SCHEDULE I
[Regulation 3(1)]

FORM OF APPLICATION

The Registrar
National Electric Power Regulatory Authority
Islamabad

Re: Application for Generation License

I, Abid Rasool Awan, being the duly authorized representative of Al-Arabia Sugar Mills Limited ("ASML") by virtue of Board Resolution dated 22 January 2018, hereby apply to the National Electric Power Regulatory Authority for the grant of a Generation License to ASML pursuant to Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

I certify that the documents in support attached with this application are prepared and submitted in conformity with the provisions of the National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999 (the "1999 Regulations"), and undertake to abide by the terms and provisions of the above said regulations. 1 further undertake and confirm that the information provided in the attached documents in support is true and correct to the best of my knowledge and belief.

A demand draft in the amount of Rs. 229,320 being the non refundable license application fee calculated in accordance with Schedule II to the 1999 Regulations, is also attached herewith.

Best regards.

Very truly yours'

AL-ARABIA SUGAR MILLS LIMITED

Abid Rasool Awan
(Asst. General Manager Legal)

SHARIF GROUP

AL-ARABIA SUGAR MILLS LIMITED

EXTRACT OF RESOLUTION PASSED IN THE MEETING OF BOARD OF DIRECTORS OF THE COMPANY HELD AT REGISTERED OFFICE ON JANUARY 22, 2018 AT 10:00 AM

"**RESOLVED THAT** Mr. Muhammad Sajjad Anwar, Business Head, Mr. Abid Rasool Awan Asst. General Manager Legal Affairs, and Mr. Muhammad Bilal, Project Coordinator of the Company be and are hereby jointly and singly authorized to do any or all of the following acts, deeds and things, on behalf of the Company, in connection with Generation License application to be filed with National Electric Power Regulatory Authority ("NEPRA") under the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 and the National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999:

(a) Represent the Company before NEPRA, and in doing so perform all lawful acts, deeds and things which we shall be entitled or permitted to do ourselves, including but not limited to filing, signing, presenting, modifying, amending, withdrawing applications and other documents, responding to any queries and meeting any objections, receiving notices and documents; and

(b) Do all acts, deeds and things, which are ancillary and incidental to the afore-said purposes and issuance of Generation License."

Sd/-
Chairman

AL-ARABIA SUGAR MILLS LTD.

Certified to be true copy

Tariq Dastgir Khan
(Company Secretary)

FREE OF COST COPY A024325

SECP

SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

COMPANY REGISTRATION OFFICE, LAHORE

CERTIFICATE OF INCORPORATION

[Under section 16(5) of the Companies Ordinance, 2016 (VI of 2016)]

Corporate Universal Identification No.**0103661**

I hereby certify that **AL-ARABIA SUGAR MILLS LIMITED** is this day incorporated under the Companies Ordinance, 2016 (VI of 2016) and that the company is **Limited by Shares**.

Given under my hand at **Lahore** this **Eighteenth** day of **November,** Two **Thousand** and **Sixteen**.

Fee Rs.4,020,500/-

Company Registration Office Lahore

(SHAUKAT HAMEED)
Joint Registrar

CERTIFIED TO BE TRUE COPY

JOINT REGISTRAR OF COMPANIES
COMPANY REGISTRATION OFFICE
LAHORE.

No.ARL/ 98975 **DATED: 18-11-2016**

THE COMPANIES ORDINANCE, 2016

COMPANY LIMITED BY SHARES

MEMORANDUM OF ASSOCIATION
OF
AL-ARABIA SUGAR MILLS LIMITED

I. The name of the Company is "Al-Arabia Sugar Mills Limited"

II. The registered office of the Company will be situated in the Province of the Punjab of Pakistan

III. The principal line of business of the company shall be to carry out manufacturing, sale, import and export of sugar and co-generation of power.

(i) Except for the businesses mentioned in sub clause (iii) hereunder, the company shall engage in all the lawful businesses and shall be authorized to take all necessary steps and actions in connection therewith and ancillary thereto.

(ii) Notwithstanding anything contained in the foregoing sub-clauses of this clause, nothing contained herein shall be construed as empowering the Company to undertake or indulge, directly or indirectly in the business of a Banking Company, Non-banking Finance Company (Mutual Fund, Leasing, Investment Company, Investment Advisor, Real Estate Investment Trust management company, Housing Finance Company, Venture Capital Company, Discounting Services, Microfinance or Microcredit business), Insurance Business, Modaraba management company, Stock Brokerage business, forex, real estate business, managing agency, business of providing the services of security guards or any other business restricted under any law for the time being in force or as may be specified by the Commission.

(iii) It is hereby undertaken that the company shall not:

(a) engage in any of the business mentioned in sub-clause (iii) above or any unlawful operation;

(b) launch multi-level marketing (MLM), Pyramid and Ponzi Schemes, or other related activities/businesses or any lottery business.

(c) engage in any of the permissible business unless the requisite approval, permission, consent or licence is obtained from competent authority as may be required under any law for the time being in force.

The liability of the Members is limited

The authorized share capital of the Company is Rupees One Billion (Rs. 1,000,000,000) divided into Ninety Crore Million (90,000,000) Ordinary shares of Rupee Ten (Rs. 10) each and Thirty One Million (31,000,000) Preference shares of Rupee Ten (Rs. 10) each. The Preference shares shall have priority and preference over Ordinary shareholders of the Company in the event of liquidation/winding up of the Company. The Preference shares shall not carry any voting right and shall not be entitled to any dividend declared by the Company. The Company may allow conversion in whole or in part of Ordinary shares into Preference shares or vice versa as approved by the shareholders in general meeting. The Company shall have power to increase, reduce or re-organize the capital of the Company, increase or reduce the nominal value of the shares and divide shares in the capital into several kinds and classes with different rights, privileges, entitlements, conditions and limitations to the extent permissible under the Ordinance and any rules and regulations for the time being in force.

[illegible] persons whose names and addresses are subscribed below, are desirous of being formed into a Company in pursuance of this Memorandum of Association and we respectively agree to take [illegible] shares in the Capital of the Company as set opposite to our respective names.

Name and Surname (Present & Former) in full (in Block Letters)	NIC No. (in case of foreigner Passport No.)	Father's / Husband's Name in full	Nationality with any former Nationality	Occupation	Residential address in full	Number of shares taken by each subscriber	Signatures
[illegible]	[illegible]	Mian Muhammad Shehbaz Sharif	Pakistani	Business	96-H Model Town Lahore	[illegible]	
[illegible] SHARIF	[illegible]	Mian Muhammad Shehbaz Sharif	Pakistani	Business	96-H Model Town Lahore	[illegible]	
[illegible]	35201-[illegible]	Mian Muhammad Shehbaz Sharif	Pakistani	Business	96-H Model Town Lahore	[illegible]	
[illegible]	[illegible]	[illegible] Shehbaz Sharif	Pakistani	Business	96-H Model Town Lahore	[illegible]	
[illegible] GARMENTS [illegible] MUHAMMAD [illegible]	CUIN [illegible]		Pakistani	Business	55-K Model Town Lahore	[illegible]	
[illegible]	CUIN [illegible]		Pakistani	Business	55-K Model Town Lahore	[illegible]	
[illegible]	[illegible]	[illegible]	Pakistani	Private Service	House No [illegible] St No 26 Gulzar [illegible] Colony Samanabad Multan Road Lahore	10	
Total number of shares (six hundred and twenty thousand)						620,000	

[illegible] this [illegible] day of November, [illegible]

Witness to the above Signatures:

National Institutional Facilitation Technologies (Pvt) Limited

[illegible] [illegible] Floor, AWT Plaza,
I.I Chundrigar Road,
Karachi

THE COMPANIES ORDINANCE, 2016

(COMPANY LIMITED BY SHARES)

ARTICLES OF ASSOCIATION

OF

AL-ARABIA SUGAR MILLS LIMITED

I. PRELIMINARY

1. Table "A" Not to Apply

The regulations in Table "A" in the First Schedule to the Companies Ordinance, 2016 shall not apply to the Company except as reproduced herein.

2. Interpretation

In these Articles, unless the context or the subject matter otherwise requires:

(a) "Articles" mean these Articles as originally framed or as from time to time altered in accordance with law.

(b) "Board" means the Board of Directors of the Company from time to time.

(c) "Company" means Al-Arabia Sugar Mills Limited.

(d) "Directors" mean the Directors for the time being of the Company, or as the Directors present at a duly convened meeting of Directors at which a quorum is present, as the case may be.

(e) "General Meeting" means a meeting of the Members which is properly convened and properly complies with notice of meeting and quorum requirements and may be either an Annual General Meeting or an Extraordinary General Meeting.

(f) "Member" means a subscriber to the Memorandum of Association of the Company and every person to whom is allotted, or who becomes the holder of, any share, scrip or other security which gives him a voting right in the Company and whose name is entered in the register of members.

(g) "Month" means calendar month according to the English calendar.

(h) "Office" means the registered office for the time being of the Company.

(i) "Ordinance" means the Companies Ordinance, 2016 or any modification or re-enactment thereof for the time being in force.

(j) "Register" means the register of Members to be kept pursuant to the Ordinance.

(k) "Seal" means the common or official seal of the Company.

(l) "Section" means section of the Ordinance.

(m) "Special Resolution" means the special resolution of the Company as defined in the Ordinance.

(n) Words importing masculine gender include the feminine gender.

(o) Words importing singular number include the plural number and vice versa.

(p) Expressions referring to writing shall, unless the contrary intention appears, be construed as including references to printing, lithography, photography and other modes of representing or reproducing words in visible form.

(q) Words importing persons shall include bodies corporate.

(r) The head-notes are inserted for convenience and shall not affect the construction of these Articles.

(s) Words or expressions contained in these Articles shall bear the same meaning as in the Ordinance.

II. BUSINESS

3. Public Limited Company

(a) The Company is a public limited company within the meaning of the Ordinance.

(b) The Company is entitled to commence business after compliance with the requirements of the Ordinance.

(c) The business of the Company shall include all or any of the objects enumerated in the Memorandum of Association.

(d) The business of the Company shall be carried out at such place or places in the whole of Pakistan or elsewhere as the Directors may deem proper or advisable from time to time.

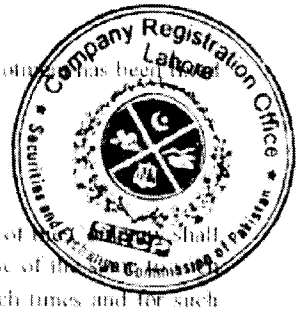
III. SHARES

A. Share Rights

4. Authorized Capital

(a) "The authorized share capital of the Company is Rupees One Billion (Rs. 1,000,000,000) divided in to Sixty Nine Million (69,000,000) Ordinary shares of Rupees Ten (Rs. 10) each, and Thirty One Million (31,000,000) Preference shares of Rupee Ten (Rs. 10) each. The Preference shares shall have priority and preference over Ordinary shareholders of the Company in the event of liquidation/winding up of the Company. The Preference shares shall not carry any voting right and shall not be entitled to any dividend declared by the Company. The Company may allow conversion in whole or in part of Ordinary shares into Preference shares or vise-versa as approved by the shareholders in general meeting. The Company shall have power to increase, reduce or re-organize the capital of the Company or increase or reduce the nominal value of the shares and divide shares in the capital into several kinds and classes with different rights, privileges, entitlements, conditions and limitations, to the extent permissible under the Ordinance and any rules and regulations for the time being in force."

(b) The minimum subscription upon which the Directors may proceed to allotment has been fixed as Rs 4,000,000 (Rupees four million) only.



5. Shares under Directors' Control

Subject to the provisions of the Ordinance and these Articles, the shares of the Company shall be under the control of the Directors who may allot or otherwise dispose of the same to such persons, firms, or corporations on such terms and conditions, and at such times and for such consideration as the Directors think fit, in accordance with the Ordinance.

6. Classes of Shares

(a) The shares of the Company may be of more than one kind and each kind may have more than one class.

(b) The shares of the Company that are not ordinary shares shall not carry voting rights and any person who owns such non-voting shares shall not be entitled to vote in any meeting of the Company.

(c) Subject to the relevant Section of the Ordinance and any rules in that regard made under the Ordinance, and without prejudice to any special rights previously conferred on the holder of any existing shares or class of share, any share in the Company may be issued with different rights, restrictions, and privileges, including but not limited to the following namely:

(i) different voting rights, voting rights disproportionate to the paid up value of shares held, voting rights for specific purposes only or no voting right at all

(ii) different rights of entitlement of dividend, right shares or bonus shares or entitlement to receive the notices and to attend the General Meetings;

(iii) rights and privileges for indefinite period, for a limited specified period or for such periods as may from time to time be determined by the Members through Special Resolution, and

(iv) different manner and mode of redemption subject to the relevant provisions of the Ordinance, including but not limited to, by way of conversion into shares with such right and privileges as determined by the Company.

7. **Allotment**

(a) The Directors shall, as regards any allotment of shares, duly comply with the provisions of the Ordinance and these Articles.

(b) The shares of the Company may be allotted or issued in payment of any property, land, machinery or goods supplied or any services rendered to the Company or promotion or formation of the Company or conduct of its business and any shares so allotted may be issued as fully paid shares.

(c) The Directors may, in their absolute and uncontrolled discretion, refuse to register any proposed transfer of shares subject to the provisions of the Ordinance.

8. **Share Certificate**

Every person whose name is entered as a Member in the Register shall, without payment, be entitled to receive within ninety (90) days after allotment or within forty five (45) days of the application for registration of transfer, a certificate issued in accordance with these Articles specifying the share or shares held by him and the amount paid up thereon. Provided that, in respect of share or shares held jointly by several persons, the Company shall not be bound to issue more than one (1) certificate and delivery of a certificate for a share to one (1) of several joint holders shall be sufficient delivery to all.

9. Certificate under Seal

The certificate of title to shares shall be issued under the authority of the Directors or of a committee of Directors when authorized thereto by the Directors in such manner and form as the Directors may from time to time prescribe. The Seal of the Company shall be duly affixed to every share certificate issued by the Company.

10. Issuance of New Certificate

If a share certificate is defaced, lost or destroyed, it may be renewed on payment of such fee, if any, not exceeding Rupees Ten (Rs. 10) only, and on such terms, if any, as to evidence and indemnity and payment of expenses incurred by the Company investigating title as the Directors think fit.

11. Joint Holders

The Company shall not be bound to register more than four (4) persons as the joint holders of any share.

12. Trust Not Recognized

Except as required by law, no person shall be recognized by the Company as holding any shares upon any trust, and the Company shall not be bound by or be compelled in any way to recognize (even when having notice thereof) any equitable, contingent, future or partial interest in any share or any interest in any fractional part of a share or (except only as by these Articles or by law otherwise provided) any other rights in respect of any share except an absolute right to the entirety thereof in the registered holder.

13. Payment of Commission

The Company may at any time pay a commission to any person for subscribing or agreeing to subscribe (whether absolutely or conditionally) for any shares, debentures or debenture-stock in the Company or procuring or agreeing to procure subscriptions (whether absolutely or conditionally) for any shares, debentures or debenture-stock in the Company, but if the commission in respect of shares shall be paid or payable out of capital, the following requirements and conditions shall be observed and complied with, and the amount and rate of commission shall not exceed such percentage on the shares, debentures, debenture-stock in each case subscribed or to be subscribed, as may be determined by the Board subject to any limits required by law. The commission may be paid or satisfied, either wholly or partly, in cash or in shares, debentures or debenture stock. The Company may also on any issue of shares pay such brokerage as may be lawful, provided that such brokerage shall not exceed such percentage on the shares, debentures or debenture stock paid up, as may be determined by the Board subject to any limits required by the law.

Company Registration Office Lahore

14. Bar to Use Company Funds

Except to the extent and in the manner allowed by the provisions of the Ordinance, no part of the funds of the Company shall be employed in the purchase of, or in loans upon the security of, the Company's shares.

B. Transfer of Shares

15. Transfer

The instrument of transfer of any share in the Company shall be executed both by the transferor and transferee, and the transferor shall be deemed to remain holder of the share until the name of the transferee is entered in the Register in respect thereof.

16. Form of Transfer

Shares in the Company shall be transferred in the following form, or in any usual or common form which the Directors shall approve.

AL-ARABIA SUGAR MILLS LIMITED

I _____ of _____ in consideration of the sum of Rupees _____ (Rs. _____) paid to me by _____ of _____ (the "Transferee"), do hereby transfer to the Transferee _____ (the shares) numbered _____ to _____ inclusive, Folio Nos. _____ to _____, Share Certificates Nos. _____ to _____ in **Al-Arabia Sugar Mills Limited**, to hold unto the Transferee, his executors, administrators and assigns, subject to the several conditions upon which I held the same at the time of the execution hereof, and I, the Transferee, do hereby agree to take the said share (or shares) subject to the conditions aforesaid.

As witness our hands this _____ day of _____ 20__

Witnesses:

(1) _____
Signature
(Name)
NIC No. Signature
Full Address: Transferor

(2)

Signature	Signature
(Name)	Transferee
NIC No.	
Full Address:	NIC No. (in case of foreigner, Passport No.)
	Full Name
	Father's/Husband's Name:
	Nationality
	Occupation
	Full Address

17. Non-Refusal of Transfer of Shares

The Directors may decline to register any transfer of shares and shall not be bound to state the grounds for such refusal provided that the Directors shall not refuse to register any transfer of shares if such transfer is sought pursuant to Article 16 (transfer with the prior written consent as proposed herein below). The Directors may also decline to recognize any instrument of transfer unless:

(a) a fee not exceeding Rupees twenty (Rs. 20) only as may be determined by the Directors is not paid to the Company in respect thereof; and

(b) the duly stamped instrument of transfer is accompanied by the certificate of the shares to which it relates, and such other evidence as the Directors may reasonably require to show the right of the transferor to make the transfer.

If the Directors refuse to register a transfer of shares, they shall within thirty (30) days from the date on which the transfer deed was lodged with the Company send to the transferee and the transferor notice of the refusal indicating the defect or invalidity to the transferee, who shall after removal of such defect or invalidity be entitled to re-lodge the transfer deed with the Company.

18. Closure of Register

On giving seven (7) days prior notice in the manner provided in the Ordinance, the Register may be closed for such period or periods not exceeding forty five (45) days in any one (1) year as the Directors may from time to time determine, but so that the Register shall not be closed for a longer period than thirty (30) days at a time.

C. Transmission of Shares

19. Transmission

The executors, administrators, heirs, or nominees, as the case may be, of a deceased sole holder of a share shall be the only persons recognized by the Company as having any title to the share. In the case of a share registered in the names of two (2) or more holders, the survivor or survivors, shall be the only persons recognized by the Company as having any title to the share.

20. Register or Transfer

Any person becoming entitled to a share in consequence of the death or insolvency of a Member shall, upon such evidence being produced as may from time to time be required by the Directors, have the right, either to be registered as a Member in respect of the share or, instead of being registered himself, to make such transfer of the share as the deceased or insolvent person could have made; but the Directors shall, in either case have the same right to decline or suspend registration as they would have had in the case of a transfer of the share by the deceased or insolvent person before the death or insolvency.

21. Rights of Person Entitled by Transmission

A person becoming entitled to a share by reason of the death or insolvency of a Member shall be entitled to the same dividends and other advantages to which he would be entitled if he were the registered holders of the share, except that he shall not, before being registered as a Member in respect of the share, be entitled in respect of it to exercise any right conferred by membership in relation to meetings of the Company.

D. Alteration of Capital

22. Power to Increase Capital

The Company may, from time to time, by resolution increase the share capital by such sum, to be divided into shares of such amount, as the resolution shall prescribe.

23. Further Issue of Capital

Subject to the provisions of the Ordinance, all new shares shall, before issue, be offered to such persons as at the date of the offer are entitled to receive notice from the Company of General Meetings in proportion, as nearly as the circumstances admit, to the amount of the existing shares to which they are entitled. The offer shall be made by notice specifying the number of shares offered, and limiting a time within which the offer, if not accepted, will be deemed to be declined, and after the expiration of that time, or on the receipt of an intimation from the person to whom the offer is made that he declines to accept the shares offered, the Directors may dispose of the same in such manner as they think most beneficial to the Company. The Directors may likewise so dispose of any new shares which (by reason of the ratio which the

new shares bear to the shares held by persons entitled to an offer of new shares) cannot, in the opinion of the Directors, be conveniently offered under this Article.

24. Provisions Applicable to New Shares

The new shares shall be subject to the same provisions with reference to transfer, transmission and otherwise as the shares in the original share capital.

25. Consolidation and Sub-division

The Company may,

(a) consolidate and divide its share capital into shares of larger amount than its existing shares;

(b) sub-divide its existing shares or any of them into shares of smaller amount than is fixed by the Company's Memorandum of Association, subject, nevertheless, to the relevant provisos of the Ordinance;

(c) cancel any shares which, at the date of the passing of the resolution, have not been taken or agreed to be taken by any person.

26. Reduction of Share Capital

The Company may, by Special Resolution, reduce its share capital in any manner and with, and subject to, any incident authorized and consent required by law.

Company Registration Office Lahore Securities and Exchange Commission of Pakistan SECP

IV. MEETINGS AND PROCEEDINGS

A. General Meetings

27. Annual General Meeting

A General Meeting to be called Annual General Meeting, shall be held in accordance with the provisions of the Ordinance, within eighteen (18) Months from the date of incorporation of the Company and thereafter once at least in every year within a period of Four (4) Months following the close of its financial year and not more than fifteen (15) Months after the holding of its last preceding Annual General Meeting as may be determined by the Directors.

28. Extraordinary Meetings

All General Meetings of the Company other than the Annual General Meeting shall be called Extraordinary General Meetings. The Directors may whenever they think fit, call an

Extraordinary General Meeting, and Extraordinary General Meetings shall also be called on such requisition, or in default may be called by such requisitionists, as is provided in the Ordinance. If at any time there are not within Pakistan sufficient Directors capable of acting to form a quorum, any Director of the Company may call an Extraordinary General Meeting in the same manner as nearly as possible as that in which meetings may be called by the Directors.

B. Notice and Proceedings

29. Notice of Meetings

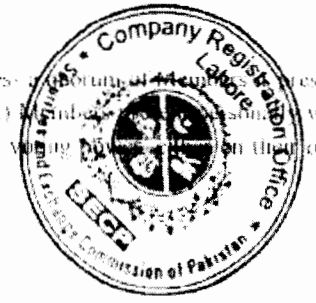
Twenty-one (21) days notice at the least (exclusive of the day on which the notice is served or deemed to be served, but inclusive of the day for which notice is given) specifying the place, the day and the hours of meeting and, in case of special business, the general nature of that business, shall be given in the manner provided by the Ordinance for the General Meeting, to such persons as are, under the Ordinance or the regulations of the Company, entitled to receive such notices from the Company, but the accidental omission to give notice to, or the non-receipt of notice by, any Member shall not invalidate the proceedings at any General Meeting.

30. Special Business

All business shall be deemed special that is transacted at an Extraordinary General Meeting, and also all that is transacted at an Annual General Meeting with the exception of declaring a dividend, the consideration of the accounts, balance sheet and the reports of the Directors and Auditors, the election or appointment of Directors, the appointment and the fixing of the remuneration of the Auditors.

31. Quorum

No business shall be transacted at any General Meeting unless a quorum of Members is present at that time when the meeting proceeds to business. Two (2) Members personally present, who represent not less than twenty five (25) percent of the total voting power, either on their own account or as proxies shall be quorum.



32. Effect of Quorum Not Being Present

If within half an hour from the time appointed for the meeting, a quorum is not present, the meeting, if called upon the requisition of Members, shall be dissolved; in any other case, it shall stand adjourned to the same day in the next week, at the same time and place, and, if at the adjourned meeting a quorum is not present the same procedure shall be repeated until the quorum stated above is achieved.

33. Chairman of Meeting

The Chairman of the Board of Directors, if any, shall preside as Chairman at every General Meeting of the Company, but if there is no such Chairman, or if at any meeting he is not present

within fifteen (15) minutes after the time appointed for the meeting or is unwilling to act as Chairman, any one of the Directors present may be elected to be Chairman, and if none of the Directors is present, or willing to act as Chairman, the Members present shall choose one of their number to be Chairman.

34. Adjournment

The Chairman may, with the consent of any meeting at which a quorum is present (and shall if so directed by the meeting), adjourn the meeting from time to time but no business shall be transacted at any adjourned meeting other than the business left unfinished at the meeting from which the adjourned meeting took place. When a meeting is adjourned for ten (10) days or more, notice of the adjourned meeting shall be given as in the case of an original meeting. Save as aforesaid, it shall not be necessary to give any notice of an adjournment or of the business to be transacted at an adjourned meeting.

35. Voting

At any General Meeting a resolution put to the vote of the meeting shall be decided on a show of hands unless a poll is (before or on the declaration of the result of the show of hands) demanded. Unless a poll is so demanded, a declaration by the Chairman that a resolution has, on a show of hands, been carried, or carried unanimously, or by a particular majority, or lost, and an entry to that effect in the book of the proceedings of the Company shall be conclusive evidence of the fact, without proof of the number or proportion of the vote recorded in favour of, or against, that resolution.

36. Demand for Poll

A poll may be demanded only in accordance with the provisions of the Ordinance.

37. Manner of Taking Poll

If a poll is duly demanded, it shall be taken in accordance with the manner laid down in the Ordinance and the result of the poll shall be deemed to be the resolution of the meeting at which the poll was demanded.

38. Time of Taking Poll

A poll demanded on the election of Chairman or on a question of adjournment shall be taken at once.

39. Casting Vote

In the case of an equality of votes, whether on a show of hands or on a poll, the Chairman of the meeting at which the show of hands takes place, or at which the poll is demanded, shall have and exercise a second or casting vote.

C. Votes of Members

40. Right to Vote

Subject to any rights or restrictions for the time being attached to any class or classes of shares, on a show of hands every Member present in person shall have one (1) vote except for election of Directors in which case the provisions of the Ordinance shall apply. On a poll every Member shall have voting rights as laid down in the Ordinance.

41. Voting by Joint Holders

In case of joint holders, the vote of the senior who tenders a vote, whether in person or by proxy, shall be accepted to the exclusion of the votes of the other joint-holders, and for this purpose seniority shall be determined by the order in which the names stand in the Register.

42. Member of Unsound Mind

A Member of unsound mind, or in respect of whom an order has been made by any court having jurisdiction in lunacy, may vote, whether on show of hands or on a poll, by his committee or other legal guardian, and any such committee or guardian may, on a poll, vote by proxy.

43. Voting by Corporation Representatives

On a poll votes may be given either personally or by proxy, provided that no body corporate shall vote by proxy as long as a resolution of its Directors in accordance with the provisions of the Ordinance is in force.

44. Proxy to be in Writing

The instrument appointing a proxy shall be in writing under the hand of the appointer or his attorney duly authorized in writing. A Member can appoint a non-member as proxy.

45. Instrument Appointing Proxy to be Deposited

The instrument appointing a proxy and the power of attorney or other authority, if any, under which it is signed, or a certified copy of that power or authority, shall be deposited at the Office not less than forty eight (48) hours before the time for holding the meeting at which the person named in the instrument proposes to vote and in default the instrument of proxy shall not be treated as valid.

46. Form of Proxy

An instrument appointing a proxy may be in the following form or a form as near thereto as may be:

AL ARABIA SUGAR MILLS LIMITED

I ____ of ____ in the district of ____ being a Member of **Al-Arabia Sugar Mills Limited**, hereby appoint ____ of ____ as my proxy to vote for me and on my behalf at the Annual/Extraordinary General Meeting of the Company to be held on ____ day of ____ 20____ and at any adjournment thereof.

47. Revocation of Authority

A vote given in accordance with the terms of an instrument of proxy shall be valid notwithstanding the previous death or insanity of the principal or revocation of the proxy or of the authority under which the proxy was executed, or the transfer of the share in respect of which the proxy is given, provided that no intimation in writing of such death, insanity, revocation or transfer as aforesaid shall have been received by the Company at the Office before the commencement of the meeting or adjourned meeting at which the proxy is used.

V. MANAGEMENT AND ADMINISTRATION

A. Board of Directors

48. Number of Directors

The number of Directors shall not in any case be less than three (3). The first Directors shall hold office until the first Annual General Meeting.

49. Qualification of Directors

Save as provided in the Ordinance, no person shall be appointed as a Director unless he is a Member of the Company.

50. Chairman of the Board

The Directors may elect one of their Member as the Chairman of the Board and may confer such powers and functions as they may deem fit in relation to the management and administration of the affairs of the Company subject to their general supervision and control.

51. Managing Director/Chief Executive

The Directors may appoint any one of them or someone from outside their body, to be the Managing Director of the Company and vest in him such powers and functions as they deem fit in relation to the management and administration of the affairs of the Company subject to their

general supervision and control. The Managing Director shall be the Chief Executive of the Company and, if not already a Director, he shall be deemed to be a Director of the Company and be entitled to all the rights and privileges and subject to all the liabilities of that office.

52. Remuneration

Subject to any approval or limits required by law, the terms and conditions and remuneration of

(a) a Director for performing extra services, including the holding of the office of Chairman, or performing special services or visiting or residing outside of Pakistan for any purpose of the Company, and

(b) any Director for attending the meetings of the Directors or a Committee of Directors shall be determined by the Board of Directors.

53. Alternate Director

When any Director intends to be, or is absent for a period of not less than three (3) Months from Pakistan, he may, with the approval of the Board, appoint any person to be his Alternate Director, during the absence of the appointer from Pakistan. Such Alternate Director shall be entitled to receive notice of and to attend and vote at the meetings of Directors, shall be subject to and entitled to the benefit of the provisions contained in these Articles with reference to Directors and may exercise and perform all such powers, directions and duties as his appointer could have exercised or performed. Such appointment shall be recorded in the Directors' minute book. A Director may at any time, by notice in writing to the Company, remove an Alternate Director appointed by him. Upon the return of the appointer to Pakistan, or the death, resignation or retirement as Director of the appointer, the Alternate Director shall cease to be such; provided that, if any Director retires but is re-elected at the meeting at which such retirement took effect, any appointment made by him pursuant to this Article which was in force immediately prior to his retirement and re-election and which has not otherwise ceased to be effective shall continue to operate after his re-election as if he had not so retired. An Alternate Director shall not be deemed to be an agent of the appointing Director but shall be reckoned as one with his appointer. An Alternate Director may resign as such by giving notice to the Board to this effect.

54. Nominee Director

In addition to the elected Directors, the financial institutions shall be entitled, during the currency of their respective loan(s) to the Company, to appoint one (1) person on the Board to be called the Nominee Director and to recall and or replace such person from time to time. Such Nominee Director may not be holder of share(s) in the capital of the Company.

B. Powers and Duties of Directors

55. General Management Powers

The business of the Company shall be managed by the Directors, who may pay all expenses incurred in promoting and registering the Company and may exercise all such powers of the Company as are not by the Ordinance or by these Articles, required to be exercised by the Company in General Meeting, subject nevertheless to the provisions of the Ordinance or to any of these Articles, and such Articles being not inconsistent with the aforesaid provisions, as may be prescribed by the Company in General Meeting but no regulation made by the Company in General Meeting shall invalidate any prior act of the Directors which would have been valid if that regulation had not been made.

56. Appointment of Chief Executive

The Directors shall appoint a Chief Executive in accordance with the provisions of the Ordinance. The remuneration of the Chief Executive shall be fixed by the Board subject to the restrictions, if any under the law.

57. Borrowing Powers

The Board may exercise all the powers of the Company to borrow money and to mortgage or charge its undertaking, property and assets (both present and future), and to issue debentures, debenture stock, and other securities including guarantees, whether outright or as collateral security for any debt, liability or obligation of the Company or of any third party.

58. Contracting Powers

A Director shall be capable of contracting and entering into any arrangement with the Company as if he was not a Director, subject nevertheless to the following provisions namely:

(a) before the contract is entered with or soon thereafter as he becomes interested in the contract or arrangement, he shall disclose in writing to the Board of his interest in the contract or arrangement, and

(b) after he becomes interested, he shall not vote in respect of the contract or arrangement or any matter arising thereabout and if he vote, his vote shall not be counted.

59. Assigning Powers

The Director(s) may assign his their office as such to another person, provided however that prior to any such assignment the aforesaid Director(s) shall cause to be convened a meeting of the Members of the Company for the purpose of adopting such assignment by Special Resolution and the Members shall exercise their respective voting powers so as to ensure that the aforesaid Special Resolution is passed by the Members with requisite majority.

60. Duties of Directors

The Directors shall comply with the provisions of the Ordinance

61. Minute Books

The Directors shall cause minutes to be made in books provided for the purpose of

(a) all appointments of officers made by the Directors,

(b) the names of the Directors present at each meeting of the Directors and of any committee of the Directors,

(c) all resolutions and proceedings at all meetings of the Company and of the Directors and of committees of Directors;

and every Director present at any meeting of Directors or committee of Directors shall sign his name in a book to be kept for that purpose

C. Disqualification of Directors

62. Disqualification of Directors

No person shall become a Director of the Company if he suffers from any of the disabilities or disqualifications mentioned in the provisions of the Ordinance and, if already a Director, shall cease to hold such office from the date he so becomes disqualified or disabled or

(a) if removed by a resolution of Members as hereinafter provided, or

(b) if by notice in writing given to the Company he resigns his office, or

(c) if he fails to acquire his qualification shares at the time of incorporation in the case of the first Directors of the Company or within two (2) Months of his appointment in the case of other Directors

Provided, however, that no Director shall vacate his office by reason only of his being a member of any company which has entered into contracts with, or done any work for, the Company but such Director shall not vote in respect of any such contract or work, and if he does so vote, his vote shall not be counted

D. Proceedings of Directors

63. Meetings of Directors

The Directors may meet together for the despatch of business, adjourn and otherwise regulate their meetings, as they think fit. Such number of Directors as constitute a majority of the Directors shall constitute a quorum. Questions arising at any meeting shall be decided by a majority of votes. In case of an equality of votes, the Chairman shall have and exercise a second or casting vote. A Director may, and the Secretary on the requisition of a Director shall, at any time, summon a meeting of Directors. Seven (7) days notice at the least (exclusive of the day on which the notice is served or deemed to be served) but inclusive of the day for which notice is given) shall be given for a meeting of Directors; provided that, if all the Directors entitled to attend and vote at any such meeting so agree, in writing, a meeting may be held of which less than seven (7) days notice has been given. It shall not be necessary to give notice of a meeting of Directors to any Director for the time being absent from Pakistan.

64. Chairman of Directors' Meetings

The Chairman of the Board shall preside at all meetings of the Board but if at any meeting the Chairman is not present within ten (10) minutes after the time appointed for holding the same or is unwilling to act as Chairman, the Directors present may choose one of their number to be Chairman of the meeting.

65. Committees

The Directors may delegate any of their powers not required to be exercised in their meeting to committees consisting of such member or members of their body as they think fit. Any committee so formed shall, in the exercise of the powers so delegated, conform to any restrictions that may be imposed on it by the Directors.

66. Chairman of Committee Meetings

A committee may elect a Chairman of its meetings, but, if no such Chairman is elected, or if at any meeting the Chairman is not present within ten (10) minutes after the time appointed for holding the same or is unwilling to act as Chairman, the members present may choose one of their members to be Chairman of the meeting.

67. Proceedings of Committee Members

A committee may meet and adjourn as it thinks proper. Question arising at any meeting shall be determined by a majority of votes of the members present. In case of an equality of votes, the Chairman shall have and exercise a second or casting vote.

68. Validity of Directors Acts

All acts done by any meeting of the Directors or of a committee of Directors, or by any person acting as a Director, shall, notwithstanding that it be afterwards discovered that there was some defect in the appointment of such Directors or persons acting as aforesaid, or that they or any of them were disqualified, be as valid as if every such person had been duly appointed and was qualified to be a Director.

69. Resolution by Circulation

A resolution in writing circulated to all the Directors and signed by a majority of the total number of Directors or affirmed by them through email, fax, telex or telegram shall be as valid and effectual as if it had been passed at a meeting of the Directors duly convened and held.

E. Election and Removal of Directors

70. First Election of Directors

At the first Annual General Meeting of the Company, all the Directors shall stand retired from office, and Directors shall be elected in their place in accordance with the Ordinance for a term of three (3) years.

71. Eligibility for Re-election

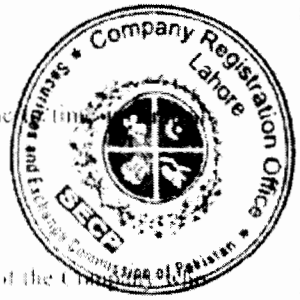
A retiring Director shall be eligible for re-election.

72. Election in Accordance with Ordinance

The Directors shall comply with the provisions of the Ordinance relating to the election of Directors and matters ancillary thereto.

73. Number of Directors

Subject to the provisions of the Ordinance, the Company may from time to time in General Meeting increase or decrease the number of Directors.



74. Filling of Casual Vacancy

If any casual vacancy occurs in the Board at any time then the Member of the Company nominated the member of the Board of Directors on account of whom the casual vacancy has occurred, shall be entitled to nominate a Member to be co-opted in place of that Director (the "Entitled Member"). On occurrence of any such casual vacancy, the Entitled Member shall nominate and notify the Board of the name of the person to be co-opted in place of the casual vacancy. The Board shall co-opt the person nominated by the Entitled Member within the period of fourteen (14) days from the receipt of the aforesaid nomination, failing which a

meeting of the Members of the Company shall be convened within shortest possible time. In such meeting the Members shall exercise all their respective voting power in the afore said meeting and take such other steps as are necessary as to ensure that the person nominated as a new Director is appointed. The person so chosen by either of the procedure described hereinbefore shall be subject to retirement at the same time as if he had become a Director on the day on which the Director in whose place he is chosen was last elected as Director.

75. Removal and Retirement of Director

(a) The Company may remove a Director but only in accordance with the provisions of the Ordinance.

(b) A Director may retire from his office upon giving one (1) Month notice in writing to the Company of his intention to do so and such resignation shall take effect upon the expiry of such notice or its earlier acceptance. The remaining Directors may appoint another person to be a Director who shall be subject to retirement at the same time as if he had become a Director on the day on which the Director in whose place he is chosen was last elected as Director.

VI. SECRETARY

76. The Secretary shall be appointed, by the Directors for such time, at such remuneration and upon such conditions as they may think fit, and any Secretary so appointed may be removed by them. The Directors may from time to time appoint a temporary Assistant Secretary to exercise all or any of the functions of the Secretary, in the absence of the Secretary.

VII. THE SEAL

77. Common Seal

The Directors shall provide a common Seal of the Company which shall not be affixed to any instrument except by the authority of a resolution of the Board or by a committee of Directors authorized in that behalf by the Directors, and two (2) Directors or one (1) Director and the Secretary of the Company or such other person as the Directors may appoint for the purpose, shall sign every instrument to which the common Seal is affixed.

78. Official Seal

The Directors may provide for the use in any territory, district or place not situated in Pakistan, of an official Seal which shall be a facsimile of the common Seal of the Company, with the addition on its face of the name of every territory, district or place where it is to be used. The provisions of the Ordinance shall apply to the use of the official Seal.

VIII. DIVIDENDS AND RESERVE

79. Declaration of Dividends

The Company in General Meeting may declare dividends but no dividend shall exceed the amount recommended by the Directors.

80. Interim Dividends

The Directors may from time to time pay to the Members such interim dividends as appear to the Directors to be justified by the profits of the Company.

81. Dividends Payable Out of Profits

No dividends shall be paid otherwise than out of profits of the year or any other undistributed profits. No unpaid dividend shall bear interest against the Company.

82. Dividends Payable on Amount Paid on Shares

Subject to the rights of persons (if any) entitled to shares with special rights as to dividends, all dividends shall be declared and paid according to the amounts paid on the shares, but if and so long as nothing is paid upon any of the shares to the Company, dividends may be declared and paid according to the amounts of the shares. No amount paid on a share in advance of calls shall be treated for the purposes of this regulation as paid on the share.

83. Reserve Fund

The Directors may, before recommending any dividend, set aside out of the profits of the Company such sums as they think proper as a reserve or reserves which shall, at the discretion of the Directors, be applicable for meeting contingencies, or for equalizing dividends, or for any other purpose to which the profits of the Company may be properly applied, and pending such application may, at the like discretion, either be employed in the business of the Company or be invested in such investments (other than shares of the Company) as the Directors may, subject to the provisions of the Ordinance from time to time think fit.

84. Profit Carried Forward

The Directors may carry forward any profits which they may think prudent not to distribute without setting them aside as a reserve.

85. Payment of Dividends in Specie

With the sanction of a General Meeting any dividend may be paid wholly or in part by the distribution of specific assets and in particular of paid up shares or debentures of any other company or in any one or more of such ways. Where any difficulty arises in regard to such distribution, the Directors may settle the same as they think expedient, and in particular may fix the value for distribution of such specific assets or any part thereof and may determine that cash payments shall be made to any Members upon the footing of the value so fixed, in order to adjust the rights of all Members, and may vest any such specific assets in trustees upon trust for the Members entitled to the dividend as may seem expedient to the Directors.

86. Dividends to Joint Holders

If several persons are registered as joint-holders of any share, any one of them may give effectual receipt for any dividend payable on the share.

87. Notice of Dividend

Notice of any dividend that may have been declared shall be given in the manner hereinafter mentioned to the persons entitled to share therein.

88. Period for Payment of Dividend

The dividend shall be paid within the period laid down in the Ordinance.

89. Unclaimed Dividends

The unclaimed dividend shall be used in accordance with section 244 of the Companies Ordinance 2016.

IX. ACCOUNTS

90. Books of Account

The Directors shall cause to be kept proper books of account as required under the Ordinance.

91. Place Where Accounts Kept

The books of account shall be kept at the Office or at such other place as the Directors shall think fit and shall be open to inspection by the Directors during business hours.

92. Inspection by Members

The Directors shall from time to time determine whether and to what extent and at what time and places and under what conditions or regulations the accounts and books or papers of the Company or any of them shall be open to the inspection of Members not being Directors and no Member (not being a Director) shall have any right of inspecting any account and book or papers of the Company except as conferred by law or authorized by the Directors or by the Company in General Meeting.

93. Annual Accounts

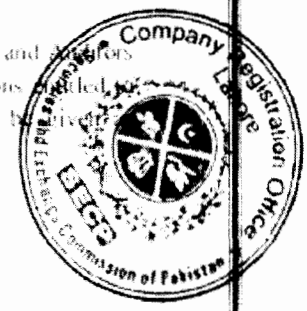
The Directors shall as required by the provisions of the Ordinance cause to be prepared and to be laid before the Company in General Meeting such profit and loss accounts and balance sheets duly audited and reports as are referred to in those Sections.

94. Balance Sheet and Profit and Loss Account

A balance-sheet, profit and loss account, and other reports referred to in the preceding Article shall be made out in every year and laid before the Company in the Annual General Meeting made up to a date not more than three (3) Months before such meeting. The balance sheet and profit and loss account shall be accompanied by a report of the Auditors of the Company and the report of Directors.

95. Copy of Accounts to be sent to Members

A copy of the balance sheet and profit and loss account and reports of Directors and Auditors shall, at least twenty-one (21) days preceding the meeting, be sent to the persons entitled to receive notices of General Meetings in the manner in which notices are to be given as hereinafter provided.



96. Compliance with Ordinance

The Directors shall in all respect comply with the provisions of the Ordinance.

97. Capitalization of Profits

The Company in General Meeting may upon the recommendation of the Directors resolve that it is desirable to capitalize any part of the amount for the time being standing to the credit of any of the Company's reserve accounts or to the credit of the profit and loss account or otherwise available for distribution, and accordingly that such sum be set free for distribution among the Members who would have been entitled thereto if distributed by way of dividend and in the same proportions, on condition that the same be not paid in cash but be applied in or towards paying up in full unissued shares or debentures of the Company to be allotted and distributed

credited as fully paid up to and amongst such Members in the proportion aforesaid, and the Directors shall give effect to such resolution.

98. Audit

Auditors shall be appointed and their duties regulated in accordance with the provisions of the Ordinance.

X. NOTICES

99. Notice to Members and Other Persons

Notice shall be given by the Company to Members and Auditors of the Company and other persons entitled to receive notice in accordance with the provisions of the Ordinance.

XI. SECRECY

100. Secrecy

Every Director, manager, adviser, auditor, trustee, member of a committee, officer, servant, agent, accountant or other person employed in business of the Company shall, if so required by the Directors, before entering upon his duties, sign a declaration pledging himself to observe a strict secrecy respecting all transactions of the Company with its customers and the state of accounts with individuals and in matters relating thereto including without limitation proprietary trade secrets, and commercial and technical information and shall by such declaration pledge himself not to reveal any of the matters which may come to his knowledge in the discharge of his duties except when required to do so by the Directors or by any General Meeting or by any court of law and except so far as may be necessary in order to comply with any of the provisions in these presents.

101. Members' Access to Company Premises

No Member or other person (not being a Director) shall be entitled to enter upon the property of the Company or examine the Company's premises or properties without the permission of the Directors, subject to Article 95, to require discovery of or any information respecting any detail of the Company's trading or any matter which is or may be in the nature of a trade secret, mystery of trade or secret process or of any matter whatsoever which may relate to the conduct of the business of the Company and which in the opinion of the Directors will be inexpedient in the interest of the Members of the Company, to communicate.

XII. RECONSTRUCTION

102. Reconstruction

On any sale of the undertakings of the Company, the Directors, or the liquidators on a winding up, may, if authorized by a Special Resolution, accept fully paid shares, debentures or securities of any other company, either then existing or to be formed for the purchase in whole or in part

of the property of the Company, and the Directors (if the profits of the Company permit), or the liquidators (on a winding up), may distribute such shares or securities, or any other properties of the Company amongst the Members without realization, or vest the same in trustees for them, and any Special Resolution may provide for the distribution or appropriation of the cash, shares or other securities, benefits or property, otherwise than in accordance with the strict legal rights of the Members or contributories of the Company, and for the valuation of any such securities or property at such price and in such manner as the meeting may approve, and all holders of shares shall be bound to accept and shall be bound by any valuation or distribution so authorized, and waive all rights in relation thereto save only such statutory rights (if any) as are, in case the Company is proposed to be or is in the course of being wound up, incapable of being varied or excluded by these presents.

XIII. WINDING UP

103. Division and Distribution of Assets upon Dissolution

(a) If the Company is wound up, the surplus asset shall be applied first in the payment of the capital paid up on ordinary shares and excess, if any, shall be distributed among the Members holding ordinary shares in proportion to the number of ordinary shares held by them respectively at the commencement of the winding up.

(b) If the Company is wound up voluntarily or otherwise, the liquidator may, with the sanction of a Special Resolution of the Company and any other sanction required by law, divide amongst the Members in specie or kind the whole or any part of the assets of the Company (whether they shall consist of property of same kind or not) and may, for such purpose, set such value as he deems fair upon any property to be divided as aforesaid and may determine how such division shall be carried out as between the Members or different classes of Members. The liquidator may, with the like sanction, vest the whole or any part of such assets in trustees upon such trust for the benefit of the contributories, as the liquidator, with the like sanction, shall think fit, but so that no Member shall be compelled to accept any shares or other securities whereon there is any liability.

XIV. INDEMNITY

104. Indemnification

Every officer or agent for the time being of the Company may be indemnified out of the assets of the Company against any liability incurred by him in defending any proceedings, whether civil or criminal, arising out of his dealings in relation to the affairs of the Company, except those brought by the Company against him, in which judgment is given in his favour or in which he is acquitted, or in connection with any application under the Ordinance in which relief is granted to him by the court.

XV. ARBITRATION

105. Differences to be referred to Arbitrator

(a) When any difference arises between the Company on the one hand and any of the Members, their executors, administrators or assigns on the other hand, touching the true intent or construction or the incident or consequences of these Articles or of the statutes or touching anything there or thereafter done, executed, omitted or suffered in pursuance of these Articles or of the statutes or touching any breach or alleged breach of these Articles, or any claim on account of any such breach or alleged breach, or otherwise relating to the premises, or to these Articles or to any statute affecting the Company or to any of the affairs of the Company every such difference shall, as a condition precedent to any other action at law be referred to conformity with the Arbitration Act, 1940, or any statutory modification thereof and any rules made thereunder to the decision of an arbitrator to be appointed by the parties in difference or if they cannot agree upon a single arbitrator to the decision of two (2) arbitrators of whom one (1) shall be appointed by each of the parties in difference, or in the event of two (2) arbitrators not agreeing then of an umpire to be appointed by the two (2) arbitrators, in writing, before proceeding on the reference, and such decision shall be final and binding on the parties. The cost of expenses incidental to any such reference and award shall be in the discretion of the arbitrator or arbitrators or umpire respectively who may determine the amount thereof or direct the same to be taxed between attorney and client or otherwise and may award by whom and in what manner the same shall be borne and paid

(b) In the event that a dispute, claim or controversy arises between the Company, its management and its shareholders, or between the shareholders themselves, directors inter-se, all steps may be taken to settle the dispute and resolve the issue through mediation by an accredited mediator before taking recourse to formal dispute resolution such as arbitration or litigation.

We the several persons, whose names and addresses are subscribed below, are desirous of being formed into a Company, in pursuance of these Articles of Association and we respectively agree to take the number of shares in the Capital of the Company as set opposite to our respective names:

Name and Surname (Present & Former) in full (in Block Letters)	NIC No. (in case of foreigner Passport No.)	Father's/ Husband's Name in full	Nationality with any former Nationality	Occupation	Residential address in full	Number of shares taken by each subscriber	Signatures
MUHAMMAD HAMZA SHEHBAZ SHARIF	35201-0713785-9	Mian Muhammad Shehbaz Sharif	Pakistani	Business	96-H, Model Town, Lahore	155,000	
SULEMAN SHEHBAZ SHARIF	35201-9868439-1	Mian Muhammad Shehbaz Sharif	Pakistani	Business	96-H, Model Town, Lahore	155,000	
MRS NUSRAT SHEHBAZ	35201-7901873-[illegible]	Mian Muhammad Shehbaz Sharif	Pakistani	Business	96-H, Model Town, Lahore	1,000	
MRS ZAINAB SULEMAN	35202-8128220-8	Suleman Shehbaz Sharif	Pakistani	Business	96-H, Model Town, Lahore	10,000	
RAMZAN SUGAR MILLS LIMITED [Through MUHAMMAD USMAN CNIC 35202-0465386-9]	CUIN 0012222	-	Pakistani	Business	55-K, Model Town, Lahore	249,990	
SHARIF FEED MILLS (PVT) LIMITED [Through GHULAM RASOOL GORSI CNIC 35202-[illegible]]	CUIN 0050961	-	Pakistani	Business	55-K, Model Town, Lahore	50,000	
MUHAMMAD USMAN	35202-0465386-9	Meraj Din	Pakistani	Private Service	House No. 4, St. No. 26, Gulzar Colony, Samanabad, Multan Road, Lahore	10	
					Total number of shares (six hundred and twenty thousand)	620,000	

Dated this 17[th] day of November, 2016

Witness to the above Signatures:

Name: National Institutional Facilitation Technologies (Pvt) Limited

Address: 5[th] Floor, AWT Plaza, I.I.Chundrigar Road, Karachi.

2. Plant Configuration

(i)	**Plant Size Installed Capacity (Gross ISO)**	18.00 MW		
(ii)	**Type of Technology**	Conventional steam turbine based power plant		
(iii)	**Number of Units (size MW)**	Unit -1	Unit-2	Unit-3
		4.00	4.00	10.00
	Unit Make and Model	Shinko Industries Limited/DNG-42-65	Shinko Industries Limited/DNG-42-65	Triveni Turbine Limited
	Commercial operation date	1995-96	1995-96	2017
	Expected Useful life	40	40	40
	Expected remaining life	18	18	38

3. Fuel/Raw Material Details

(i)	**Fuel**	**Primary Fuel**	**Alternative Fuel**
		Bagasse	Furnace Oil (FO)
(ii)	**Fuel Source (Imported/Indigenous)**	Indigenous	Indigenous and Imported
(iii)	**Fuel Supplier**	Al-Arabia Sugar Mills Limited	PSO
(iv)	**Supply Arrangement**	Through conveyor belts/loading trucks/tractor trolleys etc.,	Through Oil Tankers

(v)	**Sugarcane Crushing Capacity**	8,000 TDC
(vi)	**Bagasse Generation Capacity**	2500-2600 Tons/day
(vii)	**Bagasse Storage Capacity**	40,000 Tons
(viii)	**Number of Storage Tanks (FO)**	2
(xi)	**Storage Capacity of each tank**	500 M_3
(x)	**Gross Storage (FO)**	1,000 M_3

4. Emission Values

		Primary Fuel	**Alternative Fuel**
(i)	So_x	N/A	<400mg/m3
(ii)	No	115	<400mg/m3
(iii)	CO_2	13.5	12% - 13%
(iv)	CO (mg/Nm_3)	2080	<3%
(v)	PM_{10}	N/A	0.107 mg/m3

5. Cooling System

(i)	**Cooling Water Source/Cycle**	Deep Well Turbine Pump/Underg[illegible] water/Closed Loop

6. Plant Characteristics

		Unit-1	**Unit-2**	**Unit-3**
(i)	**Generation Voltage**	6.6 KV	6.6 KV	6.6 KV
(ii)	**Frequency**	50 Hertz	50 Hertz	50 Hertz
(iii)	**Power Factor**	0.8 Lagging	0.8 Lagging	0.8 Laggin[illegible]
(iv)	**Automatic Generation Control (AFG)**	Yes	Yes	Yes
(v)	**Ramping Rate**	90 Min	90 Min	90 Min
(vi)	**Time Required to Synchronize to Grid**	30-60 Sec	30-60 Sec	30-60 Sec

7. Efficiency Parameters

		Unit-1	**Unit-2**	**Unit-3**
(i)	Designed Efficiency of Power Plant (%)	10.9	10.9	13.[illegible]
(ii)	Gross Efficiency of Power Plant at Mean Site Conditions (%)	9.9	9.9	14.[illegible]
(iii)	Net Efficiency of Power Plant at Mean Site Conditions (%)	8.9	8.9	12.[illegible]

8. Plant Capacity

(i)	Total Gross Installed Capacity	18 MW
(ii)	De-rated Capacity at mean site condition	17.50
(iii)	Auxiliary consumption	1.00 MW
(iv)	Net capacity of the Plant at mean site conditions	16.50 MW

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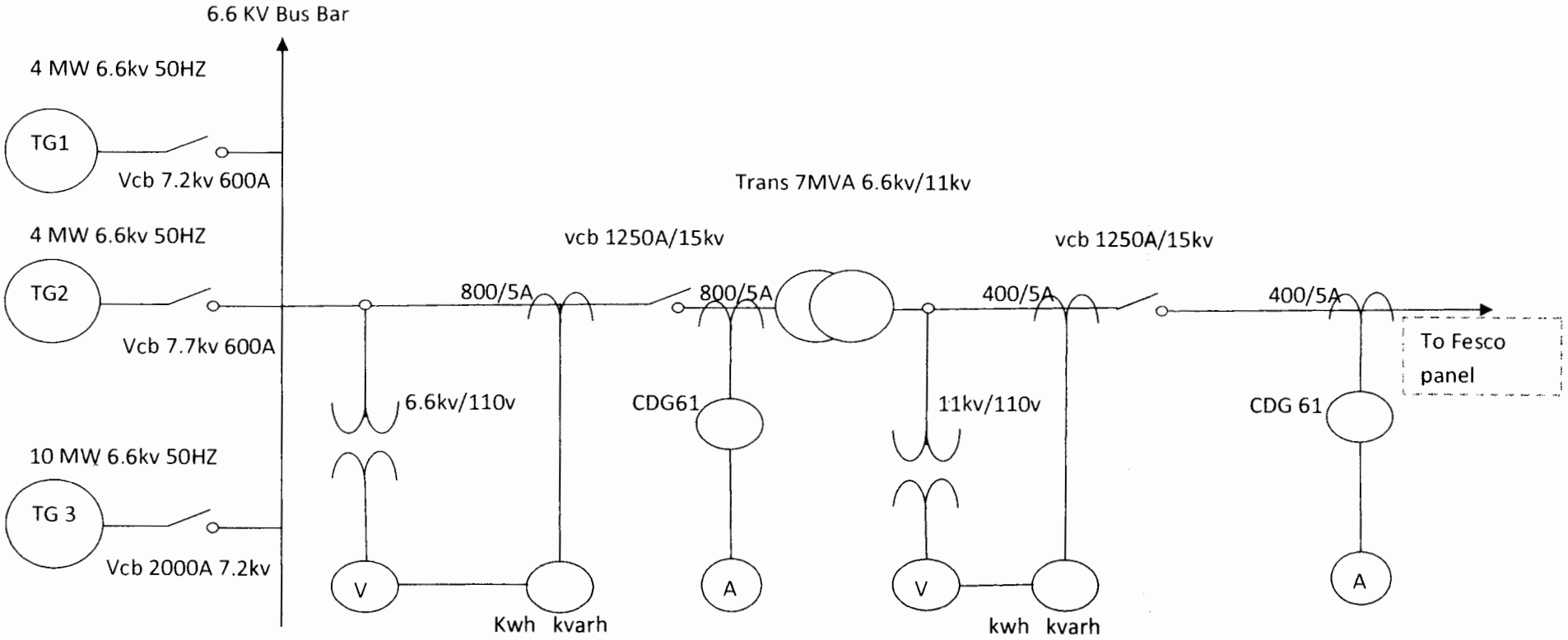
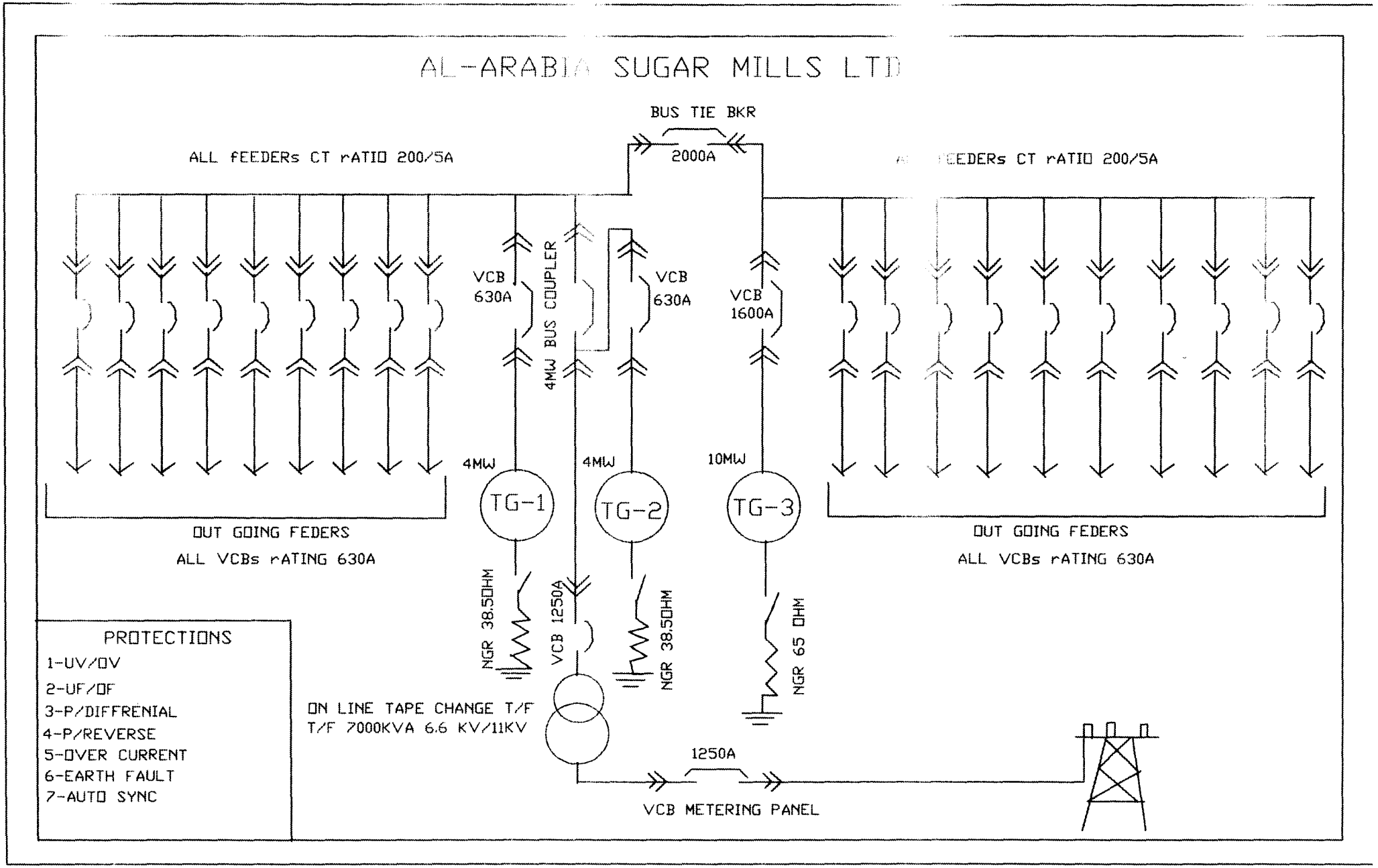
GENERATION SINGLE LINE DIA GRAM OF AASML



Generation License
Al-Arabia Sugar Mills Limited
27-KM Shahpur Sadar,
District Sargodha
Punjab

Metering, Instrumentation, Protection & control



Al-Arabia Sugar Mills Limited

Training & Development

The major objectives of the operational training shall be to acquaint the operators of the following:

a) The nature, purpose and limitations of all plant and equipment.
b) The detailed operating instructions on each section and equipment of the plant.
c) Normal start up and shutdown program for the unit.
d) The emergency procedures.

The basis, for the training shall be the Plant's operating and Maintenance Manual Particulars Book, which is compiled from the manufacturers' instructions, the contract documents and the drawings. In addition, the information gathered from the visits to the other operating plants and to the manufacturers works shall also be included in the training. Supervision and co-ordination of the training program requires full time attention of a senior executive of the plant, and also the consultant's assistance may be taken. The training program shall include lectures, expositions by experienced plant operators and maintenance personnel, informal discussions and visits to operating plants and manufacturer's works and exposure to the courses conducted by Institutions like Plant Training Institute or any other Institution to be given to the operating & maintenance staff.

The maintenance training program should be based on the requirements of the individual maintenance functions, like mechanical, electrical, instrumentation etc. The Engineers and the Technicians should be sent to the manufacturers' works to witness the production and be associated with the erection of plant and equipment.

The plant should be equipped with proper measuring/testing instrument for periodic cross checking of parameters shown in the control room and plant area local gauges. Logging of data and periodic review of the plant operation, review of failures, break downs, etc. should be done to improve the availability of the plant.

****

ENVIRONMENT PROTECTION DEPARTMENT

Government of the Punjab
National Hocky Stadium, Lahore.

NO. DD (EIA)/EPA/F-91(EIA)/2912 /2017/ 43
Dated: 17 /01 / 2018

To,

Mr. Naveed Akhtar,
Resident Director,
Al- Arabia Sugar Mills.
55-K, Model Town, Lahore.

Subject: **DECISION OF EPA PUNJAB REGARDING PROJECT "BALANCING AND MODERNIZING OF AL-ARABIA SUGAR MILL, 2-KM SARGODHA ROAD, SHAHPUR SADAR, SARGODHA."**

1.	Description of Project:	Balancing and Modernizing of Al-Arabia Sugar Mill. Sugar Production capacity of unit is 94, 080 tons per day.
2.	Location of Project:	2-KM Sargodha Road, Shahpur Sadar, District Sargodha.
3.	Date of filing of EIA:	21-08-2017

4. EPA Punjab has reviewed the Environmental Impact Assessment (EIA) Report and considered Site Inspection Report received from Assistant Director (Environment), Sargodha vide letter No. 459/AD/EPA/SGD dated 17.10.2017 EPA Punjab has also considered the recommendations of **Committee of Experts** (Meeting dated 29.12.2017) and other relevant record to take a lawful decision.

5. **EPA, Punjab accords Environmental Approval under Section 12 of Punjab Environmental Protection Act 1997 for aforesaid project subject to the following conditions:**

i. The proponent shall ensure compliance of Punjab Environmental Quality Standards (PEQS) during construction and operational phase w.r.t noise, waste water and gaseous emissions.
ii. Mitigation Measures suggested in the EIA report and Environmental Management Plan (EMP) shall be strictly adhered to minimize any negative impacts on soil, ground water, air and biological resources of the project area.
iii. Monitoring shall be carried out during the entire period of the project activities. Monitoring reports of the whole operation shall be submitted to EPA Field Office on quarterly basis.
iv. The proponent shall ensure that strict and efficient health and safety measures are in place for protection of workers backed by a comprehensive emergency response system.
v. The proponent shall provide a copy of EIA report and copy of this letter to the contractor also for his information and compliance of conditions / measures suggested in these documents.
vi. The construction material shall be piled / stored in such a way that it shall not destroy the flora / environment of the locality.
vii. The proponent shall sprinkle water on daily basis during construction activities as dust suppressant.
viii. Arrangements shall be made for safe disposal of solid and hazardous waste. The solid waste shall be retained within the unit boundary / premises and shall be disposed off in an environmental friendly way at a suitable disposal facility.
ix. The proponent shall redress the objections / concerns of neighbours / stakeholder on priority basis (if any at any stage).
x. Compensation shall be provided to the inhabitants in case of loss of property, shops, business etc. in accordance with the rates that are agreed upon. All conflicting issues regarding compensation etc. should be settled amicably before or during the project activities by the competent authority.
xi. Maximum unskilled and to the extent possible skilled jobs shall be given to locals after providing them proper training.
xii. The proponent shall obtain NOCs/ clearance of all other concerned departments before commencement of work.
xiii. The proponent will install standby power generator (if required) adopting sound proofing techniques and it shall be equipped with chimney with proper height to discharge the hot gases / smoke and the proponent will not install the generator on residential area side.
xiv. The proponent shall take measures to conserve water resources by incorporating rain water harvesting in the building design and ensuring provision of ground water recharge galleries. Furthermore proponent must not pollute or over use any surface water body in the vicinity of the project.

xvi. The proponent shall do landscaping and restore the environment after completion of the construction work.

xvii. The proponent shall plant 5,000 trees of indigenous species of 6-7 feet height in consultation with EPA Field office within six months. The proponent shall also take measures for protection and maintenance of these trees and maintain their proper record for verification by EPA.

xviii. The proponent shall appoint Environmental Manager (having at least qualification of B.S Environment Sciences) to deal with environmental matters of project/unit.

xix. The proponent shall install air pollution control devices.

xx. The proponent shall install state of the art machinery.

xxi. The proponent shall submit costed Environmental Management Plan before operation of project.

xxii. The proponent shall submit design of Waste Water Treatment Plant before operation of project.

xxiii. The proponent shall install air pollution monitoring analyzers & Ambient Air Quality Monitoring Station with online access to EPA Punjab.

xxiv. The proponent shall take all necessary measures for disposal of fly ash & bottom ash in scientific manners.

xxv. The proponent shall ensure that ground water aquifer(s) in use of locals of the area is not disturbed by sub soil water extraction of factory.

xxvi. The proponent shall follow the SOPs regarding dengue larvae eradication.

The proponent shall, before commencing construction of the project, acknowledge acceptance of e stipulated conditions by executing an Undertaking in the form prescribed in Schedule VII of Review of IEE/EIA egulations 2000.

The proponent shall be liable for correctness, exhaustiveness and validity of information supplied this department by the environmental consultant.

The proponent shall be liable for compliance of Regulations 13, 14, 18 and 19 of IEE/EIA egulations, 2000, regarding approval, confirmation of compliance, entry, inspections and monitoring.

This approval is accorded only for the installation / construction phase of the project. The oponent shall apply for confirmation of compliance under Regulation 14 of IEE/EIA Regulation, 2000 by bmitting Environmental Management Plan for operational phase along with compliance status report of the vironmental Approval of the construction phase of the project.

Any change in the approved project shall be communicated to EPA, Punjab and shall be mmenced after obtaining the approval.

This approval shall be treated as null and void if all or any of the conditions mentioned above, are not complied with. This approval does not absolve the proponent of the duty to obtain any other approval or nsent that may be required under any law in force and is subjudice to legal proceedings in any legal fora / court.

This approval shall be valid (for commencement of construction) for a period of three years from date of issue under Regulation 17 of IEE / EIA Regulations, 2000.

This approval can be withdrawn at anytime without any prior notice if deemed necessary in the blic / national interest.

ASSISTANT DIRECTOR (EIA)
for Director General, EPA, Punjab
Ph: # 042-99232285

), & DATE EVEN.

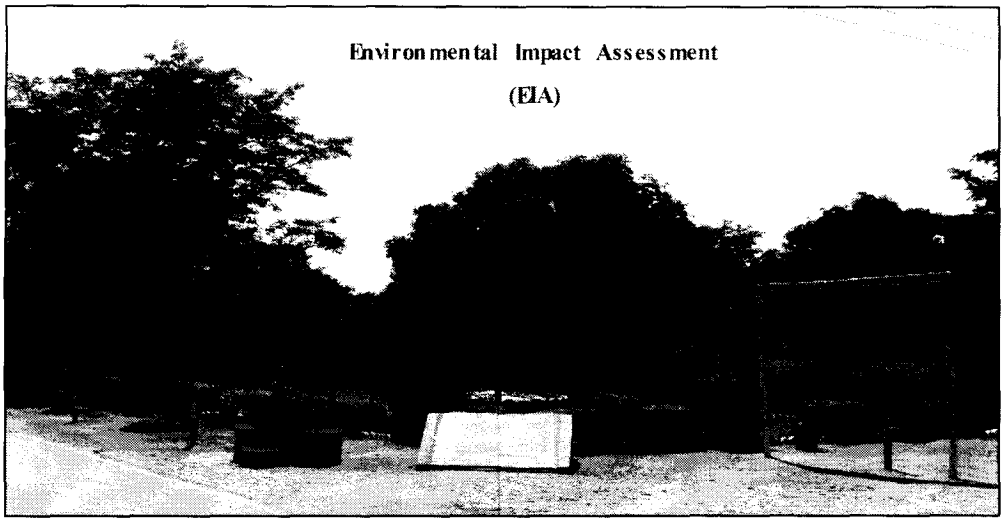
A copy is forwarded to Assistant Director (Environment), Sargodha w.r.t letter No. 459/AD/EPA/SGD ed 17.10.2017. He is requested to:-

i. Obtain Undertaking from the project proponent mentioned at Para 6 for the record of EPA Headquarter and Field Office.

i. Ensure compliance of the conditions mentioned in the Environmental Approval and maintain the file / record of correspondence with the project proponent and other stakeholders in chronological order.

ASSISTANT DIRECTOR (EIA)

Installation of Al-Arabia Sugar Mills Ltd. at 2 Km, Shahpur Saddar, District Sargodha.



Prepared by:

Suite 4, 2nd Floor, Link Arcade, Model Town Link Road, Lahore-Pakistan

Phone: + 92 42 35887517, 35925693; **Fax:** +92 42 35855508

Email: ectech_ectech@yahoo.com

August-2017

Installation of Al-Arabia Sugar Mills Ltd. at 2 Km, Shahpur Saddar, District Sargodha.

Environmental Impact Assessment (EIA)

For

Installation of Al-Arabia Sugar Mills Ltd. at 2 Km, Shahpur Saddar, District Sargodha.

Prepared by:

ECTECH
Environment Consultants

Suite 4, 2nd Floor, Link Arcade, Model Town Link Road, Lahore-Pakistan

Phone: + 92 42 35887517, 35925693; **Fax:** +92 42 35855508

Email: ectech_ectech@yahoo.com

August-2017

ECTECH

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Description of Environment

Glossary

I. **Environment:** means air, water and land; all layers of the atmosphere; all organic and inorganic matter and living organisms; the ecosystem and ecological relationships; buildings, structures, roads, facilities and works; all social and economic conditions affecting community life; and the inter-relationships between any of the factors mentioned

II. **Environmental Impact Assessment:** means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, migratory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed

III. **Initial Environmental Examination:** Means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an environmental effect for requiring preparation of an environmental impact assessment

IV. **Effluent:** Means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour

V. **National Environmental Quality Standards:** Means the permissible standards for emission of air pollutants and noise and for discharge of effluent and waste

VI. **Discharge:** Means spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping

VII. **Waste:** Means any material, substance, or by-product eliminated or discarded as no longer useful or required after the completion of a process

VIII. **Sustainability:** Means such developments that meet the needs of the present generation without compromising the ability of future generations to meet their needs

List of Annexure

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Acronyms

B & M	Balancing and Modernization
TPD	Tons per Day
HERP	Hazard and Emergency Response Plan
PEQS	Punjab Environment Quality Standards—1997.
PEQSAA	Punjab Environment Quality Standards for Ambient Air
PEWSDSW	Punjab Environment Quality standards for Drinking water
PEQSN	Punjab Environment Quality standards for Noise
EA	Environmental Approval
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMtP	Environmental Monitoring Plan
EPA	Environmental Protection Agency
EPO	Environmental Protection Order
GOP	Government of Pakistan
IEE	Initial Environmental Examination
IPPs	Independent Power Projects
IUCN	International Union for Conservation of Nature
LAA	Land Acquisition Act
MoE	Ministry of Environment
NCS	National Conservation Strategy
NEQS	National Environment Quality Standard
NGO	Non-Government organization
NOC	No-Objection Certificate
Pak-EPC	Pakistan Environmental Protection Council
PC	Public Consultation
PCCL	Pakistan Cement Company Limited
PEP(A)A	Punjab Environmental Protection (Amendment) Act
PEPA	Pakistan Environmental Protection Act
PEPC	Punjab Environmental Protection Council
PM	Particulate Matter
POPs	Parenting Organic Pollutants
Punjab EPA	Punjab Environmental Protection Agency
SOx	Oxides of Sulphur
SPM	Suspended Particulate Matter
VOC	Volatile organic compound
WAPDA	Water and Power Development Authority

Executive Summary

Executive Summary

1.1 Title and Location of the project

Environmental Impact Assessment Study is conducted for the purposed project "Installation of Al-Arabia Sugar Mills at 2 Km , Sargodha Road Shahpur Sadar.

1.2 Name of Proponent

Arabia Sugar Mills Limited.
Contact person: Mr. Naveed Akhtar
Address: 55 K Model Town, Lahore.
Phone: 042-35857233,34,35
Cell: 0300-8638583
Email: naveed.akhtar@sgroup.pk

1.3 Name of Organization preparing the Report

ECTECH-Environment Consultants
Suite 4, 2nd Floor, Link Arcade, Model Town Link Road, Lahore
Phone: 042-5887517, 5019308;Fax: 042-5855508
E-mail: ectech_ectech@yahoo.com
web: ectech.com.pk

1.4 A brief Outline of the Proposal

Al-Arabia Sugar Mills Limited purchased assets of an already installed sugar unit with cane crushing capacity between 7000 to 8000 TPD. The unit was not operational at the time of its purchase. Now they are planning to Balance and Modernize(B&M) under the new name "Al-Arabia Sugar Mills Limited" situated at 2 Km , Shahpur Saddar, District Sargodha . The plant is to produce 94,080 tons of sugar while total operational time is 120 days/year. The plant is spread over area of 75 acres. The total cost of the project is Rs.4,989 million. The project site lies within the rich in sugarcane production. Basic facilities like good quality water ,road excess, cheap labour etc. are available.

Through the export of the sugar as the final product it will earn hard currency so dear to the country, providing jobs to the people, generation of taxes for the exchequer of the govt. among man other benefits. Around 344 tons of molasses/day will be produced as a byproduct which will be used in feed mills and as raw material for distillery. Similarly 2,360 TPD of bagasse will be produced of which 1,680 TPD will be used for ultimate production of electricity while the net saving of 680 TPD of bagasse will be used of season

production of power. Other utilities including water, land, labour, road access etc. are available near to the project site.

M/S Shinko Japan are to provide technology/equipment for the project.

A complete flow sheet with explanations of each step of manufacturing is reported in the EIA report. The total period required for the completion of the project is 7 months.

M/S Jade Existing environmental resources have been discussed in the report.

Topography and geology; Soils and Climate; water; *Ecological resources*: Fisheries and aquatic biology, Biodiversity, Forestry, Wildlife, scientific institutions, Socio-economic and Cultural and other heritage have been described. It has been concluded that there will not be any adverse impact on any of the resources or any segment of environment, provided the Environmental Management (EM)) and Monitoring Plan (EMtP) as given in the report are followed. The plant will operate for 120 days/year round the clock.

According to the 'Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000" the project falls in "**Category-A"** requiring submission of Environmental Impact Assess (EIA) report to be submitted to the Environmental Protection Agency (EPA), Punjab for getting the required Environmental Approval **(EA)/NOC** No Objection Certificate as mandatory legal requirement before starting any physical activity on the project site.

Providing jobs to550 persons during construction period and 400 people during regular operations (seasonal).The report also discusses Grievance Redressing Mechanism-Formal and Informal Channels and another, Current Land Use Policies and Environmental Legal Framework.

1.5 The major impacts& Recommendations for mitigation measures

Major impacts and recommendation for mitigation measures are described hereunder:

S, No	Problem	When problem will occur and when it should be addressed	Where problem should be addressed	How problem should be addressed.
i-	I -Dust,	During construction phase. It needs to be address at the same time.	Civil works sites In fabrication workshop,	-Sprinkling water on the dusty places, on unpaved roads.
	ii-Noise		----DO-----	Ii -provide ear muffs/plugs to protect ears against
	iii-Vibrations		Iii -At civil work sites	Iii – Use machines which produce less vibrations.
	Iv-High intensity light from welding activity.		Iv –At welding and fabrication sites	IV --Provide safety goggles to the persons performing the welding duty.
	v- Special dust from lathing, tooling, grinding and machining		v- Workshop	v- Provide face masks to avoid inhalation of special dust (into lungs) to be emitted from tooling, grinding and machining causing Silicones a serious type of lung cancer.
	vi -Damages to human body during civil works			vi -All workers need to provided and wear personal safety gadgets including helmets, safety shoes. Glove while working.

	vi - Sewage Emission of SO2, NOx, CO and PM		IT must be treated before discharging into any outside water drain vehicles	

The most likely environmental problems to occur during construction phase could be due to:

I-Construction machinery,

- Civil work:

- Leveling of land,
- Excavation
- Construction of building and associated civil work.
- Compaction of soil activity,

ii-Moving vehicles,

-The pollution from these activities could be in the form of the following emissions from the exhaust of vehicles and from fuel burning in the operation of machines to be used for several of construction activities:

- Gaseous emission of SO2, NOx and CO, hydrocarbons etc.
- Particulate Matter (PM).
- Noise.

The project will; pay large sums of Government taxes which will be another addition to the earnings of the national exchequer on recurring basis. Even foreign exchange will be earned through the export of the product. This will still be another source of addition to the foreign exchange of the country besides meeting the local demand.

1.6 Proposed Monitoring

It is recommended that monitoring of:

- Treated waste water before it is allowed to be discharged out of the plant battery limits of the project site should be monitored regularly at 6hourly intervals.
- Stack emissions need to be constantly monitored.
- Ambient air monitoring needs to be carried out at least twice daily.
- Noise levels needs to be monitored twice a day i.e. Once during day time and once during night time.

1.7 Training Schedule and Monitoring Program

In order to effectively operate the Mitigation Measures/Environmental Management Plan all the staff to be engaged in this activity should be trained extensively.

Training and orientation programmers shall be organized by the HSE /in charge/Inspector for the contractors, laborers, and technical/ office staff of the contractors, site engineers and the relevant staff for building their capacity with regards to principles and procedures of environmental management, pollution abatement measures, public consultation and participation, health and safety measures and implementation of EMP.

All the staff need to be trained through some institution of repute in the following fields.

- Effluent testing,
- Monitoring of stack emissions.
- Monitoring of noise.
- Training in the 1interpretattion of Environmental Laws, rules and regulations and NEQS Pakistan.
- Controlling the operations of the waste treatment plant.
- Sufficient literature need to be provided in the field of environment.

This needs to be done before the project comes into operational phase.

Recommendations

On the basis of the findings of the EIA report it is concluded that operation of the sugar unit will not have any significant adverse impacts on the local population or any segment of environment and by implementation of provided recommendations and mitigation measures the environment will improve.

It is, therefore, recommended that NOC/EA as requested by the client may please be issued by the Environmental Protection Agency, Government of the Punjab.

2.0 Introduction

2.0 Introduction

2.1 Purpose of the report

Sugar industry is an agro based industry, which provides, employment to rural community and has great impact on national economy. During the last 50 years it has become the second largest industry after textile sector.

> At the time of independence, Pakistan had two sugar mills (at Rahwali and Takhtbai) with capacity of 600 and 1200 TCD (tons cane crushing per day) producing 10,000.0of sugar per year.

Presently, 78 sugar mills are operating in Pakistan, with installed total cane crushing of 365,000TCD, thus producing 31,025 tons of sugar daily.

"In order to discourage import of sugar from global market, efforts were made for imposition of regulatory duty (RD) on import of sugar to protect interests of the farmer" ,(The Annual review of Pakistan Sugar Mills Association for the year ending 2016, 51st Annual General Body meeting October 2016.).

Keeping in view these facts, Al-Arabia Sugar Mills Limited, purchased assets of an already installed sugar unit with cane crushing capacity between 7000 to 8000 TPD. The unit was not operational at the time of its purchase. Now they are planning to Balance and Modernize (B&M). The plant is to produce 94,080 tons of sugar. The plant is spread over area of 75 acres. The total cost of the project is Rs.4,989 million. The project site lies within the rich in sugarcane production. Basic facilities like good quality water ,road excess, cheap labour etc. are available.

According to the Punjab Environment Protection (amendment-12) Act 1997, Section 12: "Initial Environmental Examination and environmental impact assessment – (1) no proponent of a project shall commence construction or operation unless he has filed with the [Provincial Agency] an initial environmental examination or where the project is likely to cause an adverse environmental effect. And environmental impact assessment, and has obtained from the [Provincial Agency] approval in respect thereof."

Section 17 Penalties - Whoever contravenes or fails to comply with the provisions of sections 11, 12, 13, or section 16 or any order issued there under shall be punishable with

fine which may extend to five million rupees 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 such contravention or failure continues

It is with this legal mandatory requirement in view that this Environment Impact Assessment Report (EIA) report is going to be submitted to the Environmental Protection Agency (EPA), Government of the Punjab to accord No Objection (NOC)/ (EA) Environmental Approval before starting any physical activity on the ground.

2.2 Identification of the project and the proponent

2.2.1 Identification of the Project:

M/S Arabia Sugar Mills Limited, purchased assets of an already installed sugar unit with cane crushing capacity between 7000 to 8000 TPD situated at 2 Km , Shahpur Saddar, District Sargodha. The unit was not operational at the time of its purchase. Now they are planning to Balance and Modernize(B&M). Under the new name "Al-Arabia Sugar Mills Limited". The sugarcane will be procured from the area around the project, where it is plentifully available.

Through the manufacturing of the sugar as the final product providing jobs to the people, generation of taxes for the exchequer of the govt. among many other benefits. Around 344 Tons of molasses/day will be produced as a byproduct which will be used by feed mills and production of power alcohol to be exported alcohol. Similarly 23,60 TPD of bagasse will be produced of which 1,680 TPD will be used for power production while he rest 680TPD will be used as off season running of the power plant. Other utilities including water, land , labour, road access etc. are available near to the project site.

2.2.2 Identification of the project proponent::

Name of the contact person: Mr. Naveed Akhtar

Address: 55-KModel Town, Lahore.

Phone: 042-35857233-34-35

Cell: 0300-8638583

Email: naveed.akhtar@sgroup.pk

2.3 Consultants who prepared this EIA

ECTECH-Environment Consultants;

Suite 4, 2nd Floor, Link Arcade, Model Town Link Road, Lahore.

Phone: 042-5887517, 5019308; Fax: 042-5855508;

E-mail: ectech_ectech@yahoo.com

2.3.1 Persons performing the study

Details of the experts who carried out this IEE study are given in the following table:

Team members taking part in this study and preparation of this report are listed hereunder with their qualification, experience and assignment carried out by each one of them.

Table 2.1 Showing details of the consultants who participated in the preparation of the EIA report:

Name	Qualification and brief experience	Position in the EIA Team and role*
Dr. Muhammad Hanif (Chief Executive) ECTECH-Environment Consultants and APEX Environment Laboratory	**A-Qualifications:** **1-M.Sc.** (Chem. Tech.) Punjab Uni; Lahore; 1962. **2-Ph.D.** (Chemistry) Charles University, Czech Republic; 1968. **3- Post Doctorate**-Alex. Humboldt. Foundation, Senior Post Doctorate Fellow, Uni. of Freiburg, Freiburg imBreisgau, Germany; 1974-75. **4-Post graduate Diploma** in Modern Methods of Chemical Research, Charles University, Prague. **5-** Attended Course on" Hazardous Wastes Landfill; Siting, Design, Construction and Operations held under **-CDGU, UNEP and Ministry of Environment of Science and Technology at Kualampur** held on 07-11-1998. **6-** Certificate on Completion of "Seminar On Promotion Of Ozone Layer Protection In Asian Countries held from NOV 26, 1990 to DEC 01, 1990. Held under **JICA, and incorporation with International Corporation Of The Government Of The Japan.** **7-** Certificate of achievement on Treatment of Hazardous Chemicals and Wastes held on April	- Project Team Leader. -Principal author of the EIA report. - Coordination, supervision, guidance and co-author of the EIA report. -Over all monitoring of the project work, supervision, guidance and participation in all activities to ensure quality of work.

	14-27, 1986 held in **Wiesbaden and the Federal Republic of Germany;** Organized by **Asian Productivity organization and CDG.** **8-** Certificate on "**UNESCO International** Long-Term Postgraduate Course On Modern Analytical Methods Of Chemical Research "from **Charles University of Prauge**. **9-** Attended "One week course on **OZONE Depletion in Asian Countries"** held under the **auspices of EPA, Japan and JICA, at Tokyo, Japan.** **B-Experience/past Positions:** **1-Director General (R),** PCSIR Labs. Complex, Lahore. **2-Director General (Ex.)** Ministry of Environment, Local Government and Rural Development, Govt; of Pakistan. **3- (ex.) Consultant Environment, Category-A,** Asian Development Bank. **4- (ex.) Consultant Environment, UN—ESCAP** **5- Worked on World Bank Funded Project.** **6- Author** of the National Environment Quality Standards **(NEQS)** **7- Author of:** i -104 Scientific Research papers ii - Over 60 technical end project reports on environment. **8-Carried out EIA for128 projects and reviewed** over 15 SEIA reports.	

	9--Among many others, EIA carried out on behalf of the Asian Development Bank regarding Katmandu Valley (Nepal) Industrial Sites. **10**-EIA-Saindak Gold/copper Project, Pakistan. **11**-EIA Pakistan Steel, Karachi; **12**-ESIA Report (According to OPIC Environmental Handbook Format) for D.G. Cement Company Limited, KallarKahar, District Chakwal, Pakistan. ESIA Report (According to OPIC Environmental Handbook Format) for Lucky Cement Limited, Pezu, District LakkiMarwat, North West Frontier Province, Pakistan. ESIA Report (According to OPIC Environmental Handbook Format) for D.G. Cement Limited, KallarKahar/ Khairpur Project, District Chakwal Pakistan. ESIA Report (According to OPIC Environmental Handbook Format) for Chakwal Cement Company Limited, District Chakwal Pakistan. ESIA Report (According to OPIC Environmental Handbook Format) for Packages Limited, Lahore.	
Mr. Muhammad Saif-Ur-Rehman	**-B.Sc.** (Chemical Engineering), Punjab Uni, Lahore, Pakistan. **-B.SC..**(Chemistry and Physics), Punjab University, Lahore. -**M.Sc.**(Applied Environmental Sciences), Punjab Uni. Lahore, Pakistan.	-Senior Team Member -Project on site monitoring & related activities. - Co-author of the EIA report.

	-Post graduate Diploma (Applied Environmental Sciences) - **Note: B.Sc. Final Year thesis** was **Environmental Management Practices** and **Waste Water Treatment Technologies.** **-General Manager,** APEX Environment Lab. **-Chief Engineer Monitoring,** ECTECH **-Experience in Environment:** For the last over 20 years working in the field of environment on the following subjects: **- Prepared 120 EIA & SEIA reports,** in the field of cement, textile, oil & gas, power generation, fertilizer, power alcohol and chemical industry. **-Designing, fabrication, installation and operation of Waste Water Treatment Plants;** So far three plants have been installed. - **Carrying out environmental Audit:** Around 18 industrial units have been completed so far. **- Lab. Testing of effluents and water:** For the last 5 years lab. Testing services have been provided. -Full time participation in the assignments under serial 12 – under Dr. M. Hanif's contributions.	- Collection of demographic data. - Preparation of environmental management plan.
Mr. Muhammad Anees	**B.A; L.L.B**; Expert on Environment Law	Guidance on various aspects of

	- Full time participation in the assignments under serial 12 – under Dr. M. Hanif's contributions (legal aspects).	Environmental Law as applicable to EIA. Environmentalist. Preparation of Environmental management plan,
Mr. Muhammad Mujahid	**M.Sc.** (Env. Sciences), University of the Punjab, Lahore **M.Phil** (Env. Sciences), University of the Punjab, Lahore - Senior Lab. Analyst, APEX Environment Laboratory & Senior Monitoring Engineer -Senior Environmentalist ECTECH-Environment Consultants -Environmental monitoring of over 25 projects for EIA reports plus help in writing these reports. Also participated in - EIA Report (According to OPIC Environmental Handbook Format) for 10 projects. - IEE reports of 15 projects.	On site monitoring and lab. Testing of samples and data processing. - Report writing. -Preparation of environmental management plan - Environmental monitoring - Lab. Testing of pollutants
Mr. Hasnain Sabir	**M. Phil** Environmental Sciences (GCU Lahore)	On site monitoring and lab. Testing of samples and data processing. - Report writing. -Preparation of environmental management plan

Mr. Arif Hussain	**M.Sc** Environmental Sciences (P.U Lahore)	Lab. Analyst, APEX Environment Laboratory Monitoring Engineer ECTECH-Environment Consultants
Engr. Muhammad Adnan	**B.Sc** Environmental Engineering, U.E.T Taxila.	Sr. author on EIA/IEE/SEIA Reports Writing Sr. Lab. Analyst. Monitoring Engineer.
Tayyaba Akhtar	**B.Sc** (Environmental Sciences) M Sc. GC Uni, Lahore	Preparation of EIA/IEE & SEIA. Snr. Lab. Analyst
Muhmmad Waqas Ahmed	**BSc.** (Environmental Sciences), Uni of Gujrat.	Preparation of EIA/IEE & SEIA. Snr. Lab. Analyst
Hassan Waqas	**B.Sc** Environmental Sciences (Uni. of Gujrat) M.Ph. Environmental Sciences (Uni. of Gujrat)	Senior author of EIA/IEE and SEIAs, Monitoring Specialist, Senior Lab Analyst.

*Only the main roles of the team members are given. However, their role was not restricted to these only; rather it also includes many other studies in their respective fields as required by the matrix of this proposal.

2.4 Brief description of Nature, Size and location of the project

As described earlier, M/S Al-Arabia Sugar Mills Limited, purchased assets of an already installed sugar unit with cane crushing capacity between 7000 to 8000 TPD situated at 2 Km, Shahpur Saddar, District Sargodha. The unit was not operational at the time of its

purchase. Now they are planning to Balance and Modernize (B&M). Under the new name "Al-Arabia Sugar Mills Limited". The plant is to produce 94,080 tons of sugar. The plant is spread over area of 75 acres. The total cost of the project is Rs. 989,000,000/- (Rs.4,989million).The project site lies within the rich in sugarcane production. Basic facilities like good quality water, road excess, cheap labour etc. are available.

The project will employ 550 of all categories including construction phase and about 400 persons during regular operation (seasonal). It will produce 344 Tons of molasses per day which will be converted into power alcohol as value added product for export thus earning additional foreign exchange or to be used in feed mills. Bagasse will be the other by product which will be used as cheaper fuel for production of 18 MW electricity of which 12MW will be utilized for the project and excess power will be sold to the national grid thus adding to the production capacity of electricity.

Sugar is the second largest industry after textile in Pakistan. Out of 86 sugar mills in Pakistan, 46 mills are working in Punjab. Molasses production is 3.0 million tons.

According to the report "Sugar Industry of Pakistan - An Academic Report" by Ravi Magazine 5th May 2015 exports from Pakistan crossed over 400,000.0 tons in 2015. Its price in the international market has reached 900 dollars per ton.

Sugar industry in Pakistan has now entered into an era of export orientation as it has been exporting it for the last two years. But this year this looks doubtful as there is a shortfall expected in the sugar production. Pakistan may become an importer again and this trend will continue for some time until the policy makers put our sugar industry on the right track. A restructuring of the sugar industry in inevitable to prevent the constant decline in this industry and to put it back on the track of growth and profitability.

Location:

The project is to be located at 2 KM Sargodha Road Shahpur Saddar, District Sargodha

Google view of the project site is given hereunder:

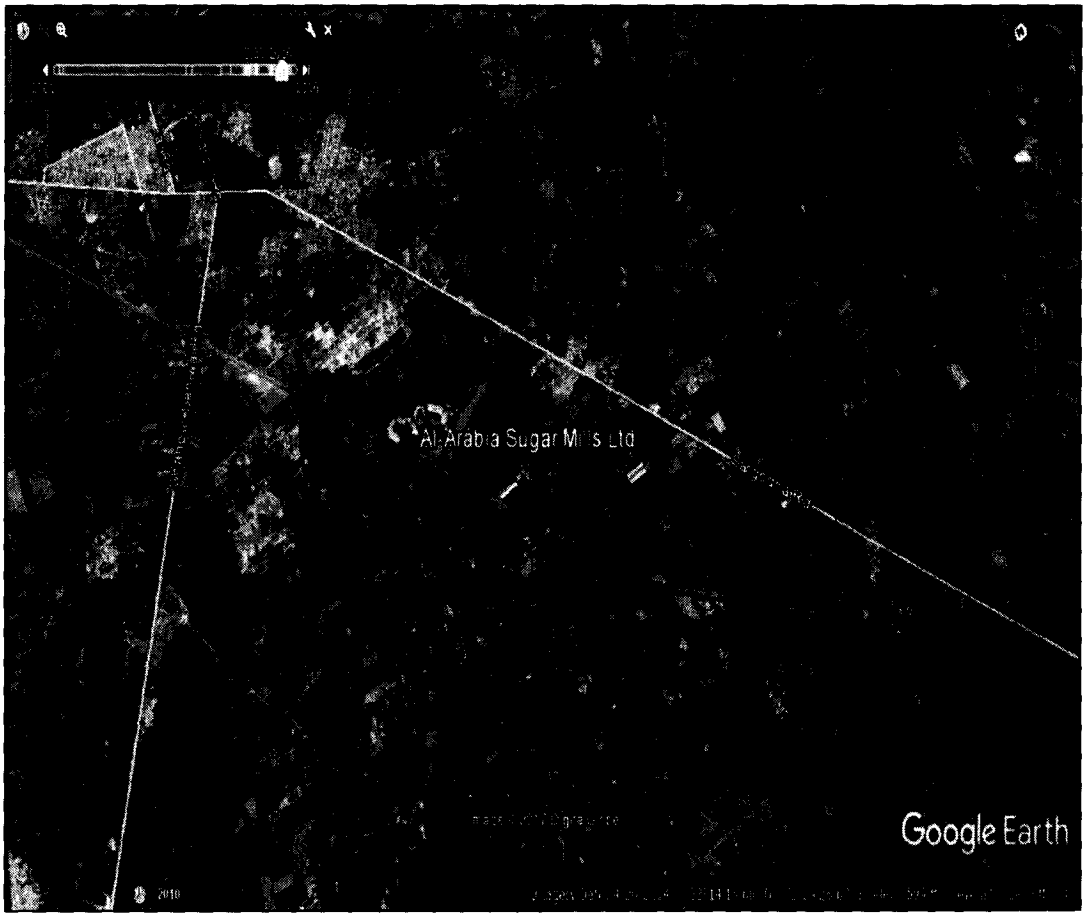


Figure 2.1: Location Map of Project Area **Courtesy Google**

2.5 Raw Materials

Among the Major Raw Materials include.

i. Sugar cane: 8,000.0 TPD available from the project area
ii. Begasse: 2,360 TPD will be available with Al-Arabia Sugar MIlls. Out of this 1,680 TPD is required to run the power plant.
iii. Power: 12MW will be available from self-generation.
iv. Steam: 180 Tons /Hr
v. Water total requirement: 335 Tons/Hr

All requirements of water for the plant will be met from the underground water source through deep well bores. The water requirement for different processes during construction and operation phase (major requirements) is given hereunder:

Water requirement during construction phase = 400 Tons/Hr

Water requirement during operational phase (during season) =198 Tons/Hr

Water requirement during operational phase (during off season) = 100 Tons/Hr

Coolant water requirement= 20 M^3/Hr

2.5 Major Equipment:

List of all major equipment is attached is Annexure-I

3.0 DESCRIPTION Of THE PROJECT

3.0 Description of the project

3.1 Type of the project

As described in the earlier part of this report, the project aims at the production of 94,080 tons of sugar per day, with generation of 344 tons of molasses per day and bagasse 2,360 tons per day. . The major raw materials sugarcane is plentifully available in the area around the project site. The bagasse will be used as cheaper fuel for production of power and molasses will be converted into power alcohol to be exported.

3.2 Category of the project

According to the 'Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000" the project falls in "Category-A" requiring submission of EIA report to the EPA Punjab for getting the required Environmental Approval (EA)/No objection Certificate(NOC).

3.3 Objectives of the project

The objectives of the project includes balancing and modernization of the old unit lying idle for so many years and purchased by the present proponent.

i. The machinery of the project will be completed and thoroughly over hauled, and some of the machinery will be replaced.

ii. Molasses as bye product of Sugar Mills will be converted into value added product as Ethanol of fuel grade/old in the market. Export of the value added product i.e. Ethyl alcohol as fuel and would earn foreign exchange.

iii. Bagasse as another bye product, will be used for the production of 18 MW electricity of which 12 MW will meet the need of the mills while other 6 MW to will be sold to the national grid.

iv. **Provide jobs to about 550** persons during **construction and 400** persons during regular operations (seasonal); of various cadres, including from a laborer to the highest levels of technically skilled, administrative and financial capabilities.

v. Increase in the earnings of the govt. through payment of taxes to be levied on the various items as regular source of income.

vi. Development of the area.

vii. Setting trend in the area to establish more industry.

viii. Promoting education through the increase of daily earnings of the common man enabling to send children to schools.

ix. Generation of self-employment including shops, hotels for the poor labour to work in the unit.

x. Provision of edibles, milk, poultry, etc. to the residents of the colony/labour.

3.4 Alternatives considered, and reasons for their rejection

Since the unit was non-operational for the last so many years and therefore assets of unit has been purchased by Al-Arabia Sugar Mills Limited,, the changes to be made include balancing, modernization and replacement or addition of some new equipment, the existing cane crushing capacity is between 7000-8000TPD.

Therefore, there is no point to discuss any alternate in the case. The project site is connected to the entire country through the two roads i.e. Sargodha road on one side and Sargodha – Mianwali road on other side. For other details reference will be made to see 2.4.2.

i- Availability of Land

The required area of 75 acres is available at the project site.

ii- Raw materials

Sugar cane is the major raw material which is already available in the project area in the required quantities.

iii- Power availability

A bagasse fired power plant will be installed at the project side which will produce 18 MW power of which 12 MW will be consumed by the mills while the 6 MW surplus will be sold to the national grid.

iv- Workshop facilities

The existing workshop will be upgraded by installing of new additional machines.

v- **Availability of other facilities**

Availability of good quality of underground water, cheap labour, road excess, transport for common man etc. at the project site. A well-developed infrastructure is already available at the project site.

In view of the above reasons the project site is the most suitable.

3.5 Location and site layout

Location of the project is given at serial 2.4

Site Layout

Site layout is attached as Annexure-II

3.6 Land-use on Site

The project site is already under the old sugar plant which is non-operational for the last so many years. However the area around the project is agricultural in nature. The major crop is cane.

3.7 Road Access

There is fair presence of road network in the area due to which almost all villages of the area are connected with each other. The old unit lies between Sargodha road and Sargodha – Mianwali road and thus connect to the entire country. For more details refer to the Google image under serial 2.4.

3.8 Vegetative features of the site

Main Crops:

Sugarcane, Wheat, Rice, Maize, Moong and Cotton are the main crops grown in the district Besides, Ground Nut, Jawar, Bajra, Guar Seed, Sunflower, Mash, Masoor, Gram and Oil Seed such as Rape / Mustard are also grown in minor quantities in the district.

Main Fruits:

Citrus, Guava and Mango are main fruits grown in the district.

Besides, Jaman, Pear, Date, Pomegranate, Phalsa and Almond are also grown in minor quantity in the district.

Main Vegetables:

Turnip, Onion, Cauliflower, Potato and Tomato are main vegetables grown in the district. Besides, Ladyfinger, Carrot, Bottle Gourd, Bitter Gourd, Chilies, Peas and Garlic are also grown in the district in minor quantities.

3.9 Cost and magnitude of the operation

The project cost is estimated at Rs.4,989 million. Sugar to the tone of 94,080 TPD will be produced both for local use and export. It will generate revenue for the Govt. exchequer in the form of taxes and duties and earn foreign exchange in case of export. The bye products molasses will either be used for production of power alcohol which will be exported or sold in the market and bagasse will be used as cheaper fuel for production of 18 MW electricity of which 12 MW will be consumed by sugar mills and the surplus power 6MW will be sold to the national grid. The total cost of the project is Rs.4,989 million and it spreads over an area of 75 acres. The project will provide jobs to about 550 people during construction phase and 400 persons during regular operation. (Seasonal)

3.10 Proposed schedule for implementation

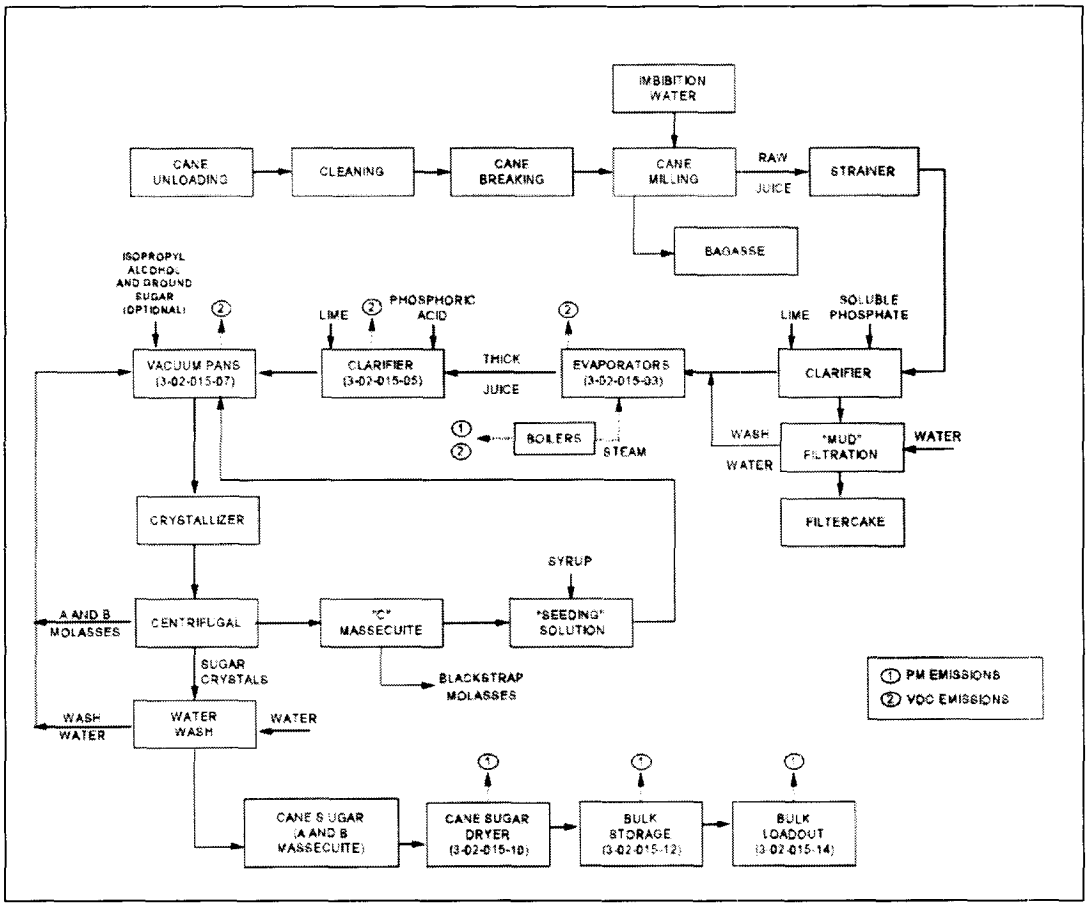
Schedule and progress report for implementation is attached as Annexure -III

3.11 Current Status of the Project

The feasibility study for the Project has been completed. The project will start after getting the NOC from EPA Punjab.

3.12 Description of the project

The Description of the project (process flowcharts / Steps) is given hereunder:



Cane Sugar Production. ***Source - U.S. EPA, 1997***

3.13 Details of restoration and rehabilitation at the end of the project life:

The sugar plant is expected to have a project life of about 25 years. Once the useful life of the new plant will be over, it will be refurbished completely. A comprehensive mechanical, electrical and civil structural overhaul will be carried out. To bring the plant to-date with the technology available, all necessary equipment replacements will also be done. In this way, the plant will be revived for another term of its useful life. The redundant parts and equipment will be sold in the market for recycling.

This all will be done conforming to the environmental management and controls so as to avoid any damage to any segment of environment or human health. The plant will be properly maintained through routine overhauling, repair and maintenance. This will provide relief not only to the environment, but also result in product cost reduction and save costs to be incurred at the end of the first life of the plant.

3.14 Government approvals

Environmental Approval from the EPA, Government of the Punjab, Lahore is the major requirement to start work on the project. After the EA is granted by the EPA.

4.0 DESCRIPTION OF THE ENVIRONMENT

4.0 DESCRIPTION OF ENVIRONMENT

4.1 Physical Resources

4.1.1 Topography and Geology

Pakistan lying in the northwestern part of the Southern Asian Subcontinent, occupies the western end of the Indo-Genetic Plain, which is beyond bounded in the north by mountain wall of the Great Himalayas and their offshoots.

Physiology of the earth is description of the behavior of the upper crust. Accordingly, some knowledge of the geology is desirable.

Of the six Physiographic Divisions of Upper Indus Plain namely:

i. Bari Doab- 2.9 million hectares,
ii. Rechna Doab-2.8 million hectares,
iii. The Chaj Doab- 1.3 million hectares,
iv. The Sindh Sagar Doab/Thal Desert, 3.2 million hectares,
v. The Bahawalpur Plain and
vi. The Derajat/Suleman Piedmont, 2 million hectares.

The project is to be sited in Sargodha District, the province of Punjab. It is the gifted with the River Indus and its five eastern tributaries- Jhelum, Chenab, Ravi, Sutlej and Beas. The plain spreads from the south of Potohar plateau up to Mithankot, where Sulaiman Range approaches river Indus. The Punjab plain is almost a featureless plain with a gentle slope southward averaging one foot to the mile. The only break in the alluvial monotony is the little group of broken hills (100 ft-1,600ft.) near Sangla and Irana on either side of the Chenab. The entire plain is extensively irrigated by a network of canals.

Sargodha is situated within the latitude 32.0837° N , longitude 72.6719° E

Sugar cane, wheat, maize, barley, cotton, grams, pulses and vegetables are extensively grown in the area around. Under ground water being sweet in most of the areas, it is used for irrigation through tube wells. Perineal and non-perennial canals also provide water for irrigation.

4.1.2 Seismology

The project site falls in the Minor to no Damage with g factor < 0.03 of the Seismic Hazard Zones of Pakistan.

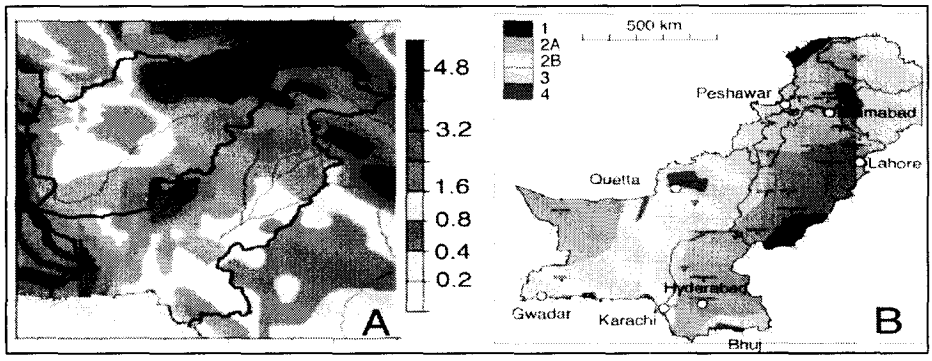


Figure 4.1Seismic Zone of Pakistan (Geological Survey of Pakistan)

4.1.3 Soil

Pakistan lying in the northwestern part of the Southern Asian Subcontinent, occupies the western end of the Indo-Genetic Plain, which is beyond bounded in the north by mountain wall of the Great Himalayas and their offshoots.

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Sargodha is situated within the latitude 32.0837° N , longitude 72.6719° E

Sugar cane, wheat, maize, barley, cotton, grams, pulses and vegetables are extensively grown in the area around. Under ground water being sweet in most of the areas, it is used for irrigation through tube wells. Perineal and non perennial canals also provide water for irrigation.

4.1.4 Water Requirement and water quality

The fertile part of the land is one among the food baskets of Pakistan. Canal water and underground sweet water are the two main sources of water for irrigation with rain water as the additional sources.

i- Underground water:

Underground water of good quality is available in large quantities will be used for the entire needs of the project. Extraction of water for project needs will not be at the cost of its availability for irrigation or other uses.

ii- Surface water

There are no wet lands in the area in the true sense. However, river Chenab flows in the area with Sargodha Distributory as irrigation canal.

4.1.5 Climate

Pakistan is situated on the western margin of one of the main regions of the world—the monsoon region. Due to this, the climate of the country is more Continental than that of the other parts of Subcontinent. Pakistan has four seasons namely:

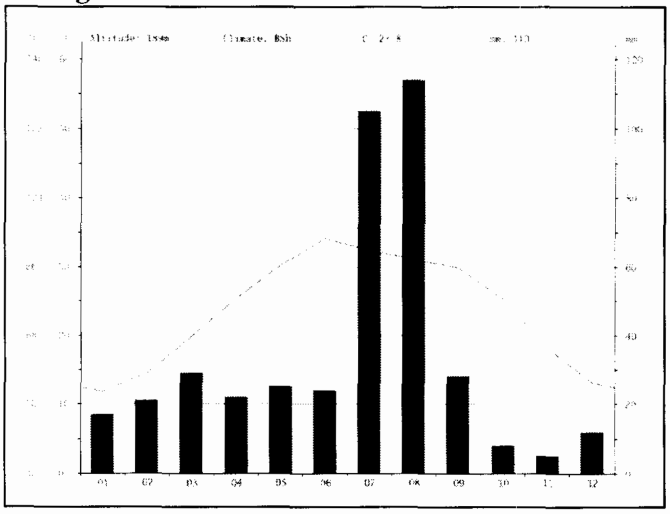
- Cold Weather Season—December to March.
- Hot Weather Season—April to June.
- Monsoon Season -- July to September
- Post Monsoon Season—October & November.

Climate Table /Historical Weather Data Sargodha:

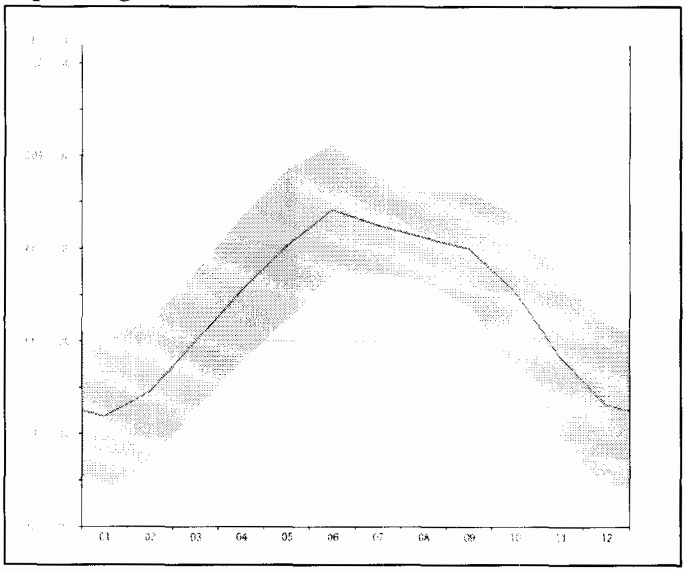
	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	11.8	14.5	19.9	25.4	[illegible]	34.1	32.4	31.1	[illegible]	[illegible]	18.2	13.1
Min. Temperature (°C)	3.7	6.7	12.3	17.5	22	26.9	27.2	26.3	23.7	17	9.2	4.2
Max. Temperature (°C)	19.9	22.3	27.5	[illegible]	[illegible]	41.5	37.7	36	[illegible]	[illegible]	[illegible]	22
Avg. Temperature (°F)	53.2	58.1	67.8	77.7	[illegible]	93.4	90.3	88.0	[illegible]	[illegible]	64.8	55.6
Min. Temperature (°F)	38.7	44.1	54.1	63.5	71.6	80.4	81.0	79.3	74.7	62.6	48.6	39.6
Max. Temperature (°F)	67.8	72.1	81.5	[illegible]	[illegible]	[illegible]	99.9	96.8	[illegible]	[illegible]	[illegible]	71.6
Precipitation / Rainfall (mm)	17	21	29	22	25	24	105	114	28	8	5	12

The precipitation varies 109 mm between the driest month and the wettest month. The average temperatures vary during the year by 22.3 °C.

Climate Graph of Sargodha:



Temperature Graph Sargodha



With an average of 34.1 °C, June is the warmest month. In January, the average temperature is 11.8 °C. It is the lowest average temperature of the whole year.

4.2 Ecological Resources, fisheries, aquatic biology, wildlife, forests, rare or endangered species

The project site lies in the province Punjab. It is the most developed and populous province of Pakistan with approximately 55% of the country's total population. Lahore is the provincial capital and Punjab's main cultural, historical, administrative and economic center.

Coordinates: 31°20′N 74°13′E31.33°N 74.21°E
Main article: List of cities in Punjab (Pakistan)
Courtesy: Wikipedia

List of major cities in Punjab			
Rank	**City**	**District**	**Population**
1	**Lahore**	Lahore	10,500,000
2	**Faisalabad**	Faisalabad	5,280,000
3	**Rawalpindi**	Rawalpindi	3,391,656
4	**Multan**	Multan	2,606,481
5	**Gujranwala**	Gujranwala	2,569,090
6	**Sargodha**	Sargodha	600,501
7	**Bahawalpur**	Bahawalpur	543,929
8	**Sialkot**	Sialkot	510,863
9	**Sheikhupura**	Sheikhupura	426,980
10	**Jhang**	Jhang	372,645
11	**Gujrat**	Gujrat	530,645
12	**D.G.Khan**	D.G.Khan	630,645
Source: World Gazetteer 2010			
This is a list of each city's urban populations and does not indicate total district populations			

Fishery and aquatic biology

The Rive Chenab flowing in the area, have a number of verities of fish, sold to the private contractors on yearly basis by the Irrigation Department. Contractor`s market the fish.

Biodiversity

Natural capital of a country mainly includes all of a country's wilderness areas and scenic landscapes, including the associated flora and fauna.

Pakistan has a total of nine major ecological zones. The contribution of the "Natural capital" is recognized at three distinct levels: species, genera, and communities (habitat and ecosystem). Both collectively and within each level, the range or variety of the resources is referred to as the "Biological Diversity". The term has relevance for each of Pakistan's administrative units—district, province, and particularly country. The more the number of species, genera and habitats and ecosystems present within these units, the greater is said to be the Biodiversity. The biodiversity of the area, with this background, is discussed as under:

Forestry

Location of Forests and Area under A forestation. An area of 1,263 Acres is under forests, which is about 0.09 % of the total area of the district. There is also linear plantation of 2,595 Km alongside the roads/rails/canals in the district. Trees grown in the area are kikar and shisham.

Wildlife

Due to extensive human interventions, there is no adequate habitat for wild life in these areas. Among the main species of wildlife sparsely found in the area especially in the cultivable lands include snakes, wild rats, goh and lizards, foxes, pigs (very few), jackals (very few), wild pigeons, sparrows, crows, owls and doves.

The land is fertile. Major cash crops include sugar cane, cotton, wheat and pulses. Trees, grasses and shrubs found both in the irrigated areas.

Flora

Local name	Botanical name	Local name	Botanical name
Kikar	Acacia Arabia	Nim	Azadirachtaindica
Phulahi	Acacia modesta	|Aam	Mangiferaindca
Shishamtali	Dalbergiasisso	Jal or Wan	Salvadoraoleodes
Jaman	Eugenia jambolana	**SHRUBS:**	
Pipal	Ficusretusa	Babri	Acacia jacquemontii
Barh	Fecusbengalenisis	Jawanh	Alhaji-camelorum

Toot	Morus alba	Karir	Capparisaphylla
Poplar	Populusspp	Aak	Alotropisprocera
Jand	Prosopisspicigera	Khar	Haloxilonrecurvum
Mesquite	Prosopisglandulosa		
GRASSES:		**GRASSES:**	
Khabbal	Cynodondactylon	Siriala	Hetropogoncontortus
Khowi	Cymbopogonjwarauc usa	Kana	Saccharummunja
Dabb	Eragrosticcynosuriod es	Kundar	Typhaangusti-folia

Fauna

Due to extensive agriculture practices and human intervention, there are no specific habitat for accommodation of any fauna of special mention in the area.

4.3 Socio-economic cultures and Features

The project site is situated in the mid of fertile agriculture land. Land holdings are small on the overall basis.. Wheat, cotton, sugarcane and pulses are the major cash crops.

Punjab contributes about 76% to annual food grain production in the country. Cotton and rice are important crops. They are the cash crops that contribute substantially to the national exchequer. Attaining self-sufficiency in agriculture has shifted the focus of the strategies towards small and medium farming, stress on barani areas, farms-to-market roads, electrification for tube-wells and control of water logging and salinity. Rearing of buffalows and cows is done for milk both for own use and for commercial purpose. Goats and sheep are also kept in abundance for meat and milk. Camels and donkeys are also reared for transport of goods especially in villages for carriage of fodder from fields to the farm houses or "dairas", sugar cane to sugar factories and cotton to ginning factories besides other uses.

On the over all basis most of the people belong to middle class, while a few people are economically doing well. The area is one among the other food baskets of the Punjab province.

There is a lot of awareness about the importance of education. Fairly reasonable proportion of the people in cities are educated. While in villages, like in other parts of the Punjab province, percentage of educated people is low. Modern means of communication including television, radio, telephone, fax, e-mail and newspapers are within the reach of majority of the people especially in the cities. The socio-economic values are subject to change in cities specifically under the influence of media especially television.

The project site is connected with other parts of the country by roads and railway. These facilities provide good opportunities to the people to mix up with the public of the other parts of the country. The economy of the district is growing quite fastly.

There is a trend in setting industries in the area . Al- Arabia Sugar Mill will set a trend for further industrialization of the area.

There also exists a highly educated and well placed segment of society, this segment is quite affluent and socially and politically well off also. Their way of life is comparable with that of any developed segment of the society in Pakistan.

Though most of the people belong to villages, yet they are quite aware of the socio economic, political and other development activities of the country. Mostly, villagers follow old traditions in almost every walk of their life. Elderly people command respect and play deciding role in decision making. A large cross section of the older generation is uneducated. But due to awareness about education younger generation of both sexes, is now trying to get education in almost every department including science and technology on preferential basis. There is a rising trend in the society to change their old traditional socioeconomic pattern of life. Print and electronic media are playing great role in bringing tangible change in the old pattern of life.

Environmentally speaking the carrying capacity of the environment is not yet utilized. The project activity, under the proposed strict operational environmental controls, is not going to leave adverse impacts on all out environment.

The operational Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMP) will further provide protection to the environment around. Legal compliance of environmental monitoring with Punjab Environment Quality Standards (PEQS) , Punjab Environment Quality Standards for Ambient Air

(PEQSAA), Punjab Environment Quality Standards (PEQS) standards for Drinking water (PEQSDW) and Punjab Environment Quality Standards (PEQS) standards for Noise (PEQSN).

The project will; pay large sums of Government taxes which will be another addition to the earnings of the national exchequer on recurring basis. Even foreign exchange to the tune of Rs. ???billion/year will be earned through the export of the product. This will still be another source of addition to the foreign exchange of the country.

4.3.1 Industries

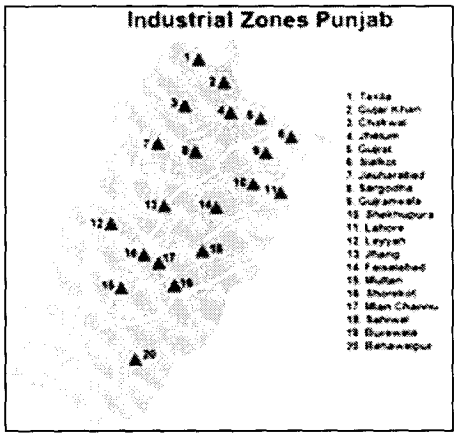
Despite lack of a coastline, Punjab in which the proposed project is to sited is the most industrialized province of Pakistan. Among the manufacturing industries include textiles, sports goods, Heavy machinery, electrical appliances, surgical instruments, Cement, Vehicles, Auto Parts, I.T, metals, Sugar mill plants, Aircraft, Cement Plants, Agriculture Machinery, bicycles and rickshaws, floor coverings, and processed foods. In 2003, the province manufactured 90% of the paper and paper boards, 71% of the fertilizers, 69% of the sugar and 40% of the cement of Pakistan.

Punjab has also more than 68 thousand industrial units. The small and cottage industries are in abundance. There are 39,033 small and cottage industrial units. The number of textile units is 14,820. The ginning industries are 6,778. There are 7,355 units for processing of agricultural raw materials including food and feed industries.

Lahore and Gujranwala Divisions have the largest concentration of small light engineering units. The district of Sialkot excels in sports goods, surgical instruments and cutlery goods.

Punjab is also a mineral rich province with extensive mineral deposits of Coal, Iron, Gas, Petrol, Rock salt (with the second largest salt mine in the world), Dolomite, gypsum, and silica-sand. The Punjab Mineral Development Corporation is running over a hundreds economically viable projects. Manufacturing includes machine products, cement, plastics, and various other goods.

The incidence of poverty differs between the different regions of Punjab. With Northern and Central Punjab facing much lower levels of poverty than Western and Southern Punjab. Those living in Southern and Western Punjab are also a lot more dependant on agriculture due to lower levels of industrialization in those regions



Industrial Zones Punjab, Source:
Courtesy: Wikipedia

AL-Arabia Sugar Mills is the only industry in the area.

4.3.2 Infrastructure:

Water and Power Development Authority (WAPDA) supplies electricity to the area through its National Grid. Majority of the villages are connected with each other and to the district head quarter. Even small connecting roads are available.

Some big villages are supplied drinking water from civil water supply. Variety of private road transport in the form of buses and wagons are available to reasonable extent. Underground water from shallow depth is also used for irrigation and drinking.

4.3.3 Land Use Planning:

The project site is situated in the arid zone. The entire land use planning is carried out according to the provincial laws. Under the present Government system, the District Government is responsible for all land use planning.

4.3.4 Power sources and transmission

WAPDA power network operates in the area. Transmission of power is through overhead electric transmission lines. National grid is the source of all power in the area.

4.4 Quality of life values

4.4.1 Socio-economic values

Residents of nearby villages are mostly belong to agricultural and livestock business. Some are very affluent portion of the society including army officials, industrialists,

bankers, politicians, educationists, medical professionals, scientists, business communities and real estate business owners.

There is a rising trend in the society to change their traditional socioeconomic pattern of life. Print and electronic media are playing key role in bringing tangible change in the old pattern of life.

4.4.2 Public Health

Few small sized dispensaries at some villages of the area are available. By and large medical/health facilities are not adequate.

4.4.3 Archeologist and historical Treasures

No archaeological sites are observed in the vicinity of proposed project during the field survey.

4.4.4 Cultural and Aesthetic values

Where some people belong to middle class, there a large number of the people are living life below poverty levels. Old traditional cultural and aesthetic values prevail among most of the people. However, media is playing a big role in bringing change in the traditional aesthetic values presently prevailing among a large cross section of the society. There is also a section of affluent people who follow even the modern way of life.

A noticeable change is appearing among a cross section of the society who is trying to pursue the modern aesthetic values of life.

People have strong commitment to Islam. This relation contributes to good aesthetic and cultural values among the people. Financial and religious factors influence aesthetic and culture values of a society.

The project area and its surroundings fall under arid zone. There is very small agricultural activity because of small land holding by majority of the people and also the dependence of agriculture upon rainwater. People cannot sustain life on this single agriculture source. Resultantly, aesthetic and cultural practices of a poor and medium type of society are dominant among a large cross section of the society.

Century old traditions of typical villages of Punjab are prevalent in culture and aesthetic sense of life on the whole. Most of the people follow quite old type of life, rituals and traditions.

Most of the old people are illiterate but awareness and importance of education is attracting the people to send their wards to schools mostly up to primary level and some inclination to high school education is also shown.

Mostly, customs and rituals are primitive in nature. Some modernization in the existing cultural values is appearing among those educated and economically well off and those frequently mixing with urban society.

4.5 Lab Reports of Environmental Analysis

Lab reports of Noise level monitoring, ambient air and surface water analysis are attached as Annexure IV

5.0 Screening of Potential Environmental Impacts and Mitigation Measures

5.1 Screening of Potential Environmental Impacts and Mitigation Measures

5.2 Baseline/ Zero Environmental Monitored Data

In order to assess; the existing status of the environment as baseline, on site environmental monitoring was carried out. Results of this monitored data are shown in the Annexure-IV

5.3 Environmental Problems associated with Location

The project aims at balancing and modernization of the existing sugar production mills. The plant also include installation of bagasse fired power plant to produce 18MW of electricity of which 12 MW will be utilized within the project while the surplus 12MW will be supplied to National Grid.

Screening of potential environmental impacts and mitigation measures as described hereunder are to be followed covering all activities during construction and operation phases, therefore no environmental problems are envisaged due to the project location.

5.4 Environmental Problems Associated with Project Design

The equipment is to be designed/supplied, by internationally reputed expert SHINKO JAPAN. The equipment/technology will meet with the required limiting values as set under the Punjab Environmental Quality Standards (PEQS) Pakistan , Punjab Environmental Quality Standards for Ambient Air (PEQSAA) (effective from 15th August 2016) & Punjab Environmental Quality Standards for Noise (PEQSN) (effective from 15th August 2016).

Under the conditions no environmental problem worth mentioning relating to design are not envisaged.

5.5 Third Party Quarterly Monitoring

Third party quarterly/monthly monitoring will further ensure compliance with the required standards.

5.6 Environmental Problems Due to project construction:

The most likely environmental problems to occur during construction phase could be due to:

-Construction machinery,

- Civil work:
• leveling of land,

• Excavation
• Construction of building and associated civil work.
• Compaction of soil activity,

ii- -Moving vehicles,

- The pollution from these activities could be in the form of the following emissions from the exhaust of vehicles and from fuel burning in the operation of machines to be used for various of construction activities:
    - Gaseous emission of SO2, NOx and CO, hydrocarbons etc.
    - Particulate Matter (PM).
    - Noise.
- Only those vehicles which pass the Punjab Environmental Quality Standards (PEQS) limits will be engaged.

--Scheduled traffic plan of vehicles visiting plant regularly, will ensure that the environmental pollution does not adversely affect the people and environment.

- Regular sprinkling of water at the unpaved sites and along the roads will look after the dust.

iii- Fabrication workshop:

Lathing, machining, tooling, welding etc: while light from the welding can damage eyes noise from the rattling of machines may adversely effect hearing, inhaling of dust particles; from machining, tooling, grinding and lathing; could lodge in lungs resulting in SILICOSIS a serious type of lung cancer.

5.7 Environmental Problems Due to project Operation

The technology suppliers/designers SHINKO JAPAN enjoy international reputation. Therefore, the plant will ensure all out environmental controls to the required levels of the standards as applicable in Pakistan/ Punjab

i. Noise levels:

Since most of the machinery will be placed within the built up area covering 3267000 Sq. meters thus ensuring noise level compliance with the required standards. Wherever necessary, double housing to the rattling parts of the machinery, is to be provided for reduction of noise levels. This is to be incorporated at the design stage of the plant. The maximum noise levels will not increase from 65 dB(A) during day time and 55 dB(A) during night time thus will remain in compliance with the limits of the PEQSN Pakistan limits.

ii- Emissions from boiler stack:

3 x 80 TPH bagasse fired boiler @25 bar/350 ®C, for steam generation with 18MW electricity production is to be is to be installed at the project site. The fuel will be bagasse.

- The concentrations of NOx and SO2 in the stack emissions are to be much below the limiting values of the PEQs Pakistan.
- Since emissions of CO is a function of plant operations such as level of excess air, and maintenance of combustion and residence time , therefore, its concentration can be very easily controlled with controlling these factors.
- **Particulate Matter (PM):**
- Mechanical dust collectors [client to confirm pl.] will be used to collect ash from the stack emissions . This will reduce the PM to around 99.9%
- **Ash handling:**

  The fly ash and bottom ash from the boiler will b used a manure/fertilizer on the land of the project site as well as it will be made available to the farmers in the area. Since the ash is to be generated from the bagasse which is a product of sugar cane therefore it will be acceptable to soil without bringing any in the soil. The total ash to be generated from the project activity will be 1800 Kg/Hr.

Well-guarded facility will be constructed at the project site to store the ash before dispatching it for its end use in suitably covered trucks.

Ash Analyses:

a) Ultimate Analysis (As Fired Basis)

b) Typical begasse ash analysis

Carbon	=	23.96%
Hydrogen	=	2.93%
Oxygen	=	21.36%
Moisture	=	50%
Nitrogen	=	0.07%
Ash	=	1.55%
Sulphur	=	0.15%
Total	=	100%
HHV	=	2224kcal/kg

b. Typical begasse ash analysis

ASH ANALYSIS	Design*	Minimum – Maximum*
Fe_2O_3	18.10	15.0 to 21.0
MnO;	1.04	0.5 to 1.5
Cr_2O_3	0.13	0.05 to 0.20
V_2O_5	0.13	0.05 to 0.20
TiO_2	0.65	0.03 to 1.00
CaO	2.87	1.50 to 3.50
K_2O	3.26	2.00 to 12.00
P_2O_5	1.83	1.00 to 2.50
SiO_2	54.80	45 to 75
Al_2O_3	7.80	5.00 to 10.00
MgO	9.10	7.00 to 15.00
Na_2O	0.10	0.1 to 1.0
Cl	0.02	0.01 to 0.05
S	0.01	0.01 to 0.05

ASH FUSION TEMPERATURES (°C)*		
	Reducing & Oxidising Conditions	
	Deformation	1110
	Softening	1222
	Hemispherical	1250
	Flow	1322

Effluent

The following volumes of the effluent will be generated from the project activity during its regular operations:

Sewage = 235 m^3/Day

Disposal method

Will be treated to the required levels of the NEQS Pakistan before using it on the land of the project proponent and the surplus to be discharged to the drain nearby after getting permission from the competent authority.

Composition of the effluent is:

BOD5= 30 mg/liter

COD = 40 mg/liter

Disposal:

The entire effluent will be treated, using the aerobic treatment/activated sludge technology, to the levels required by the PEQS Pakistan before discharging into the drain outside the factory after getting due permission of the competent authority .

Disposal certificate from the competent authority is attached as Annexure-V

Sludge: sludge to be produced NIL

Disposal:

Three options are under consideration for disposal:

Option I:

Being rich in organic and soil nutrients, it is ideally fit to be used as organic manure and soil conditioner. Therefore it could be supplied to farmers.

Option II: It may be disposed off in scientifically secured landfill on the project site.

Option III: Both of the two options may be applied i.e. after supplying it to the farmers, if some quantity is left over, then it could go to scientifically secured landfill on the project site.

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:

- **Some Additional Steps for Pollution Abatement and Resource Conservation:**

Some Additional Steps as listed below, have been included for Pollution Abatement and Resource Conservation.

5 R's concept:

Reduce: Reduce wastes

Reuse: Reuse waste material without processing

Recycle: Reuse materials as resources

Retrofit: Fitting, to the existing plant, of any new part of the machinery found to reduce/abate pollution in a better way.

Replace: Replacement of any damaged or malfunctioning part of equipment with new one to abate/reduce pollution more effectively.

Additionally of the following two words has been made for further abatement/ reduction of pollution.

Refuse: To the extent possible, avoid purchasing of materials environmentally burdensome.

Reform: Reuse materials in a different form

Good housekeeping: This means that each of the worker is responsible for keeping its environment around as clean as possible. In other words it means that the process of first polluting then cleaning is not required.

Produce more with less inputs:

This means resource conservation and pollution prevention by the use of the calculated inputs of materials and other sources.

Energy Audit: This means saving in energy use at every step in production which results in sizeable reduction in the cost of the production thus increasing the profitability and the enhance capacity for sale of the product in the national and international market.

Cleaner Production: Means to avoid wastages of material and other inputs in production.

- Good housekeeping will be the order of the day.
- Tree plantation on the project site and its vicinity will be carried out.

5.8 Safety, Security, Emergency Response Management:

Response to Emergency, safety, security and protection document is attached as Annexure-VI

5.9 Disaster Management Plan

Emergency prevention through good design, operation, maintenance and inspection are essential to reduce the probability of occurrence and consequential effect of such eventualities. However, it is not possible to totally eliminate such eventualities and random failures of equipment or human errors, omissions and unsafe acts cannot be ruled out. An essential part of major hazard control has therefore, to be concerned with mitigating the effects of such Emergency and restoration of normalcy at the earliest. The overall objective of a disaster management plan is to make use of the combined resources at the site and outside services to achieve the following:

1. To localize the emergency and if possible eliminate it.
2. To minimize the effects of the accident on people and property.
3. Effect the rescue and medical treatment of casualties.
4. Safeguard other people.
5. Evacuate people to safe areas.
6. Informing and collaborating with statutory authorities.
7. Provide authoritative information to news media.
8. Initially contain and ultimately bring the incident under control.
9. Preserve relevant records and equipment for the subsequent enquiry into the
10. cause and circumstances of the emergency.
11. Investigating and taking steps to prevent reoccurrence.
12. Hazard and Emergency Response Plan (HERP) and attach as Annexure-VII.

Ways of achieving mitigation measures.

- Changing in planning and design
- Improved monitoring and management practices
- Compensation in money terms
- Replacement, relocation and rehabilitation

The best way to be adopted is improved monitoring and strict environmental management practices for a lot of money has been reserved both for construction of waste water treatment plant and for recurring.

Reporting :

The report has been prepared according to the format as recommended in the "Guidelines for the preparation and review of Environmental Reports October199/2000, sr.5 & 5.1.

Specific Terms of reference:
They are provide: "Guidelines for the preparation and review of Environmental Reports October199/2000, sr. 5,2.

6 Environmental Management and Monitoring Program

6.0 Environmental Management and Monitoring Program:

6.1 Institutional Capacity

The project will be implemented and monitored by the Project Proponent and will be responsible for ensuring compliance to environmental requirements as well as central/ state governments. Screening of potential environmental impacts and mitigation measures will be implemented by the project proponent. Hereunder assigning responsibility by name and position are given;

Assigning responsibility for implementation (by name or position)

Official concerned	Responsibility
1-General Manager (Plant/works)	i- Ultimate in-charge and responsible for all the potential environmental impacts and mitigation measures. ii- He will be responsible to ensure smooth functioning of the E.M. system iii- Daily progress on the state of the environmental status will be reported to him in writing by the Shift Engineer/In-charge. iv- All other E.M. matters, issues and problems will be reported to him (for rectification) by the Shift Engineer/In-Charge. v- He will work as bridge between the Government concerned authorities, the senior most management of the project. vi- He will be answerable to the higher management in all matters relating to mitigation measures and report at least monthly about the state of the operations.
2- Shift Engineer/ Incharge	i- During his shift timings, he will be responsible to ensure smooth functioning of the entire mitigation measures plan. ii- He will be responsible to rectify any problem regarding environmental matter. iii- He will directly report to the G.M. (Plant/Works) all matters relating to EMP on daily basis.
3- HSE Inspector	i- Ensure safety of workers at workplace ii- briefs the Contractor on the requirements of the environmental specification iii- advises the Engineer on the interpretation, implementation and enforcement of the environmental specifications and other related safety matters iv- monitors and reports on the performance of the contractor/project in terms of environmental compliance with the mitigation plan to the G.M. (Plant/Works) v- provides technical advice relating to environmental issues to the Engineer

4- Plant Operator	i- He will be responsible to operate effluent treatment plant. ii- He will maintain all records of monitoring of the entire elements of the EMP. ii- He will report to the Shift Engineer/In-Charge about matters relating to EMP operations on daily basis and earlier if so required.
5- Laboratory Chemist	i- He will be responsible to carry out all laboratories testing of waste water at all levels. ii- He will perform all other lab. testing as may be required from time to time in the interest of effective operation of the EMP. iii- He will maintain records of the entire EMP. operations. iv- He will daily report to the Shift Engineer/In-charge about the matters relating to the EMP operations.

Table6.1: Proposed Mitigation Plan for Construction Phase

Sr. No.	Activity	Management/ Mitigation	Responsibility for Monitoring	Monitoring Frequency
Construction Phase				
1	Isolation of project area and existing utilities	– Proper and safe isolation of the existing utilities – Main pathways will be avoided to part of an isolated area or alternates routes will be provided where needed – Safety of worker during isolation of utilities will be kept into consideration to avoid any accidents	Contractor	One time on completion of activity
2	Bringing construction materials, equipment/ vehicles to the site	– Use of properly maintained and tuned vehicles onsite to avoid air and soil pollution – Demarcation of proper area onsite for parking of construction vehicles – Caution should be taken during transportation to avoid any accidents. – Prohibit vehicles washing, servicing and repairing works onsite – Transportation during the peak traffic hours will be avoided to prevent traffic jams and congestion – Construction material should be covered while transporting to the site – Safe unloading of material to minimize dust emission. – Fugitive dust if generated will be minimized by wet suppression and controlled speed of vehicles. – Proper storage and yard will be prepared for construction	Contractor	Weekly monitoring of activity

Sr. No.	Activity	Management/ Mitigation	Responsibility for Monitoring	Monitoring Frequency
		material keeping in view the free space available. – The storage area should be adequately designed to protect from rains, to be prevented from any run offs, and to be secured from any unauthorized access. – Use of water mist, covering sheets or windshields to avoid blowing of dust from soil stockpiles and other windblown materials. – Hazardous material should be stored and labeled properly in designated area with restricted access and it should be handled by trained workers to avoid any risk to the environment and human health. – Storage of material such as chemicals, fuels, and lubricants on impervious floor or use of spill prevention trays should be taken into consideration to prevent soil and groundwater contamination. – Monitoring of containers should be carried out to identify any leakage.		
3	Construction	– Construction activities should be limited to daytime to minimize the impacts on surrounding environment – Safe and secure movement of construction equipments or other facilities on the site – Dry dusty materials to be properly covered – Provision of PPEs like helmets, gloves, long work boots, ear muffles, masks, first aid and safety glasses to workers	Contractor/ HSE Inspector	Weekly monitoring of the activity

Sr. No.	Activity	Management/ Mitigation	Responsibility for Monitoring	Monitoring Frequency
		– Prior to rain, exposed material should be properly covered. – Safe and secure up-gradation of sheds will be ensured. – Health & Safety Inspector will be deputed at the site to make sure that all H&S procedures and desired environmental conditions are achieved		
4	Staff conduct	– The Contractor must monitor the performance of construction workers to ensure that the points relayed during their induction have been properly understood and are being followed	Contractor & Engineer	Ongoing monitoring
5	Dust and air pollution[1]	– Vehicles travelling to and from the construction site must adhere to speed limits so as to avoid producing excessive speed limits – A speed limit of 30km/hr must be adhered to on all dirt roads – Access and other cleared surfaces including backfilled tranches must be dampened whenever possible and especially in dry and windy conditions to avoid excessive dust – Where dust is unavoidable screening will be required utilizing wooden supports and shade cloth – Vehicles and machinery are to be kept in good working order and to meet manufacturer's specifications for safety,	Contractor & Engineer	Daily monitoring

[1]Main causes of air pollution during construction/ replacement phase is due to vehicles, stockpiles, vehicle emissions and fires.

Sr. No.	Activity	Management/ Mitigation	Responsibility for Monitoring	Monitoring Frequency
		fuel consumption etc. – Where required sprinkling of water will be carried out as frequently as necessary to prevent dust emissions – Fire due to burning match-sticks thrown carelessly while smoking by workers and fire for heating purpose at the site will be banned to avoid hazards of fire and air pollution as per 2014 Pakistan Programmatic Umbrella PERSUAP mentioned in section 2.6, page 41. Contractor provide gas cylinder for heating, cooking and place sign of 'NO Smoking' at site		
6	Noise Pollution	– Control noise through control of working hours and selection of less noisy equipment. – Prohibit use of pressure horns – Provision of acoustic enclosures (hoods and shrouds) on generator – Proper maintenance of vehicles and construction equipment. – Minimize/avoid unnecessary use of pneumatic drills and other noisy machinery	Contractor & Engineer, HSE Inspector	Daily monitoring
7	Water quality[2]	– Mixing / decanting of all chemicals and hazardous substances must take place either on a tray or on an	Contractor, HSE Inspector	Regular monitoring

[2]Water quality is affected by the incorrect handling of substances and materials. Soil erosion and sediment is also detrimental to water quality. Mismanagement of polluted run-off from vehicle and plant washing and wind dispersal of dry materials into watercourses are detrimental to water quality

Sr. No.	Activity	Management/ Mitigation	Responsibility for Monitoring	Monitoring Frequency
		impermeable surface. Waste from these shall then be disposed of to a suitable waste disposal site. – Every effort shall be made to ensure that any chemicals or hazardous substances do not contaminate the soil or groundwater site – Care must be taken to ensure that run-off from vehicle or facility washing does not enter the surface/groundwater – Site staff shall not be permitted to use any stream, river, other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities approved by the Engineer shall instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression		
8	Leakages/ spills/ Paints/ Used oil	– Proper maintenance of vehicles and machinery – All fuel tanks, chemicals including paints, pesticides or other hazardous substances will be properly marked to highlight their content – Improper storage and handling of chemicals can be source of pollution – PPE will be enforced to use during the handling and application of chemicals – Paint material must be properly covered and stored on impermeable sheet.	Contractor, HSE Inspector	Daily monitoring

Sr. No.	Activity	Management/ Mitigation	Responsibility for Monitoring	Monitoring Frequency
		– Used oil/ oil rags will be disposed through approved recyclable waste vendors.		
9	Waste management	– Refuse must be placed in the designated skips / bins which must be regularly emptied. These shall remain within demarcated areas and shall be designed to prevent refuse from being blown out by wind – Where possible sorting of waste should be carried out and stored in appropriate containers to facilitate reuse and recycling. – The contractor will maintain and make the site free from garbage or other waste. – The contractor will conduct regular housekeeping. – Trainings will be provided to personnel for identification, segregation and management of solid waste – Recycling is to be encouraged by providing separate receptacles for different types of wastes and making – All waste must be removed from the site and transported to a disposal site or as directed by the Engineer – Waste from toilets shall be disposed of regularly and in a responsible manner and care must be taken to avoid contamination of soils and water, pollution and nuisance to adjoining areas – Hazardous waste disposal must be carried out by the Contractor in a responsible manner at approved site	Contractor & Engineer, HSE Inspector	Regular monitoring

Sr. No.	Activity	Management/ Mitigation	Responsibility for Monitoring	Monitoring Frequency
11	Social impacts	– Contractor's activities and movement of staff to be restricted to designated construction areas – The conduct of the construction staff when dealing with the public or other stakeholders shall be in a manner that is polite and courteous all the time – Disruption of access for local residents, commercial establishments, etc. must be minimized – Lighting on the construction site shall be pointed downwards and away from oncoming traffic and nearby houses – The site must be kept clean to minimize the visual impact of site – Machinery and vehicles are to be kept in good working order for the duration of the project to minimize noise nuisance to neighbors – Noisy activities must be restricted to the times given in the Project Specification or General Conditions of contract – The Engineer and Contractor are responsible for ongoing communication with those people that are interested in the projects	Contractor & Engineer	Regular monitoring
12	Rejoin/reconnection of isolated utilities (electricity, water	– Safe rejoining of all temporarily isolated utilities. – Adoption of measures to avoid any damages or disruption in ongoing operative utilities.	Engineer/ HSE Inspector	On completion of activity

Sr. No.	Activity	Management/ Mitigation	Responsibility for Monitoring	Monitoring Frequency
	pipelines, sewerage line, gas supply line)	– Adoption of safety measure to avoid any accident/ loss of human life.		
13	Clearance of site from extra / surplus material and construction equipment.	– Timely removal of waste from the site to avoid congestion at work place. – Construction waste should be collected and disposed separately from other waste. – Care will be taken during handling and disposal of waste. – Contaminated soil (if generated) due to accidental spills will be removed and transported to suitable site for disposal. – Avoid mixing of hazardous waste with non-hazardous waste. – Safe transportation of construction equipment from the site. – The contractor must ensures that all structure, equipment, materials and facilities used or created on site for/ or during construction activities are removed.	Engineer/ HSE Inspector	On completion of activity
14	Workers Safety	– Provision of Personal Protective Equipment to the workers – Safety training to the workers – Safe driving training to the drivers – Adequate safety signs on site – Provide training regarding proper handling and use of chemicals/ paints.	Contractor, Engineer & HSE Inspector	Daily monitoring

Sr. No.	Activity	Management/ Mitigation	Responsibility for Monitoring	Monitoring Frequency
		– Provide safety training procedures regarding electrical installations etc. – Provide fire-fighting equipment during construction. – Any loss of public/ private property will be compensated by the contractor		
15	Restoration (disposal areas, construction camp areas, stockpiles areas, working platforms and any areas temporarily occupied area) and landscaping of the site	– Restoration of a site to a similar condition prior to the commencement of the work or to a condition agreed with the Proponent. – Empty/available space will be covered with grassy lawns. – Use of native vegetation as a part of landscape. Ornamental plant species like roses, jasmine, and seasonal flowers can be used in proposed landscaping, which is a common practice in this part of the world.	Contractor, HSE Inspector	On completion of activity
		–		
Operational Phase				
1	Landscape	– To the extent possible, develop a green belt along the facilities boundary area and other open spaces, to create to some extent a natural landscape. The flora to be used for such green belt should be tolerant to the local arid climate requiring just minimum water to survive.	Proponent, HSE Inspector	On completion of activity and followed by annual/ biannual audits carried by third party

Sr. No.	Activity	Management/ Mitigation	Responsibility for Monitoring	Monitoring Frequency
2	Surface water	– Waste water treatment, as described in this report, to be carried out continuously and monitored before its draining out of the plant boundaries.	Proponent, HSE Inspector	On completion of activity and followed by annual/ biannual audits carried by third party
3	Groundwater	– Regular inspection of facilities for intercepting leaking and spilled liquids shall be carried out. – Hazardous chemicals shall be handled only in appropriate segregated, sealed and bundled areas at site.	Proponent, HSE Inspector	On completion of activity and followed by annual/ biannual audits carried by third party
4	Solid waste	– All solid wastes shall be disposed off according to a set procedure and record of sales will be kept to track at any time when it is required. – The contractors to whom any waste is to be sold shall be fully made aware of the environmental impacts and health effects of the waste to be sold to him. He shall be provided instructions for reuse/handling of such wastes in an environmentally sustainable way.	Proponent, HSE Inspector	On completion of activity and followed by annual/ biannual audits carried by third party
5	Noise	– Equipment will be acoustically shielded and /or logged as far as possible.	Proponent, HSE Inspector	On completion of activity and

Sr. No.	Activity	Management/ Mitigation	Responsibility for Monitoring	Monitoring Frequency
		– A noise measurement campaign during full operation at operation start should be implemented to verify that the actual noise levels are in line with The World Bank standards. – Workers should be obliged to use ear protection in areas within the plant and for specific work that exceeds the tolerable maximum noise limits.		followed by annual/ biannual audits carried by third party

6.2 Training Schedule:

In order to effectively operate the Mitigation Measures/Environmental Management Plan all the staff to be engaged in this activity should be trained extensively.

Training and orientation programmers shall be organized by the HSE /incharge/Inspector for the contractors, laborers, and technical/ office staff of the contractors, site engineers and the relevant staff for building their capacity with regards to principles and procedures of environmental management, pollution abatement measures, public consultation and participation, health and safety measures and implementation of EMP.

All the staff need to be trained through some institution of repute in the following fields.

- Effluent testing,
- Monitoring of stack emissions.
- Monitoring of noise.
- Training in the 1interpretattion of Environmental Laws, rules and regulations and PEQS Pakistan.
- Controlling the operations of the waste treatment plant.
- Sufficient literature need to be provided in the field of environment.

This needs to be done before the project comes into operational phase.

6.3 Reporting and Reviewing Procedures

Monitoring schedule, as explained above will be adhered to and all the data to be monitored will be scrutinized at the level of Shift Engineer/ In Charge and on monthly basis at the G.M. level. The data will be documented according to SMART format. Discrepancies will be duly addressed to. For presentation of the data to the Government Agencies, approved data recording according to the SMART format will be followed.

6.4 Summary of impacts and mitigation measures:

6.4.1 Legal Obligation:

Project activities during construction and regular operation phases will proceed under strict environmental management in line with the legal obligations of the Punjab Environmental Protection (amendment 2012) Act-1997 and National Environmental Quality Standards (NEQS) Pakistan, National/Punjab Environmental Quality Standards for Ambient Air (NEQS AA), National/Punjab Environmental Standards for Drinking Water (NESDW), the NPEQS and National/Punjab Environmental Quality Standards for Noise (NEQSN). Under these conditions the project at its all stages including from construction to regular operation will controlled.

6.5 Summary of Impacts and Mitigation Measures:

6.5.1 Construction Stage

Sr No:	Cause/source/activity	Effects	Mitigation
1	Construction machinery	Noise, dust, vibrations	Use mufflers , maintain machinery, oiling the rattling parts. Try to replace the heavy machinery as far as possible
2	Moving vehicles	Dust, emission of CO, SO_2 and NO_x	- Engage only the vehicles passing the NEQS levels of exhaust emissions. - Do not allow to make stampede of the vehicles on the project site. - Limit speed .
3	Civil work: • lexacavations • Leveling of land • Construction of buildings,	Dust, Noise Vibrations Smoke	-Kleep sprinkling water on the dusty place. - Use muffles with the machinery -As far as possible use small size machines.

6.5.2 Summary of Adverse Impacts During Operation Stage

	• Roads and pathways development and civil work . Compaction of soil activity,		- The machine should be properly maintained.
4	Welding, cutting, machining, tooling, lathing, and all other activity relating to fabrication of equipment or any other fabrication.	Noise, light very high intensity, Dust particles of special nature to cause SILICOOSIS a serious type of lung cancer..	All the persons working on the execution of the jobs should be provided with necessary personal protection gears including goggles for eye protection, face masks, hand gloves, safety shoes, special face protection shields for the persons engaged in welding activities to protect against high intensity light. Special face masks to protect against the inhalation of special dust from the lathing, marching and tooling activity; because of its inhalation results in Silicosis – a very serious type of lung cancer.
5	Vehicular movement, traffic	Noise Pollution	– Control noise through contro l of working hours and selection of less noisy equipment. – Prohibit use of pressure horns – Proper maintenance of vehicles and construction equipment.
	Construction activities and operations	Workers Safety	– Provision of Personal Protective Equipment to the workers – Adequate safety signs on site

Summary of Environmental Impacts during Construction Phase are given Hereunder.

			– Provide fire-fighting equipment during construction.

Sr. No	Cause/source/activity	Effects	Mitigation
1	**Effluent:**	It can pollute the water quality and aquatic life in the ultimate drain to which it is to be discharged and through seepage it will pollute under ground water quality.	Will it must be treated to require levels NEQS Pakistan.
2-	Sewage	Pollute water i.e. both under ground and surface. Drinking of polluted water can result in a number of diseases like skin irritation, diarrhea, jaundice, typhoid, gastroenterit is etc.	It must be treated before discharging out of the facility battery limits
3-	Sludge:	In case not properly managed it can pollute the environment	It must be properly used . The bets use is as a manure for crops.

4	**Stack emissions**	.	Since stack emissions are to to remain within the limiting values o the standards with the exception of CO which could be controlled through the control of air in the process of combustion. However a dedicated environmental monitoring plan must be place to monitor all out parameters of environment as in house activity besides regular monthly monitoring by a third party to ascertain validity of the results.
5.	Noise	It can result in hearing loss, sleepless-ness,irritatio n, and many other problems of serious nature both for the workers and the people around the project site.	A dedicated Noise monitoring program must be the essential part of the in house monitoring.
6	**Dust**	It can cause a lot of problems from coughing to respiratory diseases like asthma . cancer.	It must be monitored regularly and reduction steps be taken on regular basis.

7	**Solid Wastes**	If not properly disposed off they can pose threat to human health, environment.	All solid wastes must be disposed off in environmentally sustainable order.

6.6 Equipment Maintenance Details

The equipment maintenance and calibration will be the responsibility of the suppliers who will be paid duly. Before purchase of the equipment it will be ensured that the suppliers are capable of repairing , maintenance and calibration of the equipment. Everything will be don in black and white. Even quality of the chemicals to be used will be guaranteed. I f so required, par time services of an expert from outside will the lab.. will be hired.

6.7 Environmental Budget

The following budget allocations have already been made for installation of waste treatment and for recurring expenses:

For treatment plant= Rs.20 million

Recurring expenses = Rs. 02 million per anum.

7.0 Public Consultation

7.0 Public Consultation:

7.1 Public Consultations (PCs)

Public consultations were held collectively and individual with the people of the project area. Even written views of the participants of the area were taken. These are exhibited as Annexure VIII.

Summary Findings:

Socio-economic baseline conditions

Socio-economic status of the people of the project area is described hereunder.

- The people whose interviews were record as a part of the public consultations come mostly from the areas situated within about 10 km radius of the project site.
- Drinking water availability and educational and medical facilities surrounding the project site are well established.
- Public transport is also readily available there.
- Near project site major source of income of local people is Job.
- Old social order of life prevails and by and large, social harmony prevails.
- Elders are very much respected and they have great say in decision making.
- Joint family system is the order of the day.
- Some of the women help in job while others are restricted to housekeeping.
- Majority of the old generation is uneducated. But new generation is showing interest in getting education.
- On the overall basis, it is concluded that socio-economic conditions of the people yet need drastic improvement. People do face hardship regarding basic amenities, education, health and employment.

Community awareness and perceptions about the project:

- Many people of the area are well aware of installation of the project. Virtually all of them have positive attitude about the project.
- They are well aware that the Town will provide them jobs.
- Their perception is that the town area is very beneficial for the community and the area.

- They foresee positive impacts out of it, like employment opportunities, business, development of the area etc.
- The people perceive overall positive social impacts by the Project. They have highly positive attitude towards the project.
- They are apprehensive of environmental aspects of the project.
- At the same time, they foresee that the project management will feel there, social, moral and legal obligation and bring in Environmental Management Order whereby the environment will not be tempered.

Social impacts:

It can be safely concluded that social and economic impacts clearly dominate the minor few negative impacts of environment.

Positive impacts:

- The conclusions of the study prove that the positive economic and social impacts of the Project are far too dominant.
- People foresee employment opportunities for them.
- These employment opportunities will follow a chain of indirect benefits also i.e. the young people of these communities will get employment and business.
- They feel that the Town and its related activities would provide a strong base for social change.
- This trend will enhance family protection, socialization of the family members.
- Commercially viable Town and long term sustainability.
- Improved and mechanized services for the community.
- From the above discussion, one can conclude that positive impacts including improvement in employment, generating income resources and business opportunities.

7.2 Methodology of Impact Assessment

This has been done using the (GPER), October1997/2000, serial 3.1 , 3.2 & table 2, using checklist.

7.3 Impact analysis and Prediction

This has been done through Meetings according to, "Guidelines for preparation and review of environmental Reports, October1997/2000, serial 3.2". PLeaese refer to the document as

under sr. No. 3.3 &3.5 . Professional judgment was used for prediction while holding meetings.

8.0 Grievance Redressing Mechanism-Formal And Informal Channels

8.1 Grievance Redressing Mechanism-Formal And Informal Channels:

8.2 **Formal Channel:**

8.2.1 **Environmental Legislation:**

The Punjab Environmental Protection (Amendment 2011) Act (PEPA) provides a complete code of conduct for addressing grievances stemming from damages to any sector of the environment from the project activities.

The project is required to operate at least 95 % of its operational period in strict compliance with the required emission standards of Pakistan as provided in the (Punjab Environmental Protection (Amendment 2011) Act and the National Environmental Quality Standards. This ensures that the project proponent is legally bound to observe all legal requirements to avoid damaging the environment around the project.

8.2.2 **Punjab Environmental Protection (Amendment 2011) Act and Environmental Management**

The Punjab Environmental Protection (Amendment 2011) Act covers aspects related to the protection, conservation, rehabilitation and improvement of the environment and the prevention, control of pollution and promotion of sustainable development. Being the prime environmental law, Punjab Environmental Protection (Amendment 2011) Act establishes complete regulatory and monitoring bodies, policies, rules, regulations and national environmental quality standards. To ensure enforcement, the act establishes regulating bodies i.e. Punjab Environmental Protection Council (PEPC) and responsible bodies i.e. Pakistan Environmental Protection Agency (Pak-EPA) at Federal level and Environment Protection Agencies at Provincial level. The act extends to the whole of Punjab province.

Punjab-EPA has the power to arrest without warrant any person against whom reasonable suspicion exists of his having been involved in an offence under the PEPA-2011, and enter, inspect and search without warrant any premises, vehicle or vessel. It also provides for seizing any plant, machinery, equipment, vehicle or substance, record or document. Punjab Environmental Protection (Amendment 2011) Act also provides the power to summon and enforce the attendance of any person and issuance of Environmental Protection Order, PO 16, an Environmental Protection Order (EPO), in relation to a person who is contravening a provision of the PEPA-2011.

8.2.3 Enforcement of PEPA and Liability

The Government of Punjab is bound to protect the environment in accordance with its international commitments under various conventions and treaties it has signed or ratified. The PEPA-2011 translates these commitments into a compliance programme for the industrial establishments. Non-compliance to these commitments may results in loss of credibility, popularity and even financial aid from the international forums.

With the eights amendment in the Constitution of Pakistan, the Punjab EPA is responsible for implementation of all Rules and Regulations within the province. Punjab EPA is responsible to ensure under the PEPA- 2011 requires:

- That no person (including companies) under its purview will discharge or emit any effluent or noise in contravention of the National Environmental Quality Standards.
- That no proponent of a project shall commence construction or operation unless he has filed with the Punjab-EPA, an Environmental Assessment report according to the sensitivity of the project or where the project is likely to cause an adverse environmental impact.
- That no person may dispose of waste on public land or on highway on or a land owned or administrated by a local council, unless done in accordance with the provisions of the Punjab Environmental Protection (Amendment 2011) Act.

The following section of this act further clarifies the mechanism of Environmental Management and Grievance Redress Mechanism.

Section 11:

"Prohibition of certain discharges or emissions. — (1) Subject to the provisions of this Act and the rules and regulations no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards or, where applicable, the standards established under sub-clause (I) of clause (g) of sub-section (1) of section 6."

"(2) The Federal Government may levy a pollution charge on any person who contravenes or fails to comply with the provisions of sub-section (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed."

Section 12:

"Initial environmental examination and environmental impact assessment.—(1) No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Protection Agencies, as the case may be, or, where the project is likely to cause an adverse environmental effects an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof".

Section 16:

"Environmental protection order.---(1) Where the Federal Agency or a Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of the provisions of this Act, rules or regulations or of the conditions of a licence, and is likely to cause, or is causing or has caused an adverse environmental effect, the Federal Agency or, as the case may be, the Provincial Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures that the Federal Agency or Provincial Agency may consider necessary within such period as may be specified in the order.

(2) In particular and without prejudice to the generality of the foregoing power, such measures may include;

a) Immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;

b) Installation, replacement or alteration of any equipment or thing to eliminate, control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;

c) Action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances; and

d) Action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Federal Agency or Provincial Agency."

Section 17:

"Penalties. — (1) Whoever contravenes or fails to comply with the provisions of sections 11, 12, 13 or section 16 or any order issued there under shall be punishable with fine which may extend to one million rupees, 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:

Provided that if contravention of the provisions of section 11 also constitutes contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

(2) Whoever contravenes or fails to comply with the provisions of section 14 or 15 or any rule or regulation or conditions of any license, any order or direction, issued by the Council or the Federal Agency or Provincial Agency, shall be punishable with fine which may extend to one hundred thousand rupees, and in case of continuing contravention or failure with an additional fine which extend to one thousand rupees for every day during which such contravention or failure continues.

Contraventions of the provisions of the PEPA-1997 is punishable with impressments extending up to five years, or with fine extending up to one million or with both. Where an offence is committed by a company every Chief Executive officer (CEO) and the company shall be deem guilty of the offence. Action can even be taken against Government Agencies and Local Authorities.

Government may also constitute an Environmental Tribunal to hear cases relating to the PEPA-1997. The tribunal may only hear cases when the complaint is made in writing by Pak-EPA, or Local Council or any aggrieved person who has given at least thirty days notice to Pak-EPA of the offence and of his intension to make a complaint to the Tribunal. The Tribunal may also hear appeals from the Agencies. Appeals from the tribunal shall go to the High Court.

In order to resolve the disputes relating to the environment issues, Environmental Tribunal Rules 1999 have been promulgated. In trying the offences, the tribunal has to follow the Code of Criminal Procedures 1898. The tribunal shall send the copies of his orders to the parties concerned and the Director General of the Federal EPA and Provincial EPAs. The Tribunal shall dispose of its proceedings within 60 days. An appeal to the Tribunal, accompanying a copy of the impugned order, copies of the documents relied and prescribed

fees, shall be sent to the Registrar by the appellant. Generally the proceedings of the Tribunal shall be open. "

8.3 Grievance Redress Mechanism- Informal

8.3.1 Compensation for Environmental Damages

As described under Section 17- Penalties, Subsection-(5), (f) of the Punjab Environmental Protection (Amendment 2011) Act, the likely damages to be caused to any sector of the environment or property or else will be paid to the affected parties.

Secondly, under the PEPA -2011, the EPA Punjab and the Environment Tribunal can legally prosecute the project proponent for the damages to occur from the pollution generation from the project.

There is complete legal cover to address issues related to compensation for any environmental damage arising out of project activity. However, to address any such issues more expeditiously, the project administration will have a local committee as an Informal Mechanism.

This informal mechanism will provide convenient, quick and cost effective decisions for compensation against any environmental damages that occur from the project activity. This informal mechanism will also build confidence between the project administration and public and safeguard the interests of both the project and the public at large.

The project administration, therefore, proposes the following committee at the local level for amicable and speedy resolution of cases pertaining to any environmental damages that likely occur from the project activity. The decision of the committee will be executed in letter and spirit.

8.3.2 Constitution of the Committee

Chief Executive of the Company or his nominee	= Chairman/Chief Executive of the committee
Head of the Shahpur City Government	= Ex-Officio Member
Head of the District Local Self Government	=Ex-officio Member
A dignitary of the project are	=Member(enjoying confidence of the people of the project area)
Head EHS Department of the project	= Member
Representative of the NGO the project area.	=Member
Representative of the aggrieved person	=Member
Environmentalist	=Member

8.4 Time Schedule for Redressing the Grievance

- The committee will be under obligation to decide the grievance within three weeks of the complaint by the aggrieved party.
- Compensation as decided by the committee will be paid in full to the aggrieved party within two weeks from the date of decision of the committee.

The decision of the committee will be binding on both parties, i.e. the project proponent as well as the aggrieved party.

9.0 Whys of Achieving Mitigation Measures

9.0 Whys of Achieving Mitigation Measures

- Changing in planning and design
- Improved monitoring and management practices
- Compensation in money terms
- Replacement, relocation and rehabilitation

The best way to be adopted is improved monitoring and strict environmental management practices for a lot of money has been reserved both for construction of waste water treatment plant and for recurring.

10.0 Reporting

10.0 Reporting

The report has been prepared according to the format as recommended in the "Guidelines for the preparation and review of Environmental Reports October199/2000, sr.5 & 5.1.

11.0Conclusion

11.0 Conclusions:

Al-Arabia Sugar Mills Limited, purchased assets of an already installed sugar unit with cane crushing capacity between 7000 to 8000 TPD situated at 2 Km , Shahpur Saddar, District Sargodha. The unit was not operational at the time of its purchase. Now they are planning to Balance and Modernize (B&M). The plant is to produce 94,080 tons of sugar while total operational time is 120 days/year. The plant is spread over area of 75 acres. The total cost of the project is Rs.4,989 million.The project site lies within the rich in sugarcane production. Basic facilities like good quality water, road excess, cheap labouretc. are available.

The Technology/ equipment is to be supplied by M/S Shinko Japan, a world-renowned company.

According to the "Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000" the project falls in category "A". Accordingly, this EIA report has been prepared for issuance of NOC/EA by the EPA, Government of the Punjab, Lahore before initiation of the project on ground

- The environmental control for stack gases emissions and PM, control Noise to the prescribed limits of the NEQS Pakistan, NEQSAA, NEQsDW and NEQSN-Punjab /Pakistan will be put in place before the project comes in operations.
- Solid wastes (solid /semi solid sludge from the waste treatment plant rich in organics and soil nutrients) disposal will be done according to the environmentally sustainable order i.e. either through scientifically prepared landfill site/ providing to farmers for soil/both options.
- EMP and EMtP as recommended in this IEE Report are to be put in place during operations of the project.
- Monthly monitoring of all out environmental monitoring by a third party also certifies that the project will run in accordance with legal requirements.

Recommendations: On the basis of the findings of the EIA report it is concluded that operation of the sugar unit will not have any significant adverse impacts p on the local population or any segment of environment and by implementation of provided recommendations and mitigation measures the environment will improve.
It is, therefore, recommended that NOC/EA as requested by the client may please be issued by the Environmental Protection Agency, Government of the Punjab.

FAISALABAD ELECTRIC SUPPLY COMPANY LIMITD

FESCO

OFFICE OF THE
CHIEF ENGINEER (P&D)
FESCO, FAISALABAD

Phone # 041-9220179
Fax # 041-9220511

No. 6402 - 6407 **Dated.** 31-08-2017

Al-Arabia Sugar Mills Limited,
55-K Model Town, Lahore
Lahore

Project: **Grid Interconnection Studies of 18 MW Co-Generation Power Project Al-Arabia Sugar Mills Ltd at Sargodha Road (2 Km), Shahpur Sadar, District Sargodha, Punjab.**

SUBJECT: **VETTING & APPROVAL OF GRID INTERCONNECTION STUDY REPORT.**

It is intimated that the subject Grid Interconnection Study Report received vide No. AASML-GIS/PPI/FESCO/08-2017-1 dated 01 August, 2017 has been checked by the concerned officer. The study has been carried out on assumed parameters. Based on these assumed parameters, study results found ok. However, it is advised to provide the technical data and curves before signing of EPA and if any deviation found at any stage, you will have to get study revised and vetted accordingly.

(MUJAHID PERVAIZ CHATTHA)
CHIEF ENGINEER (P&D)
FESCO FAISALABAD

Copies to:

1. Chief Commercial Officer FESCO Faisalabad.
2. Director (MT&CM) FESCO Faisalabad.
3. PD (Construction) FESCO Faisalabad. He is advised to prepare / submit estimate regarding interconnection line (11kv double circuit with osprey conductor) from the power plant to 132kv grid station Shah Pur for its approval from the competent authority.
4. Deputy General Manager –II CPPA (G) LTD, Ground Floor, ENERCON Building, G-5/2, Near state Bank, Islamabad.
5. Power Planner International, 64-F-1 WAPDA Town Lahore.

Report No. PPI-276.1-Final/17

INTERCONNECTION STUDY

For

18 MW Al-Arabia Sugar Mills, Shahpur Sadar, Sargodha Road, District Sargodha, Punjab

Final Report
(August 2017)

Power Planners International

UK Office:
3-Sylvester Road,
Sudbury Town, Middlesex,
HA0 3AQ, UK
Phone & Fax:+44-(0)208-9223219

Pakistan Office:
64-F/1, Wapda Town,
Lahore 54770, Pakistan
Phone: +92-42-35182835;
Fax: + 92-42-35183166

Email: info@powerplannersint.com
www.powerplannersint.com

Executive Summary

- The Final report of Al-Arabia Sugar Mills Power Plant is submitted herewith. The installed capacity of the plant is 18 MW comprising of three generating units, two units of 4 MW and a single unit of 10 MW.
- Two Units of 4 MW are already installed at Al-Arabia Mills to meet its own demand. Al-Arabia Sugar Mills Power Plant now intends to install a new 10 MW generating unit to export the power to national grid.
- It would like to go for high pressure cogeneration in the sugar mill with the aim of exporting power nearly 6 MW to the national grid during the crushing season, from November to March.
- The latest generation, transmission plan and load forecast of NTDC has been used for the study. Both of them are attached as Appendix-A.
- The study objective, approach and methodology have been described and the plant's data received from the Client is validated.
- The nearest grid facility is the 132 kV substation of Shahpur. Due to the location of Al-Arabia PP, the most feasible interconnection scheme would be connecting it directly on the 11 kV bus bar of Shahpur 132/11 kV grid on double circuit of Osprey conductor of length 2.5 Km, after stepping up from its generating point voltage of 6.6 kV.
- The up-coming chapters discuss in detail the location and interconnection of the Al-Arabia PP. Sketches are shown in Appendix-B.
- In view of planned COD of the Al-Arabia PP in November 2017, the above proposed interconnection scheme has been assessed for steady state conditions through detailed load flow studies, short circuit analysis and stability criterion for January 2018 for maximum thermal power dispatches in the grid during winter which is the crushing season. Load flow has also been carried out for off peak scenario of January 2018.
- In an extended term scenario, January 2021 has been studied to evaluate the performance of the proposed interconnection scheme. The system conditions of normal and N-1 contingency have been examined for all scenarios to meet the reliability criteria. Along with it short circuit analysis have been carried out for a complete check of the system.
- Load Flow analysis indicates that power distribution is in local grids therefore

losses are reduced and voltage profile of the area is improved. Beside this, it also has an advantage that demand from NTDC to FESCO will decrease as local generation is available.

- The short circuit level of the Al-Arabia Power Project is 12.66 kA and 14.01 at 11 kV for 3-phase and 1-phase faults respectively for the year 2021. Therefore industry standard switchgear of the short circuit rating of 25 kA would be fine to be installed at 11 kV switchyard of Al-Arabia PP taking care of any future generation additions and system reinforcements in its electrical vicinity and also fulfills the NEPRA Grid Code requirements specified for 11 kV switchgears. There are no violations of exceeding the rating of the equipment in the vicinity of Al-Arabia PP due to contribution of fault current from it.
- The dynamic stability analysis of proposed scheme of interconnection has been carried out. The stability has been tested for the worst cases, i.e. three phase fault right on the 132 kV bus bar of Shahpur substation followed by trip of a 132 kV single circuit from Shahpur to Ludewala New has been performed for fault Clearing of 5 cycles (100 ms), as understood to be the normal fault clearing time of 132 kV protection system. Also the extreme worst case of stuck breaker (breaker failure) has been studied where the fault clearing time is assumed 9 cycles i.e. 180 ms for single phase fault at the 11 kV bus of Al-Arabia Sugar Mills.
- Steady state analysis by load flows, short circuit and stability criterion reveals that proposed scheme is adequate to fulfill all the demands.

Contentss

Appendices

1. INTRODUCTION

1.1 Background

Al-Arabia Sugar Mills Power Plant referred to as Al-Arabia PP near Shahpur Sadar, in District Sargodha, embedded in the distribution network of FESCO. The electricity generated from this project would be supplied to the grid system of FESCO through 132 kV grids available in the vicinity of this project. A general idea of the location of plant and grid stations in its vicinity can be viewed in sketch-1 attached in Appendix - B.

Al-Arabia aims to go for high pressure cogeneration in the sugar mill with the aim of exporting 6 MW power to the grid during the crushing season. The project is expected to start commercial operation by November 2017. The electricity generated from this project would be supplied to the grid system of FESCO through 132 kV grids, as that of Shahpur, available in the vicinity of this project. The location of Al-Arabia PP can be seen in sketch-2 attached in Appendix - B.

1.2 Objectives

The overall objective of the Study is to evolve an interconnection scheme between Al-Arabia PP and FESCO network, for stable and reliable evacuation of electrical power generated from this plant, fulfilling N-1 reliability criteria. The specific objectives of this report are:

- To develop scheme of interconnections at 11 kV for which right of way (ROW) and space at the terminal substations would be available.
- To determine the performance of interconnection scheme during steady state conditions of system, normal and N-1 contingency, through load-flow analysis.
- To check if the contribution of fault current from the plant unit increases the fault levels at the adjoining substations at 132 kV voltage levels to be within the rating of equipment of these substations, and also determine

the short circuit ratings of the proposed equipment of the substation at Al- Arabia PP.

- To check if the interconnection withstands dynamic stability criteria of post fault recovery with good damping.

1.3 Planning Criteria

The planning criteria required to be fulfilled by the proposed interconnection is as follows:

Steady State:

Voltage	± 5 %, Normal Operating Condition
	± 10 %, Contingency Conditions
Frequency	50 Hz Nominal
	49.8 Hz to 50.2 Hz variation in steady state
	49.4 - 50.5Hz, Min/Max Contingency Freq. Band
Power Factor	0.8 Lagging; 0.9 Leading

Dynamic/Transient:

The system should revert back to normal condition after dying out of transients without losing synchronism with good damping

a) Permanent three-phase fault on any primary transmission element; including: transmission circuit, substation bus section, transformer or circuit breaker. It is assumed that such a fault shall be cleared by the associated circuit breaker action in 5 cycles.

b) Failure of a circuit breaker to clear a fault ("Stuck Breaker" condition) in 9 cycles after fault initiation.

2. ASSUMPTIONS OF DATA

There will be one generating unit at Al-Arabia PP. As per the data provided by the client following data has been modeled:

2.1 Al-Arabia PP Data

Installed capacity of power plant	= 2 x 4 + 1x10 = 18 MW
Power factor	= 0.80 lagging, 0.9 leading
Lump sum MVA capacity	= 5+5+12.5 = 22.5 MVA
Inertia Constant	= 1.0418 MW-sec/MVA (10 MW)
Generating Voltage	= 6.6 kV

2.2 Network data

The 132 kV network in the area near Al-Arabia PP, as shown in Sketches in Appendix-B. The latest Generation Expansion Plan and Load Forecast of NTDC has been used as shown in Appendix-A.

3. STUDY APPROACH AND METHODOLOGY

3.1 Understanding of the Problem

Al-Arabia Sugar Mills Power Project would like to go for high pressure cogeneration with the aim of exporting a maximum of 6 MW supply to the grid during the Crushing Season. Two 4 MW generators are already installed at the sugar mills to meet its load demand. A new 10 MW generating unit is being installed to export 6 MW to the national grid. The site of proposed project is located at a distance of about 2.5 km from the 11 kV bus bars of Shahpur G/S. The proposed Power Project is going to be embedded in the transmission network of FESCO through this nearest available 11 kV network.

The adequacy of FESCO network of 132 kV in and around the proposed site of Al-Arabia PP has been investigated in this study for absorbing and transmitting this power fulfilling the reliability criteria.

3.2 Approach to the problem

The following approach has been applied to the problem:

- Month of January 2018 has been selected for the study because it represents the maximum thermal dispatch conditions during the crushing season after the COD, November 2017, of Al-Arabia PP. Thus, lines in the vicinity of this plant will be loaded to the maximum extent, allowing us to judge the complete impact of the plant on the transmission system in its vicinity.
- Load flow and short circuit studies have also been performed for January 2021 to see the performance of the proposed plant in extended term scenario.
- Interconnection scheme without any physical constraints, like right of way or availability of space in the terminal substations, have been identified.
- Perform technical system studies for peak load conditions to confirm technical feasibility of the interconnections. The scheme will be subjected to standard analysis like load flow, short circuit, and transient stability study to check the strength of the machines and the proposed interconnection scheme under disturbed conditions.

- Determine the relevant equipment for the proposed technically feasible scheme.
- Recommend the technically most feasible scheme of interconnection.

4. DEVELOPMENT OF SCHEME OF INTERCONNECTION

4.1 The Existing and Ongoing Network

The network around the proposed location of Al-Arabia PP is shown in Sketch-1 in Appendix-B.

Al-Arabia PP is in District Sargodha embedded in the distribution network of FESCO. Network is being fed from the sources substation of Daudkhel 220/132 kV and Ludewala New 220/132 kV.

These are multiple feeding points in the vicinity which provide reliability and voltage support to the system. All these substations provide a strong 220 kV and 500 kV network around the proposed plant. A strong system helps in stable operation of a power plant.

4.2 The Scheme of Interconnection of Al-Arabia PP

Keeping in view of the above mentioned 11 kV network available in the vicinity of the site of the Al-Arabia PP, the most feasible interconnection scheme would be connecting it on the 11 kV bus bars of Shahpur 132 kV grid on double circuit of Osprey conductor of length 2.5 Km. as shown in Sketch-2 in Appendix-B. The network of Al-Arabia PP has been modeled at 132 kV, 11 kV and its respective generating voltage of 6.6 kV as well.

5. DETAILED LOAD FLOW STUDIES

The base cases have been developed for the peak conditions of January 2018 using the latest network data of NTDC and FESCO obtained by PPI. The peak loads of the year 2018 for FESCO have been modeled as per the latest PMS Demand forecast as provided by FESCO. Detailed load flow studies have been carried out for January 2018 and for the future case of January 2021.

5.1 Peak Load Case January 2018

The peak load case in January 2018 has been studied in detail for the conditions of without and with Al-Arabia PP.

5.1.1 Without Al-Arabia Sugar Mills

The results of load flow analysis without Al-Arabia PP have been plotted under normal conditions in Exhibit 0.0 in Appendix-C. The power flows on the circuits are seen well within the rated capacities. The voltage profile is also within the acceptable limit of 5%. We find no capacity constraints on 132 kV circuits under normal conditions i.e. without any outages of circuits.

N-1 contingency analysis has been carried out and the plotted results are attached in Appendix – C as follows:

Exhibit 0.1 Ludewala New to Shahpur 132 kV Single Circuit Out
Exhibit 0.2 Shahpur to T-Flying Cement 132 kV Single Circuit Out
Exhibit 0.3 T-Flying Cement to T-Pioneer Cement 132 kV Single Circuit Out
Exhibit 0.4 Wanbuchna to T-Pioneer Cement 132 kV Single Circuit Out
Exhibit 0.5 Ludewala New to Bhera Industrial 132 kV Single Circuit Out

Some under voltages were observed for Exhibit 0.1 which are improved after interconnection of Al-Arabia PP.

5.1.2 With Al-Arabia Power Plant

The scenario of Al-Arabia PP after the COD of the plant when it starts exporting 6 MW during crushing season to the FESCO network has been studied. The results of load flows with Al-Arabia PP under normal conditions have been plotted in Exhibit

1.0 in Appendix-C.

The power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of ± 5 % off the nominal. We find no capacity constraints on 132 kV circuits under normal conditions i.e. without any outages of circuits. We can see that the voltage profile has improved significantly with the introduction of Al-Arabia Power Plant.

N-1 contingency analysis has been carried out and the plotted results are attached in Appendix – C as follows:

Exhibit 1.1 Al-Arabia to Shahpur T-2 11 kV Single Circuit Out
Exhibit 1.2 Ludewala New to Shahpur 132 kV Single Circuit Out
Exhibit 1.3 Shahpur to T-Flying Cement 132 kV Single Circuit Out
Exhibit 1.4 T-Flying Cement to T-Pioneer Cement 132 kV Single Circuit Out
Exhibit 1.5 Wanbuchna to T-Pioneer Cement 132 kV Single Circuit Out
Exhibit 1.6 Ludewala New to Bhera Industrial 132 kV Single Circuit Out

We find that power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of ± 10 % off the nominal for contingency conditions' criteria. We find no capacity constraints on 132 kV circuits under normal and contingency conditions. Under voltages which were observed for the without case are also rectified after introduction of Al-Arabia PP.

5.2 Off-Peak Load Case – January 2018:

The scenario of Al-Arabia PP after the COD of the plant when it starts exporting 6 MW during crushing season to the FESCO network has been studied for Off-Peak scenario as well. The results of load flows with Al-Arabia PP under normal conditions have been plotted in Exhibit 2.0 in Appendix-C.

The power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of ± 5 % off the nominal. We find no capacity constraints on 132 kV circuits under normal conditions i.e. without any outages of circuits.

N-1 contingency analysis has been carried out and the plotted results are attached in Appendix – C as follows:

Exhibit 2.1 Al-Arabia to Shahpur T-2 11 kV Single Circuit Out
Exhibit 2.2 Ludewala New to Shahpur 132 kV Single Circuit Out
Exhibit 2.3 Shahpur to T-Flying Cement 132 kV Single Circuit Out
Exhibit 2.4 T-Flying Cement to T-Pioneer Cement 132 kV Single Circuit Out
Exhibit 2.5 Wanbuchna to T-Pioneer Cement 132 kV Single Circuit Out
Exhibit 2.6 Ludewala New to Bhera Industrial 132 kV Single Circuit Out

We find that power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of ± 10 % off the nominal for contingency conditions' criteria. We find no capacity constraints on 132 kV circuits under normal and contingency conditions.

5.3 Peak Load Case 2021: Extended Term Scenario

We have also studied the future scenario of January 2021 to assess the impact of the plant in the extended term of its installation as per NTDC requirement. Exhibit 3.0 shows the normal case of 2021 of the region with Al-Arabia PP. The total 6 MW of electrical power will be supplied to the national grid from Al-Arabia PP.

The power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of ± 5 % off the nominal.

We find no capacity constraints on 132 kV circuits under normal conditions i.e. without any outages of circuits.

N-1 contingency analysis has been carried out and the plotted results are attached in Appendix – C as follows:

Exhibit 3.1 Al-Arabia to Shahpur T-2 11 kV Single Circuit Out
Exhibit 3.2 Ludewala New to Shahpur 132 kV Single Circuit Out
Exhibit 3.3 Shahpur to T-Flying Cement 132 kV Single Circuit Out
Exhibit 3.4 T-Flying Cement to T-Pioneer Cement 132 kV Single Circuit Out
Exhibit 3.5 Wanbuchna to T-Pioneer Cement 132 kV Single Circuit Out
Exhibit 3.6 Ludewala New to Bhera Industrial 132 kV Single Circuit Out

The power flows on the circuits are seen well within the rated capacities and the voltages on the bus bars are also within the permissible operating range of ± 10 % off the nominal for contingency conditions' criteria.

We find that there are no capacity constraints in the proposed connectivity scheme even in the up-coming years i.e. 2021.

5.4 Conclusion of Load Flow Analysis

From the analysis discussed above, we conclude that the proposed interconnection scheme is adequate to evacuate the maximum 6 MW spillover power of Al-Arabia PP under normal and contingency conditions.

It was found that in 2018 all the contingency cases the surrounding circuits remain within the rated capacity, and the voltage profile can be seen to be visibly improved with the introduction of Al-Arabia PP. Also, the bus bar voltages were well within the permissible limits in all the contingency events. The scenario of January 2021 was also evaluated and found to be stable under normal and contingency cases. Load Flow analysis indicates that power distribution is in local grids therefore losses are reduced and voltage are improved. Beside this, it also has an advantage that demand from NTDC to FESCO will decrease as local generation is available.

6. SHORT CIRCUIT ANALYSIS

6.1 Methodology and Assumptions

The methodology of IEC 909 has been applied in all short circuit analyses in this report for which provision is available in the PSS/E software used for these studies.

The maximum fault currents have been calculated with the following assumptions under IEC 909:

- Set tap ratios to unity
- Set line charging to zero
- Set shunts to zero in positive sequence
- Desired voltage magnitude at bus bars set equal to 1.10 P.U. i.e. 10 % higher than nominal, which is the maximum permissible voltage under contingency condition.

For evaluation of maximum short circuit levels, we have assumed contribution in the fault currents from all the installed generation capacity of hydel, thermal and nuclear plants in the system in the years 2018 and 2021 i.e. all the generating units have been assumed on-bar in fault calculation's simulations.

6.2 Fault Current Calculations without Al-Arabia PP Year 2018

In order to assess the short circuit strength of the network of 132 kV without Al-Arabia PP for FESCO in the vicinity of the site of the Plant near Shahpur, fault currents have been calculated for balanced three-phase and unbalanced single-phase short circuit conditions in the year 2018. These levels will give us the idea of the fault levels without Al-Arabia PP and later on how much the contribution of fault current from Al-Arabia PP may add to the existing levels. The results are attached in Appendix – D.

The short circuit levels have been calculated and plotted on the bus bars of 132 kV of substations lying in the electrical vicinity of our area of interest and are shown plotted in the Exhibit 4.0 attached in Appendix-D. Both 3-phase and 1-phase fault currents are indicated in the Exhibit 4.0 which are given in polar coordinates i.e. the magnitude and the angle of the current. The total fault currents are shown below the bus bar.

The tabular output of the short circuit calculations is also attached in Appendix-D for the 132 kV and 11 kV bus bars of our interest. The total maximum fault currents for 3-phase and 1-phase short circuit at these substations are summarized in Table 6.1. We see that the maximum fault currents do not exceed the short circuit ratings of the equipment at these 132 kV substations which normally are 31.5 kA for older substations and 40 kA for new substations.

Table-6.1
Maximum Short Circuit Levels without Al-Arabia PP

Substation	3-Phase fault current, kA	1-Phase fault current, kA
Shahpur 132 kV	**14.18**	**9.94**
Shahpur T1 11 kV	**6.48**	**6.56**
Shahpur T2 11 kV	**11.25**	**11.50**
Flying Cement 132 kV	**7.52**	**4.97**
Pioneer Cement 132 kV	**5.80**	**3.80**
Ludewala New 132 kV	**21.51**	**16.34**
Bhera Industrial 132 kV	**6.15**	**4.14**
Jauhrabad 132kV	**5.76**	**2.93**
A.B.C Groat 132kV	**3.54**	**1.94**
Quaidabad 132kV	**5.68**	**3.56**
Wanbuchna 132kV	**11.28**	**8.85**

6.3 Fault Current Calculations with Al-Arabia PP Year 2018

Fault currents have been calculated for the electrical interconnection of proposed scheme. Fault types applied are three phase and single-phase at the 132 kV and 11kV bus bar of Al-Arabia PP itself and other bus bars of the 132 kV and 11 kV substations in the electrical vicinity of Al-Arabia PP. The graphic results are shown in Exhibit 4.1. The tabulated results of short circuit analysis showing all the fault current contributions with short circuit impedances on 132 kV bus bars of the network in the electrical vicinity of Al-Arabia PP and the 132 kV bus bars of Al-Arabia PP itself are placed in Appendix-D. Brief summary of fault currents at significant bus bars of our interest are tabulated in Table 6.2

Table-6.2
Maximum Short Circuit Levels with Al-Arabia PP

Substation	3-Phase fault current, kA	1-Phase fault current, kA
Al-Arabia PP 6.6 kV	14.29	16.85
Al-Arabia 11 kV	11.09	12.19
Shahpur 132 kV	14.34	9.99
Shahpur T1 11 kV	10.36	10.86
Shahpur T2 11 kV	14.65	15.33
Flying Cement 132 kV	7.55	4.98
Pioneer Cement 132 kV	5.81	3.80
Ludewala New 132 kV	21.66	16.39
Bhera Industrial 132 kV	6.16	4.14
Jauhrabad 132kV	5.77	2.93
A.B.C Groat 132kV	3.54	1.94
Quaidabad 132kV	5.68	3.56
Wanbuchna 132kV	11.29	8.85

6.4 Fault Current Calculations with Al-Arabia PP Year 2021

Fault currents have been evaluated for the peak case of 2021 in order to observe the maximum fault current on Al-Arabia and the bus bars in its vicinity considering the future additions in the system. Fault types applied are three phase and single-phase at 132 kV bus bars of Al-Arabia itself and other bus bars of the 132 kV and 11kV substations in the electrical vicinity of Al-Arabia. Both 3-phase and 1-phase fault currents are indicated in the Exhibit 4.2 which are given in polar coordinates i.e. the magnitude and the angle of the current. The total fault currents are shown below the bus bar.

The tabulated results of short circuit analysis showing all the fault current contributions with short circuit impedances on 132 kV bus bars of the network in the electrical vicinity of Al-Arabia PP are placed in Appendix-D. Brief summary of fault currents at significant bus bars of our interest are tabulated in Table 6.3

Table-6.3
Maximum Short Circuit Levels with Al-Arabia PP

Substation	3-Phase fault current, kA	1-Phase fault current, kA
Al-Arabia PP 6.6 kV	14.64	17.19
Al-Arabia 11 kV	12.66	14.01
Shahpur 132 kV	16.83	12.32
Shahpur T1 11 kV	15.45	16.01
Shahpur T2 11 kV	15.45	16.01
Flying Cement 132 kV	8.19	4.73
Pioneer Cement 132 kV	6.21	3.30
Ludewala New 132 kV	28.02	26.71
Bhera Industrial 132 kV	7.64	4.99
Jauhrabad 132kV	16.02	17.35
A.B.C Groat 132kV	5.93	4.36
Quaidabad 132kV	7.82	5.47
Wanbuchna 132kV	13.33	10.91

Comparison of Tables 6.1, 6.2 and 6.3 shows an increase in short circuit levels for three-phase and single-phase faults due to connection of Al-Arabia PP on the 132 kV bus bars in its vicinity. We find that even after some increase, these fault levels are much below the rated short circuit values of the equipment installed on these substations.

For Al-Arabia PP 11 kV standard size switchgear of short circuit rating of 25 kA is proposed. It would provide large margin for any future increase in short circuit levels due to future generation additions and network reinforcements in this area.

6.5 Conclusion of Short Circuit Analysis

The short circuit analysis results show that for the proposed scheme of interconnection of Al-Arabia PP with Shahpur 132 kV Substation, we don't find any problem of violations of short circuit ratings of the already installed equipment on the 132 kV equipment of substations in the vicinity of Al-Arabia PP due to fault current contributions from this power house under three-phase faults as well as single phase faults.

The short circuit level of the Al-Arabia PP at 11 kV is 11.09 kA and 12.19 kA for 3-

phase and 1-phase faults respectively in the year 2018 and 12.66 kA and 14.01 kA for 3- phase and 1-phase faults respectively in the year 2021. Therefore, industry standard switchgear of the short circuit rating of 25 kA would serve the purpose as per NTDC requirement taking care of any future generation additions and system reinforcements in its electrical vicinity.

7. DYNAMIC STABILITY ANALYSIS

7.1 Assumptions & Methodology

7.1.1 Dynamic Models

The assumptions about the generator and its parameters are the same as mentioned in Chapter.2 of this report.

We have employed the generic dynamic models available in the PSS/E model library for dynamic modeling of the generator, exciter and the governor as follows;

Generator	GENROU
Excitation System	EXST1
Speed Governing System	TGOV1
Inertia Constant	H = 1.0418 MW-sec/MVA (10 MW)

7.1.2 System Conditions

Month of January 2018 has been selected for the study because it represents the peak load season after the COD of Al-Arabia Power Project and thus the loading on the lines in the vicinity of Al-Arabia PP will be maximum allowing us to judge the full impact of the plant.

The proposed Al-Arabia PP has been modeled in the dynamic simulation as per data provided by client.

All the power plants of WAPDA/NTDC from Tarbela to Hub have been dynamically represented in the simulation model.

7.1.3 Presentation of Results

The plotted results of the simulations runs are placed in Appendix-E. Each simulation is run for its first one second for the steady state conditions of the system prior to fault or disturbance. This is to establish the pre fault/disturbance conditions of the network under study were smooth and steady. Post fault recovery has been monitored for nine seconds. Usually all the transients due to non-linearity die out within 2-3 seconds after disturbance is cleared in the system.

7.1.4 Worst Fault Cases

Three phase faults are considered as the worst disturbance in the system. We have considered 3-phase fault in the closest vicinity of Al-Arabia PP i.e. right at the 132 kV bus bar of Shahpur substation, cleared in 5 cycles, as normal clearing time for 132 kV i.e. 100 ms, followed by a permanent trip of a 132 kV single circuit from Shahpur to Ludewala New. Also to fulfil the Grid Code criteria case of stuck breaker (breaker failure) single phase fault has also been studied where the fault clearing time is assumed 9 cycles i.e. 180 ms for Al-Arabia 11 kV bus bar.

7.2 Dynamic Stability Simulations' Results with Al-Arabia PP interconnected - January 2018

7.2.1 Fault at 11 kV Al-Arabia

We applied three-phase fault on Al-Arabia 11 kV bus bar, cleared fault in 5 cycles (100 ms), followed by a trip of 11 kV single circuit from Al-Arabia PP to Shahpur T2. We monitored different quantities for one second pre-fault and nine cycles after clearance of fault (post-fault) conditions and plotted the results attached in Appendix – E and discussed as follows

Fig. 1.1 Bus Voltages

The bus voltages of 132 kV bus bars of Shahpur, Ludewala New, 11 kV bus bars of Shahupur T-1 and T-2, Al-Arabia and the plant's generating level bus bar of 6.6 kV are plotted. The results show quick recovery of the voltages after clearing of fault.

Fig. 1.2 Frequency

We see the system frequency recovers back to normal quickly after fault clearance.

Fig. 1.3 MW/MVAR Output of Generators of Al-Arabia

The MW/MVAR output of Al-Arabia PP gets back to the pre-fault output quickly after fast damping of the oscillations in its output.

Fig. 1.4 Speed and mechanical power of Generators at Al-Arabia PP

The speed deviation of the generator, after clearing fault, damps down quickly returning to normal speed. The transients in mechanical power also damp quickly and settle to a new equilibrium.

Fig. 1.5 MW Flow on Al-Arabia to Shahpur T1 11kV Single Circuit

Followed by clearing of fault, the trip of a 11 kV single circuit from Al-Arabia to Shahpur T2 causes the entire output of Al-Arabia PP to flow on the intact 11 kV circuit from Al-Arabia to T1. This causes significant loading on this line. We plotted the flows of MW and MVAR on this intact circuit and see that the power flows on this circuit attains to steady state level with power swings damping down fast.

Fig. 1.6 Rotor Angles

The rotor angles of the generators of Al-Arabia PP, JSM PP, Liberty-P, Jinnah and Chashmah are plotted relative to machines at Hub 500 kV. The results show that the rotor angle of Al-Arabia PP gets back after the first swing and damps down quickly. Similarly, the rotor angles of other machines swing little after the fault and damp fast after clearing of fault. The system is strongly stable and very strong in damping the post fault oscillations.

7.2.2 Fault at 11 kV Al-Arabia (Stuck Breaker)

We applied single-phase fault on Al-Arabia 11 kV bus bar, cleared fault in 9 cycles (180 ms), followed by a trip of 11 kV single circuit from Al-Arabia PP to Shahpur T2. We monitored different quantities for one second pre-fault and nine cycles after clearance of fault (post-fault) conditions and plotted the results attached in Appendix – E and discussed as follows

Fig. 2.1 Bus Voltages

The bus voltages of 132 kV bus bars of Shahpur, Ludewala New, 11 kV bus bars of Shahupur T-1 and T-2, Al-Arabia and the plant's generating level bus bar of 6.6 kV are plotted. The results show quick recovery of the voltages after clearing of fault.

Fig. 2.2 Frequency

We see the system frequency recovers back to normal quickly after fault clearance.

Fig. 2.3 MW/MVAR Output of Generators of Al-Arabia

The MW/MVAR output of Al-Arabia PP gets back to the pre-fault output quickly after fast damping of the oscillations in its output.

Fig. 2.4 Speed and mechanical power of Generators at Al-Arabia PP

The speed deviation of the generator, after clearing fault, damps down quickly returning to normal speed. The transients in mechanical power also damp quickly and settle to a new equilibrium.

Fig. 2.5 MW Flow on Al-Arabia to Shahpur T1 11kV Single Circuit

Followed by clearing of fault, the trip of a 11 kV single circuit from Al-Arabia to Shahpur T2 causes the entire output of Al-Arabia PP to flow on the intact 11 kV circuit from Al-Arabia to T1. This causes significant loading on this line. We plotted the flows of MW and MVAR on this intact circuit and see that the power flows on this circuit attains to steady state level with power swings damping down fast.

Fig. 2.6 Rotor Angles

The rotor angles of the generators of Al-Arabia PP, JSM PP, Liberty-P, Jinnah and Chashmah are plotted relative to machines at Hub 500 kV. The results show that the rotor angle of Al-Arabia PP gets back after the first swing and damps down quickly. Similarly, the rotor angles of other machines swing little after the fault and damp fast after clearing of fault. The system is strongly stable and very strong in damping the post fault oscillations.

7.2.3 Fault at 132 kV Shahpur

We applied three-phase fault on Shahpur 132 kV bus bar, cleared fault in 5 cycles (100 ms), followed by a trip of 132 kV single circuit from Shahpur to Ludewala New. We monitored different quantities for one second pre-fault and nine cycles after clearance of fault (post-fault) conditions and plotted the results attached in Appendix – E and discussed as follows

Fig. 3.1 Bus Voltages

The bus voltages of 132 kV bus bars of Shahpur, Ludewala New, 11 kV bus bars of Shahupur T-1 and T-2, Al-Arabia and the plant's generating level bus bar of 6.6 kV are plotted. The results show quick recovery of the voltages after clearing of fault.

Fig. 3.2 Frequency

We see the system frequency recovers back to normal quickly after fault clearance.

Fig. 3.3 MW/MVAR Output of Generators of Al-Arabia

The MW/MVAR output of Al-Arabia PP gets back to the pre-fault output quickly after fast damping of the oscillations in its output.

Fig. 3.4 Speed and mechanical power of Generators at Al-Arabia PP

The speed deviation of the generator, after clearing fault, damps down quickly returning to normal speed. The transients in mechanical power also damp quickly and settle to a new equilibrium.

Fig. 3.5 MW Flow on Shahpur to T-Flying Cement 132 kV Single Circuit

Followed by clearing of fault, the trip of a 132 kV single circuit from Shahpur to Ludewala New causes the entire power to flow on the adjacent 132 kV circuit from Shahpur to T-Flying Cement. This causes significant loading on this line. We plotted the flows of MW and MVAR on this intact circuit and see that the power flows on this circuit attains to steady state level with power swings damping down fast.

Fig. 3.6 Rotor Angles

The rotor angles of the generators of Al-Arabia PP, JSM PP, Liberty-P, Jinnah and Chashmah are plotted relative to machines at Hub 500 kV. The results show that the

rotor angle of Al-Arabia PP gets back after the first swing and damps down quickly. Similarly, the rotor angles of other machines swing little after the fault and damp fast after clearing of fault. The system is strongly stable and very strong in damping the post fault oscillations.

7.3 Conclusion of Dynamic Stability Analysis

The results of dynamic stability carried out for January 2018 show that the system is very strong and stable for the proposed scheme for the severest possible faults of 132 kV and 11 kV systems near to Al-Arabia PP under all events of disturbances. Therefore, there is no problem of dynamic stability for interconnection of Al-Arabia PP; it fulfills all the criteria of dynamic stability.

8. CONCLUSIONS

- Grid Interconnection study for Al-Arabia Sugar Mills PP has been carried out. The nearest grid facility is the 132 kV substation of Shahpur. Due to the location of Al-Arabia Sugar Mills PP, the most feasible interconnection scheme would be connecting it directly on the 11 kV bus bar of Shahpur 132/11 kV grid on double circuit of Osprey conductor of length 2.5 Km.
- The up-coming chapters discuss in detail the location and interconnection of the Al-Arabia Sugar Mills PP. Sketches are shown in Appendix-B.
- In view of planned COD of the Al-Arabia Sugar Mills PP in November 2017, the above proposed interconnection scheme has been assessed for steady state conditions through detailed load flow studies, short circuit analysis and stability criterion for January 2018 for maximum thermal power dispatches in the grid during winter which is the crushing season. Load flow has also been carried out for off peak scenario of January 2018.
- In an extended term scenario, January 2021 has been studied to evaluate the performance of the proposed interconnection scheme. The system conditions of normal and N-1 contingency have been examined for all scenarios to meet the reliability criteria. Along with it, short circuit analysis has been carried out for a complete check of the system.
- Load Flow analysis indicates that power distribution is in local grids therefore losses are reduced and voltage profile of the area is improved. Beside this, it also has an advantage that demand from NTDC to FESCO will decrease as local generation is available.
- The short circuit level of the Al-Arabia Power Project is 12.66 kA and 14.01 at 11 kV for 3-phase and 1-phase faults respectively for the year 2021.Therefore industry standard switchgear of the short circuit rating of 25 kA would be fine to be installed at 11 kV switchyard of Al-Arabia Sugar Mills PP taking care of any future generation additions and system reinforcements in its electrical vicinity and also fulfills the NEPRA Grid Code requirements specified for 11 kV switchgears. There are no violations of exceeding the rating of the equipment in the vicinity of Al-Arabia Sugar Mills PP due to contribution of fault current from it.
- The dynamic stability analysis of proposed scheme of interconnection has been

carried out. The stability has been tested for the worst cases, i.e. three phase fault right on the 132 kV bus bar of Shahpur substation followed by trip of a 132 kV single circuit from Shahpur to Ludewala New has been performed for fault Clearing of 5 cycles (100 ms), as understood to be the normal fault clearing time of 132 kV protection system.

- Steady state analysis by load flows, short circuit and stability criterion reveals that proposed scheme is adequate to fulfill all the demands.

FESCO
Faisalabad Electric Supply Company Limited

Tel # 041-9220179
Fax # 041-9220511

OFFICE OF THE
CHIEF ENGINEER (P&D)
FESCO FAISALABAD

No. **4381-83**

Dated: - **08 / 06 / 2017**

Mr. Abid Rasool Awan,
Asst. General Manager (Legal),
Al-Arabia Sugar Mills Limited,
55-K, Model Town Lahore.

Subject: **OFFER TO EVACUATE UP TO 09 MW POWER FROM AL- ARABIA SUGAR MILLS LIMITED SHAHPUR DISTRICT SARGODHA**

Reference: Your Office letter dated 05.06.2017.

In the letter under reference, you have offered 09-MW power for evacuation to FESCO from installed capacity of 18-MW.

In the light of CPPA(G) letter No.CPPAGL/DGM-II/MT-IV/MSML/16783-85 dated 24.02.2017, CPPA(G) has no dealing with Captive Power Plant.

So, you can submit Grid Interconnection Study Report prepared by an approved consultant directly to FESCO. It is also allowed to utilize FESCO data for preparation of cited study report.

It is further added that, in case CPPA (G) limited raises any objection (s) on your case, the same will have to be attended before further proceeding.

(Engr. Mujahid Pervaiz Chattha)
Chief Engineer (P&D)
FESCO Faisalabad

CC

1. Chief Commercial Officer, FESCO Faisalabad.
2. Dy. General Manager-II CPPA (G) Limited Ground floor ENERCON Building, G-5/2, Islamabad along with copy of referred letter.

FAISALABAD ELECTRIC SUPPLY COMPANY LIMITD

FESCO

OFFICE OF THE
CHIEF ENGINEER (P&D)
FESCO, FAISALABAD

Phone # 041-9220179
Fax # 041-9220511

No. 7791-93 **Dated.** 09/11/2017

Al-Arabia Sugar Mills Limited,
55-K Model Town, Lahore
Lahore

SUBJECT: **18 MW CO-GENERATION POWER PROJECT AL-ARABIA SUGAR MILLS LTD AT SARGODHA ROAD (2 KM), SHAHPUR SADAR, DISTRICT SARGODHA, PUNJAB.**

Ref: This office letter no. 6402-6407 Dated 31-08-2017.

Please provide the Generation License and Upfront Tariff issued / approved from NEPRA regarding purchase of power from subject project to proceed further in this regard.

(MUJAHID PERVAIZ CHATTHA)
CHIEF ENGINEER (P&D)
FESCO FAISALABAD

Copies to:
1. Director (MT&CM) FESCO Faisalabad.
2. PD (Construction) FESCO Faisalabad.