

Environmental Impact Assessment

July 2017

PAK: Jalalpur Irrigation Project

Project No. 46528-002

Part 12 of 12 of the Appendices

Prepared by Irrigation Department, Government of Punjab for the Asian Development Bank (ADB).

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Irrigation Department
Government of Punjab

DETAILED DESIGN OF JALALPUR IRRIGATION PROJECT

Appendices

ENVIRONMENTAL IMPACT ASSESSMENT
(EIA)

MAY 2017



Detailed Design of Jalalpur Irrigation Project

APPENDICES

EIA

LIST OF APPENDICES

| | |
|-----------------|--|
| Appendix-I: | Project Area of Influence Map |
| Appendix-II: | Checklists and Performa used During EIA |
| Appendix-III: | Summer Environmental Monitoring Results 3.1 Ambient Air Monitoring 3.2 Noise Monitoring, 3.3 Surface and Ground Water |
| Appendix-IV: | Winter Environmental Monitoring Results at Detailed Design Stage |
| Appendix-V: | A list of Secondary Sources used in Compiling (Biological and Natural Environment) Segment of EIA |
| Appendix-VI: | A Detailed List of Flora and Fauna Prevalent in the Project Area |
| Appendix-VII: | PID's Letter to Wildlife Department |
| Appendix-VIII: | Response Letters from Wildlife Department |
| Appendix-IX: | Socioeconomic Map showing List of Villages Situated in Project AOI |
| Appendix-X: | Infrastructure Map of Project AOI |
| Appendix-XI: | Detailed Proceedings and Photographs of the Workshops |
| Appendix-XII: | Letter from Archaeology Department |
| Appendix-XIII: | Project Impact Evaluation Matrix |
| Appendix-XIV: | Commodity Prices as per Directorate of Agriculture Punjab |
| Appendix-XV: | Noise Modeling for the Prediction of Noise Levels on Sensitive Receptors during Construction Phase |
| Appendix-XVI: | Emergency Response Plan for Breach of Canal Bank |
| Appendix-XVII: | ADB's Prohibited Investment Activities List |
| Appendix-XVIII: | WHO List of Restricted Pesticides |
| Appendix-XIX: | Locations of Existing & Proposed Interventions in Project AOI |
| Appendix-XX: | Punjab Environmental Quality Standards (PEQS) |
| Appendix-XXI: | Waste Management Plan for Construction Waste & Campsite Waste During Construction Phase |
| Appendix-XXII: | Approval Forms and Monitoring Sheets |
| Appendix-XXIII: | Tree Plantation Plan |
| Appendix-XXIV: | Chance Find Procedure |
| Appendix-XXV: | Traffic Management Plan |

**Government of the Punjab
Environment Protection Department**

NOTIFICATION: No. SO(G)/EPD/7-26/2013. - In exercise of the powers conferred under clause (c) of sub-section (1) of section 4 of the Punjab Environmental Protection Act, 1997 (XXXIV of 1997), the Environmental Protection Council has approved the following as the Punjab Environmental Quality Standards for Municipal and Liquid Industrial Effluents.

Punjab Environmental Quality Standards for Municipal and Liquid Industrial Effluents (mg/l, unless otherwise defined)

| No | Parameter | Into Inland Waters | Into Sewage Treatment |
|----|---|--------------------------|--------------------------|
| 1 | 2 | 3 | 4 |
| 1 | Temperature or Temperature Increase * | $\leq 3^{\circ}\text{C}$ | $\leq 3^{\circ}\text{C}$ |
| 2 | pH value (H^{+}) | 6-9 | 6-9 |
| 3 | Biochemical Oxygen Demand (BOD_5) at 20°C ⁽¹⁾ | 80 | 250 |
| 4 | Chemical Oxygen Demand (COD) ⁽¹⁾ | 150 | 400 |
| 5 | Total suspended solids (TSS) | 200 | 400 |
| 6 | Total dissolved solids (TDS) | 3500 | 3500 |
| 7 | Grease and Oil | 10 | 10 |
| 8 | Phenolic compounds (as phenol) | 0.1 | 0.3 |
| 9 | Chloride (as Cl^{-}) | 1000 | 1000 |
| 10 | Fluoride (as F^{-}) | 10 | 10 |
| 11 | Cyanide (as CN^{-}) total | 1.0 | 1.0 |
| 12 | An-ionic detergents (as MBAs) ⁽²⁾ | 20 | 20 |
| 13 | Sulfate (SO_4^{2-}) | 600 | 1000 |

| No | Parameter | Into Inland Waters | Into Sewage Treatment |
|----|---|--------------------|-----------------------|
| 1 | 2 | 3 | 4 |
| 14 | Sulfide (S^{2-}) | 1.0 | 1.0 |
| 15 | Ammonia (NH_3) | 40 | 40 |
| 16 | Pesticides ⁽³⁾ | 0.15 | 0.15 |
| 17 | Cadmium (Cd) ⁽⁴⁾ | 0.1 | 0.1 |
| 18 | Chromium (trivalent and hexavalent) ⁽⁴⁾⁽¹⁾ | 1.0 | 1.0 |
| 19 | Copper (Cu) ⁽⁴⁾ | 1.0 | 1.0 |
| 20 | Lead (Pb) ⁽⁴⁾ | 0.5 | 0.5 |
| 21 | Mercury (Hg) ⁽⁴⁾ | 0.01 | 0.01 |
| 22 | Selenium (Se) ⁽⁴⁾ | 0.5 | 0.5 |
| 23 | Nickel(Ni) ⁽⁴⁾ | 1.0 | 1.0 |
| 24 | Silver(Ag) ⁽⁴⁾ | 1.0 | 1.0 |
| 25 | Total Toxic metals | 2.0 | 2.0 |
| 26 | Zinc (Zn) | 5.0 | 5.0 |
| 27 | Arsenic (As) ⁽⁴⁾ | 1.0 | 1.0 |
| 28 | Barium (Ba) ⁽⁴⁾ | 1.5 | 1.5 |
| 29 | Iron (Fe) | 8.0 | 8.0 |
| 30 | Manganese (Mn) | 1.5 | 1.5 |
| 31 | Boron (B) ⁽⁴⁾ | 6.0 | 6.0 |
| 32 | Chlorine (Cl_2) | 1.0 | 1.0 |

Explanations:

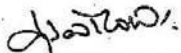
1. Assuming minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Provincial Environmental Protection Agency. By 1:10 dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent.
2. Methylene Blue Active Substances; assuming surfactant as biodegradable.

3. Pesticides include herbicides, fungicides and insecticides.
4. Subject to total toxic metals, discharge should not exceed level given at S.N. 25.
5. Applicable only when and where sewage treatment is operational and BOD₅=80 mg/l is achieved by the sewage treatment system.

* The effluent should not result in temperature increase of more than 30°C at the edge of the zone where initial mixing and dilution take place in the receiving body. In case zone is not defined, use 100 meters from the point of discharge.

** The value for industry is 200 mg/l.

- Note:
1. Dilution of liquid effluents to meet to the PEQS limiting value is not permissible through fresh water mixing with the effluent before discharging into the environment.
 2. The concentration of pollutants in water being used will be subtracted from the effluent for calculating the PEQS limits.


(IQBAL MOHAMMED CHAUHAN)
Secretary, Government of the Punjab
Environment Protection Department

Punjab Environmental Quality Standards for Municipal And Liquid Industrial Effluents

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LAHORE MONDAY AUGUST 15, 2016

**GOVERNMENT OF THE PUNJAB
LAW AND PARLIAMENTARY AFFAIRS DEPARTMENT**

**NOTIFICATION
(122 of 2016)**

12th August 2016.

The following Notification No. SO(G)/EPD/7-26/2013, dated 05.08.2016 regarding the Punjab Environmental Quality Standards for Ambient Air is published for general information:

DR SYED ABUL HASSAN NAJMEE

Secretary

Government of the Punjab
Law and Parliamentary Affairs
Department

**Government of the Punjab
Environment Protection Department**

NOTIFICATION: No. SO(G)/EPD/7-26/2013. - In exercise of the powers conferred under clause (c) of sub-section (1) of section 4 of the Punjab Environmental Protection Act, 1997 (XXXIV of 1997), Environmental Protection Council has approved the following as the Punjab Environmental Quality Standards for Ambient Air:

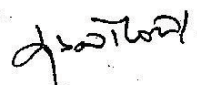
Punjab Environmental Quality Standards for Ambient Air

| Pollutant | Time-weighted average | Concentration in Ambient Air | Method of measurement |
|---|-----------------------|------------------------------|--|
| Sulfur Dioxide (SO ₂) | Annual Average* | 80 µg/m ³ | Ultraviolet Fluorescence method |
| | 24 hours** | 120 µg/m ³ | |
| Oxides of Nitrogen as (NO) | Annual Average* | 40 µg/m ³ | Gas Phase Chemiluminescence |
| | 24 hours** | 40 µg/m ³ | |
| Oxides of Nitrogen as (NO ₂) | Annual Average* | 40 µg/m ³ | Gas Phase Chemiluminescence |
| | 24 hours** | 80 µg/m ³ | |
| Ozone (O ₃) | 1 hour | 130µg/m ³ | Non dispersive UV absorption method |
| Suspended Particulate Matter (SPM) | Annual Average* | 360µg/m ³ | High Volume Sampling, (Average flow rate not less than 1.1 m ³ /min). |
| | 24 hours** | 500µg/m ³ | |
| Respirable Particulate Matter PM ₁₀ | Annual Average* | 120µg/m ³ | Preferably β-Ray absorption method |
| | 24 hours** | 150µg/m ³ | |
| Respirable Particulate Matter PM _{2.5} | Annual Average* | 15µg/m ³ | Preferably β-Ray absorption method |
| | 24 hours** | 35µg/m ³ | |

| Pollutant | Time-weighted average | Concentration in Ambient Air | Method of measurement |
|----------------------|-----------------------|------------------------------|---|
| | 1 hour | 15 $\mu\text{g}/\text{m}^3$ | |
| Lead (Pb) | Annual Average* | 1 $\mu\text{g}/\text{m}^3$ | ASS Method after sampling using EPM 2000 or equivalent Filter paper |
| | 24 hours** | 1.5 $\mu\text{g}/\text{m}^3$ | |
| Carbon Monoxide (CO) | 8 hours** | 5 mg/m^3 | Non Dispersive Infra Red (NDIR) method |
| | 1 hour | 10 mg/m^3 | |

* Annual arithmetic mean 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.


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 Secretary, Government of the Punjab
 Environment Protection Department

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GOVERNMENT OF THE PUNJAB
LAW AND PARLIAMENTARY AFFAIRS DEPARTMENT

NOTIFICATION
(124 of 2016)

12th August 2016

The following Notification No. SO(G)/EPD/7-26/2013, dated 05.08.2016 regarding the Punjab Environmental Quality Standards for Drinking Water is published for general information:

DR SYED ABUL HASSAN NAJMEE
Secretary
Government of the Punjab
Law and Parliamentary Affairs
Department

**Government of the Punjab
Environment Protection Department**

NOTIFICATION: No. SO(G)/EPD/7-26/2013 - In exercise of the powers conferred under clause (c) of sub-section (1) of section 4 of the Punjab Environmental Protection Act, 1997 (XXXIV of 1997), the Environmental Protection Council has approved the following as the Punjab Environmental Quality Standards for Drinking Water:

Punjab Environmental Quality Standards for Drinking Water

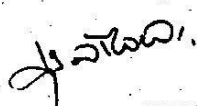
| Properties/Parameters | Standard Values | WHO Standards | Remarks |
|--|---|---|--|
| All water intended for drinking (E. Coli or Thermo-tolerant Coliform bacteria) | Must not be detectable in any 100 ml sample | Must not be detectable in any 100 ml sample | Most Asian countries also follow WHO standards |
| Treated water entering the distribution system (E. Coli or thermo tolerant coliform and total coliform bacteria) | Must not be detectable in any 100 ml sample | Must not be detectable in any 100 ml sample | Most Asian countries also follow WHO standards |
| Treated water in the distribution system (E. Coli or thermo tolerant coliform and total coliform bacteria) | Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12- month period. | Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12- month period. | Most Asian countries also follow WHO standards |
| Colour | ≤15 TCU | ≤15 TCU | |
| Taste | Non objectionable/ Acceptable | Non objectionable/ Acceptable | |
| Odour | Non objectionable/ Acceptable | Non objectionable/ Acceptable | |
| Turbidity | <5 NTU | <5 NTU | |

| Properties/Parameters | Standard Values | WHO Standards | Remarks |
|-------------------------------------|-----------------|---------------|--|
| Total hardness as CaCO ₃ | < 500 mg/l | --- | |
| TDS | <1000 | <1000 | |
| pH | 6.5 - 8.5 | 6.5 - 8.5 | |
| Essential Inorganic | | | |
| | mg/Litre | mg/Litre | |
| Aluminum (Al) mg/l | ≤0.2 | 0.2 | |
| Antimony (Sb) | ≤0.005 (P) | 0.02 | |
| Arsenic (As) | ≤0.05 (P) | 0.01 | Standard for Pakistan similar to most Asian developing countries |
| Barium (Ba) | 0.7 | 0.7 | |
| Boron (B) | 0.3 | 0.3 | |
| Cadmium (Cd) | 0.01 | 0.003 | Standard for Pakistan similar to most Asian developing countries |
| Chloride (Cl) | <250 | 250 | |
| Chromium (Cr) | ≤0.05 | 0.05 | |
| Copper (Cu) | 2 | 2 | |
| Toxic Inorganic | mg/l | mg/l | |
| Cyanide (CN) | ≤0.05 | 0.07 | Standard for Pakistan similar to Asian developing countries |
| Fluoride (F)* | ≤1.5 | 1.5 | |
| Lead (Pb) | ≤0.05 | 0.01 | Standard for Pakistan similar to most Asian developing countries |
| Manganese (Mn) | ≤ 0.5 | 0.5 | |
| Mercury (Hg) | ≤0.001 | 0.001 | |
| Nickel (Ni) | ≤0.02 | 0.02 | |
| Nitrate (NO ₃)* | ≤50 | 50 | |
| Nitrite (NO ₂)* | ≤3 (P) | 3 | |
| Selenium (Se) | 0.01(P) | 0.01 | |

| Properties/Parameters | Standard Values | WHO Standards | Remarks |
|--|--|------------------------|---|
| Residual chlorine | 0.2-0.5 at consumer end 0.5-1.5 at source | | |
| Zinc (Zn) | 5.0 | 3 | Standard for Pakistan similar to most Asian developing countries |
| Organic | | | |
| Pesticides mg/l | | | PSQCA No. 4639- 2004, Page No. 4 Table No. 3 Serial No. 20-58 may be consulted.** |
| Phenolic compounds (as Phenols) mg/l | | 0.002 | |
| Poly-nuclear aromatic hydrocarbons (as PAHs) g/l | | 0.01 (By GC/MS method) | |
| Radioactivity | | | |
| Alpha Emitters bq/L or pCi | 0.1 | 0.1 | |
| Beta emitters | 1 | 1 | |

* Indicates priority health related inorganic constituents, which need regular monitoring.

** PSQCA: Pakistan Standards Quality Control Authority.


(IQBAL MOHAMMED CHAUHAN)
Secretary, Government of the Punjab
Environment Protection Department

**Appendix XXI: Waste Management Plan for
Construction Waste & Campsite Waste During
Construction Phase**

Appendix-XXI: Waste Management Plan for Construction Waste & Campsite Waste during Construction Phase

This document outlines the plan for management of solid waste during the construction phase for the following component:

Construction of Main Canal, Distributaries & Minors and Irrigation Structures

The **Waste Management Program** should be based on the following hierarchy:

- Source segregation;
- Source reduction;
- Recycling, reuse and recovery; and
- Disposal.

The following activities are to be carried out:

- Establishment of campsite and machinery/ equipment Yard; and
- Construction works

The following activities are expected to play a role in the generation of solid waste:

- Land degradation due to solid waste disposal of camp site;
- Contamination of water by solid waste;
- Soil erosion and contamination; and
- Site overburden.

Proposed actions

- Disposal of construction waste shall be done at a properly designated landfill/disposal sites;
- If the project area does not have any disposal site the construction contractor shall use any depression for waste dumping;
- Prior to dumping the construction contractor should get the NOC from local authorities for disposal of solid waste and provide details for future land use;
- An impervious liner shall be laid to waste sites before the dumping of solid waste;
- The impervious liner shall be approved by the supervision consultant;
- After the dumping of solid waste the depression should be covered by scarified material;
- The approval for impervious liner shall be granted by supervision consultant; and
- Good housekeeping practices within the camp site shall be adopted to minimize waste generation.

Appendix XXII: Approval Forms and Monitoring Sheets

Appendix-XXII: Approval Forms and Monitoring Sheets

Construction Contractor

Consultant

Preliminary Approval Form for Campsite, Workshop, and Equipment Yard

1. Land Type _____
2. Land Use Agricultural
 Barren
3. Area of Campsite (Acres)
4. Area of Workshop/Equipment Yard (Acres)
5. Minimum Distance of Campsite from Nearest Settlement (Meters) Upwind-----
Downwind-----
6. Minimum Distance of Workshop/Equipment Yard from Nearest Settlement (Meters) Upwind-----
Downwind-----
7. Location, Campsite, Workshop/Equipment Yard _____
8. Provisional Approval of Location Granted Yes
 No
9. Date of Submission
10. Date of Approval

PROJECT MANAGER (CONTRACTOR)

RESIDENT ENGINEER (SUPERVISION
CONSULTANT)

Construction Contractor

Consultant

Final Approval Form of Campsite, Workshop, and Equipment Yard

1. Type of Land Possession Rented
 Purchased
 Leased
2. Agreement of Possession Attached Yes
3. Preliminary Approval Form Attached No
 Yes
4. Final Approval of Location Granted No
 Yes
5. Date of Submission No
6. Date of Approval

PROJECT MANAGER (CONTRACTOR)

RESIDENT ENGINEER (SUPERVISION
CONSULTANT)

Construction Contractor

Consultant

Preliminary Approval Form of Borrow Pit Site

1. Land Use Agricultural
 Barren
2. Area (Acres)
3. Location Map Attached Yes
 No
4. Provisional Approval of Location Granted Yes
 No
5. Date of Submission
6. Date of Approval

PROJECT MANAGER (CONTRACTOR)

RESIDENT ENGINEER (SUPERVISION
CONSULTANT)

Construction Contractor

Consultant

Final Approval Form of Borrow Pit Site

1. Type of Land Possession Rented
 Purchased
 Leased
2. Agreement of Possession Attached Yes
 No
3. Preliminary Approval Form Attached Yes
 No
4. Final Approval of Location Granted Yes
 No
5. Date of Submission
6. Date of Approval

PROJECT MANAGER (CONTRACTOR)

RESIDENT ENGINEER (SUPERVISION
CONSULTANT)

Daily Dust Monitoring Form (Construction Site)

Date: _____

Construction Contractor

Consultant

| Practice | Yes | No | In Case of Non - Conformance | |
|--|--------------------------|--------------------------|--|-----------------|
| | | | Duration (hrs) | Remarks/Reasons |
| Speed of vehicles/equipment within the limits (less than 20 km/hr) | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Spraying of water done twice on unpaved tracks | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Haul trucks carrying sand or aggregate covered with tarpaulin | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Cover silos openings during operation | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Monitored by: | | | <hr style="border: 0; border-top: 1px solid black; width: 100%;"/> SITE ENGINEER | |

Request for Removal of Shrubs and Trees (If Required)

Construction Contractor

Consultant

- | | |
|---|------------------------------|
| 1. Need Reported to Project Manager by: | Name & Designation: |
| 2. Reported to Project Manager on | Date: |
| 3. Location of Vegetation to be Removed | |
| 4. Reported by Project Manager to Resident Engineer | Date: |
| 5. Approval Granted by Resident Engineer | <input type="checkbox"/> Yes |
| | <input type="checkbox"/> No |
| 6. Date of Submission | |
| 7. Date of Approval | |

PROJECT MANAGER (CONTRACTOR)

RESIDENT ENGINEER (SUPERVISION CONSULTANT)

Approval Form for Solid Waste Disposal Site and Impervious Liner

Construction Contractor

Consultant

1. Land Type Government

2. Land Use Private
 Agricultural
 Depression Area
 Barren

3. Area of Disposal Site (Acres) -----

4. Minimum Distance of Disposal Site from Nearest Settlement (Meters)
Upwind-----
Downwind-----

5. Minimum Distance of Disposal Site from Campsite (Meters)
Upwind-----
Downwind-----

6. Specification of Impervious Liner

7. Selected Liner Approved Yes

8. Selected Site Approved No
 Yes

9. Date of Submission No

10. Date of Approval

PROJECT MANAGER (CONTRACTOR)

RESIDENT ENGINEER (SUPERVISION
CONSULTANT)

Form for Recording of Air Quality

| # | Date | Location | Parameter | Results | Test Report Number | Remarks |
|------------------------------------|------|----------|-----------|--|--------------------|---------|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| <hr/> PROJECT MANAGER (CONTRACTOR) | | | | <hr/> RESIDENT ENGINEER (SUPERVISION CONSULTANT) | | |

Form for Recording of Air Quality @ Stack Machinery/Equipment

| # | Date | Location | Parameter | Results | Test Report Number | Remarks |
|------------------------------------|------|----------|-----------|--|--------------------|---------|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| <hr/> PROJECT MANAGER (CONTRACTOR) | | | | <hr/> RESIDENT ENGINEER (SUPERVISION CONSULTANT) | | |

Form for Recording Noise at Construction Site

| # | Date | Location | Results | Test Report Number | Remarks |
|--|------|----------|--|--------------------|---------|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |
| <p>_____</p> <p>PROJECT MANAGER (CONTRACTOR)</p> | | | <p>_____</p> <p>RESIDENT ENGINEER (SUPERVISION CONSULTANT)</p> | | |

Appendix XXIII: Tree Plantation Plan

Annex-XXIII: Tree Plantation Plan

It is envisaged that during Construction phase of the Project, a total number of 7,256 trees will be removed. It is a general practice that, as a mitigation step, ten (10) number of trees are to be raised for each tree cut under the development projects. Therefore, total number of plants to be raised come as 72,560. Since the new canal is 110 km long with its distribution system of 176 km length, therefore, total length of canal system will spread over 286 km.

Now, taking into consideration the tract which is devoid of sufficient vegetation cover, it is advisable to plant up the canal system throughout its length of 286 km, by planting one row on each side of Main Canal as well as its Distributaries. The distance between plant to plant as well as in between rows will be kept 5 meters apart. The total number of plants required for replenishment activity is calculated as under:

- i. No. of Avenue Kilometers to be planted $(2 \times 286) = 572$ Av.Km.
- ii No. of plants in 1 km (one row with plant to plant spacing of 5m) = 200 No.
- iii. Total number of plants for Canal System $(572 \times 200) = 114,400$
(or say) = 115,000 No.

This comes to be about 15 times the number of trees to be removed. Trees will be planted on hand watering in linear pattern on both sides of Canal system among indigenous trees species given in Table below:

Table : Trees for Linear Planting

| Sr. No. | Local Name | Scientific Name |
|---------|------------|-------------------------|
| 1. | Shisham | <i>Dalbergia sisso</i> |
| 2. | Kikar | <i>Acacia nilotica</i> |
| 3. | Simal | <i>Bombax ceiba</i> |
| 4. | Bakain | <i>Melia azadarch</i> |
| 5. | Siris | <i>Albizzia lebbek</i> |
| 6. | Neem | <i>Azedracta indica</i> |

9.1.1 Plantation Cost

The cost of plantation is based on the provision of field work generally allowed by Forest Department on coolie-days basis. The cost of plantation includes the cost of equipment/machinery, initial planting (including restocking during first 2 years), and maintenance cost for first four years of plantation. Cost of equipment and planting with maintenance is given in Tables below:

Table : Tentative Cost of Equipment/Machinery

| Sr. | Name of | No. | Unit | Amount |
|-----|---------|-----|------|--------|
|-----|---------|-----|------|--------|

| No. | Equipment | | Price (Rs.) | (Rs.) |
|------------------|--|----|-------------|-------------------|
| 1. | Tractor | 4 | 1,200,000 | 4,800,000 |
| 2. | Water Tanker/Bowzer | 10 | 600,000 | 6,000,000 |
| 3. | Kassies Earth Digging Tools and Equipment (kassies, vaholas,etc) | LS | | 1,500,000 |
| 4. | Lift Pump for filling Water Tanker / Bowzers | 5 | 100,000 | 500,000 |
| 6. | Unforeseen | LS | | 200,000 |
| Sub-total | | | | 13,000,000 |

Table : Break Up Of Expenditure On Afforestation Of 1 Av.M. (500 Plants) along Canalside : (Daily Wage Rate @ Rs.500/-)

| Year | Particular of works | Rate (Coolie-Day) | Amount (Rs) |
|--------------|--|-------------------|---------------|
| 1st | Jungle clearance, Kana Mesquite stubbing etc. | 10 CD per Av.M | 5,000 |
| | Lay out and Dagh Bailing | 2 CD per Av. M | 1,000 |
| | Digging of pits @ Cft. Each (500x3) | 5 CD per % Cft | 3,750 |
| | Cost of plants including 20% restocking (500+125) | Rs.5/Each | 3,125 |
| | Planting of plants including restocking and carriage of plants (500+125) | Rs.5/Each | 3,125 |
| | Hand watering (500x36 Times=18000 No.) | 6 CD per % No. | 54,000 |
| | Weeding | 2 CD per Av. M | 1,000 |
| | Re-opening of pits (500x1 Time) @ 1Cft Each. Two Time = 1000 Cft | 5 CD per % Cft | 2,500 |
| | Cost of POL 36x450 | Rs.450/- per Av.M | 18,000 |
| | Unforeseen | | 2,500 |
| | Expenditure for 500 plants (1 Av.M.) | | 94,000 |
| Total | Expdt. For 200 plants (1 Av. Km) | | 37,600 |

| | | | |
|-----------------|---|---|---------------|
| 2 nd | Restocking including carriage 15% | Rs.5/Each | 375 |
| | Cost of plants | Rs.5/Each | 375 |
| | Hand watering (500x36 Times=18000 No) | 6 per ‰ Cft | 54,000 |
| | Cost of POL 36x450 | Rs.450/-per Av.M | 18,000 |
| | Weeding | 2 per Av.M | 1,000 |
| | Re-opening of pits 500x2 Time @ 1Cft Each | 5 per ‰ Cft | 2,500 |
| | Kana Mesquite re-stubbing | 2 per Av.M | 1,000 |
| | Unforeseen | | 2,000 |
| | Expenditure for 500 plants (1 Av.M.) | | 79,250 |
| | Total | Expdt. for 200 plants (1 Av. Km) | |
| 3 rd | Restocking including carriage 10% | Rs.5/Each | 250 |
| | Cost of plants | Rs.5/Each | 250 |
| | Hand watering (500x24 Times=6000 No.) | 6 per ‰ No. | 36,000 |
| | Re-opening of pits 500x1 Time @ 1Cft Each | 5 per ‰ Cft | 1,250 |
| | Cost of POL 24x450 | Rs.450 per Av.M | 12,000 |
| | Kana Mesquite re-stubbing | 4 per Av.M | 2,000 |
| | Unforeseen | | 2,000 |
| | Expenditure for 500 plants (1 Av.M.) | | 53,750 |
| Total | Expdt. for 200 plants (1 Av. Km) | | 21,500 |
| 4 th | Hand watering (500x24 Times=6000 No.) | 6 per ‰ No. | 36,000 |
| | Re-opening of pits 500x1 Time @ 1Cft Each | 5 per ‰ Cft | 1,250 |
| | Cost of POL 24x450 | Rs.450 per Av.M | 12,000 |
| | Kana Mesquite re-stubbing | 4 per Av.M | 2,000 |
| | Unforeseen | | 2,000 |
| | Expenditure for 500 plants (1 Av.M.) | | 53,250 |
| | Total | Expdt. for 200 plants | |

| | | | |
|---|------------|--|--|
| I | (1 Av. Km) | | |
|---|------------|--|--|

From above Table, total expenditure for raising of 200 number of plants over 1 avenue kilometer of canalside plantation comes to be : **Rs. 112,100/-**

Table 10.18: Total Plantation Cost

| Sr. No. | Item | Cost (Rs.) |
|---------|--|-------------------|
| 1. | Cost of raising of 115,000 plants (572 Av.Km) and their maintenance for four years | 64,457,500 |
| 2. | Cost of Equipment | 13,000,000 |
| 3. | Maintenance of machinery for four years (tractor, tanker) | 4,000,000 |
| 4. | Establishment Cost | |
| (a) | Tractor Drivers (4) @ Rs. 20,000 per month + 15% rise per year | 4,800,000 |
| (b) | Tanker Helpers (10) @ Rs. 15,000 per month + 15% rise per year | 9,000,000 |
| | Total Cost | 95,257,500 |

or say, **Rs. 95,300,000**

Cost of raising one plant with four years maintenance = Rs. 830/- (apprx)

Appendix XXIV: Chance Find Procedure

Appendix-XXIV: Chance Find Procedure

Project routing does not envisage any archaeological site. However, in case of any chance find, the **Construction Contractor** will immediately report through **Chief Resident Engineer** of Supervision Consultant to **Deputy Commissioner (DC)**, to take further suitable action to preserve those antiques or sensitive remains and contact the relative **Government Department (Archaeological Department, Government of Pakistan)** for further action. Representative of the **Archaeological Department, Government of Pakistan** will visit the site and observed the significance of the antique, artefact and Cultural (religious) properties and significance of the project. The report will be prepared by representative and will be given to the **concerned official** of the Archaeological Department.

In case any artefact, antiques and sensitive remains are discovered, chance find procedures should be adopted by Construction Contractors as follows;

- Stop the construction activities in the areas of chance find;
- Delineate the discovered site or area;
- Consult with the local community and Provincial Archaeological Department;
- The suggestion of the local communities and the concerned authorities will be suitable incorporated during taking the preventive measures to conserved the antique, artifact and Cultural (religious) properties;
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remain, a night guard shall be arranged until the responsible local authorities take over;
- After stopping work, the Construction Contractor must immediately report the discovery to the Supervision Engineer;
- Once authorization has been given by the responsible authorities (Archaeological Department), the Construction Contractor will be informed when works can resume.

Appendix XXV: Traffic Management Plan

Appendix-XXV: Traffic Management Plan

Construction works at the project site might require partial or full closure of the road. Therefore traffic management would be required during such time periods spanning long hours in a day. It is a contractor's contractual obligation to prepare a Traffic Management Plan, get its approval from traffic police, XEn Irrigation and HSE Officer and implement on site. The plan should be available for public in local library and published in news paper. The suggestions made in this section should be incorporated by the contractor in preparation of the Traffic Management Plan.

The purpose of traffic management plan is to cope with traffic distribution that call for co- ordinate actions from several services responsible for road/traffic management on a given road or network.

There is a single carriage way at Rasul Barrage for public transport. If part of the road needs to be used to undertake the construction works then the working area should be clearly marked with separating fence. No unauthorized person should be allowed to enter the working area. Following measures should be taken:

- Contractor should provide a temporary route during the construction;
- The temporary route should be adequate for the existing traffic plus the site traffic and designed and build by a specialized contractor;
- The rural roads leading to or passing near the construction site could be used to convey men and materials to the construction sites; and
- It is a Contractor's contractual obligation to use the roads and paths carefully and in case of any damage, repair the damaged roads or paths.

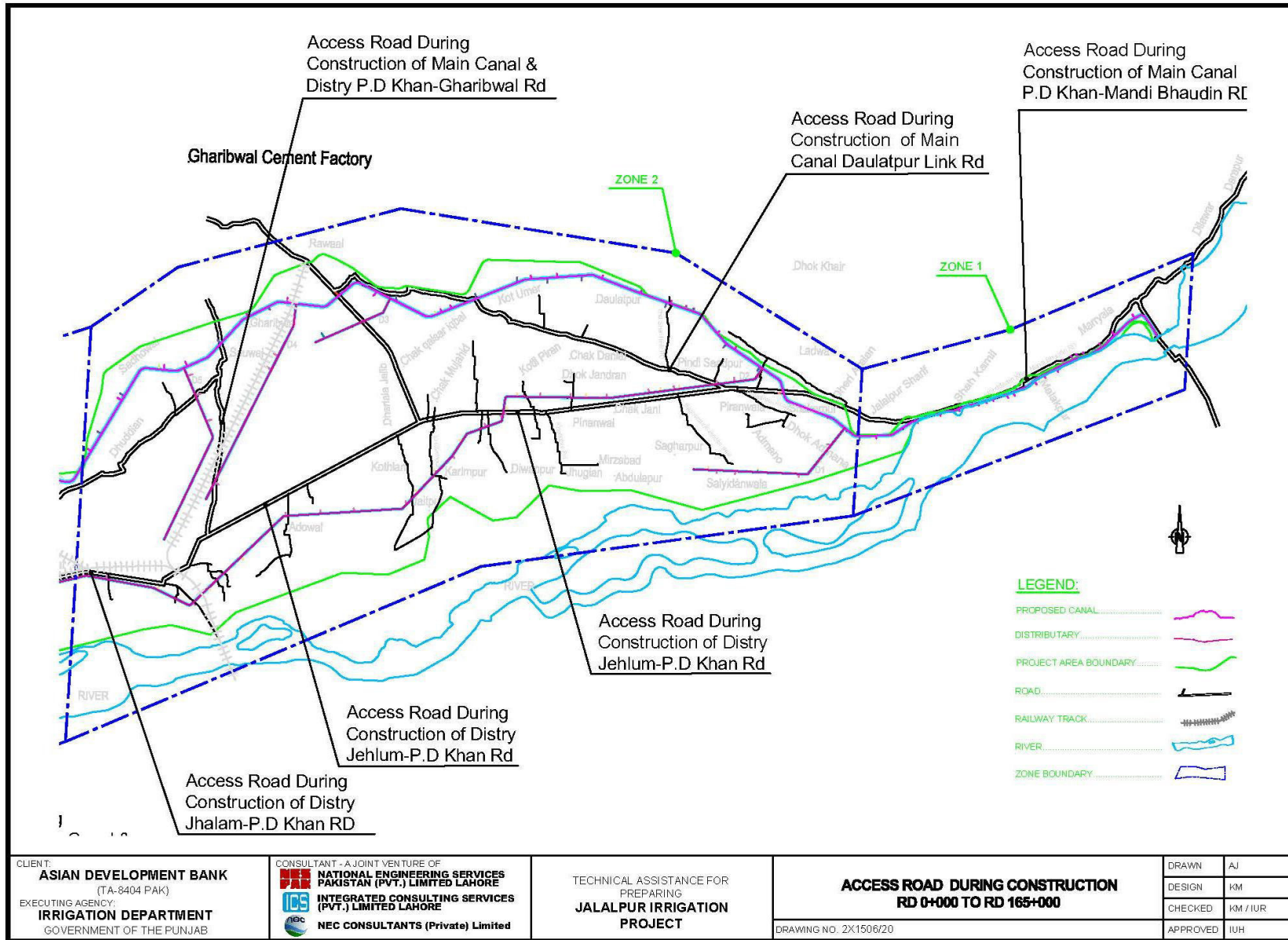
Closing one Lane

When closing down the one lane of the road then the traffic light system should be set up and allow only one side traffic at a time. Sign posts about the new traffic light and/or proposed new road layout should be placed at least one km from both sides of the Barrage. Sign boards about the expected delay in traffic and queue build up should be placed.

Complete Closure of the Road

If the road need to be closed completely without provision of alternative route then it is suggested that the closure should not be more than continuous 4 hours. Local traffic police should be informed at-least a week before the closure required. Traffic sign board regarding the closure time and suggestion for alternative routes should be placed. Where possible the closure should be arranged outside the off peak times (consider peak time from 6am to 10am and 3pm to 7pm).

Following maps of access road can be used in the preparation of "Traffic Management Plan":



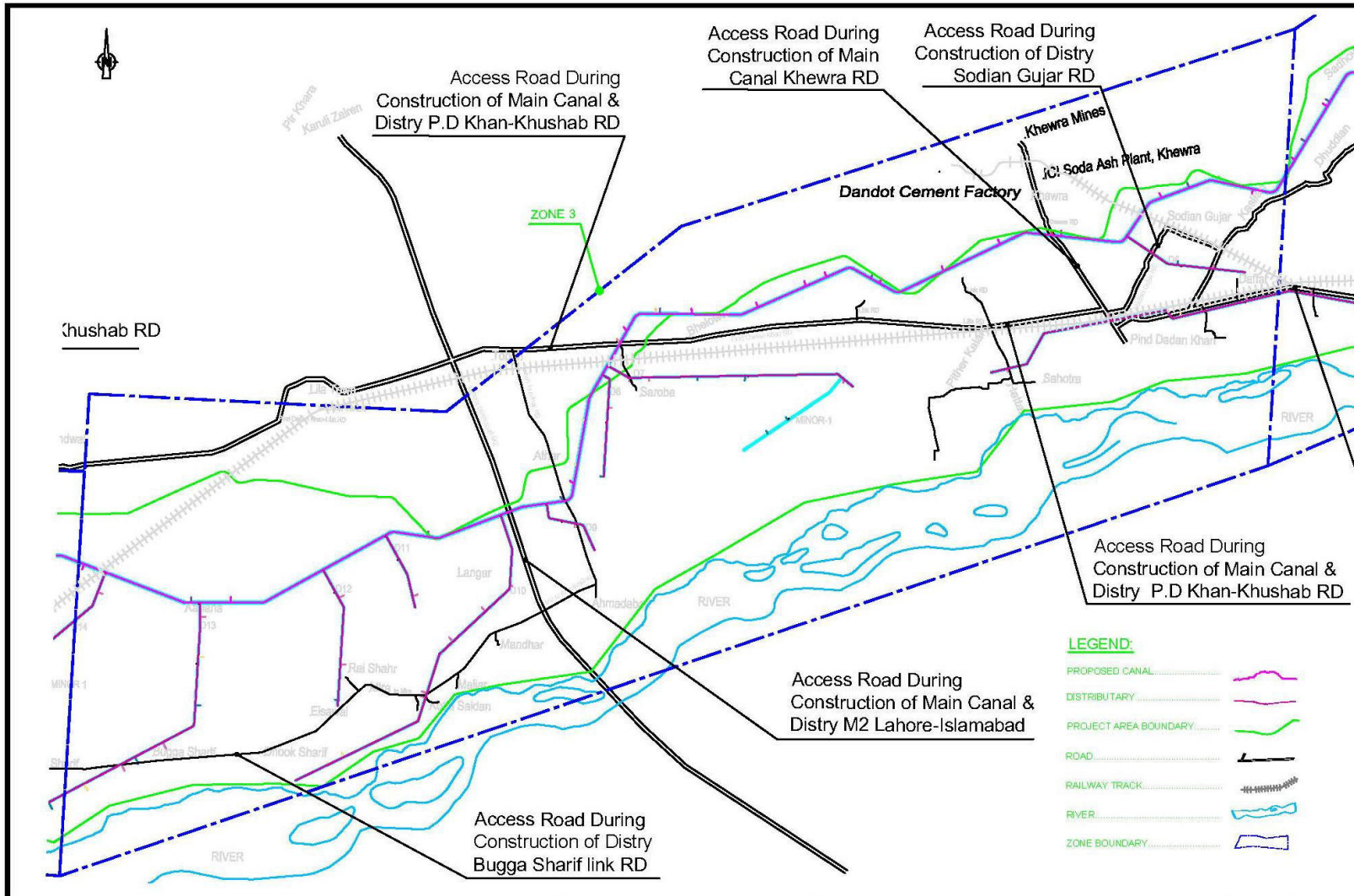
CLIENT:
ASIAN DEVELOPMENT BANK
 (TA-8404 PAK)
 EXECUTING AGENCY:
IRRIGATION DEPARTMENT
 GOVERNMENT OF THE PUNJAB

CONSULTANT - A JOINT VENTURE OF
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED LAHORE
INTEGRATED CONSULTING SERVICES (PVT.) LIMITED LAHORE
NEC CONSULTANTS (Private) Limited

TECHNICAL ASSISTANCE FOR PREPARING
JALALPUR IRRIGATION PROJECT

ACCESS ROAD DURING CONSTRUCTION
RD 0+000 TO RD 165+000
 DRAWING NO. 2X1506/20

| | |
|----------|----------|
| DRAWN | AJ |
| DESIGN | KM |
| CHECKED | KM / IUR |
| APPROVED | IUH |



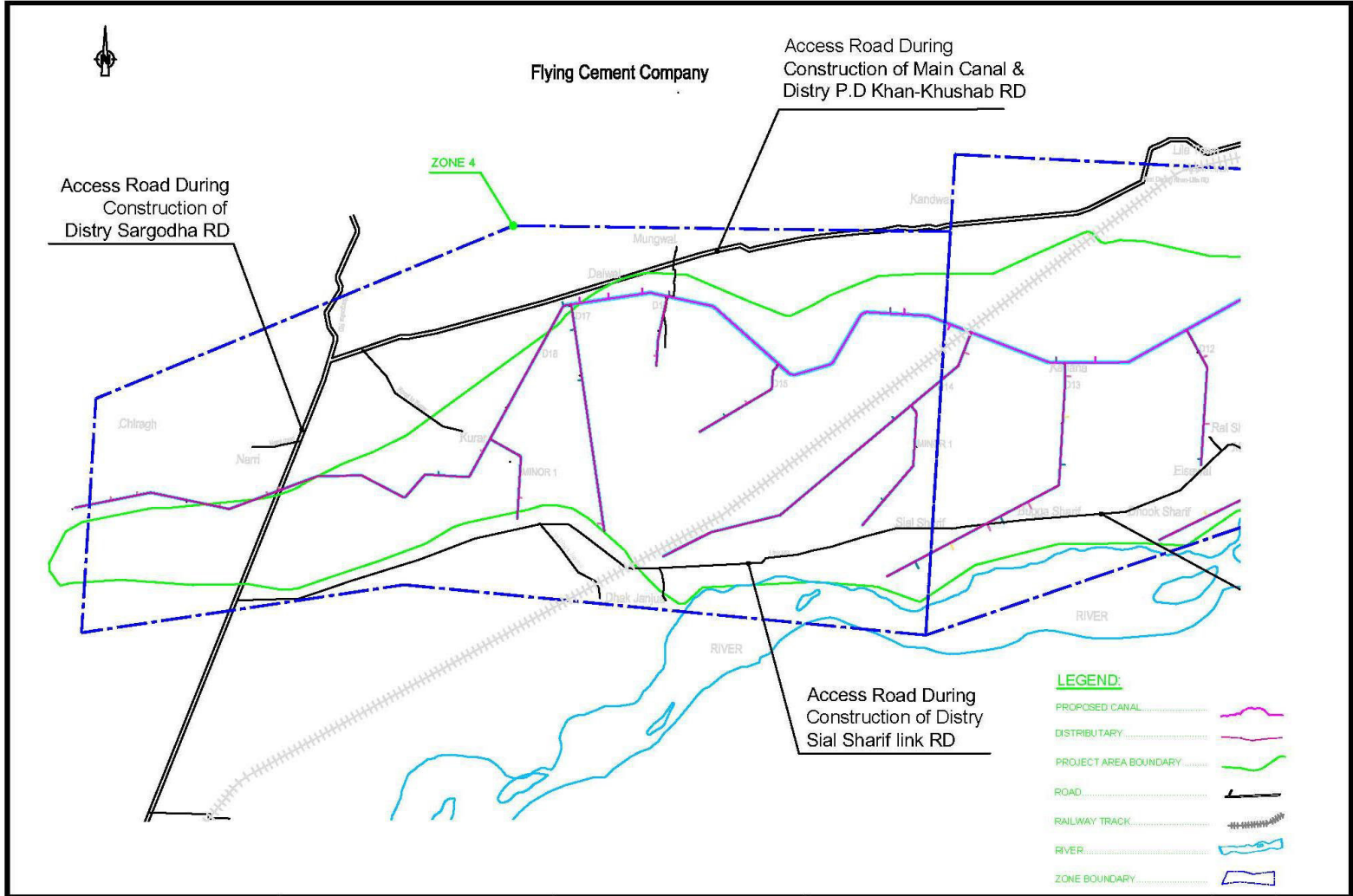
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 GOVERNMENT OF THE PUNJAB

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NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED LAHORE
INTEGRATED CONSULTING SERVICES (PVT.) LIMITED LAHORE
NEC CONSULTANTS (Private) Limited

TECHNICAL ASSISTANCE FOR PREPARING
JALALPUR IRRIGATION PROJECT

ACCESS ROAD DURING CONSTRUCTION
RD 165+000 TO RD 310+000
 DRAWING NO. 2X1506/21

| | |
|----------|----------|
| DRAWN | AJ |
| DESIGN | KM |
| CHECKED | KM / IUR |
| APPROVED | IUH |



CLIENT:
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 (TA-8404 PAK)
 EXECUTING AGENCY:
IRRIGATION DEPARTMENT
 GOVERNMENT OF THE PUNJAB

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INTEGRATED CONSULTING SERVICES (PVT.) LIMITED LAHORE
NEC CONSULTANTS (Private) Limited

TECHNICAL ASSISTANCE FOR PREPARING
JALALPUR IRRIGATION PROJECT

ACCESS ROAD DURING CONSTRUCTION
RD 310+000 TO RD 360+000
 DRAWING NO. 2X1506/22

| | |
|----------|----------|
| DRAWN | AJ |
| DESIGN | KM |
| CHECKED | KM / IUR |
| APPROVED | IUH |



NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED

Geotechnical & Geoenvironmental Engineering Division

NESPAK House, 1-C, Block N, Model Town Extension, Lahore

Tel: +92-42-99231917, 99090310 Fax: +92-42-99231950

Email: geotech@nespak.com.pk Web site: www.nespak.com.pk