

ENVIRONMENTAL PROTECTION AGENCY, PUNJAB

Environmental Assessment Checklists and SOPs

Roads, Infrastructure and Transportation Development Cluster

(Roads, Bridges, Flyovers, Underpasses, Canals, Drainage, Infrastructure Projects)

No: EPA-PB/SG-17

Version: A

Date: June 2026

CONTENTS

1. Introduction
 - 1.1 Scope of the SOPs
 - 1.2 Context of the SOPs
 - 1.3 How to Use these SOPs
 - 1.4 Reference Materials
 - 1.5 Glossary
2. Sector Overview
 - 2.1 Project Profile and Description
 - 2.2 Potential Environmental and Social Impacts
 - 2.3 Project Siting and Location Considerations
 - 2.4 Special Requirements for Roads and Highways
 - 2.5 Special Requirements for Bridges and Flyovers
 - 2.6 Special Requirements for Underpasses
 - 2.7 Special Requirements for Water Structures
 - 2.8 Special Requirements for Construction Camps and Borrow Areas
3. Negative Impacts and Mitigation Measures
 - 3.1 Land Use
 - 3.2 Transport and Traffic
 - 3.3 Noise and Vibration
 - 3.4 Air Quality
 - 3.5 Soil Stability and Erosion
 - 3.6 Water Quality
 - 3.7 Groundwater
 - 3.8 Stormwater Management and Flooding
 - 3.9 Water Supply
 - 3.10 Flora and Fauna
 - 3.11 Social
 - 3.12 Landscape and Visual Amenity
 - 3.13 Heritage Values

- 3.14 Hazards
- 3.15 Economic Issues
- 3.16 Health
- 3.17 Cumulative Impacts
- 4. Management and Monitoring
 - 4.1 Environmental Management Plan
 - 4.2 Monitoring
- 5. References

Appendix I - Environmental Assessment Checklist

Appendix II - Checklist of Environmental Parameters for Roads, Infrastructure and Transportation Projects

Appendix III - Matters to be Considered in Initial Site Assessment

1. INTRODUCTION

1.1 Scope of the SOPs

These Environmental Assessment Checklists and SOPs have been prepared by the **Environmental Protection Agency, Punjab (EPA Punjab)** to assist project proponents, consultants, contractors, and reviewing officers in the preparation and evaluation of IEE/EIA documents for projects falling under the **Roads, Infrastructure and Transportation Development Cluster**.

These SOPs cover the following sectors:

- Roads and highways
- Infrastructure development projects
- Bridges
- Flyovers
- Underpasses
- Canals and drains (where part of infrastructure development)
- Borrow areas and construction camps

These SOPs apply to **new construction, rehabilitation, widening, upgrading, overlay, drainage improvement, and associated ancillary works**.

For the purpose of these SOPs, ancillary facilities include, where applicable:

- All works within the right of way
- Access restoration to surrounding properties
- Drainage, culverts and stormwater structures
- Traffic control devices
- Toll plazas, weigh stations and administrative structures
- Worker camps, stockpiles and construction compounds

- Asphalt plants, batching plants and crusher plants
- Borrow areas, quarries, spoil disposal sites and maintenance depots

These SOPs shall be used for both **IEE and EIA projects** depending on project scale, right-of-way, sensitive locations, environmental sensitivity, and category under the **Punjab IEE/EIA Regulations, 2022**.

Minor routine maintenance activities may not require full IEE/EIA documentation unless they are located in sensitive areas or are likely to generate significant impacts as determined by the competent authority.

These SOPs are intended to assist proponents in identifying the environmental and social issues that need to be addressed, together with alternatives and mitigation measures that should be considered. These SOPs shall not be applied mechanically. The environmental assessment for each project shall focus on the issues relevant to that particular proposal and its receiving environment.

1.2 Context of the SOPs

Infrastructure development projects can cause significant environmental and social impacts including:

- Dust and air pollution during construction
- Noise and vibration impacts
- Disruption of traffic and public access
- Removal of trees and vegetation
- Land acquisition and resettlement impacts
- Soil erosion and sedimentation in drains/canals
- Contamination from asphalt and construction materials
- Improper disposal of excavated soil and debris
- Occupational and public safety risks

This guideline provides a standardized checklist and impact assessment approach for assessing and mitigating impacts.

These SOPs should be read in the context of the applicable environmental laws, rules, regulations, standards and sector procedures, including:

- Punjab Environmental Protection Act, 1997
- Punjab IEE/EIA Regulations, 2022
- PEQS for air emissions, effluents and noise
- SOPs for preparation and review of IEE/EIA documents
- SOPs for public consultation and stakeholder engagement
- Applicable sector design standards of C&W, Highway Department, Irrigation Department and local authorities
- Pakistan Environmental and Social SOPs for Roads

- IFC EHS SOPs for Construction and Decommissioning
- Labour laws and occupational health and safety requirements
- Federal sectoral SOPs for environmental reports on major roads
- ADB environmental SOPs for infrastructure projects
- World Bank environmental assessment source materials for roads and transport infrastructure

These SOPs should not be read in isolation, but as part of the broader environmental assessment and regulatory framework applicable in Punjab.

1.3 How to Use these SOPs

The proponent and consultant shall:

1. Provide project description and location details.
2. Conduct screening for IEE/EIA requirements.
3. Collect baseline environmental and social profile.
4. Identify impacts and provide mitigation measures.
5. Complete construction and operation phase checklists.
6. Prepare traffic management and community safety planning documentation.
7. Prepare an Environmental Management Plan and monitoring framework.
8. Sign the undertaking and submit supporting documentation.

The environmental assessment shall focus on key likely impacts rather than reproducing generic information not relevant to the project.

1.4 Glossary

Act: Punjab Environmental Protection Act, 1997

EPA Punjab: Environmental Protection Agency, Punjab

IEE: Initial Environmental Examination

EIA: Environmental Impact Assessment

EMP: Environmental Management Plan

ROW: Right of Way

Borrow Area: Site where soil is excavated for embankment/fill

Spoil: Excavated soil/material from construction

Asphalt Plant: Facility producing asphalt mix

Sensitive Receptor: A location likely to be adversely affected by pollution or disturbance, including residences, schools, hospitals, mosques, water bodies and protected sites

Cumulative Impact: Combined effect of the project together with other past, existing or reasonably foreseeable developments

Construction Camp: Temporary facility for workforce accommodation, equipment parking, material storage and support services

2. SECTOR OVERVIEW

2.1 Project Profile and Description

Projects in this cluster may include:

Roads and Highways

- New road construction
- Road widening
- Rehabilitation and overlay
- Drainage improvement
- Construction of culverts
- Bypasses, interchanges and service roads

Bridges and Flyovers

- Bridge construction over rivers, drains and transport corridors
- Flyover construction in urban areas
- Piling and foundation works
- Concrete batching and casting
- River training or protection works associated with bridge structures

Underpasses

- Excavation and tunneling works
- Diversion of traffic
- Relocation of utilities
- Stormwater drainage pumping systems
- Dewatering and retaining structures

Water Structures

- Construction and rehabilitation of water structures
- Embankment strengthening
- Canal head regulators and gates
- Drainage and control structures associated with infrastructure works

Supporting activities include:

- Construction camps
- Asphalt plants and batching plants
- Borrow areas and quarrying
- Waste disposal sites
- Fuel and chemical storage

- Haul routes and temporary diversions

2.2 Potential Environmental and Social Impacts

Infrastructure and transport projects provide social and economic benefits such as improved connectivity, reduced travel time, better access to markets, health and education services, improved freight movement, employment generation and support to regional development.

At the same time, direct and indirect impacts may arise during construction, operation and maintenance. These may include:

- Acquisition of land and displacement of existing land uses
- Severance of communities and loss of access
- Disruption to local traffic and road safety risks
- Dust, emissions, asphalt fumes and deterioration of air quality
- Noise and vibration from machinery, traffic, piling and blasting
- Erosion, slope instability and degradation of soils
- Contamination of drains, canals, rivers and groundwater
- Obstruction of natural drainage and increased flood risk
- Removal of trees and habitat disturbance
- Degradation of landscape and visual amenity
- Impacts on heritage and archaeological resources
- Community and worker health and safety risks
- Induced development and cumulative environmental stress

Projects involving bridges, flyovers, underpasses, water structures or drainage structures may generate additional impacts related to piling, excavation, dewatering, sediment mobilization, water flow alteration and utility disruption.

2.3 Project Siting and Location Considerations

Project siting is one of the most critical determinants of environmental impact. Alternatives in alignment, layout, access, staging areas, camps, borrow pits and disposal sites shall be examined early in planning.

Where feasible, project siting should avoid:

- Dense residential areas where major severance will occur
- Schools, hospitals, mosques and other sensitive receptors
- High quality agricultural land where severance will reduce viability
- Forests, plantations, wetlands, riverine habitats and ecological corridors
- Locations prone to erosion, subsidence, landslides or flooding
- Groundwater recharge areas and drinking water supply sources
- Heritage sites, graveyards and areas of cultural significance
- Areas where future induced development would cause unmanaged impacts

Location screening should consider environmental, engineering, hydrological, geological, ecological, traffic and social factors together, rather than only construction convenience.

2.4 Special Requirements for Roads and Highways

Road projects shall ensure:

- Proper design of drainage and culverts
- Dust control measures for unpaved areas
- Borrow areas selected away from settlements and water bodies
- Restoration of disturbed areas after construction
- Provision for pedestrians, cyclists and slow-moving traffic where relevant
- Safe crossings and community access restoration
- Adequate integration with the existing road network to avoid bottlenecks

2.5 Special Requirements for Bridges and Flyovers

Bridge and flyover projects shall ensure:

- Safe piling operations with vibration control
- Proper disposal of excavated riverbed material
- Protection of water bodies from concrete wash water
- Safe storage of construction materials
- Traffic diversion and safety planning
- Assessment of visual impacts and structure design harmony
- Protection against scouring, sediment disturbance and flood effects

2.6 Special Requirements for Underpasses

Underpass projects shall ensure:

- Groundwater management during excavation
- Proper pumping and disposal of dewatering water
- Safety barriers around excavation pits
- Stormwater drainage system planning
- Utility relocation plan for gas, electricity, water supply, sewerage and telecom services
- Flood resilience and pump failure contingency planning

2.7 Special Requirements for Water Structures

Water Structure projects shall ensure:

- Protection of aquatic ecosystems
- Management of sediment and dredging materials

- Safe disposal of dredged material
- Prevention of contamination from fuel and oil spills
- Maintenance of downstream flow during construction
- Protection of embankment stability and erosion control
- Management of worker camps and construction support areas

2.8 Special Requirements for Construction Camps and Borrow Areas

Camps and borrow areas shall ensure:

- Provision of sanitation and wastewater disposal
- Solid waste management plan
- Restoration of borrow pits after completion
- No cutting of trees for fuelwood
- Clean drinking water supply for workers
- Control of runoff, erosion, dust and fuel leakage
- Safe distance from settlements, water bodies and sensitive land uses

3. NEGATIVE IMPACTS AND MITIGATION MEASURES

3.1 Land Use

Adverse land use impacts may arise from land acquisition, displacement of existing uses, severance of agricultural holdings, disruption of business activity, impairment of community access, and induced land use changes along the project corridor.

In urban areas, impacts may include loss of residential or commercial properties, interruption of access, changes in traffic circulation, and redevelopment pressure along improved corridors. In rural areas, road and infrastructure projects may sever farms, reduce agricultural productivity, encourage ribbon development and expose previously inaccessible natural resources to exploitation.

Mitigation measures shall include:

- Avoidance of unnecessary land acquisition through design refinement
- Minimization of severance through crossings, underpasses, service roads and access restoration
- Fair, timely and transparent compensation
- Relocation and livelihood restoration where displacement occurs
- Coordination with planning authorities to control ribbon development and incompatible land use change
- Protection of community facilities, graveyards, irrigation channels and local circulation routes

3.2 Transport and Traffic

Construction and operation can affect the efficiency and safety of the surrounding transport network. During construction, haulage traffic, diversions, lane closures and equipment movement can create congestion and safety hazards. During operation, new infrastructure can generate induced traffic, alter travel patterns and create bottlenecks at interfaces with existing roads.

Special attention shall be given to pedestrians, cyclists, animal-drawn vehicles and other slow-moving traffic where these are present.

Mitigation measures shall include:

- Preparation and implementation of a traffic management plan
- Scheduling and routing of construction traffic to minimize disruption
- Provision of diversions, signage, barricades and lighting
- Maintenance of emergency access
- Safe crossings for pedestrians and local communities
- Integration with existing network capacity and junction improvements where needed
- Road safety audits for design, construction and operation

3.3 Noise and Vibration

Noise can arise from construction machinery, trucks, batching plants, piling, demolition, pavement works and operational traffic. Vibration may result from piling, compaction, blasting and heavy vehicle movement, particularly near sensitive buildings or structures.

Sensitive receptors include residences, schools, hospitals, mosques and heritage structures.

Mitigation measures shall include:

- Siting of plants and noisy equipment away from sensitive receptors where feasible
- Restricting high-noise activities to daytime where practical
- Use and maintenance of silencers and mufflers
- Temporary noise barriers where necessary
- Ppe for workers
- Advance notice to nearby communities for unusually noisy works
- Vibration monitoring and construction controls near sensitive structures
- Operational measures such as pavement maintenance, traffic management and barriers where required

3.4 Air Quality

Construction-related air emissions may include dust from excavation, demolition, haul roads, stockpiles and spoil disposal; exhaust from machinery and vehicles; and fumes from asphalt or bitumen works. Operational impacts may arise from vehicle emissions, congestion and increased traffic volumes.

Mitigation measures shall include:

- Regular water sprinkling on haul roads, exposed surfaces and stockpiles
- Covering of trucks transporting fine materials
- Proper maintenance and emission control of machinery
- Siting asphalt and batching plants away from residences and sensitive receptors
- Prohibition of open burning of waste
- Rapid stabilization of exposed areas
- Traffic management measures to reduce congestion and idling
- Encouragement of efficient traffic flow and public transport integration where applicable

3.5 Soil Stability and Erosion

Excavation, embankment construction, cuttings, spoil disposal, borrow area development and vegetation clearing can destabilize soils and increase erosion. In hilly, riverine or weak soil conditions, slope failure, subsidence or settlement may occur.

Mitigation measures shall include:

- Geotechnical assessment during design
- Minimization of exposed soil area at any one time
- Slope stabilization and retaining measures where needed
- Erosion and sediment control for embankments, cuttings, channels and spoil areas
- Topsoil conservation and reuse
- Rehabilitation and revegetation of disturbed surfaces
- Maintenance of erosion control structures throughout construction and operation

3.6 Water Quality

Projects may affect rivers, canals, drains, wetlands, ponds and other water bodies through sediment runoff, concrete wash water, fuel or oil spills, waste discharge, contaminated runoff, dredging, spoil dumping and altered drainage.

Mitigation measures shall include:

- No dumping of spoil, debris or waste into drains, canals, rivers or wetlands
- Provision of silt traps, sediment basins, filter strips or silt fencing
- Controlled handling of concrete wash water and plant effluents
- Bunding and proper storage of fuel, oils and chemicals
- Designated washing and maintenance areas away from water bodies
- Spill prevention and emergency response arrangements
- Protection of natural drainage paths and controlled crossing construction
- Monitoring of water quality where significant risk exists

3.7 Groundwater

Groundwater may be affected by dewatering, excavation below water table, seepage of fuel or chemicals, contaminated runoff, borrow pit excavation and changes in local recharge or flow patterns.

Mitigation measures shall include:

- Assessment of groundwater conditions in design-sensitive areas
- Controlled dewatering and proper disposal of pumped water
- Lined and bunded storage for fuels and chemicals
- Prevention of infiltration of contaminated wastewater
- Protection of nearby wells and drinking water sources
- Provision of alternative supply if project activities affect local users
- Engineering design to avoid instability caused by groundwater level changes

3.8 Stormwater Management and Flooding

Infrastructure may obstruct natural flow paths, reduce infiltration, increase runoff and create localized flooding. Underpasses, embankments, bridges, culverts and related works require careful hydraulic design.

Mitigation measures shall include:

- Integrated stormwater design based on local drainage patterns
- Provision of adequate culverts, drains and waterway openings
- Maintenance of flow under bridges and around embankments
- Flood-safe design for underpasses and depressed sections
- Temporary drainage management during construction
- Prevention of blockage by spoil, stockpiles or construction waste
- Maintenance planning for drains, pumps and outfalls
- Assessment of upstream and downstream flooding impacts
- Climate risk screening-stormwater for 50-year flood projections and heat stress on asphalt.
- Carbon footprint: Require basic GHG estimation for projects >10km or >500 crore PKR. IFC EHS already pushes this.
- Mitigation: Tree plantation ratios, recycled asphalt pavement targets, solar for toll plazas.

3.9 Water Supply

Construction activities may require significant water for compaction, dust suppression, concrete works and camps. Unplanned abstraction can affect local users and surface or groundwater balance.

Mitigation measures shall include:

- Identification of lawful and sustainable water sources
- Estimation and planning of project water demand

- Conservation and efficient water use
- Reuse of treated or recycled water where feasible
- Avoidance of interference with community water supplies
- Protection of water quality at abstraction and storage points

3.9-A Climate Risk Screening

Road and infrastructure projects in Punjab are exposed to climate hazards including extreme heat, urban flooding, and shifting rainfall patterns. The proponent shall integrate climate resilience per Punjab Climate Change Policy 2024.

Screening requirements:

Heat stress: For projects with >2km exposed asphalt in urban areas, model pavement temperature for 2050 RCP 4.5 scenario. Where surface temp >60°C expected, specify polymer-modified bitumen or concrete pavement.

Flood risk: Overlay project alignment with PMD's 1-in-50-year flood maps. For bridges, design for 10% increase in peak discharge vs historical data. Culverts shall pass 1-in-25-year storm + 20% climate factor.

Water scarcity: If construction >18 months, provide water balance showing no use of groundwater in notified water-stressed tehsils during April-June.

GHG mitigation:

Mandatory: Estimate construction-phase CO₂e for projects >10km or >500 crore PKR using NHA Carbon Calculator or equivalent.

Targets: Achieve minimum 10% emission reduction vs baseline through: optimized haul distance <20km for aggregates, 30% RAP in asphalt, solar for camps >50 workers.

Monitoring: Annual reporting of: fuel consumed, waste concrete recycled, plantation survival %. Data to be submitted via EPA Punjab's e-Monitoring portal.

3.10 Flora and Fauna

Tree cutting, vegetation clearance, habitat disturbance, fragmentation, noise, lighting, runoff and worker activity can affect terrestrial and aquatic ecology. Roadside and riverine vegetation may provide important environmental functions.

Mitigation measures shall include:

- avoidance of unnecessary tree cutting and habitat disturbance
- route and layout refinement/redesigning to protect ecologically sensitive areas

- compensatory plantation and habitat restoration
- protection of retained trees and vegetation during construction
- control of invasive species and site degradation
- timing of major disturbance to reduce impacts on breeding or migration where relevant
- restoration of borrow pits, camps and temporary work areas
 - mitigation hierarchy EPA Punjab prefers:
 - Avoid → Minimize → Restore → Offset.
 - Add: "If >50 mature trees removed, proponent must submit a Biodiversity Offset Plan with 1:10 plantation + 3-year survival monitoring."

3.11 Social

Projects can affect community cohesion, access, safety, livelihoods, business activity, education access, health services, privacy, local mobility and general well-being. Severance effects can be severe where roads, canals, flyovers or other linear works divide settlements or separate residents from schools, markets, mosques, farms or graveyards.

Mitigation measures shall include:

- early and meaningful consultation with affected communities
- documentation and response to community concerns
- minimizing community severance through crossings and access planning
- maintenance of access to homes, businesses, schools, health centers, farms and religious sites
- relocation assistance and compensation where required
- public safety measures, lighting, signage and barricading
- grievance redress mechanisms
- special attention to vulnerable groups and disadvantaged households

3.12 Landscape and Visual Amenity

Projects may alter the visual character of urban and rural landscapes through embankments, cuttings, bridges, flyovers, elevated roads, signage, stockpiles, camps and clearing of trees.

Mitigation measures shall include:

- visual assessment where the project is in a prominent setting
- minimization of unnecessary clearing and intrusive structures
- architectural and engineering detailing to achieve visual harmony
- landscaping of verges, medians, embankments and disturbed areas
- use of indigenous species where feasible
- maintenance of planted areas and screening vegetation
- proper housekeeping and timely removal of temporary works

3.13 Heritage Values

Projects may affect archaeological remains, historic structures, graveyards, religious sites, culturally important places and natural heritage features.

Mitigation measures shall include:

- screening for heritage resources during planning
- consultation with relevant departments and local communities
- avoidance of heritage sites wherever feasible
- chance find procedures during construction
- documentation, salvage, relocation or conservation measures where disturbance is unavoidable
- protection of graveyards, shrines and historically sensitive places through design revision where possible

3.14 Hazards

Hazards may arise from explosives, fuel storage, traffic incidents, dangerous goods transport, flooding, fire, structural failure, slope instability, electrical risks, confined works and emergency access constraints.

Mitigation measures shall include:

- hazard identification and risk assessment
- safe storage and handling of chemicals, fuels and explosives
- emergency preparedness and response planning
- coordination with district administration, rescue and health services
- safe design for fog, flooding, glare, visibility and geometric risks
- slope stabilization, seismic design and flood-resilient structures where required
- emergency traffic rerouting and incident response procedures

3.15 Economic Issues

Projects may create economic benefits through connectivity and employment, but may also adversely affect local businesses, agricultural viability, transport costs, land values and passing trade, especially in bypass projects or where access is disrupted.

Mitigation measures shall include:

- consideration of alternatives and cost-benefit implications
- assessment of effects on local business, agriculture, tourism and employment
- minimizing disruption during construction
- access planning for businesses and farms
- assistance measures where significant adverse local economic effects are unavoidable
- coordination with local development planning to manage induced growth

3.16 Health

Health impacts may arise from dust, emissions, noise, accidents, ponded water, blocked drainage, poor sanitation at camps, vector breeding, unsafe waste disposal, worker exposure and traffic hazards.

Mitigation measures shall include:

- safe drainage design to avoid stagnant water
- sanitation and solid waste management at camps and worksites
- vector control and housekeeping
- traffic and pedestrian safety controls
- worker PPE, training and first aid
- clean drinking water for labor and camps
- prevention of unsafe food handling and poor camp hygiene
- linkage with nearby health facilities for emergency care

3.17 Cumulative Impacts

Cumulative impacts may arise from the combined effects of the project with other road, infrastructure, urban development, industrial or drainage projects in the same airshed, watershed, or administrative tehsil. **Induced impacts refer to secondary development triggered by improved access.** These may include worsening air quality, noise, congestion, land use change, habitat fragmentation, flood stress and cumulative pressure on community services.

- **Screening threshold: Cumulative assessment is mandatory for:**
 - i.** All EIA-category projects, and
 - ii.** Any IEE project >5km length OR located within 10km of another major infrastructure project approved in last 5 years.
- **Assessment requirements: The proponent shall:**
 - i.** Map and list all projects >50 crore PKR within 5km radius approved in last 5 years + those in planning pipeline per C&W/Highway Dept.
 - ii.** Quantify key stressors where data exists: Combined PM2.5 load, traffic volume at shared junctions, flood plain encroachment %, loss of agricultural land.
 - iii.** Evaluate induced growth: Estimate ribbon development potential using 500m buffer along ROW. For bypasses, assess risk of stranded commercial assets in old town.
 - iv.** Consultation: Conduct joint meetings with adjacent project proponents and relevant TMAs, MCs, departments to align drainage, haul routes, and labor camp locations.
- **Mitigation hierarchy:**
 - i.** Avoid through phased corridor planning with district administration
 - ii.** Minimize via shared infrastructure: common spoil disposal sites, coordinated traffic diversion plans
 - iii.** Compensate if regional thresholds exceeded: contribute to District Air Quality Action Plan or watershed restoration fund
 - iv.** consideration of long-term transport, land use and drainage implications
 - v.** regional coordination where impacts extend beyond the project footprint

- vi. adoption of design alternatives early, when cumulative effects can still be reduced

- **Documentation: Provide a “Cumulative Impact Matrix” in EIA Chapter 6 summarizing table as per following columns**
Project | Status | Key overlap | Combined effect | Joint mitigation.

4. MANAGEMENT AND MONITORING

4.1 Environmental Management Plan

An **Environmental Management Plan (EMP)** shall provide the framework for managing and mitigating environmental and social impacts throughout the project life cycle.

For projects in this cluster, the EMP shall include, as applicable:

- management of construction impacts such as dust, noise, traffic disruption, erosion, sedimentation, waste, wastewater, camp management and rehabilitation
- management of operational impacts such as drainage maintenance, traffic safety, plantation maintenance, emergency preparedness and incident response
- assignment of responsibilities to the proponent, contractor, supervision consultant and relevant agencies
- training programs for staff and contractors
- reporting procedures and corrective action mechanisms
- linkages between monitoring results and management responses
- emergency response and spill management arrangements
- public complaints and grievance handling procedures

4.2 Monitoring

Monitoring should begin before construction to establish baseline conditions where significant impacts are likely. Baseline conditions may include air quality, noise, water quality, traffic conditions, ecological status and social conditions near affected communities.

Monitoring shall be limited to what is necessary and relevant to environmental protection and regulatory compliance. Monitoring parameters shall be linked to the impacts identified for the project.

Key monitoring aspects may include:

- dust and visible emissions
- noise levels near sensitive receptors
- traffic disruption, incidents and complaints
- erosion and sediment control effectiveness
- surface water quality near crossings or discharge points

- dewatering and groundwater-related effects where relevant
- spoil disposal and waste management
- plantation survival and site rehabilitation
- worker safety, public safety and incident records
- operation phase drainage performance and road safety features

5. REFERENCES

The development and use of these SOPs may rely on the following references:

- Punjab Environmental Protection Act, 1997
- Punjab IEE/EIA Regulations, 2022
- PEQS for air emissions, effluents and noise
- Punjab Highway Department / C&W Department standards
- Pakistan Environmental and Social SOPs for Roads
- IFC EHS SOPs for Construction and Decommissioning
- Labor and occupational health and safety regulations
- Federal sectoral SOPs for environmental reports - major roads
- ADB environmental SOPs for infrastructure projects
- World Bank environmental assessment source materials for roads and transport infrastructure

APPENDIX I - ENVIRONMENTAL ASSESSMENT CHECKLIST

SECTION I: PROJECT DESCRIPTION

1. Name of Project: _____
2. Proponent/Executing Agency: _____
3. Address: _____
4. Contact Person: _____
5. Contact No.: _____
6. Location (District/Tehsil): _____
7. GPS Coordinates: _____
8. Total Project Cost (PKR): _____

Project Type (tick):

- ☐ Road Construction
- ☐ Road Widening
- ☐ Bridge
- ☐ Flyover
- ☐ Underpass
- ☐ Canal/Drain Infrastructure
- ☐ Other: _____

1. Total length of road (km): _____
2. Road width (meters): _____
3. Right of way (ROW) (meters): _____
4. Estimated construction period: _____
5. Total workforce: _____

Borrow and Material Sources

1. Borrow area identified? ☐ Yes ☐ No
2. Quarry source identified? ☐ Yes ☐ No
3. Asphalt plant required? ☐ Yes ☐ No
4. Concrete batching plant required? ☐ Yes ☐ No

SECTION II: SCREENING

1. Does the project fall under Punjab IEE/EIA Regulations, 2022? ☐ Yes ☐ No

2. Category:
☐ IEE Category
☐ EIA Category
3. Is the project located near sensitive receptors?
☐ Schools
☐ Hospitals
☐ Mosques
☐ Residential areas
☐ Water bodies
4. Will land acquisition/resettlement be required? ☐ Yes ☐ No
- Decision:**
☐ IEE Required
☐ EIA Required
☐ Additional Information Required

SECTION III: ENVIRONMENTAL PROFILE

1. Land use of project area:
☐ Industrial
☐ Agricultural
☐ Residential
☐ Mixed
2. Nearest settlement distance: _____ meters
3. Nearest canal/drain distance: _____ meters
4. No. of trees likely to be removed: _____
5. Existing traffic volume: _____

SECTION IV: IMPACT ASSESSMENT AND MITIGATION MEASURES

Table:1.0

Potential Environmental/Social Impacts	Applicable (✓)	Mitigation Measures	Proposed (✓)	Monitoring Requirements
Dust emissions from excavation	☐	Water sprinkling, cover trucks	☐	Visual inspection
Noise from machinery	☐	Daytime work, silencers, PPE	☐	Noise monitoring

Potential Environmental/Social Impacts	Applicable (✓)	Mitigation Measures	Proposed (✓)	Monitoring Requirements
Traffic disruption	☐	Traffic plan, diversions, signage	☐	Complaints record
Soil erosion	☐	Proper slope stabilization	☐	Site inspection
Water pollution (sediment runoff)	☐	Silt traps, drainage control	☐	Water testing
Disposal of excavated material	☐	Approved dumping, reuse soil	☐	Disposal record
Tree cutting impacts	☐	Compensatory plantation	☐	Plantation monitoring
Community safety risk	☐	Barricades, warning signs	☐	Incident record
Worker safety hazards	☐	PPE, training, first aid	☐	Safety record
Land acquisition / severance	☐	Compensation, access restoration	☐	Resettlement record
Groundwater impacts	☐	Controlled dewatering, storage controls	☐	Site and water record
Flooding / stormwater blockage	☐	Culverts, drainage management	☐	Inspection after rainfall
Heritage / chance finds	☐	Stop work and reporting procedure	☐	Incident register
Camp sanitation impacts	☐	Toilets, waste management, water supply	☐	Camp inspection
Borrow area degradation	☐	Approved source, restoration plan	☐	Borrow area inspection
Visual impacts	☐	Landscaping and screening	☐	Site inspection
Health/vector risks	☐	Drainage, sanitation, waste control	☐	Public health complaints

Additional Mandatory Requirements (EPA Punjab)

1. No dumping of spoil into drains/canals is allowed.
2. Construction camps must provide sanitation and waste management.
3. Traffic diversion plan is mandatory for urban projects.

4. Tree cutting must be minimized and compensated through plantation.
5. Dust control through sprinkling is mandatory.

SECTION V: CONSTRUCTION PHASE CHECKLIST

- | | |
|---|--|
| 1. Water sprinkling system arranged? | ☐ Yes ☐ No |
| 2. Construction debris disposal plan available? | ☐ Yes ☐ No |
| 3. Fuel storage properly managed? | ☐ Yes ☐ No |
| 4. Spill kits available? | ☐ Yes ☐ No |
| 5. Barricades and warning signs installed? | ☐ Yes ☐ No |
| 6. First aid kit available at site? | ☐ Yes ☐ No |
| 7. Workers PPE provided? | ☐ Yes ☐ No |
| 8. Waste bins provided at camps? | ☐ Yes ☐ No |
| 9. Temporary drainage management arranged? | ☐ Yes ☐ No |
| 10. Toilets and wastewater arrangements at camp available? | ☐ Yes ☐ No |
| 11. Borrow area approval available? | ☐ Yes ☐ No |
| 12. Asphalt/batching plant located away from receptors? | ☐ Yes ☐ No |
| 13. Access to adjacent properties maintained? | ☐ Yes ☐ No |
| 14. Tree protection measures in place? | ☐ Yes ☐ No |
| 15. Emergency contact information displayed? | ☐ Yes ☐ No |
| 16. Traffic diversion plan provided? | ☐ Yes ☐ No |
| 17. Road Drainage system provided? | ☐ Yes ☐ No |
| 18. Cumulative Impact Matrix as per Appendix II-Table 3, completed?
(If Yes, attach MoUs/minutes of coordination meetings) | ☐ Yes ☐ No ☐ NA
☐ Yes ☐ No |
| 19. Climate risk screening done?
(If yes PMD flood map + heat model attached) | ☐ Yes ☐ No
☐ Yes ☐ No |

SECTION VI: OPERATION PHASE CHECKLIST

- | | |
|--|--|
| 1. Road drainage system functional? | ☐ Yes ☐ No |
| 2. Roadside plantation plan implemented? | ☐ Yes ☐ No |
| 3. Noise barriers required near residential areas? | ☐ Yes ☐ No |
| 4. Road safety signage/road furniture's installed? | ☐ Yes ☐ No |
| 5. Pedestrian crossings provided? | ☐ Yes ☐ No |
| 6. Stormwater runoff properly managed? | ☐ Yes ☐ No |
| 7. Access restoration completed? | ☐ Yes ☐ No |
| 8. Underpass pumping and drainage system functional? | ☐ Yes ☐ No |
| 9. Bridge/flyover drainage outlets controlled? | ☐ Yes ☐ No |
| 10. Monitoring and maintenance schedule available? | ☐ Yes ☐ No |

SECTION VII: COMMUNITY SAFETY AND TRAFFIC MANAGEMENT CHECKLIST

- | | |
|--|--|
| 1. Traffic management plan prepared? | ☐ Yes ☐ No |
| 2. Alternate routes identified? | ☐ Yes ☐ No |
| 3. Public information boards installed? | ☐ Yes ☐ No |
| 4. Emergency access routes maintained? | ☐ Yes ☐ No |
| 5. Speed control measures implemented? | ☐ Yes ☐ No |
| 6. Pedestrian safety ensured? | ☐ Yes ☐ No |
| 7. Night-time warning lights installed? | ☐ Yes ☐ No |
| 8. Safe school/hospital access maintained? | ☐ Yes ☐ No |
| 9. Community complaint focal person assigned? | ☐ Yes ☐ No |
| 10. Hazardous materials transport controls in place? | ☐ Yes ☐ No |

SECTION VIII: UNDERTAKING

I, _____ S/O, D/O _____
as the owner/proponent/authorized representative of the project titled:

" _____ "

located at _____, Punjab,
solemnly affirm and undertake that:

1. The information provided in this checklist and supporting documents is true and correct.
2. The project shall be executed in compliance with Punjab Environmental Protection Act, 1997 and Punjab IEE/EIA Regulations, 2022.
3. All mitigation measures identified in Section IV shall be implemented.
4. No construction waste or spoil shall be dumped into drains/canals.
5. Dust and noise control measures shall be ensured throughout construction.
6. Community safety measures and traffic diversion plan shall be implemented.
7. EPA Punjab may inspect the project site at any stage, and I shall provide full cooperation.
8. Any false statement or non-compliance may lead to legal action, penalties, or cancellation of approval.

Signature of Proponent: _____

Name: _____

CNIC: _____

Designation: _____

Date: _____

Stamp: _____

Witnesses

1. Name: _____ CNIC: _____ Signature: _____
2. Name: _____ CNIC: _____ Signature: _____

APPENDIX II - CHECKLIST OF ENVIRONMENTAL PARAMETERS FOR ROADS, INFRASTRUCTURE AND TRANSPORTATION PROJECTS

Table: 2

Actions affecting environmental resources and values	Potential damage to the environment	Recommended protection and mitigation measures
Site selection	Depends on nature of site constraints	Reject inappropriate sites; revise alignment; avoid sensitive areas
Land acquisition and displacement	Loss of livelihood, assets and amenity	Compensation, relocation support, livelihood restoration
Severance of land and access	Reduced viability and community disruption	Crossings, service roads, access reinstatement
Traffic disruption during construction	Safety hazards, congestion, delays	Traffic management, diversions, signage, scheduling
Lack of provision for non-motorized users	Accidents and exclusion of local users	Pedestrian/cycle facilities, crossings, access planning
Noise and vibration	Disturbance, health effects, structural damage risk	Timing controls, silencers, barriers, monitoring
Dust and air emissions	Health effects and nuisance	Water sprinkling, covers, plant siting, maintenance
Soil erosion and instability	Land degradation, sedimentation	Stabilization, revegetation, staged works
Water pollution	Damage to drains, canals, rivers and habitats	Silt traps, spill control, no dumping, controlled wash water
Groundwater impacts	Reduced quality or altered levels	Bunding, dewatering controls, alternative supplies
Flooding and stormwater blockage	Inundation, safety and property damage	Adequate drainage, culverts, hydraulic design
Water supply use	Deprivation of local users	Sustainable sourcing, efficiency, reuse
Flora and fauna disturbance	Habitat loss and biodiversity impacts	Avoidance, plantation, habitat restoration
Social impacts	Community severance, safety risks, loss of amenity	Consultation, crossings, access, grievance mechanism
Visual impacts	Loss of landscape quality	Landscaping, screening, visual design

Actions affecting environmental resources and values	Potential damage to the environment	Recommended protection and mitigation measures
Heritage impacts	Damage to cultural resources	Avoidance, chance find procedure, conservation measures
Hazard risks	Threat to people and environment	Risk assessment, emergency plans, safe storage
Economic impacts	Local business or agriculture losses	Access maintenance, phased works, assistance measures
Health impacts	Vector breeding, sanitation issues, accidents	Drainage, sanitation, hygiene and safety controls
Camp and borrow area impacts	Waste, land degradation, nuisance	Site management, approvals, restoration
Cumulative impacts	Regional environmental stress	Early planning, coordination, cumulative assessment

Table:3

Project Name & Proponent	Type & Status	Distance from ROW (right of way)	Construction Period Overlap	Key Shared Stressors	Combined Effect Rating	Joint Mitigation Measures	Responsible Agency	Status of Coordination
Example: Lahore Ring Road SL-3, C&W Dept	Express way, Under construction	1.2km, crosses at RD 12+300	Yes: 2026-2028	Air: PM2.5 + Haul traffic on Raiwind Rd. Water: Shared drain outfall at Hudiara Land: 200 laborers in same tehsil	High	1. Common haul route plan + wheel wash stations 2. Joint drainage capacity upgrade for Hudiara drain. 3. Stagger	C&W Dept + Your Project	MoU signed 15/03/2026. Joint meeting held

						ed work hours to limit dust		
Examp le: Katcha Housin g Schem e, LDA	Urban dev, Planned 2027	3.5km , parall el	No overlap	Induced traffic on link road. Land use: Agri to resident ial convers ion	Mediu m	1. Include traffic impact in junctio n design. 2. Service road provisi on to limit ribbon dev	LDA + Your Project	Letter sent to LDA, awaiting response
[Add row for each project]	.	.	.	.	.	.	.	.

Quick source tip: Check Punjab Highway Dept website > “Ongoing Projects” and LDA/PHA sites for planned schemes. For drains/canals, check Punjab Irrigation Dept Annual Development Plan.

APPENDIX III - MATTERS TO BE CONSIDERED IN INITIAL SITE ASSESSMENT

Issue	Matters to be considered
Operational requirements	Is the proposed corridor or site consistent with strategic transport and infrastructure planning? Does it provide adequate land area for present and future needs?
Water issues	Are there constraints affecting on-site water management? Are there risks to canals, drains, wetlands, rivers or groundwater? Is the site flood prone?
Flora and fauna issues	Can clearing of native vegetation be avoided? Are sensitive habitats, wildlife corridors or important trees likely to be affected?
Geological and soils issues	Are there slope, erosion, contamination, subsidence, salinity or seismic concerns? Are soils suitable for construction and revegetation?

Issue	Matters to be considered
Transport issues	Does the proposal improve transport efficiency? Can surrounding roads absorb traffic? Can impacts on residential streets be avoided?
Community issues	Is the proposal compatible with surrounding land uses? Can dislocation of homes, businesses, farms, schools, hospitals, mosques and graveyards be avoided?
Visual issues	Is the site highly visible? Can significant visual impacts be avoided or reduced through design?
Heritage issues	Are there any known or likely cultural, archaeological, religious or historic features?
Hazard issues	Is the site exposed to flooding, severe storms, seismic risk, landslides or hazardous material transport risk?
Cumulative issues	Will the proposal, together with other projects, contribute to air, noise, flood, traffic, land use or social problems?