



EXECUTIVE SUMMARY

Name of the Project:	Solid Waste Landfill Site at Bhinda Dakhli, Bahawalpur
Proponent:	Bahawalpur Waste Management Company (BWMC)
Consultants:	Engineering Consultancy Services Punjab (ECSP) (Pvt.) Limited

1. INTRODUCTION

Bahawalpur is the 13th largest city of Pakistan having population of about 0.85 million. Due to high population density and industrial activities, an enormous amount of 325 tons of solid waste is being produced per day; which is currently dumped under conventional disposal system.

The traditional site available for waste disposal is at Badar Sher near northern bypass which is being operated without taking care of scientific principles of land filling. Moreover, this disposal site accommodates only 200 tons/day of solid waste, which is only about 55% of the total waste generated from the city. The remaining 125 tons/day solid waste is being dumped in depressions, open plots and along the roads which results in serious adverse health and environmental impacts. In this connection, Bahawalpur Waste Management Company (BWMC) has proposed an Integrated Solid Waste Management (ISWM) System by proposing a scientific landfill site at Bhinda Dakhli village situated at southern bypass Bahawalpur City for proper collection and disposal of mix Municipal Solid Waste (MSW).

Engineering Consultancy Services Punjab (ECSP) (Pvt.) Limited has been engaged by the BWMC to carry out the Environmental Impact Assessment (EIA) study to start above mentioned services for the fulfillment of environmental regulatory requirements.

2. LEGAL & ADMINISTRATIVE FRAMEWORK

The national guidelines and legislations relating to the environment considered for the proposed project include, National Conservation Strategy (1992), National Environment Policy (2005), Pakistan Labor Policy (2010), Punjab Environmental Protection Act (PEPA 1997), amended PEPA, (2000), National Environmental Quality Standards (NEQS), Land Acquisition Act (1894), Cutting of Trees



(Prohibition) Act (1975), Punjab Wildlife Act (1974), Punjab Plantation and Maintenance of Trees Act (1974), Antiquities Act (1975) etc.

Current national environmental policy as well as administrative and legal framework of PEPA, 2000 has been reviewed comprehensively which provides an overview of the national policies, laws, guidelines and regulations related to the EIA study of solid waste landfill site at Bhinda Dakhli. Environment related documents have been reviewed including submission of environmental assessment study report to obtain environmental approval was made mandatory by the Pakistan Environmental Protection Ordinance (PEPO), 1983 and the Pakistan Environmental Protection Act (1997). Section 12(1) of the PEPA (1997) stipulates that no project involving construction or any change in the physical environment can be undertaken unless an IEE or an EIA is conducted, and approval (NOC) is received from the relevant provincial environmental agency.

According to the Schedule II (Regulation 4) of Pak-EPA (Review of IEE and EIA) Regulation 2000 enlist the solid waste management and landfill site requires an EIA study. This EIA report has been prepared with due consideration of PEPA, 1997, Punjab Environmental Protection (Amendments) Act, 2012 and all other legal requirements of Pakistan and Punjab Government including LAA, 1894.

3. PROJECT DESCRIPTION

The Project is a proposed integrated solid waste treatment facility to be established at Bhinda Dakhli, Bahawalpur by the BWMC with the purpose of alleviating the severe adverse impacts of uncontrolled and improper waste disposals in and around the city. It is further added that proposed Project falls under Environmental Category B, which means that Project has potential adverse environmental impacts on human population and the environment. The project comprises the following key elements:

- ✓ The proposed project is a scientific solid waste landfill site at 24 acres (194 kanals).
- ✓ The site is located about 0.5 km before the River Satluj and 1.5 km from southern Bhinda Dakhli Bypass.
- ✓ The grading, filling and compaction of the base of new land fill areas will facilitate storm water run-off and leachate flow management.



- ✓ The construction of an earth fill berm on the perimeter of the landfill area, in order to confine and manage the hazards of contaminated storm water run-off and leachate flow and to maximize the fill capacity of the site.
- ✓ Solid waste from the city of Bahawalpur will be collected by using 70 compactors and transported to the landfill site. Two types of trucks will be used at landfill site; one type will collect the solid waste from the city area and second type of trucks will carry soil and other compaction material to landfill site.
- ✓ To protect the leachate exposure to ground water, protective liner such as geo-textile and geo-synthetic membrane will be used at the base of filling site.
- ✓ The installation of leachate and storm drainage systems including holding and evaporation ponds will potentially avoid the contamination.
- ✓ An alternative site at 13-solang at Yazman Road was also considered for present site of Bahinda Dakhli. This site was rejected on the basis of some technical points related to the nearby locations of Bahawalpur airport in term of high chance of bird's strike with the flying aircrafts. Another reason of rejection was a clear three times more distance of the alternative site which will entail comparatively huge cost of fuel and vehicles maintenance.

4. APPROACH AND METHODOLOGY

A conventional approach was followed to conduct EIA study for the proposed project to meet the minimum requirements of Punjab-EPA for social and environmental sustainability standards and policies. The EIA process, however, has undergone the following steps mandatory for any standard environmental assessment:

- ✓ Invite experienced environmental experts to discuss and examine the potential environmental impacts and major environmental issues in the light of Project scheme and present environmental settings. Predict the potential environmental impacts caused by the Project upon special study and simulation incorporating expert's opinions.
- ✓ Desk studies to understand project designing drawings and other Public material as secondary information.



- ✓ Collect baseline information to identify the present environmental conditions in the Study Area on the basis of available data, field investigation and monitoring.
- ✓ Public Consultation and Project disclosure to understand public experience and understanding. A solid liaison with the public sector departments/agencies to involve them in administrative and responsibility hierarchy.
- ✓ Evaluate the environmental impacts envisaged to be caused by the Project according to relevant laws, regulations, standards and the predicted results.
- ✓ Put forward doable remedial measures, assess the residual impacts and evaluate whether they meet the relevant policies and environmental guidelines.
- ✓ Device environmental monitoring plan to evaluate the actual environmental impacts and the implementation of the remedial measures/mitigations.

5. SOCIO-ENVIRONMENTAL BASELINE CONDITIONS

Information on existing natural and socio-economic resources is of fundamental importance for the assessment of environmental impacts. Baseline environmental monitoring was conducted from 18th to 20th August, 2015. The baseline environmental conditions of the Project Area and Area of Influence (AOI) are narrated below:

Physical Environment

Baseline assessment settings of physical parameters of the environment suggest that Project is broadly located in the arid zone of Punjab. In the north of landfill site, there is an abandoned leather factory whereas; Satluj River flows in east approximately 0.5 km away from landfill site. There is continuous soil erosion occurring due to change in river pattern. The Study Area is coldest in January and hottest in May and June. Land resources of the Project Area include soil chemistry, water quality, air, noise pollution, access roads, area and location of contractor facilities, soil erosion and contamination. Present integrity of the main access roads from Bahawalpur City to landfill site is not dependable. Environmental monitoring was done by EPA approved laboratory, the results for drinking and surface water



shows that all the parameters are within the limits defined in NEQS and will be monitored on regular basis. The ambient air can be classified as cleaner because of lesser vehicular movement during and after construction. All noise values are within permissible limits, i.e. below 65 dB (A).

Biological Environment

Natural flora and fauna are integral part of any ecosystem. On account of the proposed Project, some of the principal trees, shrubs, herbs and other ground covering vegetation in Project Area are; arjun, dhak, mahwa, bahara, alstonia, ashoke, sheesham, alata, kenair, weeping willow, peepal, simbal, berri, suk chain, poplar, dab, aq etc.

The most common animals are: Fox, jackals, hares, wild boars, mongoose, arks, owls, kites and hawks are also found in large numbers. Small Indian mongoose and Indian palm squirrel have also been reported. Amphibians frequently seen in and around the Project Area; especially during rainy season, common frog (*Rana tigrina*) and Indus valley toad, while the birds species include house sparrow (*Passer domesticus*), house crow (*Corvus splendens*) and mynah (*Acridotheres tristis*) etc. are also prominent in the Study Area.

Socio-Economic Environment

The socio-economic aspects were studied and analyzed by conducting village profile and household surveys. Raheem Baksh, Kalay Khan and Bhinda Dakhli are three villages that fall in the Study Area of the proposed project and can be considered as Area of Influence (AOI) with combined population of approximately 3200. The social amenities are virtually obscure in this area and do not fulfill the basic needs of local inhabitants. As far as acceptance level of the proposed Project is concerned, mostly respondents were in favor of the Project as they expected employment opportunities during different phases of Project. Only a few residents were uncertain about Project impacts after the implementation. Saraiki and Punjabi is the predominant language being spoken by majority of the population of the district .The main castes and groups of the Project and study area are Malik, Jatt and Rajput. The most common animals are: bull, buffalo, cows, sheep and goats. Since main part of the study area shows the features of flowing Sutlej River near the proposed Project, so agriculturally

(thus ecologically) rich alluvial soils and conducive climatic conditions represents a fertile account of the area.

6. PUBLIC CONSULTATION

Extensive public consultations were conducted with all stakeholders including local government authorities, BWMC authorities, local industry and local residents. Most of the people expressed their concerns about potential adverse impacts on nearby population and environment of the area. The public generally supports the development of the Project and their views have been considered in the planning and design process.

Major socio-economic concerns and problems, quoted by the indirect affected communities of Project Area, are both positive and negative. The positive impacts of the proposed Project, as envisaged by the indirect affected persons, are in terms of their employment, improved drainage system and sanitation, transportation facility, better education and improvement in the general economic condition of the community. Similarly, negative impacts were forecasted as there will be emission of gases and their odor, vector production, leakage of leachate from compactor, hazards of accidents due to heavy transport etc.

7. IMPACTS AND MITIGATIONS MEASURES

Environmental Parameters	Risk Assessment during Different Phases			Recommended Mitigation
	Before	During	After	
A: Physical				
Land Resources				
Soil erosion	NA	-2p	-1p	The soil erosion rate can be minimized by regularly watering the land and by planting the thick vegetation along the PA. This vegetation will grow and makes the aggregates of the soil. Hence, the rate of erosion decreases
Litter Production	NA	-2t	-3t	Appropriate in-housekeeping, sanitary and solid waste management practices
Road network development	-2p	-1p	-2p	Municipal Corporation and District Officer will address the matter
Sub-soil chemistry	NA	-2p	-1p	Sub-soil may be protected by adopting best management practices
Hazardous materials	NA	NA	-3p	Safe dumping sites through HWM system
Air Resources				
PM emissions	NA	-2t	-2t	PM will be emitted in air during the operational activities it can be mitigated by regularly watering the area
Noise pollution	NA	-3t	-3t	Installation of mufflers on the equipment. Buffer zones management and reduction of traffic through community areas



Air emission	NA	-2p	-2p	✚	During and after the construction phase gaseous emission may deteriorate the air quality, turning off the engines and adopting best management practices will reduce the pollutants
Leachate	NA	NA	-3p	✚	Collect leachate in the leachate pond and spray the leachate on the landfill site by using sprinkler and transport the leachate to the specific industry for further use
✚ Noise	NA	-2t	-2p	✚	The noise being generated is within the NEQs limit but it can be further mitigated by proper tuning the machinery and automobiles. The construction of the facility also play important role in mitigating the impact of noise on the workers. The administrative buildings should be constructed with the sound-absorbent or insulating material. It can further be mitigated by putting the most noise producing equipment indoor and by establishment of the greenbelt between the facility and nearby community. As plants have the inbuilt ability to absorb noise.
✚ Odor	NA	NA	-3p	✚	This impact can be mitigated by installation of the misting systems with deodorants to mask or neutralize odors with the seasonal adjustments. At the end of the day cover all the SW with the soil to reduce odor and air-blown movement of litter.
✚ Dust	NA	-2t	-3t	✚	The dust generation can be control by paving all the roads and installing the air filtration equipments on-site. The health of the workers can be maintained by providing them with the personal protective equipments (PPs).
Water Resources					
Ground water	NA	-2p	-2t	✚	Best management practice should be adopted and water filtration and treatment should be done before use
B : Ecological					
Flora					
✚ Tree Cutting	NA	-2t	-2p	✚	Re-plantation through tree plantation plan Establishment of green belts and parks
Fauna					
✚ Terrestrial fauna	NA	-2t	-1t	✚	Wildlife protection & biodiversity management plan
C: Socio-Economics					
✚ Health deterioration	NA	-2t	-3p	✚	Occupational safety and health plans
✚ Increased traffic congestion	NA	-2t	-2t	✚	Implementation of traffic management plan
✚ Unacceptable waste	NA	NA	-2t	✚	Appropriate signs at facility entrance
✚ Vibration	NA	-2t	-2t	✚	Vibration will be reduce by using the inertial blocks, constructing heavy base and by using vibration absorbent material Shock absorber at the base of the heavy machinery
✚ Aesthetic	NA	-2t	-3t	✚	Through site restoration
✚ Agriculture	NA	-2t	NA	✚	Land clearance will affect the agriculture practice. Alternative livelihoods will be given and soil will be protected from erosion
<p>✚ Legends: 1= Low; 2= Medium; 3= High; 4= Extremely High; NA= Not Applicable; t= Temporary; p= Permanent; app= Applicable; 0= Negligible</p> <p>✚ All adverse environmental impacts except natural calamities are manageable easily by implementing EMP as proposed in Chapter 7 of this EIA Report.</p>					



8. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMMP)

Environmental Management and Monitoring Plan (EMMP) is a sort of the master plan which supervises all stages of the Project to safeguard the environmental aspects of the Project during, pre-construction, construction, operational and maintenance phases. It addresses the main components like environmental mitigation and monitoring programs, general management programs, institutional arrangements and budgeting.

Public disclosure, auditing and reporting procedure are discussed as outwardly focused activities and management plans including air, dust, storm water, leachate, landfill gas management, nuisance, bird control, odor, vector, litter, transport code of conduct, noise quality, health & safety, vibration management, site management, emergency management, fire prevention, training and capacity building and tree plantation plans are recommended in this EIA report.

A total of Rs. 3.17 million EMMP budget is calculated, which has covered direct cost of environmental operations like monitoring of air, water, noise, internal audit, training, tree plantation cost, etc. As regards, the cost of mitigations of some engineering activities, viz. road improvement, construction of flood protection walls or stone apron fixing at meandering river, etc. it is mentioned in the disposal of overall engineering budget.

9. CONCLUSION AND RECOMMENDATIONS

The conventional solid waste management system being practiced in Bahawalpur is incapable of managing the 325 tons of waste/day being produced at present and foreseeable increasing waste load in future. After comprehensive environmental assessment study, it is concluded that the proposed Project will not have any significant long term adverse impact on the prevailing atmosphere which are irreversible. The proposed Project of solid waste landfill site falls in Environmental Category “B” that means all permanent or temporary adverse impacts can positively be reversed through doable mitigation measures reported in EMMP. Minimization of adverse impacts can, however be envisaged through compiling with the EMMP in letter and spirit. Implementation of environmental mitigation measures, proper monitoring and compliances of the environmental standards/legislations, good engineering design etc. as proposed in this EIA report are some of other tools for offsetting the temporary environmental adverse impacts. It is however, further



concluded that the proposed Project will not pose significant permanent and irreversible adverse impacts on the prevailing environment of the area/region. Rather it will have many beneficial impacts on the surrounding community and future environmental conditions, where chief benefits will be to turn Bahawalpur City as one of cleanest cities in Pakistan and overall socio-economic uplift of the communities of Study Area.

Recommendations

Following are the recommendations that need to be adopted to mitigate the aforesaid adverse impacts of the proposed Project as well as turning the proposed Project into a complete success:

- For the successful operation of the landfill site, waste transfer station must be designed and commissioned to enhance the life span of the landfill site.
- An independent study, for river hydraulic erosion, aquatic ecology, solid waste characterization, quantification and economic viability is required.
- An allied Project of composting can be installed near the landfill site.
- Leachate tank may be installed instead of leachate pond, to avoid emission of deleterious impacts of obnoxious gasses.
- If Proponent finds some alternative site considerably away from the Sutlej River safer than Bhinda Dakhli that must be considered.
- The findings of the study must be incorporated in the planning and designing phase of this Project. True implementation of EMMP and utilization of that will quickly offset the adverse impacts within proper environmental budget.
- Water sprinkling on surrounding trees once in a day could be ensured during construction as plants stomata get clogged due to dust.
- Leachate gas emissions maybe trapped for industrial use as well as avoiding their bad impacts on human health.
- An alternative route must be identified in addition to present access roads to cope with any unforeseen emergency in future.
- An incineration plant must be installed on-site to manage hazardous or hospital waste or it may be sold to relevant industry immediately.
- Three bins system may be implemented to collect various categories of solid waste at public residential level, so that grading solid waste at landfill site may be relieved at source.



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- Open dumping; burning and disposal of waste in the water bodies must be avoided.
 - The Proponent must apply for Environmental Approval (NOC) to EPA, Punjab before proceeding further into the Project implementation.