



Naval Anchorage, Karachi

"Consultancy Services for Town Planning and Designing
of Infrastructure Development Work-PNWT /
Naval Anchorage Karachi (NAK)"

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

July-2023



Head Office:

C-3, Jhelum Block, Green Fort-II, Lahore.
Phone: +92 42 35450914-15
Fax: +92 42 35450916,
Email: arslan@asiancon.com

Islamabad:

Karachi:

Peshawar:

Office No. 21, 2nd Floor, 44-Zaki Centre,
I-8 Markaz, Islamabad.

Office No. 410, 4th floor, Business Avenue, PECHS,
Block-6, Main Shahrah-e-Faisal, Karachi.

Syed's Tower, Office No. 1, 4th Floor, Opposit to
Custom House, University Road, Peshawar.



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Certificate

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By (Name): _____

Licensed Professional Engineer No: _____

[Seal]





Table of Contents

EXECUTIVE SUMMARY	1
SECTION - 1: INTRODUCTION	18
1.1 Introduction.....	18
1.2 Purpose of Report	19
1.3 Need of Environmental Assessment	20
1.4 Identification of Project and Proponent	20
1.5 Details of Consultants.....	21
1.6 Nature, Size and Location of the Project	22
1.7 Approach Adopted to Conduct the Study.....	26
1.7.1 Review of Available Data.....	26
1.7.2 Delineation of Area of Project Influence or Study Area	26
1.8 Environmental Baseline Survey of the Project.....	27
1.8.1 Physical Environment.....	27
1.8.2 Ecological Environment	27
1.8.3 Social and Cultural Environment.....	27
1.8.4 Analysis of Data.....	27
1.8.5 Screening of Potential Environmental Impacts and Mitigation Measures.....	28
1.8.6 Public and Stakeholders Consultation	28
1.8.7 Preparation of Environmental Management Plan (EMP)	28
1.9 Structure of the Report	28
SECTION - 2: REGULATORY FRAMEWORK.....	29
2.1 Legal Status.....	29
2.2 Policy Framework.....	29
2.2.1 National Conservation Strategy (NCS)	29
2.2.2 National Environmental Policy, 2005	30
2.2.3 National Drinking Water Policy.....	30
2.2.4 National Sanitary Policy, September 2006.....	30
2.2.5 The Biodiversity Action Plan.....	31
2.3 Administrative and Statutory Framework	31
2.3.1 Sindh Environmental Protection Act, 2014.....	32
2.3.2 Sindh EPA (Review of IEE/EIA) Regulations, 2014	34
2.3.3 Sindh Environmental Quality Standards, (SEQS).....	35



2.4	Other Relevant Laws & Regulations	38
2.4.1	The Forest Act (Sindh Amendment) Act, 1994.....	38
2.4.2	The Sindh Wildlife Protection, Preservation, Conservation and Management Act, 2020	38
2.4.3	Hazardous Substance Rule, 2014	40
2.4.4	Self-Monitoring and Reporting by Industry Rules, 2014	40
2.4.5	Pakistan Penal Code, 1860	41
2.4.6	The Antiquities Act, 1975.....	41
2.4.7	The Sindh Cultural Heritage (Preservation) Act, 1994.....	41
2.4.8	The Land Acquisition Act, 1894.....	42
2.4.9	Civil Aviation Rules, 1994	42
2.4.10	Employment of Child Act, 1991	42
2.5	National Environmental Guidelines	42
2.5.1	Pakistan Environmental Assessment Procedures.....	42
2.6	International Environmental Guideline	46
2.6.1	World Bank Guidelines on Environment	46
2.6.2	IFC General EHS Guidelines	46
2.7	International Environmental Treaties	47
2.7.1	ILO Conventions	47
2.7.2	Climate Change & Ozone Layer.....	47
2.7.3	Waste & Pollution	48
2.7.4	Biodiversity & Protection of Plants and Animals	48
SECTION - 3:	PROJECT DESCRIPTION	49
3.1	Type and Category of Project	49
3.2	Objectives of the Project	49
3.3	Location and Site Layout	49
3.4	Master Plan for the Project.....	50
3.5	Key Features of Naval Anchorage Karachi (NAK)	51
3.6	Land Use Plan	51
3.7	Road Access.....	52
3.8	Vegetation Feature on Site	54
3.9	Water Requirement and Water Balance.....	54
3.10	Water Supply Pipe Diameter Calculation	54
3.11	Waste Water Disposal.....	55
3.12	Soft and Hard Landscaping	55



3.13	Communication	56
3.14	Security.....	56
3.15	Fire Protection.....	56
3.16	Medical Facilities.....	56
3.17	Cost and Magnitude of the Project.....	56
3.18	Construction Aspect.....	56
3.18.1	Construction Materials	56
3.18.2	Construction Camps	57
3.18.3	Work Force and Machinery	57
3.19	Restoration and Rehabilitation Plan - Construction Works.....	57
3.20	Schedule of Implementation.....	58
3.20.1	Project Pre-Construction	58
3.20.2	Development Phase.....	58
3.20.3	Project Operation Phase.....	58
3.21	Government Approvals	59
SECTION - 4:	ANALYSIS OF ALTERNATIVE	60
4.1	General	60
4.2	Possible Alternatives to the Project	60
4.2.1	Abandonment of the Project (No Project Alternative)	60
4.2.2	Changing the Scope (Reducing/Downsizing or Enhancing/Upsizing) of the Project	61
4.2.3	Shifting the Project to some other Location	62
4.3	Summary of the Alternative Consideration	62
4.4	Conclusion	63
SECTION - 5:	DESCRIPTION OF ENVIRONMENT	64
5.1	Introduction.....	64
5.2	Physical Resources.....	64
5.2.1	Topography	64
5.2.2	Geology	64
5.2.3	Seismology	65
5.2.4	Soil	65
5.2.5	Climate.....	66
5.2.6	Rainfall.....	67
5.2.7	Relative Humidity	67
5.2.8	Wind Speed and Direction	68

5.3	Water Resources.....	69
5.3.1	Surface water	69
5.3.2	Ground water	70
5.4	Solid Waste.....	72
5.5	Ambient Air Quality.....	72
5.6	Ecological Resources.....	74
5.6.1	Introduction	74
5.6.2	Methodology.....	75
5.6.3	Sample size and Vegetation Sampling.....	75
5.6.4	Data Analysis and Interpretations.....	76
5.6.5	IUCN Categories	76
5.6.6	Fauna Surveys.....	78
5.6.7	Data Analysis & Interpretations	78
5.6.8	Spoor Tracking.....	79
5.6.9	Scats Survey	79
5.6.10	Public Survey.....	79
5.6.11	Avifauna Assessment.....	80
5.6.12	Fish Assessment.....	80
5.6.13	Reptiles and amphibian Assessment.....	80
5.7	Flora Survey	80
5.8	Fauna Survey	84
5.9	Socio-Economic and Cultural Features.....	87
5.10	Methodology	87
5.11	Socio-Economic features	88
5.11.1	Demographic Characteristics.....	88
5.11.2	Livelihoods	89
5.11.3	Drinking water	90
5.11.4	Education and literacy	90
5.11.5	Health.....	91
5.11.6	Markets.....	91
5.11.7	Transportation.....	91
5.11.8	Role of Women.....	91
5.11.9	Industries.....	93
5.11.10	Indigenous People and Vulnerable Social Groups	93
5.12	Religious, Historical, Archaeological and Recreational Sites	93
5.12.1	Religious Sites.....	93



5.12.2	Historical and Archaeological Sites	93
5.12.3	Recreational Sites	93
5.13	Awareness Regarding the Proposed Project	93
5.14	Acceptability of the Proposed Project	94
5.14.1	Perceived Impacts of the Project during Construction Phase	95
5.14.2	Perceived Impacts of the Project during Operational Phase	95
5.14.3	Protective Measures Suggested by Respondents	95
SECTION - 6:	POTENTIAL ENVIRONMENTAL IMPACT AND MITIGATIONS.....	97
6.1	General	97
6.2	Approaches and Methodology	97
6.2.1	Checklist.....	98
6.2.2	Overlays	98
6.3	Characteristics of Impacts.....	99
6.4	Environmental Impacts and Their Mitigation During Pre-Construction Phase	101
6.4.1	Environmental Impacts Regarding Project Location	101
6.5	Environmental Impact and Their Mitigation During Construction Phase	101
6.5.1	Physical Impacts	101
6.5.2	Contamination of Surface and Groundwater Resources	102
6.5.3	Mitigation Measures of Impacts on Water Resources.....	103
6.5.4	Impact on Ambient air quality	103
6.5.5	Impact on Ambient Noise Levels & Vibration	104
6.5.6	Disposal of Construction Debris & Garbage	105
6.5.7	Traffic annoyance	106
6.6	Ecological Environment.....	106
6.6.1	Impact on Flora.....	106
6.6.2	Soil erosion and nutrients removal	107
6.6.3	Loss of wild plants and seed bank.....	108
6.7	Socio Economic Environment	108
6.7.1	Impact on Livelihood.....	108
6.7.2	Influx of Construction Workers	109
6.7.3	Heritage Structures	110
6.7.4	Protected Areas.....	110
6.7.5	Vulnerable Social Groups	110
6.7.6	Impacts on Local Population	110



6.7.7	Impacts on Public Health and Safety Hazard	111
6.7.8	Positive Impacts	112
6.8	Risk Assessment.....	113
6.9	Controls	114
6.10	Environmental Impacts and Mitigations Measures During the Project Operation.....	115
6.10.1	Ground Water Resource	115
6.10.2	Waste Water	116
6.10.3	Air Emissions	116
6.10.4	Solid Waste	117
6.10.5	Impact on Flora and Fauna	118
6.10.6	Security Issue.....	119
6.10.7	Traffic Impact	119
6.11	Potential Environmental Enhancement Measures	120
6.12	Positive Impacts of the Project	120
6.12.1	Provides Residential plots.....	120
6.12.2	Reduce Dependency on private schemes to provide housing	120
6.12.3	Provides Infrastructure	121
6.12.4	Reduce the housing problem in Karachi.....	121
6.12.5	Provide Employment Opportunities.....	121
6.12.6	Improve Living Standards and Strengthen the Economy.....	121
6.12.7	Study Limitations.....	121
SECTION - 7:	ENVIRONMENTAL MANAGEMENT PLAN	122
7.1	Environmental Management Plan	122
7.2	Structure of EMP	122
7.3	Regulatory Requirements and Applicable Standards.....	122
7.4	Matrix (MMM)	122
7.5	Institutional Arrangements for Implementation of EMP	133
7.6	Roles and Responsibilities	133
7.7	Construction Stage	133
7.8	Operation Stage	133
7.9	Environmental Monitoring Plan.....	133
7.9.1	Objectives.....	133
7.10	Monitoring Strategy	134
7.10.1	Activity Monitoring	134



7.10.2	Effects Monitoring	134
7.10.3	Ecological Environment	134
7.10.4	Socio-economic Environment	134
7.11	Schedule of Implementation of Environmental Monitoring During Construction and Operational Phase	137
7.12	Grievance Redress Mechanism (GRM)	138
7.13	Tree Plantation Plan	138
7.13.1	Traffic Management Plan	140
7.14	Material Transportation Plan (MTP)	140
7.15	Monitoring and Reporting	141
7.15.1	Naval Anchorage Karachi - NAK	141
7.15.2	Supervisory Consultant	141
7.15.3	Contractor	141
7.16	Equipment Maintenance Details	142
7.17	Training Programs	142
7.17.1	Objectives	142
7.17.2	Roles and Responsibilities	142
7.17.3	Training Log	142
7.18	Environmental Budget	143
7.18.1	Monitoring Cost	143
7.18.2	Wastewater Treatment Plant	144
7.18.3	Plantation Cost	144
SECTION - 8:	STAKEHOLDERS' CONSULTATION	145
8.1	General	145
8.2	Objectives of Consultation	145
8.3	Proponent's Environment Management Team	145
8.4	Responsible Authority	146
8.5	Environmental Practitioner and Expert	146
8.6	Identification of Main Stakeholders (Including other department and Agencies)	146
8.7	Consultation Meetings and Formal & Informal Group Discussions (Including Affected and Wider Community)	147
8.8	Concerns/Suggestions of the Stakeholders	147
8.9	Mitigation Measures Proposed by EIA Consultants for Addressing the Stakeholder's Concerns	148

SECTION - 9:	CONCLUSIONS AND RECOMMENDATIONS	150
9.1	Conclusion	150
9.2	Recommendations.....	151
9.3	Recommendation	152



Annexures

ANNEXURE – 1: MASTER PLAN NAK	154
ANNEXURE – 2: BASE LINE ENVIRONMENTAL MONITORING.....	156
ANNEXURE – 3: IMPACT MATRIX	157
ANNEXURE – 4: SCREENING CHECK LIST	161
ANNEXURE – 5: LAND OWNERSHIP DOCUMENT	166
ANNEXURE – 6: SOCIO-ECONOMIC SURVEY PROFORMA.....	167
ANNEXURE - 7: SITE PICTURES.....	172

List of Table

Table 1-1, EIA Team	22
Table 2-1, Sindh Environmental Quality Standard for Ambient Air	36
Table 2-2, The Motor Vehicle Noise	36
Table 2-3, Sindh Environmental Quality Standard for Noise	37
Table 2-4, Sindh Environmental Quality Standard for Municipal & Liquid Industrial Effluents	37
Table 3-1, Key Features of Naval Anchorage Karachi - NAK	51
Table 3-2, Schedule of Commercial Plots-NAK	51
Table 3-3, Schedule of Residential Plots-NAK	51
Table 3-4, Summarized Land Use of Proposed NAK	52
Table 5-1, Results of Drinking Water Analysis	70
Table 5-2, Results of Drinking Water Analysis	71
Table 5-3, Results of Ambient Air Quality and Noise Level Monitoring	73
Table 5-4, Core Project team	75
Table 5-5, The DAFOR Scale	76
Table 5-6, Tree Diversity	81
Table 5-7, Shrubs Diversity	81
Table 5-8, Herbs Diversity	82
Table 5-9, Grasses Diversity	82
Table 5-10, Fauna of Naval Anchorage Site	85
Table 5-11, Recommended Plants for Project Sites To Enhance The Vegetation Cover	87
Table 5-12, No. of School and Universities in the project Area	90
Table 5-13, Participation of Human Activity and Decision Making	92
Table 5-14, Socioeconomic Features of the Proposed Project Area	92
Table 5-15, Awareness About the Project	93
Table 5-16, Acceptability of the Proposed Project	94
Table 5-17, Protective Measures Suggested by Respondents	95
Table 6-1, Impact Characterization	99
Table 6-2, Severity of Risk during construction of NAK	113
Table 6-3, Risk assessment during construction of NAK	113



Table 7-1,	Mitigation management matrix	124
Table 7-2,	Recommended Activity Monitoring Protocol for Physical, Ecological and Social Environment	135
Table 7-3:	Recommended Effects Monitoring Protocol	136
Table 7-4,	Monitoring Schedule of Implementation During Construction Phase...	137
Table 7-5,	Schedule of monitoring during the operational phase	138
Table 7-6,	Annual Monitoring Cost during Construction Stage per Year.....	143
Table 7-7,	Annual Monitoring Cost during Operational Stage per Year.....	144
Table 8-1,	Views of Major Stakeholders	146



List of Figures

Figure 1-1, Location Plan of NAK.....	19
Figure 1-2, Site Location.....	24
Figure 1-3, Site Location Close View.....	25
Figure 2-1, EIA Review and Approval Procedure (Source: EIA Study Team)	45
Figure 3-1, Location Map for Naval Anchorage Karachi	50
Figure 3-2, Road Access to the Site	53
Figure 3-3, NAK Layout Plan	59
Figure 4-1, Design Alternatives	61
Figure 5-1, Seismic Zone of Pakistan (Geological Survey of Pakistan)	65
Figure 5-2, Mean Maximum & Minimum Temperature (Data Source: Metoblue)	66
Figure 5-3, Annual Rainfall Pattern (Data Source: Metoblue)	67
Figure 5-4, Annual Humidity Pattern (Data Source: Metoblue)	68
Figure 5-5, Annual Wind Speed (Data Source: Metoblue)	69
Figure 5-6, Annual Wind Direction Pattern (Data Source: Metoblue).....	69
Figure 5-7, Pictorial Profile of Baseline Investigations and Observations	72
Figure 5-8, Pictorial Profile of Baseline Investigations and Observations	74
Figure 5-9, Vegetation Sampling	76
Figure 5-10, SPOOR TRACKING	79
Figure 5-11, Scats Survey.....	79
Figure 5-12, Floral Families Diversity of Project site	81
Figure 5-13, Diversity of Floral Species of Naval Anchorage Site.....	84
Figure 5-14, Diversity of Fauna at Project site.....	86
Figure 5-15, Awareness About the Project	94
Figure 5-16, Acceptability of the Project.....	94
Figure 6-1, Septic tank.....	103



Preamble

This document encompasses; Environmental Impact Assessment Report of the Establishment of Naval Anchorage, Karachi for its submission to Sindh Environment Protection Agency; an obligatory requirement prior to commencement of works.



List of Abbreviations

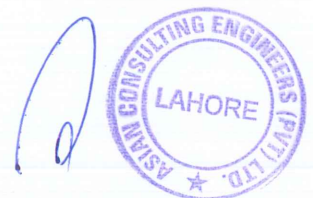
ASTM	American Standard Test Method
CC	Construction Contractor
CETP	Combined Effluent Treatment Plant
EPD	Environmental Protection Department
GDP	Gross Domestic Product
GIS	Global Information System
GoS	Government of Sindh
GoP	Government of Pakistan
HDPE	High Density Poly Ethylene
Km / KM	Kilometer
L/s or l/s	Liters per second
LDA	Lahore Development Authority
LPD	Liters per day
m	Meter
MGD	Million Gallons per Day
MGL	Million Liters per Day
NEQS	National Environmental Quality Standards
NRM	National Reference Manual
PAP's	Project Affected Persons
PEPA	Pakistan Environmental Protection Agency
PEPC	Pakistan Environmental Protection Council
PMD	Pakistan Meteorological Department
PSI	Pakistan Standards Institute
Rs. or PkRs.	Pakistan Rupee
SOP	Survey of Pakistan
TOR	Terms of Reference
UNEP	The United Nations Environment Programme
WHO	World Health Organization



Reference

1. Project (NAK) Feasibility Report.
2. Rainfall and Other Data from Pakistan Metrological Department, Regional Office Karachi
3. Topographic Surveys
4. Master Plan of NAK
5. Sindh-EPA Guidelines



EXECUTIVE SUMMARY

ES-1. Introduction

Housing is an important and productive sector of the economy and a fundamental human need. Pakistan is currently facing severe deficit of housing units nearly an overall housing backlog of 11-12 million housing units. Rapid population growth, overcrowding, shortage of supply, aging housing stock, development of slums & katchi abadis and lack of financial resources has further aggravated the situation.

Naval Anchorage Karachi is striving hard to decrease this housing deficit and to provide modern and sustainable housing facilities in all major cities of Pakistan. The project is established to make a positive contribution towards the provision of a healthy, and quality living neighbourhood. The NAK vision encompasses a living standard with the highest standards of smart technological innovations without detaching from nature. The ruling principles are based solely on natural harmony, a Zero Emission Environment (ZEE), and a sustainable and resilient energy consumption scale.

ES-2. Purpose of Report

The purpose of the Environmental Impact Assessment (EIA) study is to identify the possible beneficial and adverse environmental impacts of the project as presently envisaged and propose the applicable mitigation measures to be implemented during the construction and operational stages of the project in order to minimize the negative impacts and preparation of Environmental Management Plan (EMP) to obtain No Objection Certificate (NOC) from Sindh-EPA.

This EIA report has been prepared keeping in view the following regulations and guidelines:

- Sindh Environmental Protection Act (SEPA), 2014
- Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021
- Guidelines for Preparation and Review of Environmental Reports

It is proponent's best effort to prepare and provide the EIA Report which fulfils the requirements of the Guidelines for Preparation and Review of Environmental Reports by EPA, but the report cannot be termed as an 'Ideal one, practically, the report may fall short of the said status of 'ideal'; the Guidelines duly take care of the ground realities.

ES-3. Need of Environmental Assessment

The EIA report has been prepared in compliance with the mandatory requirements of Section 17 of Sindh Environmental Protection Act, 2014, which

states that "No proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment and has obtained from Agency approval in respect thereof". Sindh Environmental Protection Agency, thereafter; SEPA shall review the IEE & EIA and accord approval subject to such terms and conditions as it may prescribe or require.

Sindh Environmental Protection Act 2014 & SEPA Review of IEE/EIA Regulations 2021 define Schedule (I& II) of project falling under the requirement of EIA or IEE. This EIA study has, for environmental classification of the project into Schedule I, II or III, taken account of requirement of the SEPA (review of EIA/IEE) Regulations 2021.

The current project falls in Schedule III of the Sindh EPA (Review of EIA/IEE) Regulations 2021 Category III (1): "Housing schemes above 50 acres". This category of projects requires EIA report including a detailed Environmental Management Plan (EMP). incorporates the setup of mid-rise to high-rise building apartments and residential plots with all basic amenities.

ES-4. Identification of Project and Proponent

The proposed Project consists of the development of NAK with project and proponent detail is given as under:-

Name of proponent (Focal Person)	Mr. , Chief Operating Officer, Naval Anchorage Karachi (NAK) OXXXX XXXX
2. Name of project	Development of Naval Anchorage Karachi, Pakistan
3. Location/ Address of the site	Nooriabad, District Jamshoro, Sindh along Karachi-Hyderabad Motorway (M-9). The coordinates of the project site area 25° 6'45.45"N 67°39'12.27"E E. Proposed project is located along M9 Motorway, almost 5km away from Exit 6 and 19km away from Exit-5 of M9 Motorway.
4. Zone Type	Housing Scheme
5. Major process during construction	Excavations, Concrete, asphalt, course, Mixing, Elevation, Finishing
6. Estimated cost of project	PKR 14 Billion
7. Total area of the project	704.69 Acres
8. Electricity Capacity	The predicted total electrical load 76.84 MW

	including 01 Nos 132/11 kV Grid Station
9. Project start	1 month after getting NOC from all relevant departments
11. Project development duration	02 Years

ES-4.1 Details of Consultants

ASIAN Consulting Engineers Private Limited (AsCE) is providing their services to conduct Environmental Impact Assessment for the project. Firm has vast experience and expertise in this field.

The contact details of Asian Consulting Engineers Private Limited are given as under:-

Engr. Arslan Hanif

Tel: +92 42 35450914-5 | Fax: +92 42 35450916 | Mobile: +92 321 4260133

E-mail: arslan@asiancon.com

Address: C-3, Jhelum Block, Green Forts-II | Lahore | Pakistan

ES-4.2 Project Description

The objective of the project is to provide modern and sustainable housings with all amenities in the city. Karachi is facing an acute shortage of housing, and the proposed project will improve the housing situation considerably.

The development of the Project has been proposed on a piece of land measuring 704.69 acres. There will be 3,820 residential plots and 114 commercial plots. For the housing scheme, the essential infrastructure works include Roads, storm drainage system, water supply, sanitary sewerage system, solid waste management system, electrification, streetlights, security, sui gas (natural gas) works, and soft and hard landscaping, parks, playground, and other facilities will also be provided. The schedule for completion of the project is 24 months. The total development cost of the project is about approximately PKR 14 billion.

The detail master plan for Project Naval Anchorage Karachi is given in Annexure-1 of the report.

Following table presents the features of the proposed project:

Sr. No.	Land Use	%Age	Area In Acres
1	Residential/Apartments	53.20	374.92
2	Commercial	03.00	21.15
3	Amenities	10.16	71.61
4	Roads / Parking	33.64	237.01
	Total	100.00	704.69





ES-4.3 Analysis of Alternatives

No Project Option: If we consider no project option, then we will lose all positive impacts that will be caused due to the project, like providing residential plots to all income groups, and loss of potential employment and business opportunity. The "No Project Option" does not appear reasonable given the above facts. However, the expected negative impacts can be minimized by adopting appropriate mitigation measures.

Changing the Scope: The scope-changing option may also entail changing the architectural features and layout design of the facilities to be provided under the scheme. As per the existing scope, the scheme comprises 3,820 housing residential plots along with a host of support facilities and infrastructure.

Shifting the Project: The third alternative option could be relocating and shifting the project to some other site. However, the objective rationale for this option was found lacking on two counts. Firstly, it may be very difficult if not impossible to find a large and compact piece of land of suitable dimensions for constructing a housing project, as is the present one, near the city of Larkana. Secondly, despite relocating the project, the pertinent environmental impacts on the air, water, soil, and socioeconomic environment would remain almost similar as would be at the present site.

Based on the objective analysis, and views and opinions of the stakeholders, as detailed above, none of the alternative options, as discussed above, is feasible. Furthermore, the net socio-environmental impacts of the project, as thrashed out in this EIA study are positive, which favors the construction of the project at the proposed site.

ES-5. Description of Environment

In order to work out the impacts and related mitigation measures, it is most important to prepare a data base of Study Areas well as Project Area. Detail is given as below:

ES-5.1 Physical environment

Topography: The topography within 6 kilometres of the project area contains only modest variations in elevation, with a maximum elevation change of 1250 feet and min elevation above sea level of 750 feet.

Geology: Geologically, Jamshoro is formed of volcanic and sedimentary rocks of quaternary and tertiary sediments and has the same composition as that of the Indus plain and the eastern desert zone of Pakistan containing the deserts of Cholistan, Nara and Thar. The soils are silty clayey wet and saline. The natural vegetation found in the district can be divided into two categories mangroves in the coastal or delta zone, and tropical thorns in the rest of the district.



Soil: The soils are silt, clayey wet and saline.

Seismology: The Seismic Zoning Map of Pakistan places district Jamshoro in Zone 2A and 2B where it represents peak horizontal ground acceleration from 1.6 to 0.8.

Climate: According to the average results of 2014 to 2022, the climate of the district is moderate. The mean maximum and minimum temperature recorded about 39°C and 11°C respectively. The sea breeze blows for eight months of the year, from March to October, making the hot weather comparatively cool. As a result, there is an immediate fall in temperature. January is the coldest month.

In Jamshoro, the summers are sweltering, muggy, arid, and windy; the winters are short, comfortable, and dry; and it is mostly clear year-round. Over the course of the year, the temperature typically varies from 11°C to 39°C and is rarely below 8°C or above 42°C. The hot season lasts for 3.0 months, from April 3 to July 5, with an average daily high temperature above 36°C. The hottest day of the year is May 10, with an average high of 39°C and low of 26°C.

Surface Water: Surface The project area lacks any prominent surface water source in proximity, and people depend upon the rainfall for raising livestock and millet crops. Locals have to walk miles every day to access clean, safe water for drinking, cooking, washing or bathing. Meanwhile for high requirement, they are dependent on water tanker.

Ground Water: Available quantity is extremely limited and grossly insignificant, in comparison with the ultimate potable water requirements of the Project.

Measured total dissolved solids (TDS) vary from 924 to 2021 mg/l, against an acceptable limit of 1000 mg/l, rendering the groundwater slightly brackish.

Solid Waste: Solid waste disposal is the key problem being faced by nearby population. There is no proper landfill present in the area. No proper collection and disposal system exist in the area. The people disposed as open dumping in open grounds or whatever space they found

Ambient Air Quality: At present, major sources of air pollution are mobile sources and nearby industries. Ambient air quality was monitored for the purpose of this study at 03 different locations. All vales of ambient air quality are in compliance with SEQS.

Noise Level: Major sources of noise generation are operations due to vehicular traffic & neighbouring industrial activities. The results show that the noise levels are in compliance with SEQS.

ES-5.2 Ecological

Flora: The existing flora consists of trees like Keekar (*Vachellia nilotica*), Tahli (*Erythrophleum Suaveolens*), Phulai (*Senegalia Modesta*) etc... There is no forest and endangered species of flora found at project site





Fauna: Fauna included mammals like dogs, cats, house rats, bats, horses, donkeys, mules, buffaloes, cows, goats, sheep etc. Reptiles like snakes, lizards, Varanis (Goh/large lizard), spiders and scorpions, etc. Amphibians like common frog and common toad and birds like House sparrow (Passer domesticus), House crow (Corvus splendens), Mynah (Acridotheres tristis), Cheel, Fakhta, Bagle, In addition to these birds Bulbul (Pycnonotus cafer), parrots (Psittacula krameri), pigeons (Columba livia), murghabi, surkhab, ullu etc.

ES-5.3 Socio-economic

Socio-economic environment of the project area was studied in detail for developing the baseline information about the affected people of the project.

Socio-economic survey of the settlements around the project area was carried out by team of experts including the local experts of the area. The respondents were selected by using the Random Sampling technique and data was collected through questionnaires. Socio-economic features of project area that mainly focus on demography, occupation, education, poverty level, housing, family income, basic amenities, land use, resettlement concerns, archaeology and mosques are presented in socio-economic chapter.



ES-5.4 Impacts and Mitigation Measures

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance	Mitigations
Project Pre Construction								
Land Acquisition and Resettlement	Direct	Medium term	Local	Reversible	Unlikely	Minor	Low	Almost all the land is already under the control of NAK. So, there will be no impact due to land acquisition and resettlement.
Construction Phase								
Soil Contamination and Erosion (Construction Phase)	Direct	Short Term	Local	Reversible	Likely	Minor	Low	Good engineering practices should be adopted by Contractors, which will help to control soil erosion at the construction sites. Soil contamination can be curtailed by reducing the oil spill from generator and other machinery at project construction areas, proper solid waste management. The Contractor is required to impart proper training to his workforce in the storage and handling of obnoxious materials, like oil, diesel and petrol that can potentially cause soil contamination. Proper drainage facility will be provided to avoid the water accumulation, which will

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance	Mitigations
Surface Water Contamination (Construction Phase)	Indirect	Medium Term	Regional	Irreversible	Possibly	Moderate	Major	minimize the soil contamination. Septic tank and artificial drainage pipe should be developed and attached to natural drainage. The Contractor should instruct its staff not to throw any of the waste and the other scarified/scrapped materials directly into the canal or flood nullahs passing from the project area in order to avoid contamination. Construction camps should be established in areas with adequate natural drainage channels in order to facilitate flow of the effluents. Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency Response Procedures in case of any spill hazard.
Ground Water Contamination (Construction Phase)	Direct	Medium Term	Regional	Irreversible	Unlikely	Moderate	Medium	Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM10. Water Sprinkling on roads
Air Quality Deterioration (Construction Phase)	Direct	Short term	Local	Reversible	likely	Minor	Medium	

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance	Mitigations
								Equipment and vehicles should be well maintained to minimize particulate emissions. Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin
Noise (Construction Phase)	Direct	Short term	Local	Reversible	likely	Minor	Medium	Use of silencers Mufflers and proper tuning of vehicles to control noise Movements of the trucks and other construction machinery causing high noise levels must be restricted at night time
Waste Material (Construction Phase)	Direct and Indirect	Medium	Regional	Irreversible	Likely	Moderate	Medium	A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site. The construction waste will be disposed on approved landfill

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance	Mitigations
								site from Sindh EPA The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping. Arrangements should be made for regular garbage collection and removal of sewage from the construction site
Traffic Annoyance (Construction Phase)	Direct	Short Term	Regional	Irreversible	Likely	Moderate	Medium	During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time because at night time the traffic flow is very low in the project area.
Loss and Damage of Natural Vegetation (Construction Phase)	Direct	Medium Term	Regional	Irreversible	Likely	Moderate	High	About 10,000 trees will be planted at all the available open spaces in the project area or with consultation of Sindh Environmental Protection Agency (SEPA)
Disturbance to Fauna (Construction Phase)	Indirect	Medium Term	Local	Reversible	Possibly	Moderate	Medium	The 10,000 trees planted will welcome the local avifauna and other associated animals for nesting and shelter.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance	Mitigations
Loss of Livelihood (Construction Phase)	Direct	Medium-term	Local	Reversible	likely	Moderate	High	Capacity building and rehabilitation plans to be implanted for the betterment of Project Affected Persons (PAPs) Project Affected Persons (PAPs) should be given preference for direct and indirect employment opportunities especially in the project Skill development and training programs in the field of agriculture farming, livestock and mechanical equipment to be organized in the area
Issues to Local Population (Construction Phase)	Direct	Medium	Local	Reversible	Possibly	Moderate	Medium	Contractor should select specific timings for heavy machinery operation so as to cause least disturbance to the population considering their peak movement hours. Effective construction controls may be made by the Contractor to avoid inconvenience to the population due to noise, smoke and fugitive dust. Haul-trucks carrying concrete aggregate and sand fill

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance	Mitigations
								materials will be kept covered with tarpaulin. The heavy vehicles should not play loud music and horns during transporting material at night time The Contractor should warn the workers not to involve in any theft activities
Labor HSE Issues (Construction Phase)	Direct	Medium	Local	Reversible	Possibly	Minor	Low	Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62 will be ensured by the Contractor. Health safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance	Mitigations
Operational Phase								
Ground Water Level Reduction-Operational Phase	Direct	Long Term	Local	Reversible	Unlikely	Moderate	Medium	Rainwater harvesting should be done on the roof top of the commercial buildings. NAK will ensure plan for commercial centers integrated with rainwater harvesting system. The water conservation will also be adopted in Commercial Centers. NAK will install secondary waste water treatment plant and discharge treated water with in SEQs. The treated Wastewater can be used for firefighting and landscaping purposes, so the total fresh water requirement during the operational phase will be reduce.
Noise	Indirect	Long Term	Local	Irreversible	Possibly	Moderate	High	Commercial Centers should adopt compartmentalization technique to contain operations like use of generator et... Regular Monitoring should be conducted as per provisional legislative framework of

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance	Mitigations
Solid Waste Disposal - Operational Phase	Direct	Medium Term	Local	Reversible	Possibly	Moderate	Medium	environment. Regular monitoring on all sources should be done and measures will be taken if found non-compliance with SEQs. To mitigate the noise impact in commercial areas, the generator will be put in a separate generator room with sound proofing and it will be compulsory to use PPEs in case of inspection and any other activity in generator room. The Commercial Centers should have operational phase NOC from Sindh EPA and proper solid waste management mechanism before commencement of operations. NAK will also check the solid waste management plan for Commercial Centers and give approval accordingly The waste containers will be placed at suitable places along houses, shopping centers and large waste bins



Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance	Mitigations
								will be placed at open areas, parking area and staff office locations. The waste management contractor will be hired by the NAK whose responsibility is to look after the cleanliness in zone. The waste will be collected from the containers placed by the workers of waste management team. Waste Management team will transfer the waste at the designated area/secondary collection point from where the waste contractor will pick the waste and dispose in the Sindh EPA approved landfill site.



ES-6. Environmental Management Plan (EMP)

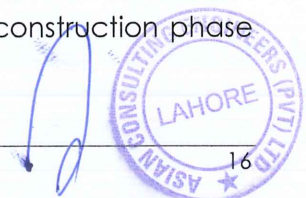
A comprehensive, Environmental Management Plan (EMP) has been developed for the Project. An environmental Mitigation Management Matrix (MMM) has been prepared considering impacts on different components of physical, ecological and socio-cultural environment. In addition, a comprehensive monitoring program has been proposed. The EMP include Review of regulatory requirements and applicable standards, MMM Institutional Arrangements for Implementation of EMP, Roles and Responsibilities of different agencies, Environmental Monitoring Plan, Grievance Redress Mechanism, Training Program and Environmental Management and Monitoring Cost.

ES-7. Conclusion

Based on the overall impact assessment, more specifically, the nature and magnitude of the residual environmental impacts identified during the present EIA, it is concluded that the Naval Anchorage Karachi is likely to cause environmental impacts mainly during its construction phase. However, these impacts can be mitigated provided the proposed activities are carried out as mentioned in the report, and the mitigation measures included in this report are completely and effectively implemented.

The EIA has made the following recommendations:

- The proponent should develop and implement an Integrated Solid Waste Management Plan for the proposed project.
- The proponent should implement the Plantation Plan as described in the EIA Report.
- Furthermore, the proponent should dedicate one of the open spaces to the development of Miyawaki Forest.
- The proponent should implement an Integrated Solid Waste Management Plan, which should include;
 - Collection of solid waste from residential buildings.
 - Segregation of solid waste into recyclable, biodegradable and non-biodegradable wastes. The recyclable wastes will be given away to recycling contractors; the biodegradable waste will be composted at the site to produce green manure, and the remaining waste will be transported to the waste disposal site.
- The implementation of the Environmental Monitoring Plan should be ensured by the contractor and proponent during the construction phase.
- Recruitment of Environmental Manager for the construction phase of the Project.





There are no remaining issues that warrant further investigation. This EIA is considered adequate for the environmental and social justification of the project.



SECTION - 1: INTRODUCTION

1.1 Introduction

Urban centers are now considered as engines of economic growth and there is a growing realization the world over, that appropriate investment in urban infrastructure and services accelerates economic development in the surrounding region. The economic interdependence between semi-urban economy and rural consumers; and rural producers and urban markets, has often been stronger in secondary cities. This underlines their important potential role in economic development of the region.

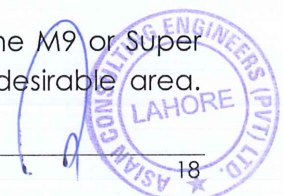
Housing is a basic and fundamental human need, yet millions are caught in the struggle to have a roof over their head in Pakistan. Realizing the gravity of the problem and appreciating the fact, that housing is not only a social need but also a productive sector of the economy.

Since the adoption of the "Universal Declaration of Human Rights" and its subsequent reaffirmation at the 1996 UN Habitat Conference, "Adequate Shelter for All" has been recognized as a basic human need. All Governments have a responsibility to take appropriate action in order to promote the protection and ensure the proper realization of the provision of adequate housing for its citizens. The housing situation in Pakistan has continuously deteriorated over the past many years and most of the policies announced were not implemented.

Realizing the fact that Housing is one of the major pillars of the macro-economy and that there is continuous degradation of housing quality and an ever-increasing shortfall in housing stock, the Government decided to review various measures and policies formulated in the past in order to come up with such policy measures which are pragmatic and implementable. The emphasis of the Government would be to focus on the fundamental requirements of creating a favorable and conducive environment in the country and to promote and facilitate this sector where the role of the Government would change from provider to facilitator. Government resolves to evolve, implement and support such measures that would ensure adequate housing for all its citizens through proper planning and management, incentives, and motivations. Special emphasis has been given to provisions of microfinance to low-income communities through such housing schemes

The proposed project involves Construction/Establishment of Naval Anchorage Karachi (NAK) which is an urban housing project in the district Jamshoro, Sindh along Karachi-Hyderabad Motorway (M-9). The proponent of this project is "Pakistan Navy".

On the Karachi to Hyderabad Motorway, often known as the M9 or Super Highway, Naval Anchorage, Karachi, is situated in a very desirable area.





Bahria Karachi 2 is directly across the street from Site.

Karachi Naval Anchorage The position is around 58 kilometres from the Super Highway Toll Plaza, 67 kilometres from Karachi's Jinnah International Airport, and 20 kilometres from Nooriabad if we approach it from the Hyderabad side. Two interchanges, Exist-5 (within 19 km) and Exist-6, are used to access the location (within 5 km).

The location plan is included hereunder in **Figure 1-1**.

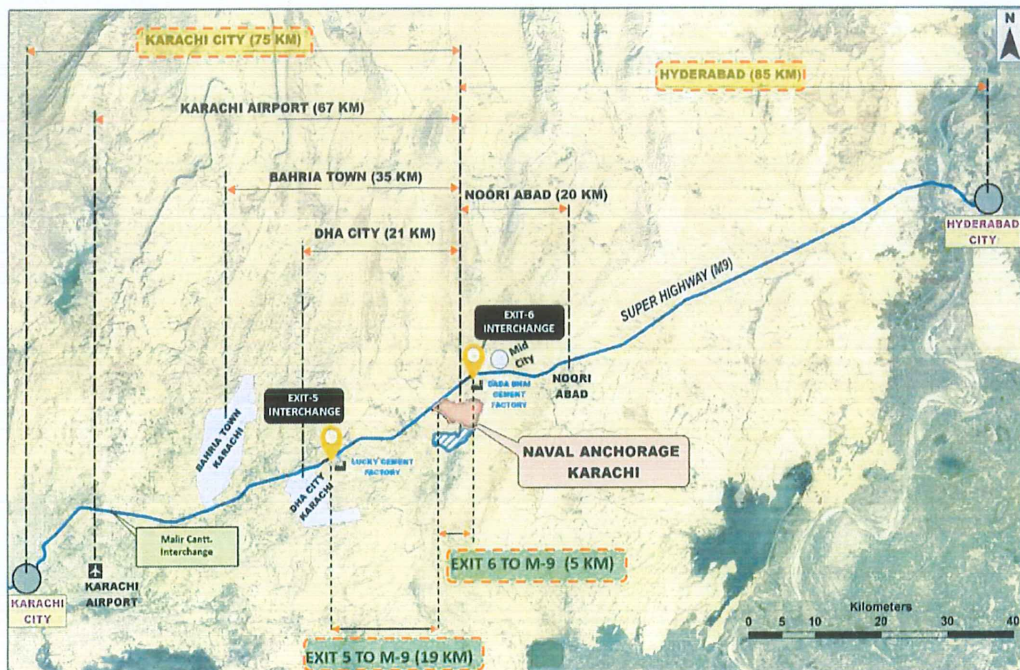


Figure 1-1, Location Plan of NAK

1.2 Purpose of Report

The purpose of the Environmental Impact Assessment study is to identify the possible beneficial and adverse environmental impacts of the project as presently envisaged and propose the applicable mitigation measures to be implemented during the construction and operational stages of the project in order to minimize the negative impacts and preparation of Environmental Management Plan (EMP) to obtain No Objection Certificate (NOC) from EPA

This EIA report has been prepared keeping in view the following regulations and guidelines:

- Sindh Environmental Protection Act (SEPA), 2014
- Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021
- Guidelines for Preparation and Review of Environmental Reports





It is proponent's best effort to prepare and provide the EIA Report which fulfils the requirements of the Guidelines for Preparation and Review of Environmental Reports by EPA, but the report cannot be termed as an 'Ideal one, practically, the report may fall short of the said status of 'ideal'; the Guidelines duly take care of the ground realities.

1.3 Need of Environmental Assessment

The apex Pakistani law governing the subject of the environment is the Pakistan Environmental Protection Act – 1997 (PEPA-97). Under Section 12 of the Act, the proponents of the projects must execute the IEE and/or EIA (where warranted) and get approval from a federal agency (i.e., Pak-EPA). This function has been delegated under Section 26 to provincial EPAs.

After the 18th amendment to the constitution of Pakistan, the environment became a provincial subject, and the environmental law governing the establishment of Naval Anchorage Karachi is now the Sindh Environmental Protection Act, 2014. In terms of its contents, the provincial act is the same as the national act. Under section 17 of the Act, the proponents of the project must execute the Initial Environmental Examination (IEE) and/ or EIA, where warranted and get approval from the concerned Environmental Protection Agency (EPA), which is Sindh - EPA for this project.

The EIA report has been prepared in compliance with the mandatory requirements of Section 17 of Sindh Environmental Protection Act, 2014, which states that "No proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment and has obtained from Agency approval in respect thereof". Sindh Environmental Protection Agency, thereafter; SEPA shall review the IEE & EIA and accord approval subject to such terms and conditions as it may prescribe or require.

The current project falls in Schedule III of the Sindh EPA (Review of EIA/IEE) Regulations 2021 Category III (1): "**Housing schemes above 50 acres**". This category of projects requires EIA report including a detailed Environmental Management Plan (EMP). incorporates the setup of mid-rise to high-rise building apartments and residential plots with all basic amenities.

1.4 Identification of Project and Proponent

The proposed Project consists of the development of Naval Anchorage Karachi (NAK) with project and proponent detail is given as under:-

Name of proponent (Focal Person)	Mr. , Chief Operating Officer, Naval Anchorage Karachi (NAK) XXXXX XXXX.com
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2. Name of project	Development of Naval Anchorage Karachi, Pakistan
3. Location/ Address of the site	Nooriabad, District Jamshoro, Sindh along Karachi-Hyderabad Motorway (M-9). The coordinates of the project site area 25° 6'45.45"N 67°39'12.27"E E. Proposed project is located along M9 Motorway, almost 5km away from Exit 6 and 19km away from Exit-5 of M9 Motorway.
4. Zone Type	Housing Scheme
5. Major process during construction	Excavations, Concrete, asphalt, course, Mixing, Elevation, Finishing
6. Estimated cost of project	PKR 14 Billion
7. Total area of the project	704.69 Acres
8. Electricity Capacity	The predicted total electrical load 76.84 MW including 01 Nos 132/11 kV Grid Station
9. Project start	1 month after getting NOC from all relevant departments
11. Project development duration	02 Years

1.5 Details of Consultants

ASIAN Consulting Engineers (ACE) is providing their services to conduct environmental assessment for the project. ASIAN Consulting Engineers is an independent consulting company working in the field of water and environment. Asian provides consulting services and sustainable solutions for infrastructure projects, industrial projects and social development projects.

The contact details for the company are given as under:-

Asian Consulting Engineers

Tel: +92 42 35450914-5 | **Fax:** +92 42 35450916 | **Mobile:** +92 3214260133

E-mail: arslan@asiancon.com

Address: C-3, Jhelum Block, Green Forts-II | Lahore | Pakistan

The junior staff consists of data enumerators, environmentalist and sociologist have been hired for the project although the key persons involved in the study is given in.





Table 1-1, EIA Team

Sr. No.	Team Member	Position Held	Qualifications
1	Aleem Butt	Chief Environmentalist Team Leader- EIA	M.Phil. Environmental Sciences, Government College University (GCU), Lahore M.Sc. Environmental Sciences, Punjab University (PU), Lahore NEBOSH, Lead Auditor
2	Noman Ashraf	Environmental Specialist	M.Phil. Environmental Sciences, Government College University (GCU), Lahore PGD, Environmental Law University of the Punjab, Lahore
3	Nimra Nawaz	Environmental Specialist	M.Phil. Environmental Sciences, University of Engineering and Technology (UET) Lahore
4	Ayesha Rasheed	Environmentalist	M.Phil Environmental Sciences, Government College University (GCU), Lahore
5	Sajjad Hussain	Chief Chemist	M.Phil. Chemistry Government College University (GCU), Lahore
6	Hafsa Mehmood	Environmentalist	BS Hons Environmental Sciences, Government College University (GCU), Lahore PGD, Environmental Law University of the Punjab, Lahore
7	Engr. Umair Tallat	Deputy Manager Field Operations	M.S. Environmental Engineering, NUST, Islamabad
8	Asma Butt	Sociologist	M.Sc. Sociology, University of the Punjab, Lahore
9	Muhammad Abbas	Monitoring Officer	M.S. Environmental Sciences, Punjab University (PU), Lahore
10	Hammas Sohail	Monitoring Officer	BS. Environmental Sciences, University of Gujrat, Gujrat

1.6 Nature, Size and Location of the Project

Naval Anchorage Karachi (NAK), is an urban housing project envisioned by "Pakistan Navy. The project is established to make a positive contribution towards the provision of a healthy, and quality living neighbourhood. The NAK vision encompasses a living standard with the highest standards of smart technological innovations without detaching from nature. The ruling principles are based solely on natural harmony, a Zero Emission Environment (ZEE), and



a sustainable and resilient energy consumption scale. The development works envisage provisioning of the following facilities:

- Construction of road network.
- Provision of Sewerage System
- Provision of Water Supplies
- Construction of Religious Facility (Mosque)
- Provision of Drainage Land.
- Construction of Disposal Station
- Provision of Fire Fighting System
- Provision of Green area
- Construction of Sports Facilities

The NAK aims to provide all the Life essentials listed below.



The site location map of the project is given in **Figure 1-1** and close view of same is presented in **Figure 1-2**.

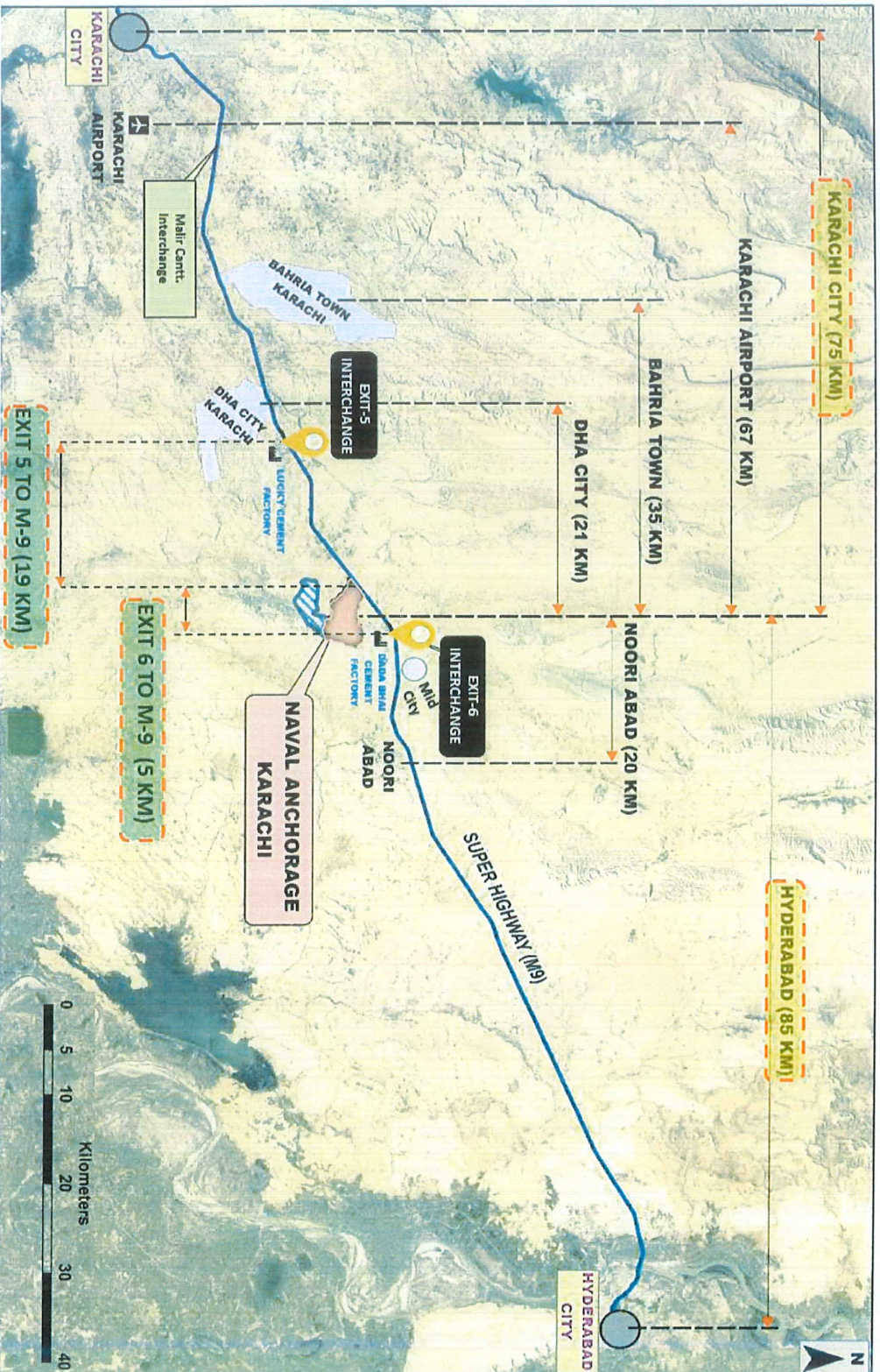


Figure 1-2, Site Location

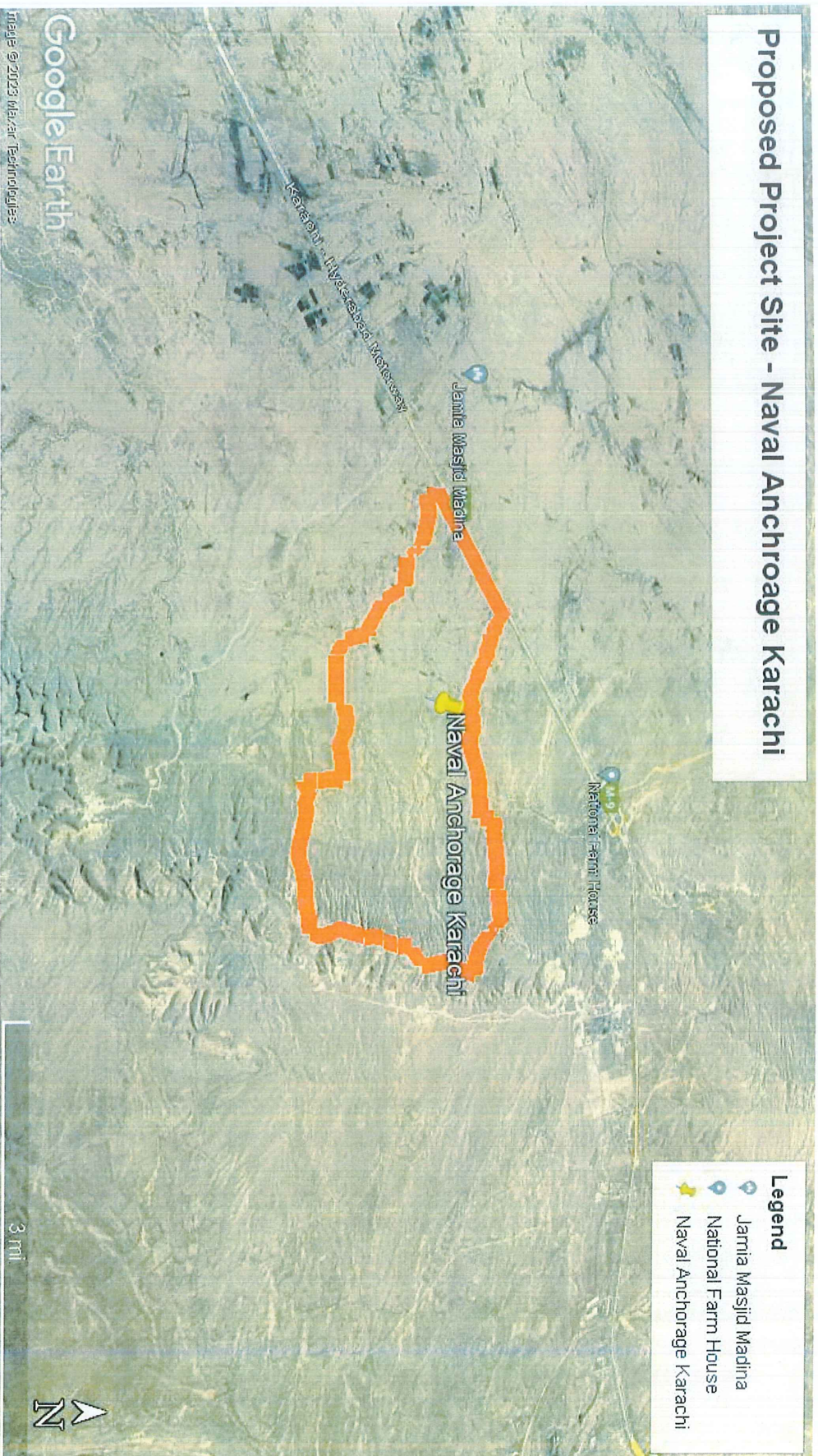


Figure 1-3, Site Location Close View

1.7 Approach Adopted to Conduct the Study

Following approach and methodology has been adopted for conducting the EIA studies:

1.7.1 Review of Available Data

A detailed review of the following available documents of the project was conducted:

- Desk Studies
- Preliminary Design Report
- Feasibility Study
- Layout Plans
- Master Plan

The basic objective of the review was to fully understand the Project and the extent of the developmental activities. The review of studies helped to assess the nature and extent of the impacts related to the implementation and operation of the proposed project activities.

1.7.2 Delineation of Area of Project Influence or Study Area

Before proceeding to the environmental analysis of the project, it is imperative to delineate the area of project influence. Despite the fact that major construction activities of the project will remain confined within acquired area of the NAK, there are some areas where construction-related activities may extend further. These will include areas required for:

- Establishment of construction camps and erection of asphalt plants on temporarily acquired land.
- Construction of haul tracks for transportation of construction materials.

The project construction as well as operation activities may have a variety of direct and indirect impacts on the physical, ecological and human resources of the Project area and its surroundings. Even the direct impacts may be of primary or secondary nature. Strictly speaking, the primary impacts are directly related to the circumstances where land is to be acquired and the people are affected insofar as their physical displacement or relocation is involved. Likewise, removal of vegetation cover for construction may also be considered as a primary impact. On the other hand, secondary impacts entail the direct impacts on physical, ecological and human resources arising from the pollution caused by noise, vibrations, toxic emissions, spill overs, fugitive dust, or consumption of natural resources, etc. As the area is rural cum semi urban so the environmental impacts due to the land use conflicts are significant. This aspect has also been kept in mind while delineating the study area.



1.8 Environmental Baseline Survey of the Project

Prior to the start of the baseline environmental survey, a checklist was developed. The major items, which were considered for physical, ecological and social environment, are discussed in the subsequent paragraphs.

1.8.1 Physical Environment

For collecting information on the physical environment, the following main parameters were considered:

Land Resources (including land use, soil composition, topography, geology, contamination of soil and soil erosion, etc.)

- Water Resources (including available surface water resources and natural streams, spring water, etc.)
- Climate (including temperature, rainfall, humidity, wind direction, etc.), Ambient Air and Noise Quality
- Existing solid waste management and effluents disposal practices and storm water drainage

1.8.2 Ecological Environment

Under the ecological environment, the following main parameters were covered:

- Flora
- Fauna

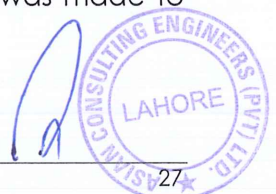
1.8.3 Social and Cultural Environment

To assess the social and cultural baseline settings of the Study Area, social survey was carried out to accomplish the following specific objectives:

- To establish the socio-economic conditions.
- To identify the potential disruption of private infrastructure.
- To identify poor and vulnerable groups and strategies to ensure that such groups should get benefit from the Project.
- To ensure adequate public/stakeholder consultations and their participation.
- To identify the effects on available common resources of the community due to the implementation of the Project.

1.8.4 Analysis of Data

After collection of the physical, ecological, environmental and social data from both primary and secondary sources; a critical analysis was made to assess the existing baseline conditions and potential impacts.





1.8.5 Screening of Potential Environmental Impacts and Mitigation Measures

- Environmental problems due to project location.
- Environmental problems related to design.
- Environmental problems resulting from project construction and operations.
- Potential environmental enhancement measures.

1.8.6 Public and Stakeholders Consultation

In addition to recording the baseline conditions of the Project Area, extensive public and stakeholder's consultations were also carried out including potential Project Affected Persons (PAPs) and general population residing in the Project Area.

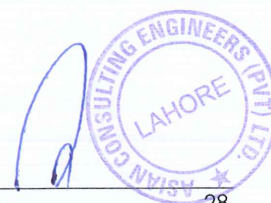
1.8.7 Preparation of Environmental Management Plan (EMP)

An EMP depicting the mitigation measures and monitoring plan has also been developed. Institutional capacity building of the Client has also been reviewed and enhancement was proposed for the effective implementation of the EMP.

1.9 Structure of the Report

This document is structured as follows:

Section-1:	Executive Summary
Section-2:	Introduction
Section-3:	Regulatory Framework for EIA
Section-4:	Project Description
Section 5:	Project Alternatives
Section-6:	Description of Environment
Section-7:	Potential Environmental Impacts
Section-8:	Environmental Management Plan
Section 9:	Stake Holders Consultations
Section-10:	Conclusions & Recommendations
Annexures	





SECTION - 2: REGULATORY FRAMEWORK

2.1 Legal Status

Notwithstanding the social and economic benefits, every development project interacts, in varying degrees, with physical, ecological and human resources of the project area and its environmental assessment studies, therefore, form an essential part of the feasibility studies of every project so as to make it environmentally acceptable besides being technically and economically feasible. In order to ensure the achievement of these objectives, laws, regulations and standards have been formulated by the relevant institutions at the respective national level by international agencies.

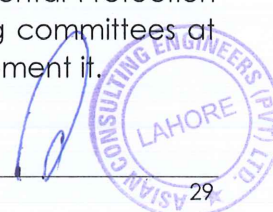
This section identifies applicable legal obligations of project proponent in context of environment and sustainable development. The proponent will comprehensively comply with relevant requirements of policy documents, legislative framework and recommendations described in national and international legislation and guidelines. Respective legislation and guidelines correspond to mitigation measures and Environmental Management Plan (EMP) which has been formulated for management of environmental and social impacts.

2.2 Policy Framework

2.2.1 National Conservation Strategy (NCS)

The Pakistan National Conservation Strategy (NCS), which was approved by the Federal Cabinet in March 1992, is the principal policy document for environmental issues in the country. The NCS signifies the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment. The core areas that are relevant to the proposed project are biodiversity conservation, restoration of rangelands, pollution prevention and abatement, and the preservation of cultural heritage.

Pakistan is a signatory to the Convention on Biological Diversity, and is thereby obligated to develop a national strategy for the conservation of biodiversity. The Government of Pakistan constituted a Biodiversity Working Group, under the auspices of the Ministry of Environment, to develop a Biodiversity Action Plan for the country, which was completed after an extensive consultative exercise. The plan, which has been designed to complement the NCS and the proposed provincial conservation strategies, identifies the causes of biodiversity loss in Pakistan and suggests a series of proposals for action to conserve biodiversity in the country. The Pakistan Environmental Protection Council (PEPC) has approved the action plan and steering committees at the federal and provincial levels have been formed to implement it.



2.2.2 National Environmental Policy, 2005

The National Environmental Policy provides an overarching framework for addressing the environmental issues facing Pakistan, particularly pollution of fresh water bodies and coastal waters, air pollution, lack of proper waste management, deforestation, loss of biodiversity, desertification, natural disasters and climate change.

It also gives direction for addressing the cross-sectional issues as well as the underlying causes of environmental degradation and meeting international obligations.

The National Environmental Policy, while recognizing the goals and objectives of the National Conservation Strategy, National Environmental Action Plan and other existing environmental related national policies, strategies and action plans, provide broad guidelines to the Federal Government, Provincial Governments, Federally Administrated Territories and Local Governments for addressing environmental concerns and ensuring effective management for their environmental resources.

The National Environmental Policy aims to protect, conserve and restore Pakistan's environment in order to improve the quality of life for the citizens through sustainable development.

2.2.3 National Drinking Water Policy

The National Drinking Water Policy provides a framework for addressing the key issues and challenges facing Pakistan in the provision of safe drinking water to the population. The overall objectives of the policy are to provide guidelines that will allow consistency and conformity in the provision of drinking water on sustainable basis, provide a financial framework within which the provision of water supply that can be undertaken in a cost-effective equitable and sustainable manner and gives key strategies to help in enhancing access to safe drinking water supply.

Provision of Safe Drinking Water for the labor will ensure the compliance of this policy. Also, under CSR activities, it is proposed that NAK will facilitate in providing safe drinking water to the nearby communities.

2.2.4 National Sanitary Policy, September 2006

The primary focus of sanitation is the purpose of National Sanitary Policy for the safe disposal of excreta away from the dwelling units and work places by using sanitary latrine and includes creation of an open defecation free environment along with the safe disposal of liquid and solid wastes; and the promotion of health and hygiene practices in the country.

Provision of sanitation facilities and washrooms for the labors will ensure the compliance of this policy.



2.2.5 The Biodiversity Action Plan

The Biodiversity Action Plan, 2000 has been the most significant direct step towards addressing the issue of loss of biodiversity. It details the current status, trends, direct & indirect causes of loss of biodiversity; its principles, goals and aims; proposals for an action plan including planning & policies, legislation, identification and monitoring, in situ & ex situ conservation, sustainable use, research and training, public education and awareness, Environmental Impact Assessment, information extraction and financial resources etc.

The Wild Birds and Animals Protection Act, 19123, the West Pakistan Wildlife Protection Ordinance 1959, the Wildlife Protection Rules 1972, provide for the protection of flora and fauna in the territory, including vegetation and protected forests³.

Through perusal of these legislation, it is evident that Wild Bird and Animal life will not be disturbed due to commissioning and operation of Naval Anchorage Karachi Project.

2.3 Administrative and Statutory Framework

The constitution of Pakistan contains provision for environmental protection and resource conservation. The constitution mentions environmental pollution and the ecology as a subject in the concurrent legislative list, meaning that both the provincial and federal government may initiate and make legislation for the purpose. Article 9 of 310 person shall be deprived of life or liberty save in accordance with law". The Supreme Court of Pakistan in its judgment in the case Shehla Zia and others vs WAPDA (1994) declared that the right to a clean environment is part of the fundamental constitutional right to life.

Several laws exist for the protection of the environment. Some of these laws are Federal and the rest Provincial in character. The promulgation of the Environmental Protection Ordinance 1983 was the first codifying legislation on the issue of environmental protection. This was indeed a consolidated enactment to plug the gaps and remove defects/deficiencies in the legislation. The promulgation of this ordinance was followed, in 1984, by the establishment of the Pakistan Environmental Protection Agency, the primary government institution dealing with environmental issues. Significant work on developing environmental policy was carried out in the late 1980s, which culminated in the drafting of the Pakistan National Conservation Strategy. Provincial environmental protection agencies were also established at about the same time. The National Environmental Quality Standards were established in 1993.

Prior to the 18th Amendment to the Constitution of Pakistan in 2010, the legislative powers were distributed between the federal and provincial governments through two 'lists' attached to the Constitution as Schedules.





The Federal list covered the subjects over which the federal government had exclusive legislative power, while the 'Concurrent List' contained subjects regarding which both the federal and provincial governments could enact laws. The subject of 'environmental pollution and ecology' was included in the Concurrent List and hence allowed both the national and provincial governments to enact laws on the subject.

However, as a result of the 18th Amendment this subject is now in the exclusive domain of the provincial government. The main consequences of this change are as follows: i) The Ministry of Environment at the federal level has been abolished. Its functions related to the national environmental management have been transferred to the provinces. The international obligations in the context of environment will be managed by various ministries and departments of the federal government, ii) The Pakistan Environmental Protection Act 1997 (PEPA 1997) is technically no longer applicable to the provinces. The provinces are required to enact their own legislation for environmental protection.

The Provincial Environmental Protection Agencies are formed by the respective Provincial Governments. A Director General who exercises powers delegated to him by the Provincial Government heads each Provincial EPA. IEEs and EIAs are submitted to provincial EPAs for approval.

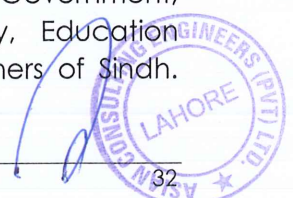
The Government of Sindh (GOS) has designated its Ministry of Environment Climate Change & Coastal Development, to administer matters related to the environment in Sindh. The Sindh Environmental Protection Agency (SEPA) is directly under the Ministry of Environment Climate Change & Coastal Development.

2.3.1 Sindh Environmental Protection Act, 2014

Legislative assembly of Sindh province of Pakistan passed the bill on 24th February 2014 to enact Sindh Environmental Protection Act 2014. The Act envisages protection, improvement, conservation and rehabilitation of environment of Sindh with the help of legal action against polluters and green awakening of communities.

It equally lays emphasis for the preservation of the natural resources of Sindh and to adopt ways and means for restoring the balance in its eco-system by avoiding all types of environmental hazards.

Environmental Protection Council (EPC): It has been formed consisting of Chief Minister as Chairman with Minister in charge of Environment Protection Department, Addl. Chief Secretary, Planning & Development Department, Government of Sindh and Secretaries of Environment, Finance, Public Health Engineering, Irrigation, Health, Agriculture, Local Government, Industries, Livestock & Fisheries Forest & Wildlife, Energy, Education Departments Government of Sindh and Divisional Commissioners of Sindh.





Non-official members are also included (i.e. representatives of Chamber of Commerce & Industry and from medical or legal professions etc.) along with DG, EPA & two Members of Provincial Assembly also form part of EPC.

The functions and powers of EPC include coordination & supervision of provisions of Act, approving provincial environmental & sustainable development policies & SEQs, provide guidance for protection & conservation, consider annual Sindh Environmental Report, deal with interprovincial and federal provincial issues, provide guidance for bio safety and assist Federal Government in implementation of various provisions of UN Conventions.

Sindh Environmental Protection Agency (SEPA): SEPA would be headed by Director General (DG) with the aim to exercise the powers and perform the functions assigned to it under the provisions of Act and the rules and regulations made there under. The Agency shall have technical and legal staff and may form advisory committees.

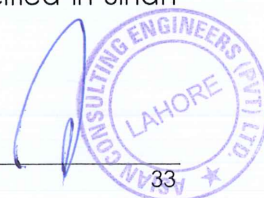
The Agency shall administer and implement the provisions of Act and rules and regulations. It shall also prepare environmental policies, take measures for implementation of environmental policies, prepare Sindh Environment Report and prepare or revise Sindh Environmental Quality Standards. SEPA shall also establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation research, inspection and audit to prevent and control pollution and to estimate the costs of cleaning up pollution and rehabilitating the environment and sustainable development. SEPA would also take measures for protection of environment such as to promote research; issues licenses for dealing with hazardous substances, certify laboratories, identify need for or initiate legislation, specify safeguards etc. SEPA would also encourage public awareness and education regarding environmental issues.

SEPA would have powers to enter or inspect under a search warrant issued by Environmental Protection Tribunal or a Court search at any time, any land or building etc. where there are reasonable grounds to believe that an offence under this Act has been or is being or likely to be committed. SEPA may also take samples, arrange for testing or confiscate any article in discharge of their duties.

The Act has also provided for Sindh Sustainable Fund derived from various sources such as voluntary contributions or fees generated etc. This fund is utilized for protection, conservation or improvement of environment.

Salient Features

Section 11: No person shall discharge or emit or allow the discharge or emission of any effluent waste, pollutant, noise or adverse environmental effects in an amount, concentration or level which is in excess to that specified in Sindh Environmental Quality Standards.





Section 12 & 13: No person shall import hazardous waste into Sindh province and handle hazardous substances except under licenses etc.

Section 14: No person shall undertake any action which adversely affects environment or which lead to pollute or impairment of or damage to biodiversity, ecosystem, aesthetics or any damage to environment etc.

Section 15: This section deals with regulation of motor vehicles banning emission of air or noise pollutants being emitted from them in excess of allowable standards.

Section 17: This section states that no proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment and has obtained from Agency approval in respect thereof. SEPA shall review the IEE & EIA and accord approval subject to such terms and conditions as it may prescribe or require. The agency shall communicate within four (04) months its approval or otherwise from the date EIA is filed failing which the EIA shall deemed to have been approved.

Section 21: Where agency is satisfied that the discharge or emission has occurred in violation of any provision of this act or rules etc. then it may, after giving an opportunity to person responsible, by order direct such person to take such measures within specified period. The agency under this section has been empowered to immediately stop, prevent or minimize emission, disposal etc. for remedying adverse environmental effects.

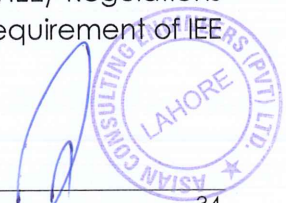
Section 22: The person who fails to comply with section 11, 17, 18 and 21 shall be punishable with a fine which may extend to five million rupees, to the damage caused to environment and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues. And, where a person convicted under sub-sections 1&2 had been previously convicted for any contravention of this Act, the Environmental Protection Tribunal (EPT) may, in addition to punishment, award imprisonment for a term that may extend up to three years, or order confiscation or closure of facility etc.

Section 23: Where any violation of this Act has been committed by any of employee of any corporate body, then, that employee shall be considered to be guilty of environmental pollution.

Section 25: This section allows for establishment of Environmental Protection Tribunals.

2.3.2 Sindh EPA (Review of IEE/EIA) Regulations, 2014

The Sindh Environmental Protection Agency (Review of EIA/IEE) Regulations 2014, define Schedules (I & II) of projects falling under the requirement of IEE or EIA.





Schedule I: A project falls in Schedule I if it is likely to have adverse environmental impacts, but of lesser degree or significance and all the mitigation measures to handle the impact is manageable. Such types of projects need IEE report including EMP.

Schedule II: Projects are categorized in Schedule II if they generate significant adverse environmental impacts that require a comprehensive management plan, or if the project is located within or passes through: a) Areas declared by the Government of Pakistan as environmentally sensitive (National Parks/Sanctuaries/Game Reserve), b) Areas of international significance (e.g. protected wetland as designated by the RAMSAR Convention), or c) Areas designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as cultural heritage sites.

According to Sindh Environmental Protection Agency Regulation, 2014, a project falling in any category listed in Schedule II shall file an EIA with the Sindh Environmental Protection Agency (SEPA). Within urban development the **Housing schemes above 10 acres** are placed in Schedule II thus requiring an EIA.

Filing: Regulation 9 requires submission of ten hardcopies and two electronic copies accompanied by an application form (schedule-V), copy of receipt of payment of review fee, NOC from relevant departments (where applicable) and environmental checklist (if project falls in schedule III).

Preliminary scrutiny: Regulation 10 states that within 15 days of report submission the agency shall review the report and inform the proponent for submission of any additional information.

Review: The agency shall review the IEE report within 60 days after issuing confirmation of completeness as per Regulation 9. It shall also conduct an experts' committee meeting or solicit views from concerned advisory committee.

Validity: Regulation 18 defines the validity period of approval of an IEE or EIA to be three years from date of construction and must start within three years of report approval. A three-year extension at a time may be granted upon the agency's discretion with or without the submission of a fresh IEE or EIA

Monitoring: Sub-regulation 20 requires the submission of a report to agency on completion of construction of project and after issue of confirmation of compliance, the submission of annual report summarizing operational performance of the project with reference to conditions of approval and maintenance and mitigation measures adopted by the project.

2.3.3 Sindh Environmental Quality Standards, (SEQS)

With the SEPA Act, 2014 the Sindh EPA revised the Environmental Quality Standards (EQS) with full consultation of the private sector, industrialist, trade



and business associations and NGOs and approval of Sindh Environmental Protection Council has developed Sindh Environmental Industrial Wastewater, Effluent, Domestic Sewerage, Industrial Air Emission, Ambient Air, Noise for vehicles, Air Emissions for Vehicles and Drinking Water Quality Standards 2015 vide Notification No. EPA/TECH/739/2014. Project proponent is committed to comply with the applicable Sindh-EQS in letter and spirit.

Table 2-1, Sindh Environmental Quality Standard for Ambient Air

Pollutant	Time-weighted average	Concentration in Ambient Air	Method of measurement
Sulfur Dioxide (SO ₂)	Annual Average*	80µgm ³	Ultraviolet Fluorescence Method
	24 hours**	120µgm ³	
Oxides of Nitrogen as (NO)	Annual Average*	40µgm ³	Gas Phase Chemiluminescence
	24 hours**	40µgm ³	
Oxides of Nitrogen as (NO ₂)	Annual Average*	40µgm ³	Gas Phase Chemiluminescence
	24 hours**	80µgm ³	
O ₃	1 hour	130µgm ³	Non dispersive UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	360µgm ³	High volume Sampling, (Average flow rate not less than 1.1m ³ /minute)
	24 hours**	500µgm ³	
Respirable Particulate Matter (PM ₁₀)	Annual Average*	120µgm ³	B Ray absorption method
	24 hours**	150µgm ³	
Respirable Particulate Matter (PM _{2.5})	Annual Average*	40µgm ³	B Ray absorption method
	24 hours**	75µgm ³	
Lead (Pb)	Annual Average*	1µgm ³	ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	1.5µgm ³	
Carbon Monoxide (CO)	8hours**	5mg/m ³	Non-Dispersive Infra-Red (NDIR) method
	1 hours	10mg/m ³	
*Annual arithmetic means of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.			
**24 hourly / 8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but not on two consecutive days.			

Table 2-2, The Motor Vehicle Noise

Parameter	Standards (maximum permissible limit)	Measuring method
Noise	85dB(A)	Sound-meter at 7.5meter from the source



Table 2-3, Sindh Environmental Quality Standard for Noise

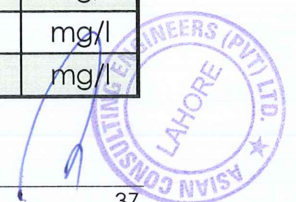
S. No.	Category of Area / Zone	Effective from 1 st January, 2015		Effective from 1 st January, 2015	
		Limit it in dB(A) Leq*			
		Day Time	Night Time	Day Time	Night Time
1	Residential area (A)	65	50	55	45
2	Commercial area (B)	70	60	65	55
3	Industrial area (C)	80	75	75	65
4	Silence Zone (D)	55	45	50	45

Note:

- 1 Day time hours: 6.00 a. m to 10.00 p. m
 - 2 Night time hours: 10.00 p. m to 6.00p. m
 - 3 Silence zone; Zone which are declared as such by competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.
 - 4 Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.
- *dB(A)Leq Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

Table 2-4, Sindh Environmental Quality Standard for Municipal & Liquid Industrial Effluents

Sr. No.	Parameter	Into Inland Waters	Into Sewage Treatment	Into Sea	Unit
1	Temperature or Temp. increase	<3	<3	<3	°C
2	pH value (H ⁺)	6-9	6-9	6-9	
3	Biological Oxygen Demand (BOD)5 at 20°C	80	250	80	mg/l
4	Chemical Oxygen Demand (COD)	150	400	400	mg/l
5	Total Suspended Solids (TSS)	200	400	200	mg/l
6	Total Dissolved Solids (TDS)	3500	3500	3500	mg/l
7	Oil and Grease	10	10	10	mg/l
8	Phenolic Compounds (as Phenol)	0.1	0.3	0.3	mg/l
9	Chloride (as Cl ⁻)	1000	1000	SC	mg/l
10	Fluoride (as F ⁻)	10	10	10	mg/l
11	Cyanide (as CN ⁻) total	1.0	1.0	1.0	mg/l
12	An-ionic detergents (as MBAS)	20	20	20	mg/l
13	Sulphate (SO ²⁻) 4	600	1000	SC	mg/l
14	Sulphide (S ²⁻)	1.0	1.0	1.0	mg/l
15	Ammonia (NH ₃)	40	40	40	mg/l
16	Pesticides	0.15	0.15	0.15	mg/l





Sr. No.	Parameter	Into Inland Waters	Into Sewage Treatment	Into Sea	Unit
17	Cadmium	0.1	0.1	0.1	mg/l
18	Chromium (trivalent and hexavalent)	1.0	1.0	1.0	mg/l
19	Copper	1.0	1.0	1.0	mg/l
20	Lead	0.5	0.5	0.5	mg/l
21	Mercury	0.01	0.01	0.01	mg/l
22	Selenium	0.5	0.5	0.5	mg/l
23	Nickel	1.0	1.0	1.0	mg/l
24	Silver	1.0	1.0	1.0	mg/l
25	Total toxic metals	2.0	2.0	2.0	mg/l
26	Zinc	5.0	5.0	5.0	mg/l
27	Arsenic	1.0	1.0	1.0	mg/l
28	Barium	1.5	1.5	1.5	mg/l
29	Iron	8.0	8.0	8.0	mg/l
30	Manganese	1.5	1.5	1.5	mg/l
31	Boron	6.0	6.0	6.0	mg/l
32	Chlorine	1.0	1.0	1.0	mg/l

2.4 Other Relevant Laws & Regulations

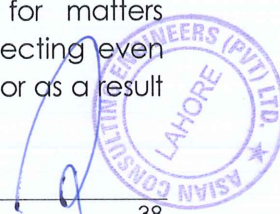
2.4.1 The Forest Act (Sindh Amendment) Act, 1994

The Act empowers the provincial forest departments to declare any forest area as reserved or protected. This Act prohibits the tree cutting in reserved and protected forest designated under the Act. Permission must be taken from the Sindh Forest department to execute the cutting of tree. Section 1(1) of this Act mentions that illegal tree cutting is subjected to pose liability or punishment to the project owner. The proposed "Naval Anchorage Karachi" Project does not encompass any reserve/protected forest area.

2.4.2 The Sindh Wildlife Protection, Preservation, Conservation and Management Act, 2020

The Sindh Wildlife Protection, Preservation, Conservation and Management Bill, 2020 having been passed by the Provincial Assembly of Sindh on 27th July, 2020 and assented to by the Government of Sindh on 25th August, 2020 is hereby published as an Act of the Legislature of Sindh.

This Act provide the protection, conservation, preservation, sustainable use of wild life for establishment, management and maintenance of protected areas in the Province of Sindh and to provide for matters connected therewith. This legislation has wider coverage, protecting even those wild animals that enter Sindh via trans-boundary migration or as a result of human activity.





Section 9(1) of this Act prohibits the following activities in Protected Areas.

- a. hunting, shooting, killing, injuring, trapping, snaring and poisoning of wildlife;
- b. polluting, poisoning, draining or diverting the water resource for the purpose other than the purpose which is essential for health of wildlife;
- c. cutting, girdling, damaging, injuring or destroying floral resources or burning and collecting the plants;
- d. damaging the infrastructure and culturally significant natural structures, defacing, counterfeiting the boundary' marks, encroachment, cultivation or changing the land use;
- e. breaking the land for oil and gas exploration, seismic surveyor any kind of other survey;
- f. drilling, kindling fire or abating in setting fire;
- g. grazing, fishing, trespassing;
- h. blowing pressure horn and playing electronic instruments such as television, radio or tape-recorder, loudspeaker causing noise and' car racing or other noise related sports; and quarrying, causing or fashioning of natural stones, exploration and exploitation of mines and minerals.

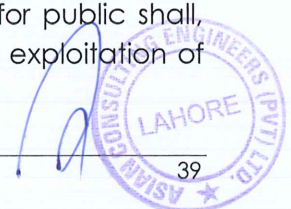
Section 9(2) states that any person who contravenes or breaches any of the acts under Sub- Section (1) shall be dealt as mentioned in Third Schedule as per Section 71.

Section 9(3) addresses that the Department with the previous sanction of competent authority may, for scientific purpose, improvement of aesthetic, scenic beauty, and in the larger public interest, relax to undertake any of the acts prohibited under Sub-Section (1) particularly in wildlife protected areas, subject to fulfillment of the requirements provided in Section 86.

Section 12(1) also addresses the Protected Area and states that the department may with the previous approval of the competent authority, by notification in the official Gazette, declare any area to be a national park with a view to protection of wildlife and outstanding scenery, flora and fauna (habitat) in the natural state in such manner as may be prescribed.

Section 13(1) The Department may with the previous approval of the competent authority may; by notification in the official Gazette, declare any area to be a wildlife sanctuary and may demarcate it in such manner as may be prescribed.

Section 13(2) states that the Wildlife Sanctuary shall be set-aside as undisturbed breeding ground for the protection of wildlife and access for public shall, except in accordance with the rules, be prohibited and no exploitation of





forest therein shall be allowed except for reducing fire hazards, epidemic or insect attacks or other natural calamities.

Section 14 states that the Department may, on the recommendations of Council Game Reserve declare any area to be a game reserve, where hunting and shooting of wildlife shall not be allowed, except under a special permit issued by Conservator Wildlife, which may specify the maximum number of animals or birds that may be hunted or captured in the area, duration for which such permits shall be valid.

Section 71 states that whosoever contravenes or attempts to contravene the provisions of this Act or the rules and regulations made thereunder shall be punishable as provided in Third Schedule of the Act.

Section 86 addresses the value of loss or degradation of habitat and states that the Department shall determine through a committee of experts, the value of loss to habitat caused as a result of any development activity of important nature, oil spill in coastal waters, flood disaster, unauthorized land use in a protected area or wildlife habitat owned by Government, to be recovered; and same amount shall be utilized for improvement.

The proposed project area does not include any protected area or Game Reserve etc. The site under discussion does not fall in any protected areas nor in any sensitive area for wildlife, environment and ecology.

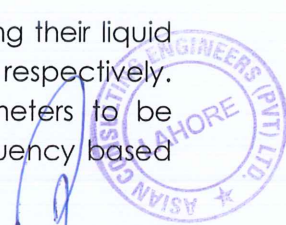
2.4.3 Hazardous Substance Rule, 2014

These Rules were notified to streamline procedures for issuance of licenses to industries / businesses that generate hazardous waste, safety precautions for workers and devices their methods for the removal of hazardous wastes in an environment friendly manner. The rules also specify procedures to be adopted for import, transport, storage and disposal of hazardous waste; and identify two hundred and forty-three hazardous substances and synthetic chemicals.

The rules also specify the requirement of obtaining license from Sindh EPA for the import, transport, storage and disposal of hazardous substances as specified in Schedule I of the rules. Any substance considered as hazardous as specified in the rules during construction and operation stages of Naval Anchorage Karachi, will be dealt under these rules and the import, transport, storage and disposal of this substance will be followed by obtaining the license from Sindh EPA.

2.4.4 Self-Monitoring and Reporting by Industry Rules, 2014

These rules classify the industrial units for monitoring and reporting their liquid effluent and gaseous emissions into three and two categories respectively. According to each category they define the priority parameters to be monitored and reported to SEPA according to a specific frequency based





on working conditions. This monitoring and reporting are in addition to the monitoring conditions as required by the conditions of approval of EIA/IEE. The sampling for testing must be carried out according to Environmental Samples Rules, 2014 and be sent to SEPA certified environmental testing laboratories.

2.4.5 Pakistan Penal Code, 1860

The Pakistan Penal Code deals with offences where public or private property and/or human lives are affected due to the intentional or accidental misconduct of an individual or body of people. In the context of environment, the Penal Code empowers the local authorities to control noise, noxious emissions and disposal of effluents. The NEQS enforced by the EPAs supersede the application of this legislation on industries and municipalities. The Penal Code, however, can provide a basis for the client to coordinate its activities with the local authorities to ensure that its construction activities do not become a cause of public nuisance or inconvenience.

2.4.6 The Antiquities Act, 1975

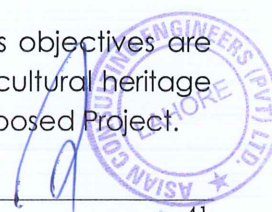
It ensures the protection of Pakistan's cultural resources. The Act defines "antiquities" as ancient products of human activity, historical sites or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the GoP to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the Project proponents are obligated to ensure that no activity is undertaken within 61 m (200 ft.) of a protected antiquity and to report to the GoP's Department of Archaeology any archaeological discovery made during the course of the project.

The federal Department of Archaeology maintains a master register containing basic and vital information on the protected monuments and sites including full measurements of the protected areas, description, location and Government Notification number with date of protection. The central directorate general of Archaeology has a separate list which is continuously updated as and when new sites are declared as protected.

No antiquities protected under this Act are located within or in proximity of project site.

2.4.7 The Sindh Cultural Heritage (Preservation) Act, 1994

It is the provincial law for the protection of cultural assets. Its objectives are similar to those of the Antiquity Act. No protected antiquity/cultural heritage site was identified within or near the impact zone of the proposed Project.





2.4.8 The Land Acquisition Act, 1894

The Land acquisition is governed under LAA 1894 which is primary law for land acquisition in Pakistan. The Land Acquisition Act 1894, as amended from time to time, is the primary law for the purpose of land acquisition in the Province of Sindh. The Act provides for acquisition of land for public purpose.

2.4.9 Civil Aviation Rules, 1994

It was made in exercise of the powers conferred by Civil Aviation Ordinance 1960, Pakistan Civil Aviation Authority Ordinance 1982, Aircraft (Removal of Danger to Safety) Ordinance 1965 and the Telegraph Act 1885.

Section 3 – Safe Guarding at Aerodromes (68) Limitation of obstructions: "No person shall erect any temporary or permanent structure, nor position a vehicle or other mobile object on or in the vicinity of any aerodrome to which these rules are applicable, that will be within the clearance area, or will protrude through an obstacle limitation surface, at that aerodrome".

2.4.10 Employment of Child Act, 1991

Article 11 (3) of the constitution of Pakistan prohibits employment of children below the age of 14 years in any factory, mines or any other hazardous employment. In accordance with this Article, the Employment of Child Act (ECA) 1991 disallows the child labor in the country. The ESA defines a child to mean a person who has not completed his/her fourteenth years of age. The ECA states that no child shall be employed or permitted to work in any of the occupation set forth in the ECA (such as transport sector, railways, construction and ports) or in any workshop wherein any of the processes defined in the Act is carried out. The processes defined in the Act include carpet weaving, bidi (kind of a cigarette) making, cement manufacturing, textile, construction and others). **Proponent and its contractors will be bound by the ECA to disallow any child labor at the project sites or camp sites.**

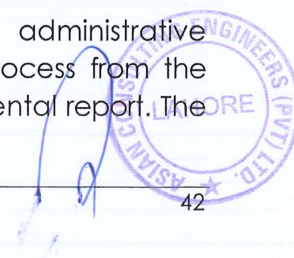
2.5 National Environmental Guidelines

2.5.1 Pakistan Environmental Assessment Procedures

The Federal EPA has prepared a set of guidelines for conducting environmental and social assessments. The guidelines derive from much of the existing work done by international donor agencies and NGOs. The package of regulations, of which the environmental and social guidelines form a part, includes the PEPA 1997 and the NEQS. These guidelines are listed below followed by comments on their relevance to proposed project:

Policy and Procedures for Filing, Review & Approval of Environmental Assessments, Pakistan Environmental Protection Agency, September 1997:

These guidelines define the policy context and the administrative procedures that govern the environmental assessment process from the project pre-feasibility stage to the approval of the environmental report. The





section on administrative procedures has been superseded by the Sindh IEE/EIA Regulations 2014. The package of regulations prepared by PEPA with relevance to this EIA includes:

- Policy and Procedures for Filing, Review and Approval of Environmental Assessments;
- Guidelines for the Preparation and Review of Environmental Reports;
- Sectoral Guidelines for Environmental Reports - New township development
- Guidelines for Public Consultation

Policy and procedures for filing, review and approval of environmental assessments: These guidelines define the policy context and the administrative procedures that will govern the environmental assessment process, from the project pre-feasibility stage, to the approval of the environmental report. According to the procedures laid out in the policy guidelines, IEE's or EIAs are to be filed with the EPA of the province where the project is to be implemented. The PEPA has, however, been given the right to review any environmental report at any time and the power to revoke the decision of the provincial EPA, if it deems this to be necessary. Projects have been classified in the policy guidelines by expected degree of adverse environmental impacts.

Projects which have comparatively lower environmental issues and can be managed by less extensive analysis are included in Schedule-I.

Guidelines for the preparation and review of environmental reports: It requires proponents to prepare terms of reference for the environmental assessment reports. It requires that all studies should contain baseline data on the area and must contain an assessment of the potential environmental impacts and the recommended mitigation measures.

Sectoral guidelines for environmental reports - new township development: These guidelines are prepared to look specifically at the Environmental impacts resulting from constructing housing estates and townships in Pakistan. The guidelines examine the alternatives on site and technology and impacts on the social and physical environment, during the construction and operation phases of the project and devices proposals for mitigation measures.

Guidelines for public consultation: These guidelines are intended to provide assistance throughout the environmental assessment of project by involving the public which can lead to better and more acceptable decision-making. Public involvement, undertaken in a positive manner and supported by a real desire to use the information gained to improve the proposal, will lead to better outcomes, and lay the basis for ongoing positive relationships between the participants.



The guidelines define the "objectives of consultation" as follows: Public involvement is a feature of environmental assessment and can lead to better and more acceptable decision-making. It can be time consuming and demanding, yet without it, proposals are seldom soundly based, and there is likely to be antagonism from affected people.

The Guidelines for Public Consultation introduces effective ways to inform the contents of the project to the general public during the planning stage & that eventually consensus building toward the implementation of project is reached.

Incorporating public involvement into the stages of environmental assessment is explained in the guidelines that public consultation meeting has to be carried out after the works on "developing options, and assessing and mitigating impacts" for comments and assessment.

The submission and approval procedure for the EIA is summarized below:

- The EIA report shall be submitted, together with a review fee and form included as Schedule- V of the Sindh IEE/EIA Regulations 2014.
- The SEPA shall conduct a preliminary scrutiny and reply within 15 working days of the submittal of the report a) confirming completeness, or b) asking for additional information, if needed, or c) returning the report requiring additional studies, if necessary.
- The SEPA is required to make every effort to complete the EIA review process within four months of the issue of confirmation of completeness.
- SEPA shall call for a Public Hearing for the project to invite all the concerned persons to raise concerns on the project.
- Following the Public Hearing, SEPA shall constitute a Committee of Experts to assist the agency in review of the EIA.
- The approval granted at the end of the review process is valid for three years for start of construction.
- Once project construction has been completed, the proponent is required to submit a request to the SEPA for confirmation of compliance. An environmental management plan for the operation phase is to accompanied with the request.
- The SEPA is required to communicate its decision within four months of receipt of the request. The project can commence operation only after it has received approval from the SEPA.
- The overall flow of obtaining the approval of EIA is shown in figure 3.1.

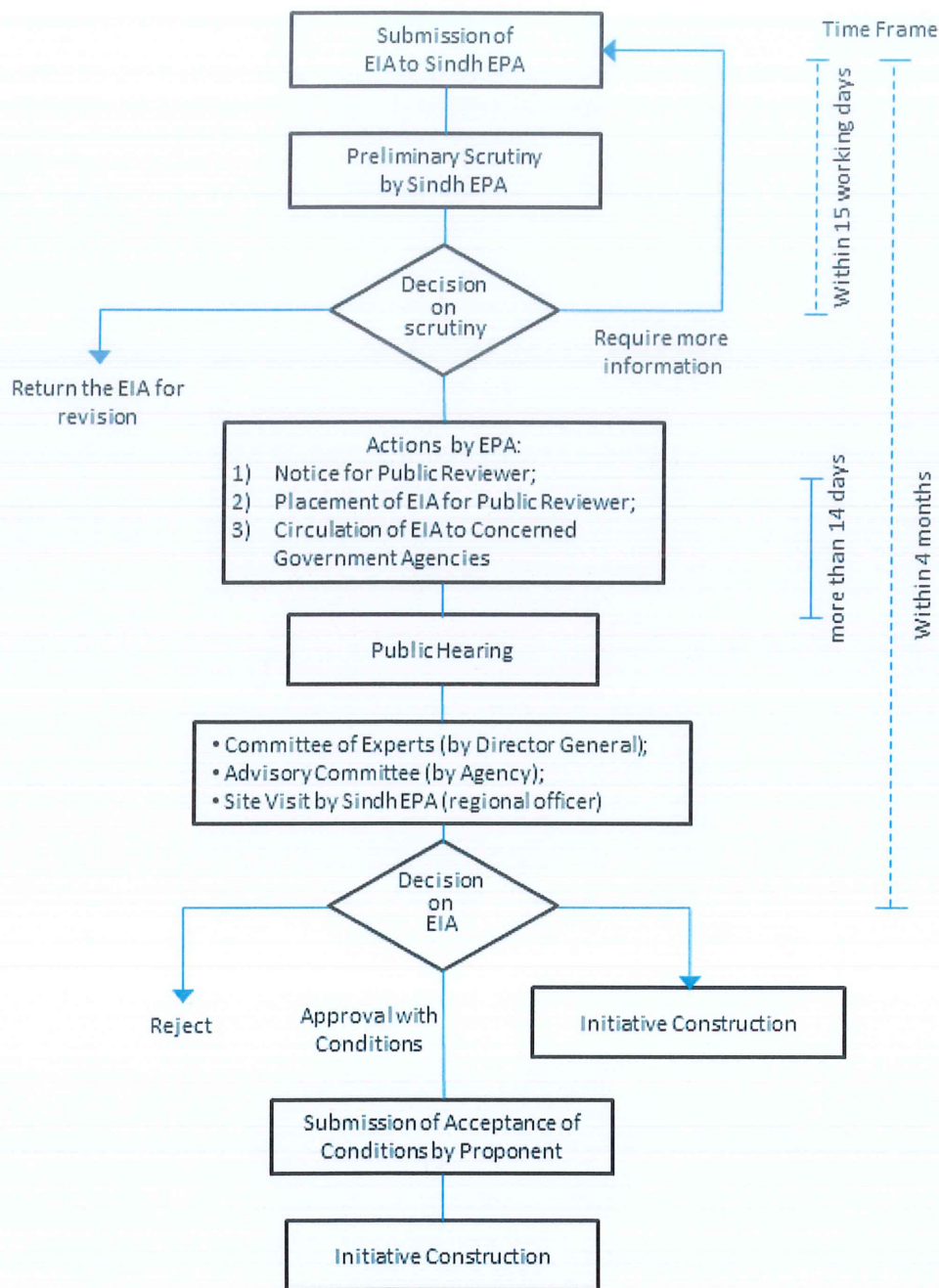


Figure 2-1, EIA Review and Approval Procedure (Source: EIA Study Team)



2.6 International Environmental Guideline

2.6.1 World Bank Guidelines on Environment

The principal World Bank publications that contain environmental guidelines are listed below.

- Environmental Assessment-Operational Policy 4.01. Washington, DC, USA. World Bank 1999.
- Environmental Assessment Sourcebook, Volume I: Policies, Procedures, and Cross-Sectoral Issues. World Bank Technical Paper Number 139, Environment Department, the World Bank, 1991,
- Environmental Assessment Sourcebook, Volume III: Guidelines for Environmental Assessment of Energy and Industry Projects. World Bank Technical Paper No. 154, Environment Department, the World Bank, 1991.
- Pollution Prevention and Abatement Handbook: Towards Cleaner Production, Environment Department, the World Bank, United Nations Industrial Development Organization and the United Nations Environment Program, 1998.

The first two publications listed here provide general guidelines for the conduct of an EIA, and address the EIA practitioners themselves as well as project designers. While the Sourcebook in particular has been designed with Bank projects in mind, and is especially relevant for the impact assessment of large-scale infrastructure projects, it contains a wealth of information which is useful to environmentalists and project proponents.

The Sourcebook identifies a number of areas of concern, which should be addressed during impact assessment. It sets out guidelines for the determination of impacts, provides a checklist of tools to identify possible biodiversity issues and suggests possible mitigation measures. Possible development project impacts on wild lands, wetlands, forests etc. are also identified and mitigation measures suggested. The Sourcebook also highlights concerns in social impact assessment and emphasizes the need to incorporate socio-economic issues in EIA exercises.

The EHS guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP).

2.6.2 IFC General EHS Guidelines

The EHS guidelines published by IFC are technical reference documents that address IFC's expectations regarding the industrial pollution management performance of its projects. They are designed to assist managers and decision



makers with relevant industry background and technical information. This information supports actions aimed at avoiding, minimizing, and controlling EHS impacts during construction, operation and decommissioning phase of a project or facility.

Environmental issues associated with the construction and maintenance activities may include, among others, noise and vibration, soil erosion and threats to biodiversity including habitat alteration and impacts to wildlife.

Examples of the impacts addressed in the General EHS Guidelines include:

- Construction site waste generation;
- Soil erosion and sediment control from materials sourcing areas and site preparation activities;
- Fugitive dust & other emissions (e.g., from vehicle traffic, land clearing activities & materials stockpiles);
- Noise from heavy equipment and truck traffic;
- Potential for hazardous materials and oil spills associated with heavy equipment operation and fueling activities.

2.7 International Environmental Treaties

Pakistan is a signatory to various international treaties and conventions on the conservation of the environment and wildlife protection. The country is thus obliged to adhere to the commitments specified in these treaties.

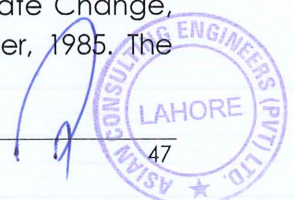
2.7.1 ILO Conventions

Pakistan has been a member of the ILO since 1947 and has thus far ratified 36 conventions. Of these, 33 are in force, whereas 3 have been denounced. The fundamental conventions which are being implemented across Pakistan through applicable labor laws include:

- C029 - Forced Labor Convention, 1930 (No. 29);
- C100 - Equal Remuneration Convention, 1951 (No. 100);
- C105 - Abolition of Forced Labor Convention, 1957 (No. 105);
- C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111);
- C138 - Minimum Age Convention, 1973 (No. 138) Minimum age specified: 14 years;
- C182 - Worst Forms of Child Labor Convention, 1999 (No. 182).

2.7.2 Climate Change & Ozone Layer

United Nations Framework Convention on Climate Change, 1992 Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1997 Vienna Convention for the Protection of the Ozone Layer, 1985. The





Montreal Protocol on Substances that Deplete Ozone Layer and associated amendments, 1987

2.7.3 Waste & Pollution

Basel Convention on the Control of Trans boundary Movement of Hazardous Wastes and their Disposal, 1989.

2.7.4 Biodiversity & Protection of Plants and Animals

- Convention on the Biological Diversity, 1992
- Cartagena Protocol on Bio safety to the Convention on Biological Diversity, 2000
- Convention on International Trade in Endangered Species of Wild Fauna & Flora (CITES), 1973
- International Plant Protection Convention, 1997
- Ramsar Convention, 1971 for the Conservation and wise use of natural resources and includes all aspects of wetland conservation

IUCN red list published by IUCN and includes those species that are under potential threat of extinction. These species have been categorized as endangered, vulnerable in decline, lower risk and data deficient.



SECTION - 3: PROJECT DESCRIPTION

3.1 Type and Category of Project

The proposed Project is essentially a non-linear housing Project with some components which are of linear nature such as construction of road, water supply and sewerage pipes and gas pipe lines.

According to the Sindh Environmental Protection Agency (SEPA) (Review of IEE and EIA) Regulations 2021 made under section 12 of Sindh Environmental Protection Act, 2014, the current project falls under Schedule-III, category 1 (Housing Schemes) and thus requires Environmental Impact Assessment (EIA), before commencement of construction activities of housing project and allied facilities.

3.2 Objectives of the Project

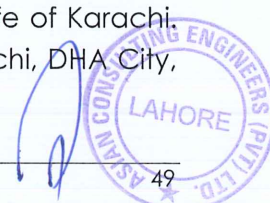
The objectives of the proposed Project are:

- To incorporate more people into a well-established and affordable housing scheme;
- To facilitate a large number of communities by enhancing commercial and economic activities in the project area;
- Maintenance of already developed infrastructure work and establishment of additional needed set-up including sewage treatment plant, parks and horticulture in the most professional manner;
- To improve scenic value of the project area; and
- To provide high quality and state-of-the-art living for general public.
- To provide employment opportunities for skilled and unskilled labour during its construction and operation phases

3.3 Location and Site Layout

Naval Anchorage, Karachi lies at a very prime location on Super Highway, i.e., Karachi to Hyderabad Motorway which is called M9 - Motorway. Naval Anchorage Karachi Location is at a distance of about 58 KM from Super Highway Toll Plaza and about 73 KM from Jinnah International Airport Karachi and 20 km away from Nooriabad if we come from Hyderabad Side. The project site has vast, flat terrain and low to medium hilly land.

Naval launched way outside from the congested environment of Karachi. It is launched on super highway where the environment is calm and peaceful and it should be an ideal residence away from the chaotic life of Karachi. Close-by Societies of Naval Anchorage are Bahria Town Karachi, DHA City,



on Karachi side from Naval Anchorage Karachi Location. Naval Anchorage Karachi is expected to utilize miles of vacant land along the super highway for this mega project and it is expected to accommodate near about 0.4 million families within a time frame of 5 to 10 years.

The map location of the project site is presented in **Figure 3-1**.

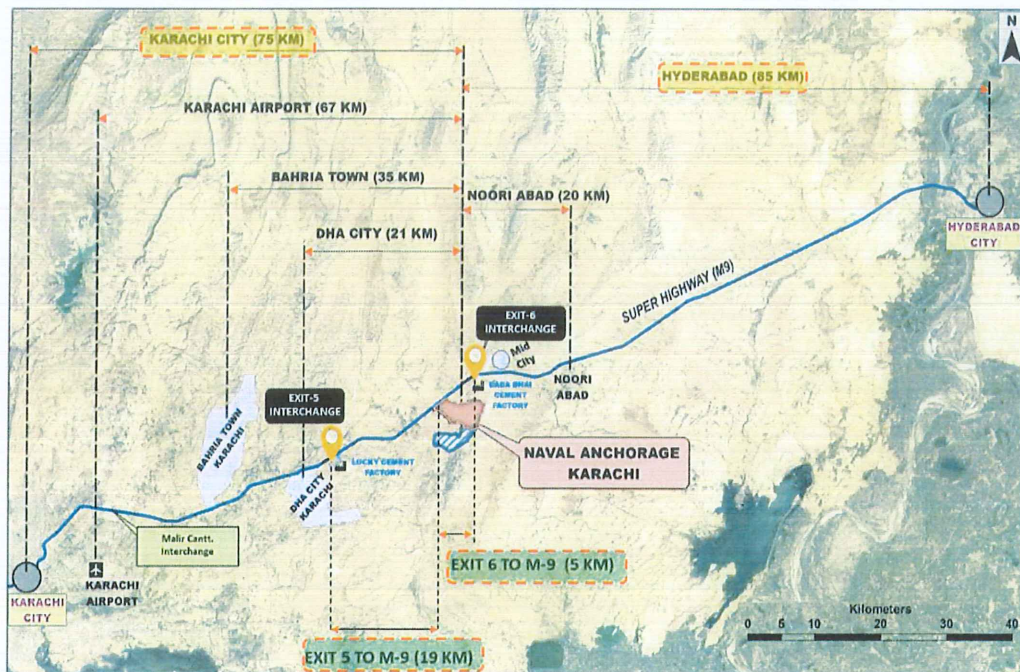


Figure 3-1, Location Map for Naval Anchorage Karachi

The project general layouts and location layouts for development of Naval Anchorage Karachi presented in large drawings given in Annexure I- Master Plan of this report.

3.4 Master Plan for the Project

The master plan for the project is given in Annexure-1 of the report. The master contains the following:-

- Road Network Planning Layout
- Site Location
- General Location Layout
- Fire Fighting Layout
- Drainage and Sewerage Networks
- Utility supplies
- Telecommunication Infrastructure
- Land Acquisitions

3.5 Key Features of Naval Anchorage Karachi (NAK)

Key features of NAK are presented in **Table 3-1**.

Table 3-1, Key Features of Naval Anchorage Karachi - NAK

Feature	Description
Zone Type	Housing Scheme
Total Area	704.69 Acres
Plot Classes	Residential 125 – Square Yard 250 – Square Yard 500 – Square Yard 1000 – Square Yard Commercial 67 – Square Yard 200 – Square Yard
Facilities	Administration Block Sports Area Medical Area Mosque Educational Institutes Refueling Stations
Utilities	Drainage System & Disposal Station Water Supply System Grid Station & Transmission Lines Rescue Station Combined Effluent Treatment Plant

3.6 Land Use Plan

The land use of the Naval Anchorage Karachi – NAK is included in **Table 3-3** and summarized in **Table 3-2**.

Table 3-2, Schedule of Commercial Plots-NAK

Sr. No.	Module Size	Numbers
1	Large Commercial Centers	10
2	67 – Square Yard	56
3	200 – Square Yard	48
Total Plots		114

Table 3-3, Schedule of Residential Plots-NAK

Sr. No.	Module Size	Numbers
1	125 – Square Yard	123
2	250 – Square Yard	3,010



Sr. No.	Module Size	Numbers
3	500 – Square Yard	0
4	1000 – Square Yard	687
Total Plots		3,820

Table 3-4, Summarized Land Use of Proposed NAK

Sr. No.	Land Use	Area	
		%age	Acres
1	Residential/Apartments	53.20	374.92
2	Commercial	03.00	21.15
3	Amenities	10.16	71.61
4	Roads / Parking	33.64	237.01
Total		100.00	704.69

It is noted from the above land use that:

- Area under Residential Units is 53.20%
- Area under Commercial Units is about 3.00%
- Area under Amenities, Open Spaces-Parks is 10.16%
- Area under Misc. facilities including Roads, Green Belts and Parking is about 33.64%

The master plan of the project is attached as Annexure-1.

3.7 Road Access

Proposed project is located along M9 Motorway, almost 5km away from Exit 6 and 19km away from Exit-5 of M9 Motorway. Current land use pattern and road access to the project site is presented in **Figure 3-2**.



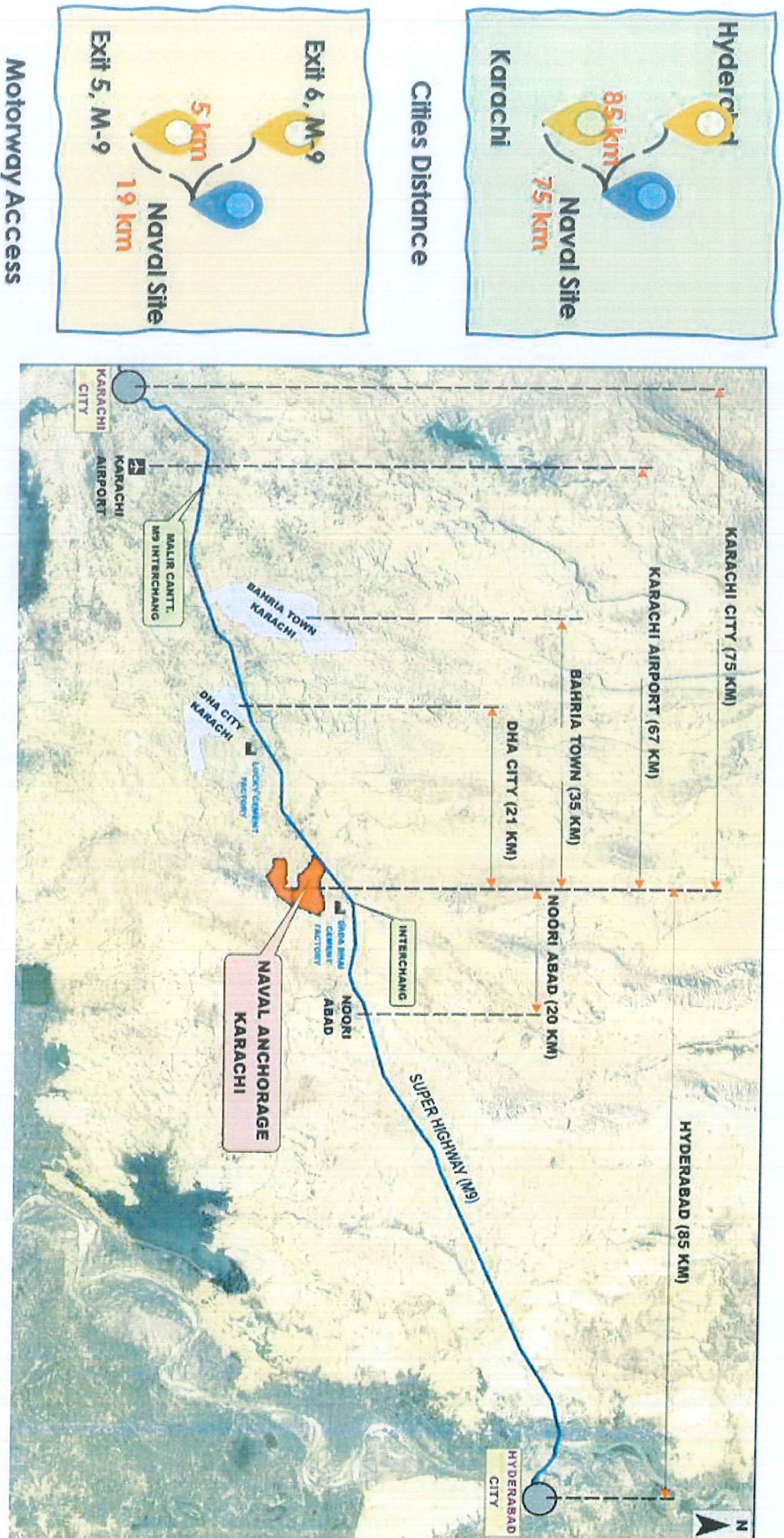


Figure 3-2, Road Access to the Site

3.8 Vegetation Feature on Site

The Site is dominated by open communities of small trees and shrubs, some of which are winter (dry season) deciduous. Common species include *Acacia modesta*, *Prosopis juliflora*, *Tamarix aphylla*, *Capparis decidua*, *Euphorbia royleana* and *Zizyphus nummularia*. Vegetation cover rarely exceeds 20% during the dry season, but a flush of ephemeral grasses and herbs may emerge from a dormant soil seed bank following the summer monsoon, temporarily increasing vegetation cover, and graze and browse available for wildlife and livestock.

3.9 Water Requirement and Water Balance

For development stage of the project the ground water will be used. Water requirement is given in following table;

Proposed No. of Residential Units		3820
Estimated No. of person per Unit		6
Total Persons		22,920
A	Domestic Water Demand (Residential)	
	Proposed No. of Person	22,920
	Average water demand gallon/capita/day	40
	Sub Total for Residential water demand g/d	916,800
B	Institutional and Commercial Water Demand	
B-1	For Community Center/Public Building	
	Proposed no. of Person (20% of People of the total population)	4584
	Average water demand g/c/d	3
	Sub Total (B-1) g/d	13,752
B-2	For Educational Institution and Commercial Area	
	Proposed No. of Person (15% of People of the total population)	3438
	Average water demand g/c/d	8
	Sub Total (B-2) g/d	27,504
C	Average water demand	
	Total of (sub-total A-C)	958,056
D	For Peak Hour Water Demand @ plus 50% on average	
	Extra 50% of average water demand	479,028
Total Water Demand g/d		1,437,084

3.10 Water Supply Pipe Diameter Calculation

180mm, 250mm and 355mm diameter HDPE pipe will be used. The Project is divided into three plot sizes according to the terrain. The diameters of service

pipes from the municipal water supply network will be determined based on the water consumption of each plot.

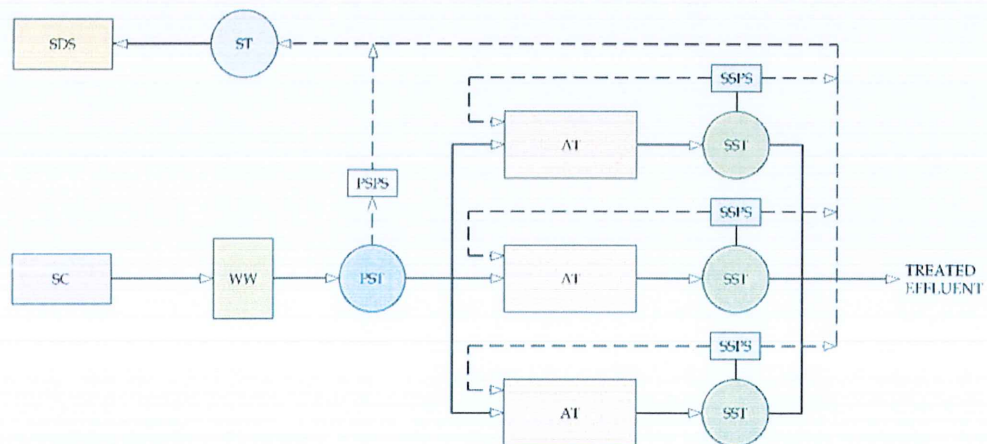
The water quality is given in Baseline Environmental Monitoring Chapter

3.11 Waste Water Disposal

The composite sewage coefficient is set as 0.80. The sanitary sewerage system has been designed at 80% of the average consumption of water per capita per day. Minimum diameter of pipe would be 8" with "British Standard specifications of RCC pipes. However, 6" dia sewer shall be used for house connections. The minimum slope to the sewer line has been adopted for attaining self-cleansing velocity.

Treatment System (Typical Flow Diagram shown in following diagram)

- Primary Settling
- Activated Sludge Process
- Mechanical Sludge Dewatering



SC	SCREEN CHAMBER
WW	WET WELL (SEWAGE PUMP STATION)
PST	PRIMARY SETTLING TANK
AT	AFERATION TANK
SST	SECONDARY SETTLING TANK
PSPS	PRIMARY SLUDGE PUMPING STATION
SSPS	SECONDARY SLUDGE PUMPING STATION
ST	SLUDGE THICKENER
SDS	SLUDGE DEWATERING STATION

3.12 Soft and Hard Landscaping

FOR providing healthy environment and in order to enhance the aesthetic value of the project area, the entire layout of the housing scheme consisting of roads, streets, avenues, commercial areas, masjids, play fields parks, nullah sides etc. shall be given proper Landscape Treatment. Keeping in view, the topographical features of the area earthwork like major / minor cutting / filling, leveling / grading by deploying earthmoving machinery as well as manual labor is to be carried out before taking up planting and turfing in the area.

For beautification of median strips of carriageways, flowering shrubs, seasonal flowers etc. are to be added after completion of the earthwork. Similarly parks and playgrounds, which usually comprise hard and soft landscape operations.

Hard landscaping involves provision of pacca paths, flower boxes, concrete benches and umbrellas provision of playing equipment etc. whereas soft landscaping includes development of lawns raising of hedges, planting of flowering shrubs, shady trees, and seasonal/perennial flowerbeds.

3.13 Communication

The NAK plans to provide the entire communication infrastructure including telephone, internet and cable arrangements.

3.14 Security

In addition to Police, Naval Anchorage Karachi -NAK will have their own elaborate security system.

3.15 Fire Protection

The fire-fighting water is sourced from the urban water supply system. Fire hydrants are set close to the intersection; if the street is wider than 60m, fire hydrants shall be set along the two sides. If the fire hydrant protection radius is not greater than 150m and the spacing is not greater than 120m, it is advisable to arrange the fire hydrants on the ground. If the fire hydrants are arranged underground, obvious signs shall be set up.

3.16 Medical Facilities

The proposed NAK will have an emergency medical care unit with all necessary facilities including a burn unit.

3.17 Cost and Magnitude of the Project

Main activities will be taken during construction phase are Excavations, Concrete, asphalt, course, Mixing, Road Network, Finishing. The project consists of development of road networks, Administrative Block, Medical Facility, Sports Facility, Water Supply & Sewerage System, CETP, fire station and allied facilities. The total cost of the project is about approximately PKR 14 Billion.

3.18 Construction Aspect

3.18.1 Construction Materials

Large quantities of building and road construction materials will be required for construction of the proposed project.



The materials mainly required are listed below:

- Coarse and fine aggregate for concrete works
- Sandy gravel (free draining materials) for backfilling, embankment raising, etc.
- Cement
- Steel
- Bitumen
- Kerb Stones
- Other materials

3.18.2 Construction Camps

The construction camps have to build by the selected contractor to accommodate construction staff, machinery and batching plants. The Location of the camps has been selected in a way that there should be minimum disturbance to the ecological environment. The area of the camp has been kept sufficiently large to accommodate parking areas for machinery, construction materials and workshops. For the drinking water and other domestic uses of the camp, the treated ground water is being used.

3.18.3 Work Force and Machinery

It has been estimated that the Project will employ about 100-120 skilled, semi-skilled and unskilled workforce for its development. The Project will deploy various types of machineries for construction purposes. These will include bulldozers, excavators, shovels, dumpers, batching plant, tankers, trucks, vibrator, compactor, cranes, loaders, grader, compressors, generators, roller, bowser etc.

3.19 Restoration and Rehabilitation Plan - Construction Works

The main areas to be considered for the site restoration include the construction areas, roads and camp site tracks etc. These areas will be restored to the original condition with the maximum possible effort. The restoration work comprises the removal of temporary construction works and removal of any fence installed, levelling of areas (wherever required), etc. The following procedures will be adopted for the restoration of the site:

- All temporary construction built for the developing NAK will be removed.
- All the toxic and hazardous chemicals/materials will be completely removed the site and properly disposed of. Efforts will be made to completely remove the spills during the construction stage.
- All fencing and gates will be removed and pits will be backfilled.
- Necessary landscaping will be done as required to restore the site as per plantation plan.



- Whole of the site will be covered with the original soil and re-vegetation will be done, wherever required.
- Finally, after the completion of the restoration process, NAK will inspect the site and NAK will give restoration clearance to the Contractor

3.20 Schedule of Implementation

The completion duration of development of Naval Anchorage Karachi - NAK is 02 years. There will be a symmetrical process.

3.20.1 Project Pre-Construction

The project pre-construction phase involves preparation of master plan, Business Plan and designing documents of the NAK, financial feasibility, Land Acquisition, obtaining NOC of all concerned departments, site evaluation and schedule of working.

3.20.2 Development Phase

Construction of NAK: The construction works include civil works, , car park, Fire Stations,, Electrification, Sewerage, Waste Water Treatment Plant, Water Supply, Civil Pavements, horticulture and finishing.

3.20.3 Project Operation Phase

The NAK will be in operation soon after the Development work of the special economic zone with allied facilities. The estimated time frame for the project to be in full scale operational phase depends upon multiple factors but expected in 2 years.

The layout plan of NAK is included in **Figure 3-3**.



Figure 3-3, NAK Layout Plan

3.21 Government Approvals

The project is seeking Environmental Approval from Sindh Environmental Protection Agency (Sindh-EPA).

(Signature)
ASIAN CONSULTING ENGINEERS (PVT) LTD.
LAHORE

SECTION - 4: ANALYSIS OF ALTERNATIVE

4.1 General

The EIA guidelines define alternatives as: "different means of meeting the general purpose and requirements of the activity, which may include alternatives to the: Site (location of property), Type of Activity to be undertaken; Design or Layout; Technology to be used".

It is a specific requirement of EIA process that includes the identification and consideration of feasible alternatives in the early stage or during scoping stage of environmental assessment. The value of this requirement is that alternatives are a form of mitigation, in that certain options may avoid or reduce the nature, extent or duration of one or more impacts, on one or more aspects of the receiving environment. The following section presents an outline of the alternatives which were considered for the project.

4.2 Possible Alternatives to the Project

In the light of the objective evidence and views of the stakeholders, the below listed possible alternatives to the project are reviewed as hereunder:

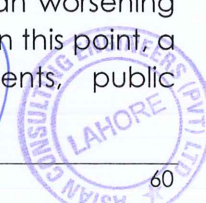
- Abandonment of the project on financial and technical grounds i.e., no project option.
- Modifying the scope (Reducing and downsizing, or enhancing and upsizing) of the project.
- Shifting the project to some other location. The above alternatives are briefly discussed below.

4.2.1 Abandonment of the Project (No Project Alternative)

The "no project" option is the ubiquitous option that can be exercised for any and every project. Exercising this option means abandonment of the project altogether and continuing with the existing position i.e., status quo.

This option could save the entire project cost of millions of rupees to the exchequer. However, the objective evidence and the pertinent data do not favor this option. As has been mentioned in earlier, there is a serious shortfall of housing units in the country compared with its availability and demand. The demand for housing units is increasing with every minute passing. The "no project" option would mean further increasing this availability demand deficit in the housing sector, which the situation cannot be afforded. The available statistics indicate that there is a lot of potential in this sector of the economy that can be tapped in both the private and the public sectors.

The construction of the project is an attempt by the proponent to reduce the growing gap between the availability and demand of housing units in the country. Non-construction of the project would therefore mean worsening the situation. In order to solicit the opinion of the stakeholders on this point, a number of persons, urban developers, real estate agents, public



functionaries, and officers of the SBCA were interviewed after explaining to them the underlying objectives of the project's construction. The majority of the interviewees favored the construction of the project as they hoped for the availability of quality housing for those who do not own a house in Karachi. None of the interviewees voted against the construction of the project. As such, this alternative of "no-action" was found devoid of any rationale, justification, or merit.

If we consider no project option then we will lose all positive impacts that will be caused due to the project; like providing residential plots to the all-income groups, provision of basic infrastructure to the people that would live there, loss of potential employment and business opportunity.

4.2.2 Changing the Scope (Reducing/Downsizing or Enhancing/Upsizing) of the Project

The second alternative could be to change the project's scope in terms of the number of the housing units, the area of the individual units and the provision of the allied and support facilities and infrastructure.

The scope-changing option may also entail changing the architectural features and layout design of the facilities to be provided under the scheme.

The design and layout alternatives of NAK is presented **Figure 4-1**.



OPTION-II



OPTION-IV

Figure 4-1, Design Alternatives



4.2.3 Shifting the Project to some other Location

The third alternative option could be relocating and shifting the project to some other site. However, the objective rationale for this option was found lacking on two counts. Firstly, it may be very difficult if not impossible to find a large and compact piece of land of suitable dimensions for constructing a housing project, as is the present one, near the city of Larkana. Secondly, despite relocating the project, the pertinent environmental impacts on the air, water, soil, and socioeconomic environment would remain almost similar in nature as would be at the present site.

Contrarily, the site owing to a number of advantages appears to be a good choice for constructing the project because not only is the barren land but also is also available and located amidst a good environment in the suburbs of Larkana. As the land is not under any other product usage, its usage for developing the housing scheme will not involve adverse land use change.

All the civic amenities and the infrastructure required for a housing scheme such as water supply, sewerage system, electricity, telephone, and natural gas is already available near the project area site. Furthermore, the construction of the project at this site does not involve the dislocation or resettlement of any population. On the other hand, relocating or shifting the project to some other site might involve land use change and or displacement and resettlement of the occupants.

Besides, the availability of such a large piece of land may be difficult. Additionally, if the proponent buys land at a new site, the cost of the project may shoot up exorbitantly, thus rendering it economically non-viable and non-affording for the target population.

The objective analysis indicates that exercising the option of shifting the project to some other location will render the project socially and financially non-viable. Non-availability of a piece of land with requisite characteristics and features will be a major restraining and impeding factor in shifting or relocating the project. Therefore, in view of the position explained above, this alternative option of shifting the project from the current site to some other location was found not feasible.

4.3 Summary of the Alternative Consideration

Based on the objective analysis, and views and opinions of the stakeholders, as detailed above, none of the alternative options, as discussed above, is feasible. Furthermore, the net socio-environmental impacts of the project, as thrashed out in this EIA study are positive in nature, which favor the construction of the project at the proposed site. Therefore, consideration of the above-discussed alternative options was found not relevant to the instant project.





4.4 Conclusion

No alternative site has been identified. If the project is not implemented, then all positive impacts related to the housing project will be lost. Therefore, the best option is to 'build as proposed' by mitigating its potential negative impacts.



SECTION - 5: DESCRIPTION OF ENVIRONMENT

5.1 Introduction

This chapter describes the baseline conditions, which cover the existing physical, ecological, and socio-economic environment of the Project Area as well as the Study Area. Information on these aspects has been derived from the desk study of available data, field visits to the Project/Study Area and information obtained through detailed consultation with the Government departments and other agencies.

5.2 Physical Resources

5.2.1 Topography

The geographical coordinates of Naval Anchorage Karachi are as follows:

- Top Left Corner: Lat 25.13 N, Long 67.63 E, Elevation 764 Feet
- Lower Right Corner: Lat 25.09 N, Long 67.67 E, Elevation 1100 Feet

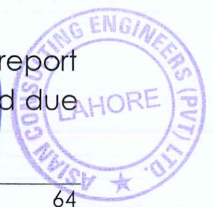
The topography within 6 kilometres of the project area contains only modest variations in elevation, with a maximum elevation change of 1250 feet and min elevation above sea level of 750 feet.

5.2.2 Geology

To evaluate the subsurface conditions at site and to arrive at a safe and economical design of the foundation for the proposed development works, geotechnical investigations were considered necessary.

After the Investigation following results are:

- Trench excavations having a depth of 5-feet or more must be excavated and shored in accordance with OSHA regulations, and we recommend that the project Contractor be solely responsible for shoring and site safety.
- Water must not infiltrate from any source; proper water proofing must be done in order to avoid any damages to foundation.
- Experienced engineer should observe the construction activities to check that the works are performed in accordance with the plans and specifications. Field and laboratory tests should be performed to confirm that the material quality, compaction and strength meet the project specifications.
- If weak/soft soil encountered at foundation excavation base of shallow foundation, it should be completely removed and backfilled with engineered fill material.
- If there is a substantial lapse of time between submission of this report and the start of work at the site and conditions have changed due





either to natural causes or to construction operation at or adjacent to site, we urge that we be promptly informed and retained to review our report to determine the applicability of the conclusions and recommendations, considering the changed conditions and/or time lapse.

5.2.3 Seismology

The project site falls in the Sindh plain which shows low to moderate level of seismicity. The project region has also been subjected to severe shaking in the past due to earthquakes in the Himalayas. Seismic Zoning Map of Pakistan places district Jamshoro in Zone 2A and 2B where it represents peak horizontal ground acceleration from 1.6 to 0.8.

Probabilistic seismic hazard assessment recently carried out for Jamshoro area as part of the revision of seismic provisions of the Building Code of Pakistan shows that the project area falls in Zone 2A & 2B. Seismic zone of Pakistan is shown in figure 5.1. It is therefore recommended that the project structures should be designed to cater the requirements of Zone 2A & 2B of Building Code of Pakistan (2007). Based on the evaluation of tectonic setting and seismicity of the project region, it is recommended that the important project structures should be designed to withstand a horizontal peak ground acceleration of 0.15g with 10% probability of exceedance in 50 year; **Figure 5-1**

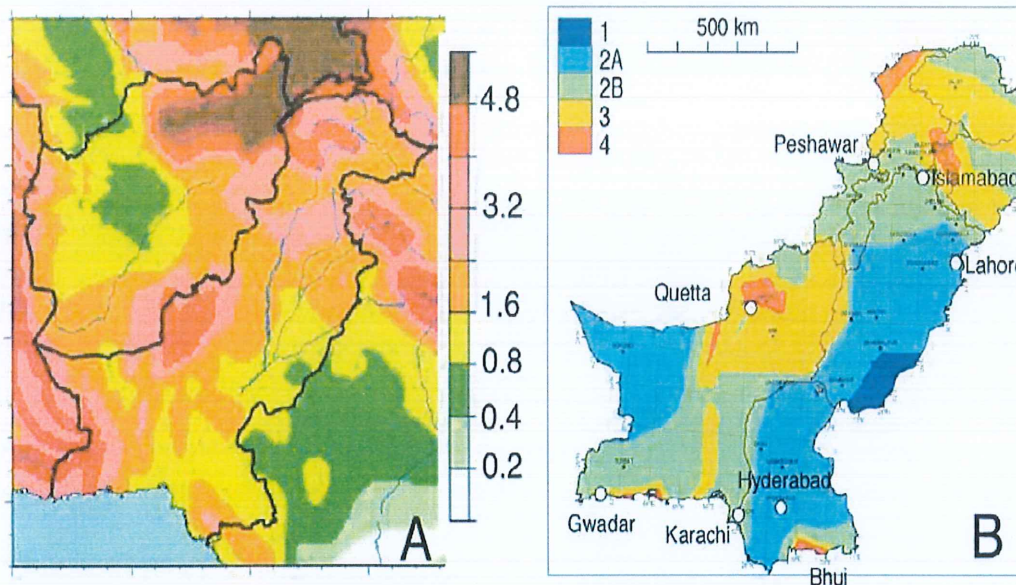
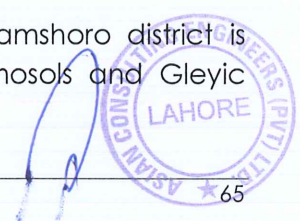


Figure 5-1, Seismic Zone of Pakistan (Geological Survey of Pakistan)

5.2.4 Soil

According to FAO UNESCO Soil Classification of the Jamshoro district is divided into three categories i.e. Lithosols, Calcic Yermosols and Gleyic





Solonchaks. The soil of the proposed project area is Lithosols.

- **Lithosols:** soils which are limited in depth by continuous coherent and hard rock within 10 cm of the surface.
- **Calcic Yermosols:** Yermosols having a calcic horizon within 125 cm of the surface.
- **Gleyic Solonchaks:** Solonchack showing hydromorphic properties within 50 cm of the surface.

The project site in Nooriabad which is mainly sedimentary rocky hills (mountains) and loose sediments predominantly deposits of older River.

5.2.5 Climate

The climate of Jamshoro district is randomly pleasant. In summer, the northern part (Sehwan) is hotter than that of other parts of the district and normal cool in winter. According to climatic zones of Pakistan, the district lies in "hot summer & mild winters" and seasonally falls under arid regions. Mild winter extends from November to February and few cold waves take place occasionally due to western weather disturbances. Summer occurs from March to June and hot weather sets in when hot winds blow from the desert area. When the pressure vacuum builds up in the north Arabian Sea, it stops sea breeze over the entire Sindh coast.

The last Five (05) years data was procured from the nearest metrological station maintained by Pakistan Meteorology Department. As no station exists in the district therefore, meteorological data from Hyderabad has been used which provide a general idea of the baseline climatic conditions of the project area and its surroundings. Following metrological parameters are used for the establishment of baseline. Yearly mean maximum and minimum temperatures is presented below in **Figure 5-2**.

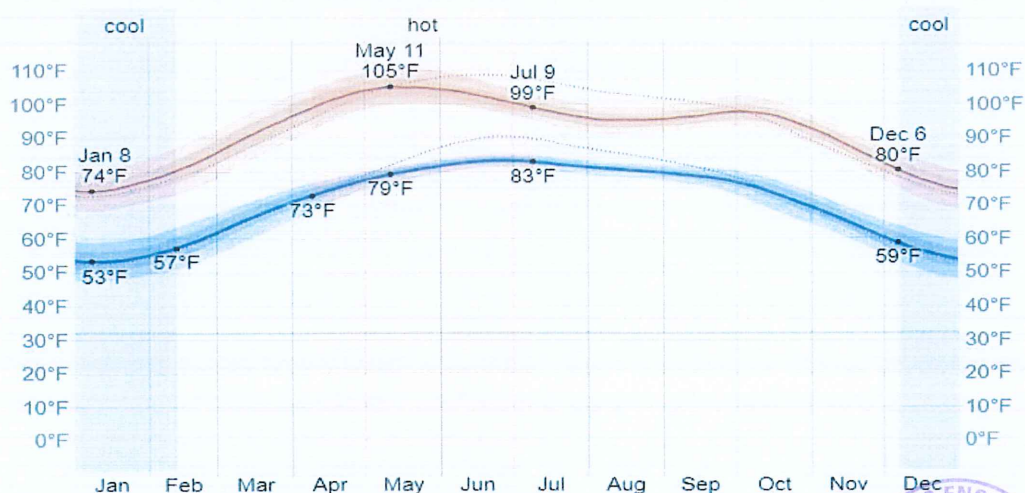


Figure 5-2, Mean Maximum & Minimum Temperature (Data Source: Metoblue)

5.2.6 Rainfall

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered around each day of the year. Jāmshoro experiences some seasonal variation in monthly rainfall. The rainy period of the year lasts for 2.8 months, from June 29 to September 21, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Jāmshoro is August, with an average rainfall of 1.5 inches. The rainless period of the year lasts for 9.2 months, from September 21 to June 29. The month with the least rain in Jāmshoro is November, with an average rainfall of 0.1 inches. The mean monthly rainfall records for project area can be seen in **Figure 5-3**.

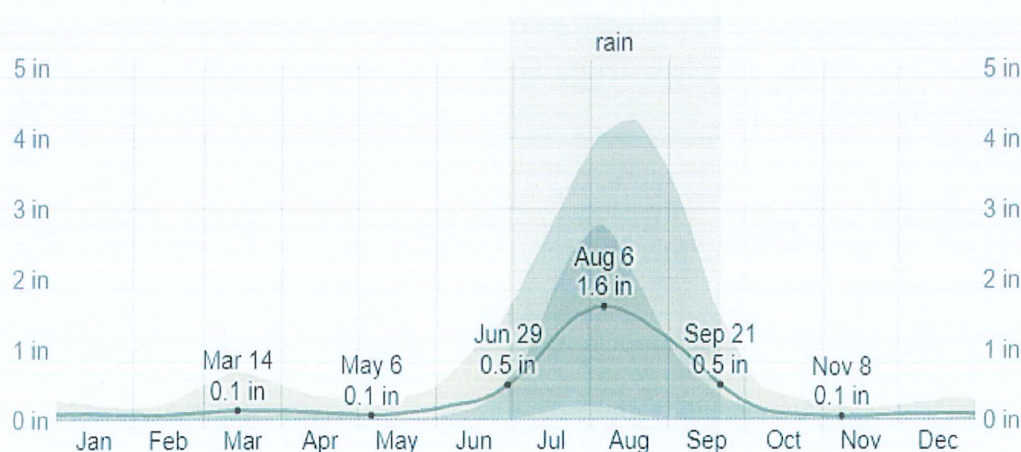


Figure 5-3, Annual Rainfall Pattern (Data Source: Metoblue)

5.2.7 Relative Humidity

We base the humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points feel drier and higher dew points feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night.

Jamshoro experiences extreme seasonal variation in the perceived humidity. The muggier period of the year lasts for 5.8 months, from April 22 to October 14, during which time the comfort level is muggy, oppressive, or miserable at least 25% of the time. The month with the muggiest days in Jamshoro is July, with 30.3 days that are muggy or worse. The month with the fewest muggy days in Jashoro is January, with 0.1 days that are muggy or worse. The mean monthly relative humidity for Ghotki can be seen in **Figure 5-4**.



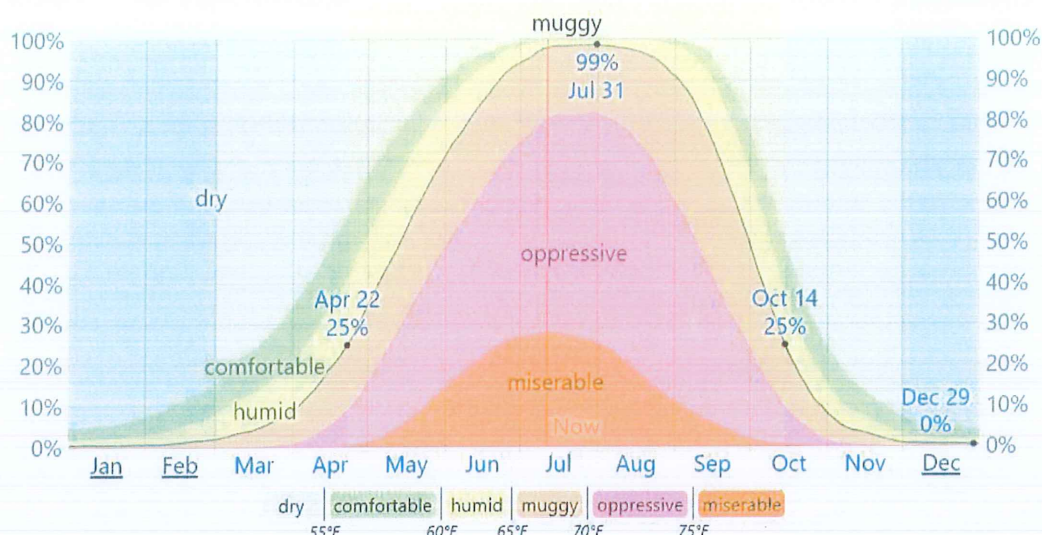


Figure 5-4, Annual Humidity Pattern (Data Source: Metoblue)

5.2.8 Wind Speed and Direction

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages. The average hourly wind speed in Jāmshoro experiences extreme seasonal variation over the course of the year.

The windier part of the year lasts for 4.9 months, from April 19 to September 15, with average wind speeds of more than 11.0 miles per hour. The windiest month of the year in Jāmshoro is June, with an average hourly wind speed of 15.6 miles per hour. The calmer time of year lasts for 7.1 months, from September 15 to April 19. The calmest month of the year in Jāmshoro is November, with an average hourly wind speed of 6.4 miles per hour.

Figure 5-5 shows the average wind speed in the proposed project area.



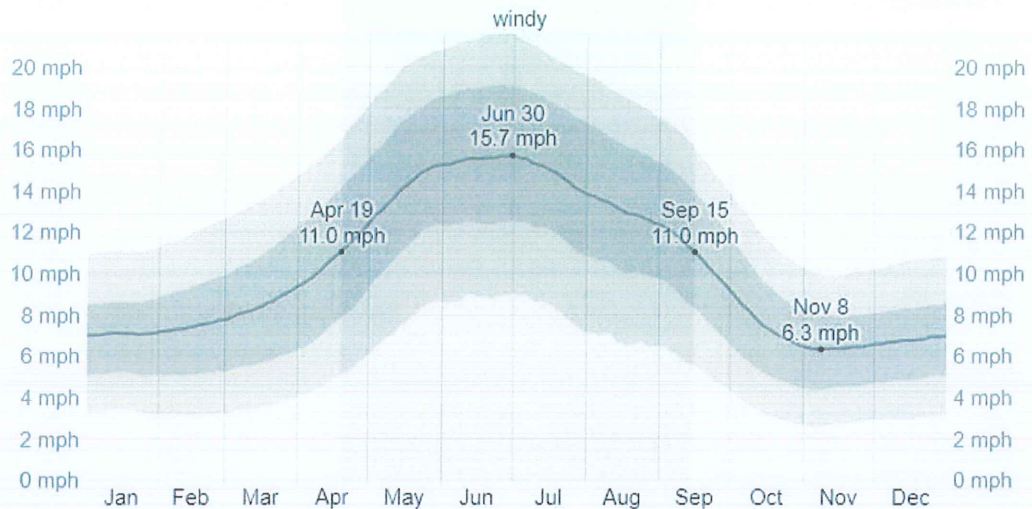


Figure 5-5, Annual Wind Speed (Data Source: Metoblue)

The predominant average hourly wind direction in Jāmshoro varies throughout the year. The wind is most often from the west for 8.4 months, from February 21 to November 2, with a peak percentage of 84% on May 14. The wind is most often from the north for 3.7 months, from November 2 to February 21, with a peak percentage of 68% on January 1. **Figure 5-6** shows the wind direction the proposed project area.

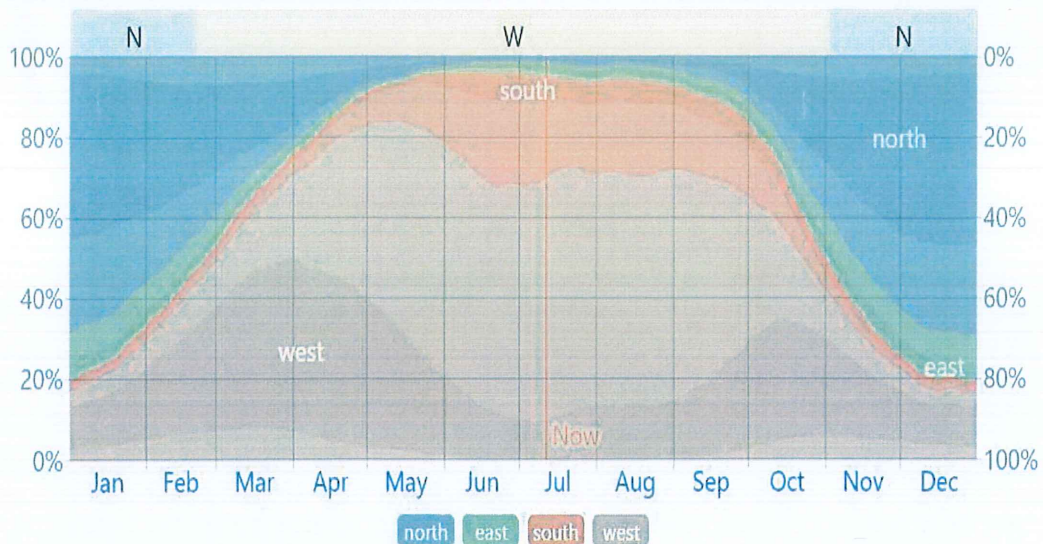


Figure 5-6, Annual Wind Direction Pattern (Data Source: Metoblue)

5.3 Water Resources

5.3.1 Surface water

Surface water in the Study Area of the Project is present in the form of flood drains / ponds.

5.3.2 Ground water

To establish baseline of the proposed project site, water samples were collected from 02 different locations nearby proposed project area subjected to chemical analysis and microbiological in the Lab.

The analysis results are given as under and reports are attached as Anneure-6 and summarized in **Table 5-1**.

Table 5-1, Results of Drinking Water Analysis

Drinking Water Analysis Results					
Parameter	Analysis Method	SEQS	Result	MU (CL95%)	Remarks
Lab Analysis					
Color	SMWW 2120 C	≤ 15 TCU	0	N.A.	Optimal
Taste	SMWW 2160 C	Non-Objectionable	Non-Objectionable	N.A.	Optimal
Odor	SMWW 2150 B	Non-Objectionable	Non-Objectionable	N.A.	Optimal
Turbidity	SMWW 2130 B	< 5 NTU	0	N.A.	Optimal
Total Hardness (as CaCO ₃) **	SMWW 2340 C	< 500 mg/L	50	± 0.87	Optimal
Total Dissolved Solids (TDS)**	SMWW 2540 C	< 1000 mg/L	174	± 0.81	Optimal
pH**	SMWW 4500 H ⁺ B	6.5- 8.5	7.15	± 0.70	Optimal
Aluminum (Al)	SMWW 3111 B	≤ 0.2 mg/L	0.006	N.A.	Optimal
Antimony (Sb)	SMWW 3114 B	≤ 0.005 mg/L	0.005	N.A.	Optimal
Arsenic (As)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Barium (Ba)	SMWW 3113 B	0.7 mg/L	0.0035	N.A.	Optimal
Boron (B)	SMWW 3113 B	0.3 mg/l	<0.02	N.A.	Optimal
Cadmium (Cd)	SMWW 3113 B	0.01 mg/L	<0.006	N.A.	Optimal
Chloride (Cl ⁻) **	SMWW 4500 Cl ⁻ B	< 250 mg/L	85	± 1.22	Optimal
Chromium (Cr)	SMWW 3113 B	≤ 0.05 mg/L	<0.004	N.A.	Optimal
Copper (Cu)	SMWW 3111 B	2.0 mg/L	<0.164	N.A.	Optimal
Cyanide (CN ⁻)	SMWW 4500 CN ⁻ F	≤ 0.05 mg/L	0	N.A.	Optimal
Fluoride (F ⁻)**	SMWW 4500 F ⁻ D	≤ 1.5 mg/L	0.05	± 0.71	Optimal
Lead (Pb)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Manganese (Mn)	SMWW 3113 B	≤ 0.5 mg/l	0.015	N.A.	Optimal
Mercury (Hg)	SMWW 3114 B	≤ 0.001 mg/L	<0.001	N.A.	Optimal
Nickel (Ni)	SMWW 3113 B	≤0.02 mg/L	<0.02	N.A.	Optimal
Nitrate (NO ₃ ⁻)	SMWW 4500 NO ₃ ⁻ B	≤ 50 mg/L	0.33	N.A.	Optimal

Drinking Water Analysis Results					
Parameter	Analysis Method	SEQS	Result	MU (CL95%)	Remarks
Nitrite (NO ₂ ⁻)	SMWW 4500 NO ₂ ⁻ B	≤ 3.0 mg/L	0.0	N.A.	Optimal
Selenium (Se)	SMWW 3114 B	0.01 mg/L	<0.01	N.A.	Optimal
Residual Chlorine (Cl ₂)	SMWW 4500 Cl ⁻ B	0.5 mg/L	0	N.A.	Optimal
Phenolic Compounds (as Phenols)	SMWW 5530 D	NGVS	0	N.A.	Optimal
Zinc (Zn)	SMWW 3113 B	5.0 mg/L	0.053	N.A.	Optimal
Microbiological Analysis					
Total Coliforms	SMWW 9222 B	0/ 100 mL CFU	0	N.A.	Optimal
Fecal Coliforms	SMWW 9222 D	0/ 100 mL CFU	0	N.A.	Optimal

Table 5-2, Results of Drinking Water Analysis

Drinking Water Analysis Results					
Parameter	Analysis Method	SEQS	Result	MU (CL95%)	Remarks
Lab Analysis					
Color	SMWW 2120 C	≤ 15 TCU	0	N.A.	Optimal
Taste	SMWW 2160 C	Non-Objectionable	Slightly Salty	N.A.	High
Odor	SMWW 2150 B	Non-Objectionable	Non-Objectionable	N.A.	Optimal
Turbidity	SMWW 2130 B	< 5 NTU	0	N.A.	Optimal
Total Hardness (as CaCO ₃) **	SMWW 2340 C	< 500 mg/L	200	± 0.87	Optimal
Total Dissolved Solids (TDS)**	SMWW 2540 C	< 1000 mg/L	994	± 0.81	Optimal
pH**	SMWW 4500 H ⁺ B	6.5- 8.5	8.15	± 0.70	Optimal
Aluminum (Al)	SMWW 3111 B	≤ 0.2 mg/L	0.006	N.A.	Optimal
Antimony (Sb)	SMWW 3114 B	≤ 0.005 mg/L	0.006	N.A.	Optimal
Arsenic (As)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Barium (Ba)	SMWW 3113 B	0.7 mg/L	0.0037	N.A.	Optimal
Boron (B)	SMWW 3113 B	0.3 mg/l	<0.02	N.A.	Optimal
Cadmium (Cd)	SMWW 3113 B	0.01 mg/L	<0.006	N.A.	Optimal
Chloride (Cl ⁻) **	SMWW 4500 Cl ⁻ B	< 250 mg/L	380	± 1.22	High
Chromium (Cr)	SMWW 3113 B	≤ 0.05 mg/L	<0.004	N.A.	Optimal
Copper (Cu)	SMWW 3111 B	2.0 mg/L	<0.164	N.A.	Optimal
Cyanide (CN ⁻)	SMWW 4500 CN ⁻ F	≤ 0.05 mg/L	0	N.A.	Optimal

Drinking Water Analysis Results					
Parameter	Analysis Method	SEQS	Result	MU (CL95%)	Remarks
Fluoride (F)**	SMWW 4500 F-D	≤ 1.5 mg/L	0.16	± 0.71	Optimal
Lead (Pb)	SMWW 3114 B	≤ 0.05 mg/L	<0.005	N.A.	Optimal
Manganese (Mn)	SMWW 3113 B	≤ 0.5 mg/l	0.015	N.A.	Optimal
Mercury (Hg)	SMWW 3114 B	≤ 0.001 mg/L	<0.001	N.A.	Optimal
Nickel (Ni)	SMWW 3113 B	≤ 0.02 mg/L	<0.02	N.A.	Optimal
Nitrate (NO ₃ ⁻)	SMWW 4500 NO ₃ ⁻ B	≤ 50 mg/L	4.42	N.A.	Optimal
Nitrite (NO ₂ ⁻)	SMWW 4500 NO ₂ ⁻ B	≤ 3.0 mg/L	0.002	N.A.	Optimal
Selenium (Se)	SMWW 3114 B	0.01 mg/L	<0.01	N.A.	Optimal
Residual Chlorine (Cl ₂)	SMWW 4500 Cl ₂ B	0.5 mg/L	0	N.A.	Optimal
Phenolic Compounds (as Phenols)	SMWW 5530 D	NGVS	0	N.A.	Optimal
Zinc (Zn)	SMWW 3113 B	5.0 mg/L	0.053	N.A.	Optimal
Microbiological Analysis					
Total Coliforms	SMWW 9222 B	0/ 100 mL CFU	0	N.A.	Optimal
Fecal Coliforms	SMWW 9222 D	0/ 100 mL CFU	0	N.A.	Optimal



Drinking water sampling

Figure 5-7, Pictorial Profile of Baseline Investigations and Observations

5.4 Solid Waste

In the Study Area, mostly good solid waste collection and transportation system is not in practice. People dump their waste openly and no proper waste collection system exists locally.

5.5 Ambient Air Quality

Air pollution has a direct impact on the health of humans and the environment. However, to assess the air quality baseline components in the

proposed project surrounding, the ambient air monitoring equipment was placed at different sample locations by mobilizing Environmental Sampling and Monitoring team of SEPA approved testing lab who carried out ambient air monitoring on 29th June, 2022 at 03 different locations with the project surrounding areas to monitor the compliance status under SEQs. Ambient air quality and noise level sampling results can be seen as **Table 5-3**. While the Lab analysis reports are given as **Annexure-2**

Table 5-3, Results of Ambient Air Quality and Noise Level Monitoring

Parameters	Units	Monitoring Duration	LDL	Average Obtained Concentration	SEQs	Remarks
Location-01						
Nitrogen Dioxide (NO ₂)	µg/m ³	24Hours	1.00	23.92	80.0	Optimal
Nitrogen Oxide (NO)	µg/m ³	24Hours	1.00	10.60	40.0	Optimal
NO _x	µg/m ³	24Hours	1.00	34.48	120.0	Optimal
Sulphur Dioxide (SO ₂)	µg/m ³	24Hours	1.00	30.68	120.0	Optimal
Carbon Monoxide (CO)	mg/m ³	24Hours	0.01	0.82	05.0	Optimal
Particulate Matter (PM ₁₀)	µg/m ³	24Hours	1.00	135.68	150	Optimal
Particulate Matter (PM _{2.5})	µg/m ³	24Hours	1.00	47.22	75	Optimal
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	244.56	500	Optimal
Location-02						
Nitrogen Dioxide (NO ₂)	µg/m ³	24Hours	1.00	25.16	80.0	Optimal
Nitrogen Oxide (NO)	µg/m ³	24Hours	1.00	8.46	40.0	Optimal
NO _x	µg/m ³	24Hours	1.00	33.57	120.0	Optimal
Sulphur Dioxide (SO ₂)	µg/m ³	24Hours	1.00	27.02	120.0	Optimal
Carbon Monoxide (CO)	mg/m ³	24Hours	0.01	0.80	05.0	Optimal
Particulate Matter (PM ₁₀)	µg/m ³	24Hours	1.00	131.48	150	Optimal
Particulate Matter (PM _{2.5})	µg/m ³	24Hours	1.00	45.19	75	Optimal
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	240.56	500	Optimal
Location-03						
Nitrogen Dioxide (NO ₂)	µg/m ³	24Hours	1.00	25.91	80.0	Optimal
Nitrogen Oxide (NO)	µg/m ³	24Hours	1.00	14.11	40.0	Optimal
NO _x	µg/m ³	24Hours	1.00	39.97	120.0	Optimal
Sulphur Dioxide (SO ₂)	µg/m ³	24Hours	1.00	28.01	120.0	Optimal
Carbon Monoxide (CO)	mg/m ³	24Hours	0.01	0.87	05.0	Optimal
Particulate Matter (PM ₁₀)	µg/m ³	24Hours	1.00	139.65	150	Optimal
Particulate Matter (PM _{2.5})	µg/m ³	24Hours	1.00	440.18	75	Optimal
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	236.15	500	Optimal



Ambient Air Monitoring

Figure 5-8, Pictorial Profile of Baseline Investigations and Observations

5.6 Ecological Resources

5.6.1 Introduction

The climate of the area is of subtropical continental type, characterized by low and sporadic rainfall, high temperatures, low relative humidity, high rate of evaporation and strong summer winds. Temperature ranges from 41°C during summer to 19°C during winter and the hottest months are May and June. Annual rainfall varies between 200 to 300 mm and average relative humidity is about 60%. Soils of the lowland plains are sandy, unconsolidated and skeletal, but are shallow to absent on the muddy mountains. Salinity is locally high around some water ponds. Ground-water aquifers are the primary source of water for perennial, woody vegetation and for use by people, and depth to the water-table varies from a few meters to more than 100 m (Anonymous., 2004).

The Site is dominated by open communities of small trees and shrubs, some of which are winter (dry season) deciduous. Common species include *Acacia modesta*, *Prosopis juliflora*, *Tamarix aphylla*, *Capparis decidua*, *Euphorbia royleana* and *Zizyphus nummularia*. Vegetation cover rarely exceeds 20% during the dry season, but a flush of ephemeral grasses and herbs may emerge from a dormant soil seed bank following the summer monsoon, temporarily increasing vegetation cover, and graze and browse available for wildlife and livestock. Human activities focus on the production

of agricultural crops including cotton, onions and wheat in irrigated fields, mung bean, lentils and millet in walled, dry fields, and the grazing of livestock (Roberts *et al.*, 2005).

The Flora Survey data analysis interprets that project site consist of wild sparse thorn vegetation as rainwater nourishing is only way to plant life support. No irrigation system is present to manage plantation. 33 Species belonging to 16 families (Figure 4) . Among them 09 tree species, 08 shrubs, 12 herbs and 04 grass species found.

5.6.2 Methodology

The Flora and Fauna survey were conducted during the month of April 2023. A Team of Botanist and environmentalists visited the project site from 03-04-2023 to 05-04-2023 for screening and detailed analysis. The plants and animals species observed, identified and recorded using standard biological methods.

A) Core Project Team

The details of ecological study team members are given in Table 2.

Table 5-4, Core Project team

Name	Area of Expertise	Qualification
Mr. Muhammad Ibrar	Botanist, Environmentalist	M. Phil Botany (GC University Lahore)
Mr. Shakeel Masih	Ornithologist & Wildlife	M. Phil Zoology (FC College University Lahore)

B) Flora surveys

Ecological surveys conducted for the study of flora, which included project area using Flora of Pakistan (Ali and Qaiser, 1992-2007; Ali and Nasir, 1990-92).

5.6.3 Sample size and Vegetation Sampling

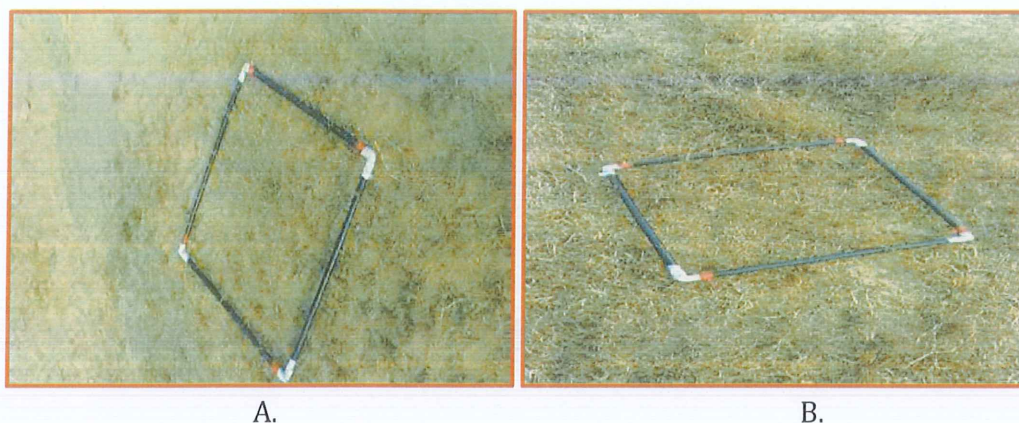
The sites based upon the presence of natural vegetation selected and surveys conducted. Transect walks were carried out for the study of flora.

Within each sample plot, all plants were divided into four layers, i.e. tree, shrub, herb and grass layer, and we surveyed each of the layers. The size of sample was 100 m² at each sampling site. A long measuring tape (25m) was laid across the stand in the communities under study and fixed with two hooks at two ends (Fang *et al.*, 2012).

The individual plants recorded touching the measuring tape and the distance from a particular end. For abundance and measurement 10×10m, quadrats were used for tree vegetation, 5×5m quadrats for shrubs and 1×1m were taken for herbs and grasses (**Figure 5-9**) (Sharma *et al.* 2014, Sadia *et al.*, 2014).



2021).



A and B Quadrat method in Project site for species abundance

Figure 5-9, Vegetation Sampling

5.6.4 Data Analysis and Interpretations

A) The DAFOR Scale

The abundance of species in the project areas was determined using the DAFOR scale. Specifically, the Dominant, Abundant, Frequent, Occasional, Rare and Absent (the DAFOR) scale records the vegetative cover of an area and represents the abundance of species (Hearnshaw *et al* 2010).

Table 5-5, The DAFOR Scale

Abundance (% age)	DAFOR Class	Abbreviation
51 – 100	Dominant	D
31 – 50	Abundant	A
16 – 30	Frequent	F
6 – 15	Occasional	O
1 – 5	Rare	R
0	Absent	X

5.6.5 IUCN Categories

The IUCN Red List Categories of Flora of Sindh visited to collect the relevant Data on the Flora of Sindh. Being an easily and widely understood system for classifying species at high risk of global extinction was used. The general aim of the system is to provide an explicit, objective framework for the classification of the broadest range of species according to their extinction risk. However, while the Red Data List may focus attention on those taxa at the highest risk, it is not the sole means of setting priorities for conservation measures for their protection. The following categories are proposed in IUCN Red Data Listing (IUCN, 2021)



Extinct (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died.

Extinct in the Wild (EW)

A taxon is Extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed extinct in the wild if exhaustive surveys in its known habitat in its historical range have failed to record an individual.

Critically Endangered (CE)

A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.

- Range reduction of 80% over 3 generations or 10 years;
- Occurrence of less than 100sq km or occupancy of less than 10sq km and decline in populations;
- Less than 250 plants and decline;
- Less than 50 matured plants;
- Probability of extinction of 50% in 10 years or 3 generations.

Endangered (EN)

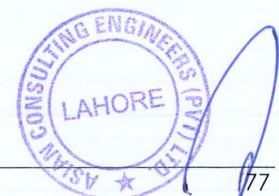
A taxon is endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.

- A. Range reduction of 50% over 3 generations or 10 years;
- B. Occurrence of less than 5,000sq km or occupancy of less than 500 Sq. km and decline in populations
- C. Less than 2,500 plants and decline;
- D. Less than 250 mature plants;
- E. Probability of extinction of 20% in 20 years or 5 generations.

Vulnerable (VU)

A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.

- A. Range reduction of 20% over 3 generations or 10 years;
- B. Occurrence of less than 20,000 Sq. km or occupancy of less than 2,000 Sq. km and decline in
- C. Less than 10,000 plants and decline;
- D. Less than 1 000 mature plants, or low occupancy (<100km²), or less than 5 locations;
- E. Probability of extinction of 10% in 100 years.





Lower Risk (LR)

A taxon is Lower Risk when it has been evaluated, does not fall into the categories Critically Endangered, Endangered or Vulnerable. There are three subcategories:

- Conservation Dependent (CD)

Taxa which are the focus of a continuing conservation program, and which would become threatened if such actions stopped.

- Near Threatened (NT)

Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.

- Least Concern (LC)

Taxa, which do not qualify for Conservation Dependent or Near Threatened.

Data Deficient (DD)

A taxon is Data Deficient when there is inadequate information to make an assessment based on its distribution and population status.

Not Evaluated (NE)

A taxon is Not Evaluated when it has not been assessed against the criteria.

Red data listing of Flora of Project Area:

All the plants collected from targeted areas were placed in their respective groups, such as trees, shrubs, herbs, grasses and sedges. The plants were arranged in their alphabetic order, the percentage (%age) frequency and the conservation status of each plant species were also recorded.

5.6.6 Fauna Surveys

Surveys conducted for the study of fauna of Project site. Data collection, analysis and interpretations as well as findings are fully described and thoroughly discussed in relevant sections of the Study Report.

5.6.7 Data Analysis & Interpretations

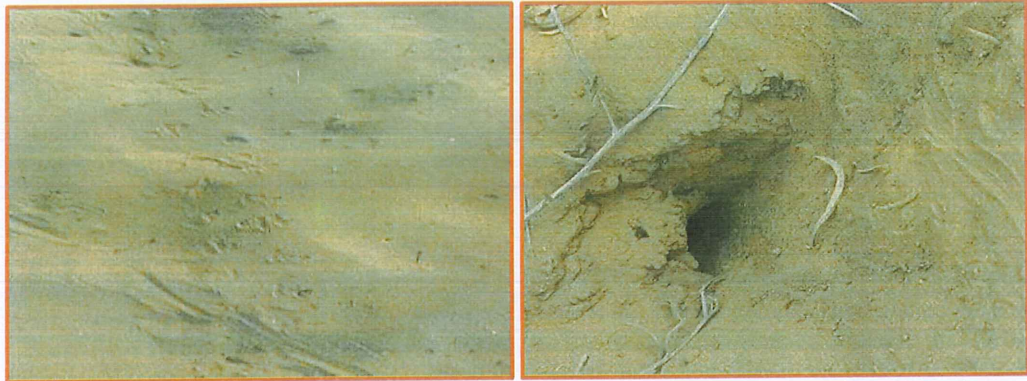
A) Mammal Assessment

A significant number of mammalian species are nocturnal, which means that they are predominantly active during the night and remain elusive during daytime, hence apart from direct sightings, indirect sampling methods were used. These methods compensate for the lack of night field surveys and enable detailed sampling without relying on direct observations and trappings. Mammal assessment was carried out using methods described by Roberts (1997, 2005). The survey was conducted by three surveyors from dawn till dusk for a period of three days.



5.6.8 Spoor Tracking

Spoor tracking is an indirect survey method which uses observations such as footprint, burrows, den sites etc. to indicate the presence of a species. The method is simple, cost effective and comprehensive as it reduces dependency on direct sighting. However, the extent of details of a footprint and its preservation entirely depends on the suitability of soil.



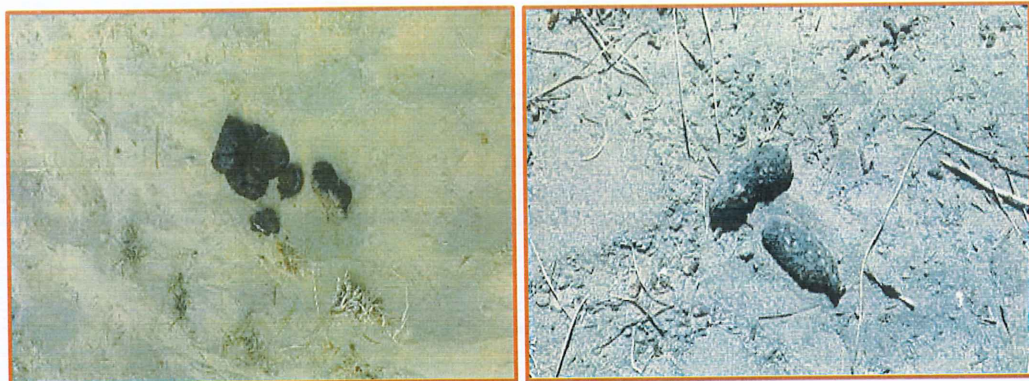
A) Trails of snakes

B) Burrow of Hare

Figure 5-10, SPOOR TRACKING

5.6.9 Scats Survey

Another indirect method is the use of fecal matter to identify species. The morphometric analysis (size and shape) of the fecal matter allows identification of the taxonomic group (Chame 2003). The method acts as a supplement to spoor tracking and an excellent measure of mammalian diversity and its abundance.



A) Dung of cow

B) Dung of Jackal

Figure 5-11, Scats Survey

5.6.10 Public Survey

The local people at the survey sites interviewed regarding the species presence, abundance, and threats. Due to nocturnal habit and elusive nature, several mammalian species may go unreported if the survey solely relied on direct observations.

5.6.11 Avifauna Assessment

The Avifauna survey was based on, line-transect, point count, general observation and call recognition. The survey was conducted from dawn till dusk the activity and detect-ability of the avifauna remained at optimal level. The birds were observed with binoculars (10 x 50), and identified with the help of acclaimed field guide Grimmett et al., 2008. The point count method involved walking on a line transect and taking observations after a settling period of one minute.

5.6.12 Fish Assessment

Fishes collected from wetlands, streams (small rainy water channel) and ponds using local available gears and nets. Local area fisherman was also interviewed to collect data regarding fishes

5.6.13 Reptiles and amphibian Assessment

A) Active Search Method and Direct Observations:

Active search method adopted whereby debris, logs, wetlands and ponds searched for reptiles and amphibians for signs such as shed skin. Therefore, the survey primarily focused on search of indirect evidence through active searching. Some members directly observed during the survey. Khan, M.S (2006) used for the identification key and distribution of species.

B) Road kill

The Reptile and Amphibian species found dead due to road kill or otherwise on roads or adjacent areas within 500 m observed.

C) Public Survey

In consideration of the hibernation period, local people, guards, and staff of the site in the Area of the project was questioned regarding the variety and abundance of the reptiles and amphibians. The interview data served as the secondary source to confirm the presence of some species.

5.7 Flora Survey

Species belonging to 16 families (Figure 4) reported 33 plant species from project site. Among them 09 tree species, 08 shrubs, 12 herbs and 04 grass species found. *Acacia modesta*, *Prosopis juliflora*, *Tamarix aphylla*, *Capparis decidua*, *Euphorbia royleana* and *Zizyphus nummularia* (Figure 5-12 and Table 5-6 & Table 5-9).

FLORAL FAMILIES DIVERSITY

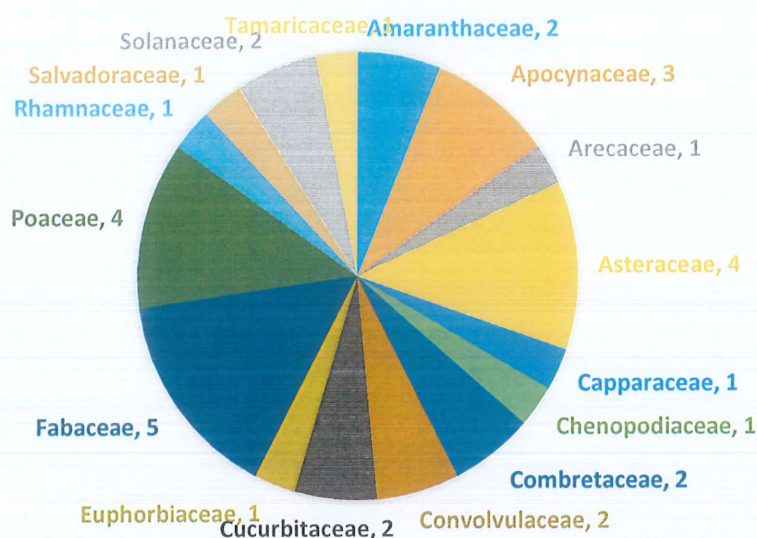


Figure 5-12, Floral Families Diversity of Project site

Table 5-6, Tree Diversity

Sr. No.	Scientific Names	Common Names	Families	DAFOR Scale	IUCN Red List Status
TREES					
1	<i>Acacia nilotica</i>	Wild Acacia	Fabaceae	A	NE
2	<i>Acacia modesta</i>	Phullai	Fabaceae	A	NE
3	<i>Phoenix dactylifera</i>	Dates	Areaceae	O	LC
4	<i>Conocarpus erectus</i>	Cono tree	Combretaceae	F	LC
5	<i>Prosopis cineraria</i>	Jand	Fabaceae	A	NE
6	<i>Prosopis juliflora</i>	Mesquite	Fabaceae	D	NE
7	<i>Salvadora oleoides</i>	Pilkun	Salvadoraceae	F	DD
8	<i>Tamarix aphylla</i>	Athel tree	Tamaricaceae	F	NE
9	<i>Ziziphus jujuba</i>	Jujube	Rhamnaceae	F	LC

Table 5-7, Shrubs Diversity

Sr. No.	Scientific Names	Common Names	Families	DAFOR Scale	IUCN Red List Status
SHRUBS					
1	<i>Tamarix aphylla</i>	Athel tamarisk	Tamaricaceae	F	NE
2	<i>Alhagi maurorum</i>	Alhagi	Fabaceae	F	NE
3	<i>Calotropis procera</i>	Apple of sodom	Apocynaceae	A	NE



Sr. No.	Scientific Names	Common Names	Families	DAFOR Scale	IUCN Red List Status
4	<i>Capparis decidua</i>	Karira	Capparaceae	A	DD
5	<i>Nerium oleander</i>	Kaner	Apocynaceae	F	LC
6	<i>Pseuda fruiticosa</i>	Seuda	Amaranthaceae	R	LC
7	<i>Leptadenia pyrotechnica</i>	Khipp	Apocynaceae	F	LC
8	<i>Ziziphus nummularia</i>	Lotebush	Rhamnaceae	O	NE

Table 5-8, Herbs Diversity

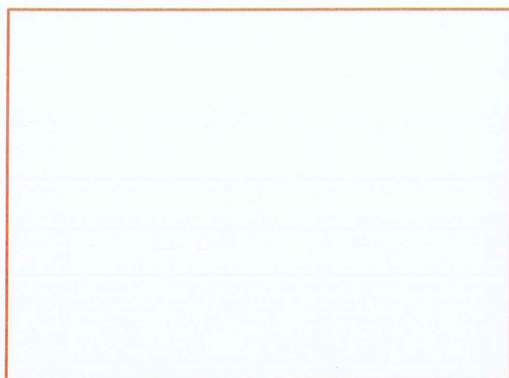
Sr. No.	Scientific Names	Common Names	Families	DAFOR Scale	IUCN Red List Status
HERBS					
1	<i>Salsola imbricata</i>	Salsola	Chenopodiaceae	F	NE
2	<i>Aerva javanica</i>	kapok bush	Amaranthaceae	F	NE
3	<i>Euphorbia royleana</i>	Royle's spurge	Euphorbiaceae	A	NE
4	<i>Carthamus oxyacantha</i>	Thistle	Asteraceae	R	LC
5	<i>Convolvulus prostratus</i>	Convolvulus	Convolvulaceae	O	LC
6	<i>Citrullus colocynthus</i>	Bitter cucumber	Cucurbitaceae	O	NE
7	<i>Datura innoxia</i>	Datura	Solanaceae	O	NE
8	<i>Cucumis prophetarum</i>	Wild cucumber	Cucurbitaceae	F	NE
9	<i>Launaea procumbens</i>	Creeping Launaea	Asteraceae	R	LC
10	<i>Parthenium hysterophorus</i>	Parthenium	Asteraceae	R	NE
11	<i>Taraxacum officinale</i>	Common Dandelion	Asteraceae	O	LC
12	<i>Solanum xanthocarpum</i>	Yellow berry	Solanaceae	R	NE

Table 5-9, Grasses Diversity

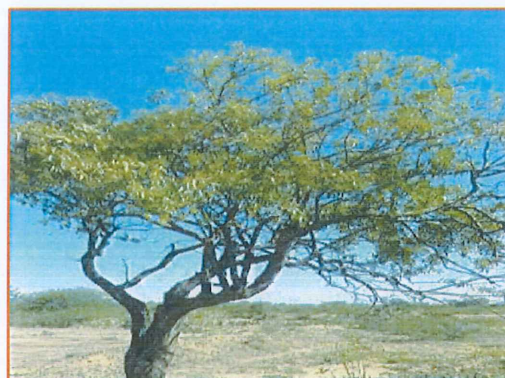
Sr. No.	Scientific Names	Common Names	Families	DAFOR Scale	IUCN Red List Status
GRASSES					
1	<i>Aristida depressa</i>	Wiregrasses	Poaceae	O	LC
2	<i>Cynodon dactylon</i>	Dub grass	Poaceae	R	NE



Sr. No.	Scientific Names	Common Names	Families	DAFOR Scale	IUCN Red List Status
3	<i>Digitaria ciliaris</i>	Crab grass	Poaceae	R	NE
4	<i>Eleusine indica</i>	Crows feet	Poaceae	R	LC



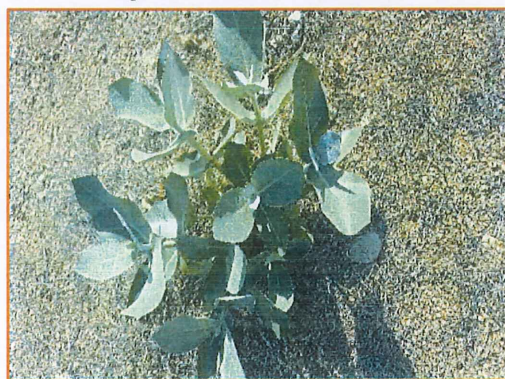
A) *Acacia modesta*



B) *Salvadora oleoides*



E) *Euphorbia royleana*



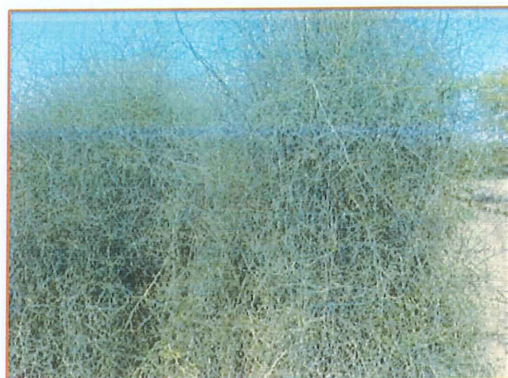
F) *Calotropis procera*



G) *Prosopis juliflora*



H) *Convolvulus prostratus*



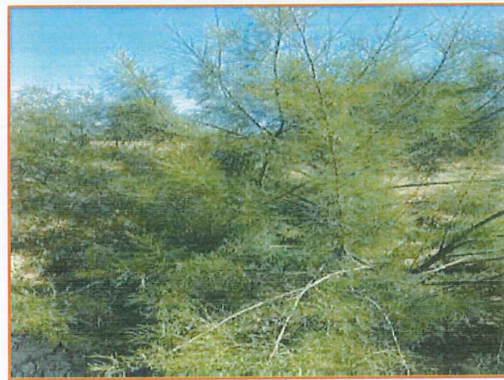
A) *Capparis decidua*



B) *Leptadenia pyrotechnica*



E) *Alhagi maurorum*



F) *Tamarix aphylla*



G) *Cucumis prophetarum*



H) *Salsola imbricata*

Figure 5-13, Diversity of Floral Species of Naval Anchorage Site

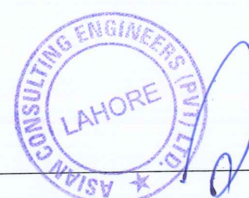
5.8 Fauna Survey

The fauna species observed and recorded at and around the project site. Total twelve bird's species, eleven mammals' species, five reptiles, two amphibians and three grazing mammals' species observed. The common birds include Common Myna, Laughing Dove, Common Quail, and Collared-Dove, Indian Robin, Indian roller, House crow, Black partridge, Common Babbler and Grey partridge. Dog, Donkeys, Squirrel, Jackals and mongoose were common mammals. Some species of birds, amphibians and reptiles were also noted (**Table 5-10** and **Figure 5-14**).



Table 5-10, Fauna of Naval Anchorage Site

Scientific Names	Common Names	IUCN Status
BIRDS		
<i>Acridotheres tristis</i>	Common Myna	LC
<i>Spilopelia senegalensis</i>	Laughing Dove	LC
<i>Streptopelia decaocto</i>	Collared-Dove	LC
<i>Coturnix coturnix</i>	Common Quail	LC
<i>Copsychus fulicatus</i>	Indian Robin	LC
<i>Coracias benghalensis</i>	Indian roller	LC
<i>Corvus splendens</i>	House crow	LC
<i>Eudynamys scolopaceus</i>	Asian koel	LC
<i>Francolinus francolinus</i>	Black partridge	LC
<i>Argya caudata</i>	Common Babbler	LC
<i>Ortygornis pondicerianus</i>	Grey partridge	LC
<i>Passer domesticus</i>	House Sparrow	LC
REPTILES		
<i>Hemidactylus frenatus</i>	Common house gecko	LC
<i>Anguis fragilis</i>	Slow worm	LC
<i>Bungarus caeruleus</i>	Common krait	LC
<i>Urosaurus ornatus</i>	Tree lizard	LC
<i>Testudines spp.</i>	Turtle	LC
Scientific Names	Common Names	IUCN Status
MAMMALS		
<i>Vulpes vulpes</i>	Red Fox	LC
<i>Bos Taurus</i>	Cow	LC
<i>Canis aureus</i>	Golden jackal	LC
<i>Canis familiaris</i>	Dog	LC
<i>Equus asinus</i>	Donkey	LC
<i>Felis catus</i>	Cat	LC
<i>Funambulus palmarum</i>	Indian squirrel	LC
<i>Herpestes edwardsi</i>	Mongoose	LC
<i>Lepus capensis</i>	Cap/wild hare	LC
<i>Rattus rattus</i>	Common rat	LC
<i>Sus Scrofa</i>	Wild Boar	LC
AMPHIBIANS		
<i>Hoplobatrachus tigerinus</i>	Indian Bull Frog	LC
<i>Duttaphrynus melanostictus</i>	Asian Toad	LC
GRAZING MAMMALS		
<i>Bos Taurus</i>	Cow	LC
<i>Capra hircus</i>	Domestic goat	LC
<i>Equus asinus</i>	Donkey	LC





a) Common Myna



b) Tree lizard



c) Hare



d) Common rat



j) Common Krait



f) Turtle



g) Indian squirrel



h) House Sparrow

Figure 5-14, Diversity of Fauna at Project site

Table 5-11, Recommended Plants for Project Sites To Enhance The Vegetation Cover

Sr. No.	Scientific Names	Common Names	Families
Recommended Plants			
1	<i>Acacia nilotica</i>	Wild Acacia	Fabaceae
2	<i>Albizia procera</i>	Siris white	Fabaceae
3	<i>Conocarpus erectus</i>	Cono tree	Combretaceae
4	<i>Dalbergia sissoo</i>	Indian rosewood	Fabaceae
5	<i>Ficus virens</i>	Wild Fig	Moraceae
6	<i>Leptadenia pyrotechnica</i>	Khipp	Apocynaceae
7	<i>Leucaena leucocephala</i>	Ippe iple	Fabaceae
8	<i>Mimusops elengi</i>	Spanish Cherry	Sapotaceae
9	<i>Nerium oleander</i>	Kaner	Apocynaceae
10	<i>Phoenix dactylifera</i>	Dates	Arecaceae
11	<i>Salvadora oleoides</i>	Pilkun	Salvadoraceae
12	<i>Tamarix aphylla</i>	Athel tree	Tamaricaceae
13	<i>Ziziphus jujuba</i>	Jujube	Rhamnaceae

5.9 Socio-Economic and Cultural Features

This section deals with the socio-economic and cultural conditions of the project area. During the desk/ office study, available reports/ documents were comprehensively studied.

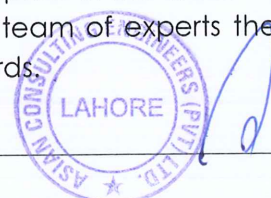
A team of experts carried out field visits to the proposed NAK and collect the baseline data from direct and indirect affectees on socio-economic and cultural aspects.

The basic objectives of the social surveys were to:

- Get the primary data from the various sources.
- Inform people about objective and purpose of the proposed project.
- Identify the potential impacts associated with the implementation of the proposed project.
- Get feedback from community about project related social issues
- And address the mitigation measures about the social issues in the report.

5.10 Methodology

Socio-economic survey of the settlements around the project area was carried out by team of experts including the local experts of the area. First of all, reconnaissance survey was conducted by the team of experts then a comprehensive field survey was carried out afterwards.





The sample size was calculated based on the Standard Statistical Formula and using a confidence level of 95% and confidence interval of 14%. The respondents were selected by using the Random Sampling technique which is a type of Probability Sampling. Interview Schedule technique was used as a tool to get data from the respondents. 49 questionnaires were developed to collect the baseline data, based on the demographic and socio-economic indicators. During the socio-economic survey, comprehensive Consultations and Focus Group Discussions (FGDs) were held to inform the people about the project related works and to record the opinions.

Information about Demographic characteristics were asked during the questionnaire survey whereas the demographic characteristics are the name of the respondent, age, sex, location, education, language, family size, marital status, caste and occupation etc. Characteristics like income, expenditure and sources of income were asked from the respondents in the Economic Profile part of the survey questionnaire. Other characteristics like housing conditions and land value were asked from the respondents in the Housing Profile part of survey questionnaire.

Information about amenities like water supply, electricity, sewerage/drainage system and telephone facilities were asked from respondents through access to Social Amenities part of survey questionnaire.

Information about facilities like health facilities, educational institutions and religious place etc. were asked in the Facilities in or Nearby the Proposed Project Area section of survey questionnaire.

Information about women participation like in household activities, child caring, sale & purchase of properties and social obligations were asked from respondents in the Women Participation and Decision-making part of the survey questionnaire.

Respondents' perceptions about project were asked in the section of Possible Impacts/Effects of the Proposed Project.

In order to quantify the existing baseline conditions of the study area, collected data was digitized and analyzed by using Statistical Package for Social Sciences (SPSS) software.

5.11 Socio-Economic features

The residents of the project area fall under the different income categories, mostly are engaged with industrial works, businesses, private and government jobs. Women residents do not have enough opportunities to work from home.

5.11.1 Demographic Characteristics

Nooriabad is an industrial town in Jamshoro District of Sindh, Pakistan. It is located 94 kilometers from Karachi on the N-5 National Highway. It is part of



Sindh Industrial and Trading Estate. There are more than 200 production plants which produce Cotton, Rice, and Oil etc.

The population of the district according to a 2017 estimate was 993,142. The predominant first language is Sindhi, the north western part of the district containing 3 Talukas and 33% area of the district is densely populated. All the 5 major towns or urban settlements of the district are located in this zone. The southern and western part of the district being a desert is thinly populated and no urban settlement is found in this zone.

However, the population of the city is exponentially increasing with the passage of time due to the rapid developmental activities such as new residential towns are being developed to reduce the burden of overpopulation on the central city. Nearly lower- and middle-class population of the city is living near one side of garden and they are associated with boating, fishing and agricultural activity. Only a few percentages of the residents of these communities are engaged in other sectors of life for earning.

5.11.2 Livelihoods

The project area is rural in nature as large majority of the population continues to reside in the rural areas. Even the medium and small sized towns that exist in the district have close social, economic and political linkages with the rural areas. The installation of some large-scale industrial units like chemical fertilizer plants thanks to district's huge natural gas reserves has paved ways for the urbanization and job opportunities in these units. The locals, however, complain that they are the mere spectator and have not benefitted from this industrialization and natural resource riches of the district.

In a number of informal discussions with local civil society organizations and local during the course of this survey, it was noted that strong and suppressive Sardari system that prevails in the district has actually affected the livelihood options and systems for the locals. The tribal clashes create security risks for the ordinary citizens in some pockets of the district especially in those located deep in the desert and lying in close proximity to the river Indus. A Naib Tehsildar (Revenue officer), requesting anonymity, said that due to security risks, people try to leave the homes late in the morning and return before the sunset. This reduces the time available to them they could put otherwise in the income earning activities, he added. A local school teacher told that the tribal clashes result in restricted mobility and in extreme cases closure of schools that badly affect the school routine of the children. The locals also told that insecurity leads in male members of a tribe getting involved in the clashes, killed or arrested. This leaves the children and women helpless and adding to their social and economic miseries.





The district level segregated data that could help understand the livelihood conditions in the district, is available in the district census report 1998. Though various changes should be expected to have happened in last one decade, the census data still appears to be relevant as there is no considerable change in the proportion of urban and rural population since the last census of 1998. According to this document;

According to the report by Multidimensional Poverty in Pakistan 2014-15 the Multidimensional Poverty Index is 0.297 in Jamshoro. In another report by Naveed and Nazimvi (2012), the intensity of poverty 0.54, the head count ratio is 0.39, poorest of the poor 0.23, most Vulnerable 0.16.

5.11.3 Drinking water

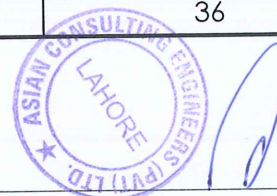
Piped water supply is available to only 1/10th of households. Hand pumps and Motor pumps are the major sources of water for household consumption in urban houses whereas motor pumps have not widely been installed in the rural areas. 85% rural households are dependent on the hand pumps. Rely on hand pumps for drinking water. More than 28% of the villages also get drinking water from canals. A large number of sampled households have fitted flush system within the housing unit. Others go to agricultural fields or behind the boundaries of the houses to urinate or defecate. About 86.7% have latrine facility with flush mechanism within their houses, of which 30% have the modern fittings of seat and tank fitted with their flush system in the latrine. The surface underground water of the area is fresh and cool in nature. Some people farmer's and animals are directly depending on it, suitable to use for drinking purpose, as the salt content is very low in the water.

5.11.4 Education and literacy

According to updated census, the district has 3 Universities, 1 Government College, 5 Government Higher Secondary Schools, 36 Government High Schools, 32 Middle Schools and 826 Primary Schools. Apart from this, there is 1 Government Technical Training Institute, 1 Government Mono Technical Institute and 4 Technical Vocational Commercial Institutes. It was complained by the locals that due to the lack of female teachers they were seeking for female teachers in the schools but government never took any action at their grievances.

Table 5-12, No. of School and Universities in the project Area.

Sr. No.	Description	Proposed project Area
1	No. of universities.	03
2	Primary and Middle Schools (No)	32, 826
3	Secondary and Higher	36





5.11.5 Health

Hospitals exist in the project area. People rely on "self-treatment" as the first option in case of any illness. There is no government hospital or maternity hospital available at Jamshoro, however there exists a Health Centre at Kotri. No active basic Health Unit (BHU) exists in UCs. People generally access to private hospitals in Jamshoro and Hyderabad and sometimes to nearby private dispensaries. Fever, malaria and chest congestion, Hepatitis C were reported as the common diseases of the project area. A large proportion of both urban and rural women and children do not have an access to formal health services. This is reflected from the recent health sector statistics compiled in PSLM 2006-07. For instance, 48% male and 55% female children aged between 12-23 months have yet not been fully immunized.

5.11.6 Markets

It was observed during the field survey that few closer markets exist in the project area and people access to Jamshoro Phatak and Kotri markets for daily shopping and purchase of miscellaneous items. As there are only a few small shops in which some grocery and some general items are available, therefore people rush to Hyderabad city and Karachi to buy special items. It is quite economical to possess a shop in the area and some villagers have small shops. Therefore many shops were observed in the surroundings of project area. They sell basic household necessities, cigarettes and food items. People visit Kotri and Hyderabad market for the purchase of daily use items. Many CNG, Petrol and Diesel pumps are also existent in the nearby vicinity.

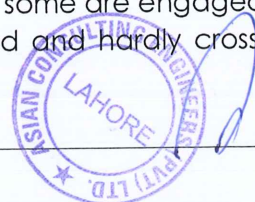
5.11.7 Transportation

Generally, the project area is not rich in the means of transportation. Main roads are metaled but inside roads are katcha muddy roads so proper transportation is not properly available inside the residential colonies. Chinch (four seated vehicle supported by bike), ikshaw, bikes and some buses are the means of transport for the residents of the area. Project area is located 2 km away from main Jamshoro, some villages like Lakho Faqir Khaskheli, Siddique Rajjar, Chakkar Khan Rajar are located near the industry.

5.11.8 Role of Women

The role of women in domestic activities and their involvement in decision making was explored by posing a series of questions to male respondents during the socioeconomic survey. Findings reveal that women are the most suppressed section of society. In urban areas, the women have access to education, employment, travel and medical treatment. Women have high involvement in household activities and child rearing.

On the other hand the women in the undeveloped part are purely house wives and some are involved in home economics and some are engaged in agricultural activities. These women are less educated and hardly crossed





primary education due to unavailability of good schools in the nearby vicinity and also the trend of low education in the society. The women in the rural parts and Goths are not allowed to go for shopping independently and their necessities are fulfilled by men. Common wears of women in the area are according to the culture of Pakistan along with some western fashion in the developed towns of the area. In the villages, the women wear colorful dresses according to their customs and cultures and represents rural environment. The only economic activities with some of women is livestock rearing and farming. The findings of the socioeconomic survey are presented in **Table 5-13**. The Participation of Human Activity and Decision Making can be seen in **Table 5-14**.

Table 5-13, Participation of Human Activity and Decision Making

Sr. No.	Nature of Activities	Participation by women %	
		In Activity	In Decision Making
1	Household Activities (Washing, Cooking, repairs)	88.1	66.3
2	Child Caring	98.1	60.8
3	Livestock Rearing	50.0	13.2
4	Farm/Crop Activities	64.7	3.4
4	Social Obligations (Marriage, Death events)	89.6	2.5
5	Sales & Purchase of Land/ Immoveable property	4.5	1.0
6	Any Other issue in the family	3.4	-

Table 5-14, Socioeconomic Features of the Proposed Project Area

Wellbeing Indicator	Name of Town / Area
	Nooriabad
GPS Coordinates	25° 07' 47.83" 67° 48' 36.73"
Major Communities	Urdu-speaking, Punjabi, Sindhi, Pukhtoon, Rajisthani, Marwari
Livelihood	Labor, business, shops, transporters, Public and private jobs
Electricity	Available
Fueling Source	Available
Major Institutions	Armay Public School, Jamshooro Sindh Uni
Literacy Rate	low
Drinking Water	Tankers system, Surface water, WAPDA
Major Health Problems	Skin Diseases, Respiratory Tract Diseases, Gastro Intestinal Tract Infections
Health Facilities	FWO, Clinics



Major Needs	Govt. hospitals, Modern Schools, Security, Drinking Water, Continuous Electricity
Major Markets	Small Markets and some supermarkets and Shops,
Transport	Public Transport, Motorcycle, cars, buses

5.11.9 Industries

Two out of four talukas have industrial estates in this district. The industrial state in Taluka Kotri consists of 160 factories. This industrial estate employs a large number of people from all over the country. Taluka Thano Bula Khan has an industrial state in Nooriabad along superhighway, which consists of 72 industrial units but where only 42 units are functional and providing employment to its inhabitants and outsiders. Mining is also a source of income for the inhabitants of this taluka.

5.11.10 Indigenous People and Vulnerable Social Groups

No indigenous group of people was identified.

5.12 Religious, Historical, Archaeological and Recreational Sites

5.12.1 Religious Sites

Religious sites include mosques, shrines and graveyards. These are socially sensitive areas to deal with. Mosques and graveyards are regarded as sacred heritage and receive devoted attention from the people. As far as the present study is concerned, there is no disturbance to religious sites due to development and operation phase of the project.

5.12.2 Historical and Archaeological Sites

No historical and archaeological site was identified in the Study Area.

5.12.3 Recreational Sites

No recreational site was identified in the study area.

5.13 Awareness Regarding the Proposed Project

Awareness about the proposed project is shown in **Table 5-15**.

Table 5-15, Awareness About the Project

Sr. No.	Awareness of the Project	Number	Percentage (%)
1.	Yes	47	95.9
2.	No	2	4.1
	Total	49	100

According to the table, a large number of respondents i.e. 95.9% were aware of the proposed project while only 4.1% were those, who had no prior knowledge of the project, **Figure 5-15**.

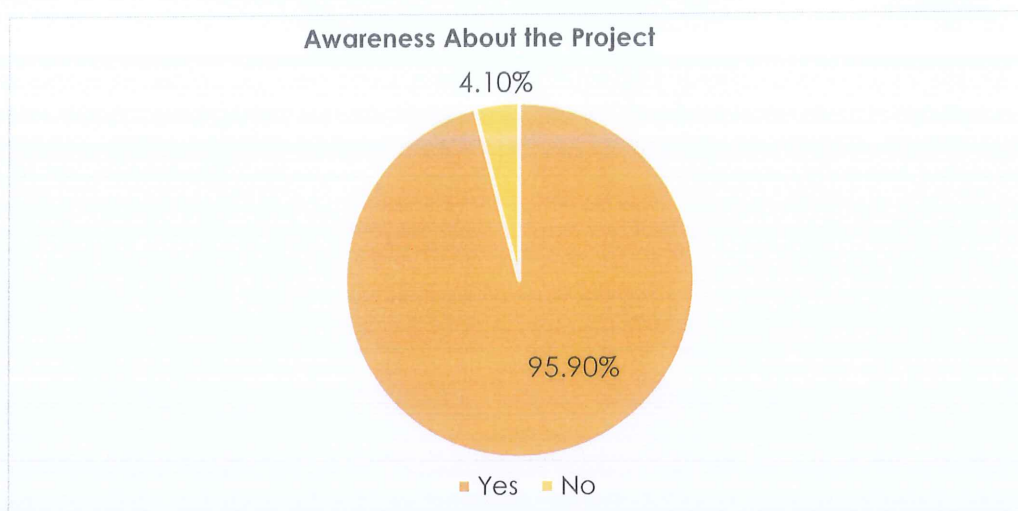


Figure 5-15, Awareness About the Project

5.14 Acceptability of the Proposed Project

Acceptability of the proposed project is shown in **Table 5-16**.

Table 5-16, Acceptability of the Proposed Project

Sr. No.	Frequency of Project Acceptability	Number	Percentage (%)
1.	Yes	47	95.9
2.	No	2	4.1
	Total	49	100

According to the table, 95.9% respondents favoured the construction of the proposed project keeping in view of its importance and 4.1% respondents were against the construction of the proposed project due to industrial pollutions, **Figure 5-16**.



Figure 5-16, Acceptability of the Project



[Handwritten signature]

5.14.1 Perceived Impacts of the Project during Construction Phase

During the survey, respondents were inquired about their views regarding the perceived impacts of the project during construction phase. Almost all respondents express their positive and negative views. The views are:

- There will be noise and dust pollution
- There will be health and safety issues
- Their social norms and privacy will be disturbed
- They will get job opportunities

5.14.2 Perceived Impacts of the Project during Operational Phase

During the survey, respondents were inquired about their views regarding the perceived impacts of the project during operational phase. Almost all respondents express their views. The views are:

- Employment opportunities will be increased
- The project area value will be enhanced.
- Living standard of the people will be higher

5.14.3 Protective Measures Suggested by Respondents

Protective measures suggested by respondents are shown in **Table 5-17**.

Table 5-17, Protective Measures Suggested by Respondents

Sr. No.	Protective Measures	Number	Percentage (%)
1.	Project should complete well in time	10	12
2.	If any private land is acquired then proper compensation should be paid	18	21.7
3.	Harmful effects on local residents during construction should be minimize	9	10.8
4.	Implementation of HSE plan for a safe working environment	2	2.4
5.	Local residents should be given priority of jobs	33	39.8
6.	Provision of basic facilities in project area (please specify)	5	6
7.	Any Other (Please Specify)	0	0
8.	No Response	6	7.2
Total		83	100

According to the table, majority of the respondents i.e. 39.8% highlighted that local residents should be given priority of jobs. 21.7% accentuated that



Project Affected Persons (PAPs) should be given market-based compensation for the land acquisition and relocation. 12% respondents highlighted that the construction activities should be completed well in time, 10.8% respondents suggested that harmful effects on local residents during construction should be minimize, 7.2% respondents had no response, 6% respondents suggested that provision of basic facilities in project area should be provided and just 2.4% suggested implementation of HSE plan for a safe working environment.

Views Regarding the Project

During the survey, respondents were inquired about their views regarding the proposed project. Almost all respondents showed their concerns about the Proposed Project. Some of the respondents had positive thinking and they were in favor of the project. But few respondents did not know much about the Proposed Project so they could not express their views in positive or negative sense. There were also some respondents who were against the project because

- There will be noise and dust pollution
- Their social norms and privacy maybe affected by the project.



SECTION - 6: POTENTIAL ENVIRONMENTAL IMPACT AND MITIGATIONS

6.1 General

This chapter identifies the potential impacts related with Preconstruction, construction and operation phases of the Project on the physical, ecological and socio-economic domains of the environment. Accordingly, mitigation measures have been proposed to mitigate the negative impacts and to enhance the positive impacts.

6.2 Approaches and Methodology

During the preparation for the project construction phase the future contractors must be notified and prepared to co-operate with the executing agency, project management, supervising consultants and local population in the mitigation of impacts. Furthermore, the contractor must document the implement the EMP in full and be ready to engage trained environmental management staff to audit the effectiveness and review mitigation measures as the project proceeds. The effective implementation of the EMP will be prepared and must be audited and this will be considered as the most important part of planning. In this regard the proponent must fulfil the requirements of the law and guidance prepared by EPA on the environmental aspects of power projects and the recommendations already made for projects in this EIA and under EIA/IEE regulation and Environmental Protection Act.

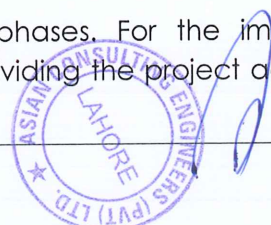
For impact identification, various EIA methodologies are available including the checklists, interaction matrices, networks and overlays. Among these four methods, following three are used in EIA of Navel Anchorage Karachi.

- Project Interaction Matrix
- Checklists
- Overlays

Interaction matrix is a two-dimensional matrix wherein the project actions are placed along one axis (i.e. along y-axis) and on the other axis there are different environmental parameters likely to be affected by the proposed project actions grouped into categories i.e. Physical, Ecological & Socio-economic Environment. Interaction matrix is used in this project due to the following reasons:

- It provides cause-effect relationship between the project actions and resulting consequences impacts.
- It provides nature (+ve or -ve) and weighting of different impacts.
- It provides cumulative impacts of a project.

Matrix grouped project actions into temporal phases. For the impact assessment, project interaction matrix is used by dividing the project action





into different phases (Preconstruction, construction and operation). The environmental impacts are divided into three main categories including physical, ecological and socio-economic domains. The environmental impacts of the project actions are identified and weighed into the following categories:

+3	=	Extremely Beneficial
+2	=	Potentially Positive
+1	=	Slightly Positive
0	=	Insignificant
-1	=	Slightly Negative
-2	=	Potentially Negative
-3	=	Extremely Negative

The assignment of significance is based on the previous knowledge and professional judgment of EIA team experts. The project impact matrix has been developed and attached in Annexure-III. It may be noted that the environmental parameters, which are not related to the implementation of the projects, have not been considered in the matrix.

6.2.1 Checklist

The assignment of significance is based on the previous knowledge and professional judgment of EIA team experts. The project Checklist has been developed for "without" and "with mitigation" is attached as Annex 4. It may be noted that the environmental parameters, which are not related to the implementation of the projects, have not been considered in the matrix.

6.2.2 Overlays

In order to identify spatial based impacts, overlays were used. An overlay is based on a set of transparent maps, each of which represents the spatial distribution of an environmental characteristic (for example, susceptibility to erosion). Information for an array of variables is collected for the standard geographical units within the study area, and recorded on a series of maps, typically one for each variable. These maps are overlaid to produce a composite. The resulting composite maps characterize the area's physical, social, ecological, land use and other relevant characteristics, relative to the location of the proposed development.

The existing land use map of the NAK has been overlay with the master plan of the proposed NAK. The impacts on social and bio-physical environment have been analysed through the development of new map. The Overlay map developed for analysing impacts is attached as Annexure-I.





6.3 Characteristics of Impacts

The predicted impacts have been characterized; various aspects of the impact characterized include:

- Nature (direct/indirect)
- Duration of impact (Short term, medium term, Long term)
- Geological extend (local, regional)
- Timing (Project phase)
- Reversibility of impact (Reversible/Irreversible)
- Likelihood of the impact (certain, likely, unlikely, rare)
- Impact consequence severity (major, moderate, minor)
- Significance of impact (High, medium, low)

The above aspects of environmental characterization are defined in **Table 6-1**.

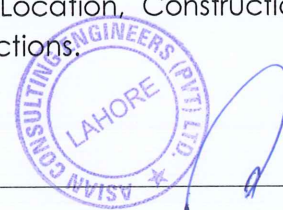
Table 6-1, Impact Characterization

Nature	Direct: The environmental parameter is directly changed by the project. Indirect: The environmental parameter changes as a result of change in another parameter
Duration of Impacts	Short-term: lasting only for the duration of the project such as noise from the construction activities. Medium-term: Lasting for a period of few months to a year after the project before naturally reverting to the original condition such as loss of vegetation due to clearing of campsite, contamination of soil or water by fuels or oil. Long-term: lasting for a period much greater than medium term impact before naturally reverting to the original condition such as loss of soil due to soil erosion.
Geographical Extent	Local, regional (spatial dimension)
Timing	Construction and Operation
Reversibility of Impact	Reversible: when a receptor resumes its pre-project condition. Irreversible: when a receptor does not or cannot resume its pre-project condition.
Likelihood of the Impact	Almost Certain: Impact expected to occur under most circumstances.



	Likely: Impact will probably occur under most circumstances. Possibly: Impact may possibly occur at some time. Unlikely: Impact could occur at some time. Rare: Impact may occur but only under exceptional circumstances.
Impact Consequences severity	Major: When an activity causes irreversible damage to a unique environmental feature; causes a decline in abundance or change in distribution over more than one generation of an entire population of species of flora and fauna: has long term effects (period of years) on socioeconomic activities of significance on regional level. Moderate: When an activity causes long-term (period of years), reversible damage to a unique environmental feature; causes reversible damage or change in abundance or distribution over one generation of a population of flora or fauna: have short-term effects (period of years) on socioeconomic activities of significance on regional level. Minor: When an activity causes short-term (period of a few months), reversible damage to a unique environmental feature; slight reversible damage to a few species of flora or fauna within a population over a short period; has short-term (period of months) effects on socioeconomic activities of local significance. Negligible: when no measurable damage to physical, socioeconomic, or biological environment above the existing level of impact occurs.
Significance of Impact	Categorized as High, Medium, Low Based on the consequence, likelihood, reversibility, geographical extent, and duration: level of public concern: and conformance with legislative of statutory requirements.

The impact characterization due to Design, Location, Construction and operational phase is given in their respective sections.





6.4 Environmental Impacts and Their Mitigation During Pre-Construction Phase

6.4.1 Environmental Impacts Regarding Project Location

As already discussed in the location alternative that most of the current site is already under control NAK and this location is best suitable with reference to studied dimensions of raw material root planning, and green cycle development. Therefore, it is established that this location is the best for development of Housing Scheme.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Land Acquisition and Resettlement	Direct	Medium term	Local	Reversible	Unlikely	Minor	Low

Mitigation

As all the land is already under control of NAK and designated residential area so no mitigatory measures are required to be discussed.

6.5 Environmental Impact and Their Mitigation During Construction Phase

6.5.1 Physical Impacts

A) Soil contamination

- Soil Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the Project Site and in its nearby surroundings. Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites.
- Construction Camp site will generate about 0.5 kg/person/day solid wastes from site camps and construction debris from construction activities. Although quantity of waste is much less, inappropriate disposal methods will have a negative impact on the physical environment of the project area.
- During the construction stage of the project, large quantity of waste materials, chemicals, fuel and lubricants will be used apart from the generation of solid waste and liquid waste from the construction camps. Fuels and chemicals will be stored at the site for their immediate use, which will contaminate the soil.



Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Soil Contamination and Erosion (Construction Phase)	Direct	Short Term	Local	Reversible	Likely	Minor	Low

Mitigation

Good engineering practices will help in controlling soil erosion at construction sites. Following measures will be adopted as per site conditions:

- Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators.
- The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste.
- Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination.
- Ground shall be levelled to avoid slopes.
- Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems.

6.5.2 Contamination of Surface and Groundwater Resources

- No Surface Water Body is present near the proposed project site.
- Sewage is generated from the construction camps. This may contaminate surface water, if not disposed of properly.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Ground Water Contamination (Construction Phase)	Direct	Medium Term	Regional	Irreversible	Unlikely	Moderate	Medium



6.5.3 Mitigation Measures of Impacts on Water Resources

Sewage from construction camp will be disposed off using septic tank which has been designed properly keeping in view the following parameters:

- Soil stratigraphy at site
- Depth of groundwater table
- Discharge of sewage from construction camp

The septic tank has been designed by the Design Consultant according to the relevant standards. The example of the septic tank is shown in **Figure 6-1**.

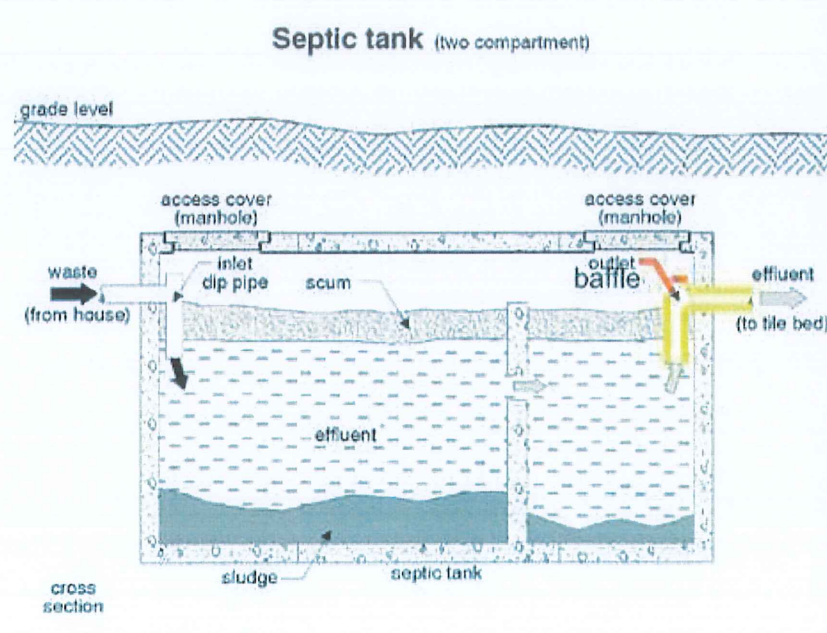


Figure 6-1, Septic tank

- During the development, the Contractor should instruct its staff not to throw any of the waste and the other scarified/scrapped materials directly into the nullah or canal passing from or nearby project area in order to avoid contamination.
- Construction camps should be established in areas with adequate natural drainage channels in order to facilitate flow of the effluents.
- Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency Response Procedures in case of any spill hazard.

6.5.4 Impact on Ambient air quality

Due to the construction activities like excavation, clearing, levelling and compaction with the use of machinery like batching plants, excavators, dump truck and other transport vehicles etc. Most of these are using diesel engines that generate noise and exhaust emissions. The possibility of exhaust emissions increases when old vehicles/plants are utilized for the execution



purposes. Generally, the above activity is generating particulate- matter (PM10), smoke, dust, CO and NOx in the ambient air, which is deteriorating the air quality and resulting in impacts on human health, fauna and flora. The movement of heavy machinery and vehicles on the dirt tracks is also causing dust emissions. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Air Quality Deterioration (Construction Phase)	Direct	Short term	Local	Reversible	likely	Minor	Medium

Mitigation Measures of Impacts on Ambient Air Quality

- Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM10.
- Equipment and vehicles powered with diesel should be well maintained to minimize particulate emissions.
- Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin.
- The fugitive dust emission will not be a problem because the roads are paved but for the precautionary measure sprinkling of water by water trucks will be done.

6.5.5 Impact on Ambient Noise Levels & Vibration

During the implementation of the project a large amount of equipment and construction machinery will be utilized for construction. The equipment would include excavators, concrete mixer, trucks and other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the Project Area and Neighborhood residential may be disturbed by the noisy activities. The impact will be significant when compared to the without project situation.





Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Noise (Construction Phase)	Direct	Short term	Local	Reversible	likely	Minor	Medium

Mitigation Measures of Impacts on Noise & Vibration

- For the construction machinery generating noise level in excess of that prescribed in SEQs and WHO limits, Contractor will make arrangements to bring the noise level within applicable limits (including proper tuning of vehicles and mufflers/silencers). Movements of the trucks and other construction machinery causing high noise levels must be restricted at night time to avoid disturbance to the nearby locality. Truck drivers should be instructed not to play loud music especially night and stop use of horn.

6.5.6 Disposal of Construction Debris & Garbage

During construction phase of the Project, construction waste will produce, the disposal of which, if not managed properly could have negative impacts on the site and surrounding areas. Clearing of shrubs and grass could pose a fire hazard and affect air quality if burned on location. Construction materials including concrete waste, wood, steel, packaging plastics etc. could be dispersed that may result in the blockage of drainage channels if not disposed of at approved disposal sites.

Mitigations

- A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site.
- The construction waste will be disposed on approved landfill site from Sindh-EPA
- The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping.
- Arrangements should be made for regular garbage collection and removal of sewage from the construction site.





6.5.7 Traffic annoyance

Due to construction activities, there is little increase in traffic flow on link roads for regular income and outgoing of construction vehicles. Due to increase in the traffic flow the locals may be affected in respect of traffic delays in and around the project site

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Traffic Annoyance (Construction Phase)	Direct	Short Term	Regional	Irreversible	Likely	Moderate	Medium

Mitigation

During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time due to at night time traffic flow very low in the project area.

6.6 Ecological Environment

6.6.1 Impact on Flora

- More than 184 trees including Keekar (*Vachellia nilotica*), Phulai (*Senegalia Modesta*) etc... will be lost due to the development of this area. Cutting of trees can speed up the land erosion which will disturb the soil ecology of adjacent area.
- Ground flora and the seed bank of this flora will be severely disturbed after compaction of soil due to the movement of heavy machinery.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Impact on trees	Direct	Medium Term	Regional	Irreversible	Likely	Moderate	High

Mitigation

10,000 trees will be planted at available sites in NAK and remaining (if any) will be planted with consultation of Sindh Environmental Protection Agency (SEPA). Suitable fruit and shady trees will be planted as these are indigenous



to the area.

A plantation cover of appropriate trees /bushes will be raised within the open available spaces and along roads. Ornamental trees, bushes and climbers have been included to improve the scenic and aesthetic value of the sectors. A mixture of shady trees with heavy foliage will be required to counter the air and noise pollution, possibly along the roads, where underground or overhead cables do not interfere with the plantation plan.

The selection of species to be planted may not be strictly confined to the proposed plantation plan, as local factors such as the available quantity of irrigation water and edaphic limitations will also govern the choice of plants. It is further recommended that, if possible, a small nursery may be established comprising of fast-growing trees.

An average space of 10 ft. x 6 ft. will be maintained. However, the plant-to-plant distance might vary depending upon the site conditions and/or the growth characteristics of the tree species.

All preventive measures will be adopted to control the spill-over of chemicals and other effluents on the ground to protect soil fauna and ensure microbial activity following SEQS 2016 promulgated under Sindh Environmental Protection Act 2014.

The construction crew will be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood will not be allowed.

Some grass species should also be introduced into the project area due to their soil binding capacity.

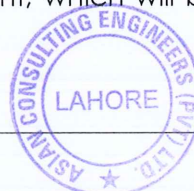
6.6.2 Soil erosion and nutrients removal

Due to construction activities natural nutrient rich topsoil will be removed. Soil drainage capacity or water holding capacity will also be reduced as a result of compacted soil due to vehicular movement and increased surface runoff.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Soil erosion and nutrients removal	Direct	Medium Term	Local	Irreversible	Possibly	Moderate	Medium

Mitigation

To avoid the loss of natural nutrient rich topsoil, upper 6-inch layer of soil of the present lawns should be stored at safe point, which will be used in the landscaping of the NAK.





6.6.3 Loss of wild plants and seed bank

The project site is adjacent to housing societies / urban land which provides very limited habitat for wildlife. The loss of natural vegetation discussed above and other project activities will potentially have adverse impacts on the faunal resources and habitats of the area as well. Smoke, chemicals, dust particles, and noise generated by heavy machinery are scary factors for wildlife. Rodents, hedgehogs, etc. would lose their abode.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Loss of wild plants and seed bank	Direct	Medium Term	Local	Irreversible	Possibly	Moderate	Medium

Mitigation

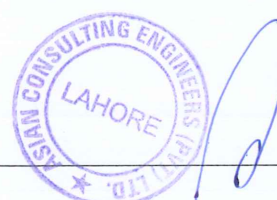
To avoid the loss of seed bank of the wild plant, upper 6-inch layer of few partial part soil where construction is planned should be stored at safe point and after the construction of building should be reused for lawns. Bird's attraction sites around the outer boundary of Naval Anchorage Karachi site should be created.

- The measures to prevent soil and water contamination will forestall any adverse impact on the faunal resources of the area.
- The measures to restore natural vegetation loss in the area will benefit the area's fauna as well.
- The project staff should not be allowed to indulge in any hunting or trapping activities.
- Night-time construction work should not be undertaken.

6.7 Socio Economic Environment

6.7.1 Impact on Livelihood

Main occupation in the project area is agriculture. Majority of the locals are related to agriculture farming. They have no other skill except agriculture, so after the acquisition of their agriculture land, livelihood of the people will be affected. They cannot perform other work which create social problem and it may convert in to violence.





Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Loss of Livelihood	Direct	Medium-term	Local	Reversible	Likely	Moderate	High

Mitigation Measures

- Capacity building and rehabilitation plans to be implanted for the betterment of Project Affected Persons (PAP)
- Project Affected Persons (PAP) should be given preference for direct and indirect employment opportunities especially in the project
- Skill development and training programs in the field of agriculture farming, livestock and mechanical equipment to be organized in the area

6.7.2 Influx of Construction Workers

For the construction of proposed project, the contractors are likely to use unskilled labor drawn from local community but use of specialized construction equipment will require trained personnel not likely to be found locally. Therefore, sudden and relatively short-lived influxes of construction skilled workers to communities near the NAK may have the potential to skew certain demographic variables, privacy and the traditional social coherence.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Influx of Construction Workers	Direct	Medium	Local	Reversible	Possibly	Minor	Low

Mitigation Measures

- Preference to be given to locals for construction work
- Local suppliers for machineries and construction materials to be given preference
- Local transporters to be preferred for transportation of machinery/material





- To train unskilled local workers, short term skill development courses to be organized in the area

6.7.3 Heritage Structures

There is no heritage, historical, cultural or archaeological structure in the area around the NAK. Therefore, no impact is anticipated due to extension of runway and expansion of proposed NAK. Hence, no mitigation measure is required.

6.7.4 Protected Areas

Based on the social surveys and GIS maps it has been identified that there is no protected site exists in the proposed project. Therefore, no mitigation measure is required.

6.7.5 Vulnerable Social Groups

During the field survey, it was identified that there was no vulnerable social group (e.g., widow and women headed household) exists in the proposed project. Thus, no mitigation measure is required.

6.7.6 Impacts on Local Population

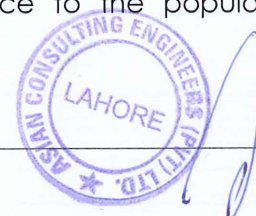
The population residing in and the surroundings of the Project Area will be affected during the construction phase as follows:

- Insecurity problems may arise for the local population due to the Contractor's workers during the construction phase
- Community may face the noise and dust problems during the construction activities.
- Theft problems to the community by the Contractor's workers and vice versa.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Issues to Local Population	Direct	Medium	Local	Reversible	Possibly	Moderate	Medium

Mitigations Measures of Impacts on Local Population/Workforce

- Contractor should select specific timings for heavy machinery operation so as to cause least disturbance to the population considering their peak movement hours.





- Effective construction controls may be made by the Contractor to avoid inconvenience to the population due to noise, smoke and fugitive dust.
- Haul-trucks carrying concrete, aggregate and sand fill materials will be kept covered with tarpaulin to help contain the construction materials being transported to the specific site.
- The heavy vehicles should not play loud music and horns during transporting material at night time
- The Contractor should warn the workers not to involve in any theft activities and if anyone would involve in such type of activities, he will have to pay heavy penalty and would be handed over to police. Similarly, at the time of hiring labour/workers, Contractor has to ensure that the workers should be of good reputе/character.

6.7.7 Impacts on Public Health and Safety Hazard

- Construction activities, particularly excavation and movement of haul trucks and machinery may prove dangerous for the safety of the workers as well as for local residents.
- Contractor's staff while working on the high-rise columns, transoms, etc. may slip and get injured. Similarly, working at excavated areas may also cause injuries due to the failure of side slopes of excavation.
- The storage of all solid waste shall be practiced so as to prevent the attraction, harbourage or breeding of insects or rodents, and to eliminate conditions harmful to public health or which create safety hazards, odours, unsightliness or public nuisance.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Labor HSE Issues	Direct	Medium	Local	Reversible	Possibly	Minor	Low

Mitigation Measures of Impacts on Public Health and Safety Hazards

- Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the work place. Compliance with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62 will be ensured by the Contractor.
- Health safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures,



environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.

Contractors all shall ensure that:

- Reasonable steps are taken to protect any person on the site from health and safety risks;
- The construction site is a safe and healthy workplace;
- PPE will be distributed to workers as appropriate – including hearing protection, dust goggles and protective footwear;
- For work near water, sharp drops will be fenced and flotation equipment within easy access;
- Machinery and equipment are safe;
- Adequate training or instruction for occupational health and safety is provided;
- Adequate supervision of safe work systems is implemented;
- The contractor will carry out daily inspections and weekly audits to ensure the works area is safe and hygienic for farmers and community members passing through or using the areas.
- Induction and regular toolbox talk on proposed project EHS requirements will be held. Emergency preparedness and response plan and emergency escape routes shall be identified and all the workers will be made aware of them;
- Signs to improve the understanding of all the health safety instructions and precautions for workers are provided. Signage will be in languages appropriate to the workforce employed.

6.7.8 Positive Impacts

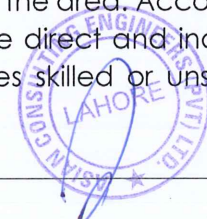
Following are the positive social impacts of the proposed project:

Impact on Economy

Implementation of housing schemes has been linked with economic development so the proposed project will play a significant role in the economic development of a region, as well as the nation as a whole. It will support hi-technology businesses of the future. Implementation of proposed project will increase per capita income of locals due to export-oriented industrial enterprises. It will improve domestic investment and domestically owned capital stock.

Impact on Employment

Implementation of NAK will support employment generation which will have beneficial impacts on the socio-economic conditions of the area. According to the baseline survey, the proposed project will create direct and indirect employment opportunities. Direct employment includes skilled or unskilled





labor while indirect employment includes jobs created in support of the economic zone like fuel stations, hotels, restaurants, retail stores, sports and night clubs, rental cars, banks and local transportation. It will also generate employment opportunities for women workers. Therefore, the proposed project would open new avenues for alternative sources of income and employment in different sectors.

Impact on Standard of Living

Standard of living means good living condition, happiness and satisfaction of people living near the proposed project. People living in the community will experience gradual changes brought about by the construction and full operation of the proposed NAK. The experiences will have great impact on the quality of life of the people. Completion and operation of the proposed project will increase income of the people which will raise the standard of living. Increased economic activities will promote development of business, trade and commerce which leads to the generation of income and employment. These activities would help to meet the basic needs of housing, health, education and food that will ultimately improve their living condition, quality of life and assuage poverty.

6.8 Risk Assessment

Risk assessment is done for construction phase which will describe the potential impacts/hazards so that the precautions/control may adopt accordingly, **Table 6-2** and **Table 6-3**.

Table 6-2, Severity of Risk during construction of NAK

Risk Magnitude/ severity	Assigned Values	Probability/ Likelihood	Assigned Values
Low	1	Highly Unlikely	1
Medium	2	Unlikely	2
High	3	Possible	3
Extreme	4	Likely	4
Catastrophic	5	Very likely	5

Table 6-3, Risk assessment during construction of NAK

Hazard	Source	Duration Hours/day	Severity's (S)	Likelihood (L)	Risk amount S*L
Noise	Generators and excavation	8	2	4	8
Dust	Excavation and transportation of construction materials	8	3	4	12
Vibration	Excavation	8	2	3	6
Falling	Construction	8	4	2	8



Hazard	Source	Duration Hours/day	Severity's (S)	Likelihood (L)	Risk amount S*L
objects	activities				
Ergonomics	No proper posture for Work	8	3	3	9
Work load	Continues work	8	2	3	6
Temperature	Sunlight during summer	8	3	4	12
Fire	Flammable materials, electrical short circuit	8	3	4	12
Work at height	----	During work	3	4	12
Air pollution	Vehicles and generator	During their working	3	5	15

Likelihood Severity	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Green colour boxes (1-5): Low risk and unlikely to cause health impact.

Yellow colour boxes (6-12): Noticeable risk. It has potential to cause medium impacts.

Red colour boxes (15-25): High risk & cause high level health impacts.

6.9 Controls

Almost all the risks, which can occur in this project during both construction and operational phase do not fall in high-risk area except air pollution. But there is still need of controls which are given below:

- Generator should put at such place where its noise does not disturb the community as well as the workers during construction, during operation it should place on the top of the building and should place in closed canopy.
- New technology generator should be used and its proper maintenance to avoid the air emission.
- Regular tuning of construction vehicles and generators.
- To avoid the dust water should sprinkle after specific duration.



- PPE should be provided to workers.
- Job rotation to avoid work pressure.
- Proper holdings, controls and use of PPEs for safe work at height.

6.10 Environmental Impacts and Mitigations Measures During the Project Operation

6.10.1 Ground Water Resource

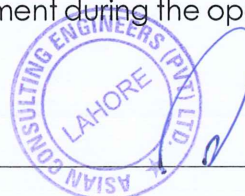
During the operational phase the ground water will be used. The water consumption is calculated with land usage index method according to the land usage and area. Therefore, the total water consumption of the Project is predicted to be about 540 m³/d. The quantities of required water are from direct groundwater usages that will ultimately impact on level of ground water resource which may reduce with the passage of time.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Ground Water Level Reduction- Operational Phase	Direct	Long Term	Local	Reversible	Unlikely	Moderate	Medium

Mitigation

In order to reduce the impact on ground water resource following measures will be adopted.

- There will be proper lining and engineered structure to be built in order to avoid the leakages. The NAK will check the design before giving final approval to industries.
- Rainwater harvesting should be promoted in NAK and also in commercial centers. It is a simple technique of catching rainwater and storing it in underground aquifers. Rainwater harvesting helps increase the water table, improve the quantity of groundwater and reduce tube well pumping costs.
- The water conservation will also be adopted. Water conservation techniques should be adopted in buildings such as installing water-saving gadgets and eco-devices.
- The treated Wastewater will be used for firefighting and landscaping purposes, so the total fresh water requirement during the operational phase will be reduce.





6.10.2 Waste Water

The composite sewage coefficient is set as 0.80. This waste water poses the threat to fresh water resource if not been treated. Additionally, it may deteriorate quality of downstream and may also be threat to the local flora and fauna.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Surface Water Contamination- Operational Phase	Direct	Medium Term	Local	Reversible	Possibly	Moderate	Medium

Mitigation

- The wastewater will be domestic in nature and will be treated in Combined Effluent Treatment Plant (CETP) before the final disposal.
- Water conservation and efficient techniques of process water usage should be encouraged and subsidized in NAK.
- The wastewater will ensure to compliance with SEQs before the final disposal.

6.10.3 Air Emissions

- There are various key air emission sources due to traffic; stacks emissions.
- The dominant pollutant emissions to air associated above include Nitrogen Oxides (NO_x), Volatile Organic Compounds (VOCs), Carbon Monoxide (CO), Carbon di oxide (CO₂), Sulphur di oxide (SO₂) and Particulates. These pollutants may be increased in ambient condition due to operation of the NAK.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Air Emissions – Operational Phase	Direct	Medium Term	Regional	Reversible	Almost Certain	Moderate	Medium



Mitigation

In order to reduce the air emissions due to operation of the NAK following mitigation measures will be adopted.

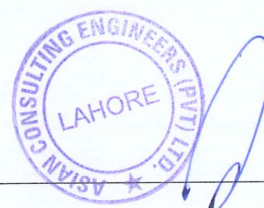
- Banned all substandard fuel in NAK.
- Regular Monitoring should be conducted by commercial centers as per provisional legislative framework of environment.
- ensuring the cleanest fuel at NAK
- Generators should be maintained properly and tuned up in respect of air to fuel ratio in order to have these pollutants within the SEQS limit.
- Regular monitoring on all emission sources should be done and measures will be taken if found non-compliance with SEQS.
- Conducting a review on existing GHGs emission performance and exploring measures to further control air emissions.

With above mitigation measures it is also recommended that ambient air quality monitoring station should be installed at the NAK in order to continuous measure of pollutants and generate the annual ambient air quality data. The data will be useful in analyzing the ambient quality that should not be deteriorating in such a way that the pollutants may exceed the standard limit against the SEQS. If that happen then the emergency measures with the advice of the environmental experts should be implemented.

6.10.4 Solid Waste

NAK is likely to generate solid wastes of different types. This will create a nuisance in the areas if proper solid waste management procedures are not adopted and facilities for collection/storage of solid waste and disposal are not provided. Two main types of waste will be generated during the operational phase of the project. These include domestic waste from houses, community centers, mosques commercial areas etc.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Solid Waste Disposal – Operational Phase	Direct	Medium Term	Local	Reversible	Possibly	Moderate	Medium





Mitigation

The solid waste management plan for NAK is developed given as under:-

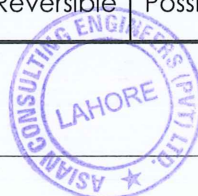
- The implementation of composting program is also recommended. This will provide on-site recycling of the biodegradable waste and grass clippings. It will also provide natural fertilizer or green manure, to be used in the NAK landscapes.
- The integrated Solid Waste Management Plan should incorporate a Solid waste segregation facility. Where Solid Waste should separate into recyclable and non-recyclable waste. For this purpose, residents can be provided with different color waste bins for different waste materials.
- The solid waste generated by the residents of the Project shall be collected in the waste bins, and placed at all houses and containers will be placed at various locations keeping in view the design criteria. The solid waste in the containers will be collected through the waste management vehicles and finally will be disposed of at the proposed disposal site.
- The waste management contractor will be hired by the NAK whose responsibility is to look after the cleanness in zone.
- The waste will be collected from the containers placed by the workers of waste management team.
- Waste Management team will transfer the waste at the designated area/secondary collection point from where the waste contractor will pick the waste and dispose in the Sindh EPA approved landfill site.

6.10.5 Impact on Flora and Fauna

The impacts of NAK on the natural vegetation of the area are likely to be comparatively less than those which would be encountered during the construction phase. Most of the potential impacts of the estate operation on the faunal resources are associated with the damage to the natural vegetation and habitat.

In addition, the wildlife may be disturbed by noise, illumination, and mere presence of the people.

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Significance
Flora and Fauna – Operational Phase	Direct	Medium Term	Local	Reversible	Possibly	Minor	Low





Mitigation

Most of the mitigation measures for protecting the biological resources during the construction phase would be applicable during the operation as well. The additional mitigation measures are:

- Keeping the light low (mounting the fixture as low as possible) where possible.
- Lower the wattage of all outdoor lighting, over lighting reduces the eye's ability to see outside of the lit area. In addition, excess light can produce glare, which also reduces visibility. Selecting the correct lamp wattage increases safety and reduces costs (for industrial buildings).
- Closing curtains (where possible) at night to keep indoor light in, will prevent bird crashes
- Extra lights in the lawns and core doors in industrial buildings should be avoided as at night light may start photosynthesis in plant which stops other processes.
- Floodlight at a higher mounting height with narrow beam angle should be used.
- The additional 10,000 trees planted will welcome the local avifauna and other associated animals for nesting and shelter.

6.10.6 Security Issue

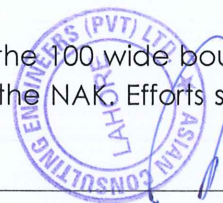
There is need for vigilant security presence in and around the NAK round the clock on a permanent basis to guard against any theft and terrorist activities. The security concerns will have to be addressed adequately. Any threat to the security should be dealt with as a major challenge.

Mitigation

A comprehensive Security Plan is developed and implemented for the NAK which includes construction of a security check post on the main entrance gate consisting of security guards. The aim of the security is to check out the in and out movements of vehicles and to monitor all the security related issues. The security towers are also built at boundary walls of the NAK. The boundary wall will be secured through fence wire. The walk through gates will also be installed for checking of the workers and visitors. In addition to this the security guards regularly monitor in and around the whole NAK to ensure proper security. Moreover, the security cameras will be installed at NAK and will be control through common control room.

6.10.7 Traffic Impact

In order to improve the traffic flow within the area, the 100 wide boulevard has been proposed at the entry boundary point of the NAK. Efforts shall be





done to build a ring arterial road system, so as to form an arterial road network of "one horizontal three vertical" within the Zone and serve internal divisions. Import road traffic facilities along the collector road in important blocks should be improved.

The detail is given in master plan attached as Annexure- I

6.11 Potential Environmental Enhancement Measures

In order to enhance environment, the following measures will be adopted:

- a. Rainwater harvesting and other water conservation and reuse technologies should be promoted in Special Economic Zone, which helps to increase the water table, improve the quantity of groundwater and reduce tube well pumping costs. The rainwater harvesting will be implemented in each industry and conditionalized with their approval.
- b. Native trees will be planted to improve the biodiversity of the area. The list of native trees and suggested plantation is given in EMP.
- c. Green spaces will improve physical and mental health of residents and visitors, and will increase the beauty area.
- d. Promotion of the renewable energy
- e. About 10,000 trees of indigenous species will be planted in NAK which enhance the vegetation feature of the site and well come the avifauna.

Besides the concrete measures to be adopted as described above, the quality of environment will further be enhanced through the running of project in complete accordance with the 5RS Principles- Reduce, Reuse, Recycle, Refurbish and Retrofit. Good housekeeping practices will be the order of the day.

6.12 Positive Impacts of the Project

The positive impacts of NAK are given as under:-

6.12.1 Provides Residential plots

The development of the proposed Project will provide residential plots for all income groups.

6.12.2 Reduce Dependency on private schemes to provide housing

There is a considerable shortage of housing in the area. The private sector is fulfilling this demand through building schemes on the outskirts of Karachi & Hyderabad.





6.12.3 Provides Infrastructure

This project will provide basic infrastructure facilities in the area like Roads, Drainage, Water Supply and Sanitary Sewerage System Community Center School, Parks, etc.

6.12.4 Reduce the housing problem in Karachi

This project will facilitate reducing the pressure on already overcrowded housing in Pakistan, particularly in Karachi

6.12.5 Provide Employment Opportunities

This project will provide employment opportunities both direct (workers and employees) and indirect by accelerating the business activities in the project area, especially for the locals.

6.12.6 Improve Living Standards and Strengthen the Economy

Indirectly the project will improve the living standards of the people by strengthening the micro economy.

6.12.7 Study Limitations

This study was focused mainly on the social, economic, and environmental implications of the proposed housing scheme on the people that live near the project area. Nonetheless, the Consultant is cognizant of the fact the Project would have broader benefits to the region and the entire country.

SECTION - 7: ENVIRONMENTAL MANAGEMENT PLAN

7.1 Environmental Management Plan

This Section provides an overall approach for managing and monitoring the environmental issues and describes the institutional framework and reporting mechanism to implement the Environmental Management Plan (EMP) for the Development of Naval Anchorage Karachi - NAK. The EMP has been prepared with the following objectives:

Provide the details of the project impacts along with the proposed mitigation measures, and a corresponding implementation schedule.

Define the roles and responsibilities of the project proponent, contractor, and supervisory consultants in order to effectively communicate environmental issues among them.

Frame a monitoring mechanism, reporting frequency, auditing mechanism and identifying monitoring parameters to ensure that all the mitigation measures are completely and effectively implemented.

Define the requirements necessary for documenting compliance with EMP and communicating it to all the concerned regulatory agencies.

7.2 Structure of EMP

- The EMP has been divided into the following sections:
- Review of regulatory requirements and applicable standards
- Mitigation Management Matrix (MMM)
- Institutional Arrangements for Implementing the EMP
- Roles and Responsibilities of the different agencies.
- Environmental Monitoring Plan
- Tree Plantation Plan
- Traffic Management Plan (TMP)
- Training program

7.3 Regulatory Requirements and Applicable Standards

The main law and legislation concerned with the environment is Sindh Environmental Protection Act 2014. This Act is a fairly comprehensive legislation and provides for protection, conservation, rehabilitation and improvement of the environment.

The salient features of the law are:

7.4 Matrix (MMM)

This matrix identifies the environmental impacts of multipurpose project during the construction and operation stages and establishes the linkages between the environmental and social impacts, mitigation strategy and the agencies



responsible for execution. The MMM presented in **Table 7-1** identifies the following:

- The mitigation measures recommended in EIA.
- The person/organization directly responsible for adhering to or executing the required mitigation measures.
- The person/organization responsible for ensuring and monitoring adherence to the mitigation measures.
- The parameters which will be monitored to ensure compliance with the mitigation measures.
- The timing at which the mitigation or monitoring has to be carried out.



Table 7-1, Mitigation management matrix

Sr. No.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
Pre-Construction Phase					
Project Location					
01	Land Acquisition and Resettlement during Pre-Construction	No land acquisition and resettlement involved.	-	-	Not Applicable
Construction Phase					
Physical Impacts					
02	Soil Erosion and Contamination due to construction activities	Good engineering practices should be adopted by Contractors, which will help to control soil erosion at the construction sites. Soil contamination can be curtailed by reducing the oil spill from generator and other machinery at project construction areas, proper solid waste management. The Contractor is required to impart proper training to his workforce in the storage and handling of obnoxious materials, like oil, diesel and petrol that can potentially cause soil contamination. Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination.	CC	SC and NAK	Equipment maintenance. Placement of solid waste storage containers at project site. Collection and disposal by Contractor



Sr. No.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
03	Surface and Ground Water Contamination during construction activities	Septic tank and artificial drainage pipe should be developed and attached to natural drainage. The Contractor should instruct its staff not to throw any of the waste and the other scarified/scrapped materials directly into the river or canal passing from the project area in order to avoid contamination. Construction camps should be established in areas with adequate natural drainage channels in order to facilitate flow of the effluents. Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency Response Procedures in case of any spill hazard.	CC	SC and NAK	Septic tank Verify that the camp has constructed on adequate natural drainage.
04	Generation of noise, vibration and exhaust emission due to construction activities. Ambient Air Quality Deterioration due to Construction Activities	Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM10. Water Sprinkling on roads Equipment and vehicles should be well maintained to minimize particulate emissions. Haul-trucks carrying, earth, sand, aggregate and other materials	CC	SC and NAK	Maintenance of Vehicles Water Sprinkling Filled Vehicles covered with tarpaulin

Sr. No.	Anticipated impacts	Mitigation measures	Responsibility		Actions /Monitoring parameters /Monitoring methods
			Execution	Monitoring	
		should be kept covered during transportation of materials and during storage at site, with tarpaulin Use of silencers Mufflers and proper tuning of vehicles to control noise Movements of the trucks and other construction machinery causing high noise levels must be restricted at night time			
05	Disposal of Construction Debris and Garbage	A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site. The construction waste will be disposed on approved landfill site from Pb-EPA The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping. Arrangements should be made for regular garbage collection and	CC	SC and NAK	SC have to ensure that the site waste management plan is properly implemented

Sr. No.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
06	Traffic Disturbance on Service Road due to additional Construction Vehicles	removal of sewage from the construction site During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at night time due to at night time traffic flow very low in the project area.	CC	SC and NAK	Timings of the construction vehicles Grievance Record Register
Ecological Environment					
07	Loss and Damage of Natural Vegetation (About 184 trees including Keekar (<i>Vachellia nilotica</i>), Phulai (<i>Senegalia Modesta</i>) etc... will be lost due to implementation of project)	About 10,000 trees will be planted at all the available open spaces in the project area. As almost significant amount of open area will be used for the landscaping, so it will enhance the natural features of the area.	CC	SC and NAK	SC to verify that plantation plan is properly implemented.
08	Soil Erosion and Nutrient Removed due to Construction Activities.	To avoid the loss of natural nutrient rich topsoil, upper 6-inch layer of soil of the present lawns should be stored at safe point, which will be used in the landscaping of the expansion of NAK.	CC	SC and NAK	Site Inspections by SC
09	Disturbance to fauna due cutting of trees and construction activities	The 10,000 trees planted will welcome the local avifauna and other associated animals for nesting and shelter.			
10	Threats to aquatic life due to construction and liquid	The impact will be mitigated by best construction management	CC	SC and NAK	SC to verify the fences Regular Monitoring of surface



Sr. No.	Anticipated impacts	Mitigation measures	Responsibility		Actions /Monitoring parameters /Monitoring methods
			Execution	Monitoring	
	waste disposal	practices to prevent accidental damage to the water resources.			water
Social Environment					
11	Issues to Local Population due to influx of construction workers	Preference to be given to locals for construction work Local suppliers for machineries and construction materials to be given preference Local transporters to be preferred for transportation of machinery/material The Contractor should warn the workers not to involve in any theft activities Effective construction control should be done by the contractors by management of heavy vehicles and machinery operation	CC	SC and NAK	Employment records of contractors
Operational phase					
12	Reduction in ground water level	There will be proper lining and engineered structure to avoid the leakage. Rainwater harvesting should be done on the roof top of the Commercial buildings. NAK will approve plan for commercial centers integrated with rainwater harvesting system.	NAK	Sindh-EPA	Regular Monitoring of ground water level through piezometer

Sr. No.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
13	Waste water Generation due to operation of Housing Scheme	The wastewater will be the Domestic in nature and will be treated in Combined Effluent Treatment Plant before the final disposal in sewage line along Manga Raiwind Road. NAK will check the design of wastewater treatment plant before giving approval to Commercial Centers. The wastewater will ensure to compliance with SEQs before the final disposal.	NAK	Sindh-EPA	Wastewater Treatment Plant
14	Air Emissions due to operations	Banned all substandard fuel in NAK-Karachi. Regular Monitoring should be conducted as per provisional legislative framework of environment. Generators should be maintained properly and tuned up in respect of air to fuel ratio in order to have these pollutants within the SEQs limit. Regular monitoring on all emission	NAK	Sindh-EPA	Regular Monitoring of Emission at Air side

Sr. No.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
		sources should be done and measures will be taken if found non-compliance with SEQs. Conducting a review on existing GHGs emission performance and exploring measures to further control air emissions.			
15	Solid Waste Management & Disposal	- The implementation of composting program is also recommended. This will provide on-site recycling of the biodegradable waste and grass clippings. It will also provide natural fertilizer or green manure, to be used in the NAK landscapes. - The integrated Solid Waste Management Plan should incorporate a Solid waste segregation facility. Where Solid Waste should separate into recyclable and non-recyclable waste. For this purpose, residents can be provided with different	NAK	Sindh-EPA	Monitoring of Solid waste disposal as per plan



Sr. No.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
		- color waste bins for different waste materials. - The solid waste generated by the residents of the Project shall be collected in the waste bins, and placed at all houses and containers will be placed at various locations keeping in view the design criteria. The solid waste in the containers will be collected through the waste management vehicles and finally will be disposed of at the proposed disposal site. - The waste management contractor will be hired by the NAK whose responsibility is to look after the cleanness in zone. - The waste will be collected from the containers placed by the workers of waste management team. - Waste Management team			

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131



Sr. No.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods
			Execution	Monitoring	
		will transfer the waste at the designated area/secondary collection point from where the waste contractor will pick the waste and dispose in the Sindh EPA approved landfill site.			





7.5 Institutional Arrangements for Implementation of EMP

The main institutions involved in the implementation and management of EMP will be as follows:

- Naval Anchorage Karachi (NAK)
- Supervisory Consultants (SC)
- Construction Contractor (CC)
- Sindh Environmental Protection Agency (Sindh-EPA)

7.6 Roles and Responsibilities

The key organizations will have the following roles and responsibility during the construction and operation stages:

7.7 Construction Stage

During the construction stage, Construction Contractor (CC) will be mainly responsible for the execution of the mitigation measures. Supervisory Consultants (SC) will be responsible for the monitoring of the compliance with top management as defined in mitigation management matrix.

7.8 Operation Stage

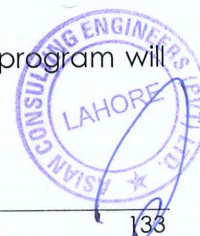
During the operational stage of the project, role of CC and SC will gradually decrease. During this phase of the project, implementation of recommendations of EMP and its supervision will be the responsibility of NAK and EPA as defined in mitigation management matrix.

7.9 Environmental Monitoring Plan

7.9.1 Objectives

The objectives of the environmental monitoring during the construction and operation stages are as follows:

- To check compliance with the requirements of the EMP by monitoring activities of the project contractors. This will be called Activity Monitoring.
- To monitor actual impacts of the project activities on physical, ecological and socioeconomic receptors of the Project Area so that any impacts not anticipated in the EMP or impacts which exceed the levels anticipated in the EMP can be identified and appropriate mitigation measures can be adopted in time. This objective will be achieved through effects monitoring.
- To achieve these objectives, the following monitoring program will be implemented.



7.10 Monitoring Strategy

7.10.1 Activity Monitoring

Activity monitoring will be carried out to ensure compliance with the requirements of the EMP.

The mitigation management matrix will be used as a management and monitoring tool. Activity monitoring will be the responsibility of all organizations involved in the operation, i.e. top management of multi-purpose building, Project Consultants and the Contractors and hence it will be done at three levels:

- Activity Monitoring by NAK
- Activity Monitoring by Consultant's field monitors
- Activity Monitoring by the Contractor's officers

The Contractors will report compliance with the MMM to SC and then SC will report to the NAK for verification.

7.10.2 Effects Monitoring

Effects monitoring will be the responsibility of NAK. Monitoring requirements have been outlined in the EMP. However, a detailed monitoring program is attached as Table 6.1. The monitoring program describes in detail the resources and methodology that will be adopted for the purpose of Effects Monitoring.

Physical Environment will target at identifying project impacts on:

- Water
- Air

A monitoring protocol is provided in the matrix given in **Table 7-2**.

7.10.3 Ecological Environment

Floral surveys will be conducted to determine the effects of different project activities on Flora. The recommended effects monitoring protocol for Flora is provided in **Table 7-3**.

7.10.4 Socio-economic Environment

Effects on the socio-economic environment will be monitored by the consultants who will conduct survey both during construction and operation stage. The surveys will be structured to ascertain the level of impacts during the course of the project and the implementation of mitigation measures prescribed in the EMP such as health and safety of communities.

Table 7-2. Recommended Activity Monitoring Protocol for Physical, Ecological and Social Environment

Parameter/Receptor	Location	Monitoring Mechanism	Monitoring and Reporting Frequency
Water Quality	Near the project area Concrete preparation plants Fuel (Petrol, Oil and Grease) products storages	Discrete grab sampling and laboratory testing of water samples.	Sampling and laboratory testing should be done on Monthly basis during the construction and annually during the operational stage. Outlet and drains from the mechanical repair units should include testing.
Dust Emissions	Construction site	Visual checks	Daily visual monitoring during routine monitoring by activity monitors and reported on a monthly basis during the construction period.
Noise Levels	Construction site Nearby area due to track movement	Noise meter	On fortnight basis throughout the construction period. Monthly from 3 rd party environmental laboratory Quarterly during the operational stage.
Stack emissions and Ambient Air	Silencers of heavy machinery, trucks and other vehicles. Stack monitoring of generator. Construction site Ambient Air	Monitoring of ambient air quality in ppb.	Monthly monitoring of air pollution parameters including PM, NO _x , SO _x , CO, Hydrocarbons during the construction period, and annually during the operation stage only for ambient air
Ecological Environment			
Plants disruption	As plants are not present at site so it will be monitored around the Project Area during the construction phase	Plants	Weekly during routine monitoring and reported on monthly basis during the construction period, and once in a year monitoring and reporting during the operation period.
Socio-cultural Environment			
Inconvenience to community	All around the Project Area	Consultations with community to get feedback about inconvenience due to the construction activities to perform their daily routine chores.	Monthly monitoring and reporting during the construction period.



Table 7-3: Recommended Effects Monitoring Protocol

Parameter/Receptor	Location	Monitoring Mechanism	Monitoring and Reporting Frequency
Water Quality	Sampling from the points located at a greater distance from the construction sites to ensure that they show the influence on a wider range of receiving body.	Sampling and laboratory testing of wastewater from drainage system relative away from project site	Sampling and laboratory testing should be done on monthly basis during the construction stage and annually during the operation stage.
Air Quality	Existing residential near the project site.	Ambient air quality monitoring in ppb.	Annually ambient air quality monitoring for NOX, SOX, CO, PM10 during the construction stage. Once a year during the operation stage.



7.11 Schedule of Implementation of Environmental Monitoring During Construction and Operational Phase

The schedule and implementation of environmental monitoring during operational as well as construction stage is given in **Table 7-4** and **Table 7-5**.

Table 7-4, Monitoring Schedule of Implementation During Construction Phase

Parameter	Frequency	Remarks	Responsibility
Solid waste	Fortnight	Visual check to access the disposal methods	Contractor and supervisor and reporting to NAK who then reports to Sindh-EPA
Particulate matters	Monthly	Instrumental measurement and 3 rd party environmental laboratory	Contractor and supervisor and reporting to NAK who then reports to Sindh-EPA
Exhaust gases	Monthly	Instrumental measurement and 3 rd party environmental laboratory	Contractor and supervisor and reporting to NAK who then reports to Sindh-EPA
Ground water quality and wastewater	Monthly	Instrumental measurement and 3 rd party environmental laboratory	Contractor and supervisor and reporting to NAK who then reports to Sindh-EPA
Noise and vibration	Monthly	Measurement of noise and vibration due to construction activities and vehicle movement Instrumental measurement and 3 rd party environmental laboratory	Contractor and supervisor and reporting to NAK who then reports to Sindh-EPA
Health and safety	Monthly	Monitoring of health and safety of workers	Contractor and supervisor report to NAK

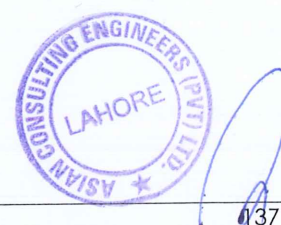


Table 7-5, Schedule of monitoring during the operational phase

Parameters	Frequency	Remarks	Responsibility
Ambient Air Quality	Annually	Ambient air quality from air side and in residential areas. Installed AQMS Monitoring by 3 rd party environmental laboratory	Administration of project and Reporting to EPA
Noise	Biannually	Noise by activities in the residential area and on-air side	Administration of project and Reporting to EPA
Surface and ground water	Annually	Monitoring of surface water and wastewater parameters defined by EPA	Administration and Reporting to EPA
Ground Water and its level	Annually	Monitoring of ground water parameters defined by EPA Ground water level from piezometer	Administration and Reporting to EPA

7.12 Grievance Redress Mechanism (GRM)

NAK will form the GRC committee in which the one member from NAK and one member from local and environmental specialist from NAK or Supervisory Consultant (SC) will be included. The objective of the GRC is to resolve the issues of the effected persons especially during pre-construction stage of the project although the GRC will also work effectively during the construction stage of the project as well and any compliant related to the environment and social will be resolved at the project or NAK institutional level. If the complaint is unresolved at the institutional level, then it may be taken at the national /provincial legal system.

The GRC register will be maintain at the project office and all complaints will be recorded in the GRC register. The GRC will develop the system to track and follow-up the compliant until it resolved.

7.13 Tree Plantation Plan

Strategic tree plantation in the Site of NAK will help to meet air quality standards as by the Sindh EPA. The plantation is proposed in the best way to minimize the pollution emitted by the construction and operation of such a big project. Number of plants will increase the canopy area in the given site

which is favorable for ecological hierarchy. This will decrease the erosion process of soil and will terminate the leaching out of soil.

The main purpose of the project is to increase the overall vegetation of the area and to enhance the conservation of natural reserves. This is so favorable for the area to grow local plant species especially of trees in the project site for the regeneration and rejuvenation of soil of the area and population living around. Local species better synchronize with environment as compared to the exotic ones.

Objectives of plantation in the Naval Anchorage Karachi is:

- Trees to combat the climate change.
- To produce oxygen, absorb CO₂ and clean the pollutants of the air.
- To sooth the body and mind of the people residing nearby.
- To absorb high frequency noise effecting human health.
- To increase values of property
- To beautify spaces
- To provide essential habitat for many species.
- To lower the cooling cost of nearby buildings.

Area of plantation will be reserved outside and near the boundary of the project site.

Goals:

Goal of the plantation is to conserve the local flora around the project site and to ensure the protection of precious species of tree plants in the given area of the project so that the habitat would not disturb in the future.

No. of Plants and Trees to be Planted:

Total 10,000 species of the plants will be planted in the vicinity of project site within the five years.

Plants will comprise 20% ornamental trees, 40% local tree species and 30% fruit and 10% grass species.

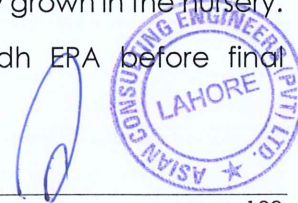
There is no plant which is clearly mentioned in the IUCN red list data, the site is free from any kind of endangered or threatened species.

All the trees will be grown in the project owned nursery and will be transferred back to the proposed site of the plantation.

Herbs and grasses will be act as colonizer and control the process of soil erosion along with the trees which are very important for plantations.

Seeds will be collected from the site and will be carefully grown in the nursery.

Plantation plan will also be discussed with the Sindh EPA before final implementation.



7.13.1 Traffic Management Plan

No traffic diversion plan needed during the construction stage of the project. The traffic will be managed through peak and off-peak timing. Mostly the heavy construction vehicles come at night time when the traffic is too low and leave the project area early in the morning.

For the operational phase, the traffic flow will be increased due to workers and visitors came at the NAK so in order to improve the general traffic flow within the NAK boundary area the roundabout has been proposed at the entry boundary point of the NAK.

7.14 Material Transportation Plan (MTP)

Material Transportation Plan will be prepared which specifies the routes for material transportation for construction of this Housing Scheme. These routes have been established in such a way that there is minimum hindrance or disturbance to the local communities and flow of traffic. HSE arrangements and proper documentation have been planned in order to achieve the above objectives as follows:

Material Transportation HSE Arrangements

Transportation timings should preferably be at night time to minimize the traffic conflicts.

Filled trucks should be covered with tarpaulin to avoid fugitive dust and should be visually inspected for proper loading, sealing and decontamination.

Vehicles should have passed an annual inspection and carry the fitness certificate.

The truck drivers will be strictly instructed not to play music and do not use horns at night time to minimize disturbances.

Material Transportation Documentation

A field logbook will be maintained for the documentation. This logbook will additionally serve to document observations, personnel onsite, equipment arrival, and departure times, a truck exit inspection checklist and other project information.

Field logbooks will document where, when, how, and from whom any vital project information is obtained. Logbook entries will be completed and accurate enough to permit reconstruction of field activities. Logbooks will be bound with consecutively numbered pages. Each page will be dated and the time of entry notice. All entries will be legible, written in black ink, and signed by the individual making the entries. Language will be factual, objective, and free of personal opinions or inappropriate terminology. If an error is made, corrections will be made by crossing a line through the error.

and entering the correct information. Correction will be dated and initialled. No entries will be obliterated or otherwise rendered unreadable.

Entries in the field logbook will include at a minimum the following for each field work date:

- Site name and address
- Recorder's name
- Time of site arrival/entry on site and time of site departure
- A summary of any onsite meetings
- Description of transport vehicle(s)
- Quantity of excavated soils in truckloads (approximate percentage of full load)
- Names of waste transporters and proposed disposal facilities

Levels of safety protection

The HSE officer of the Contractor will communicate HSE requirements and tailgate safety meetings to all drivers and on-site workers. He will provide information related to contaminant descriptions, and requirements for the containment and clean-up of an accidental release along with basic safety requirements, name of personnel in-charge, contact information and a map and directions to the nearest hospital.

7.15 Monitoring and Reporting

Following section describes monitoring and reporting frequencies and responsibilities;

7.15.1 Naval Anchorage Karachi - NAK

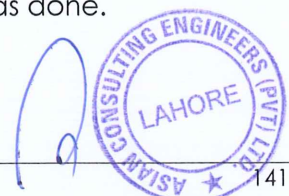
The NAK will be responsible to submit the monthly compliance report during the construction/development stage to Sindh-EPA. During the operational stage the frequency of submission of report will be defined by Sindh-EPA.

7.15.2 Supervisory Consultant

The supervisory consultant through its environmental specialist will ensure that the compliance monitoring is being carried out monthly, quarterly and semi-annually basis during the construction period. If noncompliance is recorded, conduct review meetings with Contractor to address the non-compliance.

7.15.3 Contractor

The Contractor through its Environment Engineer will be required to submit monthly checklists to the Supervisory Consultant defining what mitigative actions have been undertaken and where this work was done.





Conduct the Environmental Monitoring (Air, drinking water Canal Water, Noise (ambient noise and equipment noise) as per frequencies and parameters mentioned in the EMP

7.16 Equipment Maintenance Details

All Construction vehicles, Earth moving equipment, Construction equipment and Material handling equipment will be maintained in accordance with the Maintenance Scheduling for Mechanical Equipment (Facilities Instructions, Standards, and Techniques Volume 4-1A – Revised 2009), U.S. Department of the Interior Bureau of Reclamation.

The contractor will make the detail plan for maintenance schedule of their machinery before the construction to be started and will be submitted to the consultant. The contractor will do the continuous follow-up and regular checks will ensure on all the construction machinery equipment's.

7.17 Training Programs

Environmental training for construction period will form part of the environmental management system. The training will be directed towards all personnel for general environmental awareness.

7.17.1 Objectives

The key objective of the training program is to ensure that the requirements of the EMP are clearly understood and followed throughout the Project.

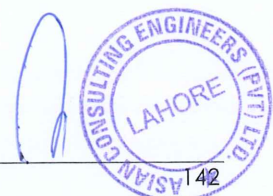
7.17.2 Roles and Responsibilities

SC will be responsible for conducting environmental training to all the Project personnel on potential environmental issues of the Project through Contractor, who will be responsible to arrange training and ensure the presence of targeted staff. SC will prepare a Project specific training manual for this purpose. Contractors on their part will be required to provide induction training/briefing to all their staff at the time of their recruitment and before the start of any activity in the Project Area. This will be followed by training arranged by the SC to all the targeted staff.

7.17.3 Training Log

A training log will be maintained by the SC. The training log will include;

- Topic
- Date, time and location
- Trainer
- Participants





7.18 Environmental Budget

7.18.1 Monitoring Cost

Environmental monitoring cost during construction stage related to the mitigation measures of environmental parameters related to the location of camp site facilities, construction and demolition activities etc. will be the sole responsibility of the Contractor and he will take care of cost implications as it will be a part of his contract agreement. The environmental cost during operational stage is the sole responsibility of NAK Tentative annual monitoring cost as per environmental monitoring plan is given in **Table 7-6**.

Table 7-6, Annual Monitoring Cost during Construction Stage per Year

Sr. No.	Item	Unit Cost	No. of Unit	Frequency Per Annum	Total (Rs)
1	Construction Noise Monitoring	500	10	12	60,000
3	Drinking water quality monitoring (During construction)	30,000	02	04	240,000
5	Personal protective Equipment	8000	200	1	1600,000
6	Fire Fighting Equipment's Purchase and refilling	10,000	10		100,000
7	Health and Hygiene				-
7.1	First Aid box complete	10,000	4		40,000
7.2	Water filter with extra filters	30,000	4		120,000
7.3	Air monitoring & Testing				-
7.3.1	Air emission testing including vehicles, gensets and Ambient Air on construction sites	100,000	1	04	400,000
8	HSE specialist and officer	100,000	1	12	1200,000
9	Contingency /Misc. / other (Afforestation, Plantation of trees, Landscaping and others)	10 % (376,000)			
Total					41,36,000 Rs. 4.1 (million approx.)

Tentative annual monitoring cost during operation stage is included in **Table 7-7**.



Table 7-7, Annual Monitoring Cost during Operational Stage per Year

Sr. No.	Item	Unit Cost	No. Of Unit	Frequency Per Annum	Total (Rs)
3	Environmental Monitoring (Ambient Air, Noise, Ground water and Wastewater)	300,000	01	12	3600,000
6	Fire Hydrants	300,000	15	1	4500,000
7.1	First Aid box complete	10,000	4		40,000
7.2	Water filter with extra filters	30,000	4		120,000
8	Environmental Specialist and officer	100,000	1	12	1200,000
9	Contingency /Misc. /	10 % (946,000)			
Total					10406000 (Rs.10.4 million approx.)

7.18.2 Wastewater Treatment Plant

The wastewater treatment plant will be installed during the operational phase of the project. The wastewater treatment plant cost around 200 million Approx.

7.18.3 Plantation Cost

Around 10,000 trees of indigenous species will be planted during the operational phase of the project. The estimated cost for the plantation is around Rs. 0.5 million approximately.



SECTION - 8: STAKEHOLDERS' CONSULTATION

8.1 General

Public consultation is a systematic process, which provides an opportunity for planners, citizens, managers and selected representatives to share their experience, knowledge and concerns and perceptions about any proposed development.

The consultation process with various stakeholders of Asian Consulting Engineers (AsCE) Pvt Ltd has been carried out to involve community and other stakeholders at earlier stages. Information dissemination during public consultation is fundamental to successful conclusion of the project. This chapter describes the objectives and details of the consultative process adopted; its outcome and the conclusions drawn thereafter.

Public consultation has been done during the planning and design phases of the project with Government departments, line agencies, NGOs and affected persons of the project area; concerns and suggestions thereafter have been taken into account and included where appropriate. The consultative process to date has been effective in addressing the concerns over the project operational impacts.

8.2 Objectives of Consultation

Public consultation plays a vital role in studying the effects of any development project on stakeholders and in its successful implementation and execution. It affords an opportunity to exchange knowledge with those who as members of the society are concerned with the project, immediately or remotely. Referring particularly to a project related to environmental assessment, involvement of public is all the more essential, as it leads to better and more acceptable decision-making.

The objectives of the stakeholder and public consultation conducted in project area were;

- To apprise the project community and stakeholders about project interventions and potential impacts;
- To record the community concerns and recommendations regarding the project;
- To address/incorporate those recommendations in the project design to the extent possible and;
- To share the mitigation measures with the local communities.

8.3 Proponent's Environment Management Team

Possible impacts and mitigation measures related to the subject project were discussed with the developer and his management team. They assured to



take all suggested mitigation measures to control any discrepancy arose by the project and to make the project environmentally friendly.

8.4 Responsible Authority

The Environmental Protection agency shall be the responsible authority for the site inspection and provision of environmental approval for the project.

8.5 Environmental Practitioner and Expert

The Asian team have endeavoured to hold consultative sessions with a number of prominent stakeholders (Project Proponent, Government departments, line agencies, NGOs and affected persons of the Project Area) to evince their views on the project and their opinions, suggestions, understanding on various issues and concerns. The consultations aimed specifically at:

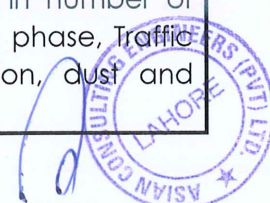
- Dissemination of Project information through discussions, education and liaison.
- Eliciting the comments and feedback on the project.
- Documentation of information narrated by the stakeholders.
- Documentation of mitigation measures proposed by the stakeholders.
- Incorporation of public concerns and their addresses in the EIA/ EMMP.

8.6 Identification of Main Stakeholders (Including other department and Agencies)

Among all stakeholders some major stakeholders were identified in the proposed Project Area. Error! Reference source not found. contains the list of major stakeholders and their apprehensions.

Table 8-1, Views of Major Stakeholders

Sr. No.	Stakeholders	Apprehensions
1	Local Residents	Movement problem for local residents, dust and noise problem, privacy / safety issues, disturbance of public utilities, traffic jam. Wastage of time & fuel
2	Shopkeepers	Temporarily Loss of business & reduction in number of customers during construction phase, Traffic congestion, air pollution, dust and noise, movement problem.
3	Shop owners	Loss of business & reduction in number of customers during construction phase, Traffic congestion, noise, air pollution, dust and noise, movement problem.





Sr. No.	Stakeholders	Apprehensions
4	Customers	Movement problem for customer, dust, noise and vibration problems, safety issues, traffic jam.
5	Students	Movement problem for students, dust, noise and vibration problems, and safety issues, traffic congestion, Wastage of time & fuel.
6	Road users	Traffic congestion, dust, noise and vibration, disruption to travelers, increase travelling time during construction.
7	Pedestrians	During construction period pedestrians will face difficulties while walking to nearby places existing in the vicinity of proposed Project Area and will face safety issues.

8.7 Consultation Meetings and Formal & Informal Group Discussions (Including Affected and Wider Community)

Consultation meetings regarding project impacts, their magnitude and mitigation measures were held with the, local residents, shop owners, shop keepers(renters), customers, pedestrians, road users, students and general public to know their concerns regarding proposed project.

Scoping sessions were conducted with the local residents, shop keepers, customers, road users, students and pedestrians. These sessions were carried out at various location of the proposed project (pictorial evidences are shown in figure 5.1). Socio-economic survey is attached as Annexure 6.

Generally, it was found that people were already aware of the proposed project. After the meetings, majority of the respondents including local residents and other stakeholders were in favor of the project site. Although this project will be beneficial in terms of good infrastructure development, not only for the local residents but also good for the socio-economic development of the area as the land is already residential and owned by Naval Anchorage Karachi, but some concerns/suggestions raised by stakeholders are given which are shown below:

8.8 Concerns/Suggestions of the Stakeholders

The most commonly raised concerns during the meetings are listed below:

Construction of road should be completed in time without any delay as per project timeline;

- Exposure of noise and dust pollution will cause disturbance and health & safety issues to the local residents and other stakeholders throughout the construction stage due to the movement of construction machinery and transportation of construction materials. The effects of noise and dust pollution on the local residents should



be minimized by making necessary arrangements. Dust pollution should be controlled by water sprinkling on regular basis;

- Due to the movement of loaded trucks during the construction period of proposed project, congestion on the access road will increase. Proper diversion route rather than access road should be clearly defined to avoid traffic blockage during the entire construction period;
- During construction period local residents, road users and pedestrians will face difficulties while moving to places in the vicinity of proposed project area. Appropriate diversion plan should be developed to avoid the disruption of all the people due to use of heavy machinery in day timings and should avoid disturbance for the local residents living in the project vicinity;
- Local residents should be given priority for jobs during the construction phase;
- Due to the construction of the proposed project, public utilities will be disturbed. Arrangements should be made to minimize the disruption of public utilities or they may be rehabilitated on priority basis to reduce the impacts;
- Increase in traffic and safety hazards will create problems to local population and surrounding communities. Accordingly, a detailed Health and Safety Plan (HSE Plan) must be developed to mitigate the construction and operation risks of the proposed project on the local residents and surrounding communities;
- Solid waste produced during construction should be disposed off timely and properly;
- Construction material and asphalt plant should be located outside the residential area;
- The labour camps should be away from the populated area to avoid privacy issues;
- Local residents should be given priority for unskilled jobs during construction phase;
- The batching plant should be installed at distance from the residential area; and
- Good quality construction machinery may be used to reduce noise and pollution issue.

8.9 Mitigation Measures Proposed by EIA Consultants for Addressing the Stakeholder's Concerns

The contractors and design consultants may include the following environmental and safety provisions in the project design in order to protect the surrounding communities from the anticipated impacts of pre and post construction activities:





- Significant efforts including change in design should be adopted to minimize the physical and economical displacement / disturbance of the local residents;
- If physical displacement is unavoidable, occupants should be given compensation as per law;
- Local residents should be given priority while hiring during construction phase of the proposed project;
- Construction machinery should be placed at adequate locations away from the sensitive areas to minimize the impacts related to the noise;
- Project facilities should be located outside the existing residential areas.; In order to avoid restricting the daily movement of the local stakeholders, construction vehicles should remain confined within their designated areas of movement;
- The utilities to be shifted due to the implementation of the proposed project should be rehabilitated on priority basis to minimize the impacts on the stakeholders;
- Solid waste generated during construction at site should be disposed of safely at the waste disposal sites approved by the contractor; and
- All necessary measures should be taken to ensure the safety of traffic during construction, including barricades (including signs boards, pavement markings, flags, and lights). All such barricades will be set up to facilitate the local traffic.





SECTION - 9: CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusion

The project involves the construction of Naval Anchorage Karachi, Jamshoro. According to the "Sindh Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2021" the project falls in schedule III. Accordingly, this EIA has been prepared for issuance of N NOC/EA by the SEPA, before initiation of the project on ground.

The implementation of the proposed project will have beneficial impacts on population. Major beneficial impacts of the proposed project are:

- Construction of proposed project will incorporate more inhabitants in a modern housing society.
- The project will decrease housing deficit in the country and will provide a high-standard housing scheme to the local residents;
- The project will produce job opportunity in construction as well as in operational phase;
- Development of NAK will provide safe and secure environment for living and commercial activity.

Apart from the beneficial impacts of the project, the proposed project has potential adverse environmental and social impacts during the construction and operational phases. Most of the adverse impacts during construction are of a temporary nature. These potential impacts can be avoided or mitigated by adopting suitable mitigation or remedial measures as mentioned in this EIA Report. Following are the conclusions based on the findings of detailed EIA study.

1. Incompatible planning and engineering design of the structures with little spaces between already developed buildings that can result in congested structures with poor ventilation, low air circulation and reduced sunlight, inconveniences of movements of the pedestrians, difficulty in transporting materials through narrow passages and blockage of sunlight;
2. Improper water supply design may result in low pressure, mixing of sewage into water supply pipes, unavailability of water during fire etc.;
3. Inefficient design of sewerage and drainage system may result in accumulation of silt in sewers in low areas over time, overflows, blockages which may lead to both technical and social problems along with environmental issues like creating foul smell and unhygienic conditions;



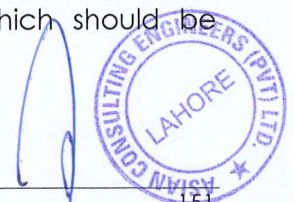


4. The project area is located in Seismic Zone 2A, where 2A represents peak horizontal ground acceleration from 0.8 to 1.6 m.sq/sec. A low to moderate intensity earthquake can adversely impact the development in case of poor structural planning;
5. Major adverse impact at the construction phase will be soil and water contamination, noise and air pollution, generation of solid waste, impact on flora and fauna, disturbance to local people and health & safety of workers;
6. During operational phase, excessive withdrawal of groundwater for a prolonged period of time without adequate recharge may affect availability of water. Careless behaviour of residents may result in wastage of water, pollution of groundwater due to percolation of polluted water/ leaked oil during maintenance etc. into groundwater;
7. Improper operation and maintenance of sewerage system may lead to choking of sewer resulting in stagnant of wastewater in the streets or in low lying areas;
8. Air quality of the project area may be affected in the operational phase mainly due to increased vehicular movement and open burning of solid waste and garden waste;
9. Noise levels are anticipated to increase mainly due to traffic related noise pollution and due to commercial activities in the project area; and
10. Improper management of solid waste and accumulation of solid waste due to non- collection may give rise to various severe issues to environment and health.

9.2 Recommendations

Following recommendations must be taken care prior to any of the decision about the proposed project:

1. Proper implementation of Environmental Management & Monitoring Plan (EMMP), containing mitigation measures for anticipated potential impacts along with monitoring program, should be ensured during all three phases of the proposed project.
2. All personnel staff, employees and contractors/s should undertake appropriate training prior to construction to ensure they are aware of the on-site responsibilities in respect of all environmental and social issues. In addition, EMMP should be a part of contract document of Contractor/s. Moreover, the cost for environmental management, monitoring and training has been estimated which should be included in overall project cost.





A comprehensive EMP has been developed identifying the impacts, mitigation measures, agencies responsible for implementation, monitoring and auditing of the proposed measures. EMP also provides the roles and responsibilities of the agencies responsible for mitigation, monitoring and auditing of EMP. The EMP also provides the proposed institutional setup for effective implementation of the mitigation measures, monitoring parameters, and training, Contractors and Supervisory Consultant staff to enhance their capacity. As the EIA Study has been carried out at Design Stage of the Project, so a change management plan has been provided in the EMP to cater the changes that may occur at detailed design and even during construction and operation stages of the Project. Similarly, generic guidelines for HSE, EMS, Waste Management and Air Emissions etc. have also been provided in EMP at zone level which will help to prepare detailed management plans for estate and individual units on later stage by the NAK and private investors.

Based on the EIA report, it can be concluded that the development of NAK will play a vital role in empowering the people of Sindh especially Karachi and adjacent areas with economic development and employment opportunities in the region. The EMP as recommended in this EIA Report is to be put in place during implementation of the project. In accordance with EMP the monthly and annual monitoring of environmental parameters by a third-party environmental laboratory also certifies that the project will run in accordance with legal requirements. Further, the implementation of the environmental mitigation measures, proper monitoring and compliance of the environmental standards/legislations will make the Project environmentally more sustainable.

9.3 Recommendation

On the basis of the facts summarized as above, the project merits for issuing Environmental Approval by the Environmental Protection Agency, Government of Sindh.





ANNEXURES



ANNEXURE – 1: MASTER PLAN NAK



19.LOP of Phase-I (11-04-2023)



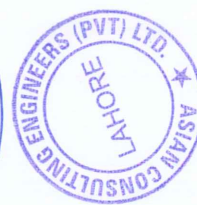


ANNEXURE – 2: BASE LINE ENVIRONMENTAL MONITORING





ANNEXURE – 3: IMPACT MATRIX



Environmental Component		Physical, Ecological and Social Environment																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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A. Planning & Design Phase	1	Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Ambient Air Quality	0	0	-2	-2	-1	-1	-1	0	0	0	0	0	-2	-1	-1	-1	0	-1	-1	0	-1	-1	0	-1	-1	0	0	0	0	0	0	0	1	1
Impact on Ambient Noise Levels	0	0	0	-1	-1	-2	-2	-1	0	0	0	-1	-1	-1	-1	-1	0	-1	-1	0	-1	0	0	-1	0	0	0	0	0	0	0	0	0	
Water Consumption	0	0	0	-2	-1	-2	-2	0	0	0	0	0	0	0	-1	-1	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	
Resource Conservation	0	0	-1	-2	-1	0	0	0	0	0	0	0	0	0	-1	-1	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	
Impacts of Wastewater Generation	0	0	0	0	-1	0	1	0	0	0	0	1	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	-2	0	0	0	
Operation of Vehicular Traffic	0	0	0	0	-1	-2	-2	0	0	0	0	0	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	
Materials selection	0	0	0	0	-2	0	-2	0	0	0	0	-2	0	-1	-1	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	-1	0	0	0	
Occupational Health and Safety	0	-1	-2	-1	0	0	0	0	0	0	0	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	
Energy Use	0	0	0	-1	0	1	0	0	0	0	1	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	-2	0	0	0	0	
Community Health and Safety	0	-1	-2	-1	0	0	0	0	0	0	0	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	
C. Operational Phase	1	2	3	4	5	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
Solid Waste Generation and Disposal	0	0	-1	-1	-1	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	0	1	-1	0	0	0	0	-2	0	1	3	3	

[illegible]



ANNEXURE – 4: SCREENING CHECK LIST



SCREENING CHECKLIST OF Naval Anchorage Karachi

Adverse Impact -, Significant Adverse --, Beneficial Impact +, Highly Beneficial ++, No Impact 0

Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
1	Atmosphere					
a	Ambient Air	0	--	--	-	-
b	Primary Pollutants	0	--	--	-	-
c	Secondary Pollutants	0	-	--	0	-
d	Noise	0	--	--	-	-
e	Vibration	0	-	0	-	0
2	Climate					
a	Temperature	0	0	-	0	-
b	Precipitation	0	0	0	0	0
c	Relative Humidity	0	0	0	0	0
e	Evaporation	0	0	0	0	0
3	Water Resources					
a	Surface Water	0	-	--	0	-
	Rivers	0	-	--	0	-
	Streams	0	-	--	0	-
	Springs	0	0	0	0	0
	Wetland	0	0	0	0	0
	Flow	0	-	-	-	-
	Quality	0	--	-	0	0
	Usage	0	-	-	0	0
	Sediments	0	0	0	0	0
	Chemicals	0	-	0	0	0
	Pollution	0	-	0	0	0
	Erosion	0	-	0	0	0
b	Ground Water					
	Sources	0	-	-	0	-
	Depth	0	-	-	-	-
	Quantity	0	-	-	-	-
	Potential Extraction	0	-	-	-	-
	Usage	0	-	-	-	-

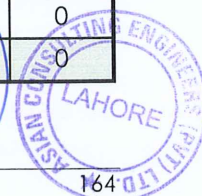


Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
	Domestic Supply	0	0	0	0	0
	Industrial Water Supply	0	0	--	0	-
	Irrigation	0	0	0	0	0
	Hydropower Generation	0	0	0	0	0
	Quality	0	-	-	0	-
4	Land Resources					
a	Topography	0	-	0	0	0
b	Soil	0	-	0	0	0
c	Major Land use	0	0	0	0	0
5	Ecological Environment					
a	Terrestrial Ecology					
	Flora	0	--	0	-	+
	Fauna	0	--	0	-	+
b	Aquatic Ecology					
	Aquatic Flora	0	--	0	-	0
	Aquatic Fauna	0	--	0	-	0
	Fisheries	0	-	0	0	0
c	Wildlife	0	-	0	0	+
d	Forestry	0	0	0	0	0
e	Beneficial Plants and Animals	0	0	0	0	+
f	Endangered Species	0	0	0	0	0
6	Socio-economic Environment					
a	Institutional and Administrative Setup	0	0	0	0	+
b	Demography	0	0	0	0	0
c	Gender issues	0	-	-	0	0
d	Social Equity	0	0	0	0	0
e	Settlement Patterns	0	-	0	0	0
f	Land Holdings & Titling	0	-	0	0	++
g	Common Resource Rights	0	0	0	0	0
h	Fish	0	0	0	0	0
i	Wood	0	0	0	0	0
j	Grazing	0	0	0	0	0
k	Fodder	0	-	0	-	0





Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
l	Domestic Energy and Fuel	0	0	0	0	0
m	Domestic Water Supply	0	0	0	0	0
n	Sanitation	0	-	0	0	0
o	Health	0	-	--	0	-
p	Waterborne Disease	0	-	-	0	+
q	Common Diseases	0	0	0	0	0
r	Mental Health	0	0	0	0	++
s	Human Nutrition	0	0	0	0	0
t	Education & Literacy	0	0	0	0	+
u	Cultural & Historical Sites	0	0	0	0	0
v	Religious Sites	0	0	0	0	0
w	Aesthetics	0	-	-	0	+
x	Landscape	0	-	-	0	++
y	Livelihood	0	--	0	0	++
z	Agriculture	0	-	0	-	0
	Livestock	0	0	0	0	0
	Forestry	0	0	0	0	0
	Fisheries	0	0	0	0	0
	Industry	0	0	0	++	++
	Other Cash Income	0	+	+	+	++
7	Transport, Infrastructure & Communication					
a	Roads	0	-	+	0	++
b	Tracks	0	-	+	0	++
c	Bridges	0	0	0	0	++
d	Pedestrian Tracks	0	-	+	0	++
e	Navigation	0	0	0	0	0
f	Energy and Power	0	-	0	0	++
g	Telecommunication	0	0	0	0	++
8	Natural Risks and Hazards					
a	Earthquake	0	0	0	0	0
b	Landslides	0	0	0	0	0
c	Storms	0	0	0	0	0
d	Floods	0	0	0	0	0



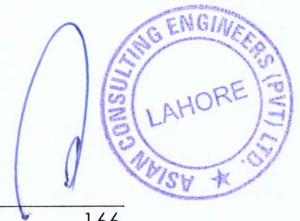


Sr. No.	Main Environmental Parameters	Baseline Conditions	With Project			
			During Construction without Mitigation	During Operation without Mitigation	During Construction with Mitigation	During Operation with Mitigation
e	Erosion	0	0	0	0	0
f	Drought	0	0	0	0	0
g	Human Disease	0	0	0	0	0
h	Pollution	0	--	0	-	--
i	Social Instability	0	0	0	0	+
j	Economic Instability	0	+	+	0	++
k	Political Instability	0	0	0	0	0
9	External Constraints					
a	Upstream Constraints	0	0	0	0	0
b	Upstream Impacts	0	0	0	0	0
c	Downstream Constraints	0	0	-	0	0
d	Downstream Impacts	0	0	-	0	0



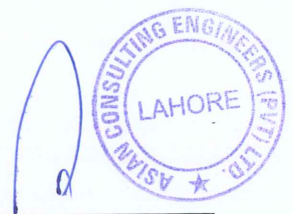


ANNEXURE – 5: LAND OWNERSHIP DOCUMENT





ANNEXURE – 6: SOCIO-ECONOMIC SURVEY PROFORMA





**ENVIRONMENTAL IMPACT ASSESSMENT (EIA)
OF**

**Naval Anchorage Karachi
SOCIO-ECONOMIC BASE LINE SURVEY**

1. Name of Interviewer: _____ 2. Date: _____
3. Village Name: _____ 4. Union Council/Tehsil: _____

DEMOGRAPHIC PROFILE

5. Name of Respondent: _____
6. Respondent's Father Name: _____
7. Gender of Respondent: a. Male b. Female
8. Age of Respondent: a. 15-25 b. 26-35 c. 36-45
d. 46 & Above
9. What is your Education Level? a. Illiterate b. Primary c. Middle
d. Matric e. Intermediate f. Bachelors g. Above Bachelors
10. What is your Occupation?
a. Business b. Government job c. Private job d. Farmer e. Unemployed
11. What is your Marital Status? a. Married b. Unmarried
12. What is your primary Language (i.e., the one you speak most of the time)? _____
13. What is your Caste? _____
14. What is your Religion? _____
15. What type of your family system? a. Joint _____ b. Nuclear _____
16. Total number of Family Members (Adult) living with you?
a. Male _____ b. Female _____ c. Total _____
17. How many Children's you have (upto 10 years)?
a. Male _____ b. Female _____ c. Total _____

ECONOMIC PROFILE

18. What are the major sources of your household income?
a. Service _____ b. Agriculture _____ c. Business _____
d. Labor _____ e. Livestock _____ f. Any other _____
19. What is distance of your office/work place from your house?
a. 1-10 Km _____ b. 11-20 Km _____ c. 21-30 Km _____ d. 30 Km & Above _____
20. Approximately what is your Family Monthly Income?
a. Less than Rs. 20,000 b. Rs. 21,000-40,000 c. Rs. 41,000-60,000





- d. Rs. 61,000-80,000 e. More than Rs. 80,000
21. Approximately how much is your Family Monthly Expenditure?
a. Less than Rs. 20,000 b. Rs. 21,000-40,000 c. Rs. 41,000-60,000
d. Rs. 61,000-80,000 e. More than Rs. 80,000
22. How many of your family members are in age (16-65)? _____
23. How many of your family members in age (16-65) are employed? _____
24. Status of ownership (In case of shop keeper/business owner)?
a. Owner b. Renter
25. Respondent per day income _____
26. What are your normal working hours? _____

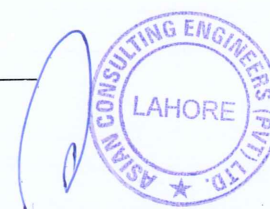
HOUSING PROFILE

27. Status of Ownership: a. Resident Owner b. Resident Tenant
28. Total Area of the House: a. Kanal _____ b. Marla _____
29. Total Living Rooms (No.): _____
30. Type of Construction: a. Katcha b. Semi Pacca c. Pacca
31. Present Value Rs. _____

32. SOCIAL AMENITIES PRESENT IN HOUSE (Tick)

Social Amenities	Available	Satisfactory	Non-Satisfactory	No Access
Electricity	☐	☐	☐	☐
Sui Gas	☐	☐	☐	☐
Water Supply	☐	☐	☐	☐
Telephone	☐	☐	☐	☐
Sewerage/Drainage	☐	☐	☐	☐

33. What are the sources of water for your domestic use?
a. Public Water Supply/Tube-well b. Hand Pumps / Electric Motor
c. Bore Hole d. Any other
34. What is your land holding _____ in acres?
35. What is the source of water used for irrigation purpose?
a. Tube well _____ b. Canal _____ c. Any Other _____
36. Are you satisfied with the water quality and quantity? a. Yes _____ b. No _____
37. What are the major crops in this area?
a. _____ b. _____ c. _____ d. _____
38. What are the major common diseases in the area?





a. _____ b. _____ c. _____ d. _____

39. Facilities in or nearby the proposed project area

Facilities	Yes	No	No. of Institutions	Name	Distance from Proposed Project
Education Institutions					
Health Institutions					
Religious Place (Mosque / Shrine / Graveyard)					
Recreational Place					
Historical /Archeological Monument					

40. Is there any protected site in this area? a. Yes b. No

If yes, then Name _____ Place _____

Significance _____

41. Specify the existing Non -Government Organizations (NGOs) in your area and state of their area of work? Name of Organization _____
Area of interest _____

42. WOMEN PARTICIPATION AND DECISION MAKING IN DIFFERENT ACTIVITIES (Tick)

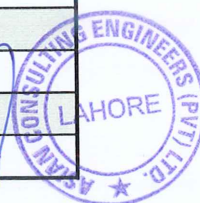
Activities	Participation	Decision Making
Household activities		
Child caring		
Farm/crop/Livestock rearing		
Working woman		
Sale & Purchase of properties		
Social obligations (marriage, birthday & other functions)		
Local representation (council political gathering)		

RESPONDENT'S VIEWS ABOUT PROJECT

43. PERCEPTIONS OF RESPONDENTS FOR ACTION ASSOCIATED WITH THE PROJECT

Possible impacts/effects of the Project (Tick)

	Increase	Decrease
Employment opportunities		
Recreational facilities		
Living standard		
Income generating activities		
Other specify		





44. Do you know about the proposed project? a. Yes b. No
45. Is your land or any asset being acquired due to the implementation of this proposed project?
a. Yes b. No If yes, please give details _____
46. In your opinion, should this Project be implemented here? a. Yes b. No
47. In your opinion, how will you be affected by construction of this project?

48. In your opinion, how will you be affected by operation of this project?
49. Would you like to be associated with the project as a worker?
a. Yes b. No
50. What protective measures do you suggest to safeguard your interests?

Protective Measures	Response
Project should complete well in time	
If any private land is acquired then proper compensation should be paid	
Harmful effects on local residents during construction should be minimize	
Implementation of HSE plan for a safe working environment	
Local residents should be given priority of jobs	
Provision of basic facilities in project area (please specify)	
Any Other (Please Specify)	
No Response	

51. Contact # _____

Interviewer Views: _____

Name & Signature of Interviewer: _____



ANNEXURE - 7: SITE PICTURES





Proposed Project Site



Proposed Project Site



Proposed Project Site



Proposed Project Site