for O&M of 24x7 water supplies in the Demonstration Zones, for the period 2012-2014, was also renewed with Veolia Water<sup>3</sup>.

The number of house service connections has increased from 25,383 in 2010 to 28,951 as of April, 2015. The ULBs levied volumetric user charges and the basis of tariff fixing and revision was according to GoK tariff orders<sup>3</sup>.

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<sup>2</sup> Urban Development Department, Government of Karnataka (<http://www.uddkar.gov.in/KWASIP>)

<sup>3</sup> Based on discussions with KUIDFC officials

All the performance metrics such as reduction in loss levels, ensuring 100% coverage to the existing and regularised connections, etc. were achieved during the O&M phase. All five zones met the objective of continuity of supply and connections increased by 50 per cent. Overall, there was a five-fold increase in revenue billed and approximately a seven-fold increase in revenue collected<sup>4</sup>.

Tenders have now been invited for O&M for a period of 1 year (April 1, 2015 to March 31, 2016)<sup>5</sup>.

## 1.4 Financing Information<sup>6</sup>

The total cost for the construction/rehabilitation activity was capped at INR 42 crores. The actual cost incurred against this ceiling has been, approximately, INR 32 crores. The ULBs did not bear the debt burden for the capital costs. Upon incurring the expenditure on capital works for distribution infrastructure and the costs of financing during construction, the private developer was reimbursed the costs from KUWASIP funds via KUIDFC. The operator fee of INR 22 crores was paid from the revenues accruing to the ULBs from the user charges collected. However, delays during the course of the implementation of the project, led to escalation in the compensation to be paid to the operator by KUIDFC and the operator fee was increased to INR 28 crores.

**Table 1: Project Details**

Particular	
Project IRR	14%
Debt Equity ratio	80:20
NPV	INR 2.57 crores

Of the estimated project cost of approximately INR 62 crores, World Bank's loan based assistance to the project was INR 45 crores.

The project was structured with financial incentives to the private developer for efficient execution of the rehabilitation works and the operation and management activity with the maximum permissible bonus set at 25 per cent of the remuneration decided (initially decided as INR 22 crores and later revised to INR 28 crores). The incentive structure agreed for the construction phase and operation phase are as listed in Table 2.

**Table 2: Incentives to be provided under the Construction Phase**

No.	Component	Target	Percentage share of the bonus
1.	Savings in the total capital expenditure incurred on rehabilitation works	Up to 25%	3.75%
		>25%	10%
2.	Savings in the O&M expense	Up to 25%	15%
		>25%	40%
3.	Reduction in real losses	Between 15-20 %	20%

<sup>4</sup> The Karnataka Urban Water Sector Improvement Project- 24x7 Water Supply is Achievable, The Water and Sanitation Program, 2010

<sup>5</sup> Based on discussions with KUIDFC officials

<sup>6</sup> Case Study 2: Karnataka Urban Water Supply Improvement Project, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

	< 15%	30%
4. Percentage increase in billed volume to the base volume of bulk supplied water	Up to 25% increase	12%
	>25%	30%

For instance, savings greater than 25 per cent on the capital expenditure amount, would make the developer eligible to receive an incentive of 10% from the corpus (25 per cent of operator fee) set aside for the same. During the rehabilitation and construction phase of the project, the private developer was able to reduce the capital costs by over 25 per cent and was eligible to avail the incentives as set. The construction was undertaken at a cost of INR 32 crores. During the course of execution of the O&M phase of the project, the private developer was able to bring about savings of greater than 25 per cent in the O&M expense, reduction in the losses to less than 15 per cent and also increase the billed water supply to over 25 per cent.

During the renewal period of the O&M contract, the operator fee for the tenure of April 1, 2010 to March 30, 2012 (extended to September 30, 2012) was INR 1.15 crores which eventually increased to INR 4.87 crores for the period October 1, 2012 to September 30, 2014 (extended to March 31, 2015)<sup>7</sup>.

## 1.5 Process Analysis<sup>8</sup>

### 1.5.1 Inception:

The GoK with the assistance of the World Bank launched an urban water supply and sanitation sector reform process through KUWASIP. One of the objectives under KUWASIP was to bring initial improvements in water supply systems of the three ULBs of Belgaum, Gulbarga and Hubli-Dharwad. For furthering the same, five demonstration zones were identified where specific interventions were to be brought about under a 24x7 water supply system. These three ULBs experienced poor water supply levels, inclusive of non-reliable water supply hours, and high level of leakages.

### 1.5.2 PPP Project Preparation:

As a first level of preparatory activity, an assessment of the project area was undertaken by Tata Consultancy Engineering (TCE) to ascertain the status of the water supply service levels in the project area. As per the assessment it was identified that the water supply service delivery standards were extremely poor in the three ULBs. For instance, the frequency of water supply ranged between once in 7 days for Hubli-Dharwad to once in 2 days for Gulbarga, and on alternate days in Belgaum. Non-Revenue- Water levels in these cities were, on an average, higher than 50 per cent.

This assessment was followed by estimation of capital investment, and a review of the financial position and capacity of the three Municipal Corporations. Given the low sustenance capacity of the three Corporations, it was decided to fund the capital investment required for the rehabilitation work from the KUWASIP funds.

<sup>7</sup> Based on discussions with KUIDFC officials

<sup>8</sup> Case Study 2: Karnataka Urban Water Supply Improvement Project, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010



A project for rehabilitation, operation and maintenance of a 24x7 water supply system in the demonstration zones on a public private partnership basis was prepared with the following objectives:

- To assess whether post rehabilitation/refurbishment works, a 24x7 water supply system can be implemented in an identified area
- To ascertain the cost involved in the refurbishment activity
- To assess whether the project can be replicated in other areas
- To identify the socio-economic benefits of the project

### **1.5.3 Procurement:**

For procurement, a two stage bidding process was followed, i.e. the Request for Qualification (RFQ) stage followed by the Request for Proposal (RFP) stage. At the RFQ stage interest was expressed by approximately 30 bidders which included both domestic and international firms. From the 30 bidders, seven were selected and invited to submit their proposals. The technical qualification criteria stated in the RFQ document resulted in only international players in the water business being eligible for undertaking the project. Most of the Indian firms could not qualify due to lack of adequate experience. Indian firms, however, partnered with the international players as part of consortia. The financial bid evaluation criterion was determined as the lowest financial quote made by the bidder for remuneration towards operation and maintenance activity. The lowest quote of INR 22 crores was received from the French company Compagnie Generale des Eaux, which was selected as the preferred bidder. The financial bid had a fixed remuneration component and another component contingent on meeting of performance targets by the private developer. It may be noted that there was no request from the participating bidders for having a fixed and a performance based component in the bid.

### **1.5.4 Development:**

The project was planned in three phases as explained below:

- **Preparatory period A:** The duration of this period was envisaged as 6 months during which the private developer was required to first undertake an assessment of the existing water supply system of the zones in the three ULBs. On the basis of the assessment, the private developer was required to prepare the draft investment requirement, and prepare detailed designs. During this period, the private developer was also required to get the approval from KUIDFC and KUWSDB on the designs submitted.
- **Preparatory period B:** This period was envisaged to be spread over 9 months. During this phase, the private developer was required to first arrange for finances for the investment amount as identified in the Draft Investment Report approved by KUIDFC. As stated earlier, this investment amount was capped at INR 42 crores. Following the receipt of approvals, the developer was required to commence the construction works for the rehabilitation/ refurbishment activity. The activity of issuing tenders, selection of contractors and supervision of the rehabilitation works was expected to be managed by the private developer. During the construction activity, it was incumbent for the private developer to maintain the existing levels of water supply services to the consumers. The private developer did not disconnect the existing consumers during the rehabilitation phase and instead water was made available through the existing lines and / or parallel lines to all the zones. During this period, the private developer was also required to



manage all installation works, provide service connections to the customers approved by the ULBs and demonstrate the efficient working of the system where the performance targets were being met. The efficient working of the system was subject to an audit by an independent engineer appointed by KUIDFC, and post approval, the private developer was allowed to take over the system for the operation and maintenance phase of the project. It is to be noted here that the private developer, during this phase, also undertook a consumer survey in the project zone to ascertain the number and type of connections which were to be provided. The private developer identified the authorised consumers and those which required regularisation by the ULBs.

- **Period C:** During this phase of the project, the private developer was required to undertake O&M of the entire distribution system for a period of 2 years. The tasks of the private developer entailed provision of 25,000 direct house service connections, a 24\*7 supply of treated water at a set pressure level, reduction in leakages and redressal of consumer complaints etc.

The total time allocated for these three activities as per the RFP was 42 months. However, during the course of the implementation of the project's rehabilitation works, there were delays in the course of the construction phase, and the demonstration phase for several reasons such as delays in obtaining permits from other utilities' departments, for digging and construction activities, limited or poor co-operation from the three ULBs in information sharing, delays brought about due to the unfavourable climatic conditions during the construction phase, etc. Additional delays occurred at the time of commencement of the demonstration works which was largely caused due to the non-availability of the bulk water supply by KUWSDB as per schedule.

Further, during the O&M phase, assistance from the ULBs was required by the private developer for undertaking all the improvement works and for provision of all connections. However, the same was not fully made available, resulting in delays.

On account of all these factors, the total time period was extended by 17 months as against what was envisaged in the RFP and the total time increased to 59 months against the initial plan of 42 months. As per the contract, the private developer had to adhere to the performance targets set and any non-compliance would result in immediate termination. There were no separate set of penalties which were stated in the contract. KUIDFC, however, noted that the delays were largely caused due to delays from the client's side i.e. from the ULBs and the KUWSDB, and therefore no penalties in this regard were imposed on the private developer. Also, for the period of extension, KUIDFC fully compensated the private developer for additional costs incurred due to time over runs. Therefore, the operator fee increased from INR 22 crores to INR 28 crores corresponding to overruns for the extended time period.

### **1.5.5 Delivery:**

Subsequent to completion of the rehabilitation works, the O&M activity was to be undertaken over a time period of 104 weeks.

The performance targets which were set for the private developer included the following:

- Continuous pressured water supply to every connected property and stand-post connected to the public network.
- Emergency stoppages to reduce to maximum of four for less than 12 hours in a year
- Redressal of customer complaints.

- 100 per cent metering of all property connections (individual and shared), public stand-posts and feeds to street storage tanks, and maintenance of computerised records of the readings.
- 100 per cent of customer meters to be read every month and a bill for water used based on these volumetric readings to be issued to all the connected properties, each month, with prior approval of the respective ULB.
- Reduction in losses from the distribution network in the following manner

**Table 3: Reduction in Losses**

Elapsed time from the final takeover date (in months)	Losses (in litres/connection/day/meter pressure)
12	25
18	23
24	20

- System connection requests to be fulfilled within 7 days of directions being issued by the Corporation, subsequent to the payment of connection fee.
- Set up customer service and support centre at a location that is easily accessible by residents of the given area and is to be operated on a 24 hour basis.
- All customer queries and complaints to be responded within 24 hours and redressed within 7 days of such complaint or query, except the complaints concerning low pressure or poor quality of water, which must be responded to within 12 hours and redressed within 24 hours of such complaint.

In order to monitor the achievement of the above listed performance targets, KUIDFC appointed a technical auditor. The technical auditor continuously monitored the performance of the private developer against these parameters. It may be noted that these performance targets which were set for the O&M activity have been largely met by the private developer in the respective demonstration zones.

For each of the five zones, manpower numbering eight per zone was also provided from each ULB to assist the private developer in their various works. However, it is understood that the manpower so provided was of limited assistance to the private developer. The private developer could not depend on them and had to bring along their own manpower at the project site. It may be noted here that there was no instance of resistance from the employees of the participating ULBs in the entire implementation process.

### **1.5.6 Key Challenges:**

The project faced several challenges, some of which are listed below<sup>9</sup>:

- Improved bulk water supply in demo zones and towns were essential for the demonstration of service level improvements. Delay in completion of such prioritised work has had serious implications.
- HDPE pipes were used by the operator during replacement of entire distribution network of water supply, as the existing pipes could not withstand the pressure, but there was resistance by KUWS&DB in accepting the new material
- Adoption of volumetric tariff system was delayed by the State government because of public concerns raised in the demonstration zone.
- To suppress the anxiety prevailing amongst the political class and the public-related to

<sup>9</sup> Implementation Completion and Results Report, World Bank, 2011

volumetric billing and usage of water meter- ULBs adopted flat tariff for six months so that in the meantime consumers could moderate their consumption and adapt to the billing system.

- Extensive efforts were made to ensure local political support for regularisation of unauthorised connections, providing new connections to slum dwellers as per state's pro-poor policy.
- Social intermediation and communication teams were strategically placed to put forth the right messages at the right time.

The private developer, however, still faced few issues during the O&M phase of the project. For instance, the private developer was required to provide direct connections to those consumers for whom regularisation and authorisation had been provided by the ULBs. These had to be provided within seven days of receipt of such a request by the private developer. However, the ULBs did not provide information on the authorised consumer list in a timely manner. Instead, at random intervals, information was shared on the connections to be provided by the developer. Due to this developer was expected to address too many requests in a short time of seven days. Another issue faced by the private developer was related to demands for provision of the services beyond the project area. Such demands would have had adverse financial implications for the private developer.

To ensure effective operations and provide the necessary assistance to the private developer, KUIDFC played a very active role. Project Improvement Units (PIU) were established to coordinate the O&M activity. Further a technical auditor was appointed to oversee the O&M works being undertaken on the site. A few modifications were made to the performance targets set for the private developer based on practical conditions. For instance, the private developer was permitted to continue generation of flat rate bills beyond the stipulated period of six months since the ULBs did not adopt a volumetric tariff structure. The project witnessed initial resistance from the general public on account of apprehensions of private sector involvement in provision of water supply services; however, effective provision of water supply services in the demonstration zone of Belgaum resulted in greater acceptance of the project in the remaining zones. Additionally, Non-Governmental Organisations (NGOs) were involved in awareness creation among the general public regarding the project and its benefits.

### **1.5.7 Exit:**

The O&M activity managed by the private developer was completed in March, 2010. But the same contract was renewed for interim operation and maintenance from April, 2010 to March, 2012<sup>10</sup>. Post conclusion of the contract, the entire distribution system including the assets created by the private developer would be handed over to the respective ULBs for O&M activities. As a part of the exit activity, the private developer has provided training to the existing staff at the three ULBs with respect to handling the system post termination of the contract. The private developer has raised concerns regarding the skills of the existing staff to be able to effectively manage the system post its exit.

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<sup>10</sup> Based on information provided by KUIDFC officials

### 1.5.8 Risk Allocation Framework:

**Table 4: Risk Allocation Framework**

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
Delay in obtaining permits	High	0-3 months	Private developer	The private developer was responsible for obtaining permits for rehabilitation works. There were difficulties in the same owing to the need to obtain permits from several departments which were not forthcoming. Lack of coordination among various departments resulted in a delay in permits being obtained. However, since the three ULBs were stakeholders in the project, the process of obtaining permits was eventually managed.
Design Risk	High		Private developer	The three ULBs did not have an asset inventory list and there were no detailed drawings of the physical assets. The design for the system was to be fully developed by the private developer based on their own assessment of the distribution system. Post implementation of the project, no design related issues have arisen.
Construction Risk	High	0-2 years	Private developer	The private developer was allowed to sub contract the construction activity, and fully manage the process. The construction period exceeded the timeline envisaged. However, no penalty was imposed on the private developer since, the delays were largely attributed to lack of on ground information sharing and assistance by the respective ULBs.
Construction cost over runs	High	0-2 years	Private developer	The construction cost ceiling was a pre-determined ceiling. In the event of the costs exceeding the limits set, KUIDFC had the authority to terminate the contract. The project was however implemented well within the limits set.
Performance risk during the transition phase between construction and commencement of O&M management	Low	0-2 years	Private developer	The private developer was required to maintain the service standards available at the time of handover of the system for rehabilitation work. The private developer was able to manage the same without any disruption of supply.

Change in Scope Risk	-	-	-	No specific provision for change in law was made in the contract. On ground, however, there was no change in scope of the developer once the project commenced.
Market Risk	-	2 years	Government	The private developer was to be paid a fixed remuneration of INR 22 crores as operator fees. This fee increased to INR 28 crores on account of delays from the Government's side. Additionally, financial incentives had to be paid for achievement of performance targets by the private developer. Further, although the private developer undertook the generation of bills as per the tariff set, its levy and collection was the responsibility of the respective ULBs.
Operations Risk	High	2 years	Private developer	The release of operator fee to the private developer was based on achievement of performance targets. However, though the performance targets were met by the private developer, there were substantial time delays on the part of the ULBs in release of the operator fee. These delays ranged from 3 months to almost a year in some instances.
Financial Risk	High	0-4 years	Private developer	The private developer was to prepare a capital investment plan for the rehabilitation works and undertake the construction within the ceiling of INR 42 crores specified. Any incremental expenditure above the same would have, as per the agreement, resulted in the private developer having to bear the same, or in case of non-compliance, would have resulted in termination of the contract
Force Majeure	-	-	Government and Private developer	In the event of the private developer being unable to perform the duties on account of Force Majeure event, the Government would provide suitable extension, and would continue reimbursements to the private developer.

Source: Case Study 2: Karnataka Urban Water Supply Improvement Project, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

## 1.6 Key Benefits

A qualitative assessment of the key benefits of the project has been undertaken with the purpose of highlighting the benefits of private sector participation on account of limited availability of financial data.

- One of the parameters used for assessing the key benefits is the suitability of the project to be undertaken on a PPP basis. The project has seen efficiency both at the construction phase and during the O&M phase. In the construction phase, for instance, the budget allocation for the rehabilitation works was capped at INR 42 crores. Though majority of the rehabilitation works have been executed, there are ongoing civil works as part of the O&M activity. The final estimate of the capital expenditure so incurred on the project could be correctly estimated only at the time of completion of the contract i.e. in March, 2010. However, it is understood that of the original budget of INR 42 crores for rehabilitation works, approximately a total of INR 32 crores has been expended by the private developer towards capital works. Thus, the private developer has been able to bring about a substantial saving in the project costs. During the O&M phase, the operator was able to bring down the O&M costs by effectively monitoring the power consumption. Also, the private developer has managed to meet the performance targets effectively which has resulted in financial incentives over and above the operator fee.
- The project demonstrated feasibility of continuous water supply systems through the following indicators<sup>11</sup>.
  - Installation of a 238 km long water distribution network, including house connections and repair of customer's water meters in all 5 demo-zones, covering more than 25,640 new house connections
  - Continuous (24\*7) water supply with good pressure in all 5 demo zones
  - Contracts completed for demo-zone network strengthening (necessary for 24X7) and the initial two-year period of operation (2008 to 2010). The second O&M contract for two additional years was awarded for the period 2010 to 2012.
  - Billing based on a volumetric tariff introduced in all 5 demo zones, with a cost recovery rate of over 70 per cent by the contract end date (March 2012), taking into account the costs for bulk water delivery, O&M, operator remuneration, technical auditor fee, and debt service.
  - The cost recovery rate was 100 per cent, if bulk water delivery and O&M alone are considered.
- It is also worthwhile to mention that the initial resistance which came up from few of the customers was effectively addressed since the project was able to quickly demonstrate the intended benefits. With assured supply, the consumers were themselves willing to make tariff payments. Increasingly, attempts are being made to replicate the 24\*7 model demonstrated by this project in other urban areas of the state of Karnataka.
- A brief on the performance levels before the PPP based intervention and after the implementation of the project are represented below in Table 5.

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<sup>11</sup> Implementation Completion and Results Report, World Bank, 2011

**Table 5: Performance levels before and after PPP intervention**

Sr. No.	Parameter	Situation before PPP intervention	2010-11	2012-13	2013-14
1.	Hours of Supply	Average of 3 hours in 3-7 days	24*7	24*7	24*7
2.	Volume of water supplied to demo zones (in ML)		7590	8479	8852
3.	Average pressure in the distribution system (m)	0-5 m; highly un-equitable Distribution	6	6	6
4.	Population served	180,000	189,680	209,806	221,154
5.	Losses as a % of input	More than 50%	11%	13.3%	10.7%
6.	Metering	Negligible	100%	100%	100%
7.	Non- revenue water		11%	13.3%	10.7%
8.	Collection of user charges (including arrears)	Nil	79%	102.68%	89.14%
9.	Per Capita Water Supplied (lpcd)	-	110	111	110

Source: Case Study 2: Karnataka Urban Water Supply Improvement Project, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010 and KUIDFC

- Water bill payments were made promptly by the population residing in the demo-zones indicating their awareness and keen acceptance of the 24x7 water supply service. As shown in Table 6, the low consumption consumers (less than 15 KL per month) represent the poorer sections in the demo-zones, but it was observed that payments from them were more prompt as compared to those in the high water consumption categories and higher income categories. Payments exceeding 100% meant that the poor also were paying the backlog/ arrears accrued under intermittent supply regime<sup>12</sup>.

**Table 6: Revenue Collection Efficiency (Demo-Zones)**

Consumption slab (in kL per month)	Hubli	Dharwad	Belgaum (south)	Belgaum (north)	Gulbarga
0-8	141%	85%	144%	106%	75%
8-15	111%	93%	120%	97%	85%
15-25	78%	78%	105%	95%	88%
25-40	58%	72%	102%	92%	79%
>40	44%	49%	84%	86%	94%
Overall Efficiency	62%	71%	94%	88%	88%

*Source: Implementation Completion and Results Report, World Bank, 2011*

- The project has brought about strong socio economic benefits. These benefits also extend to health issues, and also willingness on part of the consumers to make payments for the water supplied. It has been reported that post implementation of the project, the number of cases of water borne diseases in the project area has seen a significant fall. As per a study by the Health inspector for the region, it has been reported that the number of gastronomic diseases have reduced from 400 cases in the pre project phase to approximately 80 cases post the implementation phase.

<sup>12</sup> Implementation Completion and Results Report, World Bank, 2011



## 1.7 Key Learning and Observations

- **Pre project assessment critical:** Before tendering out the project, it is important that the government undertakes a first level service assessment of the project area. This assessment should be able to indicate the status of the physical infrastructure and the service delivery gaps, and later on the basis of the assessment, ascertain the nature of rehabilitation works required and the investment needed. Such an assessment would give a realistic picture of the on ground situation to the government and also post award of bids, to the private developer. It is, therefore, important on the part of the ULB to have undertaken the following basic studies to assess the ground situation before performance parameters are developed and a private developer is brought in. These studies include:
  - Water audit studies
  - Energy audit studies
  - Consumer survey
  - Pre-feasibility studies
  
- **Effective facilitation of project implementation by the government:** There were project awareness activities, which were initiated by KUIDFC, to familiarise the consumers with the proposed project. Additionally, several NGOs and PIUs were brought together to facilitate effective implementation of the project. The project incorporated a strategic communication during the preparation and implementation phases of the project. These strategies involved door-to-door distribution of regularly updated and frequently asked questions, establishment of public information centres so that transparent access to information was made available to all citizens, ward level meetings, media tours, information sharing with media on a regular basis, and paid-advertisements to place factual information in the public domain. During these communications, NGOs played an important role in the door to door communications, so that local communities had a clear understanding of the project approach, project progress, billing and tariff arrangements, grievance redress arrangements, and user responsibilities in a 24X7 water supply system. These measures ensured consumer ownership and willingness to pay for the improved water supply<sup>13</sup>.
  
- **Government needs to provide full cooperation to the private developer at various phases:** The private developer needs to be provided with maximum cooperation in implementation of the project. It has been observed that there were delays during the demonstration phase of the project due to the non-availability of bulk water for supply by KUWSDB. Further, the ULBs did not provide sufficient and prompt information, and also did not release the payments due to the developer on time. It is important that such payments are made on time to the private developer. There were also delays in getting permits.
  
- **Project ownership by the implementing agency and the participating ULBs is important:** For the success of water supply projects it is important that there is project ownership by both the implementing agency and the participating ULBs. To identify what

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<sup>13</sup> Implementation Completion and Results Report, World Bank, 2011



potential users want and what resources they are willing to apply to finance and manage installed systems, it is also required that correct and relevant information be collected during preparation. Consultation and participation of the consumers and other stakeholders are crucial for successful implementation of the project.

- **Appropriate time allocation for different phases of the project:** It is critical that the private developer be provided reasonable time for achievement of the various tasks enlisted under each phase of the project. For instance, the preparatory period-A of the project was 6 months long, during which the private developer was required to carry out a detailed assessment of the project area and develop designs on the basis of the same. In the context of a situation where the ULBs have a poor information base of the existing infrastructure level and service delivery status, it is important that sufficient time be provided to undertake a detailed assessment in order to arrive at an accurate situation analysis.
- **Proper preparation for takeover by the ULBs and KUIDFC:** The private developer has provided training to the existing staff of the three ULBs for managing the system post hand over by the private developer. It is important that these skills are well absorbed by the officials and the management of the system understand well for effective implementation and continuance of smooth operations of the system by the ULBs.
- It should be noted that an important characteristic of this pilot project was that capital financing was provided by a development agency (the World Bank), and not by commercial sources.
- In designing similar projects, it would be helpful to carry out comprehensive benefit monitoring and evaluation. The evaluation shall focus on aspects like:
  - Impacts on soil quality.
  - Reduction in instances of water logging,
  - Avoidance of cross contamination,
  - Reduction in wastage of water at house hold level,
  - Change in storage of water and other coping strategies by the consumer,
  - Improvements in the water quality,
  - Specific health improvements,
  - Changes in habits of personal hygiene,
  - Changes in wastewater generation, before and after the project.
- The resulting data for these parameters could be used as a baseline for project and reveal the impact of the project, and highlight areas for improving project performance.
- Based on these experiences and observations, the proposal of up-scaling 24x7 water supply to the entire corporation areas of Belgaum, Gulbarga and Hubli-Dharwad at an estimated cost of INR 1,809 crores has been approved, vide Government Order No. UDD 244 PRJ 2013, dated November 7, 2013; under which, the World Bank's share is 66 per cent (INR 1,209 crores).

## **1.8 Documents Referred to**

- Case Study 2: Karnataka Urban Water Supply Improvement Project, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010
- RFP document
- Draft Concession Agreement
- Project Appraisal Document on KUWASIP ,World Bank
- Project Information Document on KUWASIP, World Bank
- Urban Development Department, Government of Karnataka (<http://www.uddkar.gov.in/KWASIP>)
- Implementation Completion and Results Report for Karnataka Urban Water Sector Improvement Project, World Bank, 2011
- The Karnataka Urban Water Sector Improvement Project- 24x7 Water Supply is Achievable, The Water and Sanitation Program, 2010

## **1.9 Interviews**

- Officials from KUIDFC
- Officials from Veolia Water

## 2. Tuni Anakapalli Annuity Road Project

### 2.1 Project Description<sup>14</sup>

The Tuni Anakapalli project is a road expansion project undertaken by the National Highways Authority of India (NHAI) as one of the several projects under the Golden Quadrilateral programme. The project's scope was to strengthen the existing two lanes and widen them to a four lane dual carriageway, for an aggregate stretch of 59 kilometres between Tuni and Anakapalli on National Highway (NH) number 5 (Chennai to Kolkata) in Andhra Pradesh, on PPP basis. Keeping in mind the lack of attractiveness in tolling the road, NHAI decided to take up the project on the Build Own Transfer (BOT) Annuity model.

The GMR Group, in consortium with United Engineers Malaysia (UEM) Berhad Group, were awarded the project contract. An SPV with the name GMR Tuni Anakapalli Expressways Private Limited (GTAEPL) was formed to execute the project. The construction (expansion) of the road started in May, 2002 and ended in December, 2004 after a month's time overrun due to delays in handing over of land by the NHAI. The total project cost was INR 295 crores.

The NHAI pays the concessionaire a fixed annuity semi-annually, of INR 29.48 crores from May 9, 2005 to November 9, 2019.

### 2.2 PPP Structure<sup>14</sup>

The Project has been awarded by NHAI on a BOT (Annuity) basis. The annuity model involves the payment of a fixed semi-annual sum- by the NHAI to the concessionaire- during the concession period, to compensate him for the capital cost and operational and maintenance expenses of the project along with a certain percentage of returns- thereon.

If due to the concessionaire's failure, the actual availability of carriageway in any annuity payment period is less than the assured availability, then the annuity is proportionately reduced. NHAI secures the annuity payment by providing a revolving letter of credit from a schedule bank in India throughout the operations period.

The GMR Group (that included GMR Power Corporation Private Limited, GMR Infrastructure Limited and GMR Technologies and Industries Limited), in consortium with UEM Group of Malaysia, won the project contract to develop, operate and maintain the road for a period of 17.5 years concession; including, the construction period of 2.5 years. An SPV - GTAEPL was formed to execute the project, in which the GMR group had 74 per cent stake and UEM had 26 per cent stake.

GTAEPL had also entered into a State Support Agreement, dated March 18, 2003 with the State of Andhra Pradesh and NHAI. Under this, the Government had agreed to extend continued support and to grant certain rights, authorities to facilitate the implementation and operation of the project, including all infrastructural facilities, applicable permissions, dedicated team of police personnel, highway patrols, and to generally support the project implementation.

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<sup>14</sup> Case Study 7: Tuni Anakapalli Annuity Road Project, , Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

GTAEPL does not have any right to toll, levy charges or allow any kind of other developments or advertising options on the road. The annuity is the only project revenue for the developer. However, NHAI has the right to levy and collect a toll or fee or permit any advertisements.

GTAEPL entered into an operations and maintenance agreement with UEM Limited (O&M Contractor) to operate and maintain, and to take full risk in the care of the project facilities, against:

- An O&M fee of INR. 0.125 crore per month
- A periodic fee of INR. 7.5 crore

The O&M fee increased to Rs. 3.28 crore per annum and the periodic fee increased to Rs. 30 crore in 2014-15<sup>15</sup>.

At the end of the concession period in November 2019, the concessionaire shall handover the project assets free of cost to NHAI.

## **2.3 Current Status**

The project commenced operations in December, 2004 and is in its eleventh year of operations.

## **2.4 Financing Information<sup>16</sup>**

The estimated project cost of the project was INR. 315 crore. The project achieved financial closure on 26 June, 2002. The project was funded on a debt-equity ratio of 3:1. The term loan component was INR. 154 crore, the non-convertible debentures component was INR. 82 crore and the equity component was INR. 78.69 crore.

ICICI Bank was the lead banker and the lending consortium included several public sector banks such as State Bank of India, Union Bank of India, Indian Overseas Bank, Jammu & Kashmir Bank, Bank of India, Punjab National Bank, Industrial Investment Bank of India, and State Bank of Mysore. The average spread of the loan ranged from 12.5 per cent to 12.75 per cent. The loan tenure was 13.5 years, including a construction period of 2.5 years.

The equity funding for the project was primarily through the issue of preference shares.

In May, 2005, GTAEPL raised further debt of about INR. 372 crores from a consortium of lenders through securitisation of future annuity receivables (68 per cent of annuity receivables) to be received from NHAI over a period of fifteen years. These funds were raised at a cost lower than the cost of project debt by about 3 per cent, and were used for prepayment of the project debt.

## **2.5 Process Analysis<sup>16</sup>**

### **2.5.1 Inception:**

The road expansion project of Tuni-Anakapalli Expressway was undertaken as a part of the several road expansion projects that were taken up to improve NH-5, 6 and 60 (the Kolkata-

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<sup>15</sup> Based on discussions with NHAI officials

<sup>16</sup> Case Study 7: Tuni Anakapalli Annuity Road Project, , Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

Chennai stretch) under the Golden Quadrilateral initiative of the NHAI. The road was a two-lane structure and the project was to extend it to a four-lane road. At the time, NHAI was actively considering various PPP options such as direct tolling or shadow tolling for such projects.

Direct tolling was beginning to lose favour with the developers for many stretches of the National Highways because of the lack of viability and effective access control. Shadow tolling was another option for which, initially, the Tuni-Anakapalli project was to be the pilot project. However, this option was eventually not adopted due to the absence of a model concession agreement. The NHAI, thus, decided to take up the project on the BOT (Annuity) model.

### **2.5.2 Procurement:**

A two-stage bidding process was adopted. The first stage was to qualify bidders based on their technical experience and financial capability, while the second stage was to select the final developer based on the annuity amount quoted. The RFQ stage had sixteen bidders while the RFP stage had six bidders, of which the GMR-UEM consortium was awarded the bid.

The RFQ sought:

- Technical Capability: Experience of the bidder as a developer and / or Construction contractor and
- Financial capability: Net Worth at the end of the recent most financial year to be at least equal to INR. 240 crore and aggregate net cash accruals for the last three financial years to be at least equal to INR. 120 crore.

In the bidding stage, an annuity quote was sought from the bidders and GTAEPL with the least annuity amount was awarded the bid. The concession agreement was signed in October, 2001.

### **2.5.3 Development:**

GTAEPL appointed a turnkey construction contractor for development of the project. The construction (expansion) of the road started in May, 2002 and ended in December, 2004 after a month's time overrun due to delays in handing over of land by the NHAI. As per the Concession agreement, NHAI agreed to award an extension of 46 days to the commencement date to compensate against the loss of time for delayed hand over of project land. Hence, GTAEPL was not liable to pay any penalty to NHAI. The actual project cost was eventually INR. 295 crores as against the envisaged project cost of INR. 315 crores.

### **2.5.4 Delivery:**

The project commenced commercial operations in December, 2004. The project has been progressing well without any issues (legal or operational) during the operations stage. As of 2015, there are no plans of expansion of the project or any lane additions.

In case of any requirements for capacity augmentation during the concession period, the NHAI has the option to invite bids from eligible developers including the concessionaire. After evaluation, the concessionaire, if not the lowest bidder, will get the first right of refusal or alternatively receive a termination payment from the winning bidder.

### **2.5.5 Exit:**

At the end of the concession period in November, 2019, the concessionaire shall handover the project free of cost to NHAI. Prior to the handover, an independent engineer will inspect and

certify the quality of the road. If required, the independent engineer will furnish the concessionaire a list of works to be carried out to ensure that the road conforms to the handover standards.

### 2.5.6 Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary risk bearer	Comments
A) Pre- Operative Risk				
Delays in land acquisition	Low	0-1 years	NHAI	The obligation for land acquisition was with NHAI. The land already had all environmental and other clearances. However, there was a slight delay in the land acquisition because of which the construction was delayed by a month.
Financing risks	Low	0-2 years	Concessionaire	While the concessionaire had to bear this risk, it was relatively easier to get financing because of fixed annuity payments from NHAI. In addition, NHAI also gave an irrevocable revolving letter of credit for INR. 29.48 crores, throughout the concession period. This provided comfort to the bankers.
Approvals	Low	0-2 years	Concessionaire	While this obligation rested with the concessionaire, assistance from NHAI and the state support agreement ensured easier and faster approvals.
Social Risk	Low	0-2 years	Concessionaire	The risk was low since it was an existing road expansion with minimal displacement.
B) Construction Phase Risk				
Design Risk	Low	0-2 years	Concessionaire	The design had to be accepted by NHAI and vetted by an independent engineer. In addition the road designs were standardized as per the Indian Roads Congress (IRC) and Ministry of Surface Transport (MoST) standards.
Construction Risk	Low	0-2 years	Concessionaire	The concession agreement had clear standards and specifications for construction with an independent engineer having to ensure adherence. The concessionaire had to provide a Performance Security for INR. 6.58 crores. Also, the clause of retention of minimum equity (26 per cent) in the SPV by the original concessionaire throughout the concession period provided a sense of security to NHAI.

Construction Time Overrun Risk	High	0-2 years	Concessionaire	An early or late completion attracted a bonus or penalty. Moreover, the concession period included the construction period which incentivised the concessionaire to complete the construction at the earliest.
Approvals	Low	Throughout	Concessionaire	NHAI assistance and the state support agreement ensured easier approvals.
C) Operational Risk				
Operations & Maintenance Risk	Low	Throughout	NHAI	The Concession Agreement defines penalties for non-adherence to standards regarding O&M. These include a reduction or non-payment of annuity in case of non-availability of agreed carriageway, due to reasons attributed to the concessionaire. In addition, in cases where concessionaire fails to maintain the roads as per the specified conditions or fails to perform O&M as identified and instructed by NHAI, NHAI shall undertake the repairs and have the concessionaire reimburse such costs. In cases of material breach of O&M requirements, the NHAI has the right to terminate the agreement.
Market Risk	None	-	-	The annuity payment is not related to the traffic or other market related forces. Therefore, there is no such risk.
Payment Risk	Low	Throughout	Concessionaire	NHAI is compensating the concessionaire by way of a fixed annuity backed by an irrevocable revolving letter of credit for INR. 29.48 crores throughout the concession period. This facility reduces the risk of defaults in annuity payments.
D) Handover Risk				
Handover risk	Low	17-18 years	Concessionaire	The concession agreement defines the standards for handover of the project site back to NHAI. An independent engineer certifies the quality of the road. NHAI ensures the requisite repairs are undertaken by the Concessionaire before handover, by retaining a sum of INR. 7.4 crores from four annuity payments immediately preceding the expiry of the concession period.
Concessionaire event of default	Low	Throughout	Concessionaire	NHAI has the right to terminate the contract and pay the concessionaire 70 per cent of the book value of

				assets (if it is after the commencement of operations).
Government's event of default	Low	Throughout	NHAI	Concessionaire can terminate the contract and NHAI is liable to pay the concessionaire the discounted value of future net cash flows (if it is after commencement of operations) or Book Value of assets + interest (if termination is before commencement of operations)
E) Other Risk				
Change in Law	Medium	Throughout	Concessionaire/ NHAI	The Concessionaire is exposed to risks in case of any increase in the capital expenditure and/or operating costs or taxes due to a change in law. This obligation of the Concessionaire is limited to Rs. 6 crores, beyond which NHAI has to bear the expense. In case of operating expenditure the exposure of the Concessionaire is restricted to Rs. 1 crore.

Source: Case Study 7: Tuni Anakapalli Annuity Road Project, , Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

## 2.6 Key Benefits<sup>17</sup>

The assessment of key benefits from the project has been carried out on a qualitative basis, primarily, on account of limited financial information available in the public domain. This analysis is based on the benefits from this project. The key benefits which have accrued as a consequence of this project are:

**Speed and Scale of Development:** The Golden Quadrilateral project was one of the earliest initiatives of the Government of India to modernise and improve the quality of roads in India. NHAI was assigned the responsibility of developing and improving these stretches with ambitious timelines.

Undertaking the projects as PPPs was the most viable and workable option to meet the timelines and provide improved facilities to the users of the roads. The private sector not only brought the efficiencies of construction and modern technologies to reduce time in construction, but also had skill sets and resources to operate and maintain the roads.

**Private Sector Efficiencies:** The concessionaire not only managed to complete the project with only a month's delay (attributed to delay in land acquisition by NHAI), but also completed the construction at a lower project cost. It was able to bring in innovative financing techniques such as securitisation to lower the overall cost of funds for the project.

**Transfer of Risk:** The Annuity model ensured that the government had to make no upfront investment in the project and had a fixed pre-determined annual outflow towards the project.

<sup>17</sup> Case Study 7: Tuni Anakapalli Annuity Road Project, , Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010



The risk of time and cost overruns, which are typical to public procurement, were thus transferred to the private sector on account of the annuity model.

**Demonstration Effect:** The Tuni-Anakapalli was amongst the first set of projects considered for the BOT (Annuity) model. The project, till date, has been progressing well and has created a demonstration effect for projects to be taken up on similar lines.

## **2.7 Key Learning and Observations<sup>18</sup>**

### **2.7.1 Innovative Funding through Securitisation**

During the operations stage, GTAEPPL raised debt at very low interest rates by securitising the annuity payments receivable from NHAI. This mode of funding enabled the concessionaire to repay the term loan and provided access to relatively lower cost funding.

### **2.7.2 Transfer of Risk**

The GMR consortium stabilised its risks by entering into a long term O&M contract with its own consortium partner; thereby, transferring substantial risk of the project.

### **2.7.3 Incentive to Developer to complete construction on schedule**

The Developer had an incentive for early completion that attracted a bonus payment while a delay led to a penalty. Moreover, the concession period included the construction period, so the developer was incentivised for an earlier completion to begin earning annuities.

## **2.8 Documents referred to:**

- Case Study 7: Tuni Anakapalli Annuity Road Project, , Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010
- Concession Agreement
- Credit Rating Perspective on GMR Tuni-Anakapalli Expressways Pvt. Limited
- Share Issue Prospectus of GMR Infrastructure Limited
- Articles in periodicals and publications

## **2.9 Interviews:**

- An official from National Highways Authority of India
- An official from GMR

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<sup>18</sup> Case Study 7: Tuni Anakapalli Annuity Road Project, , Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

## 3. Nhava Sheva International Container Terminal

### 3.1 Project Description<sup>19</sup>

India has 12 major ports and 200 non major ports (minor and intermediate ports) spread across nine maritime (coastal) states. Realising the necessity of restructuring of major ports in India to bring in efficiency in Indian exports, Government of India came up with a policy guideline for privatisation of ports in October, 1996. Pursuant to this, a developer was selected and a 30 year license for the port was awarded in 1997 for:

- The construction of a 600 metre piled wharf with three approach bridges,
- Reclamation of 20 hectares for container yards and installation of requisite container handling equipment
- Construction of office facilities and ancillary buildings and
- Construction of an electrical sub-station and associated electrical work

The Nhava Sheva International Container Terminal (NSICT), promoted by P&O Ports, Australia, is India's first private container terminal and one of the most modern container terminals in India. The project was conceptualised in 1993 such that it could be executed without any government support. The terminal is located within the Jawaharlal Nehru Port Trust (JNPT) area at Uran, in the state of Maharashtra.

This project was the first fully automated container terminal to be developed in India with all its operations, from receiving the vessel bay plans to invoicing, being computerised. The total design capacity of the 2-berth container terminal was 7.2 million tonnes per annum in Phase I (i.e. 0.6 million Twenty-Foot Equivalent Units (TEU)) and a cumulative 15.6 million tonnes per annum (i.e. 1.3 million TEU (0.6 million TEU + 0.7 million TEU = 1.3 million TEU)) in Phase II. The terminal was made fully-operational, with both Phases I & II operational, in July, 2000. As on March 2015, it is operating at more than 90 per cent capacity<sup>20</sup>. The port handles containerised cargo only.

### 3.2 PPP Structure<sup>19</sup>

Nhava Sheva International Container Terminal Private Limited (NSICTPL) was incorporated as a Special Purpose Vehicle in 1997, based on the joint venture agreement between M/s P&O Australia Ports Pty Limited, M/s Konsortium Perkapalan Berhad and M/s D.B.C. Group of Companies (represented by Trans Impex Private Limited). In March, 2006, P&O Ports was acquired by Dubai Ports World Limited (DP World), one of the world's largest container terminal operators, following which NSICTPL came into the fold of DP World terminal network.

#### 3.2.1 Obligations of the Parties:

The concession agreement that was signed included responsibilities for the licensee including development, operation, maintenance, and management of the container terminal on a Build, Operate and Transfer (BOT) basis for a period of 30 years, expiring in 2027. JNPT is responsible

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<sup>19</sup> Case Study 9: Nhava Sheva International Container Terminal, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

<sup>20</sup> Based on discussions with JNPT officials

for scheduling entry and berthing of vessels, pilotage, towage, dredging, navigational safety, supply of electricity, water supply to terminals and ships and monitoring air and water pollution. JNPT provided the licensee with six hectares of additional developed container yard area and also made available a fully developed railway yard of two hectares for inland container depot operations. Ownership of the land, reclaimed sea and water in the licensed premises remains with JNPT.

### **3.2.2 Modality of Royalty between NSICTPL and Port Trust<sup>21</sup>**

In consideration of the grant of license:

- NSICTPL paid an initial amount of INR 7.2 crore.
- In addition, NSICTPL pays royalty, on monthly basis, to JNPT based on annual minimum guaranteed traffic, which is calculated on the basis of TEU transferred across the apron irrespective of discounts in tariffs that may be granted by NSICTPL.
- The royalty has to be paid by the 7<sup>th</sup> day of subsequent month. At the end of each quarter, total royalty payable is computed and the difference, if any, between the royalty payable and actually paid till such date is remitted by NSICTPL within 15 days of expiry of the relevant 3 months period.
- Unless the failure is attributable to factors outside NSICTPL control, NSICTPL is required to pay royalty to JNPT for minimum guaranteed traffic in the event of not achieving the minimum traffic indicated.
- Delay or failure to pay the royalty on the respective due dates attracts interest charge at the rate of 1.5 per cent per month in addition to a penalty not exceeding 2 per cent of the amount due.

### **3.2.3 Pricing**

Licensee collects prescribed rates and charges as per the rates published in the JNPT Port Tariff Schedule and Scale of Rates as approved by the Government of India towards terminal, container and cargo services. NSICTPL guarantees handling of at least 90 per cent of the projected annual throughput levels.

### **3.2.4 Termination**

On expiry of the stipulated license period, all the civil engineering structures, equipment, machinery, ancillaries, etc. would be handed over to JNPT free of cost. If JNPT were to terminate the agreement prior to the thirty-year period, NSICTPL would receive the depreciated cost of permanent construction and other assets- as taken over. The agreement specifies the life span of the assets for estimating depreciation.

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<sup>21</sup> Based on discussions with JNPT officials

The Figure 1 below depicts the PPP structure for this project.

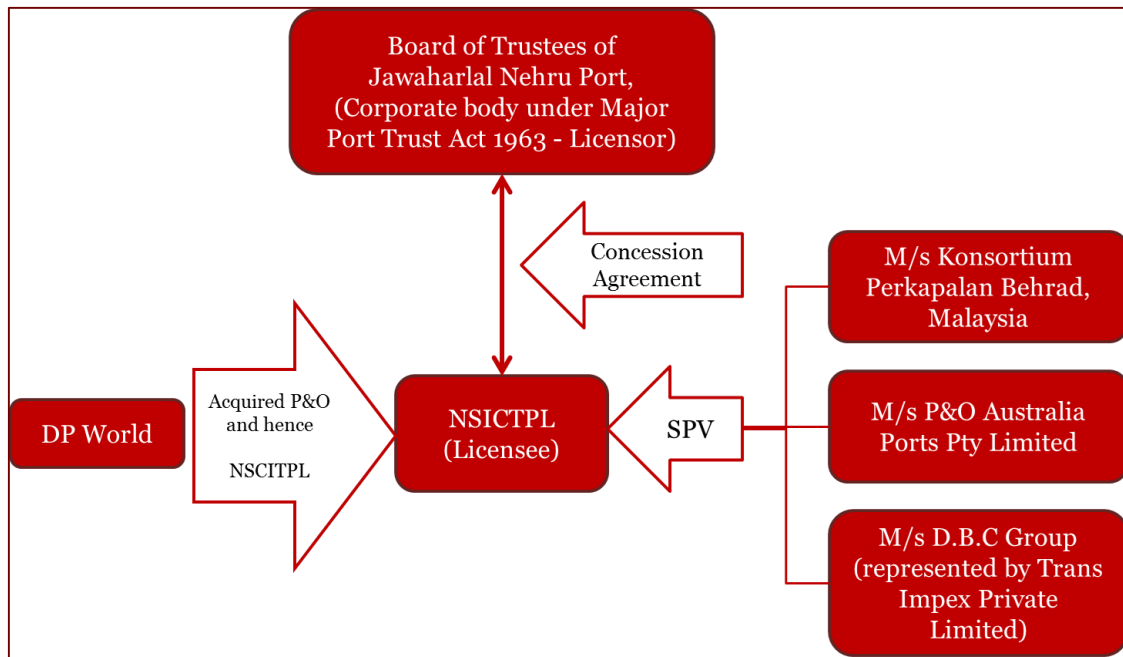


Figure 1: Structure of the Project

### 3.3 Current Status

NSICT is operational and handles close to 13 per cent of container traffic handled by all the Major Ports in India. NSICT has handled over 1.16 million TEUs in the financial year 2014-15, which is up by 19.68 per cent from the value for the same period, last year<sup>22</sup>.

The primary goods exported are garments and other textile articles like embroidery, sporting goods, carpets, machines, meat, and medicines. Main products imported are chemicals, machinery, plastics, electrical machinery, vegetable oils, aluminium, and other non-ferrous metals. The terminal has convenient access to Mumbai and to the hinterland of the states of Maharashtra, Madhya Pradesh, Gujarat, Karnataka and a large part of North India. As on March 2015, NSICT has no expansion plans of its terminal at the port.

### 3.4 Financing Information<sup>23</sup>

The terminal project was developed at a cost of INR 733 crores over a period of two years. The Debt Equity Ratio for the project was 1:1 and the project feasibility numbers ascertained that it doesn't require any VGF (Viability Gap Fund) support. ICICI led consortium of lenders had lent around INR 190 crores (26 per cent of project cost) to the SPV under a guarantee provided by P&O Ports, Australia. The remaining debt of INR 177 crores was raised from other financial institutions. Of the total debt, 55 per cent was US\$ denominated debt while the balance was Rupee denominated debt. The cost of debt mentioned by NSICTL in their cost statement submissions to Tariff Authority for Major Ports (TAMP) is 10.5 per cent.

<sup>22</sup> Based on discussions with JNPT officials

<sup>23</sup> Case Study 9: Nhava Sheva International Container Terminal, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

**Table 7: Project Finance Details**

Particulars	
Project IRR	18%
Debt Equity Ratio	1:1
NPV (INR in crore)	224.59

Source: Case Study 9: Nhava Sheva International Container Terminal, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010  
 Note: The project IRR estimate is based on the return on capital employed that is normally permitted as per JNPT’s tariff. The NPV is based on the winning consortium’s bid.

### 3.5 Process Analysis

The Figure 2 provides the timeline of NSICT’s development:

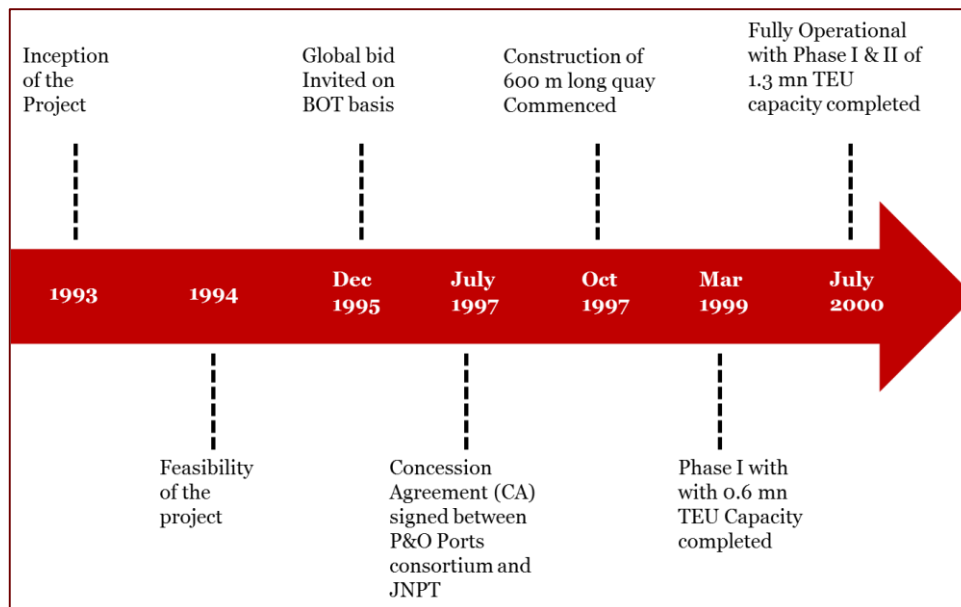


Figure 2: Timeline of NSICT Development

#### 3.5.1 Inception:

Following introduction of reforms in India in early nineties, the core sector industries including the Indian port sector began to witness a new phase of revival and growth. In view of continuous growth in container traffic and to meet the growing demand for additional container handling facilities, JNPT took the initiative to introduce private participation in ports for the first time in India. In January 1994, it was initially decided to contract the existing container terminal at JNPT to private operators. Government of India, accordingly, requested the World Bank (WB) to conduct the necessary work for the tendering of operations of the JNPT container terminal. However, subsequently the proposal was amended and it was decided to invite private participation for creating a new container terminal, while retaining the existing one under government ownership and operations.

### **3.5.2 Procurement:**

The JNPT Port Planning and Development Department prepared an extensive bid document in consultation with the WB, Ministry of Surface Transport (MoST) and other ministries. Though the WB played a critical role, both at the Inception and Procurement stage, JNPT took a long time to finalise the bid document, which delayed the start of the procurement process by about 2 years. JNPT finally issued the global tender for a new container terminal on “Build, Operate and Transfer” basis for thirty years in December, 1995.

Thirty firms from India and abroad purchased the bid document, out of which five consortia submitted their proposals. The financial offer made by the four responsive bidders to the Government by way of the highest NPV of Royalty Offered was assessed. The four consortia were:

- A consortium led by Hutchinson International Port Holding Ltd., Hong Kong including ABG Heavy Industries Ltd. and Bank of America International Investment Corporation.
- A consortium led by Marubeni Corporation, Japan including Evergreen International and IL&FS, Mumbai.
- A consortium led by P&O Ports Australia Pty. Ltd. including DBC Port Management and Konsortium Perkapalan Berhad.
- A consortium led by the Port of Singapore Authority including Samsung Corporation, Seletar Investment, Neptune Orient Lines Ltd., and Samrat Shipping.

The final concession agreement between JNPT and the SPV was signed in January, 1997. Based on the documents available in public domain, the royalty payable per TEU ranges from about 2 per cent in the initial years to about 50 per cent of the Minimum Guaranteed Royalty payment in the terminal year.

### **3.5.3 Development:**

Construction work commenced in October, 1997. First stage of the project was completed by December, 1998 and the second phase by December, 2000.

### **3.5.4 Operations:**

#### **Issue of Royalty:**

The terminal started experiencing issues related to the royalty pay-out. There was lack of clarity in the concession agreement on whether the royalty payment was to be considered as a part of cost or as a share in the profit of the SPV's accounts, while determining the port tariff. NSICTPL was of the view that, although, the royalty was in the form of a revenue share, since it was paid to the Port Trust, it should have been considered as an expense (The basic nature of Royalty is an expense as per the Indian Companies Act and is not considered as a part of profit). The Tariff Authority of Major Ports' (TAMP) view on the other hand was that royalty should not be considered as a part of cost as it was an appropriation of profit.

In the procurement process, the royalty payment was the principal bid parameter. The treatment of royalty as an expense could have led to a scenario where a firm, in order to win the bid, quoted a higher revenue share as royalty by increasing the proposed port-user charges. Thus, while on one hand the operator would agree to share a higher amount of royalty with the government so as to win the bid, on other hand, by assuming royalty as a cost, it would seek higher port-user

charges to recover the return on investment as specified by TAMP. This ultimately would result in an excess burden on the port/terminal users, and thus, would reduce the demand for the port services.

In its revised guidelines in 2005, TAMP recognised the principle that royalty would be paid out of the Operating Surplus (i.e. Profit) of the concessionaire. However, for bids received prior to July 29, 2003, it allowed royalty to be considered as a cost in the tariff computation up to the maximum of the next highest bid. This meant that if firm “A” won the bid by offering 30 per cent of the revenue as royalty and firm “B” had bid 24 per cent of the revenue as royalty then, the maximum royalty that could be allowed as cost for tariff computation would be 24 per cent. TAMP’s guidelines were framed with the objective that the operator does not incur losses due to royalty payments. However, there was no clarity on considering royalty as a cost in cases where the terminal operators were making profits. Although this revision resulted in a reduction in NSICT’s tariff by 12 per cent, it still imposed an excess burden on port users.

**Port Performance:**

Since commencement of its operations, NSICT has achieved operational results comparable with global standards. In recognition of its performance, the Confederation of Indian Industries (CII) bestowed the CII Award for Excellence in Infrastructure to NSICT in February, 2003.

Throughput figures for the terminal since its commissioning in March, 1999 are stated in Table 2 below.

<b>Table 2: Operational Results</b>	
<b>Financial Year</b>	<b>Total NSICT Throughput (million TEU)</b>
2000	0.34
2001	0.69
2002	0.94
2003	1.2
2004	1.23
2005	1.23
2006	1.32
2007	1.36
2008	1.51
2009	1.43
2010	1.53
2011	1.54
2012	1.4
2013	1.04
2014	0.96
2015	1.16

Source: Based on information provided by JNPT officials

**3.5.5 Exit Clause:**

The concession agreement has been signed for a period of 30 years and is expected to expire in 2027. Upon expiration of the stipulated license period, all the civil engineering structures, equipment, machinery, ancillaries, etc. would be handed over to JNPT free of cost.

### 3.5.6 Risk Allocation Framework<sup>24</sup>

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
<b>A. Pre-Operative Risks</b>				
Delay in land acquisition	Low	1-2 years	Public Sector – Port Trust	The Port Trust already owned the land required for the project. However, there was lack of clarity in the concession agreement about additional land for expansion and allied activities.
External linkages	High	Throughout the contract	Private Operator	<p>The Port Trust provided road connectivity from the port boundary to the nearest national highway as well as railway connectivity. However, over the last 10 years, this capacity has become congested largely due to two reasons –</p> <ul style="list-style-type: none"> <li>• Low initial traffic projections and</li> <li>• Growth in the urban developments in the vicinity of port.</li> </ul> <p>The expansion of these linkages (road and rail) has thus become a major issue and is adversely impacting the port operations.</p>
Regulatory	High	Throughout	Private Operator	The regulatory risks were high because the government had limited experience with respect to PPP and the laws governing PPPs were new and untested which led to contractual gaps and subsequently caused several issues during the operations phase.
Approvals	Low	0-5 years	Private Operator	Being an extension of an existing port, NSICT did not face many issues related to approvals. Most of the approvals were within the purview of existing regulations / guidelines, and hence,

<sup>24</sup> Case Study 9: Nhava Sheva International Container Terminal, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010



Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
				obtaining them was not a bottleneck for the project.
<b>B. Operations Phase Risks</b>				
Operations & Maintenance Risk	Medium	Throughout	Private Operator	As the location of the port / terminal allows limited expansion of Container Freight Stations (CFS), warehouses or other allied facilities, this has an impact on the efficiency of terminal operations. Issues impacting operations such as transport strikes, congestion on rail & road capacities were beyond the private players' control and have had a detrimental impact on operations.
Market Risk	High	Throughout	Private Operator	Market risks are high due to competition but guaranteed minimum cargo in the form of long term cargo commitments from users have mitigated these risks. A thorough market assessment could have also assisted in mitigating this risk as capacity and capital investment would have accordingly been planned.
Financial Risks	Medium	Throughout	Private Operator	There has been uncertainty with respect to the tariff, which is set by an Independent Authority. Other financial risks, as a result of adverse movements in interest rates, exchange rates, etc., are expected to be managed by the private sector through appropriate financial management techniques.
<b>C. Handover Risk Events</b>				
Concessionaire event of default	Medium	Throughout	Lenders	In this case, lenders are the most vulnerable in case of default on account of the concessionaire, as the lenders would only be able to realise their investment after the licensor clears all his dues, which could take a year and a half. During this period the

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
				lender would have to bear the risk.
Government's event of default	Low	Throughout	Government	The Government needs to pay higher of a fair value of assets and the proposal value received from a replacement developer (if applicable).
<b>D. Other Risks</b>				
Change in Law	Low	Throughout	Private Operator	No compensation from the government is due, although there is an enabling provision to mutually discuss, in good faith, and suitably amend the terms of the concession agreement, including an extension of concession period. No compensation for changes in any tax laws. Extreme government actions, including change in law that frustrates operations of the project have been included under political force majeure events and suitable termination and compensation procedures have been prescribed.
Force Majeure	Low	Throughout	Private Operator	While, force majeure risks are partially transferred to the extent of insurance, they are largely borne by the private operator. In the event of termination, there is compensation payable to the concessionaire to the extent of debt outstanding and varying levels of equity contribution, depending upon the nature of the event.

Source: Case Study 9: Nhava Sheva International Container Terminal, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

### 3.6 Key Benefits<sup>25</sup>

The entire process of bidding of NSICT is a case of a successful PPP process implementation, barring the issues related to tariff and royalty on account of contractual gaps in the concession

<sup>25</sup> Case Study 9: Nhava Sheva International Container Terminal, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

agreement. The analysis of key benefits presented here is not a quantitative assessment as financial data/information of the private port operator is not available in the public domain. The value from this project has been assessed by way of the efficiencies the private sector was able to bring on board in the terminal operations.

### 3.6.1 Operational Efficiencies:

The container traffic growth at the NSICT, from FY01 onwards, catapulted the positive traffic growth at JNPT. Table 3 highlights the impact of NSICT on the overall performance of JNPT. Significant improvements were observed in key port efficiency parameters:

- The average turnaround time dropped from 4.5 days in FY98 to about 2 days in FY 09 and 1.43 days in FY 14<sup>26</sup>.
- The pre-berthing delays dropped from close to 1.5 days in FY 98 to 0.5 days in FY 09.

KPI	2012-13	2013-14
<b>Vessel-related</b>		
Pre berthing waiting time	0.03	0.02
Turnaround Time	1.59	1.43
Average ship berth day output (tonnes)	30,715 (2,146 TEUs)	28,680 (2,117 TEUs)
Cargo handled (TEUs)	1,044,105	969,458
<b>Rake-related</b>		
ICD containers handled (TEUs)	219,763 TEUs	190,534 TEUs

Source: Operating Performance Profile, JNPT website (<http://www.jnport.gov.in/Performance.aspx?id=23&cid=18>)

The success of NSICT can be attributed to its superior productivity parameters as well as the state-of-the-art equipment and latest technology.

### 3.7 Key Learning and Observations<sup>27</sup>

- **Bid evaluation criteria need to be simple but robust.** The bid evaluation criterion – Highest NPV of Royalty payment - was simple but insufficient. The lack of a methodology to assess the royalty payout to the licensor and the failure to foresee problems arising from the interaction of the royalty with the tariff level created a number of issues in the subsequent operations phase.
- **Quality of market assessment.** The traffic forecast (market assessment) is the key input in tariff setting and is directly linked to the revenues against which cost and returns are set off. For the same level of investments, the unit cost of container handling varies with different levels of traffic, largely, because of the distribution of fixed costs and returns over the traffic base. Hence, the quality of traffic projections (market assessment) for a port is critical.
- **Clear definition of Roles and Responsibilities of licensor and licensee.** The clarity on the roles and responsibilities of both licensor and licensee, not only during the bidding

<sup>26</sup> Based on discussions with JNPT officials

<sup>27</sup> Case Study 9: Nhava Sheva International Container Terminal, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

phase and termination phase, but also during the operations phase is critical. For instance, the provision of sufficient transport linkages directly influences the efficient operations of the port.

- **Addressing project performance & contractual issues in the agreement explicitly.** This issue is related to specific performance norms or delivery standards that need to be specified to safeguard users' interests. In the NSICT agreement, the only performance related standard mentioned was crane productivity (i.e. moves per hour), which was of limited interest to the users. Moreover, there was no mention of penalties in case of shortfalls in performance.
- **Proactive approach towards tariff structuring and Efficient Project Management.** The operations of TAMP should be critically examined to ensure efficient and cost effective management of port facilities by the port service providers – public and private. Further, along with tariff structuring, a capable Project Management Team, with the ability to take decisions, should be empowered to monitor port operations and maintain the performance standards as defined by the guidelines.
- **Commitment for providing additional land:** Additional land may be required for various purposes including for road / rail linkages, warehouses, storage yards, etc. At the time of signing the contract, it could not be reasonably ascertained as to what would be the requirement of additional land during the concession period, and whether there was such extent of additional land available and would the port trusts be in a position to provide additional land. Hence, while drafting the agreement, appropriate provisions for such expansion could have been considered to avoid an adverse impact on the terminal / port growth.
- **Termination commitments to cover debt due:** It is a standard practice to protect lenders' interest and such a provision is quite common in concession agreements. However, it places greater pressure on the government to monitor the borrowings and repayments of the SPV. This is even more critical in areas where independent regulators have not been instituted to monitor service and financial performance. For example in major ports, the Tariff Authority of Major Ports (TAMP) scrutinises the capital expenditure of port terminals and allows or disallows certain expenditure to be included under the heading of 'allowable expenditure' for the purpose of tariff setting. In short, while the commitment to cover 'debt due' is essential, the government sponsors are also required to build capacity for effective contract supervision and regulation to ensure that lender's interests are protected.
- **Impetus to other Port Sector PPPs:** The successful bid process of the NSICT project, paved the way for other PPP projects in the ports sector, which is now one of the most sought after infrastructure sectors. Of-late, the increase in the number of port projects being offered through the PPP route reflects the benefits being derived by the government from the participation of private entities.

### **3.8 Documents Referred To:**

- Case Study 9: Nhava Sheva International Container Terminal, Public Private Partnerships in India, Compendium of Case Studies, PPP Cell, Department of Economic Affairs, Government of India, December 2010

- Background paper prepared for the World Development Report 2005 – “Managing Port Reforms In India: Case Study of Jawaharlal Nehru Port Trust (JNPT) Mumbai” By Amit S Ray, Professor of Economics, School of International Studies, Jawaharlal Nehru University New Delhi, India (2004)
- “A Diagnostic Study of Jawaharlal Nehru Port Trust” on behalf of Ministry of Commerce, Government of India, G. Raghuram, IIM Ahmedabad (2005)
- Planning Commission Case Study “Concession for Nhava Sheva Container Terminal” Bharat Salhotra (Nov, 2007)
- TAMP Order (2000, 2005, 2006) for NSICT, <http://tariffauthority.gov.in/htmldocs/JNPTorNSICT.htm>

### **3.9 Interviews:**

- Officials from JNPT

## 4. Coimbatore Integrated Municipal Solid Waste Management Project

### 4.1 Project Description

Coimbatore district is situated in the western part of the State of Tamil Nadu and is famous for its textile industry. The city Municipal Corporation was formed on May 01, 1981.

The city's growth in recent years can be attributed to the large scale industrial development backed by abundant water and power availability. Industrialisation has created livelihoods leading to urban migration from surrounding villages. Though the city's waste management is the responsibility of CMC, the waste management system in the city was inadequate to cater to the needs of the urban growth, and as a result was unable to meet the norms stipulated under the Municipal Solid Waste Rules, 2000.

Thus, a Solid Waste Management (SWM) project was conceptualised under Jawaharlal Nehru National Urban Renewal Mission (JnNURM) to augment the existing SWM capacity and create necessary infrastructure by adopting an integrated SWM approach. The project was approved by the Central Sanctioning and Monitoring Committee (CSMC) under JnNURM in February, 2007.

The project was divided into two (2) packages. The first package of the project comprised of segregation of waste at source, primary collection, secondary collection and transportation of segregated waste up to the transfer stations. The project development and implementation of first package was undertaken directly by the Coimbatore Municipal Corporation (CMC).

The second package comprised of (a) construction of four transfer stations at Peelamedu and Ukkadam having 200 tons per day (TPD) capacity, each, and Sathy Road and Ondipur having 125 TPD capacity, each (b) Secondary transportation of waste up to the processing site/disposal site at Vellalore, (c) construction of 375 TPD capacity compost plant (waste processing facility) at Vellalore, and (d) Establishment of a sanitary landfill facility at Vellalore including scientific closure of old & abandoned dumpsites at Ondipur, Kavundampalayam, and Vellalore. The second package of the project was structured on PPP mode<sup>28</sup>.

**Present day information:** Population of the city of Coimbatore as per Census 2011 was 10.6 lakh people and in October, 2012, the area of the city more than doubled from 106 sq km to 257 sq km; thereby, increasing the population to 16 lakh people as nearby areas/villages were agglomerated into the CMC limits. Today, Coimbatore generates around 815 metric tonnes (MT) of Municipal Solid Waste (MSW), daily, having an average generation rate of 600 gm per capita per day<sup>28</sup>.

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<sup>28</sup> City Report, Coimbatore Solid Waste Management Project under JnNURM, July 2013

## 4.2 PPP Structure

The second package of the Coimbatore SWM project was undertaken on Design Build Own Operate and Transfer (DBOOT) basis. The concessionaire (Consortium of M/s Bharuch Enviro Infrastructure Limited (BEIL), United Phosphorus Limited (UPL), and CMC established an SPV, 'Coimbatore Integrated Waste Management Company Limited' (CIWMCL). Flow of waste and financial flow are depicted in Figure 1.

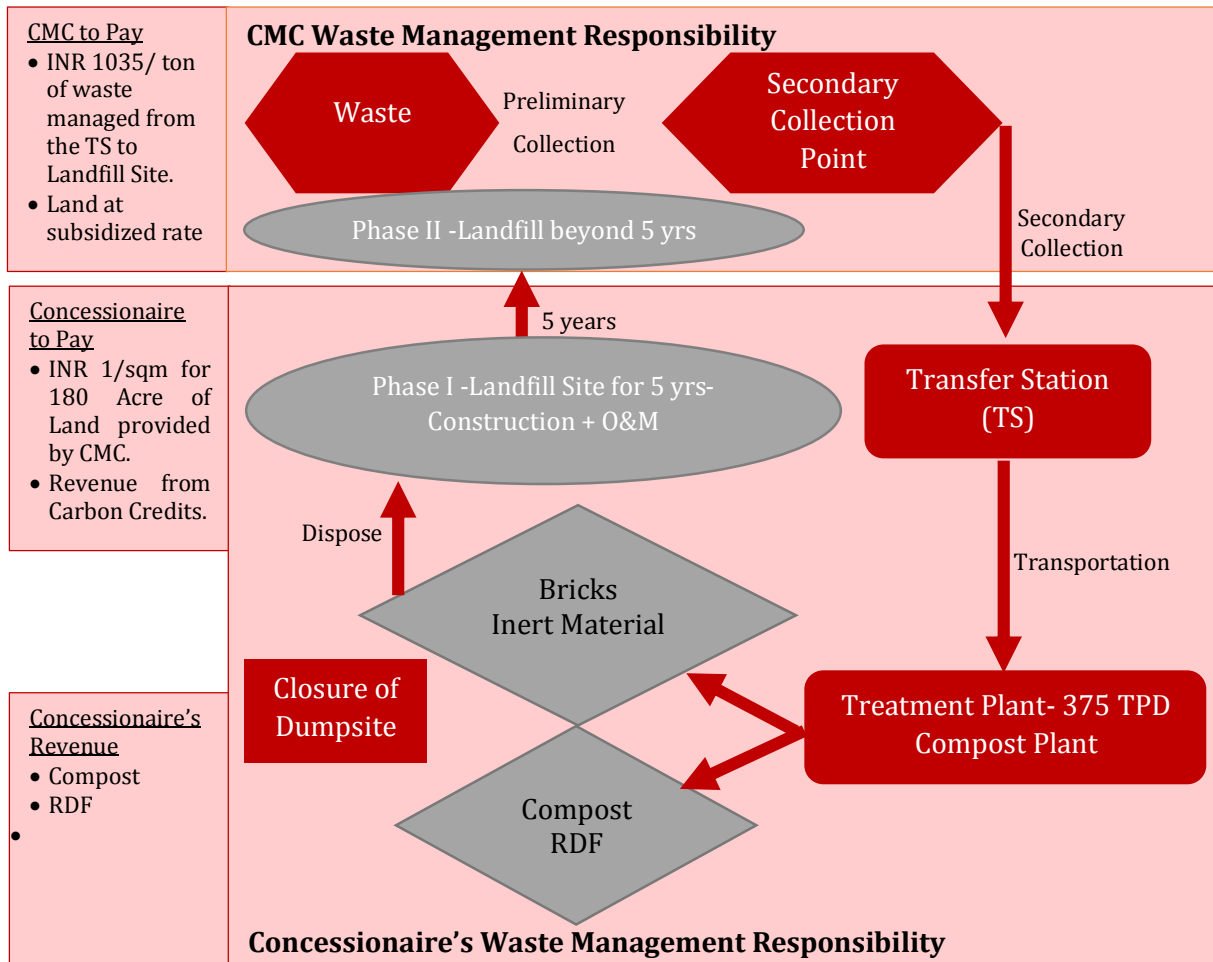


Figure 3: Project Structure of Coimbatore SWM Project

Source: City Report, Coimbatore Solid Waste Management Project under JnNURM

Brief details about the flow of the waste in this process are explained in Figure 1. The waste is collected at a door to door level and is then sent to transfer station from a secondary collection point. Segregation of the waste is done at the transfer station and then the waste is sent to the treatment plant; wherein, the composting process is carried out by windrowing. The compost generated from the process is further packed and stored, while the inert material that is extracted is sent to the scientific dumpsite. Revenue earned by sale of end products of the treatment belongs to the concessionaire. The end products generated from the process are compost, Refuse derived fuel (RDF) and brick. RDF consists largely of combustible components of municipal waste such as biodegradable waste or plastic.

Scope of work under CMC obligation is as follows<sup>29</sup>:

- Door to Door Collection and transfer of MSW to the transfer stations.
- Assured Minimum Quantity (AMQ) of waste
- Payment within 30 days of producing the receipt of the monthly statement
- Achieve segregation of waste at source
- Disburse funds to the project account in a timely manner
- In case the available site falls short of the requisite needs of the operator, provision of an additional landfill site within 12 months of the operator's request.
- Provision of Capital Cost of expansion of Sanitary Landfill after 5 years of commissioning of the project by the ULB.

Scope of work under CIWMCL obligation is as follows<sup>29</sup>:

- MSW transportation from the existing and proposed transfer stations to Vellalore landfill Site.
- Construction/O&M of 4 transfer stations.
- Construction and management of MSW processing facility with aerobic composting facility.
- Closure of existing waste dumpsites (in 3 locations) in the city.
- Construction and O&M of sanitary landfill site at the integrated project facility for 5 years.
- Including informal waste pickers in the integrated treatment and disposal facility.

#### **4.2.1 Asset Ownership:**

Primary and secondary collection bins and tipper for transfer of primary and secondary collection were to be procured by CMC<sup>30</sup>. The Government of Tamil Nadu had handed over corporation land to the concessionaire to execute this project. The ownership of all the immovable assets including site and civil structures were to remain with CMC. Procurement of plant and machinery, equipment including tippers, bins, hook lifter etc. are to be owned and managed by the SPV till the concession period. All movable assets would remain with concessionaire till the term of the concession<sup>31</sup>.

#### **4.2.2 Asset Transfer on Termination:**

On the date of expiry of the agreement the concessionaire shall handover the site and the entire waste processing facility- including assets- to CMC. Landfill site and post closure monitoring would also be handed over to CMC free of cost<sup>31</sup>.

### **4.3 Current Status**

Post the implementation of the Integrated Municipal Solid Waste Management (IMSWM) project, the city of Coimbatore has developed a systematic waste management system, with adequate infrastructure, that is capable of handling the daily waste generated in the city. Details of infrastructure created through this project are given in Table 1 below.

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<sup>29</sup> City Report, Coimbatore Solid Waste Management Project under JnNURM, July 2013

<sup>30</sup>Report on Coimbatore Corporation-Jawaharlal Nehru National Urban Renewal Mission, On-going Scheme Details

<sup>31</sup> Concession agreement between Consortium of M/s BEIL- UPL and CMC



**Table 1: Details of augmented infrastructure**

<b>Service Head</b>	<b>Infrastructure Augmented</b>	<b>Equipment (Nos.)</b>
Waste Storage and Primary Collection	Waste storage system at the household level using twin bins, door-to door collection and collection of street sweeping waste using 6 push cart bins, handcarts for drain desilting waste, and litter bins with a 40-litre capacity deployed at suitable distances and locations as part of primary collection equipment.	Containerised Hand Carts - 1990 Seamless carts - 200 Animal Drawn Carts - 71 Mini Tippers (TATA ACE) - 12 Vehicle Mounted Road Sweepers - 3 Ride-on Type Road Sweepers - 1 Excavator Loaders - 8 Front End Loaders - 4
Secondary Collection	CMC deployed 3.5 cum. green and white containers to be lifted by dumper placer vehicles, 1.1 cum bins with compactor trucks/refuse collectors, skip containers, skip lifter machines (for collection of C&D waste), hook loaders.	Dumper Placer Lorries (Single Bin Lifter) - 19 Dumper Placer Lorries (Twin Bin Lifter) - 25 Refuse Collector Lorries - 37 Refuse Compactors - 11 Skip Lifter Lorries - 3 4m <sup>3</sup> capacity metallic bins - 288 2.5m <sup>3</sup> capacity G.I. Bins - 1183 1100 Litre HDPE Bins - 1254 660 Litre G.I.Bins - 500 5m <sup>3</sup> capacity metallic bins (for C&D waste)- 30 Tipper Lorries (light & heavy)- 34
Intermediated Storage	2 modernised transfer stations of 200 TPD capacities each. 2 modernised transfer stations of 125 TPD capacities each.	
Secondary Transportation, Treatment and Disposal of inert through IMSWMP	SPV deployed loaders to transfer waste to the treatment plant. Use of windrow turner, loader and tipper lorries at the windrow platform of the processing plant, after which, maturity and curing of the waste is allowed for some 30-40 days. After separation of semi-finished product and inert material, latter is send to the sanitary landfill site using dozer, excavator and grabbers. Simultaneously, the finished product is packed and stored.	Hook Loader - 31 Hook Loader Bins of 22m <sup>3</sup> capacity - 62 Tipper Lorries - 5 Wheel Loader & dozer - 2 Excavator Loader - 1 Windrow Turner- 1 Tractor Dozer - 2 Tractor Mounted Grabber - 2 Hydraulic Excavator - 1 Front End Loader - 1
Others	Road sweepers, workshop for vehicle maintenance, and improvement of community bin areas by proper concreting.	
IEC	IEC activities and awareness generation	
<i>Source: City Report, Coimbatore Solid Waste Management Project under JnNURM, July 2013 and Presentation on "Municipal Solid Waste Management in Coimbatore City Municipal Corporation", March 2013</i>		

The status of Project during March, 2013 is given below<sup>32</sup>:

Package I (Primary Collection):

- Procurement and distribution of waste storage bins to all the Households had been completed
- Procurement of containerised hand carts used for collection of waste from households had been completed
- Procurement of waste collection trucks and receptacles had been completed
- Information, Education and Communication (IEC), and awareness generation among general public was under progress

Package II (Secondary Collection, Transportation, Treatment & Disposal):

- Construction of transfer stations at Peelamedu and Ukkadam – 200 TPD (expandable) had been completed and the transfer stations have been operational since 2009 and 2011, respectively.
- The construction work for transfer Station at Sathy Road – 125 TPD (expandable) had been completed and the transfer station has been operational since 2010
- The construction of the Transfer Station at Ondipudur – 125 TPD (expandable) was on the verge of completion
- Scientific closure of old dumpsites had been completed under which design and development of the three dump sites at Ondipur, Kavundampalayam, and Vellalore was done. The sites were free from environmental pollution and have been transformed into a Garden and Park, and have been a place for entertainment activities creating an aesthetic ambience.
- Construction of compost plant and establishing a sanitary landfill facility at Vellalore had been completed
- All necessary plant and machinery, equipment and tippers required for composting and landfill operations had been procured by the SPV and used for closure of existing dump sites. Hook lifters, bins and bulk carriers for secondary storage and transportation had been procured.

#### **4.4 Financing Information**

Under JnNURM, the Coimbatore SWM project had an approved cost of INR 96.51 crore. Sources of funding of the two project packages are presented in Table 2.

Table 2: Funding Sources for the Coimbatore SWM Project

<b>Funding Source</b>	<b>Package 1 details</b>	<b>Package 2 details</b>
Government of India	50%	50%
Government of Tamil Nadu	20%	20%
ULBs Share	30%	
Private Operator's Investment		30%
Approved Cost (INR crore)*	26.29	68.93
*cost is excluding 3.5% contingencies		
<i>Source: Presentation on "Municipal Solid Waste Management in Coimbatore City Municipal Corporation", March 2013</i>		

<sup>32</sup> Presentation on "Municipal Solid Waste Management in Coimbatore City Municipal Corporation", March 2013

The details of funding from each source are provided in Table 3.

Table 3: Financial Structure of Coimbatore SWM Project

Sr. No.	Finance Head	Amount (INR in Crores)
1.	Government of India Grant (50%)	48.26
2.	Government of Tamil Nadu (20%)	19.30
3.	ULBs Share (30%)	8.16
4.	PPP contribution against ULBs Share	20.79
	<b>Total Approved Cost of Project</b>	<b>96.51</b>

Source: City Report, Coimbatore Solid Waste Management Project under JNNURM, July 2013

The project package 2 is essentially divided in 4 main components. The cost details for each of the components are provided in the Table 4.

Table 4: Component wise breakup of approved budget for Package 2.

Sr. No.	Component Description	Approved budget (INR in crores)
1.	Setting up of Transfer Stations	18.40
2.	Processing- Compost Plant	16.50
3.	Closure of Existing Dumping Sites	8.75
4.	Disposal- Sanitary Landfill	25.28
	<b>TOTAL</b>	<b>68.93</b>

Source: Presentation on "Municipal Solid Waste Management in Coimbatore City Municipal Corporation", March 2013

The JnNURM Mission Directorate, while approving the Detailed Project Report (DPR), directed CMC to explore the possibility of user charge collection in order to recover the regular Operation and Maintenance (O&M) charges of the waste management system. The CMC passed a resolution in 2007 to levy and collect user charges based on property tax (households, commercial units, etc.). The details of user charge levied is presented in Table 5.

Table 5: Structure of User charge collection

Sr. No.	Description	User charges (INR)
1.	Property tax less than INR 500	INR10/-per house per month
2.	Property tax between INR 501 to 1000	INR20/-per house per month
3.	Property Tax more than INR 1000/-	INR30/-per house per month
4.	Shops and Establishments	INR2/-per day
5.	Restaurants / Kalyana Mandapams / Commercial Establishments / Industrial Establishments	
i.	Through small vehicles (upto 3.00 Tons of waste)	INR 500 per trip
ii.	Through heavy vehicles (above 3.00 Ton of waste)	INR 1000 per trip

Source: City Report, Coimbatore Solid Waste Management Project under JNNURM, July 2013

## 4.5 Process Analysis

### 4.5.1 Inception:

Coimbatore witnessed rapid expansion, and a need to augment the waste management infrastructure to support this growth. With the existing SWM infrastructure, it was difficult for CMC to manage the waste generated, daily. In addition, the city was following an open dumping procedure for solid waste. The lack of scientific treatment and disposal posed a threat to public health and could cause environmental issues in the surrounding regions. To address these

problems, a proposal to augment the existing SWM system using an integrated approach was prepared under JnNURM.

Prior to the implementation of this project, the existing situation of solid waste management in Coimbatore was<sup>33</sup>:

- **Storage of Waste:** Waste storage practice in the city was inadequate, and citizens were not inclined towards cleanliness of the city. Almost 45 per cent of the households and 80 per cent of shops and establishments scattered waste on the streets.
- **Segregation** of recyclable waste was hardly practiced. Around 91 per cent citizens did not segregate waste at source, as the concept of twin bin system or any mode of segregation at source did not prevail in the city.
- **Collection at Source:** Only 44 per cent of the households were covered under door-to-door collection service.
- **Street Sweeping:** Street sweeping on 72 per cent of the streets was regularly done.
- **Secondary collection system:** Almost 85 per cent of waste storage depots used to be open, resulting in unhygienic conditions, environmental issues and ground pollution due to the decaying of the waste, foul smell.
- **Transportation of Waste:** Almost 91 per cent of waste was collected on a day-to-day basis. However, about 46 per cent of the waste generated was transported in open vehicles, resulting in spilling-over on the way to the dump site.
- **Treatment & Disposal:** The waste treatment and disposal practice lacked in terms of standards specified in the MSW rules. CMC did not have any system for treatment or scientific disposal of waste. A small treatment plant, set-up and operated by a private company, catered to only 3 per cent of the city's waste. Hence, majority of the waste was left untreated and disposed unscientifically.
- **Status of Infrastructure:** CMC managed waste with the help of containerised hand carts, single bin lifters, refuse collector lorries and tipper lorries.

Hence, there was a need to increase the coverage under door to door collection, store and transport the waste in a hygienic manner, and finally treat and dispose the waste in a scientific manner.

Under this initiative, the Integrated Municipal Solid Waste Management Project (IMSWMP) was taken up, for implementation, by CMC with consideration to the following components.

Table 6: Details of Components of the IMSWM Project

S.No.	Component	Description
1	Primary Collection	– Equipment, vehicles, tools, etc., to augment primary collection, and street sweeping
2	Secondary Collection and Transportation	– Secondary storage, direct transfer and transportation of waste to transfer stations/treatment plants – High pressure water jets for washing containers, bins/baskets washing of lorries at transfer stations – Road sweepers – Maintenance workshop for repair and maintenance of vehicles – Construction of transfer stations, construction of computerized weigh bridge with office at transfer stations.

<sup>33</sup> City Report, Coimbatore Solid Waste Management Project under JnNURM, July 2013

3	Waste Treatment	– Compost Plant of 375 MT/day capacity
4	Waste Disposal	– Landfill site civil construction – Waste closure cost at the existing Vellalore landfill site – Remediation and closure of 40 year old, recently abandoned landfill sites situated in the city – Bulldozer, wheel dozer, tippers, JCB and other equipment for waste treatment and land filling – Regular pollution monitoring to detect the pollution caused by the vehicles.
5	IEC activities and awareness generation.	
Source: City Report, Coimbatore Solid Waste Management Project under JnNURM		

#### 4.5.2 PPP Procurement<sup>28</sup>:

Subsequent to the approval of the project in February, 2007, the selection process for a private developer was carried out through a competitive bidding process which lasted 4 months.

- Request for Qualification (RfQ) was issued in July, 2007 and applications were received on August 16, 2007
- The proposals were submitted by shortlisted bidders in October, 2007
- The financial proposal was opened on October 10, 2007
- Letter of intent to the preferred bidder was issued on October 31, 2007
- A consortium of M/s. Bharuch Enviro Infrastructure Limited (BEIL) and United Phosphorus Limited (UPL) was awarded the project in November, 2011 on the basis of minimum Net Present Value (NPV) of the following parameters:
  - Transportation Cost (in INR / ton)
  - Processing Cost (in INR / ton)
  - Landfilling of Inert (in INR / Ton)
  - Closure of Dumping Site (in INR Lakh per annum)
- The average tipping fee worked out to INR 668/ MT in 2008, INR 1035/ MT in 2013 and INR 3709/ MT for the design year 2027.
- A Concession Agreement was signed between the CMC and the Concessionaire on 20.12.2007. The concession was signed for a period of 20 years including the construction period of the facility.
- The Concessionaire incorporated a SPV by the name M/s Coimbatore Integrated Waste Management Company Private Limited on January 01, 2008 for implementing the project.
- The Government of Tamil Nadu accorded necessary permission for handing over the corporation land to the Concessionaire on May 09, 2008.

#### 4.5.3 Delivery:

Preliminary collection of waste from door to door is done by collection from twin bins that is provided to each household. Through twin bin collection, segregation of waste at source has been achieved. This segregated waste is then transferred to secondary collection bins and subsequently sent to transfer centres for further segregation.

Segregation of waste is done manually at the transfer centre. From transfer stations, the waste is taken to the compost plant for further processing.

A compost plant is set up so that instead of open dumping of waste, MSW is processed in these plants to produce compost, and the inert material is sent to a scientifically designed and managed landfill.

The design of the compost plant is based on the concept of open windrow aerobic composting of organic (biodegradable) component of solid waste. 8.5 acres of land has been earmarked for setting up a compost plant for the scientific treatment of municipal solid waste. The processing method for decomposition of organic fraction of Municipal Solid Waste is microbial (Aerobic) windrow method of decomposition.

The fresh municipal solid waste received is treated on a day to day basis without allowing accumulation on the yard. It has been planned that the resultant non-degradable inert rejects are directed on a day to day basis to the sanitary land fill site.

A landfill site for the initial the 5 year period has been constructed at the Vellalore site. It has a total capacity of handling 1,71,093 tons of inert waste, which has been calculated, considering maximum reject of 25 per cent from the 375 TPD plant. The landfill has been designed in compliance with the MSW Rules, 2000. It has a base line complete with leachate collection system and leachate monitoring well. The concessionaire has to dispose the inert waste from the treatment plant into the landfill and regularly monitor it, as per the prevalent rules<sup>34</sup>.

The complete process employed for the waste treatment is depicted in Figure 2.

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<sup>34</sup> City Report, Coimbatore Solid Waste Management Project under JnNURM, July 2013

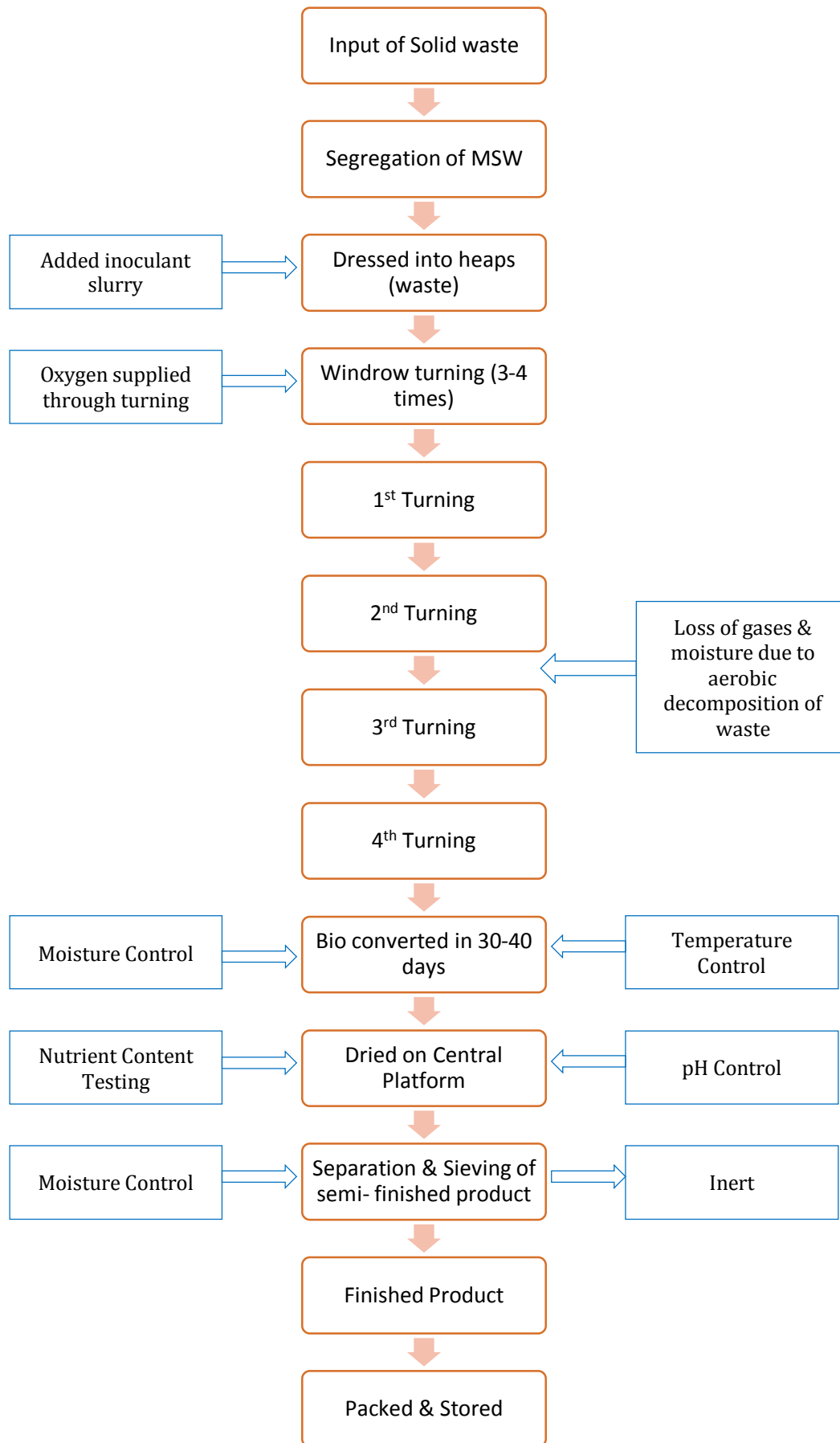


FIGURE 4: Waste Treatment Flowchart of Coimbatore Integrated SWM Project

Following steps are followed during the treatment process:

- **Material intake system comprising of visual inspection and weighing of the incoming waste:** All the vehicles used for transportation of waste have been tagged by Radio Frequency Identification Device (RFID) tags. Vehicles containing municipal solid waste are weighed at a weighbridge and weight readings are noted of municipal solid waste received. The waste is then delivered at the reception area.
- **Segregation of waste:** Organic materials and recyclable materials are separated, and simultaneously, segregated out by passing the waste through a feeder, conveyer and trammel with suitable mesh sizes. The Waste is then laid open for manual sorting so that any leftover plastics or other recyclables can be removed. The sorting component of the plant resembles a materials recovery facility.
- **Yard management system (windrow system):** The waste that enters the facility is placed in the form of a heap to resemble trapezoidal shape called 'windrows' having 4-6 m width and 2-3 m height on the compost pads. A typical compost pad constitutes of a concrete platform on which the waste is kept and allowed to undergo decomposition. Spraying of various chemicals is done on the fresh stacks of waste so that odour, mosquitoes and other related factors of the waste are reduced. These windrows are turned regularly for proper oxidation and aerobic decomposition, using various types of equipment such as front end loaders.
- Material is held in the windrows for 4-6 weeks and during this period degradation of the waste and composting process results in loss of mass. During this process the temperatures range from 50°C to 80°C. At the end of this period, the composting heap is shifted to a monsoon shed for further stabilisation.
- **Segregation and sieving system:** Once the material is stabilised, such that the final product has matured and further decomposition has stopped and has attained marketable form, it is fed to the segregation and sieving section. In case of Coimbatore, a two-stage screening system has been adopted to achieve maximum efficiency while using vibrating screens and trammels. Cascading action inside the trammel ensures better screening of the lumps in the waste. Screened material coming out is uniform in texture and contains pure organic compost. The organic compost is then bagged and stored as an inventory.
- **Leachate Management System:** The compost pad constitutes of a peripheral drain to collect any leachate (liquid that extracts out during composting process) generated from the process, or from rainfall, to prevent seepage into the ground water to prevent ground water pollution. The leachate so collected is recycled to control the moisture content of windrows.

#### **4.5.4 Exit:**

As per the concession agreement, the concessionaire has to procure, install and operate all the equipment on its own cost till the completion of concession period; which is, in total 20 years, and 10 years after commissioning of the project. After expiry of the concession agreement, the waste processing plant and landfill sites are to be handed over to CMC free of cost. Before 12 months of expiry, joint inspection at the treatment facility will be undertaken and all works shall be



completed before 3 months of expiry of agreement. At least 12 months prior to the expected expiry of landfill site, post closure operation plan shall be jointly discussed and prepared<sup>35</sup>.

#### 4.5.5 Risk Allocation Framework:

Identification of the PPP model was based on a detailed mapping of service gaps, available resources, associated risks, and opportunities of development. Table 7 highlights the various issues and risk associated with SWM services in the city.

Table 7: Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk bearer	Comments
Delays in land acquisition	High	0-6 months	CMC	CMC was responsible to transfer the site to the Concessionaire free of any encumbrances for a period of 20 years. The transfer of unencumbered land in a fully cleaned and levelled condition after filling etc. was to be provided to concessionaire before commencement of the work. This was stated as a pre-condition in the concession agreement.
Delay in obtaining permits	low	0-6 months	Concessionaire /CMC	The concessionaire was responsible for obtaining approvals and permits to commence the work on site. However, CMC was responsible to facilitate the concessionaire in obtaining the key government approvals/clearances such as Environment & Forest, AAI, TNPCB and Groundwater board. The site authorisation as per MSW Rules, 2000 and approval from urban development department was the responsibility of CMC. The other approvals related to generation and sale of power (regulatory approval for power tariff, power evacuation from distribution company and PPA etc.), tie-ups for product marketing (for RDF & compost) and consent to operate under the 'Air and Water Act' from TNPCB was part of scope of the concessionaire.
Financing Risk	Moderate	0-6 months	Concessionaire	The project was funded up to 70% through government grant under the JnNURM scheme. The balance (INR 21 Crores) was to be arranged by the concessionaire through a mix of equity and debt financing. The development of the landfill after the first phase (5 years) was to be supported by CMC to the monetary

<sup>35</sup> Concession agreement between Consortium of M/s BEIL- UPL and CMC

				<p>extent of INR 4 crore per year which would be increased by 5% every year, thereafter. Hence, the burden of funding the capital cost was less on the concessionaire which provided better viability to the project. In addition, CMC agreed to support and assist the Concessionaire in obtaining finances from financial institutions.</p>
Planning & Design Risk	Moderate	0-2 years	Concessionaire	<p>CMC had undertaken extensive project preparation prior to the appointment of concessionaire. The concessionaire was responsible to adhere to the construction requirements as per the Detailed Project Report and standards/guidelines as per BIS, MSW Rules 2000 and other applicable standards/guidelines. Thus, the design and planning risk was mitigated to a large extent as the broad designs and specification guidelines were already provided to the concessionaire.</p>
Construction Risk	High	0-2 years	Concessionaire	<p>The concessionaire was responsible to undertake the construction works either itself or through a reputed contractor. The concession agreement stipulated that CMC has the right to terminate the agreement and enforce the performance bank guarantee if the commercial operations date was delayed by 90 days, as certified by the Project Engineer appointed by CMC</p>
Technology Risk	High	Throughout	Concessionaire	<p>The Concessionaire was responsible for the development, construction, operations and maintenance of the project till the handover. The risk of providing the suitable technology which would ensure successful running of the treatment facility and landfill was with the concessionaire in such manner that it does not have any adverse impact of the environment. Since the landfill capacity was predetermined based on the DPR, the concessionaire had to ensure that least amount (not more than 25%) of waste was rejected and rest was treated to produce compost which could be sold in the market.</p>
Market Risk	Low	During O&M	Concessionaire	<p>The responsibility of providing the agreed quantity of waste to the concessionaire was the responsibility of CMC. The</p>

				<p>concessionaire was entitled to the entire agreed fee 'take or pay' even in case CMC was unable to provide the agreed quantity of waste. Also, the concessionaire had a right to reject the waste received in case it was other than municipal waste- like hazardous waste or C&amp;D waste. In addition, CMC was responsible to provide only segregated waste to enable the concessionaire to honour the landfilling requirements during O&amp;M. Hence the market risk was low for the concessionaire.</p>
Operations & High Maintenance Risk		During O&M	Concessionaire	<p>The O&amp;M risk was entirely to be borne by the concessionaire. The fee payments were structured in a way that maximum payment was to be based on treatment of the waste with limited disposal in landfill. The CMC appointed Project Engineer (PE) would be in charge to inspect the facilities during O&amp;M. based on this independent reporting, the concessionaire could be in material breach of O&amp;M requirements. Appropriate records were to be maintained by the concessionaire at the project site, which would be counter signed by the PE. The concessionaire was also responsible to submit monthly, quarterly and annual reports of the same to CMC.</p>
Revenue Risk	Low	During O&M	Concessionaire	<p>The CMC was responsible for collection of user charges which it had notified prior to the commencement of the project. The tipping fee to be paid to the concessionaire was fixed based on the schedule for minimum waste quantity that CMC would supply to the concessionaire. The proceeds from the collection of user fee were to be escrowed in a separate project account, to maintain ring fencing of the SWM operations.</p>
Handover Risk	Low	On closure	Concessionaire	<p>The concessionaire was responsible to handover the project site and landfill facility including all assets to CMC after the completion of the concession period. The concessionaire was also responsible to prepare a post closure plan 12 months in advance of the expiry of the landfill life and maintain the facility in accordance with post closure maintenance plan. CMC would maintain a Post Closure</p>

			Performance Account by deducting a fixed percentage from fee payments to concessionaire and would deduct amount for any shortfall of performance.
Other Risk			
Force Majeure	Throughout	Concessionaire/ CMC	a. The Force Majeure Risk has been covered through sufficient provision in the concession agreement. The key risks associated with force majeure and the allocation of payments due to either part as a result of Force Majeure has been mentioned. The clause on dispute resolution is in case of any dispute arising out of Force Majeure event is also provide for the concession agreement compensation due

#### 4.6 Key Benefits

The assessment of key benefits from the project has been carried out on a qualitative on basis of the information available. The key benefits which have accrued as a consequence of this project are:

**Suitability for PPP:** The project has demonstrated the benefit of bringing in PPP in the SWM sector by bringing in private sector efficiency while allocating risks in a suitable manner so that the project becomes attractive to the private sector.

The contract was awarded on the basis of the tonnage of waste transported, processed, tipping fee and cost of landfilling of inert material. If observed closely at the level of financial details under each head, it has been observed that maximum per ton amount is that of tipping fee, then for transportation and least is for landfilling. The revenue structure of the project is such that more waste collected will result into more revenue generation for the SPV. As the processed final product is saleable too, it ensures proper processing of the waste and reduces dumping at landfill site.

Basically, there was an in-built incentive mechanism that ensured that the private sector participant would try to increase waste collection from the town and would want to only dispose the inert material in the landfill. The Detailed Project Report was already prepared and financing was tied up under JnNURM. The bidder was, therefore, able to bid with considerable project background. The ensuing offer provided value for money.

**Risk allocation:** The risk allocation, as worked out in the project structuring, also ensured effective implementation of the project. The PPP model ensured that the ULB did not make any upfront investment in the project and executed an agreement that ensured a pre-determined annual outflow towards the operations and maintenance. The risk of time and cost overruns which are typical to public procurement were transferred to the private sector.

Door to door collection and transportation up to the transfer stations was retained by CMC, so that the risk of raw material would not be levied on the private sector. Also, the minimum waste was guaranteed to the private sector. Segregation at source was also retained as a responsibility

of the ULB, which helped in smooth operation of the waste management facility by the private sector. The ULB notified the user charges and maintained a separate account for collection of user charges which ensured transparency in payment to the private developer.

**Achieving system efficiency:** This project is envisaged to be economically viable as the SPV is presently incurring net profit from the project. Due to public awareness programs and training sessions to sanitary workers, the community level acceptance is envisaged to increase, resulting in better performance of the system at the primary level of collection. Operational efficiency of the project has led to increase in revenue collection. The mechanised system of weighing of waste collected, and the final product produced, resulted in reduction of faulty practice. Bio-Metric system used for attendance has enforced regular manpower availability for waste collection at primary and secondary level.

The existing MSWM process was not cost effective as the CMC incurred an expenditure of INR 16.30 crore towards secondary collection and transportation of waste during the year 2009-10. The expenditure incurred towards payment of tipping fee (fee inclusive of transportation, processing & disposal of MSW) to the Concessionaire during the FY 2011-2012 was INR 14.69 crore resulting in net savings of INR 1.69 crore.<sup>36</sup>

**Improved environment and city aesthetics:** This project benefits far outstrip the intended consequences. The project addressed a major hygiene problem that prevailed in the growing city. Benefits achieved from this project do not include only the efficiency increase in the waste collection system but also in closure of old dumping sites eliminating environmental hazard to the surrounding region. The new landfill site has been planned and designed in a manner that minimises the pollution levels and maximises output of full processed compost.

#### **4.7 Key Learning and Observations**

**Improvement in approach to waste management:** The project was formulated under the JnNURM scheme with considerable amount of project preparation. Project implementation has brought about a drastic improvement in the SWM practises in the city. Prior to the implementation of this project, waste was managed through temporary storage spaces where manual sorting was carried out by scavengers. The waste was transported in open vehicles (like trucks, tractors and tippers) and disposed without treatment.

With implementation of the project, waste is stored in semi-closed type transfer stations with in-built waste compactor. These transfer stations along with the Closed Body Hook loaders (Bulk Refuse Carriers) helped in effective transportation without any manual handling or spillage of waste. As waste is compacted in the transfer stations, it helps in reducing the number of trips made by the transfer trucks (hook loaders) between the transfer station and the treatment/disposal site. The waste is now treated and disposed in a scientifically designed landfill and the new system is designed to meet the MSW Rules, 2000.

**Beneficiary participatory approach:** Inclusion of the beneficiaries in the project preparation phase was a critical factor in ensuring success. By providing training and awareness to the sanitary workers, and simultaneously, reaching the masses by ways of group meetings, leaflet distribution, area level committee formation, poster display, street plays, etc. the project became a point of discussion within the community. These discussions and IEC initiatives helped people understand the requirement of segregation of solid waste at source. CMC provided segregation

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<sup>36</sup> City Report, Coimbatore Solid Waste Management Project under JnNURM, July 2013

bins to end-users that enabled households to segregate their waste which could be easily transported and treated.

**Improved Service Efficiency:** The project brought about service level improvement. The door-to-door collection of waste has increased from 44 per cent to 90 per cent in 2013 with an overall collection efficiency of 95 per cent after implementation of the project as per City Report, Coimbatore Solid Waste Management Project under JnNURM, July, 2013. The project has enabled 80 per cent waste segregation and scientific disposal of waste with a capping of 25 per cent of waste to landfills.

The benefits accrued through the new transportation and waste handling facility in transfer stations are - number of trips made by each of the dumper placers, refuse collector cum compactor vehicles has increased from 3 to 5 trips daily due to reduction in their tipping time at the transfer points thereby improving the collection efficiency.

Further, introduction of RFID system has improved trip counts as well as improved the monitoring of the collection and transportation system.

**Government support to the private developer at various phases:** The private developer needed maximum cooperation in implementation of the project. The project structuring was done in a manner so that obligations of each party are clearly defined and risks are appropriately shared. Public awareness about the project benefits and availability of trained manpower at CMC level was also important which otherwise could have delayed or jeopardised the project execution. IEC activities and biometric attendance system to ensure high worker attendance contributed to success of the project. CMC also facilitated the concessionaire by providing a clean site, and necessary clearances and approvals to ensure timely construction of the project.

**Use of technology for reducing faulty practices in day to day activities:** Waste Truck Monitoring is done by using RFID. RFID arrangement is set up along with weigh bridge installed at the Vellalore dumpsite. All trucks deployed for waste transportation are fitted with RF Tags. It has been programmed in such a way that as soon as the truck halts at the weigh bridge it automatically records the truck number, wards from which waste is collected, driver's name, time of vehicle entry, and weight of waste. CMC has been able to monitor the exact number of trips made by the vehicle; thereby, ensuring that the developer is meeting performance parameters and fee payments are accordingly made.

**Positive Environmental Impact:** Recycling and reuse of waste has increased by 60 per cent which is a significant positive impact of the project on the city's environment, by means of effective diversion of waste from landfills. Door-to-door collection led to cleaner roads in the city and therefore, has enhanced the appearance of the city. The project has significantly helped in the avoidance of methane emissions as well as in the reduction of carbon footprint due to significant reduction in the number of trips required for transportation of the waste (10 trips required by a conventional waste collection truck is now achieved by 1 trip by engaging a Bulk Refuse carrier vehicle).

#### **4.8 Documents Referred to:**

- Concession agreement between Consortium of M/s BEIL- UPL and CMC.
- City Report, Coimbatore Solid Waste Management Project under JnNURM, July 2013, MoUD, GoI.
- Project Design Document (CDM-PDD) for Composting Project at Coimbatore in Tamil Nadu, by Coimbatore Integrated Waste Management Company Private Limited, 2011.
- Presentation on “Municipal Solid Waste Management in Coimbatore City Municipal Corporation”, March 2013.
- Report on Coimbatore Corporation-Jawaharlal Nehru National Urban Renewal Mission, On- going Scheme Details

## 5. Development of Grain Silo in Ujjain

### 5.1 Project Description<sup>37</sup>

The state of Madhya Pradesh (MP) has recorded an increasing trend in the production of wheat, *Mandi* (agricultural market) arrivals and procurement of wheat over the past few years. The short term Compounded Annual Growth Rate (CAGR) of production, *Mandi* arrival and procurement between 2009-10 and 2011-12 was recorded at 16.9 per cent. In September, 2012, the state had total storage capacity of 87,41,846 MT (metric tons), while the total storage requirement of wheat during the same period was 2,17,46,374 MT. This indicates that the storage capacity of the state was only 40 per cent of the total capacity needed for storing the produced and procured quantity of wheat. There was a need for creation of additional storage facility for wheat. In order to promote Madhya Pradesh as the “Warehousing & Logistics Hub” and to increase the storage capacity of the state through private sector investments, the state government formulated the “Warehousing & Logistics Policy, 2012”. The Cabinet Order for the same was issued by the State Government in the month of February, 2012.

Under the Policy, post-harvest storage facilities are eligible for funding under Viability Gap Funding (VGF) Scheme for Public Private Partnership (PPP) projects. Madhya Pradesh Warehousing & Logistics Corporation (MPWLC), the nodal agency, undertook development of storage facilities for wheat at ten locations in Madhya Pradesh (M.P.) through Public-Private Partnership on Design, Build, Finance, Operate and Transfer (DBFOT) basis. These locations are Sehore, Dewas, Vidisha, Bhopal, Indore, Ujjain, Satna, Harda and Hoshangabad<sup>38</sup>. All the ten locations mentioned above have similar project design and structure. This case study focuses on the grain silos being developed in Ujjain.

MPWLC proposed development of storage facilities in the form of steel silos instead of conventional covered warehouses and Covered Area Plinths (CAP). Silos were considered a better option for bulk storage of grains due to their various benefits like assured shelf life of grain up to 2-3 years, easier grain management, lesser (up to 1/3<sup>rd</sup>) land requirement compared to traditional warehouses, and minimised risk of pilferages.

### 5.2 PPP Structure<sup>38</sup>

The development of grain silos on PPP basis was based on Design, Build, Finance, Operate and Transfer (DBFOT) model. Land for the project was provided by the State Government on license basis for 30 years.

The project was funded under the VGF Scheme; under which, in addition to 20 per cent VGF provided by the Government of India (GoI), the state government would provide up to a maximum of 20 per cent VGF support, if required and as per guidelines of the VGF Policy of GoI.

The project was awarded through a transparent bidding process to M/s. Adani Enterprise, Ahmedabad.

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<sup>37</sup> Feasibility report on Setting up of Steel Grain Silo in Ujjain, Madhya Pradesh, May 2013

<sup>38</sup> Based on information provided by MPWLC officials



The project cost was INR 30.55 crores for development of 50,000 MT capacity of Steel Grain Silo consisting four bins of minimum 12,500 MT of capacity, each. The land of about 7 acres was allotted by the State Government to the private developer for development of the facility.

Role of MPWLC in the project is:

- Selection of Private developer through transparent bidding process.
- Land Allotment for the project.
- Providing VGF support as required (State Government share as required).
- Providing a Business Guarantee (guaranteed utilisation and payment of silo facility) for the initial 10 years.
- To obtain all the applicable permits, if any, related to environmental protection and conservation, and forest clearance.

Role of private developer in the project is:

- Financing the Project
- Construction of the storage facility.
- Operation & maintenance of storage facility.
- Storage, preservation, management and handling of food grains in a scientific way.

### 5.3 Current Status<sup>39</sup>

The concession agreement for the grain silo project in Ujjain was signed in June, 2014. The proposed construction period of the project is one year. The project is presently under construction. Against the sanctioned capacity of 50,000 MT for the silo, capacity of 25,000 MT was made operational on April 01, 2015 under the phased completion clause of the concession agreement.

### 5.4 Financing Information

The cost of developing the storage facility in Ujjain is INR 30.55 crores. Finance details, including the details of VGF are provided in the Table 1.

Table 1: Project Finance Information

Funding Source	Details
Total Project Cost	INR 30.55 crore
Private Operator's Investment	Equity (30 per cent of project cost) and debt from Financial Institutions)
VGF amount, if any	INR 2.41 crores (7.88 per cent of total project cost)
<i>Source: MPWLC</i>	

Information on the project financials such as Net Present Value (NPV), Internal Rate of Return (IRR), and Debt Equity Ratio (DER) etc. has been provided in Table 2.

Table 2: Project Financials

Sr. No.	Particulars	Values
1.	Project IRR	14.90%
2.	Equity IRR	16.95%
3.	Debt equity ratio	85:15
4.	NPV	INR 70.56 crore (12% discount rate)
<i>Source: MPWLC</i>		

<sup>39</sup> Based on information provided by MPWLC officials

Component wise break up of Project Cost has been provided in Table 3.

Table 3: Component wise breakup of Project Cost

Sr. No.	Component Description	Amount (INR in crore)
1.	Land & Site Development	0.007
2.	Building and Civil Works	14.456
3.	Plant and Machinery	9.669
4.	Electrical Automation and other Utilities	2.875
5.	Preliminary & pre- Operative expenses	2.187
6.	Contingency	1.350
	<b>TOTAL</b>	<b>30.546</b>

*Source: Feasibility report on Setting up of Steel Grain Silo in Ujjain, Madhya Pradesh, May 2013*

## 5.5 Process Analysis

### 5.5.1 Inception:

Increasing wheat production trends in the district of Ujjain resulted in the requirement of a storage facility for post-harvest grains. It was envisaged to develop a facility with large storage capacity, requiring minimum land area, and capable of handling food grains by mechanised means. Storage of grain in silos was considered as one of the ways to meet these requirements.

Silos are primarily large, tank type structures either made of steel or concrete for storage of food grains or other materials in monitored atmosphere; in which, grains are stored in bulk form. Silo requires mechanised loading and unloading of material. Ujjain being an inland city, the development of steel silos was selected as they would be cost effective and easy to construct. Also, steel silos require 10-12 months of construction time, as compared to 14 months required in case of concrete silos.

Given the need for bulk storage and factors such as construction material and duration of construction, it was decided by MPWLC to develop steel silos at Ujjain.<sup>40</sup>

The feasibility study of the project evaluated the various storage techniques and also the location analysis for site selection.

### Storage Techniques

Three types of storage techniques were analysed for the project. All these techniques were studied on 4 common factors:

<sup>40</sup> Feasibility report on Setting up of Steel Grain Silo in Ujjain, Madhya Pradesh, May 2013

**Table 4: Comparison of different types of Storage**

Factor	Silo	Covered area (CAP)	plinth Conventional covered warehouse
Shelf Life	Safe shelf life of up to 2 years. Mechanical handling of grains.	Shelf life of grains in CAP storage is dependent on grain management and preservation, and therefore, there is no fixed period. In general, the standard time for which the grain can be kept completely safe in CAP storage is about 6 months	Shelf life of grains in warehouse depends on grain management and preservation and therefore there is no fixed period. In general the grain can be kept safely in warehouses up to about 16- 18 months.
Land Requirement	In this case, for a 50,000 MT capacity silo, 7 acres of land would be required.	CAP storages are horizontal structures which require sizeably more land area as compared to silos. Since there is no peripheral structure, the land requirement is lesser than that of a warehouse.	Warehouses are horizontal structures which require significant land area as compared to other two options. It is estimated that a 50,000 MT warehouse would require an area of approximately 18-20 acres.
Ease of Construction & Maintenance	Construction of steel silos can be done within 10 months including the lead time of importing the steel structures. The erection time is about 2-3 months. Steel silos are also easy to maintain. Concrete silos take relatively more time for construction.	Food Corporation of India (FCI) has standardised the construction and maintenance guidelines for CAP and it is understood that a CAP is easily built in short timeframe of a few days as materials are available locally and the technical knowhow is also available.	FCI has standardised the construction and maintenance guidelines for warehouses and it is understood that a warehouse can be easily built in a short timeframe of 3-4 months as materials are available locally and the technical know-how is also available.
Multiple Commodity Storage	As silos are meant for bulk storage, two commodities cannot be kept within the same silo bin or even in different bins as they have the same mechanical handling equipment.	CAP storages are bagged storage therefore they can accommodate multi commodities.	Warehouses have bagged storage therefore it can accommodate multi commodities. Primarily FCI and other procurement agencies store wheat and rice in the existing warehouses together.
<i>Source: Feasibility report on Setting up of Steel Grain Silo in Ujjain, Madhya Pradesh, May 2013</i>			

## Location Analysis

Site connectivity is an important factor as storage inputs are serviced from multiple locations. The site is about 6 km from the nearest rail head. The State Highway connecting Bhopal and Indore is approximately 8 km from the selected site of the grain silo at Ujjain. The selected site is located ideally from the point of view of supply chain and logistics needs.

## Capacity and Technical details

Silos were constructed from bolted corrugated galvanised steel. Facilities have been designed to store 50,000 MT of grain. Four silos were to be developed at each location.

The daily intake capacity is minimum 150 MT/ hr or 1500 MT/ day. The system is designed to have a cleaning system of 150 MT/ hr, handling capacity of 60 MT/ hr and designed area for storage of bagged food grain of 200 MT.

## Process Design

This project was formulated on the premise of shortage of storage capacity, by developing additional storage facility in the state. Madhya Pradesh is a decentralised procurement state (DCP), wherein food grains are procured for the public distribution system (PDS) consumption and excess grain is sent to FCI, after the state has retained sufficient stock for its own consumption. This stock of grain handled is as follows:

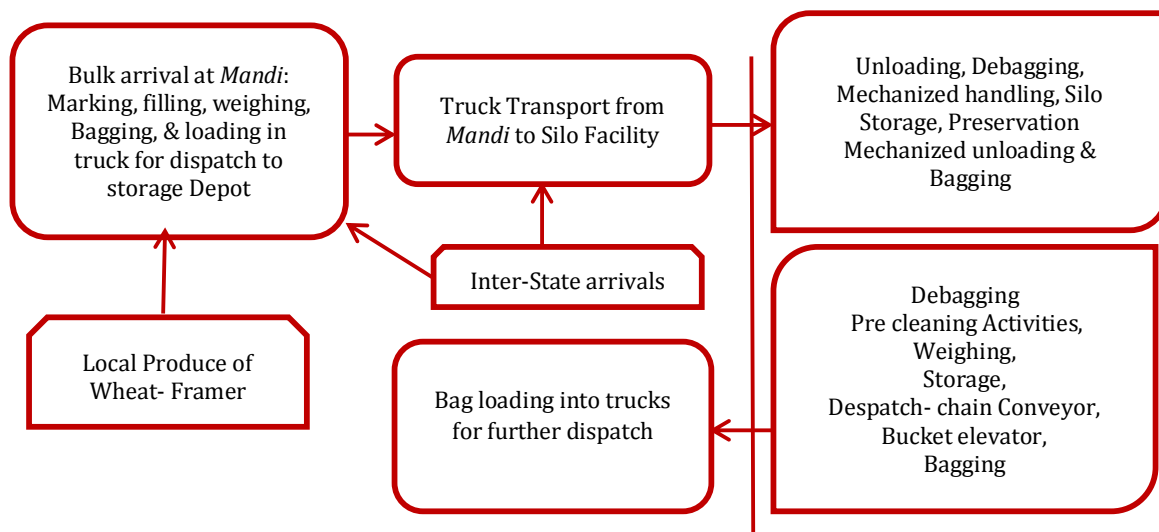


FIGURE 1: SUPPLY CHAIN & INDICATIVE PROCESS FLOW OF SILO FACILITY

Source: Feasibility report on Setting up of Steel Grain Silo in Ujjain, Madhya Pradesh, May 2013

Grains arrive in bulk or in bags. In such cases, grains are unloaded from the conveyance (and debagged if in bags at the debagging platform) and are loaded into the unloading hoppers. Upon unloading, the wheat grains are proposed to be sampled through a pneumatic system linked to the laboratory. Based on the sampling results, the temporary storage hopper would dispatch the wheat grains onto a conveyor for pre-cleaning activities like removal of foreign particles and weighing. Once in the storage bins, the wheat grains would need to be regularly ventilated. The ventilation is subject to constant temperature controls through probes to maintain the grain quality all along the storage period. To protect the grains from contamination from different sources, they would be fumigated by spraying as they pass on the loading conveyors. During

dispatch, the grains will be taken out of each bin by a chain conveyor located in the gallery under the bins. A bucket elevator would be connected to the chain conveyor to carry the grains to the bagging plant. The wastes accumulated during the process would be conveyed by a separate elevator to a waste bin, to be discharged locally.

#### **Performance Measures<sup>41</sup>:**

Performance of the storage facility would be evaluated based on factors such as:

- Availability: Not less than 96% of the storage capacity shall be available for storage during any accounting year of the concession period.
- Reliability: Not more than 2 forced closures in the facility, in each quarter.
- Shortfall: Inspections/ tests are to be conducted once in every 3 months to ascertain shortfall.
- ISO Certification: achieve within 6 months of COD and maintain the same throughout the concession period
- Prior to the storage in silo, grains should be screened and cleaned
- At all times during the operation period, a ready stock of 200 MT of food grains in bags should be kept available for dispatch.
- Silos should be fumigated, as per requirement, on a regular basis.

Monthly reporting of these parameters with reasonable details is to be submitted by the concessionaire. Concessionaire is supposed to submit the report within 7 days after the month closure.

#### **Revenue Model**

**Construction Phase:** The private developer will receive VGF support during construction.

**Operation Phase:** In this phase, the sources of revenue for the project developer are mainly handling and storage of grain (mainly wheat). The grain handling operation involves loading, unloading, testing, weighing, bagging and debagging. The storage charges comprise of fixed charge and variable charge. For the concession period, fixed charge would be payable irrespective of the quantum of the food grains actually handled while the variable charge would be linked directly to the quantum of food grains handled.

The following are the terms on which the handling and storage charges would be levied.

**Fixed Charges:** INR 5.75/quintal per month in respect to the availability of storage capacity for particular month, which would be revised annually.

**Variable charges:** INR 0.50/quintal per month payable for the food grains actually stored, for any month or part thereof, and would be revised annually to reflect the variation in WPI.

**Service charges:** for providing services such as unloading, debagging, cleaning, drying, bagging and loading.

#### **5.5.2 Procurement: <sup>41</sup>**

MPWLC followed a two stage bidding process for selection of a project developer.

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<sup>41</sup> Based on information provided by MPWLC officials

**Qualification Criteria:** At the qualification stage, following criteria were used to shortlist bidders:

- i) Financial Capacity of the private developer: Minimum net worth of INR 30 crores at the close of the preceding Financial Year.
  - ii) Technical Capacity of the private developer: Projects having capital cost of more than INR 6 crores were considered for technical capacity of applicant in case of PPP project (category I&II). In case of EPC project i.e. Category III & IV, only those projects would be considered in which the applicant would have received payments of INR 6 crores or more.
    - a. Category I: PPP Projects in Warehousing / Storage Sector
    - b. Category II: PPP Projects in Core Sector
    - c. Category III: EPC Project in Warehousing / Storage Sector
    - d. Category IV: EPC Projects in Core Sector
- Based on the Qualification Criteria, four (4) Bidders were short listed at the bidding stage.
  - The Bid parameter for the project was Lowest VGF/ Highest Premium.
  - In March 2014, Letter of Award (LoA) was awarded to the concessionaire M/s. Adani Enterprise Ltd.
  - The concession agreement was signed in June, 2014 having a concession period of 30 years including 1 year for construction.

### 5.5.3 Development<sup>42</sup>:

The concession agreement was signed in June 2014 and the project is currently under construction. After the signing of the concession agreement, the land for the site was handed over by MPWLC to the private developer. The project is partially constructed and capacity of 25,000 MT was made operational on April 01, 2015.

### 5.5.4 Risk Allocation Framework:<sup>42</sup>

The identification of PPP model was based on a detailed mapping of service gaps, available resources, associated risks, and opportunities of development. Table 5 highlights various issues and risks associated with the project.

Table 5: Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk bearer	Comments
Delay in obtaining clearances and permits	Low	0-6 months	MPWLC	MPWLC was responsible for obtaining all the clearances and permits related to environment protection, and forest. As the land belonged to state government and was neither in forest area nor in buffer zone of a forest area, so the perceived risk of Environment Clearances was low.
Construction Risk	Low	0-1 year	Concessionaire	Silos construction methodologies are simple, proven and standardised. The project construction does not involve any complex technology to be adopted

<sup>42</sup> Based on information provided by MPWLC officials

				and construction risk is low. The land had been made available by MPWLC along with the approach road to the site.
Finance Risk	Moderate	throughout	Concessionaire	The PPP project was structured on DBFOT. Financing to the extent of VGF support, during construction, was provided.
Revenue Risk	Moderate	1-30 years	Concessionaire	Guaranteed storage charges would be paid to the developer for first 10 years at 100% utilisation. An escrow account would be created to route the fixed monthly charge payments to the Concessionaire. The authority would also provide a letter of credit for an amount equivalent to minimum monthly payment which may be drawn upon by the Concessionaire to meet any shortfall of payment against the monthly invoice. Thus a major part of the revenue risk of the developer was covered.
Operation & maintenance Risk	Moderate	0-30 years	Concessionaire	The Concessionaire is mandated to adhere to key performance parameters (KPI) throughout the O&M period. The performance parameters refer to availability of storage capacity, reliability of operation (number of forced closures), shortfall in performance during quarterly inspections by the MPWLC, monthly reporting on the KPI and obtain and maintain ISO certification. In the event that Concessionaire is unable to meet the KPI, it is liable to pay damages specified in the Concession Agreement to the authority.
Force Majeure		Throughout	Concessionaire/ State Government	The Force Majeure clause is covered in sufficient detail in the Concession Agreement. There are adequate provisions in the agreement to provide for termination payments by the authority in favour of the lenders (at least 90% of debt due) and Concessionaire in case of Force Majeure events.
<i>Based on Model Concession Agreement for storage of food grains, Food Corporation of India</i>				

## 5.6 Key Benefits

The development of silos through PPP mode enabled in utilising the resources and efficiencies of the private sector. The project preparation helped MPWLC to identify the best technology option and use the steel silo technology which previously has not been widely used for grain storage, but holds substantial advantages with respect to functional, structural and financial aspects over the conventional storage technologies. The government provided the requisite support in terms of land allocation, clearances, connectivity which were critical for the project. The government also provided support through VGF and guarantees which assured the return to the private operator

if it met the specified KPI's. The project is a good example of a replicable PPP model in grain storage which can be taken up in other states.

## 5.7 Key Learnings and Observations

**Facilitation of land and clearances by the government:** The land for the site was provided by the government and the approach road was already constructed before the site was handed over to the private developer. The state government provided a Business Guarantee (guaranteed utilisation and payment of the silo facility) for the initial 10 years. The facilitation provided by state government ensured smooth implementation of the project.

**Choice of Technology:** MPWLC chose steel silos over the conventional technologies like CAP and covered warehouses. Construction of steel silos can be done within 10 months including the lead time of importing the steel structures. The erection time is about 2-3 months. Concrete silos take relatively more time to be constructed and are considered more beneficial in coastal areas. Steel silos are also easier to maintain. Given all these factors, the risks arising from cost and time over runs, and long term operations and maintenance are minimised as compared to the other methods of grain storage. These advantages of construction of steel silos in the project location provide faster construction and economy in operations compared to CAP and conventional covered warehouses.

During the project preparation phase, it is important to selection of the right technology or method of operation and conducting a cost-benefit analysis of the available technologies can be significantly beneficial to the project.

**Nodal agency facilitating better project implementation:** MPWLC played a critical role in conceiving the project and conducting adequate project preparation activities. The procurement of applicable permits related to environmental clearance, conservation and forest clearance were done by MPWLC. The involvement of public sector agency in conducting adequate project preparation and providing government approvals offers better readiness and minimised delays in project execution.

## 5.8 Documents Referred to:

- Project documents shared by Madhya Pradesh Warehousing and Logistics Corporation
- Feasibility report on Setting up of Steel Grain Silo in Ujjain, Madhya Pradesh, Mott Macdonald, May, 2013
- Model Concession Agreement for storage of food grains, Food Corporation of India
- Report of Working Group on Warehousing Development And Regulation for The Twelfth Plan Period (2012-17), Government Of India, Planning Commission, New Delhi, October, 2011



## **6. LIST OF ACRONYMS AND ABBREVIATIONS**

BOMST	Build Own Maintain Share Transfer
BOO	Build Own Operate
BOOT	Build Own Operate Transfer
BOQ	Bill of Quantities
BOT	Build Own Transfer
CAGR	Compounded Annual Growth Rate
CAP	Covered Plinth Area
CDM	Clean Development Mechanism
CDR	Corporate Debt Restructuring
CFS	Container Freight Stations
CII	Confederation of Indian Industries
CIWMCL	Coimbatore Integrated Waste Management Company Limited
CMC	Coimbatore Municipal Corporation
CPI	Consumer Price Index
DEA	Department of Economic Affairs
DPR	Detailed Project Report
DSCR	Debt Service Coverage Ratio
DST	Department of Science & Technology
DWT	Dead Weight Tonne
EOI	Expression of Interest
EPC	Engineering, Procurement & Construction
ESR	Elevated Storage Reservoir
FICCI	Federation of Indian Chambers of Commerce and Industry
FSI	Floor Space Index
GIS	Geographic Information System
GoI	Government of India
GTAEP	GMR Tuni Anakapalli Expressways Private Limited
GTIL	Gateway Terminals India Limited
HUDCO	Housing and Urban Development Corporation Limited

IEC Information, Education and Communication  
IDBI Industrial Development Bank of India  
IDFC Infrastructure Development Finance Company  
IIFCL India Infrastructure Finance Company Limited  
IIM Indian Institute of Management  
IIPDF India Infrastructure Project Development Fund  
IL&FS-IDC IL&FS Infrastructure Development Corporation Limited  
ILFS Infrastructure Leasing & Financial Services Limited  
IMSWMP Integrated Municipal Solid Waste Management Project  
IRC Indian Roads Congress  
IRR Internal Rate of Return  
ISO International Organization for Standardization  
ITES Information Technology Enabled Services  
JNNURM Jawaharlal Nehru National Urban Renewal Mission  
JNPCT Jawaharlal Nehru Port Container Terminal  
JNPT Jawaharlal Nehru Port Trust  
KUIDFC Karnataka Urban Infrastructure Development and Finance Corporation  
KUWASIP Karnataka Urban Water Supply Improvement Programme  
KUWSDB Karnataka Urban Water Supply and Drainage Board  
LoA Letter of Award  
LIC Life Insurance Corporation of India  
LPCD Litres per Capita per Day  
MGA Minimum Guaranteed Amount  
MLD Million Litres Per Day  
MoA Memorandum of Agreement  
MoU Memorandum of Understanding  
MPWLC Madhya Pradesh Warehousing and Logistics Corporation  
MSW Municipal Solid Waste  
MTPA Metric Tonnes Per Annum  
NCB National Competitive Bidding  
NHAI National Highways Authority of India  
NOC No Objection Certificate

NPV Net Present Value  
NRW Non Revenue Water  
NSICT Nhava Sheva Integrated Container Terminal  
NSICTPL Nhava Sheva International Container Terminal Private Limited  
OMST Operate Maintain Share and Transfer  
OSV Offshore Supply Vessel  
PCB Pollution Control Board  
PCU Passenger Car Units  
PHPDT Peak Hour Peak Distribution Traffic  
PPPAC Public Private Partnership Appraisal Committee  
PPP Public Private Partnerships  
PWD Public Works Department  
RDF Refuse Derived Fuel  
RFID Radio Frequency Identification Device  
RFP Request for Proposal  
RFQ Request for Qualification  
SBI State Bank of India  
SPV Special Purpose Vehicle  
STP Sewage Treatment Plant  
SWM Solid Waste Management  
TAMP Tariff Authority of Major Ports  
TCE Tata Consultancy Engineering  
TCS Tata Consultancy Services  
TEU Twenty-Foot Equivalent Units  
TPD Tonnes Per Day  
UEM United Engineers Malaysia  
UGR Underground Reservoir  
ULB Urban Local Body  
UNFCCC United Nations Framework Convention on Climate Change  
USA United States of America  
USD United States Dollars  
UTI Unit Trust of India

VGf Viability Gap Funding

WPI Wholesale Price Index

WTP Willingness To Pay

**Notes:**