# TABLE OF CONTENTS

## EXECUTIVE SUMMARY

1 INTRODUCTION

1.1 Project Background and Overview

1.2 The Project

1.3 Project Nature and Size

1.4 Scope and Objective of the Project

1.5 Purpose of the Report

1.6 Limitations of Study

1.7 Project Proponent

1.8 Details of Consultants

2 LEGAL & ADMINISTRATIVE FRAMEWORK

2.1 General

2.2 National Policies, Laws, Regulations and Guidelines

2.2.1 Pakistan Penal Code, Act XLV of 1860

2.2.2 Pakistan Explosives Act, 1884

2.2.3 Land Acquisition Act, 1894

2.2.4 National Conservation Strategy (NCS), 1992

2.2.5 National Environmental Quality Standards (NEQs) {1995, 2000, 2009, 2010}

2.2.6 National Environment Policy, 2005

2.2.7 Pakistan Environmental Protection Agency (PEPA) Regulations, 2000

2.2.8 Pakistan Environmental Impact Assessment Procedures

2.2.9 Pakistan Labor Policy, 2010

2.2.10 Punjab Irrigation and Drainage Authority Act, 1997

2.2.11 Punjab Environmental Protection Act, 1997

2.3 Solid Waste Disposal Act, 1965

2.4 Endangered Species Act, (1973)

2.5 Punjab Plantation and Maintenance of Trees Act, 1974

2.6 Punjab Wildlife Act, 1974

2.7 Cutting of Trees (Prohibition) Act, 1975

2.8 Antiquities Act, 1975

2.9 International Guidelines and Agreements

2.9.1 Agenda 21 (The Earth Summit)

2.9.2 Convention on Biological Diversity, 1994

2.10 Procedure for Environmental Approval

a Classification of the Project

b Submission of EIA

c Issuance of N.O.C

3 PROJECT DESCRIPTION

3.1 General

3.2 Type and Category of Project

3.3 Cost and Magnitude
5.3.4 Climate
   a Seasons
   b Temperature
   c Precipitation Rate
   d Humidity
   e Wind

5.3.5 Ambient Air Quality Monitoring

5.3.6 Noise Level

5.4 Water Resources
   5.4.1 Surface Water
   5.4.2 Groundwater
   5.4.3 Flooding

5.5 Ecological Environment
   5.5.1 Aquatic Flora and Fauna
   5.5.2 Terrestrial Flora and Fauna
      a Flora
      b Fauna
         i Mammals
         ii Reptiles
         iii Birds
         iv Amphibians
         v Endangered Species

5.6 Socio-Economic Environment
   5.6.1 Cultivated Crops
   5.6.2 Livestock

5.7 Socio-Economic Profile of Study Area
   5.7.1 Demographic Information of Study Area

5.8 Social and Public Amenities Available
   5.8.1 Physical Structures
      a Structures
      b Religious Structures
      c Protected Structures
   5.8.2 Quality of Life Values
      a Occupation of Respondents
      b Personal Income
      c Facilities Available
      d Education
      e Health Facilities
      f Common Diseases
      g Road Access

6 STAKEHOLDER’S CONSULTATION

6.1 Objectives of Stakeholder’s Consultation
6.2 Classification of Stakeholders
6.3 Identification of Stakeholders and Information Disclosure
6.4 Technique and Tools used in consultation
6.5 Consultation with Stakeholders
6.6 Consultation Process
6.7 Interested and Affected Parties Consulted
   a Person under direct influence
   b Person under indirect influence
   c Wider Community
6.8 Views and Concerns of the Stakeholders
   6.8.1 Persons under Direct Influence
   6.8.2 Persons under Indirect Influence
      a Factory Workers
      b Shopkeepers
6.9 Views of Responsible Authorities
   6.9.1 Consultation with Nusrat Tufail Gill, Senior Manager (Planning) of LWMC
   6.9.2 Consultation with Abid Butt, Senior Manager (Procurement & Contracts) of LWMC
   6.9.3 Consultation with Mr. Inaam Pasha, Advocate
   6.9.4 Consultation with Mr. Muhammad Hassan, Operational Manager of LWMC
6.10 Study Area Profile
   6.10.1 Study Area Profile of Katar Band Road
   6.10.2 Study Area Profile of Katchi Basti Area
   6.10.3 Consultation with local people in the Proposed Project Site
      a First Category
      b Second Category
      c Third Category
6.11 Summary of Stakeholder’s Views
6.12 Acceptability of the Proposed Project
   6.12.1 Reasons of Rejection
6.13 Other Problems of Stakeholders
7 IMPACTS AND MITIGATION MEASURES
7.1 Environmental Impact Characterization
7.2 Impact Assessment Procedure
7.3 Impact Evaluation
   7.3.1 Methodology for Impact Evaluation
      a Impact Screening Checklist
      b Project Impact Evaluation Matrix
      c Overlays
7.4 Beneficial Impacts of the Project
   7.4.1 Direct Benefits
   7.4.2 Indirect Benefits
7.5 Environmental Impacts before Construction
   7.5.1 Impacts on Land Resources
7.5.2 Impact on Hydrology 92
7.5.3 Biological Environment 93
7.6 Impacts During Construction Phase 93
7.6.1 Impacts on Hydrology 90
7.6.2 Impacts on Land Resources 96
7.6.3 Impacts on Air Resources 97
7.6.4 Noise Levels During Construction 98
7.6.5 Impacts on Ecology 100
7.6.6 Impacts on the Social Environment 101
7.7 Impacts During Operational Phase 104
7.7.1 Physical Environment 104
7.7.2 Impact on Air Resources 109
7.7.3 Impacts on Water Resources 110
7.7.4 Impacts on Biological Environment 111
7.7.5 Health and Safety Issues 112
8 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN 115
8.1 Environmental Management and Monitoring Plan (EMMP) 116
8.2 Environmental Management and Monitoring Framework 117
8.3 Institutional Arrangements and Responsibilities 117
8.3.1 Responsibilities 118
8.3.1 a The Project Manager 118
8.3.1 b The Environmental Officer 118
8.3.1 c Contractors and Service Providers 119
8.3.1 d Independent Monitoring Consultant 120
8.3.1 e HSE Manger 121
8.4 Management and Monitoring Plan of Significant Environmental Issues 121
8.5 Equipment Maintenance Details 130
8.5.1 Tree Plantation Plan 130
8.5.1 a) The Plantation Plan 131
8.5.1 b) Plantation Cost 131
8.5.2 Environmental Cost 133
9 CONCLUSION AND RECOMMENDATIONS 132
9.1 Findings 135
9.2 Recommendations 136
# List of Tables

<table>
<thead>
<tr>
<th>Table No.</th>
<th>Description</th>
<th>Page#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1.1</td>
<td>Average Composition of CDW</td>
<td>2</td>
</tr>
<tr>
<td>Table 3.1</td>
<td>Cost of the Project</td>
<td>15</td>
</tr>
<tr>
<td>Table 3.2</td>
<td>Solid Waste Generation (in tons/day)</td>
<td>18</td>
</tr>
<tr>
<td>Table 3.3</td>
<td>Waste Collection Schedule</td>
<td>19</td>
</tr>
<tr>
<td>Table 3.4</td>
<td>C&amp;D Waste Quantification</td>
<td>20</td>
</tr>
<tr>
<td>Table 3.5</td>
<td>C&amp;D Waste Characterization</td>
<td>23</td>
</tr>
<tr>
<td>Table 3.6</td>
<td>Average Rates (approx.) for Transportation</td>
<td>24</td>
</tr>
<tr>
<td>Table 3.7</td>
<td>Cost of Civil Works and Crusher Equipment</td>
<td>25</td>
</tr>
<tr>
<td>Table 3.8</td>
<td>Operational Cost of the Facility/Month</td>
<td>26</td>
</tr>
<tr>
<td>Table 3.9</td>
<td>Schedule of Implementation</td>
<td>27</td>
</tr>
<tr>
<td>Table 4.1</td>
<td>Techniques Used for Various analysis by GEL Laboratory</td>
<td>36</td>
</tr>
<tr>
<td>Table 4.2</td>
<td>Noise Level Monitoring</td>
<td>37</td>
</tr>
<tr>
<td>Table 4.3</td>
<td>Drinking Water Sample Locations</td>
<td>38</td>
</tr>
<tr>
<td>Table 4.4</td>
<td>Wastewater Sample Locations</td>
<td>38</td>
</tr>
<tr>
<td>Table 4.5</td>
<td>Ambient Air Quality and Noise Level Monitoring Locations</td>
<td>39</td>
</tr>
<tr>
<td>Table 5.1</td>
<td>Mean Average Temperature in Lahore</td>
<td>43</td>
</tr>
<tr>
<td>Table 5.2</td>
<td>Mean Precipitation and relative humidity</td>
<td>45</td>
</tr>
<tr>
<td>Table 5.3</td>
<td>Mean Wind Speed and Direction</td>
<td>47</td>
</tr>
<tr>
<td>Table 5.4</td>
<td>Ambient Air Quality Monitoring Result</td>
<td>48</td>
</tr>
<tr>
<td>Table 5.5</td>
<td>Noise Level Monitoring Results (GEL, 2015)</td>
<td>49</td>
</tr>
<tr>
<td>Table 5.6</td>
<td>Groundwater Monitoring Results</td>
<td>50</td>
</tr>
<tr>
<td>Table 5.7</td>
<td>Wastewater Monitoring</td>
<td>52</td>
</tr>
<tr>
<td>Table 5.8</td>
<td>List of Identified Trees in the Project Area</td>
<td>57</td>
</tr>
<tr>
<td>Table 5.9</td>
<td>List of Identified Trees in the Study Area</td>
<td>58</td>
</tr>
<tr>
<td>Table 5.10</td>
<td>Inventory of Shrubs and Herbs Present in Study Area</td>
<td>58</td>
</tr>
<tr>
<td>Table 5.11</td>
<td>Birds in the Study Area</td>
<td>60</td>
</tr>
<tr>
<td>Table 6.1</td>
<td>Views of the Public</td>
<td>73</td>
</tr>
<tr>
<td>Table 6.2</td>
<td>Study Area of Katar Band Road</td>
<td>77</td>
</tr>
<tr>
<td>Table 6.3</td>
<td>Study Area Profile of Katchi Basti</td>
<td>78</td>
</tr>
<tr>
<td>Table 6.4</td>
<td>Acceptability of the Proposed Project</td>
<td>82</td>
</tr>
<tr>
<td>Table 6.5</td>
<td>Protective Measures Suggested by the Respondents</td>
<td>83</td>
</tr>
<tr>
<td>Table 7.1</td>
<td>Impact Characterization</td>
<td>84</td>
</tr>
<tr>
<td>Table 7.2</td>
<td>Summary of Impact Evaluation Matrix</td>
<td>87</td>
</tr>
</tbody>
</table>
Table 7.3  Noise levels of Construction Equipment for SW Transfer Station and C&D Recycling Unit

Table 8.1  Components of an Environmental Management Plan
Table 8.2  Air Quality Management and Monitoring Plan
Table 8.3  Dust Management and Monitoring Plan
Table 8.4  Litter Management and Monitoring Plan
Table 8.5  Transport Code of Conduct
Table 8.6  Noise Quality Management and Monitoring Plan
Table 8.7  Vector Management and Monitoring Plan
Table 8.8  Training and Capacity Building Plan
Table 8.9  Health and Safety Plan
Table 8.10 Vibration Management and Monitoring Plan
Table 8.11 Odor Management and Monitoring Plan
Table 8.12 Total tree Removal in Proposed Project Site
Table 8.13 Estimated Tree Plantation
Table 8.14 Trees to be Planted
Table 8.15 Tentative Cost of Equipment
Table 8.16 Estimated Cost of Unit Plantation (100 Plants) & Maintenance for 1st Year
Table 8.17 Estimated Cost of Plantation Unit (50 Plants) & Maintenance for 2nd Year
Table 8.18 Estimated Cost of Plantation Unit (50 Plants) & Maintenance for 3rd Year
Table 8.19 Estimated Cost For Maintaining 100 Plants for 4th Year
Table 8.20 Final Cost Per Tree Planted
Table 8.21 Summary of Budget for EMMP

<table>
<thead>
<tr>
<th>Figure. No.</th>
<th>Description</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.1</td>
<td>City District Lahore Map</td>
<td>3</td>
</tr>
<tr>
<td>Figure 3.1</td>
<td>Proposed Project Layout</td>
<td>17</td>
</tr>
<tr>
<td>Figure 3.2</td>
<td>Waste Generation Rate (tons/day) in 9 Towns of Lahore</td>
<td>18</td>
</tr>
<tr>
<td>Figure 3.3</td>
<td>Union Councils of Lahore District</td>
<td>19</td>
</tr>
<tr>
<td>Figure 3.4</td>
<td>Solid Waste Characterization of Lahore City</td>
<td>21</td>
</tr>
<tr>
<td>Figure 3.5</td>
<td>Transfer Station Layout</td>
<td>22</td>
</tr>
<tr>
<td>Figure 3.6</td>
<td>Road Access Map</td>
<td>28</td>
</tr>
<tr>
<td>Figure: 5.1</td>
<td>Topography of the Project Area</td>
<td>41</td>
</tr>
<tr>
<td>Figure: 5.2</td>
<td>Geology of Lahore in Geological Map</td>
<td>42</td>
</tr>
<tr>
<td>Figure: 5.3</td>
<td>Soil type of Project Area</td>
<td>43</td>
</tr>
<tr>
<td>Figure 5.4</td>
<td>Daily Temperature in Lahore</td>
<td>45</td>
</tr>
</tbody>
</table>
List of Annexes

Annex-A  Socio-Environment Team
Annex-B  Reference Documents
Annex-B1  TOR
Annex-B2  PEPA 2000
Annex-B3  NEQS 2000
Annex-C  Survey Tools
Annex-C1  Maps
<table>
<thead>
<tr>
<th>Annex</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>Environmental Checklist</td>
</tr>
<tr>
<td>C3</td>
<td>Study Area Profile</td>
</tr>
<tr>
<td>C4</td>
<td>Socio-Economic Questionnaire</td>
</tr>
<tr>
<td>D</td>
<td>Results</td>
</tr>
<tr>
<td>D1</td>
<td>Environmental Monitoring Results</td>
</tr>
<tr>
<td>D2</td>
<td>Photo Gallery</td>
</tr>
<tr>
<td>E</td>
<td>End Notes</td>
</tr>
<tr>
<td>E1</td>
<td>References</td>
</tr>
<tr>
<td>E2</td>
<td>Glossary</td>
</tr>
<tr>
<td>E3</td>
<td>Sorting Catalogue</td>
</tr>
</tbody>
</table>