



Office of Principal Scientific Adviser, Government of India

India's Waste to Wealth Mission Global Request for Proposals

**“Waste Mining & Land Recovery of the
Ghazipur Dump Site in New Delhi”**



I. Introduction

The Office of Principal Scientific Adviser (PSA) to the Government of India under the aegis of Prime Minister –Science, Technology and Innovation Advisory Council (PM- STIAC) has identified “Waste to Wealth” as one of the nine priority missions;with the aim to identify, develop and deploy technologies to treat waste.

The office of PSA is issuing a global Request for Proposals (RFP) in PPP mode for “*Waste Mining and Land Recovery at Ghazipur dumpsite in New Delhi*”. The RFP aims to undertake deployment and implementation of proven technological solutions for the two challenges of the Ghazipur dump site:

- a) Removal and valorization of the legacy waste at the open dump/ landfill site; which is approximately 14 million tones of mixed waste (details of the Ghazipur dumpsite are provided at in Annexure 1)
- b) Management and treatment of the continuous inflow of 2200 tons of fresh waste per day.

Ghazipur “waste dump” in Delhi is cause of serious environmental problems, ranging from local pollution concerns (health, soil and water) and land-use restrictions to global impacts in terms of greenhouse-gas emissions. Landfills are one of the major sources of methane and other green house gases emissions.

The RFP is looking for setting up pilot demonstration units towards integrated valorisation and reclamation of land from the waste dump with possible enhanced mining extraction, valuable materials from both landfilllegacy waste and fresh daily waste.

Waste treatment and management is the highest priority of the Government of India and the RFP is seeking for government departments, private industries/companies, academia, and civil society from India or outside of India, to come together for providing solutions for the treatment and management of Ghazipur Dumpsite in Delhi.



The Proposed technology (ies):

- Could be a combination of pyrolysis, hydrolysis, electrolysis, biodegradation, hydro/ion metallurgical etc unit operations, as well all residual matrix valorization technologies, for mitigation and complete degradation of Ghazipur landfill waste.
- Should integrate with both recycling/urban mining and other landfill mining concepts such as temporary storage places, bioreactors, and sustainable landfilling;
- Should be for excavation, separation/recovery, transformation/upcycling in view of improved resource utilization efficiency;
- Should develop and apply scientifically based methods for evaluating mining technology methods in terms of social, environmental and economic impacts, from a local, regional to global perspective;
- Must disseminate the technological and non-technological features of technologies to a diversity of audiences including local communities for east adoption and scalability.

The expected impact/outcomes of the pilot studies are as follows:

- Meeting the Global Sustainable Development goals
- Valorization of matrix material to high value products
- Environmental and Health Impact Assessment
- Development of new business cases with regard to landfill mining.

II. Invitation for proposal

The office of Principal Scientific Adviser (PSA) to Government of India in partnership with East Delhi Municipal Corporation (EDMC) invites proposals from technology partners for recovery of land at Ghazipur open dump site in New Delhi by demonstration/ implementation of technology for amelioration of the landfill waste. Multiple technologies may be selected for implementation at the Ghazipur Landfill site, operating in parallel to address the landfill challenge in a multi-pronged fashion. Pilot demonstration units will be set up in the land adjacent to the landfill and the waste from the landfill will be provided to each pilot project.



The implementation of the pilot demonstration project provides an opportunity for companies to validate technologies in real-time conditions.

The details of the RFP are as below:

III. Objective

The Ghazipur dump site/landfill has the following two challenges:

- a) Removal and valorization of the legacy waste at the open dump/ landfill site; which is approximately 14 million tones of mixed waste (details of the Ghazipur dumpsite are provided at in Annexure 1)
- b) Management and treatment of the continuous flow of 2200 tons of fresh waste per day.

These solutions should be demonstration of implementation, validation and efficacy of technology to bring about amelioration of the waste, mining and valorization of the legacy waste; treatment of leachates and mitigation of contaminated subsoil & groundwater. Segregation of fresh waste at source and complete utilization and recycling to avoid addition of waste to the Ghazipur Dumpsite. The most ambitious expected outcome is zero landfill.

The proposals can address either one or both the challenges as below, in one application.

- a. Legacy waste
- b. Fresh daily waste
- c. Both legacy and fresh daily waste

IV. Eligibility criteria

1. The applicant may be a single specified entity, or a group of entities joined together as a consortium. In case of consortium, the lead partner must be clearly identified and shall be liable for fulfilling all and any obligations towards the proposal goals.



2. Should not have been blacklisted or debarred from participating in tenders by any Central / State Government agencies or autonomous bodies or universities/ institutions. (An undertaking to this effect should be furnished).
3. In case of non-Indian entities, should not have been named in any sanction from any nation, nor should have been held guilty under various anti-corruption/anti-malpractice laws worldwide. An undertaking to the effect must be furnished.
4. The applicant should have established, validated and field-tested technology targeting either one or both challenges as at III a & III b.
5. The applicant should have demonstrated expertise in environment, health and safety (EHS) aspects and impacts that need to be addressed at dumpsite while cleaning up the site.
6. It is preferred that the applicant should have prior experience in dealing with legacy and or fresh waste, including waste of hazardous and infectious waste.
7. Should submit the following documents:
 - a) List of similar projects undertaken in the past (including completed and ongoing projects, in India and abroad) with details as per form given in Appendix I. Further information may be sought in case deemed required.
 - b) Company Registration certificate and in case of partnership company, partnership deed with power of attorney. In case of non-Indian entity, equivalent documents must be furnished (similarly for items c-f below)
 - c) PAN Card of the firm
 - d) Latest clearance of IT, VAT/CST, P.TAX, Service TAX, Trade license, Work permit, if applicable
 - e) Audited Statement of Accounts for the last three financial years.
 - f) List of clients presently being served/have been served in past for similar work, with Contact name, address and mobile no.

V. Duration of the Project: 18 Months



VI. GOI will provide the following support:

1. Funds
2. Land for setting up the pilot
3. Other logistic support
4. Support may be considered for scale up of successfully demonstrated technologies based on the merit and socio-economic impact of the technology.

VII. Expected responsibilities of the company/ industry:

1. Contribution in cash/kind of the industry in setting up the pilot.
2. The application will be evaluated by experts.

VIII. Evaluation criteria

The proposals shall be evaluated on the basis of the work plan, and the outcomes of the proof of concept technology validation, the ability to bring academia and industry partners together to implement the project end to end, and the commitment to transform the Ghazipur waste site to a clean and green location. A committee, under the aegis of Ministry of Science and Technology and the office of the Principal Scientific Adviser (PSA), shall review the proposals.

IX. Confidentiality

Information relating to the examination, evaluation, comparison, and post qualification of application, and recommendation of contract award, shall not be disclosed to applicant or any other persons not officially concerned with such process, until the award of the contract.

Any attempt by applicant to influence the evaluation authority or other officials in the examination, evaluation, comparison, and post qualification of the application or Contract award decisions may result in the rejection of their application.

X. IPR

Existing prior IP will be protected.



XI. Proposal Proforma

1. Basic Information

Challenge Category

Acronym for the project

2. Details of the applicant.

Company/Institution Details

Name of the Institution/Company

Address

Street/Village

City/Town

State

Country

Pin/Zip code

Landline

Mobile no

Website (if available)

Principal Key Investigator Details

Title

First Name

Last Name

E-mail

Postal Address

Pin/Zip Code

Landline

Mobile

3. Does the application have collaborators?

YES

NO



If yes,

Collaborators' Details

Collaborator I

Title

First Name

Last Name

Name of the Institute

E-mail

Postal Address

Pin/Zip Code

Landline

Mobile

4. Waste technology challenge objective a) or objective b) or c)
5. Provide details of the technology to be validated on site
6. Proposal work plan and timeline

S. No.	Methodology/Experimental Design Detailed Work Plan	Timeline	Alternate Strategies	Process Indicator for Measuring Success

7. Requirements for land (near the landfill or otherwise)
8. Budget requirements/details and justification requirement***Release schedule will be worked out according to timelines.**
9. Contribution of the company towards setting up the pilot in cash and kind
10. Have you tested the proposed technology in the field elsewhere, if yes, provide details of the project and the outcomes achieved?
11. Any other relevant details



The applicants can submit their proposal **online** only. For submission of Proposal, institution/ companies need to register online at the PSA website (*The call microsite will be up by 1st July, 2019*).

The selected applicants shall be invited for a **final presentation**. Selected technologies that are successfully validated using Ghazipur waste in the 18-month pilot, shall be considered for further scale up.

XII. Timeline

1.	Call opens on	July 01, 2019
2.	Call Closes on	July 21, 2019
3.	Selection/ announcement of projects by	July 31, 2019
4.	Expected commencement of Projects	September 01, 2019

- 1) If any date specified herein is a holiday, then the next working day will be considered for the activity and the time will remain the same.
- 2) The Schedule indicated above is tentative and may change and or the entire schedule under intimation to applicants.



Annexure 1: About Ghazipur

Characterization of the Ghazipur waste site

The Ghazipur landfill site is located at 28° 27' 30'' N - 77° 19' 40'' E, and was started in the year 1984. It is still in use, despite a planned site life of 25 years. It spreads over an area of approximately 70 acres and is 65 meters high. On an average, 2200 tons of waste is dumped daily at the site. It does not have the attributes of a modern engineered landfill, and can be classified as an open dump site due to its physical characteristics and waste disposal operationsⁱ. It is situated in a constrained area that provides limited space to expand disposal operations outside of the current footprint. At least three million people live within the 10km radius of Ghazipur and the nearest residential settlement is just 200 metres away. The overall quantity of waste disposed of till date is \approx 14 million tons. The dumpsite holds a very close proximity from various commercial food-chain markets like poultry, fish, dairy farms, etc. The water facilities in the area is partially available by municipal agencies and as a result nearby inhabitants are largely depends upon ground water to supplement daily water requirement. It is proposed to rehabilitate the Ghazipur dump site, by managing both the legacy waste and new solid waste being dumped on a daily basis, using bio mining, or any suitable technology or combination of suitable technologies.

General study

Several characterization studies have been carried out at the Ghazipur site. Preliminary studies indicate that the waste is slightly acidic in nature and also non-hazardous based on TCLP. It is also estimated that the organic content is less than 20% at the waste siteⁱⁱ. The waste releases excessive color and excessive soluble salts.

Additionally, the waste dump includes the following constituents: groceries, food scraps, vegetable remains, packing materials, paper, remains of used coal, ash, wood, metals, plastics, ceramics, cloth, glass, etc. Construction & demolition waste consisting of sand, bricks and concrete block are also part of the dump. Further, waste from the adjacent poultry market, fish market, slaughter house, dairy farm and non-infectious hospital waste are also part of the dump. The place has become a home for rats, flies, bacteria, mosquitoes, all having the potential of causing many human diseases. A typical pictorial view of Ghazipur land fill site is shown below:

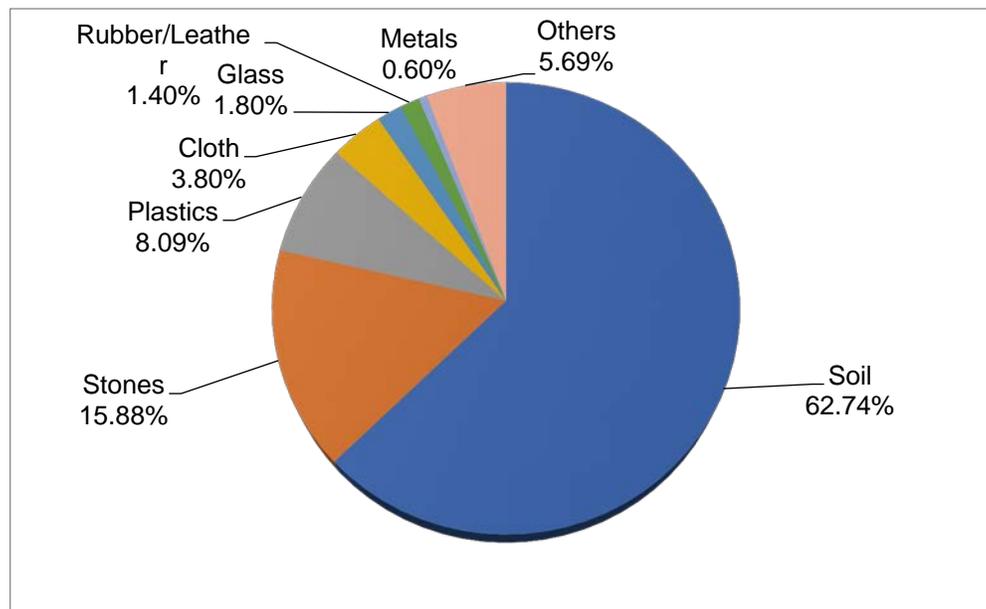




Ghazipur dump site

Physical characteristics includeⁱⁱⁱ

- stones constitute > 78% of total weight
- Average moisture in waste – 25%
- Moisture in soil like fraction – 15%



Physical composition of the Ghazipur waste

In a different study, it was reported that the range of methane emission flux was $18\text{mg/m}^2/\text{h}$ lowest in winter sample and highest $264\text{mg/m}^2/\text{h}$ in summer sample, and the range of nitrous oxide emission was estimated at $230\text{-}1370\text{ ug/m}^2/\text{h}$ ^{iv}.

In another IIT Delhi research study, it was reported that the average annual leachate percolation from the base of Ghazipur landfill site has been estimated as 24.36 million litres, using a Hydrologic Evaluation of Landfill Performance model (HELP). In the peak rainy season (month of July), generation of surface run-off even reaches to a level of 1.39 million litres per day. The underground strata around the study area consists of alluvial formation and the basement or hard rock occurs at greater depth around 100 m below ground level (bgl).

Groundwater contamination study

The characteristics of the ground water samples collected around the Ghazipur landfill site has clearly shown an indication of the contamination. Moderately high groundwater samples



,which deteriorates its quality for drinking and other of contamination in the ground water. Especially presence of Cl^- , NO_3 , NH_4^+ and Fe may be referred as a tracer of contamination in the ground water. The pH value of the collected sample was found to be in the range of 7.5 -8.5. The relatively high values of TDS indicate the presence of inorganic material in the samples. Among the nitrogenous compound, ammonia nitrogen was present in high concentration, this is probably due to the deamination of amino acids during the decomposition of organic compounds

High concentrations of NO_3 were also observed in the samples. The high level of Fe in the groundwater sample indicates that iron and steel scrap are also dumped in the landfill. The dark brown color of the leachate is mainly attributed to soluble organics and inorganics. The samples were also found to be bacteriologically unsafe.

Further, as per the logging results, fresh water aquifer is available within the range of 32 – 58 meters. The groundwater quality improves with the increase in depth and distance of the well from the pollution source. At greater depths (more than 40 m), it was found that leachate percolation becomes gentler and this further improves with the varying distance. This shows the strata b/w 40-60 m is presently safe for ground water withdrawal. It was also observed that leachate percolation usually concentrates in West and North-western sides along with a high concentration of a few parameters on eastern side^v.

The leachate generated from the landfill site is affecting the groundwater quality in the adjacent areas through percolation in the subsoil. Although, the concentrations of a few contaminants were not found to exceed the limits, even then the ground water quality represent a significant threat to public health.

In another study conducted by JNU, it was indicated that the area around landfill site is underlain by fine to medium sand mixed with coarse hard kankar up to a depth of 50-60 m bgl. Sediments below this depth are predominantly clayey in nature. At place, lenses of minor clayey silt horizons are also present within the sand horizon^{vi}

ⁱGhazipur Landfill Rehabilitation Report, U.S. Environmental Protection Agency and Climate and Clean Air Coalition Municipal Solid Waste Initiative

ⁱⁱ CRR I report, 2016

ⁱⁱⁱ Presentation by EDMC to Scientific Advisory Committee, on January 12, 2018

^{iv} Landfill mining: a case study from Ghazipur landfill area of Delhi, International Journal of Environmental Sciences, 2014

^v Groundwater Contamination From Non-Sanitary Landfill Sites – A Case Study on The Ghazipur Landfill Site, Delhi (India), International Journal of Applied Environmental Sciences, 2017

^{vi} Study of Groundwater Contamination through Landfill Site, NCT Delhi, JNU, 2006