Ministry of Housing and Urban Affairs
Government of India

स्वच्छ भारत
एक कदम स्वच्छता की ओर

CHECKLIST
for Conducting Legacy Waste Dumpsite Remediation

Introduction

India has set targets to achieve reclamation of legacy waste dumpsites of cities less than 10 lakh by March 2023 and more than 10 lakhs by March 2024 and make cities garbage free (Ministry of Housing & Urban Affairs 2021). Prime Minister Narendra Modi on October 1,2021 had announced the plan to make India Garbage free and one of the major objectives under SBM 2.0 is "Lakshya Zero Dumpsite" to remediate 14,000 acres of city land parcels.

Solid waste Management Rules 2016 demands the urban local bodies (ULBs) to identify and remediate old open dumpsites. It also advices cities towards becoming zero waste to landfill. Further, the hon'ble National Green Tribunal (NGT) in 2019 has asked ULBs to get old open dumpsites remediated in an environmentally safe and cost-effective manner.

Legacy waste dumpsites are a source of land pollution (soil contamination), water pollution (rivers/lakes/ waterbodies pollution, ground water contamination and marine pollution) and air pollution. Therefore, such a legacy waste remediation is an important step in preventing all forms of pollution.

Key Learnings

Looking at the dumpsite remediation cases around the country, here are the key learnings for the cities to address the possible gaps/ concern areas.

PLANNING STAGE:

Appropriate Planning: It is important that cities evaluate and plan remediation strategy keeping in mind the scale of operation and approach, available pockets (land parcels) for undertaking remediation work. Appropriate disposal of fresh waste/rejects from processing units, possible landfill fires, appropriate assessment of waste quantity, challenges for bi-product disposal, etc.

Strategizing remediation: Complete reclamation of site is possible with appropriate processing technique and linkages for recovered materials. Though, this also requires availability of space/ low lying areas for disposal of recovered soil and Inerts. If city has limited space for disposing rejects/transportation costs are too high, the non-combustible fraction of fine earth and stones can be contained and capped in certain portion of disposal site. This will require scientific technique for capping and robust post closure maintenance for few years. It is also important that before undertaking dumpsite reclamation, strategies for disposal of rejects on alternate site/sanitary landfill are appropriately devised.

Clarify the obligations: The responsibility for getting consents, identifying market demand, appropriate linkage and disposal of recovered materials and rejects, environmental monitoring, material testing etc should be clearly demarcated. These obligations should also be stipulated with timeframes for each party, to avoid any contradiction/conflicting situation later.

Clear contract basis: Volume based contracts might lead to conflicts, and thus will require close monitoring and third party verifications. Generally, contractor has all equipment's and labours placed on weight basis, thus making weight-based contracts is easily tracked through SCADA systems. However, a city should judiciously choose the model of operation. Topographical surveys also have errors due to variation in contour interval, as well as creation of windrows on landfill surface area. There should also be a clarity on permissible fluctuations with respect to quantity and viz-a-viz contract value.

PROCESSING STAGE

Space availability and remediation capacity: Identifying an appropriate space on the disposal site for placement of machines and equipment's to sort materials is the biggest challenge initially. Appropriate planning is important while taking up remediation work. Number of machines can gradually be increased to meet the targeted timelines, but this must be planned accordingly.

Complete stabilisation: Excavation and Pre stabilisation of materials with bio culture is the most essential step during remediation (around 27 days in temperate region), requiring efforts in regular turning of materials. This might require a larger duration in case water table is too high, or during monsoons. This requires land area, proportional to required capacity of remediation.

Controlling dumpsite fires: Appropriate surveillance of disposal sites to identify dumpsite fires and controlling them should be part of contract mechanism, as generally disposal sites tend to catch fire either due to methane being emitted, or heat during stabilisation. Combustible materials also are a good source to sustain such fires, strategizing material storage and safety is also important.

Appropriate IEC: Informing public near the reclamation site through appropriate information, education and communication (IEC) is important to avoid any conflicting situation. The final outcomes and environmental management measures should be appropriately showcased, to keep stakeholders involved.

Environmental Management and Safety: Environmental management and safety and monitoring are the key aspects. These should be planned well under the contracts. Appropriate disposal of recovered materials – combustibles, recyclables, fine earth, C&D waste, inerts as well as hazardous waste materials is the key. Materials are to be analysed every month, for assessing toxic releases/ appropriate disposal mechanism.

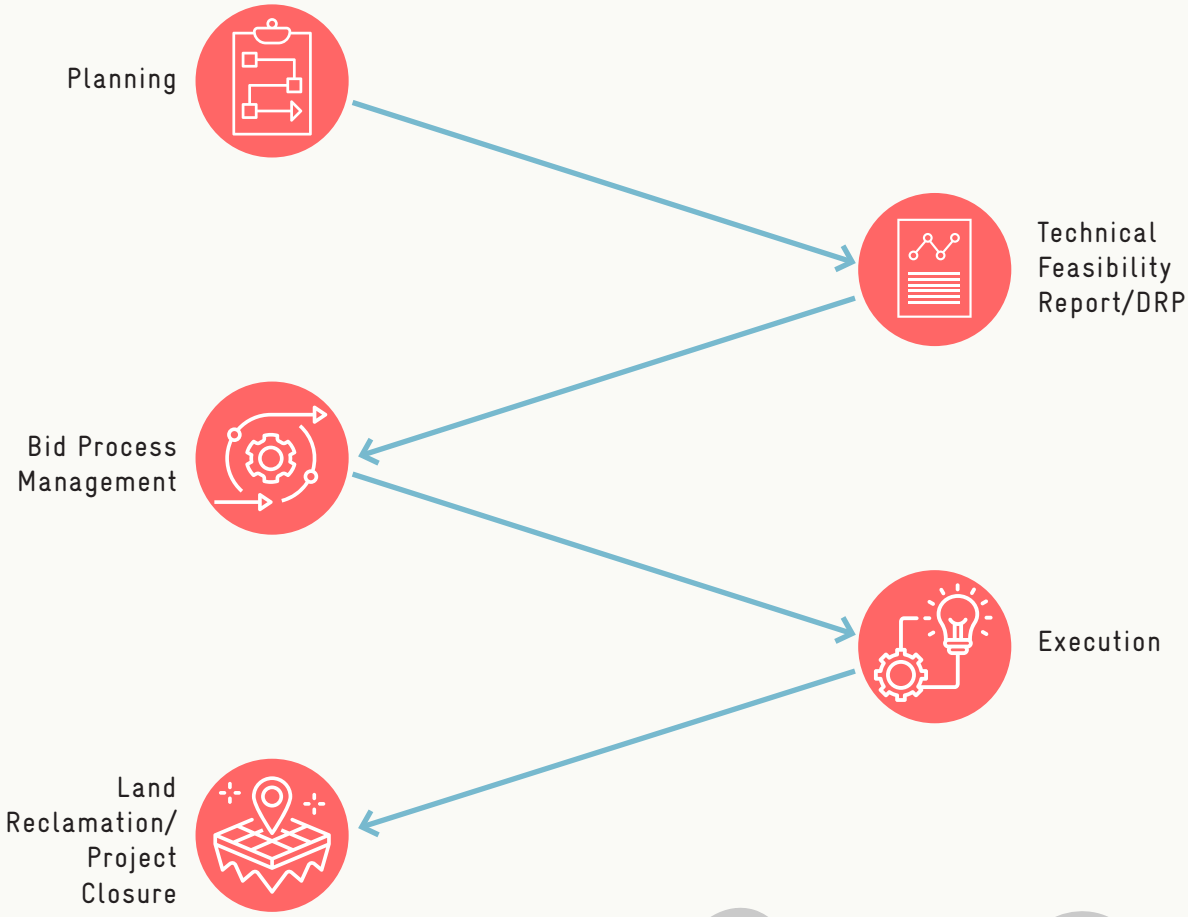
POST REMEDIATION STAGE:

Post remediation utilisation: Appropriate use of recovered site should be considered while planning reclamation of legacy waste dumpsite. It is important that once site is recovered it should not lead to any release of toxic leachate/ other harmful fumes/gasses. Appropriate post remediation monitoring should be planned by the ULB.

To help a ULB understand the key inferences from the learnings, a checklist has been provided in consequent section.

Key Inferences- Checklist

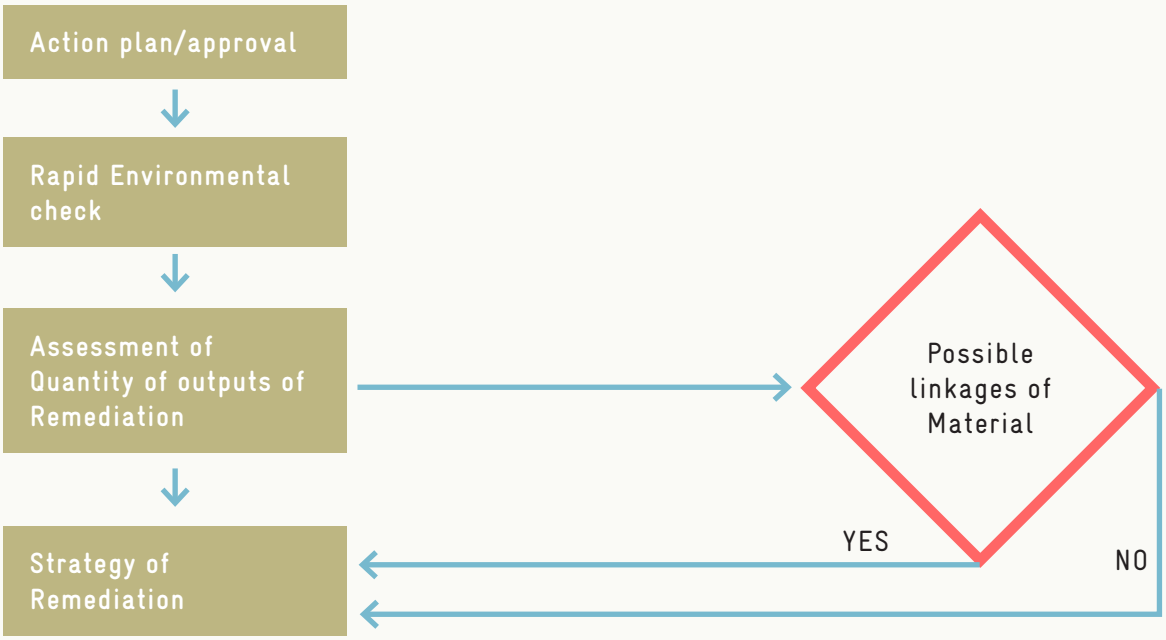
Based on the learnings from the case studies, it may be inferred that a city to undertake legacy waste remediation (municipal solid waste disposal site) should look at the projects from a holistic point and take appropriate planning steps to make the projects successful. Here are some of the stages and respective steps a city should undertake while undertaking a remediation project:



STAGE 1:

Planning

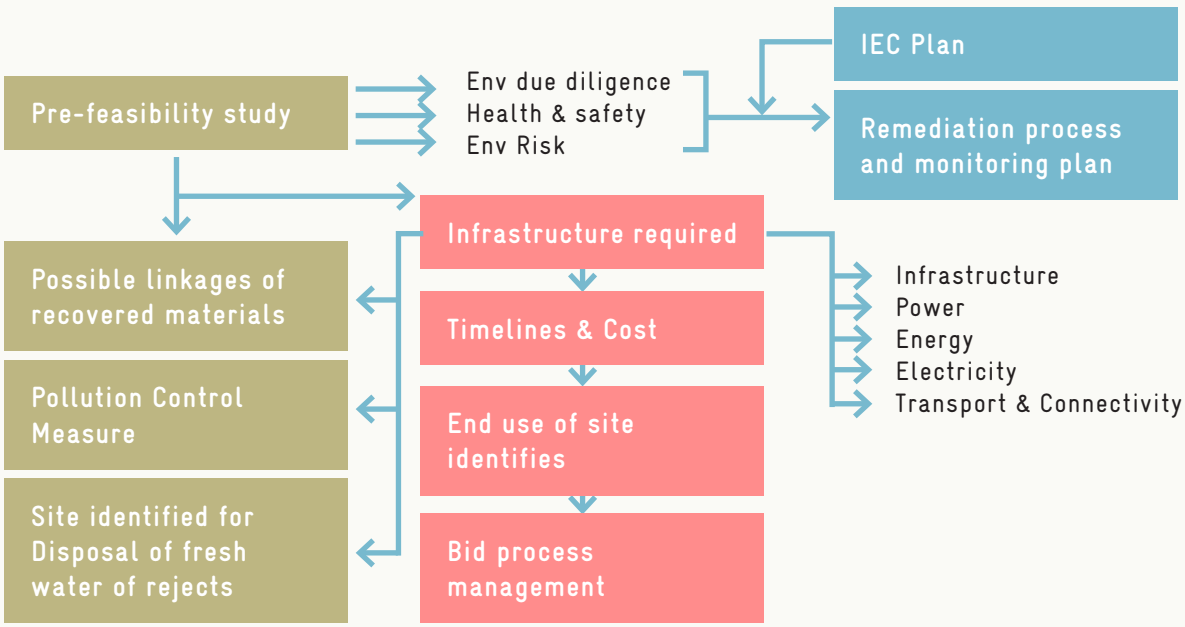
STEP 1	Preparation of Action Plan/ Obtaining Project Approvals
STEP 2	Rapid environmental check done: ■ Air quality monitoring ■ Landfill gas testing through borehole at different locations ■ Ground water quality monitoring ■ Surface water quality monitoring ■ Soil germination test ■ Analysis of legacy waste as per SWM Rules 2016, CPCB guidelines on remediation, NGT directions, etc..
STEP 3	Contour mapping (drone survey/ topography survey) and density check of legacy waste site for estimating the quantity and volume of waste and preparing contour profile and base contours.
STEP 4	Sampling and Waste Characterization to assess the quantum of outputs of remediation- fine earth, stones, combustible material, recyclables etc done.
STEP 6	Possible linkages for disposal/ Utilization of remediated/recovered materials.
STEP 5	Strategy for remediation identified- ■ With partial reclamation and capping ■ 100% site reclamation based on the local situation.



STAGE 2:

Technical feasibility Report/ DPR

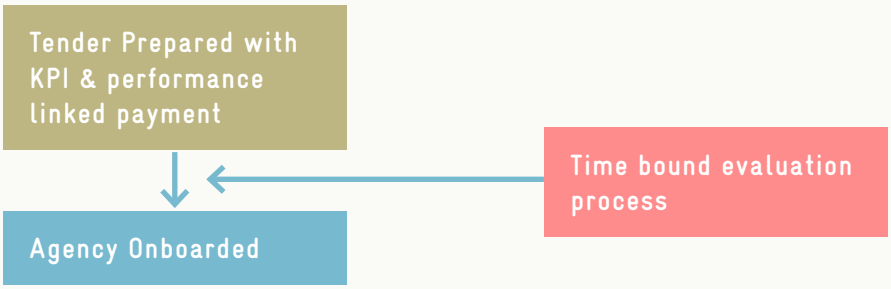
STEP 1	Prefeasibility studies for remediation (including detailed environmental due diligence, mapping of health, safety and environment risks involved) for remediation strategy- 100% reclamation/ partial reclamation & capping. Making projects bankable and sustainable?
STEP 2	Technique for remediation process with landfill gas and leachate management and storm water management identified. Identify measures to control pollution related to air, water and noise. Strategies identified to maintain ecology, create green belt, conduct environmental monitoring as per SWM Rules 2016 and CPCB norms, with appropriate solid waste disposal for all recovered components. Also testing presence of toxic materials which can possibly leach.
STEP 3	IEC campaign plan for sensitizing nearby population- considers all social and environmental parameters
STEP 4	Appropriate linkages for possible recovered materials, including specifications of required materials identified.
STEP 5	Other required infrastructure in relation to power, energy, electricity, transportation and connectivity etc is identified.
STEP 6	Alternate site/portion of recovered site for disposing fresh waste (including rejects from processing sites) identified.
STEP 7	Estimate tentative cost and time schedule for conducting the activity.
STEP 8	Alternate/end usage of reclaimed sites identified
STEP 9	Bid process management for selection of Operator

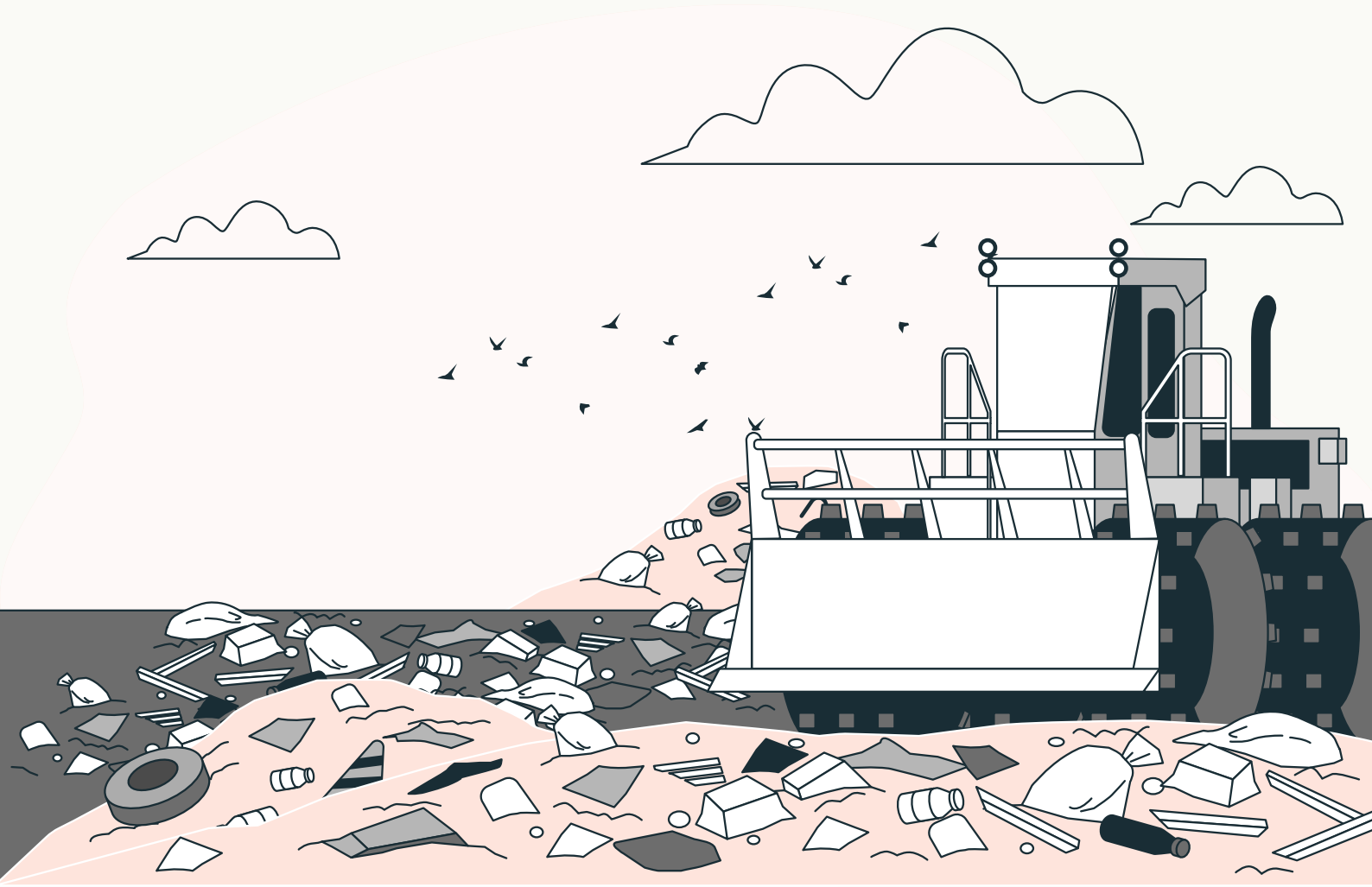


STAGE 3:

Bid Process Management:

STEP 1	Preparation of Tender Document with clearly mentioning obligations of all stakeholders/ Time period/ Payment terms and project closure conditions. Tenders to be based on Model tender documents provided by MoHUA/ NITI Aayog with project specific changes along with key performance indicators.
STEP 2	Time bound tender evaluation process for selection of operator
STEP 3	Agreement Signing with technically and financially qualified operator to undertake remediation.

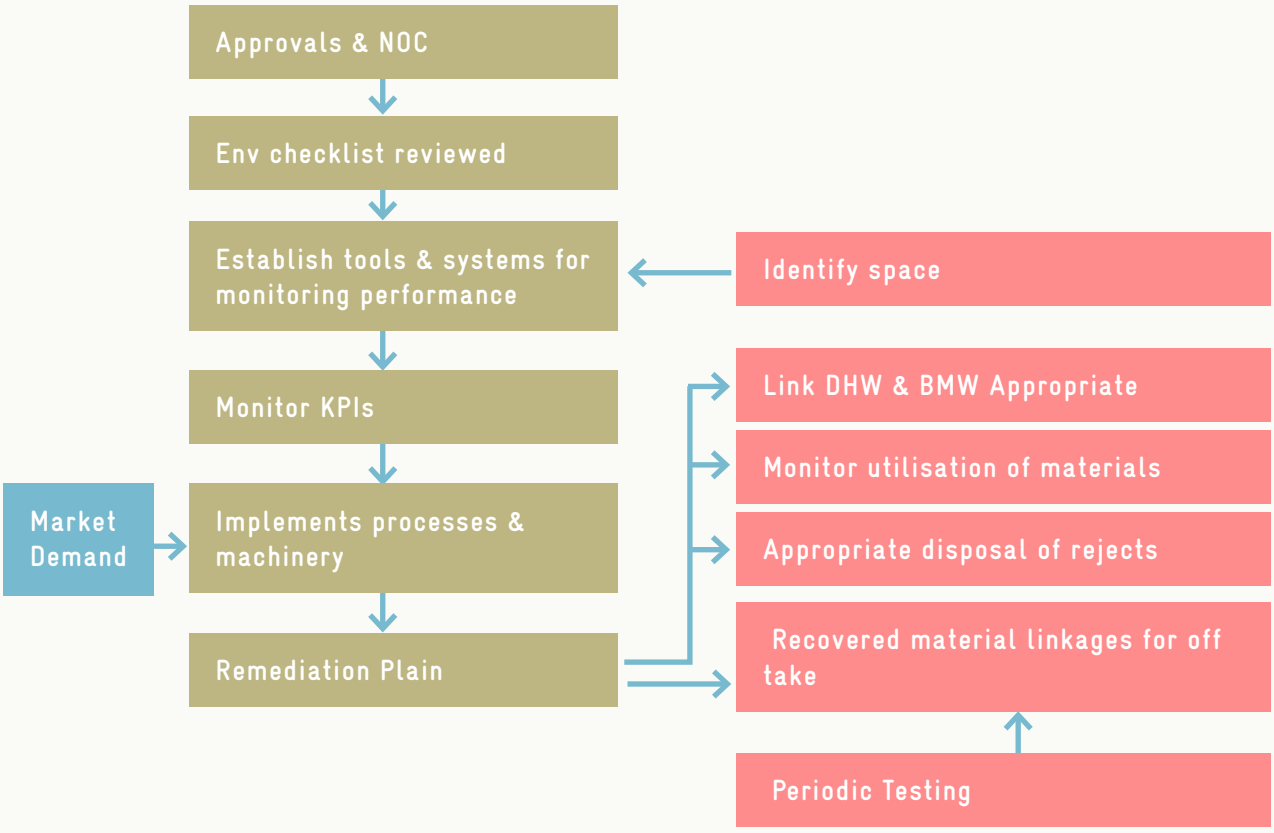




STAGE 4:

Execution phase: Involving Excavation, stabilisation and disposal

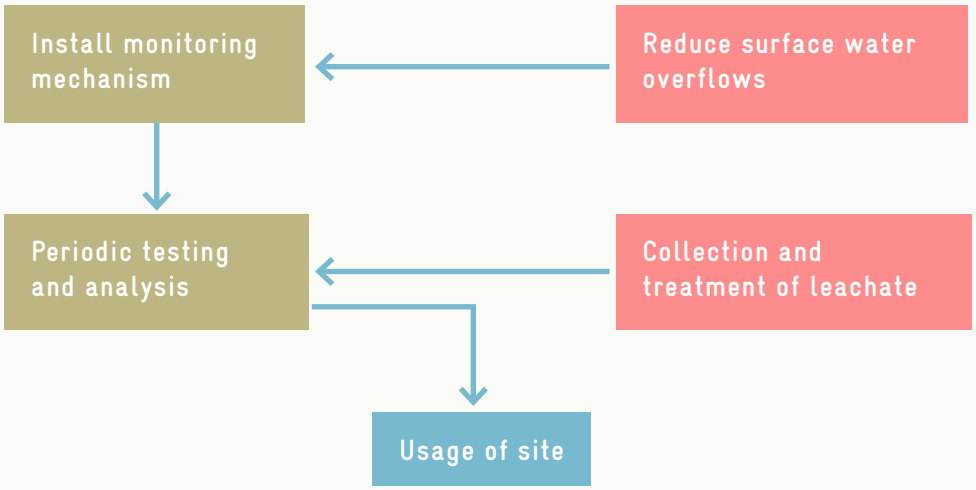
STEP 1	Obtain approvals and authorization for execution of remediation work (Including NOC from state PCB)
STEP 2	Environmental checklist reviewed (as proposed in TFR/ DPR) to ensure implementation of all safety measures and safety guidelines for execution of work.
STEP 3	Established all required tools and systems on ground for monitoring work progress/performance in a robust manner.
STEP 4	Monitor key performance indicators of remediation project- linked with payments to contractor.
STEP 5	Identify spaces for installation of machines of required capacity.
STEP 6	Execute excavation and stabilisation of waste in windrows. This will vary based on age of waste, organic contents and type of effective microorganism solution used.
STEP 7	Link domestic hazardous waste recovered from remediation with TSDFs and recovered domestic biomedical waste with BMW management units.
STEP 8	Monitoring of utilization of recovered and reused materials. Data should be maintained for all the remediated material against it reuse/ utilization
STEP 9	Periodic sampling and testing of recovered materials – combustibles, soil materials and inerts for appropriate disposal.
STEP 10	Post remediation monitoring plan followed -storm water management, Leachate management (when capped), ground water monitoring (when capped), air emissions monitoring etc as per EMP/DPR.



STAGE 5:

Post Remediation

STEP 1	Install monitoring mechanism in line with environmental checklist under TFR (particularly when capped).
STEP 2	Periodic testing and analysis of site should be undertaken as per SWM rules 2016 and CPCB norms in case the site has been capped.
STEP 3	Mechanisms to be installed to reduce surface water overflows as well as collection and treatment of leachate if generated from site (when capped).
STEP 4	Usage of site for recreational / waste management / other identified uses by city in line with guidelines of SWM Rules 2016/ CPCB norms.



This 'Checklist for Conducting Legacy Waste Dumpsite Remediation' has been prepared by
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