



Ref. No. HSML/NEPRA/1799

Dated: March 27, 2017

The Registrar  
National Electric Power Regulatory Authority  
NEPRA Tower, Attaturk Avenue (East)  
Sector G-5/ I  
Islamabad

**Subject: Application for a new Generation License for 30 MW Cogeneration Power Project (Phase-2) by M/s Hamza Sugar Mills Limited**

Dear Sir

I, Muhammad Latif Anjum, Dy. General Manager (Power), being the authorized representative of M/S HAMZA SUGAR MILLS LIMITED by virtue of Board Resolution dated 21<sup>st</sup> March, 2017, hereby apply to National Electric Power Regulatory Authority for grant of Generation license to the M/S HAMZA SUGAR MILLS LIMITED pursuant to section (3) 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 provision of the National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999, and undertake to abide by the terms and provisions of the above-said regulations. I 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.

Bank Draft No. \_\_\_\_\_ dated \_\_\_\_/03/2017 in the sum of Rs.293,728/-, being the non-refundable license application fee calculated in accordance with the schedule II to the National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999, is also attached herewith.

We shall be pleased to provide any further information you may require.

Thanking You.  
For Hamza Sugar Mills Limited

  
(Muhammad Latif Anjum)  
Dy. General Manager (Power)

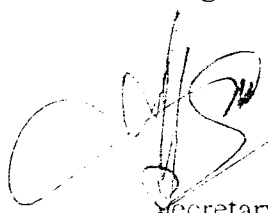
March 27, 2017


**EXTRACT OF RESOLUTION PASSED BY THE BOARD  
OF DIRECTORS OF M/S.HAMZA SUGAR MILLS  
LIMITED, IN ITS MEETING HELD ON MARCH 20,2017  
AT 11.00 A.M AT ITS THE REGISTERED OFFICE A/22,  
S.I.T.E., MAURIPUR ROAD, KARACHI.**

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~RESOLVED THAT;

Mr. Muhammad Latif Anjum. Dy. General Manager (Power) of Hamza Sugar Mills Limited (HSML) shall be authorized on behalf of Hamza Sugar Mills Limited (HSML) to sign and submit application to National Electric Power Regulatory Authority (NEPRA) for grant of Generation License for 30MW (Gross) Co-Generations Power Plant (Phase-2) by Hamza Sugar Mills Limited, located at Jetha Bhutta, Tehsil Khanpur, District Rahim Yar Khan . He shall also be authorized to sign all required agreements/applications/documents which may be required by NEPRA for grant of Generation License

  
Secretary



**CERTIFICATE OF  
INCORPORATION**

# GOVERNMENT OF PAKISTAN



## CERTIFICATE OF INCORPORATION ON CHANGE OF NAME

[Under section 40 of the Companies Ordinance, 1984 (XLVII of 1984)]

Company Registration No. 4-1310 of 1965-63

I hereby certify that pursuant to the provisions of section 38 or section 39 of the Companies Ordinance, 1984 (XLVII of 1984) the name of -----  
HYKSONS SUGAR MILLS LIMITED

has, with the approval of the Registrar of Companies, Pakistan, been changed to  
HAMZA SUGAR MILLS LIMITED

and that the said company has been duly incorporated as a company limited by  
shares as a  
Public Company under the provisions of the said Ordinance.

This change is subject to the condition that for period of one year from the date of issue of this certificate, the company shall continue to mention its former name alongwith its new name on the outside of every office or place in which its business is carried on and in every document or notice referred to in clauses (a) and (c) of section 143.

Given under my hand at KARACHI  
this 15th day of JULY one thousand nine  
hundred and SEVENTY-NINE

Fee Rs. 200/-

C.R.O.-2

(TAHIR MAHMUD)

JOINT REGISTRAR  
OF COMPANIES  
SLA-2.

No. 1822 588-01/13-7-PP



Certified to be a true Copy  
by the  
Joint Registrar of Companies  
SLA-2.

THE COMPANIES ORDINANCE, 1984

(COMPANY LIMITED BY SHARES)

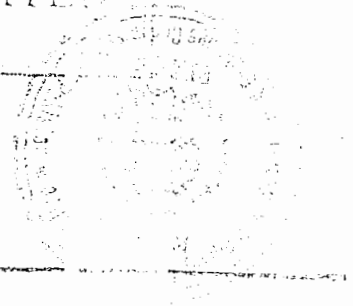
*Memorandum*

*and*

*Articles of Association*

*of*

HAMZA SUGAR MILLS LIMITED



THE COMPANIES ORDINANCE, 1984

COMPANY LIMITED BY SHARES

*Memorandum of Association*

of

HAMZA SUGAR MILLS LIMITED

- I. The name of the Company is "HAMZA SUGAR MILLS LIMITED".
- II. The Registered Office of the Company shall be situated in the province of Sind.
- III. The objects for which the Company is established are :-

(I) To carry on in Pakistan or in any part of the world all or any of the businesses of Sugar manufacturers and dealers in all their respective territories and in particular without prejudice to the generality of the foregoing words to carry on the business of manufacturing, producing, refining, processing, storing, transporting, exporting, exchanging, buying, selling, distributing and dealing in sugar of any variety or varieties, sugar molasses, sugar candy, jaggery, sugar-cane, sugar-beet and any other vegetable, fruit or part or any other material from which sugar and allied products could be manufactured, and all products thereof including confectionery, tinned, canned, bottled and preserved fruits and vegetables, syrups, glucose, essences and food products generally and/or by-products thereof, of all kinds, including ethyl alcohol, acetone, carbon dioxide, hydrogen, potash, cane-wax, fertilizers, and all products generally provided always that the alcohol and spirit shall only be manufactured for industrial consumption and not for human consumption and for the purpose hereof to own, acquire, construct, erect, operate plant or plants with all the machinery, equipment, refineries, buildings, mills and other works and supporting facilities necessary or incidental to the above objects of the Company or to them.

To grow, plant, cultivate or otherwise acquire sugarcane, sugar-beet, or other qualities and sorts of any variety or varieties on land or on lands or on lands of others, on such terms and conditions as the Company may move, from time to time and advance money and loans to growers, planters, processors and provide them with seeds, manure, fertilizers, and other facilities, on such terms and conditions as the Company may move, from time to time and to acquire all or any such goods, or to acquire, manufacture, process, or fruit, vegetable or corn in (Pakistan) or in any other country or in any other part of the world and to sell, export, import, or otherwise dispose of the same and to do all such other things as may be necessary or incidental to the above objects of the Company or to them.

- (3) To carry on the business in all its branches, in Pakistan or in any part of the world, as brokers, commission agents, buyers, sellers and dealers of sugar of any variety or varieties, sugar-beet, fruit, vegetable, corn or any produce or form of such commodities or of advancing of money by way of loan upon the security in respect of the same or upon or against bills of lading, dock warrants or other documents of title representing the same.
- (4) To carry on the business of manufacturers of and dealers in all kinds and classes of pulp including Sugarcane bagasse pulp, sulphate wood pulp, mechanical pulp, and soda pulp and paper of all kinds, including transparent, writing, printing, glazed, absorbent, news-printing, wrapping, tissue, blotting, filter, bank and bond, brown, buff or coloured, cloth-lined, azuleid, cream-laid, green or waterproof, handmade parchment, drawing, kraft, carbon, envelope, cardboard, box board, veneer board, straw board, mill board, duplex and triplex boards, wall and ceiling papers and all kinds of articles in the manufacture of which pulp, paper or board is used and materials used in the manufacture or treatment of pulp and paper.
- (5) To carry on the business of manufacturers of and dealers in chemical products of any nature and kind whatsoever and as wholesale and retail chemists and druggists, analytical chemists, dyers, oil and colour men, importers, exporters and manufacturers of and dealers in heavy chemicals, alkalis, acids, drugs, tannins, essences, pharmaceutical, photographic dyes, medicinal, chemical, industrial and other preparations and articles of any nature and kind whatsoever, mineral and other waters, cements, oils, paints, pigments and varnishes, dyes, inks, dyes, dyestuffs, organic or mineral intermediates, paint and colour grinders, makers of and dealers in proprietary articles of all kinds, and of electrical chemical, photographic, - surgical and scientific apparatus and materials.
- (6) To acquire by purchase, lease or otherwise, ranches and sheep farms, poultry farms and to carry on the trades or businesses of cattle rearers, sheep farmers and poultry farmers, and to export, import, procure, manufacture, produce, vend, buy, sell, distribute and deal in meat, live cattle and sheep, poultry, eggs, hides and skins, fat, tallow, grease, offal and other, animal products.
- (7) To carry on all or any of the businesses of farmers, dairymen, milk contractors, dairy farmers, milkers, purveyors and vendors of milk, or can, cheese, butter, poultry and provision of all kinds, growers of and dealers in corn, hay and straw, seedmen and nursery-men, and to buy, sell and trade in any goods or articles which in any of the above businesses, or any other business associated therewith, or in the carrying interest of the company may be advantageously carried on by the company.





We, the several persons, whose names and addresses are subscribed, are a number 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 set opposite our respective names.

Name of subscribers	Name, address and description of the subscribers	No. of Shares taken by each Subscriber	Witness
1. Sd/- Mr. K. M. Munier	1. Mr. K. M. Munier 67-68A, Queens Road, Karachi, Industrialist.	Ten	
2. Sd/- Mr. K. M. Munier	2. Mr. K. M. Munier 13, Old Chitron, Karachi, Industrialist.	Ten	
3. Sd/- Mr. K. M. Asaf	3. Mr. K. M. Asaf 67-68A, Queens Road, Karachi, Industrialist.	Ten	
4. Sd/- Mr. K. M. Asaf	4. Mr. K. M. Asaf 13, Old Chitron, Karachi, Industrialist.	Ten	
5. Sd/- Mrs. Anwar Jehan Basheer	5. Mrs. Anwar Jehan Basheer 67-68A, Queens Road, Karachi, Industrialist.	Ten	
6. Sd/- Mrs. Khairat	6. Mrs. Khairat Khannam Minneer 13, Old Chitron, Karachi, Industrialist.	Ten	
7. Sd/- Mrs. Shamim Khan	7. Mrs. Shamim Khan 67-68A, Queens Road, Karachi, Industrialist.	Ten	

Sd/- (SULTAN ALI JILAN MUSSAVI)

Secretary

Govindgopal & Co. Chartered Accountants, 11, Park Drive, New Market,  
2nd Floor, Market Road, Karachi-2

course of being wound up, such statutory rights (if any) as are incapable of being varied or excluded by these Articles.

#### SECRECY

150. Every Director, Manager, Secretary, Auditor, Officer, Servant, Agent or other person employed in the business of the Company shall, if so required by the Directors before entering upon his duties or at any other time, sign a declaration pledging himself to observe a strict secrecy respecting all transactions of the Company and the state of its accounts with individuals, and in matters relating thereto, 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 so to do by the Directors, or by any Meeting, or by a Court of Law, or by the persons to whom such matters relate, and except so far as may be necessary in order to comply with any of the provisions in these Articles contained.

#### INDEMNITY

151. Save and except so far as the provisions of this article shall be voided any provisions of the Ordinance, the Directors, Chief Executive, Chief Accountant, Auditors, Secretary and other Officers for the time being of the Company and the Trustees (if any) for the time being acting in relation to any of the affairs of the Company, and their respective executors or administrators shall be indemnified and secured harmless out of the assets of the Company from and against all actions, suits, damages, costs, charges and expenses which they or any of them, their or any of their executors or administrators, shall or may incur or sustain by reason of or any act done, concurred in or omitted in or about the execution of their duty or supposed duty in their respective offices or trusts, except such (if any) as they shall incur or sustain through their own willful neglect or default respectively and none of them shall be answerable for the acts, receipts, neglects or defaults of any other of them, or for joining in any receipt for the sake of conformity or for any bankers or other persons with whom any moneys or effects of the Company shall be deposited or safe-kept, or for the insufficiency or deficiency of any security upon which any moneys of the Company shall be placed lent or invested, or for any loss, misfortune or damage which may happen in the execution of their respective offices or trusts, or in relation thereto, except if the same shall happen by or through their own willful neglect or default respectively.

Indemnity of  
Directors  
and Officers.

#### WINDING UP

152. If the Company shall be wound up, the liquidator may, with the sanction of a Special Resolution of the Company and any other sanction required by law, divide the assets of the Company in specie or kind (whether they shall consist of the whole or part of the assets of the Company) (whether they shall consist of property of the same kind or of different kinds) and may, for such purpose, sell such assets or property to be divided as aforesaid in such manner as he may think fit.

(if he has no registered address in Pakistan) to the address, if any, within Pakistan supplied by him to the Company for the giving of notices to him. Where a notice is sent by post, service of the notice shall be deemed to be effected by properly addressing, prepaying and posting a letter containing the notice, and, unless the contrary is proved, to have been effected at the time at which the letter should be delivered in the ordinary course of post.

Notice where  
no address  
in Pakistan  
registered.

145. If a member has no registered address in Pakistan and has not supplied at the Company an address within Pakistan for the giving of notices to him, a notice addressed to him and advertised in a news paper circulating in the neighbourhood of the office shall be deemed to be duly given to him on the day on which the advertisement appears.

Notice to  
joint holders.

146. A notice may be given by the Company to the joint holders of a Share by giving the notice to the joint holder named first in the Register in respect of the share.

Notice after  
death or  
insolvency.

147. A notice may be given by the Company to the persons entitled to a Share in consequence of the death or insolvency of a Member by sending it through the post in a prepared letter addressed to them by name, or by the title of representatives of the deceased, or assignee of the insolvent, or by any like description, at the address (if any) in Pakistan supplied for the purpose by the persons claiming to be so entitled, or (until such an address has been so supplied) by giving the notice in any manner in which the same might have been given if the death or insolvency had not occurred.

Notice of  
General Meeting.

148. Notice of every General Meeting shall be given in some manner hereinafter authorised to (a) every Member of the Company except those Members who (having no registered address within Pakistan) have not supplied to the Company an address within Pakistan for the giving of notices to them, to (b) every person entitled to a Share in consequence of the death or insolvency of a Member, who but for his death or insolvency, would be entitled to receive notice of the Meeting and (c) to the auditors of the Company.

#### RECONSTRUCTION

Reconstruction

149. On any sale of the undertaking of the Company, the Directors or the Liquidator in winding-up may, if authorised by a Special Resolution, accept fully paid up shares, debentures or securities of any other Company, whether incorporated in Pakistan or not, 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 Liquidator (in winding-up), may distribute such shares, debentures or securities, or any other property of the Company amongst the members without reallocation, or vest the same in trustees for them and any special Resolution may provide for the distribution or appropriation of the cash, shares, debentures, securities, benefits or property otherwise than in accordance with the strict legal rights of the members or contribution of the company, and for the valuation of any such securities or property at such prices and in such manner as the members may approve, and all holders of shares shall be bound to agree to be bound by any resolution of the Directors or authorised, and the members in relation to the reconstruction of the company shall be bound to be or as in the

## RESERVES

141. The Directors may from time to time set aside out of profits of the Company and carry to reserve such sums as they think proper, which, at the discretion of the directors, shall be applicable for meeting contingencies or for the gradual liquidation of any debt or liability of the Company or for repairing or maintaining the works, plant and machinery of the Company or for special dividends or bonuses or for equalising dividends or for any other purpose to which the profits of the Company may properly be applied, and pending such application may either be employed in the business of the company or be invested. The Directors may divide the reserve into such special funds as they think fit, and may consolidate into one fund any special funds or any part of any special funds into which the reserve may have been divided. The Directors may also without placing the same to reserve carry forward any profits which they may think it not prudent to divide.

Power to carry profit to reserve.

Application to reserve.

Division of reserve into funds.

Power to carry forward profits

## CAPITALISATION OF PROFITS &amp; RESERVES.

142. The Company may, upon the recommendation of the Directors, by Ordinary Resolution resolve that it is desirable to capitalise any sum standing to the credit of any of the Company's reserve accounts (including any share premium account and any capital redemption reserve fund) or any sum standing to the credit of profit and loss account or otherwise available for distribution provided that such sum is not required for paying the dividends on any shares and accordingly that the Directors be authorised and directed to apply such sum to the credit of the profit of the members in the proportion in which such sum would have been divisible amongst them had the same been applied or been applicable in paying dividends, and to apply such sum on their behalf, in paying up in full un-issued shares or debentures of the company of a nominal amount equal to such sum, such shares or debentures to be allotted and distributed credited as fully paid up to and amongst such members in the proportion aforesaid.

Power to capitalise profits

143. Whenever such a resolution as aforesaid shall have been passed, the Directors shall make all appropriations and applications of the sum resolved to be capitalised thereby and all allotment of shares and fully paid shares or debentures (if any), and generally shall do all acts and things required to give effect thereto, with full power to the Directors to make such provision for payment in cash or otherwise as they think fit in the case of shares or debentures becoming distributable in fractions and also to authorise any person to enter on behalf of all the members interested in to an agreement with the Company or any of the members to their satisfaction, to be fully paid up by the Company further shares to which they may be entitled upon such conditions and any arrangement made under the provisions of the above resolution shall be binding on all such members.

Implementation of resolution to capitalise profits

## SCHEDULE

This Schedule may be amended or added to by ordinary resolution of the Company.



powers of the Company to pay interest on shares capital as herein-before provided) no dividend shall be payable except out of the profits of the Company, or in excess of the amount recommended by the Directors.

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|--|---|
| Retention of dividends on shares pending transmission. | 132. The Directors may retain the dividends payable on shares in respect of which any person is under the provisions as to the transmission of shares hereinbefore contained entitled to become a member, or which any person under the said provisions relating to transmission is entitled to transfer, until such person shall become a member, in respect of such shares or shall duly transfer the same.   |
| Payment of Interim Dividends.                          | 133. If and so far as in the opinion of the Directors the profits of the Company justify such payments, the Directors may pay to the holders of any class of shares interim dividends thereon of such amounts and on such dates as they think fit.  |
| Unclaimed Dividends.                                   | 134. All dividends unclaimed for one year after having been declared may be invested or otherwise used by the Directors for the benefit of the Company, but the investment or payment of any unclaimed dividend or other money payable on or in respect of a share into a separate account shall not constitute the Company a trustee in respect thereof. Any dividend unclaimed after a period of three years from the date of declaration such dividends may be forfeited, and if so shall revert to the Company subject to the Rules of the Stock Exchange as in force for the time being in this regard.  |
| Deduction of debts to joint holders.                   | 135. The Director may deduct from any dividends or other monies payable to any member on or in respect of a share all sums of money (if any) presently payable by him to the Company.   |
| Dividends due to joint holders.                        | 136. If several persons are registered as joint holders of any share, or are entitled to a share in consequence of the death or insolvency of the holder, any one of them may give effectual receipts for any dividend or other monies payable on or in respect of the share.   |
| Notice of Dividends.                                   | 137. Notice of any dividend that may have been declared shall be given in the manner prescribed by these Articles to the members entitled to share therein.   |
| Dividends not to bear interest.                        | 138. No dividend or other moneys payable on or in respect of a share shall bear interest as against the company.  |
| Dividends payable.                                     | 139. All dividends shall belong and be paid (subject to the foregoing provisions) to the members who shall be on the register at the date on which the dividends shall be declared, notwithstanding any subsequent transfer or transmission of shares.  |
| Payment of Dividends in specie.                        | 140. The Directors may upon the recommendation of the Directors by ordinary resolution direct payment of a dividend in whole or in part by distribution of specific assets and in particular of paid up shares or of shares of any other Company or in any one or more of such ways; and the Directors shall give effect to such resolution and where any difficulty arises in regard to such distribution, the Directors may in their discretion make such arrangements as they think fit, and in particular may in the value for distribution of any assets or any part thereof, make any apportionment that may seem to them to be made to any member upon the footing of the value of the shares held by him and may vest any such assets in any person or persons. |

the authority exempts any company from making such disclosure on the ground that such disclosures would be prejudicial to the business of the Company;

(iii) contain the fullest information and explanation in regard to any reservation, observation, qualification or adverse remarks contained in the auditor's report;

(iv) circulate with it information and explanation in regard to any reservation, qualification or holding of the shares in the form prescribed.

(c) The Directors shall in all respect comply with the provisions of Section 236, 242 and 243 of the Ordinance or any statutory modifications thereof for the time being in force.

126. (a) The Directors shall send a copy of such balance sheet and profit and loss account so audited together with a copy of the auditor's report and the directors' report to the registered address of every member of the Company at least twenty-one days before the meeting at which it is to be laid before the members of the company, and shall keep a copy at the registered office of the company for the inspection of the members of the company during a period of at least twenty-one days before that meeting.

Copies of Balance Sheet and Report to be posted to members entitled.

(b) The Company shall, simultaneously with the despatch of the balance sheet and profit and loss account together with the requisite reports and five copies each of such balance sheet and profit and loss account and other documents to the Authority, the stock exchange and the Registrar of Joint Stock Companies.

(c) The Company shall:-

(i) within two months of the close of the first half of its year of account, prepare and transmit to the members and the stock exchange in which the shares of the company are listed a profit and loss account for, and balance sheet as at the end of that half year, whether audited or otherwise, and

(ii) simultaneously with the transmission of the half-yearly profit and loss account and balance sheet to the members and the stock exchange, file with the Registrar and the Authority such number of copies thereof as may be prescribed.

#### AUDIT

127. The Company shall at its Ordinary Meeting appoint as provided by the Ordinance Auditors to hold office until the next ensuing Ordinary Meeting. The Auditor's report shall be read before the Company at its General Meeting and shall be open to inspection by any member.

to appoint auditors.

No Director or other officer of the Company nor any person who is a partner in the company or in the Company, nor any company or any person who is a partner in the Company shall be capable of being appointed Auditor of the Company.

to appoint auditors.

#### RESOLUTIONS

128. Any resolution of the Company shall be validly passed if it is carried by a majority of the votes of the members of the Company present at a meeting of the Company.

to appoint auditors.

## ACCOUNTS

Directors to  
keep proper  
accounts.

Inspection  
of books.

Extent of  
inspection.

Submission of  
balance sheet  
and profit and  
loss account.

Provisions  
concerning  
balance sheet  
and Director  
report.

123 The Directors shall cause proper books of accounts to be kept as required by Section 230 of the Ordinance.

124 The books of accounts shall be kept at the office or at such other place as the Directors think fit, and shall be open to the inspection of the Directors during business hours.

125 The Directors shall from time to time determine whether, in any particular case or class of cases, or generally, and to what extent, and at what times and places and under what conditions or regulations the accounts and books of the Company, or any of them, shall be open to the inspection of members, and no member (other than a Director) shall have any right to inspecting any account or book or document of the Company except as conferred by law or authorised by the Directors or by the Company in General Meeting.

126 Once at least in every calendar year the Directors shall lay before the Company in General Meeting a profit and loss account and a balance sheet both made up to a date not more than six months before the meeting. The Directors shall in preparing every such balance sheet and profit and loss account have regard to the provisions of the Ordinance applicable thereto.

127. (a) The balance sheet and profit and loss account of the Company shall be approved by the Directors and shall be signed by the Chief Executive and at least one Director.

(b) When the Chief Executive is for the time being not in Pakistan, then the balance sheet and profit and loss account or income and expenditure account of the Company shall be signed by not less than two Directors for the time being in Pakistan but in such a case there shall be subjoined to the balance sheet and profit and loss account or income and expenditure account a statement signed by such Directors explaining the reasons for non-compliance with the provisions of Clause (a) above.

(c) The Directors shall make out and attach to every balance sheet a report with respect to the state of the company's affairs, the amount, if any, which they recommend to be paid by way of dividend, and the amount, if any, which they propose to carry to the Reserve Fund, General Reserve or Reserve Account shown specifically in the balance sheet or to a Reserve Fund, General Reserve or Reserve Account to be shown separately in a subsequent balance sheet.

(d) The Directors' report shall in addition to the matters specified in Clause (c) above:

(i) disclose any material contingent liabilities affecting financial position of the company which have occurred during the end of the financial year of the company to which the balance sheet relates and the provisions therefor;

(ii) so far as is material Company's affairs, have occurred during the business of the company in which the company is engaged or is to be engaged, or the nature of the state of affairs, and with any change of circumstances concerning the nature of the business in the classes of business in which the company is engaged or is to be engaged.

other Directors of the Company and if he ceases to hold the office of the Director from any cause he shall ipso facto and immediately cease to be Chief Executive/Managing Director.

112. The remuneration of a Chief Executive/Managing Director shall from time to time be fixed by the Directors.

Remuneration  
of Chief Execu-  
tive/Managing  
Director.

113. The Directors may from time to time entrust to and confer upon a Chief Executive/Managing Director for the time being such of the powers exercisable under these presents by the Directors as they may think fit and may confer such powers for such time and to be exercised for such objects and purposes, and upon such terms and conditions and with such restrictions as they think expedient, and they may confer such powers either collaterally with or to the exclusion of and in substitution for all or any of the powers of the Directors in that behalf, and may from time to time revoke, withdraw, alter or vary all or any of such powers.

Power and  
duties of  
Chief Executive/  
Managing  
Director.

#### SECRETARY

114. A Secretary may be appointed by the Directors for such terms at such remuneration and upon such conditions as they may think fit, and any Secretary so appointed may be removed by them, but without prejudice to any claim he may have for damages for breach of any contract of services between him and the company.

Appointment  
and removal.

#### SEAL

115. The Director shall provide for the safe custody of the seal, which shall only be used by the authority of the Directors or a Committee of the Directors authorised by the Directors in that behalf, and every instrument to which the seal shall be signed by two Directors or by a Directors and some other person appointed by the Directors for the purpose, and in favour of any purchaser or person bonafide dealing with the Company, such signature shall be conclusive evidence of the fact that the seal has been properly affixed.

Provision  
for affixing  
seal.

#### AUTHENTICATION OF DOCUMENTS

116. Any Director or the Secretary or any person appointed by the Directors for the purpose shall have power to and to do the documents affecting the constitution of the Company and any resolution passed by the Company or the Directors, and have power to sign, records, documents and accounts relating to the business of the Company, and to certify or put thereon or extracts therefrom as true and correct copies, and where the books, records documents or accounts are kept other than the office, the Local Manager or other Officer of the Company having the custody thereof shall be deemed to be a person authorised by the Directors in that behalf.

Power to  
authenticate  
documents.

117. A document purporting to be a copy of a resolution of the Directors or of a minute of a meeting of the Directors which is certified as such in accordance with the provisions of the last preceding Article shall be conclusive evidence in favour of any person dealing with the Company that the facts stated therein are true and correct, and as the case may be, that such copy is a true and correct copy of the original as constituted (including the minutes of the meeting).

Recd

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their body as they think fit. Any committee so formed shall in the exercise of the powers so delegated conform to any regulations that may be imposed on them by the Directors.

109. A meeting of the Board for the time being at which quorum is present shall be competent to exercise all powers & discretions for the time being exercisable by the Board. The quorum necessary for the transaction of the Board may be determined by the board but the quorum shall be not less than three Directors.
110. The meetings and proceedings of any such committee consisting of two or more members shall be governed by the provisions of these Articles regulating the meeting and proceedings of the Directors, so far as the same are applicable and are not superseded by any regulations made by the Director under the last preceding Article.
111. A resolution in writing signed by all the Directors not being less than three Directors for the time being entitled to receive notice of Meetings of Board shall be as valid and effectual as if the same had been passed at a Board Meeting duly convened and held. Provided that such resolution does not relate to the matters specified in Section 196(2) of the Ordinance.
112. The Directors shall cause minutes to be made in books to be provided for the purposes:-
- (a) of all appointments of Officers made by the Directors;
  - (b) of the names of the Directors present at each meeting of Directors and of any committee of Directors;
  - (c) of the names of participants of General Meeting; and
  - (d) of all resolutions and proceedings at all meetings of the Company and of any class of members of the company and of the Director and of Committee of Directors
113. The Directors may admit any members of the staff, including any Managing Director or other salaried Director who is in the whole-time employment of the Company or any of its subsidiaries or associated companies notwithstanding that he is a Director, to participate in staff pension under/or life insurance scheme of the Company.
114. The Directors may, at their discretion, fix and pay pensions or allowances to any retired member of the staff, including any Managing Director or other retired salaried Director who shall have been in the whole-time employment of the Company or any of its subsidiaries or associated Companies for a period of at least five years, and being dependent on any such members of the staff after his death.

#### CHIEF EXECUTIVE/MANAGING DIRECTOR

Appointment of  
Chief Executive/  
Managing  
Director

The Directors may from time to time appoint any person as the Chief Executive/Managing Director in accordance with the provisions of Section 199 to 201 of the Ordinance and designate such Chief Executive as Managing Director of the Company and may subject to the provisions of Section 202 of the Ordinance from time to time remove or discontinue from office and appoint another in his place.

What provisions  
shall be  
subject to

A Chief Executive/Managing Director shall be subject to the provisions of the Sections 199 to 201 of the Ordinance as to removal or

local board or agency for managing any of the affairs of the Company in any such specified locality, and may appoint any persons to be members of such local board, or managers or agents and may fix their remuneration. And the Directors from time to time, and at any time, may delegate to any person so appointed any of the powers, authorities and discretions for the time being vested in the Directors, other than their power to make calls, and may authorise the members for the time being of any local board, or any of them, to fill up any vacancies therein, and to act notwithstanding vacancies, and any such appointment or delegation may be made on such terms and subject to such conditions as the Directors may think fit, and the Directors may at any time remove any persons so appointed, and may annul or vary any such delegation.

102. The Directors may at any time, and from time to time, by power of Attorney under the Seal of the Company, appoint any person or persons to be the Attorney or Attorneys of the Company for such purposes and with such powers, authorities and discretions (not exceeding those vested in or exercisable by the Directors under these powers, and for such period and subject to such conditions as the Directors may from time to time think fit; and any such appointment may (if the Directors think fit) be made in favour of the member or any of the members of any local board established as aforesaid, or in favour of any company, or of the members, directors, managers, or managers of any company or firm, or in favour of any fluctuating body of persons, whether nominated directly by the Directors and such Power of Attorney may contain such provisions for the protection or convenience of persons dealing with such Attorneys as the Directors think fit.

Power of Attorney

103. And such delegates or Attorneys as aforesaid may be authorised by the Directors to sub-delegate all or any of their powers, authorities and discretions for the time being vested in them.

Sub-delegation

104. The Company may exercise the powers conferred by Section 213 of the Companies Ordinance and such powers shall accordingly be vested in the Directors.

Seal for use abroad.

#### PROCEEDINGS OF DIRECTORS

105. The directors may meet together for the dispatch of business, adjourn and otherwise regulate their meetings as they think fit. A Director may, and the Secretary on the request of a Director shall, at any time summon a meeting of the Directors. Notice of meeting of the Directors shall be sent to all directors by post.

Notice of meeting

106. The directors may elect a Chairman of the meetings and determine the period for which he is to hold office, and if no such Chairman be elected, the directors may meeting the Chairman or if not present within fifteen minutes after the time appointed for the meeting, the directors may choose any of their members to be Chairman of the meeting.

Chairman

107. Any resolution put to a meeting shall be decided by a majority of votes, and in case of an equality of votes, the Chairman shall have a casting vote.

Decided by a majority of votes

Chairman

108. The directors may delegate any of their powers to committees consisting of such members as they think fit.

Delegation of powers

Committee

Chairman

Secretary

Chairman

Secretary

Chairman

Secretary

Chairman

Secretary

Chairman

Secretary

Chairman

Secretary

Chairman

Secretary

Chairman

Secretary

to the Company, in which it is interested, or for any other purposes, and to execute and do all such deeds and things as may be requisite in relation to any such trust, and to provide for the remuneration of such trustee or trustees.

- |   |   |
|---|---|
| To bring and defend legal proceedings etc.                                  | (6) To institute, conduct, defend, compound or abandon any legal proceedings by or against the Company or its officers or otherwise concerning the affairs of the Company, and also to compound and allow time for payment or satisfaction of any debts due, and of any claims or demands by or against the Company.  |
| To refer to arbitration   | (7) To refer any claims or demands by or against the Company to arbitration, and observe and perform the awards.  |
| To give receipts.   | (8) To make and give receipts, releases and other discharges for moneys payable to the Company, and for the claims and demands of the company.  |
| To authorize acceptance etc.  | (9) To determine who shall be entitled to sign on the Company's behalf bills, notes, receipts, acceptances, endorsements, cheques, releases, contracts, and documents.  |
| To contribute to associations and funds for benefit of Company's employees. | (10) To establish and support, or aid in the establishment and support of such associations, institutions, trusts, funds or conveniences as they may consider calculated to benefit employees or ex-employees of the Company, or dependants or connections of such employees or ex-employees, and to grant, or agree to grant, or give the right to pension or allowances or other payments to any employees or ex-employees, subject if they think fit to such terms and conditions as they determine. |
| To invest moneys  | (11) To invest and deal with any of the moneys of the Company upon securities (not being Shares in this Company) and in such manner as they may think fit, and from time to time to vary or realise such investment.  |
| To give percentages   | (12) To give to any person employed by the Company a commission on the profits of any particular business or transaction, or a share in the general profits of the Company, and such commission or share of profit shall be treated as part of the working expenses of the Company.   |
| To make bye-laws  | (13) From time to time to make, vary and repeal bye-laws for the regulation of the business of the Company, its officers and servants.  |
| To make contracts etc.  | (14) To enter into all such negotiations and contracts and covenants and vary all such contracts, and execute and do all such acts, deeds and things in relation to the business of the Company as they may consider expedient, in relation to any of the matters aforesaid or otherwise for the purposes of the company.   |

#### GENERAL MANAGEMENT

109. The Directors may from time to time provide for the management and administration of the business of the Company in any special manner, whether at home or abroad, in such manner as they think fit, and any provisions contained in the Memorandum of Association or in the Articles of Association shall be deemed to be subject to the powers conferred by this clause.
110. The Directors from time to time, and at any time, may do all or any of the following things:

shall be determined by the Board. The number of such Directors appointed shall not be counted within minimum or maximum fixed for number of the Directors in these Articles.

96. The Company shall keep at its office a register of its directors and officers including the Chief Executive, Secretary, Chief Accountant, Auditors and Legal Advisor containing the particulars as described in Section 205 (1) (a) of the Ordinance and shall file such particulars to the Registrar in accordance with Section 205 (3) of the Ordinance.

Register of Directors

#### POWER OF DIRECTORS

97. The business of the Company shall be managed by the Directors, who may pay all expenses incurred in getting up and registering the Company, and may exercise all such powers of the Company as are not, by the Companies Ordinance or any statutory modification thereof for the time being in force, or by these Articles, required to be exercised by the Company in General Meeting subject nevertheless to any regulation of these Articles, to the provision of the said Ordinance and to such regulation, being not inconsistent with the aforesaid regulations or 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.

General Powers of Company vested in Directors

98. Without prejudice to the general powers conferred by the last preceding clause, and the other powers conferred by these powers, it is hereby expressly declared that the Directors shall have the following powers, that is to say, power:-

Specific Powers given to Directors

99. (1) To purchase or otherwise acquire for the Company any property, rights or privileges which the Company is authorised to acquire, at such price, and generally on such terms and conditions, as they think fit.
- (2) At their discretion, to pay for any property, rights or privileges acquired by, or services rendered to, the Company, either wholly or partially in cash or in shares, bonds, debentures, or other securities of the Company, and any such shares may be issued as fully paid up as may be agreed upon; and any such bonds, debentures, or other securities may be issued as fully or partly paid up on all or any part of the property of the Company.
- (3) To secure the fulfilment of any contract entered into by the Company, by mortgage or charge on all or any of the property of the Company or in such other manner as they think fit.
- (4) To appoint, and their discretion remove (if need be), Managers, Secretaries, Accountants, Legal Advisors, and Officers, Clerks, surveyors, Clerks, Agents, and Servants, and to pay them salaries or other services, as they may think fit, and to determine their powers and duties, and to require accounts from them, and to grant such remuneration or other allowances as they may think fit.

To acquire property

To pay in debentures

To secure contract by mortgage

To appoint Officers

- (5) To employ any person or persons (whether or not they are directors or officers of the Company) to act as auditors of the Company, and to require accounts from them, and to grant such remuneration or other allowances as they may think fit.

To employ auditors

The Institution or security holders, as the case may be, nominating a Director may require cancellation or removal of such Director or on resignation or death of such Director, and shall have the right to nominate another person in his stead unless such appointment is otherwise stipulated under the terms of an agreement or contract, in which case the appointment and vacancy shall be regulated by those stipulations.

Modaraba and  
PTC Directors

- (b) The Directors shall have powers to co-opt additional Directors nominated by a Modaraba Company or a Modaraba or by any PTC or TFC holders or their trustees or representatives where such appointment is required by financing party and such directors shall act as a Director during subsistence of finance under Modaraba or PTC/TFC Contracts. Such Director may be called Modaraba or PTC Directors and shall not be required to hold any qualification shares and shall have the same rights and privileges and be subject to same responsibilities as other Directors of the Company.

Alternate  
Director

92. A Director who is about to leave or is absent from Pakistan may, with the approval of Board, appoint any person including another Director to be an Alternate Director during his absence. Provided that such appointee shall be deemed to be Director and may exercise and perform all such powers, discretions and duties as his appointor could have performed but not including power of appointing a substitute and such appointee while he holds office as Alternate Director shall be entitled to notice of meeting of Directors and to attend and vote thereat accordingly; and shall ipso facto vacate office when his appointor returns to similar office as a Director or removes the appointee from the office. An appointment or removal under this Article shall be effected by a notice in writing under the hand of a Director making the same.

Additional  
Directors

93. The Directors shall have power to appoint or co-opt persons as additional Directors with or without qualification, provided majority of Directors concur in such appointment. Additional Directors shall retire from the office along with all other Directors when the term of Directors expires. They shall be eligible for re-election.

Trust Deeds  
Directors

94. Any Trust Deed for securing debentures or debenture stock, in so far as arranged, provide for the appointment from time to time of the trustee thereof or by holders of the debentures or debenture stocks of some person to be a Director of the Company and may empower such trustees or holders of debentures or debenture stocks from time to time to appoint any Director so appointed. The Director appointed under this clause is herein referred to as the "Debenture Director" and the term "Debenture Director" means the Director for the time being appointed under this Article. The Debenture Director shall not be bound to hold any qualification shares and shall not be liable to retire by rotation or be removed by the Company. The Trust Deed may contain any other provisions as may be arranged between the Company and the trustee thereof and all such provisions shall have effect notwithstanding anything to the contrary provided herein contained.

95. The Directors shall have power to appoint a person as a Technical Director and when Technical Director may be appointed, the number of members of the Board for a fixed period in such appointment shall be determined by the Board.



...shall be liable to be disqualified by the Court on application made by the Company.

...shall be liable to be disqualified by the Court on application made by the Company.

Subject to the provisions of Section 152(1)(g) of the Companies Act, 1956, a Director may, in addition to the remuneration payable to him as such Director, receive any other remuneration or honorarium or fee or any other benefit in connection with his office or position as Director or in connection with his duties as Director.

(c) A Director who serves on any Committee or who devotes special attention to the business of the Company or who performs special services which in the opinion of the Board, or in the case of a Director, in the opinion of the Board, are of such a nature as to require special remuneration by way of salary, honorarium or fee or any other benefit in connection with his office or position as Director or in connection with his duties as Director.

(d) The Company may pay to any Director all such reasonable expenses as he may incur in attending meetings of the Board, or of Committees of the Board, or in connection with the business of the Company.

(e) The remuneration of a Director shall be Rs. 5000 per annum, or such other sum as may be determined by the Board, or by the Company, or by the Court, or by the Government, or by the Legislature.

77. The first Directors of the Company shall be:—  
(1) Mr. K. M. Ramesh  
(2) Mr. K. M. Ramesh  
(3) Mr. K. M. Ramesh  
(4) Mr. K. M. Ramesh  
(5) Mr. K. M. Ramesh  
(6) Mr. K. M. Ramesh  
(7) Mr. K. M. Ramesh  
(8) Mr. K. M. Ramesh  
(9) Mr. K. M. Ramesh  
(10) Mr. K. M. Ramesh

Power of  
Director to  
appoint and  
dismiss  
Company  
Director

Reimbursable  
Expenses  
of  
Directors

Number of  
Directors

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

Name of subscriber.	Name, address and Description of the subscribers.	No. of Shares taken by each Subscriber.	Witness.
1. Sd/- Mr. K. M. Basheer	1. Mr. K. M. Basheer 67-68A, Queens Road, Karachi. Industrialist	Ten	Sd/- (SULTAN ALI JULLIAM HUSSAIN) Secretary C/o Gangani & Co., Chartered Accountants, Safe Deposit Chambers, 2nd Floor, Market Road, Karachi-2
2. Sd/- Mr. K. M. Munoor	2. Mr. K. M. Munoor 15, Old Clifton, Karachi. Industrialist	Ten	
3. Sd/- Mr. K. M. Asaf	3. Mr. K. M. Asaf 67-68A, Queens Road, Karachi. Industrialist	Ten	
4. Sd/- Mr. K. M. Razi	4. Mr. K. M. Razi 15, Old Clifton, Karachi. Industrialist	Ten	
5. Sd/- Mrs. Anwar Jehan Basheer	5. Mrs. Anwar Jehan Basheer 67-68A, Queens Road, Karachi. Industrialist	Ten	
6. Sd/- Mrs. Khairat Khairat Munoor	6. Mrs. Khairat Khairat Munoor 15, Old Clifton, Karachi. Industrialist	Ten	
7. Sd/- Mrs. Shamim Khan	7. Mrs. Shamim Khan 67-68A, Queens Road, Karachi. Industrialist	Ten	

Dated this 17th day of January 1954

In Witness Whereof, the several persons, whose names and addresses are subscribed, have hereunto set their hands and seals at Karachi, on the 17th day of January 1954.

Witness my hand and seal this 17th day of January 1954.

Witness my hand and seal this 17th day of January 1954.

Sd/- (SULTAN ALI JULLIAM HUSSAIN)

Witness my hand and seal this 17th day of January 1954.

company may be interested as shareholder or otherwise and unless otherwise agreed shall not be accountable for any remuneration or other benefits received by him as a Director or officer, or by virtue of his interest in such other company.

Election of Director.	82. Subject to the provisions of Article 76 the Directors other than the first Director shall be elected by the members of the Company in General Meeting in the manner laid down in Section 178 of the ordinance.
Vacation of office of Director.	83. The office of a Director shall be vacated in any of the following events, namely:-
Resignation.	(a) if he resigns his office by giving written notice to company.
In solvency.	(b) if he be adjudged insolvent or a receiving order be made against him or he makes any arrangement or composition with his creditors.
Unsound mind.	(c) if he be found to be lunatic or becomes of unsound mind.
Absence.	(d) if he absents himself from three consecutive meetings of the Directors or from all meetings of the Directors for a continuous period of three months, whichever is the longer, without leave of absence from the Directors.
Request to resign.	(e) if not being a Director as mentioned in Articles 91 and 94 he be requested in writing by all his Co. Director to resign.
	(f) if he has been debarred from holding such office under any provision of the Ordinance.
Acceptance of loans or Guarantees.	(g) if he or any firm of which he is a partner or any private company of which he is a Director accept a loan or guarantee from the Company in contravention of Section 195 of the Ordinance.
Office or profit without sanction.	(h) if, without the sanction of the Company in General Meeting, he or any firm of which he is a partner, or any private company of which he is a Director, except or hold any office of profit under the company other than that of a Director, or be a legal or Technical Advisor or Bankers.
Entering contract without consent.	(i) if without the consent of the Directors, he or any firm of which he is a partner, or any partner of such firm or a private company, of which he is a member or a Director, enters into any contract with the Company for the sale, purchase or supply of goods or materials or
Removal by resolution.	(j) if he be removed by resolution of the Company in General Meeting pursuant to Article 85 thereof.
	(k) any other event mentioned in Section 182 of the Ordinance.
Notice of intention to stand for election of Director.	84. No person shall be eligible for election to the office of Director at any General meeting unless not then fourteen days then twenty one clear days before the day appointed for the meeting notice shall have been given to the Secretary, notice in writing of the intention of that person of his intention to offer himself for election and such notice shall be transmitted by the Company to the members of the Company not less than seven days before the said meeting.
Removal of Directors.	85. The Company may, subject to Section 195 of the Ordinance, remove any Director in General Meeting remove any Director in the manner provided in Section 178 of the Ordinance. The Company may also remove any Director by resolution of the Company in General Meeting.



of the Ordinance respectively, before the expiration of his period of office (but so that such removal shall be without prejudice to any claim such Director may have for damages for breach of any contract of service between him and the Company).

86. The Directors shall have power at any time, and from time to time, to appoint any person to be a director to fill a casual vacancy. Any Director so appointed shall hold office for the remainder of the term of the Director in whose place he is appointed and shall then be eligible for re-election. Any appointment of a Director may be made in contemplation of the occurrence of a vacancy, such appointment will be effective upon actual occurrence of such a vacancy.

Power to  
fill casual  
vacancies

87. The continuing Directors may act notwithstanding any vacancies but if and so long as the number of Directors is reduced below the minimum number fixed by or in accordance with these Articles the continuing Directors or Directors may act for the purpose of filling up vacancies or of summoning General meeting of the Company, but not for any other purpose. If there be no Directors or Director able or willing to act, then any two members may summon a general Meeting for the purpose of appointing Director.

Proceedings  
in case of  
vacancies.

88. All acts done by any meeting of Directors, or of a Committee of Directors, or by any person acting as a Director, shall as regards all persons dealing in good faith with the company, notwithstanding that there was some defect in the appointment of any such Director or person acting as aforesaid or that they or any of them were disqualified or had vacated office, or were not entitled to vote, be as valid as if every such Director had been duly appointed and was qualified and had continued to be a Director and has been entitled to vote.

Validity of  
acts of  
Directors,  
in spite of  
some formal  
defect

89. At the First Ordinary general Meeting all the Directors shall retire from office. A director elected under section 173 shall hold office for a period of three years unless he earlier resigns and becomes disqualified or otherwise ceases to hold office.

Term of office  
of Directors.

90. A retiring Director shall be eligible for election.

Eligible for  
re-election

#### INSTITUTIONAL DIRECTORS

91. (a) The Directors shall have power to accept, or agree to accept, additional Directors nominated by any financial institution, including banks or any Mudharaba or local or foreign collaboration company, or other institution (hereafter called "Institution") where such Institution shall have the appointment or their nominees as a Director under terms of a loan, subscription to the company's PFC, LFC, Debenture, or other contract or arrangement, or under stipulations that the Institution shall be entitled to two shares at the option of either the Institution or the company for any other consideration and the Institution shall act as a Director so long as the amount of loan or subscription or other consideration under these Articles remains outstanding. A Director so appointed shall be called an "Institutional Director" and shall not be subject to the provisions of the Ordinance relating to the election and removal of Directors, and such Director shall not be deemed to hold any office or position in the company.

Institutional  
Director.



Securities  
assignable  
free from  
equities.

Issue at  
discount or  
with privilege  
etc

Register of  
mortgages.

Register of  
PTCs/Deben-  
tures

Instrument of  
transfer of  
PTCs, TFCs,  
and debentures.

Notice of  
refusal to  
register  
transfer.

Inspection of  
copies, Register  
of PTC, TFC  
and debenture  
holders, etc

Supply copies  
of debenture  
holders.

Right of  
trustees for  
PTC, TFC and  
debenture  
holders to  
Balance Sheet.

No loan or  
security for  
members.

Qualifications  
for directors

65. Modaraba, PTCs, TFCs, Debentures, stocks thereof, bonds and other securities may be made assignable free from any equities between the Company and person to whom the same may be issued.

66. Any securities may be issued at discount, premium, or otherwise, and with privileges as to conversion, redemption, surrender, drawings, allotment of shares, attending and voting at general meetings of the Company, appointment of Directors and such other privileges.

67. The Directors shall cause a proper register to be kept in accordance with Section 125 of the Ordinance, of all mortgages and charges specifically affecting property of the Company and shall comply with requirements of Sections 121 & 122 of the Ordinance, in regard to registration of mortgages and charges therein specified and requirements of Section 130 of the Ordinance, as to keeping a copy of every instrument creating mortgage or charge at the office, and requirements of Section 132 as to giving limitation of payment of Satisfaction of charges or mortgage created by the Company.

68. Registers of holders of PTCs, TFCs, and debentures may be closed for any period not exceeding, in whole, thirty days in any year, subject as aforesaid every such register shall be open to inspection of registered holders of PTCs, TFCs, and debentures and of any member, but the Company may impose any reasonable restriction so that at least two hours in each day, when such register is open, are appointed for inspection.

69. Subject to provisions of Section 76 of the Ordinance, no transfer of PTCs, TFCs, or debentures shall be registered unless a proper instrument of transfer duly stamped and executed by transferor and transferees has been delivered to the Company together with certificate of concerned securities.

70. If the Directors refuse to register transfer to PTCs, TFCs, or debentures, they shall within thirty days from the date on which instrument of transfer was lodged with the Company, send to the transferee and transferee a notice showing the reason of refusal as required under Section 73.

71. The Company shall comply with provisions of Section 136 allowing inspection of copies kept at the Office in pursuance of Section 130 and allowing inspection of Register of PTC, TFC, or debenture holders, in pursuance of Section 136 of the Ordinance.

72. The Company shall comply with provisions of Section 136 for supplying copies of Register of PTC, TFC, and debenture holders to trustees of the fund of PTC, TFC or debenture.

73. Trustees for the PTC, TFC and debenture holders shall have the same rights to examine and inspect balance sheets and profit and loss account of the Company and reports of Auditor and other reports as are possessed by holders of ordinary shares in the Company.

74. No loan or guarantee or security for loan shall be made directly or indirectly by the Company for or on behalf of any member of the Company, if no security shall have been approved by the Board of Directors.

#### DIRECTORS

75. The qualification of a Director shall be the holding in his own name

or he is appointed to act at that meeting as the representative of a corporation pursuant to Article 55.

51. The instrument appointing a proxy and the power of attorney or other authority (if any), under which it is signed or a notarially certified copy of such power or authority, shall be deposited at the office or such other place as the Directors may appoint not less than forty-eight hours before the time appointed for holding the meeting or adjourned meeting at which the person named in the instrument proposes to vote and in default thereof the instrument of proxy may at the discretion of Directors be treated as invalid. The proxy shall be deemed to include the right to demand or join in demanding a poll, and generally to act at the meeting for the member giving the proxy.

Deposit of  
proxies.

52. Every instrument of proxy shall, in every circumstance in which it shall be in the form or to the effect following:-

Form of  
proxy.

#### HAMZA SUGAR MILLS LIMITED

I/We..... of.....  
in the district of..... being a  
Member/Members of HAMZA SUGAR MILLS LIMITED,  
hereby appoint..... of.....  
as my/our proxy to vote for me/us and on my/our behalf at the (ordinary  
or extraordinary, as the case may be) General Meeting of the Company  
to be held on the..... day of.....  
and at any adjournment thereof.  
Signed this..... day of.....

53. 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 at the authority under which the proxy is given, provided that no intimation in writing of such death, insanity, revocation or transfer 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.

Intervening  
events or  
insanity of  
principal not  
to be received

#### BORROWING POWERS

54. (a) The Directors may borrow from Members or other persons and may themselves lend any sums or money for purposes of the Company.

Power to  
Borrow.

- (b) The Directors may, in the payment of money in a manner and on terms and conditions as they think fit and in particular by (i) entering into Mortgage, (ii) issue of perpetual or redeemable and convertible or nonconvertible, DTLs, TPLs, debentures and other bonds, promissory notes, bills of exchange, usances bills and other securities, (iii) furnishing guarantees and undertakings, (iv) depositing securities, shares and documents of title for securing, charging and mortgaging properties and assets (present and future) of the company and creating floating charges over such properties, and (v) appointing attorneys or agents with powers of executing documents having them registered, leasing and managing the properties, including and excluding the right to sublet, and (vi) creating such other securities as may be considered expedient, and to all the powers, authorities and discretions which may be required and deliver same to the persons to whom they may be required.



52. A poll demanded on the election of Chairman, or on a question of adjournment, shall be taken forthwith. A poll demanded on any other question shall be taken at such time being not more than fourteen days from the date of which it was demanded, and place and in such manner as the Chairman directs.
53. The demand for a poll shall not prevent the continuance of a meeting for the transaction of any business other than the question on which the poll has been demanded.
54. Any corporation holding shares conferring the right to vote may by resolution of its Directors or other governing body authorise such person as it thinks fit to act as its representative at any meeting of the Company, or at any meeting of holders of any class of shares of the company, and the person so authorised shall be entitled to exercise the same powers on behalf of the corporation which he represents as the corporation could exercise if it had been an individual member of the company.
- VOTES OF MEMBERS**
55. Subject and without prejudice to any special privileges or restrictions as to voting for the time being attached to any special class of shares for the time being forming part of the capital of the Company, on a show of hands every person present and entitled to vote shall have one vote and on a poll every member present in person or by proxy shall have one vote for every share of which he is the holder.
56. In the case of joint holders of a share 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 of members.
57. 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 a show of hands or on a poll, by the committee, committee or committees appointed by such Court, and such committee or committees, or other person may on a poll vote by proxy, provided that such evidence as the Directors may require of the authority of the person claiming to vote shall have been deposited at the office or at such other place as the Directors may appoint not less than seventy-two hours before the time for holding the meeting.
58. No objection shall be raised to the qualification of any voter except at the meeting or adjourned meeting at which the vote is objected to or given or tendered, and every vote not disallowed at such meeting shall be valid for all purposes. Any objections made under the provisions of this Article shall be referred to the Chairman of the meeting and his decision shall be final and conclusive.
59. The instrument appointing a proxy shall be signed in writing under the hand of the appointer or of his attorney duly authorised in writing, or if the appointer is a corporation either under the seal of the corporation or under the hand of an officer or attorney so authorised. Members not resident in Pakistan may appoint and authorise proxies by telegram.
60. No person shall act as a proxy unless he is entitled on his own behalf to be present and vote at the meeting in which he acts as proxy.

members present in person and representing not less than twenty five percent of the total voting power either on their own account or as proxies, shall be a quorum for all purposes.

45. If within half an hour from the time appointed for the meeting a quorum is not present, the meeting, if convened on 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 such adjourned meeting a quorum is not present within half an hour from the time appointed for holding the meeting, the members present being not less than two shall be a quorum.

Adjournment  
of quorum  
not present.

46. The Chairman of the Board of Directors or, if he is not present, a Deputy Chairman shall preside as Chairman at every General Meeting of the Company. If at any meeting neither the Chairman nor Deputy Chairman be present or there by neither Chairman or Deputy Chairman within fifteen minutes after the time appointed for holding the meeting, or be unwilling to act as Chairman, the Directors present shall choose one of their member to be the Chairman or if no Director be present or if all the Directors present decline to take the chair, the members present shall choose one of their member to be the Chairman of the meeting.

Chairman or  
Deputy Chairman

47. 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 and from place to place, but no business shall be transacted at any adjourned meeting except business which might lawfully have been transacted at the meeting from which the adjournment took place. When a meeting is adjourned for not more than three days or more, notice of the adjourned meeting shall be given as soon as practicable, but in other respect 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.

Adjournments

48. At any General Meeting a resolution put to the vote of meeting shall be decided on a show of hands unless poll is (before or on the declaration of the result of the show of hands) demanded by the Chairman (being a person entitled to vote) or by at least five members having the right to vote on the resolution and present in person or by proxy holding not less than one tenth of the total voting power in respect of the Resolution or by any member or members present in person or by proxy and holding shares in the company conferring right to vote on the resolution. The demand for a poll may with the consent of the Chairman of the meeting be withdrawn.

Decision on  
poll

49. Unless a poll is demanded, a declaration by the Chairman that a resolution has been carried, or carried unanimously or by a particular majority or not, and an entry to that effect in the minute book, shall be conclusive evidence of the fact without proof of the number or proportion of the votes recorded in favour of or against such resolution.

Minutes  
of meeting  
conclusive

50. If a poll be duly demanded, the result of the poll shall be deemed to be the result of the meeting and shall be entered in the minute book.

51. In the case of any equality of votes, the Chairman shall have a second or casting vote.

Chairman's  
casting vote

the member is entitled, and limiting a time within which the offer, if not accepted, will be deemed to be declined, and after the expiration of such time, or on the receipt of an intimation from the member to whom the offer is made that he declines to accept the shares offered, the Directors may, subject to these Articles, dispose off the same in such manner as they think most beneficial to the Company. The Directors may, in like manner, dispose off any such new or original shares as aforesaid which, by reason of the proportion borne by them to the number of persons entitled to such offer as aforesaid or by reason of any other difficulty in apportioning the same, cannot in the opinion of the Directors be conveniently offered in manner herein-before provided.

31. All new shares shall be subject to the provisions of these Articles with reference to transfer, transmission or otherwise.

Rights and  
Privileges  
attached to  
new shares.

32. The Company may, by Ordinary Resolution:

- (a) consolidate and divide all or any of its share capital into shares of larger amount than its existing shares (subject, nevertheless to the provisions to Section 92 of the Ordinance);
- (b) 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 and diminish the amount of its capital by the amount of the shares so cancelled, or
- (c) sub-divide its shares, or any of them into shares of smaller amount than is fixed by the Memorandum of Association (subject, nevertheless, to the provisions to Section 92 of the Ordinance).

Power to  
consolidate  
shares.

33. The Resolution where by any matter is decided may determine that as between the holders resulting from such division, one or more of such shares shall have some preference or special advantage as regards dividend, capital, voting, or otherwise, or as compared with the others or other, subject nevertheless to the provision of Section 92 of the Ordinance.

Variation of  
rights in  
sub-division.

34. Whenever the capital is divided into different classes of shares all or any of the rights and privileges attached to any class (unless otherwise provided by the terms of issue of the shares of that class) may be modified, commuted, affected, abrogated or destroyed by agreement between the Company and any person purporting to act on behalf of that class, provided such agreement: (i) ratifies the consent of the holders of at least three-fourth in nominal value of the issued shares of the class or (ii) confirmed by a special Resolution passed at a separate General Meeting of the holders of shares of that class and all the provisions hereinafter contained as to General Meeting shall, in all circumstances, apply to every such meeting, except that the quorum shall be members holding or representing proxy one-fifth of the nominal amount of the issued shares of the class and that holder of one-fifth of the shares present in person or by proxy may demand a poll. The provisions are not by implication to oust the power of modification which may be exercised by the Company if this Article is not complied with.

Power to  
modify rights.

35. Subject to confirmation by the Company in General Meeting, the Company may, by Special Resolution, create and issue shares of any class which may be Special

Shares may be Special

Shares may be Special



Surviving holder, shall be the only persons recognised by the Company as having any title to his shares but nothing herein contained shall release the estate of a deceased holder (whether sole or joint) from any liability in respect of any share solely or jointly held by him.

Registration  
of executors  
and assignees  
of insolvents.

25. Any person becoming entitled to a share in consequence of the death, bankruptcy or insolvency of a member may, subject as here in after provided, either be registered himself as holder of the share upon giving to the Company notice in writing of such desire, or transfer such share to some other person. All the limitations, restrictions, and provisions of these Articles relating to the right to transfer and the registration of transfer of shares shall be applicable to any such notice of transfer as aforesaid as if the death or insolvency of the member had not occurred and the notice of transfer was a transfer executed by such member.

Duties of  
personal  
representative  
prior to  
registration.

26. The Company shall not be bound to recognise an executor or administrator unless the shall have obtained probate or letters of a administration or other legal representation, as the case may be, valid as having effect in Karachi, provided nevertheless that it shall be lawful for the Directors in their absolute discretion to dispense with the production of probate or letters of administration or such other legal representation upon such terms as to indemnity or otherwise as the Directors may decide.

Right of  
un-registered  
executors and  
trustees.

27. Save as otherwise provided by or in accordance with these Articles, a person becoming entitled to a share in consequence of the death or insolvency of a member shall be entitled to receive and may give a discharge for all dividends and other moneys payable in respect of the shares, and shall be entitled to attend and vote at any General Meeting as if he were the registered holder of such share, provided that seventy-two hours at least before the time of holding the meeting or adjourned meeting at which he proposes to vote he shall satisfy the Directors as to his rights, or to the Directors shall have previously admitted his rights, to vote at every meeting in respect thereof.

Fee for  
Registration  
of probate  
etc.

28. There shall be paid to the Company in respect of the registration of any probate, letters of administration certificate of marriage or death, power of attorney or other document relating to or affecting the title to any shares, or for making any entry in the register affecting the title of any shares such fee, not exceed ten rupees, as the Directors may from time to time, require or prescribe.

Directors  
right to  
refuse  
registration on  
transmission

29. The Directors shall have the right to refuse to register a person entitled by transmission to a share or his nominee as if he were the transferee named in an ordinary transfer presented for registration.

#### SHARE CAPITAL.

30. The Company in General Meeting may from time to time by Ordinary Resolution increase its capital and such sum to be divided into shares of such amounts as the Company may from time to time prescribe.

Unless otherwise determined by the Company in General Meeting any original shares for the time being outstanding and any new shares from time to time be created shall be offered to the members in proportion to the shares held by the such offer shall be made by notice specifying the number of shares to which

## TRANSFER OF SHARES

19. The Transfer of shares shall be affected by an instrument in writing in the usual common form, modified so as to suit the circumstances of the parties.

Form of  
Transfer

The instrument of transfer of a share shall be duly stamped and shall be executed both by the transferor and the transferee whose execution shall be attested by at least one witness who shall add his address and occupation, and the transferor shall be deemed to remain the holder of such shares until the name of the transferee shall have been entered in the Register in respect thereof.

Whenever shares of different classes have been issued a separate instrument of transfer shall be required for each class of shares unless the Directors resolve otherwise.

20. The Directors may decline to recognise any instrument of transfer, unless the instrument of transfer is deposited at the office or such other place as the Directors may appoint, accompanied by the certificate or certificates of shares to which it relates, and such other evidence (if any) as the Directors may reasonably require to show the right of the transferor to make the transfer, and if the instrument of transfer is executed by some other person on his behalf, the authority of that person so to do.

Deposit of  
Transfer

21. If the Directors refuse to register a transfer they shall within 30 days after the date on which the transfer was lodged with the Company send to the transferee and the transferor notice of the refusal as required by the Ordinance.

Notice of  
Refusal to  
Transfer

22. The Directors may on giving seven days previous notice by advertisement in some newspaper circulating in the Province in which the office is situated, in the Province in which the stock exchange on which the Company is listed is situated, close the transfer books and register of members during such time as the Directors think fit, not exceeding in the whole thirty-five days in each year, and not exceeding thirty days at a time.

Closing  
Register

23. Neither the Company nor its Directors shall incur any liability for registering or acting upon a transfer of shares apparently made by sufficient parties, although the same may be found to be fraudulent or illegal, or to be void as to the Company or its Directors, be legally inoperative or invalid, or to pass the property in the shares proposed or professed to be transferred, and although the transfer, may as between the transferor and transferee be liable to be set aside, and notwithstanding that the Company may have notice that such instrument of transfer was signed or executed and delivered by the transferor in blank or in the name of the transferee, or the particulars of the share transferred, or otherwise in default of the Ordinance. And in every such case the person registered as transferee, the directors, administrators, and assignees shall be entitled to be recognised as the holder of such shares and the previous holder shall be deemed to have assigned the same to the Company as transferee, and the Company is bound to register the same as such.

Indemnity  
against  
wrongful  
transfer

## TRANSMISSION OF SHARES

24. In the event of the death of a shareholder the executor or administrator of his estate shall be deemed to be the transferee of the shares of the deceased shareholder.



Shares may  
be registered  
in the name of.

Return as to  
Allotments.

Register of  
members.

How special  
rights of  
shares may  
be varied.

Proceedings  
for Class  
Meetings.

Creation of  
issues of  
further shares.

11. Shares may be registered in the name of any limited company or corporate body, but not in the name of a minor, save by transmission or by a judicial order, or in the name of any partnership firm, nor shall more than four persons be registered as joint-holders of any share.
12. As regards all allotment from time to time made, the Directors shall duly comply with Section 73 of the Ordinance.
13. The Company shall cause to be kept a Register of Members and an index of Members in accordance with Section 147 to the Ordinance.
14. Whenever the capital of the Company is divided into different classes of shares, the company may by resolution, at a separate General Meeting and subject to the provisions of Section 73 and 108 of the Ordinance, vary, extend or abrogate the right or liabilities of members of the different classes. Such rights and liabilities may be so varied or abrogated whilst the company is a going concern or when it is in the process of being wound up.
15. Except as provided in Article 14 hereof, at every such separate General Meeting all the provisions of these Articles relating to the General Meeting of the Company, or the proceedings thereat, shall mutatis mutandis apply.
16. In the event of the creation of issue of shares with special rights attached thereto, such rights shall not, unless otherwise expressly stipulated by the terms of issue thereof, be deemed to be varied by the creation of issue of further shares ranking as regards participation in the profits or assets of the Company in some or all respects pari passu therewith, and in no respect in priority thereto.

#### CERTIFICATE

Certificate.

17. Every person whose name is entered as a member in the register of members shall be entitled without payment to receive, within 45 days after allotment or within 45 days of the application for registration, and transfer (or within such other period as the conditions of issue shall provide) one certificate for all his shares of any one class or, upon payment of such sum, not exceeding one rupee for every certificate, after the first as the Directors shall from time to time determine, as many certificates each for one or more of his shares of any one class. When a member transfers part only of the shares comprised in a certificate, the old certificate shall be cancelled and a new certificate for the balance of such shares issued in lieu without charge. Every certificate shall be issued under the seal and bear the autographic signatures of the Company. Article 120 hereof, and shall specify the shares in respect of which it relates. In the case of a share held jointly by several persons, the Company shall not be bound to issue more than one certificate, and the delivery of a certificate for a share to one of several persons shall be sufficient delivery to all.

Re-  
Call

18. If a share certificate be defaced, worn out, lost or destroyed, renewed on payment of such fee (if any) not exceeding one rupee on such terms (if any) as to evidence and indemnity and in such other respects as the Company may determine, as the Directors think fit.

4. (a) Subject to the provisions of these Articles the shares shall be under the control of the Directors who may allot or otherwise dispose off the same to such persons on such terms and conditions and at such times as they think fit, and with full power to give to any persons the right to call for the allotment of any shares either at par, or at a premium, for such consideration as the Directors may seem fit, provided that upon the issue of further shares the Directors shall comply with the provisions of Section 36 of the Ordinance unless the company shall in its general meeting decide upon the issue of such shares on other terms.
- Share under the control of Directors.
- (b) Subject to the provisions of the Ordinance and these Articles the Directors may allot and issue shares in the capital of the Company in payment or part payment of any property, sold or transferred, goods or machinery supplied or for services rendered to the company in or about the formation or promotion of the Company or conduct of its business, and any shares which may be so allotted may be issued as fully paid up shares, and, if so issued shall be deemed to be fully paid-up shares.
- Directors may allot fully paid-up shares as payment of property etc.
5. 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 absolute or conditionally) for any shares, debentures or debenture-stock in the Company, but so that if the commission in respect of shares shall be paid or payable out of capital, the statutory requirements and conditions shall be observed and complied with, and the amount or rate of commission shall not exceed 2-1/2% on the shares, debentures or debenture-stock in each case authorised to be subscribed. The Commission may be paid or satisfied, either wholly or in part, in cash or in shares, debentures or debenture-stock.
- Payment of Brokerage and Commission.
6. With the previous authority of the Company in General Meeting and the sanction of the Corporate Law Authority and upon other conditions complying with Section 34 of the Ordinance it shall be lawful for the Directors to issue at a discount shares of a class already issued.
- Shares at a Discount.
7. None of the funds of the Company shall be employed in the purchase of, or for the security of, shares of the Company and the Company shall not, except to the extent permitted by Section 36 of the Ordinance give any financial assistance for the purposes of, or in connection with, any purchase of shares in the Company.
- Company not to purchase its own shares.
8. The Company may make any allotment on the terms that the person to whom such allotment is made shall have the right to call for further shares at such time or times and at such price or prices (above or below par) as may be thought fit.
- Right to call for further shares.
9. Every Share holder shall name to the Company an address in Pakistan, to be registered at his address and such address shall be deemed to be his place of residence.
- Address of Share Holder.
10. The company shall not, either as a company or by any officer or agent, be bound to recognise any beneficial, fractional or partial interest in any share, or any other share except as the full right therein in the person or persons entitled to the same.
- Company not to recognise fractional interest.

the meaning respectively assigned to them in the Modaraba Companies and Modaraba (Floatation and Control) Ordinance, 1980.

"PTC" and "FC" means Participation Term Certificate and Term Finance Certificate respectively.

"Securities" includes Shares, Modaraba Certificates, PTCs, FFCs, and Debenture Certificates.

Words importing the singular number also includes the plural number and vice versa.

Words importing the masculine gender also include the feminine gender.

"In writing" and "written" means and include words printed, lithographed, represented or reproduced in any mode in a visible form. Words importing persons include firms, associations corporations.

### CAPITAL

#### Capital-Clause 5(a) of Articles of Association

Capital

- (a) The Capital of the company is Rs. 1,000,000,000/- (One Billion Only) divided into 100,000,000 Shares of Rupees Ten.
- (b) The Company shall offer to Pakistan Industrial Credit and Investment Corporation Limited (hereinafter called PICIC) out of the initial public issue for each share in its capital equal to nominal value (or as near thereto as possible) to 20 per cent of the share which PICIC shall give to the Company pursuant to an Agreement which is being entered into between the Company and the PICIC. The offer shall be at liberty either to decline the offer of shares in whole or in part. In the event of its declining the offer or accepting it in part, PICIC's rights take up the shares to an aggregate of 20 per cent of the total shall be carried forward to any further issue or issues of shares for cash (not being bonus issues) as may be made by the Company during the subsistence of the business notwithstanding anything contained in articles 10 or 11 of the company. In the event of PICIC accepting the offer in full or in part, PICIC shall make payment for the shares taken by it in cash or by cheque. If the offer is not accepted within a period of one week from the date of offer, it will be deemed to have been declined and the Directors may dispose of the shares offered to PICIC in such manner as they think most beneficial to the company.
- (c) The Directors of the Company shall guarantee the obligation to all shareholders to pay to PICIC in the form of cash or by cheque or by promissory note or by any other mode of payment between PICIC and the Company.
- (d) PICIC shall have the right at any time and from time to time to call upon the Company to pay to PICIC the amount of the shares taken by PICIC in terms of an agreement (which is being entered into between the Company and PICIC) into ordinary shares of the Company subject to the provisions of the Companies Act, 1947 and to PICIC during the subsistence of the company and any other provisions of the Companies Act, 1947.
- (e) The Company shall offer shares in its capital to any other person who may be interested in the shares of the Company in accordance with clause (b) and (c) of the above clause.

THE COMPANIES ORDINANCE, 1984  
COMPANY LIMITED BY SHARES

Articles of Association

HAMZA SUGAR MILLS LIMITED

PREAMBLE

1. (a) The regulations contained in the Table numbered A in the First Schedule to the Companies Ordinance, 1984 shall not apply to the Company except so far as the same are repeated contained or expressly made applicable in these Articles or by the Ordinance. The regulations for the management of the Company and for the observance of the members thereof and their representatives shall, subject to any exercise of the statutory powers of the Company in reference to the repeal or alteration of or addition to its regulations by Special Resolution as permitted or permitted by the Ordinance be such as are contained in these Articles.

(b) The business of the Company shall include all or any of the several objects expressed in the Memorandum of Association.

no marginal notes hereto shall not affect the construction of the provisions in these presents, unless there be something in the subject or context inconsistent therewith.

"The Company" means the HAMZA SUGAR MILLS LTD.  
"The Ordinance" means Companies Ordinance, 1984.  
"Special Resolution" has the meaning assigned thereto by Section 3(1) (b) of the Companies Ordinance, 1984.

"The Director" means the Director for the time being of the Company.  
"The Board" means the Board of Directors for the time being of the Company.  
"The Officer" means the Officer for the time being of the Company.

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- (59) To create provident fund, reserve fund, depreciation fund, sinking fund, insurance fund, or any other special fund conducive to the interest of the Company.
- (60) To advance money to member of staff or customers of the Company or others having dealings with the Company with or without security and on such terms as the Company may deem expedient.
- (61) To make advances of such sum or sums of money upon or in respect of or for the purchase of raw materials, goods, machinery, stores, or any other property, articles and things, required for the purposes of the Company upon such terms and with or without security, as the Company may deem expedient.
- (62) To act as Trustees of any deeds constituting or securing any debentures, debenture stock, or other securities or obligations and to undertake and execute any other trust and also to undertake the office of executor, administrator, or registrar or to become secretary of any business and to keep for any company, Government authority or body, any register relating to any stocks funds, shares, or securities or to undertake any duties in relation to the registration of transfer, the issue of certificates or otherwise.
- (63) To open an account or accounts with any firm, or company, or with any Bank or Banker and to pay into and withdraw money from such account or accounts.
- (64) To accept shares, debentures, mortgage debentures or other security of any other company in payment or part payment for any services rendered or for any sale made to or debt owing from any such company.
- (65) To capitalise in whole or in part the profits of the Company and to distribute among shareholders of the Company in the form of dividends and as the Directors of the Company may think fit in the manner best calculated to set up, in favour of the shareholders of the Company.
- (66) To pay and discharge all expenses incurred by the Company in the necessary expenses for the same.
- (67) To employ experts to investigate and report on the value, character, and circumstances of any business, concerns and undertakings and generally of any business, any or
- (68) To keep and maintain a full and complete record of the business of the Company.
- (69) To do all such other things as may be necessary for the carrying out of the business of the Company.

- (52) To promote, form and to be interested in and to acquire or take by subscription, purchase or otherwise whatsoever and to hold shares in, or securities of any company, association or undertaking in Pakistan or abroad having any objects of like nature or description with any of those of this Company or such as may be deemed by this Company likely to advance either directly or indirectly the interest of this Company or to subsidise or otherwise assist such company or companies if it directly or indirectly benefits this Company.
- (53) To sell, improve, develop, turn to account, exchange, let on rent, royalty, share of profits or otherwise, grant licences, easements and other rights in or over, and in any other manner deal with or dispose of the undertaking and all or any of the property or assets for the time being of the Company for such consideration as the Company may think fit.
- (54) To amalgamate with any other company whose objects are or include objects similar to those of this Company, whether by sale or purchase (for fully paid-up shares or otherwise) of the undertaking, subject to the liabilities of this or any such other company as aforesaid, with or without winding up or by sale or purchase (for fully paid-up shares or otherwise) of all or a controlling interest in the shares of this or any such other company as aforesaid, or by partnership, or any arrangement of the nature of partnership, or in any other manner.
- (55) To purchase, acquire, own, underwrite or guarantee, the subscription of shares, debentures, debenture stocks, bonds, obligations and securities issued or guaranteed by any company, association, trust, undertaking or body constituted and carrying on business in Pakistan (or elsewhere as may be allowed by law) or issued or guaranteed by any Government, State, Municipality or any other Public Body or Authority in Pakistan (or elsewhere as may be allowed by law) at such times and upon such terms, conditions as to terms, manner as may be agreed upon and to sell, exchange, transfer, dispose of, deal in and turn to account such shares, debentures, debenture stocks, bonds, obligations and securities.
- (56) To sell or dispose of or transfer the business, or part of the business, of the Company or part or parts thereof for such consideration as the Company may think fit and in particular for shares, debentures or securities of any other company having objects similar to part of the business of this Company.
- (57) To procure the Company to be registered or recognised as a company in any place.
- (58) To enter into contracts giving any persons or company the right to supply the Company with any articles or equipment or to supply any person or company with any articles or equipment, on such terms and conditions and for such period or periods as may from time to time.

- (45) To accept payment for any property or rights sold, or otherwise disposed of or dealt with by the Company, either in cash, by instalments or otherwise, or in fully paid-up shares of any company or corporation, or in debentures or mortgage debentures or debenture stock, mortgages, or other securities of any company or corporation, or partly in one mode and partly in another, and generally on such terms as the Company may determine, and to hold, dispose of or otherwise deal with any shares, or securities so acquired.
- (46) To obtain from any Government, State, Municipal or other public authorities, supreme or otherwise rights, concessions, licences, permits, and the like, periodical or otherwise, for conduct of any of the objects for which the Company is established.
- (47) To issue any shares or securities which the Company has power to issue by way of security or indemnity to any person whom the Company has agreed or is bound to indemnify against any debt, liability, costs, losses or expenses out of the funds of the Company.
- (48) To purchase or otherwise acquire and undertake the whole or any part of business, property, rights, and liabilities of any person, firm, or company, carrying on any business which this company is authorised to carry on, possessing property or rights and privileges suitable for any of the objects of this Company and to purchase, acquire, sell and deal in property, shares, debentures, debenture-stock of any such person, firm or company and to conduct, make or carry into effect any arrangements in regard to the winding up of business of any such person, firm or company.
- (49) To enter into partnership or any joint venture, arrangement or any arrangements for sharing profits, union of interest or cooperation with any company, firm or person and to acquire and hold, sell, deal with or dispose of shares or securities of any such company, and to give, enter into or incur any liability or obligation in respect of the interests or capital of any shares, or securities of any such company, and also assist any such company.
- (50) To meet and pay all losses, damages, risks, accidents and liabilities of an enterprise conducted by the Company, whether in respect of its contracts, agreements, or otherwise, or in respect of servants or employees of the Company, or in respect of any property belonging to or leased to or hired by the Company, or in respect of any part funds of the Company or by accident, such in or out of the business of the Company.
- (51) To do all such things as the Company may think fit to do for the purpose of carrying out the objects of the Company.

- (36) To invest and deal with the moneys of the Company not immediately required for the purposes of its business in or upon such investments or securities and in such manner as may from time to time be determined.
- (37) To undertake and execute any trust or trusts which the Company may deem to be desirable, expedient or necessary.
- (38) To institute, conduct, defend, compound or abandon any legal proceedings by or against the Company or its officers or otherwise concerning the affairs of the Company and also to compound and allow time for payment or satisfaction of any debts due and of any claims or demands by or against the Company.
- (39) To remunerate the Directors, officials, servants of the Company and others out of or in proportion to the income or profits of the Company or otherwise as the Company may think proper.
- (40) To refer any claims or demands by or against the Company to arbitration and observe and perform the awards.
- (41) To enter into agreement with and/or employ workers, technicians, specialists, experts, consultants and other persons having special knowledge of matters relating to the business of the Company, as may be necessary or expedient for conducting the business of the Company, on such terms conditions and stipulations as the Company may deem proper.
- (42) To depute any of the representatives, officers, or other employees of the Company to any part of Pakistan or abroad for any of the purposes which may be expected to benefit the Company, directly or indirectly, with such assets as necessary, and incur such expenses of journey or voyage, lodging, boarding, and other expenses as may be necessary for their purposes and to make payments or to give remuneration to such person or persons through whose agency, assistance or mediation or otherwise in any feasible and helpful manner available to the Company towards one or more objects of the Company.
- (43) To adopt such means of advertising or publicizing the business of the Company as may seem proper or important by advertisement in the press, by outdoor publicity, by notices, circulars, pamphlets, folders, circulars, posters, or by publication of books, or by other periodicals, magazines or by any other suitable media or by any other means of gifts, prizes, rewards and donations which may be expected to make the Company popular and prosperous.
- (44) To pay for any proper expenses incurred by the Company, either in cash or fully paid-up shares, or partly in cash and partly in shares, and the Company has power to issue, or partly in cash and partly in shares, and generally to do anything which is the Company may think proper.



- (77) To generate electrical power by conventional, non-conventional methods including Coal, Bagasse, Natural Gas, Steam, Gas lignite, Furnace Oil, Biomass, Waste, Thermal, Solar and wind etc and carry on business of generating, purchasing, selling, importing, Exporting by all means, transforming, converting, distributing, supplying and dealing in electricity and all other forms of energy and products or services associated therewith and of promoting the conservation and efficient use of electricity and in the business of electricity generation, transmission, distribution supply, and sale to Government, Semi Government, Private Enterprises, Independent power project and any other organization intended to purchase the Electric power.
- (78) To locate, establish, construct, equip, operate, use, manage and maintain thermal power plants, Bagasse, Natural Gas, Steam and coal fired power plants, power grid station, transforming, switching, conversion, and transmission facilities, grid stations, cables, overhead lines, sub-stations, switching stations, tunnels, cable bridge, link boxes, heat pumps, plant and equipment for combined heat and power schemes, offices, computer centers, shops, dispensing machines for pre-payment cards and other devices, snowrooms, depots, factories, workshops, plants, printing facilities, warehouses and other facilities.
- (79) To carry on all or any of the business of developers, retailers, traders, importers, exporters, suppliers, distributors, designers, developers, manufacturers, installer, filters, testers, repairers, maintainers, contractors, constructors, operators, users, inspectors, conditioners, improvers, alterers, protectors, removers, hirers, replacers, importers and exporters of and dealers in, electrical appliances, systems, products and services used for energy conversion equipments, machinery, materials and installations, including but not limited to cables, wires, metal conduits, racks, rails, pipes, and any other plant, apparatus equipment, systems and things incidental to the offering, sale, use, procurement, maintenance, supply and distribution of electricity.

(79) The above list of the members is limited.

#### Part V of Memorandum of Association

The share capital of the company is divided into 100,000 shares of Rs.100/- (Rupees Ten) each. The company may, from time to time, by ordinary resolution, increase or decrease the share capital of the company.

300,000/- (Rupees One Lakh) the total authorized share capital of the company may be increased or decreased by ordinary resolution of the company.

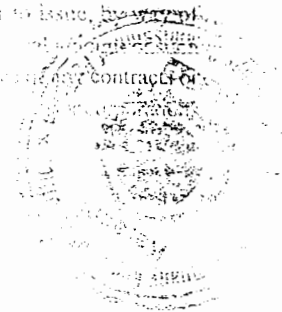


having dealings with the Company, or in whose businesses or undertakings the Company is interested, whether directly or indirectly.

- (31) To receive money on loan from members, staff or customers of the Company or others upon such terms as the Company may approve and to give guarantees and indemnities of any description and generally to act as bankers for members, customers and others having dealings with the Company
- (32) To guarantee or undertake the performance of the obligations of any company, association, firm or person and the payment of dividends and interest on, and the repayment or payment, of capital or other moneys payable in respect of any, shares debentures, debenture stock, securities and obligations of whatsoever nature of any company, association, firm or person in respect of which such loan, undertaking or guarantee may be considered likely, directly or indirectly, to further the objects of this Company or the interest of its members.
- (33) To pay all costs, charges and expenses incurred or sustained in or about the promotion and establishment of the Company and the issue of its capital or which the company shall consider to be in the nature of preliminary expenses, including therein the cost of advertising, commissions for under-writing, brokerage, printing and stationery and expenses attendant upon the formation of agencies and local boards and to remunerate or make donations to (for cash or other assets or by the allotment of fully paid share debentures, debenture stock or securities of this or any other company, or in any manner, whether out of the Company's capital or profits or otherwise) any person, firm or company for services rendered or to be rendered in introducing any property or business to the Company or in placing or assisting to place or guaranteeing the subscription of any of shares, debentures, debenture stock or other securities of the Company or for any other reason which the Company may think proper.
- (34) To contribute, allowances, gratuities and pensions to or for, or officers, employees or employers of the Company or its subsidiaries in business or the interests or connections of such persons, to establish and maintain or contribute to the establishment and maintenance of any fund or funds (whether contributory or non-contributory) with a view to providing pensions or other benefits for any such persons as aforesaid, their dependants or representatives or to contribute to any fund or funds or institutions, the support of which, in the opinion of the Directors, be calculated directly or indirectly to benefit the Company or its employees or to contribute to the establishment or profit-sharing scheme calculated to advance the interests of the Company or its employees.
- (35) To contribute to any fund or funds or institutions, the support of which, in the opinion of the Directors, be calculated directly or indirectly to benefit the Company or its employees or to contribute to the establishment or profit-sharing scheme calculated to advance the interests of the Company or its employees.

cars, and other rolling stock, and otherwise to provide for and employ the same in the transport of Sugar, Sugar cane, Sugar beet, gum, Medicines, fruit, vegetable, corn and moveable property and merchandise of all kinds, and the transportation of personnel, employees, customers and visitors, and to purchase or otherwise to acquire any shares or interests in any ships or vessels, aeroplanes, railways, motor transportation, or in any companies, possessed of or interested in any ships, vessels, aeroplanes, railways and motor transportation.

- (26) To apply for, obtain, own, register, renew, purchase, lease or otherwise to acquire, and to use, own, produce, manufacture, operate and introduce, and to sell, assign, grant, licence or otherwise dispose of patents, brevets d'invention, inventions, improvements, formula and processes used in connection with or secured under letter patents of any government or country in the world, including licences, concessions and the like conferring exclusive or non-exclusive or limited right to use any secret or other information as to any invention which may seem capable of being used for any of the purposes of the Company or the acquisition of which may seem directly or indirectly calculated to benefit the Company, and to use, exercise, develop, disclaim, alter or modify, grant licences in respect of, or otherwise take account of the property, rights, and information so acquired, also to acquire, use, register, assign and dispose of trade marks, trade names, registered or other designs, rights of copyright, or other rights or privileges in relation to any business carried on by the Company.
- (27) To borrow or secure the payment of money in such manner as the Company shall think fit and in particular by mortgage or by the issue of any shares, bonds, debentures, obligations or any other securities charged or based upon the undertakings of the Company, or any part or parts thereof, present and future including the rights of the Company or with or without the liability and upon such terms as to priority or otherwise and generally to borrow money in such manner as the Company shall think fit.
- (28) To issue debentures, participation term Certificates and Modaraba Certificates, part or whole of which could be converted into shares.
- (29) To mortgage and charge the undertaking and property of the real and personal property and assets, present or future, for the financing of the Company, and to issue at par or at a premium or discount, and for or in consideration and with and subject to such rights, powers, privileges and conditions as may be thought fit, debentures or debenture stock either payable or redeemable or repayable, and to call upon the holder to secure any part of the Company by a trust deed or other instrument.
- (30) To issue any securities which the Company may think fit to issue, to secure any and all loans, mortgages, debentures, and other securities, and to take any and all contracts for the purpose of the Company, any or all of its objects.



- (24) To carry on the business of clearing, consigning, transshipping, forwarding, export, debenture, storerooms, shipping agents, lighters etc., and to acquire by purchase or otherwise lands and buildings in Pakistan and elsewhere and to erect and maintain warehouses and other buildings and to carry on and undertake the storage, warehousing, packing, removal, carrying, forwarding, delivery, purchase, sale, exchange, mortgaging, pledging goods and chattels of every description

(22) supplying, demonstrating, maintaining, hiring, manufacturing and distributing, machinery, apparatus, accessories and materials in connection with any of the undertakings of the Company.

- To establish, organize, conduct and/or administer either divisions or departments within the business of mechanical, electrical, civil and general engineering, including, but not limited to, mechanics, fitters, mill-wrights, boilermakers and generally to act as chief planning, research, executive and technical engineers and advisers in the field of industrial and commercial engineering.

- [illegible]

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# **INTERCONNECTION ARRANGEMENT**

## **INTERCONNECTION ARRANGEMENT** **FOR THE DISPERSAL OF POWER FROM THE** **POWER PLANT OF M/S HAMZA SUGAR MILLS LIMITED**

The Power generated by Hamza Sugar Mills Limited (IEL) from its Bagasse based Thermal Power Generation facility shall be dispersed to the Load center of Multan Power Company Limited (MEPCO).

The Interconnection/Transmission Arrangement will be at 132 KV voltage level by making in/out arrangement at 132kV Khanpur-132kV Liaquatpur Transmission Line located at a distance of 1.3 KM from the Generation Facility of M/s Hamza Sugar Mills Limited.

Hamza Sugar Mills Limited while developing 15 MW Cogeneration Power Project in Phase, has already got constructed 132kV Transmission Line as per above mentioned interconnection arrangement to cater its planned total 60 MW power from its mills. Hence construction of further interconnection arrangement shall not be required.

The Grid Interconnection Study Report has been approved both by MEPCO and NTDCL. Photocopies of Approval Letter issued by MEPCO and NTDCL and Single Line Diagram (SLD) and Proposed Network of the proposed network are enclosed herewith.

A copy of Grid Interconnection Study Report is placed at Annex-**"A"**.





## NATIONAL TRANSMISSION & DESPATCH CO(NTDC)

General Manager Planning Power, NTDC

No. GMPP/CEMP/TRP-333/1333-36

Dated: 10-03-2017

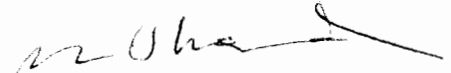
Chief Executive Officer (CPPA-G) Ltd.  
6<sup>th</sup> Floor, Shaheed-e-Millat Secretariat  
Jinnah Ave., Blue Area, Islamabad.  
Fax #: +92-51-9213617

**Subject: Vetting of Grid Interconnection Study of 30 MW (Gross) Bagasse Based Co-generation Power Project Hamza Sugar Mills (Phase-II), Jetha Bhutta, Khanpur, Rahim Yar Khan**

Ref: (i) Letter No. CPPAGL/DGM-II/MT-IV/HSMLP-II/13643-46 dated 11-01-2017.  
(ii) M/s Hamza Sugar Mills Limited's letter No. HSML/REF/NO/1774 dated 07-03-2017.

This office has reviewed the final report and electronic PSS/E study files of the subject power project submitted by its consultant M/s Power Planners International (PPI). In this regard, it has been found that the consultant has incorporated our comments. Therefore, the final report of 30MW (gross)/ Maximum 27 MW (spill over) Bagasse Based Co-generation power Project by M/s Hamza Sugar Mills (Phase-II) has been vetted at NTDC end.


It is however intimated that the subject report has been vetted only for interconnectivity aspect. Any commitment regarding project execution or for any other purpose should be discussed with CPPA and MEPCO. It is added that during EPA, if there is any major change in the parameters assumed in interconnection study, then the relevant studies will have to be revised.

  
(Imtiaz Ahmad Shad)

Chief Engineer Master Planning

CC:

- Chief Engineer (P&E), MEPCO HQ, Multan.
- M/s Hamza Sugar Mills Limited, Jetha Bhutta, Khanpur, District Rahim Yar Khan.
- M/s PPI, 66-H/2, Wapda Town, Lahore.
- Master File (MP)

*certified to be  
a true copy.*  


561

Office of the, Chief Executive Officer, MEPCO Multan

No. /CE/MEPCO/CSD/D(MKT)/PP-122/ 1928-36


Dated: 08 JAN 2017

The Chief Technical Officer,  
CPPA (G) L, Ground Floor,  
Enercon Building G-5/2 Islamabad

**Subject: APPROVAL OF GRID INTERCONNECTION STUDIES (GIS)  
FOR 27MW SPILL OVER (NET) POWER FROM 30MW  
(GROSS) CO-GENERATION POWER PROJECT BY HAMZA  
SUGAR MILLS AT JETHA BHUTTA KHANPUR, DISTRICT  
RAHIM YAR KHAN, PUNJAB**

In continuation to this office letter No.510/CE/MEPCO/CSD/  
D(Mkt)/PP-122/57535-40 dated 13.12.2016, the interconnection study  
approval report of the subject project received from the office of  
Chief Engineer (P&E) vide No.63908/CE(P&E) dated 30.12.2016 is hereby  
forwarded for further necessary action please. This GIS is further to be vetted  
/ approved by GM Planning Power NTDCL Lahore.


DA/As above

  
Chief Engineer /C.S. Director  
MEPCO Multan

CC to:-

1. The Chief Executive Officer MEPCO Multan for kind information please.
2. Chief Executive Officer, AEDB, 2<sup>nd</sup> Floor, OPF Building, G-5/1 Islamabad.
3. Chief Executive Officer, CPPA (G) Limited, 6<sup>th</sup> Floor, Shaheed-e-Millat Sect, Jinnah Avenue, Dha Area, Islamabad
4. G.M. Planning Power, 4<sup>th</sup> Floor, PIA Tower, Egerton Road Lahore.
5. The Chief Engineer (P&E) MEPCO Multan w.r. to letter referred above.
6. The Chief Engineer (Dev) PMU MEPCO Multan.
7. Director (Marketing, Tariff & C&I) MEPCO Multan
8. GM(Admn), M/s Hamza Sugar Mills Limited, Jetha Bhutta, Khanpur District R.Y.Khan

*certified to be  
a true copy.*

  
Assistant Collector  
Tahsil Jetha Bhutta

# MEPCO MULTAN ELECTRIC POWER COMPANY LIMITED

Tel #. 9220192  
Fax #. 9220249

Office of the  
Chief Executive  
MEPCO Ltd. Multan

Memo No. 63908 /C.E (P&E)

Dated 30-12-2016

Chief Engineer / CS Director  
MEPCO Ltd. Multan

SUB: GRID INTERCONNECTION STUDIES FOR 27 MW SPILL  
OVER (NET) FROM 30 MW (GROSS) CO-GENERATION  
POWER PROJECT BY HAMZA SUGAR MILLS AT  
JETHABHUTHA KHANPUR, DISTRICT RAHIM YAR  
KHAN, PUNJAB


Ref: Chief Engineer / C.S Director letter No. 502/CE/MEPCO/CSD/D(MKT)/PP-  
122/ dated 09.12.2016.

This office received the final report of the subject power plant vide above referred letter. After review of the report and electronic PSS/E Study files, the contents of the subject study are found to be appropriate. Therefore, the interconnection study report of Hamza Sugar Mills at Jethabhutha Khanpur, District Rahim Yar Khan, Punjab is approved from MEPCO as per assumptions and study results presented in the report.

It is however intimated that the subject report has been vetted only for interconnection aspect of the power plant. Any commitment regarding project execution or for any other legal aspect/conflict/court case regarding Hamza Sugar Mills should be discussed/considered at your own level and other relevant departments of MEPCO. NTDC may endorse / approve the said study in light of NEPRA letter No. 9046-57 dated 24.07.2016.

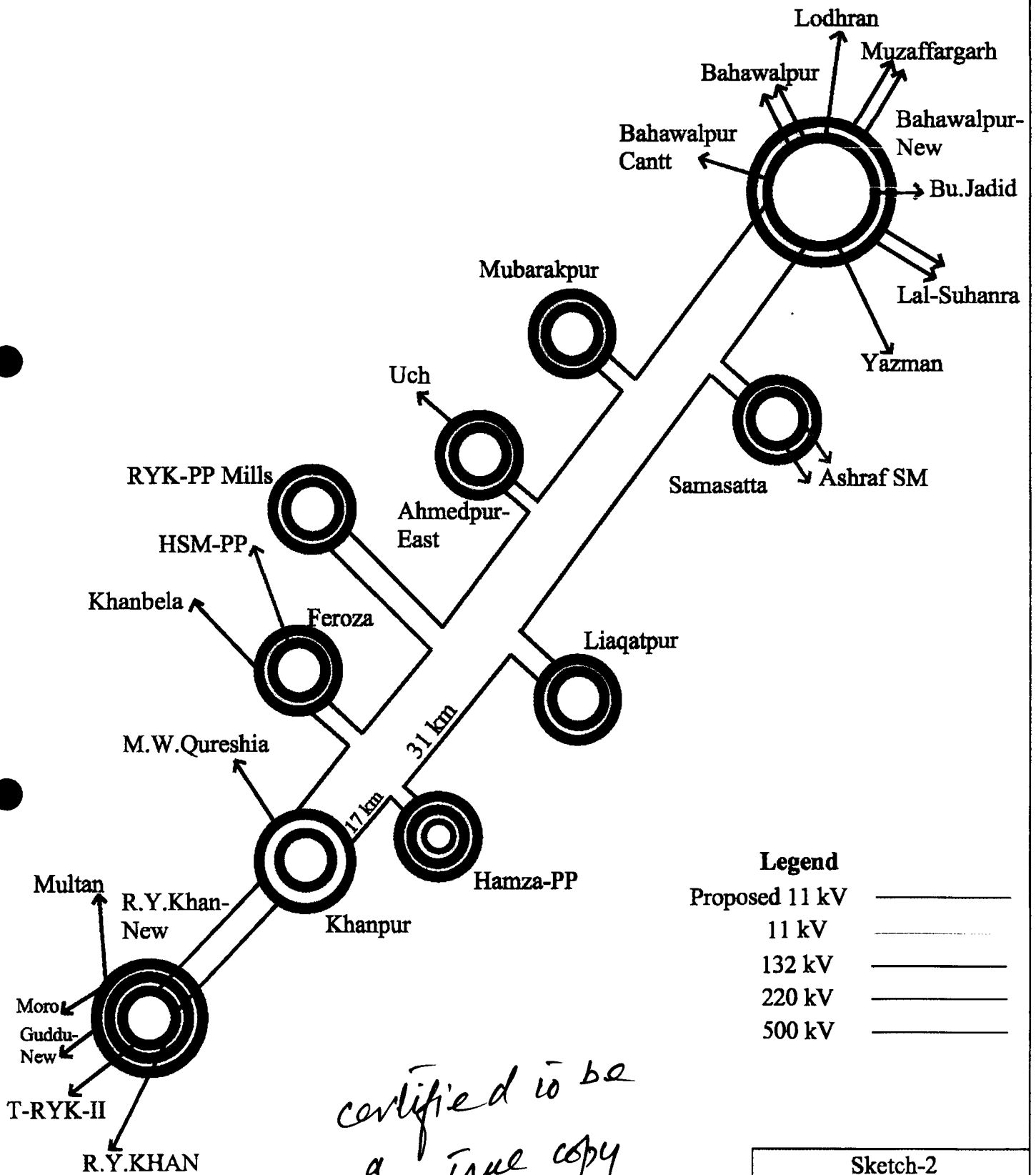
It is further intimated that during EPA, if there is any major change in the parameters used in the Interconnection Study, then study will have to be revised.

  
Chief Engineer (P&E)  
MEPCO Ltd. Multan

*certified true copy*  


Assistant Engineer (P&E)  
Tehsil Multan

# Network Around Proposed Site of Hamza Sugar Mills Phase-II (with Hamza Phase-II, Year 2018)



*certified to be  
a true copy.*

*[Signature]*  
Assistant Commissioner/Collector  
Tehsil Lodhran

Sketch-2			
Interconnection Study of 30MW Hamza Sugar Mills Phase-II			
Power Planners International			
DATE 2016	SHEET 1	CHG. NO. Hamza-PP-II Sketch-2.DWG	REV.

# PLANT DETAILS

## **Plant Details**

### **1. General Information**

<b>(i)</b>	Applicant's Name	Hamza Sugar Mills Limited
<b>(ii)</b>	Registered Office	A/22, S.I.T.E, Mauripur Road, Karachi
<b>(iii)</b>	Plant Location	At Hamza Sugar Mills Limited, Jetha Bhutta, Tehsil Khanpur, District Rahim Yar Khan
<b>(iv)</b>	Type of Generation Facility	Bagasse fired Cogeneration Power Plant
<b>(v)</b>	Expected Commissioning/Commercial Operation Date	18months from Financial close
<b>(vi)</b>	Expected Life of the Facility from Commercial Operation/Commissioning	30 years (Minimum)
<b>(vii)</b>	Expected Remaining Useful Life of the Facility	30 years (Minimum)

### **2. Plant Configuration**

<b>(i)</b>	Plant Size Installed Capacity (Gross ISO)	30 MW (Gross)
<b>(ii)</b>	Type of Technology	Cogeneration Power Plant with high pressure boiler and Steam Turbine
<b>(iii)</b>	Number of Units	One
<b>(iv)</b>	Boiler	150 TPH approximately, High pressure 100 bar
<b>(v)</b>	Steam Turbine	Steam Turbine - Extraction

		cum condensing type 30 MW.
(vi)	Installed Capacity	Power Generation: 30 MW (Season operation) 30 MW (Off-season operation)
(vii)	Auxiliary Consumption	10% approx.
(viii)	Interconnection	1.3 km from proposed project site with 132 KV MEPCO transmission system

### 3. Fuel / Raw Material Details

(i)	Primary Fuel	Bagasse
(ii)	Alternate Fuel	Bagasse/ biomass
(iii)	Fuel Source (Imported/Indigenous)	Indigenous
(iv)	Fuel Supplier	Hamza Sugar Mills Limited/ from local market
(v)	Supply Arrangement	Through conveyor belts/loading trucks/tractor trolleys etc.,
(vi)	Sugarcane Crushing Capacity	24,500 TCD
(vii)	Bagasse Generation Capacity	7,105 Tons per day (TPD)
(viii)	Bagasse Storage Capacity	Bulk Storage
(ix)	Number of Storage Tanks	Not Applicable, bagasse shall be stored in open yard

### 4. Emission Values

Emission values will remain in the limits prescribed by the National Environment Quality Standards (NEQs).

### 5. Cooling System

(i)	Cooling Water Source / Cycle	Deep Bore well water/ Cooling Towers
-----	------------------------------	--------------------------------------

## 6. Plant Characteristics

(i)	Generation Voltage	11000 volts
(ii)	Frequency	50 Hz
(iii)	Power Factor	0.8 Lagging, 0.95 Leading
(iv)	Automatic Generation Control (AGC)	By Turbine Governing System
(v)	Ramping Rate	10% of full load per minute (approx.)
(vi)	Estimated Time Required to Synchronize to Grid.	<div>During cold start (i.e. when plant is started later than 72 hours after shutdown)</div> <div>During warm start (i.e. when plant is started at less than 36 hours after shutdown)</div> <div>During Hot start (i.e. when plant is started at less than 12 hours after shutdown)</div>
		<div>600 minutes</div> <div>200 minutes</div> <div>60 minutes</div>

### Note:

All the above figures are indicative in nature. The Net Capacity available for dispatch will be determined through procedure(s) contained in the Energy Purchase Agreement, Grid code or any other applicable document(s).



# **PROFILE OF MAJOR SUB CONTRACTORS**

## **Profile of Major EPC Contractors/Sub-Contractors**

The following are the major EPC Contractors/Sub-Contractors:-

1. Siemens Pakistan Engineering Company
2. Pak Asia Engineering Company
3. M/s Abdullah Associates

The Profiles of all the prospective Contractors/Sub-Contractors are attached as “Annex-D”, “Annex-E”, “ ” and “Annex-F” respectively.

# PROJECT COST

## **PROJECT COST AND SOURCES**

The total expected investment is expected to be approximately US\$ 29.79 Million i.e. Pak Rs.3187.53 Million ( @ 1 US\$ = Rs.107)

HSML has already installed 2x60, 5x80 & 2x25, 23 bar boilers for in-house consumption and sale of surplus 2.5 MW power to MEPCO. Further HSML has completed development of 15MW Co-generation Power Plant based on high pressure boiler technology, which has achieved Commercial Operation Date (COD) on 10<sup>th</sup> March, 2017 and supplying power to national grid successfully under Framework for Power Cogeneration 2013 (Bagasse/Biomass)/

By the grace of Almighty Allah, HSML has developed all of these power plants from its own resources without involvement of any borrowing from the financial institutions. Accordingly HSML has shall be developing the proposed 30MW Co-Generation Power Plant (Phase-II) from its own sources.

# PROJECT LOCATION

**LOCATION OF COGENERATION POWER PLANT**  
**HAMZA SUGAR MILLS LIMITED**

The proposed Cogeneration Power Plant of M/s Hamza Sugar Mills Limited is located at G.T. Road, Jetha Bhutta, Tehsil Khanpur, District Rahim Yar Khan, Province of Punjab.

The geographical locations maps showing altitude and longitude of the proposed site are enclosed herewith.

# GPS Coordinates

Home Driving Directions Coordinate Converter Lat Long States Countries GPS Coordinates App

START NOW

Track Your Package



Enter Tracking Number Here.

## GPS Coordinates Finder

**Latitude and Longitude Finder** get or share **GPS coordinates**, address, and Latitude and Longitude. Get gps coordinates from address, or get address from latitude and longitude or **Lat Long**. Type an address and **find latitude and longitude** now.

Address

No resolved address

Get GPS Coordinates

DD (decimal degrees)

Latitude 28.9554876  
Longitude 70.72924760000001

Get Address

DMS (degrees, minutes, seconds)

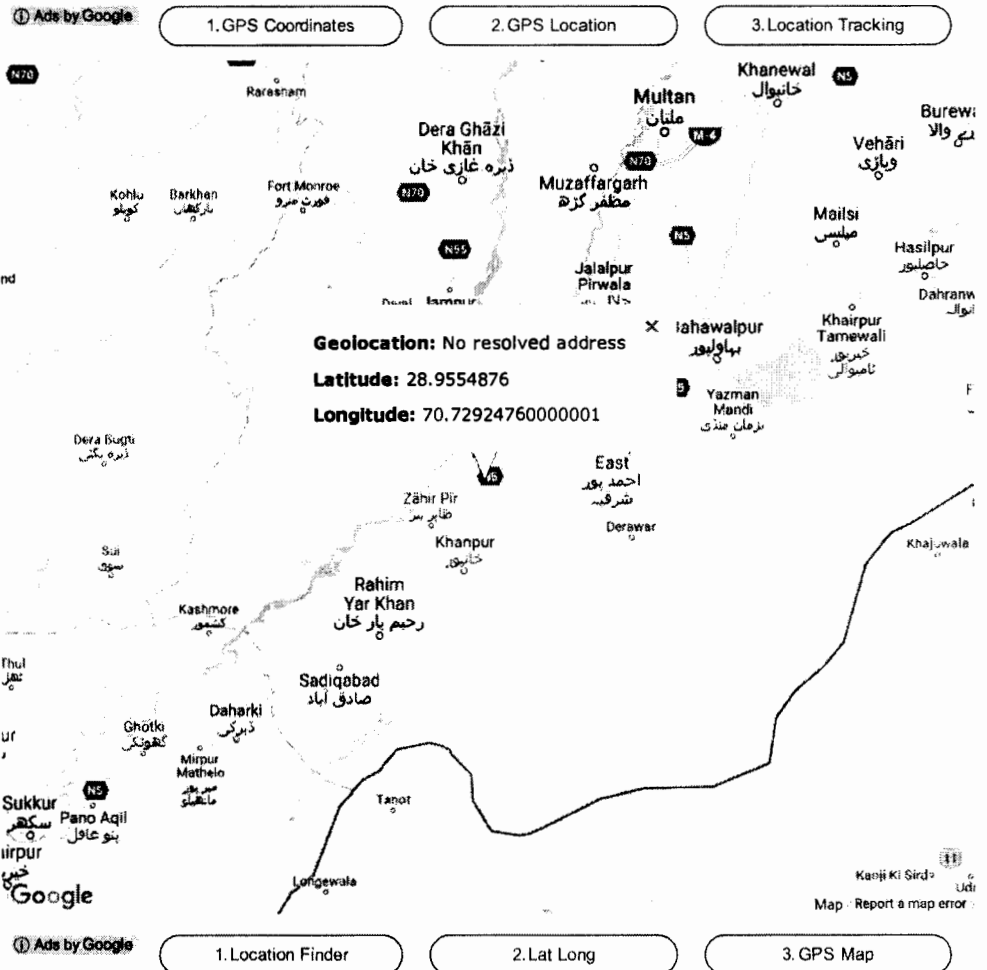
Latitude 28° 57' 19.7562"  
Longitude 70° 43' 45.2922"

Get Address

START NOW

Track Your Package

Enter Tracking Number Here.



## Latitude and longitude Finder

**GPS Coordinates Finder** convert address to lat long. Type in the address field and click on the **Get GPS Coordinates** button to get **latitude and longitude** from address. You will see the result on the map coordinates and in the Latitude Longitude fields.

## Coordinates Finder

The **coordinates finder** or coordinate locator will find the **longitude and latitude**, address by clicking on any point on the map. The result will show on both the map coordinates and on the corresponding fields. The coordinates finder will **get latitude and longitude** from any address.

## Address Finder

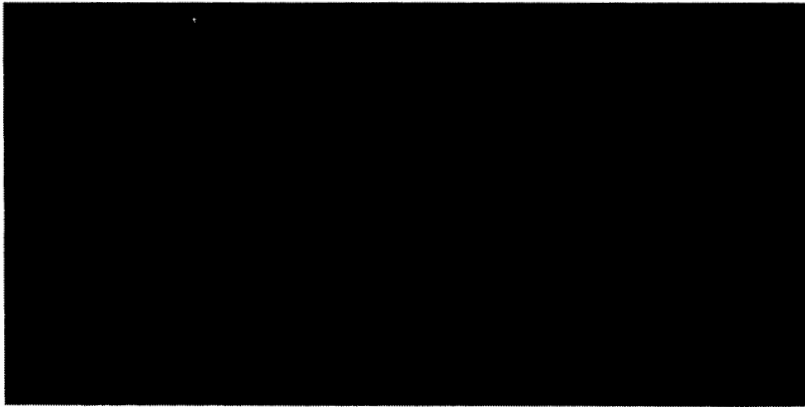
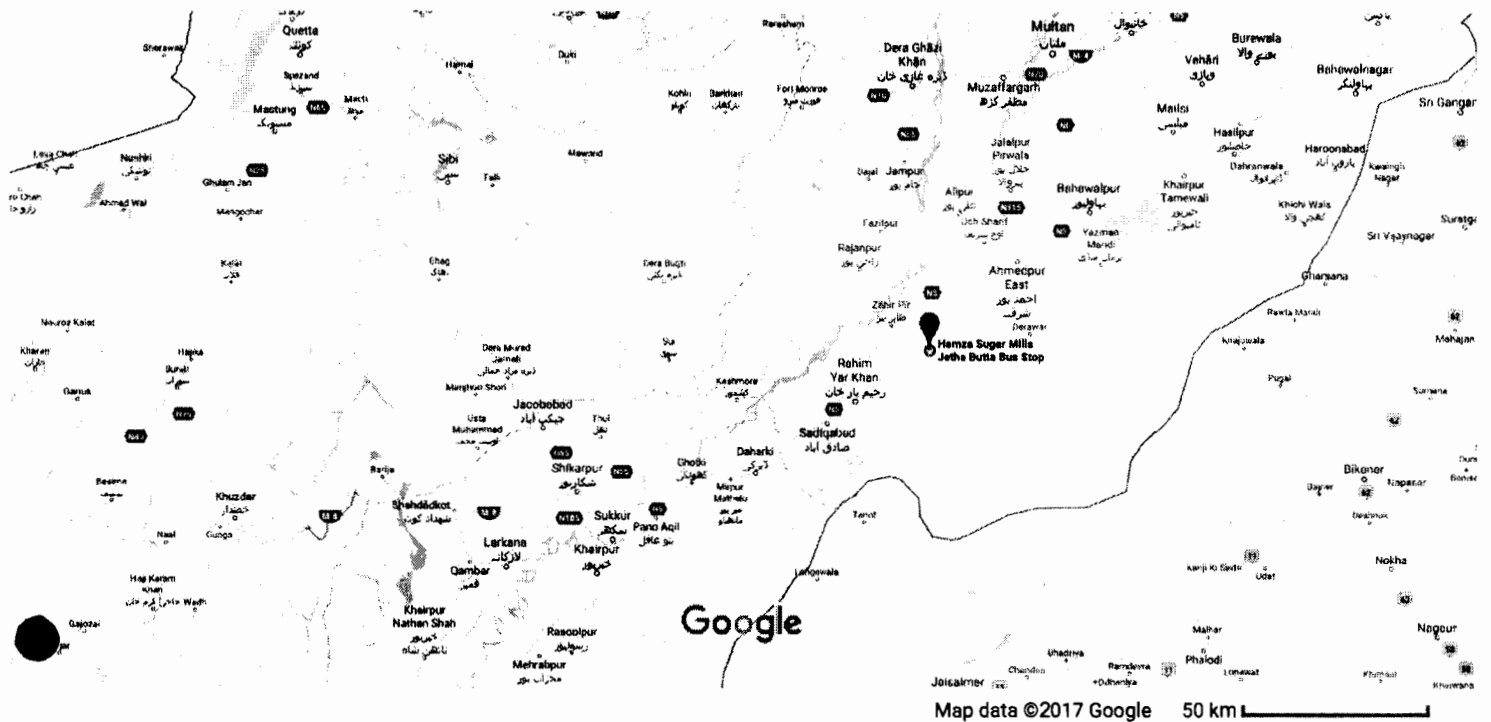
Bluetooth GPS Navigator



Worldwide Handheld GPS Navigator

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a True copy  
Resident Commissioner/Collector  
District Court Pur

# Google Maps Hamza Sugar Mills Jetha Butta Bus Stop



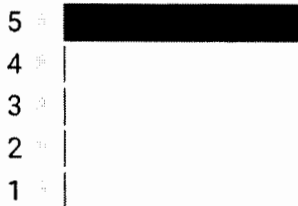
## Hamza Sugar Mills Jetha Butta Bus Stop

5.0 ★★★★★ · 1 review

Bus Station

Shahi Rd, Pakistan

## Review summary



5.0

★★★★★

1 review

*certified to be a true copy.*

*Asst. Commissioner Collector  
Tehsil Chakwal Pur*

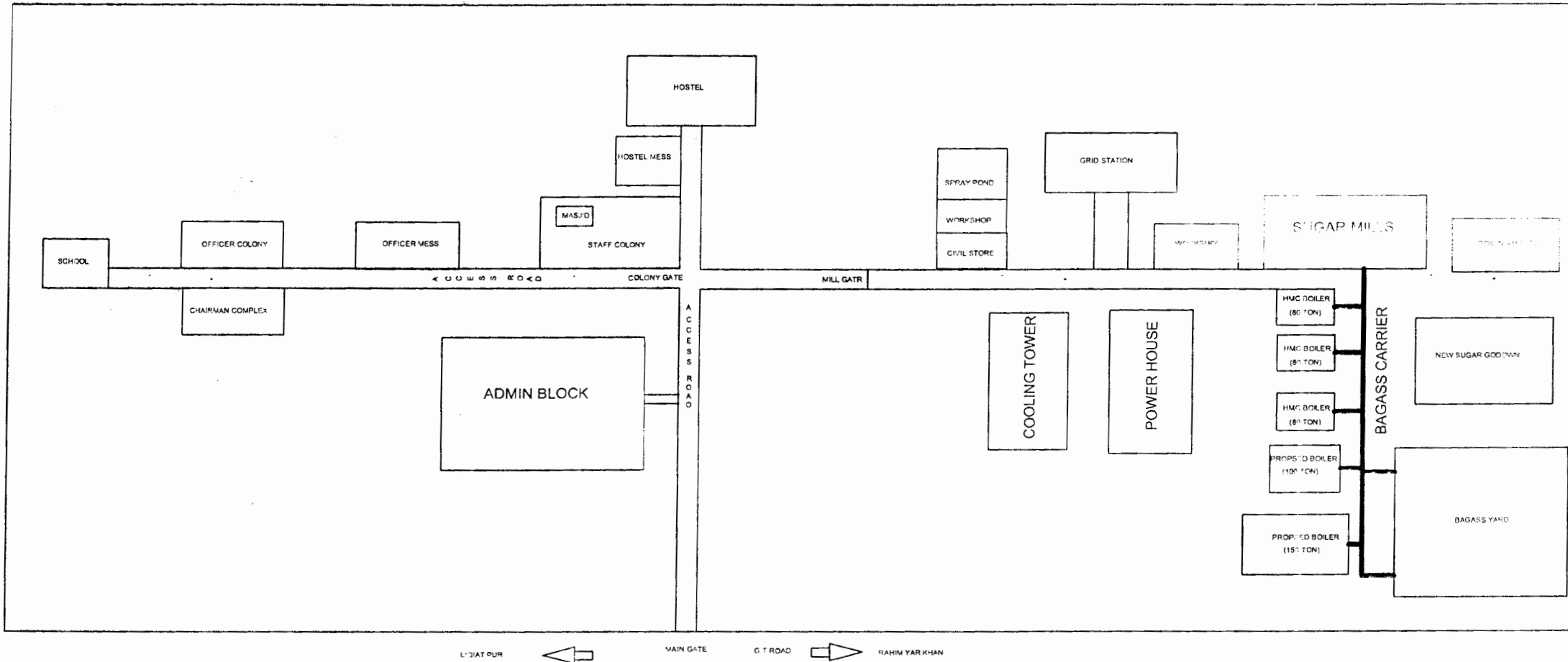


## BASIC OUTLINE FOR PLANT AND STRUCTURE

ANNEX-D

30 MW COGENERATION POWER PROJECT (phase-ii) HAMZA SUGAR MILLS LTD

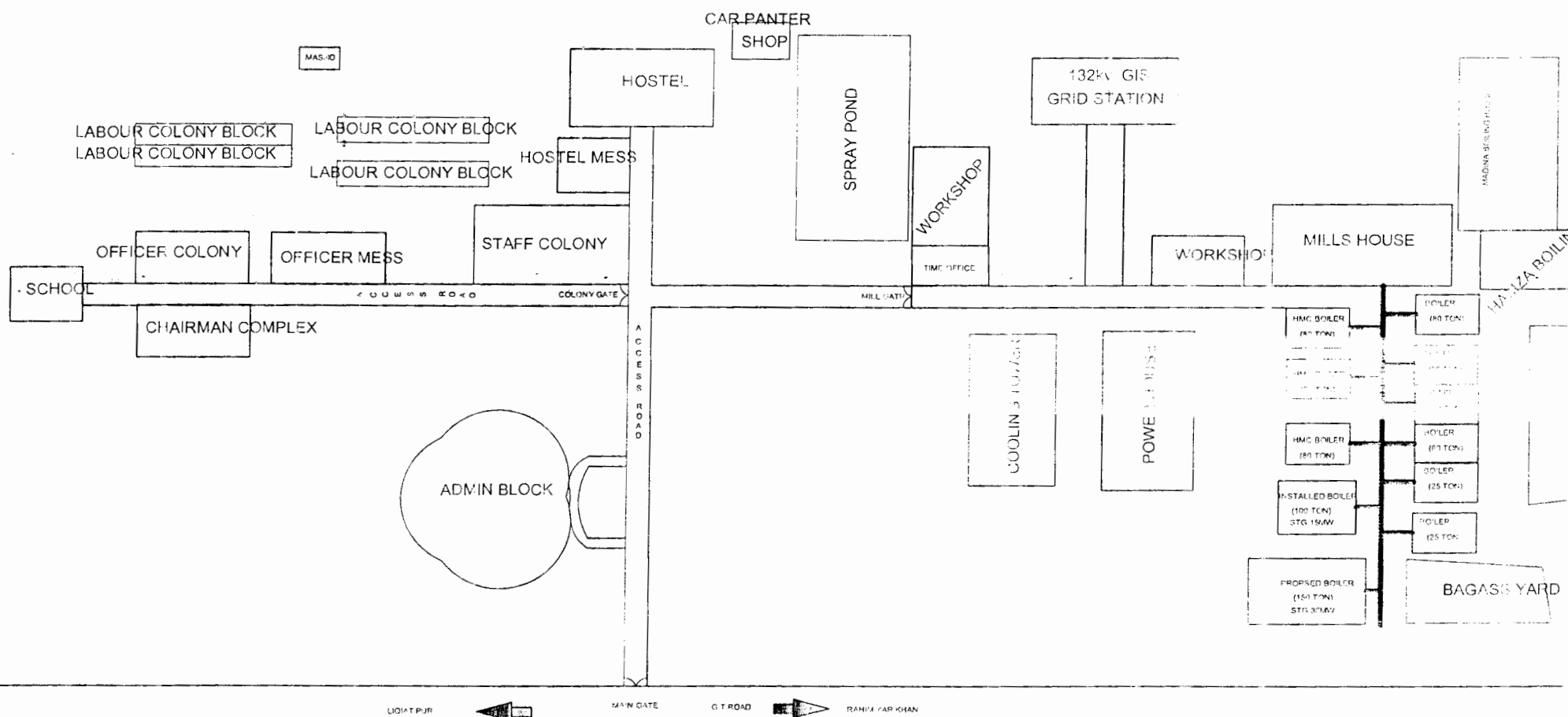
LOCATED AT JETHA BHUTTA, KHANPUR, DIST RAHIM YAR KHAN



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*[Signature]*  
Assistant Collector  
Tehsil Khanpur

## INDEX

LOCATED AT JETHA BHUTTA, KHANPUR, DIST RAHIM YAR KHAN



certified to be a  
true copy

MILLS HOUSE

HAMZA BOILING HOUSE

HMC BOILER  
(80 TON)

BOILER  
(80 TON)

HMC BOILER  
(80 TON)

BOILER  
(80 TON)

HMC BOILER  
(80 TON)

BOILER  
(60 TON)

BOILER  
(60 TON)

INSTALLED BOILER  
(100 TON)  
STG 15MW

BOILER  
(25 TON)

BOILER  
(25 TON)

PROPOSED BOILER  
(150 TON)  
STG.30MW

NEW SUGAR GODOWN

BAGASS YARD

certified to  
be a true copy  
Hassan

# PROSPECTUS

## **Prospectus**

### **BRIEF INTRODUCTION OF THE APPLICANT**

M/s Hamza Sugar Mills Ltd (HSML), while engaging in the manufacturing/sale of sugar with crushing capacity of 24500 TCD has already been operating and maintaining a Bagasse based 35.3 MW Power Plant to meet with its own steam and power requirements successfully, out of which HSML is supplying 2.5 MW power to MEPCO, since 2011 under PEPCO's SPPs/CPPs Policy.

Hamza Sugar Mills Limited (HSML) had planned to generate 60 MW by developing power plants based on high pressure technology boilers in three phases comprising upon 15MW, 30MW & 15MW. In its Phase-1, HSML has already developed a **15 MW Cogeneration Project in Phase-1**, under Framework for Power Cogeneration 2013 (Bagasse/Biomass), which successfully achieved **Commercial Operation Date (COD) on March 10, 2017** and supplying power to national grid.

Following its goal HSML is setting up another new 30MW Bagasse/Biomass fired based Co-Generation Power Project in its planned Phase-2 under Framework for Power Cogeneration 2013 (Bagasse/Biomass), making a total supply to national grid up to 45MW. For the purpose of reaching its target of 60MW supply to national grid, HSML shall be developing another 15MW Co-generation Power Plant in the 3<sup>rd</sup> Phase.

The cogeneration will be based primarily on bagasse while ensuring that all requisite measures are in place to ensure that the project is environmentally compliant. During crushing season, bagasse being a by-product of HSML process, will be the primary fuel for the project. During rest of the year, the un-utilized bagasse of HSML as well as from outside market (if available) will be utilized for power generation.

### **SALIENT FEATURES OF THE FACILITY FOR WHICH LICENSE IS SOUGHT**

The Facility shall employ 30 MW Steam Turbo Generator (STG) for power generation. The generated power shall be dispatched to the National Grid by looping in/out arrangement at already available interconnection arrangements at 132kV Khanpur-132kV Liaquatpur Transmission Line.

1	Plant location	G.T. Road, Jetha Bhutta, Tehsil Khanpur, District Rahim Yar Province of Punjab
2	Plant Capacity	30.00MW (Gross)
3	Technology	Conventional steam power cycle
4	Installed capacity	30,000 KW (Gross)
5	Plant details i. Steam Turbo generators ii. Boiler	1X 30 MW Steam Turbo Generator (STG) 1X150 TPH approximately, 100 Bar Bagasse fired boiler

The company shall opt for the upfront tariff for New Bagasse Based Co-Generation projects determined by NEPRA in May 2013 under the Framework for Power Cogeneration 2013 for Bagasse/Biomass to include bagasse/biomass under the ambit of the Renewable Energy Policy, 2006.

### **PROPOSED INVESTMENT**

The proposed investment is expected to be approximately US\$ 29.79 Million i.e. Pak Rs.3187.53 Million ( @ 1 US\$ = Rs.107) and shall be made through own sources of Hamza Sugar Mills Limited. The Financial Close is however expected on June 30, 2017.

### **SOCIAL AND ENVIRONMENTAL IMPACT OF THE PROPOSED FACILITY**

Bagasse is a by-product produced during the sugar manufacturing process and is an environmental friendly biomass fuel and helps reduce emission of Green House Gasses. Governments across the Globe including Pakistan and neighboring India have incentivized biomass based generation to reduce the effects of Global Warming and to promote the use of indigenous energy sources for electricity generation.

Bagasse based generation like HSML, provide the following benefits:

- Import substitution by replacing costly furnace oil, saving precious foreign exchange. It is estimated that approximately 3,000 MW can be generated by sugar mills located in various parts of the country.
- Contributing towards reducing the electricity shortfall during the low generation months as sugar mills operate in the winter months i.e. non-gas and non-hydel months
- Since Bagasse based generation offers direct replacement for furnace oil/diesel based generation it offers a clear price advantage.
- Environment friendly nature of the fuel helps in reducing Green House Gases and Carbon Footprints.
- The Project will use a high pressure boiler to generate electricity for sale to the national grid. The higher steam parameters shall result in more energy dispatch from the same fuel.
- Reducing distribution costs. Sugar Mills are located in rural areas and are vastly spread and, therefore, are ideal vehicles for cheap distribution of power to rural areas and non-traditional load centers.



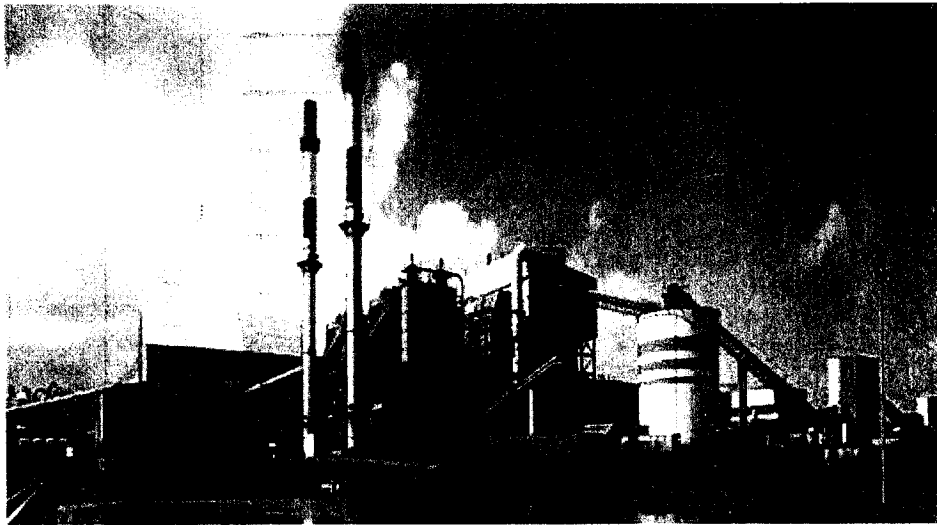
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# INTERCONNECTION STUDY

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*For*

## **30 MW CO-GENERATION POWER PROJECT BY HAMZA SUGAR MILLS LIMITED**



*Final Report  
(February 2017)*

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# INTERCONNECTION STUDY

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## **Executive Summary**

- ❖ The Final Report of 30 MW Hamza Sugar Mills Power Plant is submitted herewith after accommodating all the comments from MEPCO. The installed capacity of the plant would comprise of one unit of 30 MW which would deliver maximum net power of 27 MW to the grid.
- ❖ Electrical Grid Studies by Hamza Sugar Mills for the Total 60 MW capacity has already been approved and vetted by NTDC via Letter No. GMPP/CEMP/TRP-333/Hamza Sugar/2119-22 dated 15-05-2014.
- ❖ Phase-I of 15 MW Hamza Sugar Mills has already been installed for the supply of 13.5 MW to the National Grid. Hamza Sugar Mills now intends to add another unit of 30 MW at the same location.
- ❖ It would like to go for high pressure cogeneration in the sugar mill with the aim of exporting power nearly 27 MW to the national grid during both the crushing season and Non-crushing seasons. Crushing season will be from November to March and Non-Crushing season will be from April to onward depending upon the availability of Bagasse.
- ❖ 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 substations of Khanpur. It lies at about 12 km from the site of Hamza Sugar Mills.
- ❖ Due to the location of Hamza Sugar Mills., the most feasible interconnection scheme would be looping in-out one of the existing 132 kV double circuit between Liaqatpur to Khanpur at Hamza PP, as had been done for Hamza Sugar Mills. The up-coming chapters discuss in detail the location and interconnection of the new unit. A few approximate sketches are shown in Appendix-B.
- ❖ The two breaker bays of 132 kV at Hamza PP to connect with the 132 kV circuits each from Liaqatpur and Khanpur respectively are already installed for Hamza Sugar Mills.
- ❖ In view of planned COD, of the Hamza Sugar Mills Phase II 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.

- ❖ Steady state analysis by load flows, short circuit and stability criterion reveals that proposed scheme is adequate to export 27 MW output of the plant under normal and contingency conditions.
- ❖ Since the plant operates during summer as well, the high-water season, its detail analysis has also been carried out for September 2018.
- ❖ In an extended term scenario, September 2021 and January 2022 have also been studied to evaluate the performance of the proposed interconnection scheme. In these cases 15 MW Hamza PP Phase III has also been modeled. 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 and dynamic stability analysis have been carried out for a complete check of the system.
- ❖ The short circuit analysis carried out to calculate maximum fault levels at Hamza Sugar Mills and the substations of 132 kV in its vicinity reveals currents for the proposed scheme are much less than the rated short circuit capacities of switchgear installed at these substations. There are no violations of exceeding the rating of the equipment due to contribution of fault current from Hamza Sugar Mills.
- ❖ 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 Hamza Sugar Mills substation followed by the final trip of 132 kV circuits emanating from this substation 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 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. The stability of system for far end faults of 3-phase occurring at Khanpur 132 kV and Liaqatpur 132 kV bus bar has also been checked.



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## **Appendices**

**Appendix –A: Generation, Transmission Plan and Load Forecast for Chapter – 4**

**Appendix –B: Map & Sketches for Chapter – 4**

**Appendix –C: Plotted Results of Load Flow for Chapter – 5**

**Appendix –D: Plotted Results of Short Circuit for Chapter – 6**

**Appendix –E: Plotted Results of Stability Analysis for Chapter – 7**

**Appendix –F: Generator, Transformer and Dynamic Data**



# **1. INTRODUCTION**

## **1.1 Background**

Hamza Sugars Mills Ltd. Power Plant is a Cogeneration plant near Khanpur in District Rahim Yar Khan embedded in the distribution network of MEPCO. Currently, it has a generation capacity of 15 MW. It has one generating unit, which provides a spillover of 13.5 MW to the national grid. The plant will successfully achieve its COD in the first quarter of 2017. It is located nearly 11-12 km from the existing Khanpur 132 kV Substation in the concession area of Multan Electric Power Company (MEPCO). A general idea of the location of plant and grid stations in its vicinity can be viewed in sketch-1 attached in Appendix-B.

Hamza Sugar Mills aims to install another 30 MW unit, in the same region, and go for high pressure cogeneration in the sugar mill with the aim of exporting 27 MW power to the grid during the crushing season and a little while after it i.e. for the months of April to August depending on the availability of bagasse. 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 MEPCO through 132 kV grids, as that of Khanpur, and Liaquatpur, available in the vicinity of this project. The location of Hamza Sugar Mills 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 Hamza Sugar Mills Power Project and MEPCO network, for stable and reliable evacuation of 30 MW 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 132 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 Hamza Sugar Mills. 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

#### Short Circuit:

132 kV Substation Equipment Rating 31.5 kA or 40 kA

#### 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 5 cycles after fault initiation.



## **2. ASSUMPTIONS OF DATA**

The number of new generating units at Hamza PP will be one. As per the data provided by the client following data has been modeled:

### **2.1 Hamza-PP Data**

Installed capacity of power plant	= 1 x 30 = 30 MW
Net Capacity of power plant	= 27 MW
Lump sum maximum generating capacity	= 30 MW
Power factor	= 0.80 lagging, 0.95 leading
Lump sum MVA capacity	= 1 x 37.5 MVA = 37.5 MVA
Inertia Constant	= 2.8895 MW-sec/MVA
Generating Voltage	= 11 kV
Transformer Rating	= 40 MVA

### **2.2 Network data**

The 132 kV network in the area near Hamza Sugar Mills Power Project are 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. The network of MEPCO in the vicinity of Hamza Sugar Mills was verified during a visit held on 3<sup>rd</sup> August 2016 by PPI engineers. Reinforcements required in the MEPCO network were also discussed in detail in meeting with MEPCO and NTDC on 5<sup>th</sup> and 6<sup>th</sup> October 2016.

### **3. STUDY APPROACH AND METHODOLOGY**

#### **3.1 Understanding of the Problem**

Hamza Sugar Mills Pvt Ltd. intends to increase generating capacity in the same region as that of Hamza Sugar Mills, by adding a 30 MW unit of its own. The maximum spillover to the National Grid from the site will be about 27 MW of electrical power during the crushing season and a little while after it.

The location of the Hamza PP Phase II is in accordance with already installed Hamza Mills PP. Interconnection has already been done, Transmission Lines to evacuate the power has already been laid. The distance of the plant from the looping point is about 1.3 km. The conductor used is 132 kV Lynx. Hamza Sugar Mills added to the existing network is shown in Sketch-2 in Appendix-B. The proposed power plant embedded in local network in this area shall provide relief to the source substations such as Guddu, Rahim Yar Khan and Bahawalpur which are feeding the local network distantly.

The adequacy of MEPCO network of 132 kV in and around the proposed site of Hamza PP would be 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:

- A base case network model has been prepared for the year 2018, in which the peak load scenario will occur after the commissioning of Hamza PP in November 2017, comprising all 500kV, 220kV and 132 kV system, envisaging the load forecast, the generation additions and transmission expansions for that year particularly in MEPCO.
- 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, of Hamza 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.
- The month of September 2018, has also been completely analyzed for the system, considering maximum hydel dispatches.

- Load flow and short circuit studies have also been performed for future scenarios of September 2021 and January 2022 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**

Hamza Sugar Mills is in District Rahim Yar Khan embedded in the distribution network of MEPCO. Network is being fed from the sources substation of Guddu 500/220/132 kV and Bahawalpur 220/132 kV. Rahim Yar Khan 500/220/132 kV grid station is also being constructed in the vicinity.

These are multiple feeding points in the vicinity which provides 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 Hamza-PP**

Keeping in view of the above mentioned 132 kV network available in the vicinity of the site of the Hamza PP Phase II, the interconnection scheme has already been developed and the 132 kV transmission lines have also been constructed. This scheme of interconnection has been approved and vetted for the complete evacuation of 60 MW by NTDC via Letter No. GMPP/CEMP/TRP-333/Hamza Sugar/2119-22 dated 15-05-2014.



## **5. DETAILED LOAD FLOW STUDIES**

The base cases have been developed for the peak conditions of January 2018 using the network data of NTDC and MEPCO available with PPI. The peak loads of the year 2018 for MEPCO have been modeled as per the latest PMS Demand forecast as provided by NTDC. Detailed load flow studies have been carried out for January 2018, September 2018 and future cases of September 2021 and January 2022.

### **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 Hamza PP Phase II.

#### **5.1.1 Without Hamza-Power Plant Phase II**

The results of load flow analysis with Hamza PP Phase I, but without Hamza PP Phase II 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 and the voltages on the bus bars are also within the permissible operating range of  $\pm 5\%$  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 0.1: Hamza-PP to Liaquatpur 132 kV Single Circuit Out

Exhibit 0.2: Hamza-PP to Khanpur 132 kV Single Circuit Out

Exhibit 0.3: Samasata to Liaquatpur 132 kV Single Circuit Out

Exhibit 0.4: Bhawalpur-New-2 to Samasata 132 kV Single Circuit Out

Exhibit 0.5: Rahim Yar Khan-New to Khanpur 132 kV Single Circuit Out

Exhibit 0.6: Khanpur to Feroza 132 kV Single Circuit Out

Exhibit 0.7: Rahim Yar Khan-New to R.Y.Khan 132 kV Single Circuit Out



### **5.1.2 With Hamza-Power Plant Phase II**

The scenario of Hamza Sugar Mills PP after the COD of the plant when it starts exporting 27 MW to the MEPCO network has been studied. The results of load flows with Hamza PP Phase I and Hamza PP Phase II 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  $\pm 5\%$  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 1.1: Hamza-PP to Liaquatpur 132 kV Single Circuit Out

Exhibit 1.2: Hamza-PP to Khanpur 132 kV Single Circuit Out

Exhibit 1.3: Samasata to Liaquatpur 132 kV Single Circuit Out

Exhibit 1.4: Bhawalpur-New-2 to Samasata 132 kV Single Circuit Out

Exhibit 1.5: Rahim Yar Khan-New to Khanpur 132 kV Single Circuit Out

Exhibit 1.6: Khanpur to Feroza 132 kV Single Circuit Out

Exhibit 1.7: Rahim Yar Khan-New to R.Y.Khan 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  $\pm 10\%$  off the nominal for contingency conditions' criteria. We find no capacity constraints on 132 kV circuits under normal and contingency conditions.

### **5.2 Off-Peak Load Case January 2018**

The off-peak load case in January 2018 has been studied in detail for the conditions of with Hamza PP Phase II.

The scenario of Hamza Sugar Mills PP after the COD of the plant when it starts exporting 27 MW to the MEPCO network has been studied. The results of load flows with Hamza PP Phase I and Hamza PP Phase II 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  $\pm 5\%$  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: Hamza-PP to Liaquatpur 132 kV Single Circuit Out

Exhibit 2.2: Hamza-PP to Khanpur 132 kV Single Circuit Out

Exhibit 2.3: Samasata to Liaquatpur 132 kV Single Circuit Out

Exhibit 2.4: Bhawalpur-New-2 to Samasata 132 kV Single Circuit Out

Exhibit 2.5: Rahim Yar Khan-New to Khanpur 132 kV Single Circuit Out

Exhibit 2.6: Khanpur to Feroza 132 kV Single Circuit Out

Exhibit 2.7: Rahim Yar Khan-New to R.Y.Khan 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  $\pm 10\%$  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 2018: Summer Scenario**

The scenario of Hamza Sugar Mills PP during the summer season, for the month of September with maximum hydel dispatches, has been studied. The results of load flows with Hamza PP Phase I and Hamza PP Phase II under normal conditions have been plotted in Exhibit 3.0 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  $\pm 5\%$  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: Hamza-PP to Liaquatpur 132 kV Single Circuit Out

Exhibit 3.2: Hamza-PP to Khanpur 132 kV Single Circuit Out

Exhibit 3.3: Samasata to Liaquatpur 132 kV Single Circuit Out

Exhibit 3.4: Bhawalpur-New-2 to Samasata 132 kV Single Circuit Out

Exhibit 3.5: Rahim Yar Khan-New to Khanpur 132 kV Single Circuit Out

Exhibit 3.6: Feroza to Khanpur 132 kV Single Circuit Out

Exhibit 3.7: Rahim Yar Khan-New to R.Y.Khan 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  $\pm 10\%$  off the nominal for contingency conditions' criteria. We find no capacity constraints on 132 kV circuits under normal and contingency conditions.

#### **5.4 Peak Load Case September 2021: Extended Term Scenario**

We have also studied the future scenario of September 2021 to assess the impact of the plant in the extended term of its installation as per NTDC requirement.

Exhibit 4.0 shows the normal case of 2021 of the region with Hamza PP. As it can be seen 15 MW Hamza PP Phase III is also modeled in this scenario. This way total 54 MW (27 MW + 27 MW) of electrical power will be supplied to the national grid from Hamza 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  $\pm 5\%$  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 4.1: Liaquatpur to Hamza-PP 132 kV Single Circuit Out

Exhibit 4.2: Hamza-PP to Khanpur 132 kV Single Circuit Out

Exhibit 4.3: Samasata to Liaquatpur 132 kV Single Circuit Out

Exhibit 4.4: Bhawalpur Energy to Samasata 132 kV Single Circuit Out





Exhibit 4.5: Rahim Yar Khan-New to Khanpur 132 kV Single Circuit Out

Exhibit 4.6: Feroza to Khanpur 132 kV Single Circuit Out

Exhibit 4.7: Rahim Yar Khan-New to R.Y.Khan 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  $\pm 10\%$  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.

### **5.5 Peak Load Case January 2022: Extended Term Scenario**

We have also studied the future scenario of crushing season January 2022 to assess the impact of the plant in the extended term of its installation as per NTDC requirement.

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  $\pm 5\%$  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 5.1: Hamza-PP to Liaquatpur 132 kV Single Circuit Out

Exhibit 5.2: Hamza-PP to Khanpur 132 kV Single Circuit Out

Exhibit 5.3: Samasata to Liaquatpur 132 kV Single Circuit Out

Exhibit 5.4: Bhawalpur Energy to Samasata 132 kV Single Circuit Out

Exhibit 5.5: Rahim Yar Khan-New to Khanpur 132 kV Single Circuit Out

Exhibit 5.6: Feroza to Khanpur 132 kV Single Circuit Out

Exhibit 5.7: Rahim Yar Khan-New to R.Y.Khan 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  $\pm 10\%$  off the nominal for contingency conditions' criteria.



## **5.6 Conclusion of Load Flow Analysis**

From the analysis discussed above, we conclude that the proposed interconnection scheme of looping in-out one of the Liaqatpur - Khanpur 132 kV double circuit at Hamza-PP is adequate to evacuate the 27 MW spillover power of Hamza PP Phase-II under normal and contingency conditions.

It was found that in 2018 all the contingency cases the surrounding circuits remain within the rated capacity. Also the bus bar voltages were well within the permissible limits in all the contingency events.

The scenario of September 2021 and January 2022 was also evaluated and found to be stable under normal and contingency cases.

## **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.

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

### **6.2 Fault Current Calculations without Hamza PP Phase II Year 2018**

In order to assess the short circuit strength of the network of 132 kV without Hamza PP Phase II for MEPCO in the vicinity of the site of the Plant near Khanpur and Liaquatpur, 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 Hamza PP Phase II and later on how much the contribution of fault current from Hamza PP Phase II 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 6.0 attached in Appendix-D. Both 3-phase and 1-phase fault currents are indicated in the Exhibit 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 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 20 kA, 25 kA or 31.5 kA for older substations and 40 kA for new substations.

**Table-6.1**  
**Maximum Short Circuit Levels without Hamza Sugar Mills PP**

Substation	3-Phase fault current, kA	1-Phase fault current, kA
Hamza-PP 132kV	6.64	6.36
Liaquatpur 132kV	4.59	4.53
Samasatta 132kV	7.70	7.79
Bahawalpur-New-II 132kV	8.31	8.55
Mubarakpur 132kV	4.68	5.14
Khanpur 132kV	10.00	10.43
RYK-New 132kV	16.61	16.15
R.Y.Khan 132kV	9.63	10.20

### **6.3 Fault Current Calculations with Hamza PP Phase II–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 11 kV bus bar of Hamza-PP itself and other bus bars of the 132 kV substations in the electrical vicinity of Hamza-PP. The graphic results are shown in Exhibit 6.1.

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 Hamza-PP Unit-II and the 132 kV and 11 kV bus bars of Hamza-PP Unit-II 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 Hamza Sugar Mills.PP**

Substation	3-Phase fault current, kA	1-Phase fault current, kA
Hamza-PP T-2 11kV	16.52	22.60
Hamza-PP T-1 11Kv	22.25	12.43
Hamza-PP 132kV	6.71	7.21
Liaqatpur 132kV	4.63	4.69
Samasatta 132kV	7.71	7.82
Bahawalpur-New-II 132kV	8.32	8.58
Mubarakpur 132kV	4.68	5.15
Khanpur 132kV	10.06	10.80
RYK-New 132kV	16.65	16.35
R.Y.Khan 132kV	9.64	10.25

#### **6.4 Fault Current Calculations with Hamza-PP interconnected– Year 2021**

Fault currents have been evaluated for the peak case of 2021 in order to observe the maximum fault current on Hamza PP and the bus bars in the vicinity of Hamza-PP after its interconnection with the MEPCO/NTDC network. Fault types applied are three phase and single-phase at 132 kV and 11 kV bus bars of Hamza -PP itself and other bus bars of the 132 kV substations in the electrical vicinity of Hamza-PP. The graphic results showing maximum 3-phase and 1-phase fault levels are indicated in Exhibit 6.2, 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 Hamza-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 Hamza Sugar Mills.PP**

Substation	3-Phase fault current, kA	1-Phase fault current, kA
Hamza-PP T-2 11kV	16.66	22.76
Hamza-PP T-1 11kV	28.56	20.50
Hamza-PP 132kV	6.91	7.34
Liaquatpur 132kV	4.56	4.62
Samasatta 132kV	6.13	6.14
Bahawalpur-New-II 132kV	9.06	9.30
Mubarakpur 132kV	4.99	5.38
Khanpur 132kV	10.32	10.90
RYK-New 132kV	16.91	15.98
R.Y.Khan 132kV	9.59	10.20

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 Hamza-PP on the 132 kV bus bars in its vicinity; and a rise on Khanpur 132 kV bus bars because of direct connection with Hamza-PP Phase II. 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 Hamza PP 132 kV standard size switchgear of short circuit rating of 40 kA has already been installed. 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 Hamza-PP with Khanpur 132 kV and Liaquatpur 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 Hamza-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 Hamza-PP Phase II 11 kV is 16.66 kA and 22.76 kA for 3-phase and 1-phase faults respectively in the year 2021. Therefore industry standard switchgear of the short circuit rating of 40 kA would serve the purpose, and can be installed at 132 kV switchyard of Hamza-PP 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 = 2.8895 MW-sec/MVA

#### **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 Hamza Sugar Mills Power Plant and thus the loading on the lines in the vicinity of Hamza-PP will be maximum allowing us to judge the full impact of the plant. Also the month of September 2021 has also been analyzed as there is a significant addition in the generation in vicinity of Hamza-PP. Also the 15 MW phase-III of Hamza-PP has also been modeled.

The proposed Hamza-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 Hamza-PP i.e. right at the 132 kV bus bar of Hamza-PP 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 emanating from this substation. 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.

## **7.2 Dynamic Stability Simulations' Results with Hamza-PP interconnected - January 2018**

### **7.2.1 Fault at 132 kV Hamza-PP**

We applied three-phase fault on Hamza-PP 132 kV bus bar, cleared fault in 5 cycles (100 ms) followed by trip of a 132 kV single circuit between Hamza-PP and Khanpur 132 kV substation. 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 Hamza-PP, RYK-New, Khanpur and Liaquatpur along with 11 kV bus bars of Hamza-PP-I and Hamza-PP-II 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 Hamza-PP-II**

The MW/MVAR output of Hamza-PP-II gets back to the pre-fault output quickly after fast damping of the oscillations in its output. However MVAR output acquires equilibrium at a slightly different value.



**Fig. 1.4      Speed and mechanical power of Generators at Hamza-PP-II**

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 Hamza-PP to Liaquatpur 132 kV circuit**

Followed by clearing of fault, the trip of a 132 kV single circuit from Hamza-PP to Khanpur causes the entire output of Hamza-PP to flow on the intact 132 kV circuit between Hamza-PP and Liaquatpur 132kV circuit. This causes significant loading on the Hamza-PP to Liaquatpur 132 kV circuit. 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 Hamza-PP-I 11 kV, Hamza-PP-II 11 kV, RYK-PP-I 11 kV, KAPCO, Guddu 220 kV and Guddu New 500 kV are plotted relative to machines at Guddu New 500 kV. The results show that the rotor angle of Hamza-PP-II 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 132kV Hamza-PP (Stuck Breaker)**

We applied single-phase fault on Hamza-PP 132 kV bus bar, cleared fault in 9 cycles (180 ms), to simulate a stuck breaker case, followed by trip of a 132 kV single circuit between Hamza-PP and Khanpur 132 kV substation. 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 Hamza-PP, RYK-New, Khanpur and Liaquatpur along with 11 kV bus bars of Hamza-PP-I and Hamza-PP-II 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 Hamza-PP-II**

The MW/MVAR output of Hamza-PP-II 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 Hamza-PP-II**

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 attain equilibrium.

**Fig. 2.5 MW Flow on Hamza-PP to Liaquatpur 132 kV circuit**

Followed by clearing of fault, the trip of a 132 kV single circuit from Hamza-PP to Khanpur causes the entire output of Hamza-PP to flow on the intact 132 kV circuit between Hamza-PP and Liaquatpur 132kV circuit. This causes significant loading on the Hamza-PP to Liaquatpur 132 kV circuit. 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 Hamza-PP-I 11 kV, Hamza-PP-II 11 kV, RYK-PP-I 11 kV, KAPCO, Guddu 220 kV and Guddu New 500 kV are plotted relative to machines at Guddu New 500 kV. The results show that the rotor angle of Hamza-PP-II 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 Liaquatpur 132 kV**

We applied three-phase fault on far 132 kV bus bar of Liaquatpur to study the impact of a disturbance in the grid on the performance of the plant. The fault is cleared in 5 cycles (100 ms) followed by trip of 132 kV single circuit between Liaquatpur and Samasata. 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 Liaqatpur, Samasta, Khanpur and Hamza-PP alongwith 11 kV bus bars of Hamza-PP-I and Hamza-PP-II 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 Hamza-PP-II**

The MW/MVAR output of Hamza-PP-II 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 Hamza-PP-II**

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 attain equilibrium.

**Fig. 3.5      MW Flow on Hamza-PP to Liaqatpur 132 kV circuit**

Followed by clearing of fault, the trip of a 132 kV single circuit from Liaqatpur to Samasata, we have monitored the flow from Hamza-PP to Liaqatpur. 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 Hamza-PP-I 11 kV, Hamza-PP-II 11 kV, RYK-PP-I 11 kV, KAPCO, Guddu 220 kV and Guddu New 500 kV are plotted relative to machines at Guddu New 500 kV. The results show that the rotor angle of Hamza-PP-II 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.

#### **7.2.4 Fault at Khanpur 132 kV**

We applied three-phase fault on far 132 kV bus bar of Khanpur to study the impact of a disturbance in the grid on the performance of the plant. The fault is cleared in 5 cycles (100 ms) followed by trip of 132 kV single circuit between Hamza-PP and Khanpur. 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. 4.1 Bus Voltages**

The bus voltages of 132 kV bus bars of Khanpur, RYK-New, Liaqatpur and Hamza-PP alongwith 11 kV bus bars of Hamza-PP-I and Hamza-PP-II are plotted. The results show quick recovery of the voltages after clearing of fault.

##### **Fig. 4.2 Frequency**

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

##### **Fig. 4.3 MW/MVAR Output of Generators of Hamza-PP-II**

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

##### **Fig. 4.4 Speed and mechanical power of Generators at Hamza-PP-II**

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 attain equilibrium.

##### **Fig. 4.5 MW Flow on Feroza to Khanpur 132 kV circuit**

Followed by clearing of fault, the trip of a 132 kV single circuit from Hamza-PP to Khanpur, we have monitored the flow from Feroza to Khanpur. 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. 4.6 Rotor Angles**

The rotor angles of the generators of Hamza-PP-I 11 kV, Hamza-PP-II 11 kV, RYK-PP-I 11 kV, KAPCO, Guddu 220 kV and Guddu New 500 kV are plotted relative to machines at Guddu New 500 kV. The results show that the rotor angle of Hamza-PP-II 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.

#### **7.2.5 Fault at 132 kV Hamza-PP**

We applied three-phase fault on Hamza-PP 132 kV bus bar, cleared fault in 5 cycles (100 ms) followed by trip of a 132 kV single circuit between Hamza-PP and Liaquatpur 132 kV substation. 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. 5.1 Bus Voltages**

The bus voltages of 132 kV bus bars of Hamza-PP, RYK-New, Khanpur and Liaquatpur along with 11 kV bus bars of Hamza-PP-I and Hamza-PP-II are plotted. The results show quick recovery of the voltages after clearing of fault.

#### **Fig. 5.2 Frequency**

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

#### **Fig. 5.3 MW/MVAR Output of Generators of Hamza-PP-II**

The MW/MVAR output of Hamza-PP-II gets back to the pre-fault output quickly after fast damping of the oscillations in its output. However MVAR output acquires equilibrium at a slightly different value.

#### **Fig. 5.4 Speed and mechanical power of Generators at Hamza-PP-II**

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. 5.5 MW Flow on Hamza-PP to Khanpur 132 kV circuit**

Followed by clearing of fault, the trip of a 132 kV single circuit from Hamza-PP to Liaquatpur causes the entire output of Hamza-PP to flow on the intact 132 kV circuit between Hamza-PP and Khanpur 132kV circuit. This causes significant loading on the Hamza-PP to Khanpur 132 kV circuit. 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. 5.6 Rotor Angles**

The rotor angles of the generators of Hamza-PP-I 11 kV, Hamza-PP-II 11 kV, RYK-PP-I 11 kV, KAPCO, Guddu 220 kV and Guddu New 500 kV are plotted relative to machines at Guddu New 500 kV. The results show that the rotor angle of Hamza-PP-II 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 Dynamic Stability Simulations' Results with Hamza-PP interconnected - September 2021**

#### **7.3.1 Fault at 132 kV Hamza-PP**

We applied three-phase fault on Hamza-PP 132 kV bus bar, cleared fault in 5 cycles (100 ms) followed by trip of a 132 kV single circuit between Hamza-PP and Khanpur 132 kV substation. 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 Hamza-PP, RYK-New, Khanpur and Liaquatpur along with 11 kV bus bars of Hamza-PP-I and Hamza-PP-II 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 Hamza-PP-II**

The MW/MVAR output of Hamza-PP-II gets back to the pre-fault output quickly after fast damping of the oscillations in its output. However MVAR output acquires equilibrium at a slightly different value.

**Fig. 1.4      Speed and mechanical power of Generators at Hamza-PP-II**

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 Hamza-PP to Liaquatpur 132 kV circuit**

Followed by clearing of fault, the trip of a 132 kV single circuit from Hamza-PP to Khanpur causes the entire output of Hamza-PP to flow on the intact 132 kV circuit between Hamza-PP and Liaquatpur 132kV circuit. This causes significant loading on the Hamza-PP to Liaquatpur 132 kV circuit. 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 Hamza-PP-III 11 kV, Hamza-PP-II 11 kV, RYK-PP-I 11 kV, Etihad-PP-I, BWP Energy and Guddu New 500 kV are plotted relative to machines at Guddu New 500 kV. The results show that the rotor angle of Hamza-PP-II 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.

**7.3.2 Fault at 132kV Hamza-PP (Stuck Breaker)**

We applied single-phase fault on Hamza-PP 132 kV bus bar, cleared fault in 9 cycles (180 ms), to simulate a stuck breaker case, followed by trip of a 132 kV single circuit between Hamza-PP and Khanpur 132 kV substation. 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 Hamza-PP, RYK-New, Khanpur and Liaqatpur along with 11 kV bus bars of Hamza-PP-I and Hamza-PP-II 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 Hamza-PP-II**

The MW/MVAR output of Hamza-PP-II 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 Hamza-PP-II**

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 attain equilibrium.

**Fig. 2.5      MW Flow on Hamza-PP to Liaqatpur 132 kV circuit**

Followed by clearing of fault, the trip of a 132 kV single circuit from Hamza-PP to Khanpur causes the entire output of Hamza-PP to flow on the intact 132 kV circuit between Hamza-PP and Liaqatpur 132 kV circuit. This causes significant loading on the Hamza-PP to Liaqatpur 132 kV circuit. 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 Hamza-PP-III 11 kV, Hamza-PP-II 11 kV, RYK-PP-I 11 kV, Etihad-PP-I, BWP Energy and Guddu New 500 kV are plotted relative to machines at Guddu New 500 kV. The results show that the rotor angle of Hamza-PP-II 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.

### **7.3.3 Fault at Liaqatpur 132 kV**

We applied three-phase fault on far 132 kV bus bar of Liaqatpur to study the impact of a disturbance in the grid on the performance of the plant. The fault is cleared in 5 cycles (100 ms) followed by trip of 132 kV single circuit between Liaqatpur and Samasata. 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 Liaqatpur, Samasta, Khanpur and Hamza-PP along with 11 kV bus bars of Hamza-PP-I and Hamza-PP-II 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 Hamza-PP-II**

The MW/MVAR output of Hamza-PP-II 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 Hamza-PP-II**

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 attain equilibrium.

#### **Fig. 3.5      MW Flow on Hamza-PP to Liaqatpur 132 kV circuit**

Followed by clearing of fault, the trip of a 132 kV single circuit from Liaqatpur to Samasata, we have monitored the flow from Hamza-PP to Liaqatpur. 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 Hamza-PP-III 11 kV, Hamza-PP-II 11 kV, RYK-PP-I 11 kV, Etihad-PP-I, BWP Energy and Guddu New 500 kV are plotted relative to machines at Guddu New 500 kV. The results show that the rotor angle of Hamza-PP-II 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.

### **7.3.4 Fault at Khanpur 132 kV**

We applied three-phase fault on far 132 kV bus bar of Khanpur to study the impact of a disturbance in the grid on the performance of the plant. The fault is cleared in 5 cycles (100 ms) followed by trip of 132 kV single circuit between Hamza-PP and Khanpur. 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. 4.1 Bus Voltages**

The bus voltages of 132 kV bus bars of Khanpur, RYK-New, Liaquatpur and Hamza-PP along with 11 kV bus bars of Hamza-PP-I and Hamza-PP-II are plotted. The results show quick recovery of the voltages after clearing of fault.

#### **Fig. 4.2 Frequency**

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

#### **Fig. 4.3 MW/MVAR Output of Generators of Hamza-PP-II**

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

**Fig. 4.4      Speed and mechanical power of Generators at Hamza-PP-II**

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 attain equilibrium.

**Fig. 4.5      MW Flow on Feroza to Khanpur 132 kV circuit**

Followed by clearing of fault, the trip of a 132 kV single circuit from Hamza-PP to Khanpur, we have monitored the flow from Feroza to Khanpur. 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. 4.6      Rotor Angles**

The rotor angles of the generators of Hamza-PP-III 11 kV, Hamza-PP-II 11 kV, RYK-PP-I 11 kV, Etihad-PP-I, BWP Energy and Guddu New 500 kV are plotted relative to machines at Guddu New 500 kV. The results show that the rotor angle of Hamza-PP-II 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.

### **7.3.5 Fault at 132 kV Hamza-PP**

We applied three-phase fault on Hamza-PP 132 kV bus bar, cleared fault in 5 cycles (100 ms) followed by trip of a 132 kV single circuit between Hamza-PP and Liaqatpur 132 kV substation. 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. 5.1      Bus Voltages**

The bus voltages of 132 kV bus bars of Hamza-PP, RYK-New, Khanpur and Liaqatpur along with 11 kV bus bars of Hamza-PP-I and Hamza-PP-II are plotted. The results show quick recovery of the voltages after clearing of fault.

**Fig. 5.2      Frequency**

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

**Fig. 5.3      MW/MVAR Output of Generators of Hamza-PP-II**

The MW/MVAR output of Hamza-PP-II gets back to the pre-fault output quickly after fast damping of the oscillations in its output. However MVAR output acquires equilibrium at a slightly different value.

**Fig. 5.4      Speed and mechanical power of Generators at Hamza-PP-II**

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. 5.5      MW Flow on Hamza-PP to Khanpur 132 kV circuit**

Followed by clearing of fault, the trip of a 132 kV single circuit from Hamza-PP to Liaquatpur causes the entire output of Hamza-PP to flow on the intact 132 kV circuit between Hamza-PP and Khanpur 132kV circuit. This causes significant loading on the Hamza-PP to Khanpur 132 kV circuit. 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. 5.6      Rotor Angles**

The rotor angles of the generators of Hamza-PP-III 11 kV, Hamza-PP-II 11 kV, RYK-PP-I 11 kV, Etihad-PP-I, BWP Energy and Guddu New 500 kV are plotted relative to machines at Guddu New 500 kV. The results show that the rotor angle of Hamza-PP-II 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.

#### **7.4 Conclusion of Dynamic Stability Analysis**

The results of dynamic stability carried out for January 2018 and the future scenario of September 2021 show that the system is very strong and stable for the proposed scheme for the severest possible faults of 132 kV systems near to and far of Hamza Sugar Mills PP under all events of disturbances. Therefore there is no problem of dynamic stability for interconnection of Hamza Sugar Mills PP; it fulfills all the criteria of dynamic stability.



## **8.CONCLUSIONS**

- ❖ 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 substations of Khanpur. It lies at about 12 km from the site of Hamza Sugar Mills.
- ❖ Due to the location of Hamza Sugar Mills., the most feasible interconnection scheme would be looping in-out one of the existing 132 kV double circuit between Liaqatpur to Khanpur at Hamza PP, as had been done for Hamza Sugar Mills. The up-coming chapters discuss in detail the location and interconnection of the new unit. A few approximate sketches are shown in Appendix-B.
- ❖ The two breaker bays of 132 kV at Hamza PP to connect with the 132 kV circuits each from Liaqatpur and Khanpur respectively are already installed for Hamza Sugar Mills.
- ❖ In view of planned COD, of the Hamza Sugar Mills Phase II 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.
- ❖ Steady state analysis by load flows, short circuit and stability criterion reveals that proposed scheme is adequate to export 27 MW output of the plant under normal and contingency conditions.
- ❖ Since the plant operates during summer as well, the high-water season, its detail analysis has also been carried out for September 2018.
- ❖ In an extended term scenario, September 2021 and January 2022 have also been studied to evaluate the performance of the proposed interconnection scheme. In these cases 15 MW Hamza PP Phase III has also been modeled. 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 and dynamic stability analysis have been carried out for a complete check of the system.
- ❖ The short circuit analysis carried out to calculate maximum fault levels at Hamza Sugar Mills and the substations of 132 kV in its vicinity reveals currents for the



proposed scheme are much less than the rated short circuit capacities of switchgear installed at these substations. There are no violations of exceeding the rating of the equipment due to contribution of fault current from Hamza Sugar Mills.

- ❖ 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 Hamza Sugar Mills substation followed by the final trip of 132 kV circuits emanating from this substation 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 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. The stability of system for far end faults of 3-phase occurring at Khanpur 132 kV and Liaquatpur 132 kV bus bar has also been checked.

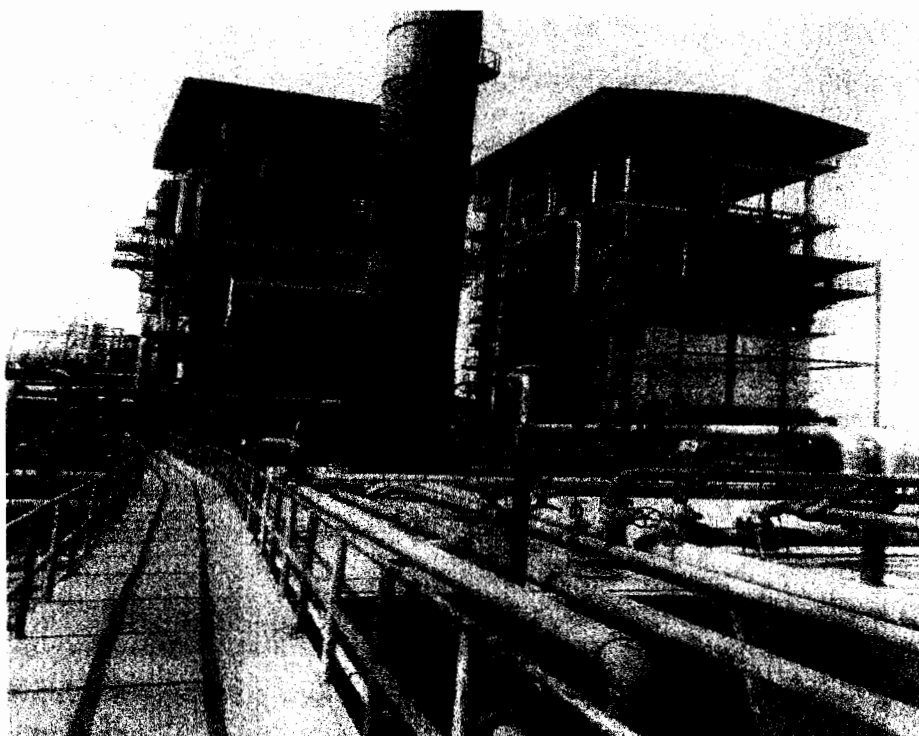


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# FEASIBILITY STUDY

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*For*  
**30 MW Cogeneration Power Project by  
Hamza Sugar Mills Limited  
Located at Jetha Bhutta, Khanpur,  
District Rahim Yar Khan, Punjab**



*(April 2017)*

## **HAMZA SUGAR MILLS LTD.**

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## Executive Summary

### 1.0 Introduction

1.1 The unabated Green House Gas (GHG) emissions and its potential to cause serious damages to the environment are causing worldwide concerns. The frenetic pace of developments in the last few decades and the consequent energy guzzling are causing irreversible damages to Earth's eco-system. The consequences of global warming with changing weather patterns, water shortage, food shortage, and inundation of low lying seacoast areas etc. are staring at the mankind. The Earth is in a precarious position, mainly because of the rapid growth in population, urbanization and fossil fuel consumption. It is important for any country, that the objectives of natural resource conservation and environment protection are integrated with the overall development process. The strategies to achieve the above objectives are encouraging fuel efficiency and preventing wasteful energy use and promoting technologies using renewable natural resources such as biomass, wind and solar energy.

1.2 Bagasse based Cogeneration, for additional power generation in sugar industry, offers a number of advantages both to the sugar company and to the country. Apart from helping in bridging the gap between the demand and the supply in the power sector, the Bagasse based Cogeneration offers an environmentally friendly solution for additional power generation, helps in reducing the dependence on the fossil fuels, saves on the foreign currency outflow from the country and improves the financial position of the sugar factory. Bagasse based Cogeneration is being extensively used in India where the installed generation capacity is close to 1800 MW with more plants under implementation. The other countries that had exploited Bagasse based Cogeneration to a major extent are Mauritius (around 250 MW), Reunion Island (around 220 MW), Brazil etc.

## 2.0 Background

- 2.1 M/s Hamza Sugar Mills Ltd (HSML), Jetha Bhutta, Khanpur, District Rahim Yar Khan is engaged in the manufacturing/sale of sugar and it operates as one of the largest sugar mills in the country with crushing capacity of **24500 TCD** (tons cane crushing capacity per day) and capacity to generate approximately **100 MW** power by developing of Power Plant based on high pressure boilers technology.
- 2.2 HSML has already been operating and maintaining a Bagasse based **35.3 MW** Power Plant to meet with its own steam and power requirements, out of which HSML is supplying **2.5 MW** power to MEPCO, since 2011 under PEPCO's SPPs/CPPs Policy.
- 2.3 Keeping in view its crushing capacity, HSML had planned to generate **60MW** by developing power plants based on high pressure technology boilers. In line with its objective, HSML entered into Energy Purchase Agreement with **CPPA (G) Ltd** on **11.08.2015** for development of **15MW** Bagasse Based Cogeneration Power Project (**Phase-I**) under Framework for Power Cogeneration 2013 (Bagasse/Biomass). By the Grace of Allah Paak, the said generation facility has achieved **Commercial Operation Date (COD) on March 10, 2017** and supplying power to national grid successfully.
- 2.4 Following its goal, HSML decided to develop the proposed **30MW** Bagasse/Biomass based Co-Generation Power Project (**Phase-II**) for sale of power to national grid under Framework for Power Cogeneration 2013 (Bagasse/ Biomass). This would make a total supply of **45 MW** power to national grid based on high pressure boiler technology. For the purpose of reaching its target of **60MW** supply to national grid based on high pressure boilers technology, HSML shall be developing another **15MW** Co-generation Power Plant in its **3<sup>rd</sup> Phase**.
- 2.5 The proposed **30 MW** Bagasse/Biomass based Cogeneration Power Project shall be developed by HSML under and pursuant to the GoP's Policy for Development of Renewable Energy for Power Generation read with Framework for Power Co-generation 2013 (Bagasse/Biomass) and Upfront Tariff determined by NEPRA for new Bagasse based Co-generation Projects in May, 2013 (modified in July, 2015).

2.6 HSML's sugar mill is comprised upon the most modern plant & machinery. HSML with an excellent management team and the best machinery ensures good performance of the sugar mill and power generation. Consequently the mill is the top sugar mills in the country in terms of sugarcane crushing, production, power generation and efficiency. HSML is located in an excellent cane growing area of the Punjab Province, located at Jetha Bhutta, Khanpur, District Rahim Yar Khan, Pujab. The mill is located at main G.T Road and about 10 kms from the city of Khanpur. The nearest airport is at Rahim Yar Khan and the nearest seaport is Karachi at a distance of about 600 km. The mill is well connected by road to Karachi, Lahore and Islamabad all through main highways.

### **3.0 Project Rationale & Drivers**

3.1 HSML had planned for development of the high pressure Cogeneration program to generate grid quality exportable power. Even though the sugar mill operation with the existing steam and power generation system on low pressure boilers is quite comfortable, HSML is contemplating high pressure Cogeneration due to the following reasons:

- Contributing to the growth of the country's economy by generating the much-needed electricity.
- Helping to reduce the foreign exchange outflow by using a local renewable fuel, instead of the costly imported fossil fuel for generating electricity.
- Putting an energy resource like Bagasse to better use and maximizing the power generation with Bagasse. The Bagasse, which is a renewable energy source, contributes to the reduction in the green house gases.
- Improving the Energy efficiency of the plant, as inefficiency in any form is to be eliminated in this energy deficient world.

- 3.2 With the stabilization of the crushing at 24500 TCD, the potential for additional power generation at HSML is very good. With Cogeneration in mind, the company had taken adequate care in ensuring the sustainability of the crushing. To that effect HSML has been concentrating on cane development to get assured cane for crushing. Also HSML, with the view to enhancing the power export potential, is planning for conversion of the steam turbine drives of the mills and the cane preparatory devices to electric drives. They had already made adequate efforts in reducing the steam consumption and going in for the energy efficiency measure in the process area to reduce the thermal energy consumption. With these forward planning, the implementation of Cogeneration could become much easier in this sugar mill. With the implementation of the energy efficiency measures, there will be a remarkable reduction in the process steam and power consumption in the sugar mill, enhancing the energy export to the grid.
- 3.3 Currently Pakistan has an installed electric generating capacity of about  $\pm 20,000$  MW, with the demand far exceeding this installed capacity and the access to electricity in Pakistan is about 62%. With a fast-growing economy and demography, the projection for the demand in 2030 is forecast to be 100,000 MW. This calls for a tremendous growth rate in the power sector. The Government of Pakistan is making all out efforts to increase the generation capacity by tapping all conventional and non-conventional sources of electricity generation. Born out of this Government's initiative to augment the generation through non-conventional energy sources is the "National Policy for Power Cogeneration by Sugar Industry" promulgated in January 2008. The Government of Pakistan has recognized that Bagasse based Cogeneration can play a significant role in the country's efforts to augment the electricity generation.
- 3.4 The Government's pro-active policy on power Cogeneration created a lot of interest in the sugar Industry in Pakistan. The sugar Industry, suffering due to the vagaries of nature and global market fluctuations had been looking for support from the Government on the cogeneration initiative. However after the initial euphoria, the policy aimed at laying down clear guidelines about tapping the Bagasse based Cogeneration potential, did not evoke much of interest. The major probable reasons, why there was not much of enthusiasm, were the minimum size of 60 MW and the treatment of the Cogeneration plants as IPPs. With no sugar mill coming

forward to implement the Cogeneration program, the sugar industry has taken up the matter with the Government and the new initiative by the industry and the Government has brought about a new policy framework in 2013 which promises great hopes for Bagasse based Cogeneration in Pakistan. Under this new policy framework, 4 power plants have already achieved successful commercial operation and contributing electricity to the national grid.

#### **4.0 Project Sponsors**

- 4.1 The Bagasse generation in the sugar mill is remarkably good, at 30% on cane, on account of the high fibre in cane, and the generated Bagasse is not fully utilized presently. The high crushing capacity and the high percentage of Bagasse make this sugar mill an ideal candidate for the implementation of the Cogeneration programs. Fully aware of the benefits of Cogeneration to the company as well as to the power starved country, HSML decided to develop the proposed 30 MW Cogeneration project (Phase-II) and keeping in view its present expertise in power generation comprising upon 2.5 MW supply to MEPCO based on low pressure boilers and 15 MW to CPPA (G) Ltd based on high pressure boilers, it is taking up the implementation of the proposed project on fast track basis successfully.
- 4.2 Under the present arrangement, the sugar plant's complete steam and power requirements are being met by 1x100 TPH, 67 bar (a), 504 V, 5x80 TPH 23 bar(a) and 350 °C boilers, 2x60 TPH, 23 bar(a), 350°C boilers, and 2x27 TPH, 18 Bar (a), 300 °C boilers with matching 1x15 MW Condensing/Extraction, 4x6MW, 1X3MW, 1X2.5MW and 2x1/5MW Back Pressure turbines. In addition, there are quite a few steam turbine drives to drive the mills and the cane preparatory system devices, which are inherently inefficient. Under the Cogeneration program, the low-pressure boiler and the existing turbogenerators will be retired in phases. The drive turbines will be replaced by electric motors.
- 4.3 HSML being progressive has already initiated measures to make the sugar mill energy efficient and consequently the steam consumption in the process is 43% on cane. For a sugar mill producing refined sugar this is an appreciable achievement. The sugar mill is running comfortably as the total installed capacity for steam generation is adequate for meeting this requirement. Using the steam generated, the mill is generating enough

electricity to meet with all the internal requirements and supply of power to national grid. HSML had embarked on the energy conservation measures, to bring down the steam consumption to 43%, while the contemporary mills are consuming around 55. When the proposed Cogeneration plant is installed and operating, the process steam consumption of the sugar plant will be 41% and only this quantity of steam is considered to be extracted from the power plants.

## **5.0 Technology**

5.1 For the proposed Cogeneration program HSML has procured/imported for the proven latest technology. With the gasification of Bagasse has still not attained full-scale commercial exploitation; the only technology available for using the Bagasse is through the combustion route. The technology chosen is the conventional thermal power plant technology based on the Rankine Cycle. The Bagasse will be combusted in a high-pressure boiler and the steam generated will be fed to the steam turbine to generate power. The turbine will be different from the conventional thermal power plants, as the turbine will be provided with a controlled extraction for extracting the process steam required for the sugar mill. To enhance the efficiency of operation, regenerative heaters are used in the feed water circuit. For the Cogeneration power plant proposed for HSML, the Cogeneration cycle is based on the parameters of 100 bar(a) and 540 °C at the boiler outlet, currently being used in many countries for the Cogeneration projects. The cycle chosen with the above parameters is the latest used in any of the Bagasse-fired installations around the world. These above selected parameters make the cycle more efficient and help in the generation of more units for the same quantum of the fuel. There are already a few Cogeneration plants operating in India with these parameters and the operating experience of those plants, in synchronization with the sugar mill operation, has been smooth and without any hitch. The Cogeneration scheme for HSML proposes 1x100 TPH capacity boilers and 1x30 MW extraction condensing turbogenerators.

- 5.2 After development of 15MW Cogeneration Power Project in its First Phase comprising upon 1x67 bar (a) and 1x15 MW Condensing/Extraction Turbine, HSML planned to establish the proposed 30 MW Cogeneration Power Project in its Second Phase comprising upon 1x100 TPH capacity boiler with 1x30 MW Extraction/Condensing Turbine.
- 5.3 HSML shall be developing a 15 MW Cogeneration Power Project in its Third Phase comprising upon 1x100 bar (a) boiler and 1x15 MW Extraction/Condensing Turbine.
- 5.4 Considering the off-season operation of the plant, the Cogeneration power plant boilers will be designed for firing the saved Bagasse and a few other compatible biomass fuels.
- 5.5 The power requirement of the sugar mill during the season operation shall be catered by the existing low pressure boilers and the power from the existing 15 MW and proposed 30 MW Cogeneration Projects shall be exported to national grid excluding auxiliary consumption of about 10% of total 45 MW which shall remain intact during the off-season period. The power requirement for meeting the power required for the off-season for maintenance of the sugar plant machinery, export to MEPCO, meeting the colony and office power requirements shall also be catered by running some of the existing power plants based on low pressure boilers.
- 5.6 Upon completion of the proposed 30 MW Cogeneration Power Project, the exportable gross power generation in the Sugar mill from High Pressure Boilers shall be 45 MW in addition to 2.5 MW being supplied to MEPCO from the existing power plants based on low pressure boilers.
- 5.7 Considering the huge investment and also the round the year power requirement of the grid, HSML will operate the Cogeneration power plant in power plant mode both during season and off-season. The season operation of the Cogeneration plant consumes a lot of Bagasse, but still leaves remarkable surplus quantity for the off-season operation of the power plant. As seen earlier, the plant will operate with the saved Bagasse for a period of  $\pm 60$  days. However HSML wants to operate the plant for approximately 300 days in a year for which Bagasse would also



be purchased from other sugar mills and compatible bio-mass fuel like rice husk, wood chips etc. shall also be arranged.

- 5.8 The plant and equipment for the new proposed Cogeneration system will consist of the high pressure boiler, extraction condensing turbogenerator, water cooled condensing system, main and auxiliary cooling water system, water treatment plant system, condensate and feed water system, compressed air system and electrical system consisting of switchgears, LT distribution panels, Variable Frequency Drives, step up transformer to export the power, step down transformers for meeting the in-house power requirement, outdoor switchyard equipment etc.

## **6.0 Generation & Grid Interconnection**

- 6.1 MEPCO's 132kV Khanpur-Liaquatpur Transmisiion Line passing nearby the site of HSML at a distance of about 1.3 K.M.
- 6.2 HSML while making arrangement for already connected 15MW power with CPPA (G) Ltd, got constructed the said 132kV 1.3 K.M Transmission Line with in/out arrangement for induction of a total planned **60 MW** to cater all the connected 15 MW, the present proposed 30MW (Phase-II) and upcoming 15 MW power in Phase-III.
- 6.3 The Grid Interconnection Study Report of the proposed project of M/s HSML has already been vetted both by MEPCO and NTDC
- 6.4 Keeping in view the explanation at 6.1 to 6.3, the proposed 30MW Cogeneration Project (Phase-II) will comfortably be connected to the national grid with the already constructed 132kV Transmission Line and by adding 132kV Equipment in the existing Grid Station.

## **7.0 Implementation Schedule**

- 7.1 All the main equipment i.e. Boiler, Turbine, Generator and allied equipment pertaining to power house have already been procured/imported and under installation. Hence the implementation of the proposed new Cogeneration system second phase is expected to be completed within upcoming crushing season. The Commercial Operation Date (COD) of the cogeneration project is expected to be in the next Crushing Season of 2017-2018.
- 7.2 The size of the project calls for proper project management and control procedures to ensure implementation within the scheduled program. Adequate qualified and trained manpower is already taking care of the implementation of the new proposed Cogeneration Power Project. However, HSML plans for engaging additional staff for Operation and Maintenance to take over the O&M of the plant.

## **8.0 Conclusion**

Bagasse based Cogeneration is being considered by many countries as an environment friendly way of augmenting the generation capacity. The Government of Pakistan has estimated a potential of 3000 MW of Cogeneration power from the existing sugar mills, and has decided to fast track these projects. HSML's sugar mill with 24500 TCD of crushing per day will be able to sustain the generation of the proposed 30 MW of power in HSML's Cogeneration plant (Phase-II) for a period of about 180 days, with the Bagasse generated in the mill. The proposed Cogeneration plant of HSML, when implemented, will export a substantial quantum of power to the national grid. The proposed Cogeneration cycle is already proven and implementation of this project will benefit both the sugar mill and the country.

**1.0 Cogeneration Plant Technology and Scheme Proposed for the Project**

**1.1 Cogeneration Plant Proposed for HSML**

The Cogeneration plant proposed of HSML will be based on the boiler outlet steam parameters of 100 bar (a) and 540 °C. The steam parameters at the inlet of the turbine will be 100 bar(a) and 540 °C. The plant will be dedicated for export of power to national grid both during the season and off-season operations.

**1.2 Basis of the Feasibility Study**

The following points pertaining to the plant operating parameters, availability of raw materials, process steam requirement, operation of the existing boiler & turbogenerator etc., are the basis on which the program for the implementation of the Cogeneration project at HSML is developed.

1.3 The nominal cane crushing capacity of the sugar plant, for designing the Cogeneration plant, will be 24500 TCD in 24 hours or 918.75 Tonnes of Cane per Hour (TCH).

1.4 The nominal crushing period for the HSML's sugar plant will continue to be 120 days in a year. The power requirement of the sugar mill during the season operation shall be catered by the existing low pressure boilers and the power from the existing 15 MW and proposed 30 MW Cogeneration Projects shall be exported to national grid excluding auxiliary consumption of about 10% of total 45 MW which shall remain intact during the off-season period. The power requirement for meeting the power required for the off-season for maintenance of the sugar plant machinery, export to MEPCO, meeting the colony and office power requirements shall also be catered by running some of the existing power plants based on low pressure boilers.

1.5 With the view to enhancing the export from the Cogeneration plants, HSML will be replacing the inefficient steam turbine drives in the sugar mill with electric motors drives. The mills that crush the cane are presently driven by steam turbines and the same will be replaced with electric motors.

- 1.6 The Cogeneration plant boilers have been designed with a travelling grate with hydraulic drive to burn Bagasse, and biomass fuels. The outlet steam parameters will be 100 bar (a) and 540 °C. The boiler MCR capacity will be 100 TPH. The inlet feed water temperature will be 210 °C, with the feed water heated in two stage high pressure feed water heaters. The deaerator outlet water temperature will be around 130 °C, depending on the extraction pressure.
- 1.7 The proposed new turbogenerator will be of 30 MW nominal capacity. The turbine will be extraction condensing type machine. The turbine steam inlet parameters will be 100 bar(a) and 535 °C. The exhaust steam from the turbine will be condensed in the turbine water cooled surface condenser.
- 1.8 The deaerator will be serving the dual purpose of deaerating the feed water as well as heating the feed water, to raise its temperature, with the extraction steam. The deaerator will be operating at around 2.7 bar(a) pressure, with the deaerated feed water temperature at around 130 °C. The deaerator will receive the condensate from the surface condenser, the condensate of the heating steam from the sugar process and the feed water make up. The condensate of the heating steam from the feed water heaters will be cascaded to the deaerator, to optimally use the energy in the feed water heating steam.
- 1.9 The power generation in the new Cogeneration turbogenerators will be at 11 kV level. The new turbogenerator will be operating in parallel with the national grid. Power requirement of the auxiliaries of the new Cogeneration boiler and TG system will be met by the power generated in the new turbogenerator. The balance of the power generated in the plant will be exported to the grid.
- 1.10 The exportable power will be stepped up to 132 kV and will be connected to the available in/out arrangement at MEPCO's 132kV Khanpur-Liaquatpur Transmission Line.
- 1.11 The water requirement of the sugar mill is presently being met by the drawls from the deep bore wells and Water Pumps installed at Head Canal of Aab-e-Hayat Canal located at a distance of about 1.5 K.M from HSML. As the availability of water is good, it has been decided to go with

water-cooled condensing system for the Cogeneration plant. For meeting with the makeup water requirements of the plant, new bores will be established. As the existing system in the sugar plant is just sufficient to meet with the requirements of the sugar mill, it is proposed to provide totally independent raw water and treated water system for the proposed Cogeneration project. The new system will include the storage reservoir, Ultra-filtration, Reverse Osmosis and De-mineralization system and the storage tanks.

## **2.0 Description of the Proposed Cogeneration Scheme**

- 2.1 For Phase-II, the Cogeneration scheme proposed at HSML, envisages one unit of 30 MW capacity. Unit has been designed with a 150 TPH capacity boiler with the outlet steam parameters of 100 bar(a) and 540 °C, with the feed water inlet temperature of 210 °C. Turbogenerator will be of 30 MW nominal capacity and designed with an extraction / condensing turbine. The Cogeneration plant will be designed with all the auxiliaries for the new boiler and the turbogenerator and with all the auxiliary plant and systems like the fuel and ash handling system, Cooling water system, feed water system, Raw water and DM water system, Instrument air system, Electrical system for its successful operation.
- 2.2 The Power generation in the Cogeneration turbogenerator will be at 11kV. Step down transformers will be provided to step down the 11 kV voltage for Cogeneration plant equipment and auxiliaries. The additional power from the turbogenerator will be stepped up to 132 kV for paralleling with the national grid, at available in/out arrangement at MEPCO's 132kV Khanpur-Liaquatpur Transmission Line.
- 2.3 The 30 MW Cogeneration plant consisting of new 150 TPH boiler and the 30 MW turbogenerator and all the auxiliary plants and systems will be located within in the premises of sugar mill.

**3.0 Operation of the proposed Cogeneration System During Season and Off-Season**

**3.1** The nominal crushing period for the HSML's sugar plant will continue to be 120 days in a year. The power requirement of the sugar mill during the season operation shall be catered by the existing low pressure boilers and the power from the existing 15 MW and proposed 30 MW Cogeneration Projects shall be exported to national grid excluding auxiliary consumption of about 10% of total 45 MW which shall remain intact during the off-season period. The power requirement for meeting the power required for the off-season for maintenance of the sugar plant machinery, export to MEPCO, meeting the colony and office power requirements shall also be catered by running some of the existing power plants based on low pressure boilers.

**4.0 Fuel for the Power Plant & Plant Efficiencies**

**4.1 Bagasse**

Bagasse is a biomass fuel and is considered to be belonging to the category of renewable energy source. Bagasse, as is the sugarcane crop, is a product of photosynthesis and hence is renewable. As long as the cane crushing continues in the sugar mill, the Bagasse will be available year after year. Bagasse, being a biomass is considered to be carbon neutral and hence is environment friendly. Bagasse is considered to be a good fuel, except that the moisture content in the as milled Bagasse is quite high at about 50% and the average bulk density of the milled Bagasse is at around 150 kg/m<sup>3</sup>. The quantity of Bagasse generated in the sugar mill and the quantity made available for the operation of the HSML.

The major advantage of using the Bagasse in the power plant is that no transportation of the fuel is involved. The Bagasse will be consumed in the vicinity where it is generated. The milled Bagasse will be transported to the Cogeneration plant through conveyors and the surplus Bagasse will be stored for future use.

#### 4.2 **Raw Water**

The raw water supply for the plant will be from the bore wells located in the plant Water Pumps installed at Head Canal of Aab-e-Hayat Canal located at a distance of about 1.5 K.M from HSML.. This raw water will be used as a source for make up for the losses in the process steam, boiler blow down, cooling tower blow down, service water, make up water, etc.

The design of the water treatment system will be based on the standard values.

#### 4.3 **Auxiliary Plant and Equipment**

- Fuel handling
- Ash handling
- Cooling Tower
- Pumps
- Condensate System
- DM / RO Plant
- Crane for the Turbogenerator Building
- Vessels & Heat Exchangers
- Tanks
- Compressed Air System

4.3.1 Piping

All piping system has been designed as per ASME B 31.1. In addition, statutory requirements of Pakistan Boiler Regulations shall be complied with.

4.3.2 Insulation

All exposed portions of the plant which operate at temperatures of 60°C and above during normal operation shall be thermally insulated so that the temperature on the outer surface of the cladding shall not exceed by more than 20°C above ambient, based on an ambient temperature indicated in site data. The specified insulation thickness shall not include the thickness of wire netting, finishing cement or any other finishing or weatherproofing application. Insulation shall not fill the contours of the expansion bellows. Piping and equipment that are not insulated but having a surface temperature exceeding 50 °C shall be insulated for personnel protection. In refractory walls suitable expansion gaps shall be provided at regular intervals.

4.3.3 Ventilation System and Air Conditioning system

The following areas has been envisaged with exhaust ventilation system:

- TG hall
- Water Treatment plant Equipment room
- Chemical Storage area in WTP (water treatment plant) building
- Muffle furnace, Hot oven, etc room in WTP building
- WTP MCC panel room
- Fire Pump House
- Toilets

The exhaust ventilation system will maintain the temperature rise within 5 °C above ambient temperature.

The following areas of power plant will be envisaged with Ductable type, ceiling suspended air conditioning system:

- PCC, MCC, VFD, Auxiliary MCC panel rooms in TG building
- Control Room in TG building



### **Battery room**

The following areas of power plant will be envisaged with Hi-Wall split air conditioning system:

- SWAS panel room in TG building
- WTP DCS operator station room in WTP building
- WTP laboratory room in WTP building
- Office and Conference Room

The air conditioning system will maintain a temperature of 22 ° C inside the rooms.

#### **4.3.4 Fire Fighting System**

The following fire fighting systems will be envisaged for the power plant:

Fire Hydrant system for the entire power plant including fuel storage areas.

Automatic Fire detection and alarm system for the TG building

Portable Fire extinguishers for the TG building

High Velocity water spray system for Switch Yard Transformer

The fire hydrant system shall consist of two numbers of pumps (one working and one standby). The main pump will be of diesel engine driven and standby pump will be of electrical motor driven. In addition to the above two pumps, there will be an electrical motor driven jockey pump. The fire hydrants, water monitor, hoses and nozzles shall be located throughout the power plant. All the fire water pumps shall be located near raw water reservoir in cogeneration plant taking suction from the raw water reservoir. The suction for the other pumps drawing water from the raw water reservoir will be located such a way that the minimum storage of water in the reservoir will be maintained for meeting the fire water requirements.

The fire alarm system shall consist of smoke detectors, heat detectors, fire alarm panel, hooter, manual call point etc. The detectors shall be located in all the electrical panel rooms, control room and battery room. The manual call point and hooters shall be located throughout the entire

TG building. The detectors will sense the fire automatically and will generate fire alarm through Fire alarm panel.

The portable fire extinguishers shall consist of dry chemical powder type, carbon-di-oxide type, foam type fire extinguishers. The extinguishers shall be located strategically inside the TG building.

## **5.0 Plant and Machinery for Cogeneration Plant**

### **5.1 Main Equipment (Mechanical)**

The main equipment at Generation Facility comprising upon High Pressure Boiler and Steam Turbine Generator (STG) have been imported and being installed at the Complex.

The detail of the main equipment is given hereunder:-

<b>Sr. No.</b>	<b>Equipment</b>	<b>Specification</b>
1.	Boiler	1x150 ton/hr, 105 bar, 540°C High Pressure Boiler, make Guangxi Wuguo Boiler Manufacture Co. Ltd., China.
2.	Steam Turbine	1 x 30 MW Extraction/Condensing type Steam Turbine, Make, Guangzhou Skoda-Jinma Turbine Ltd. China.
3.	Generator	Guangzhou, China make 30 MW Turbo Generator, Make, Guangzhou Guangzhong Enterprise Group Corporation, China. Generating Voltage : 11kV

- Voltage balance / PT fuse failure
- Over fluxing Protection
- 100% stator earth fault relay
- Over all differential relay

Following additional stage of protections shall be used to trip tie CB with grid interconnection:

- Over voltage
- Over frequency
- Under voltage
- Under frequency

### 6.3 LAVT and NGR Cubicles

The LAVT cubicle will house surge capacitors, potential transformers for protection (class 3P), metering (class 0.2) & AVR sensing / excitation supply, lightning arrestors, cable box etc. The NGR cubicle will comprise of current transformers (class 0.2 and 5P10), neutral isolating switch and grounding resistor (punched grid type stainless steel grids). The enclosure for the panels will be of Cold Rolled Cold Annealed (CRCA) sheet of 3 mm thick for front and back and 2.5 mm thick for rest.

### 6.4 11 kV Switchgear Panel

The broad specification for the 11 kV switchgear panel will be as follows:

Rated Voltage	:	11 kV, 3 Phase, 50 Hz
Maximum Voltage	:	12 kV
Power frequency Voltage	:	28 kV rms
Impulse withstand voltage	:	75 kV peak
System Fault level	:	750 MVA
Maximum bus bar Temp.	:	As per IEC
Operating Duty	:	O-0.3sec-CO-3min-CO
Control Voltage	:	100 V DC

#### **6.5 Plant Auxiliary Transformers and LT Panels**

Plant Auxiliary Transformers conforming to IEC:60076 shall be provided for catering power to the cogeneration plant.

#### **6.6 Earthing System**

Neutral point of the converter & distribution transformer and neutral grounding resistor of the TG set generators will be effectively connected to individual earth pits and will be interconnected, as per IEEE: 80 recommendations. Non-current carrying parts of all electrical equipment viz. motors, MCCs, PCCs, distribution boards, control panels, HT switchgears, generators and all lighting fittings will also be earthed rigidly, to ensure safety.

#### **6.7 Cables**

All cables will be selected to carry the load current under site conditions, with permissible voltage drop. In addition, high voltage cables will be sized to withstand the short circuit current. The following types of cables will be used:

Power cables for 11 kV system will be with three core aluminium conductor, XLPE insulated, screened, armoured and overall PVC sheathed confirming to IEC:502.

The power cables of 1.1 kV grade will be of PVC insulated, aluminium conductor, inner sheath PVC taped strip / wire armoured with outer sheath of PVC compound conforming to latest version of IEC:227.

The control cables for control / protection / indication circuit of the various equipment will be of 1.1 kV grade, PVC insulated annealed high conductivity stranded copper conductor, inner sheath PVC taped, flat/round wire armoured with outer sheath of PVC compound conforming to latest version of IEC:227.

#### **6.8 DC supply system**

Two (2) Nos. of DC system each rated for 100% requirement of both the unit consisting of battery banks, float cum boost charger and DC distribution board will be provided in common for the power house DC load requirements (viz. turbine emergency oil pumps, control & protection), switchyard loads and emergency lighting.

The battery charger will be of SCR controlled with one float cum boost charging (FCBC) and one float charging (FC) equipment housed in a free standing, floor mounting cubicle having hinged half doors made out of 14 SWG CRCA sheets.

#### **6.9 AC Auxiliary Supply**

AC supplies of single and three phase, needed for internal use for Illumination, Battery charging, UPS, Transformer tap changer drives, Excitation supply, Power supplies for communication equipment, Breakers / Disconnect switch motors, Space heaters in cubicles, generators and marshalling kiosks will be arranged from minimum two supply sources. For extremely critical AC loads, UPS supply system will be envisaged.

#### **6.10 Lighting System**

Good lighting in the cogeneration plant will be ensured to facilitate normal operation and maintenance activities and at the same time to ensure safety of the working personnel. Lux levels and glare index will be as per recommendations of IES Standard. The lighting system would comprise of normal and emergency power supplies. Main lighting system will receive supply from reliable supply sources and the emergency lighting system will be supplied from battery units. Emergency lighting will be provided at strategic points in the power station, switchyard area and in control rooms.

#### **6.11 Lightning Protection**

Building lightning protection system will be provided as per IEC / IEEE guidelines. The protections consisting of roof conductors, air terminals and down conductors will be provided for the power house structure and other taller structures of the plant.

#### **6.12 Plant Communication system**

All parts of the power plant, viz. boiler, Bagasse & ash handling, water system, ESP and switchgear rooms will be linked to the plant control room through telephone communication system and Walkie-Talkies. The plant shall be effectively connected with NTDC (National Transmission and Dispatch Company) / DISCO (Distribution Companies) load dispatch centre through a suitable telephonic system as per NTDC/DISCO requirement.

#### **6.13 Proposed system**

The Co-generation Project envisages a power export of 27 MW both during crushing season and off-season operation

Switchyard arrangement and other requirements will be N-1 contingency double bus bars, breakers and metering system, inline with NTDC/MEPCO specifications and standards. Switchyard shall have provision for extension of 15 MW power in future in Phase-III.

Tariff metering shall be accommodated in outdoor kiosk near metering CTs & PTs in the plant end switchyard as per NTDC/MEPCO standards/requirements. The tariff meter shall register import as well as export parameters and shall be of digital type, with class of accuracy 0.2 as per IEC:687 / IEC:1036 an NTDC /MEPCO specifications.

In/out arrangement at MEPCO's 132kV Khanpur-Liaquatpur Transmission line has already been got constructed from MEPCO.

#### **6.14 Safety Earthing System for switchyard**

A safety earthing system consisting of a buried GI flat conductor earthing grid will be provided for the switchyard. The earthing system will be formed to limit the grid resistance to below 1 ohm. In the switchyard area, the touch potential and step potential will be limited to the safe values. The earthing design will be as per IEEE:80 recommendations.

### **7. Instrumentation and Control System**

#### **7.1 General**

The objectives of Instrumentation & Control system design are as follows.

- a. To ensure maximum availability of the plant
- b. To effectively monitor and control the plant to ensure desired efficiency levels.
- c. To ensure plant and personnel safety and reduce down time
- d. To provide necessary information to management personnel regarding overall plant performance
- e. To have self diagnostics & faster response time
- f. To be user friendly for operation and maintenance personnel

#### **7.2 Design Criteria**

The control system shall be based on the State-Of-The-Art Distributed Control System (DCS) technology with Data Acquisition and control of the entire plant operational parameters.

#### **7.3 Plant Control & Operation Philosophy**

Microprocessor based Distributed Control System (DCS) is envisaged for the centralized control and monitoring of the co-generation power plant. DCS will be located in the central control room (CCR), in the Turbogenerator building.

The Cogeneration power plant will be mainly comprised of the following system.

#### 7.4 **Boiler and its Auxiliaries**

The control of the boiler operations like Start-up / Shut-down / Trip shall be realized directly from the DCS. All the signals required for controlling the boiler operation shall be processed by the DCS and necessary actuating signals for the various final control elements shall be driven from the DCS.

The major control of the boiler includes the following as a minimum:

- Deaerator level control
- Deaerator pressure control
- Drum level (3 element) control
- Combustion control
- Furnace Draft pressure control
- Superheated Steam Temperature Control
- CBD Level Control (If Applicable)
- Soot Blower Control
- PRDS control

All the Boiler safety and protection interlocks shall be realized from DCS.

#### 7.5 **Steam Turbine and its Auxiliaries**

The closed loop controls of each of the Turbine such as Gland steam pressure control, hot well level and minimum re-circulation flow control shall be performed by the DCS as a minimum (except turbine governor control):

The open loops and interlocks & protections will be implemented in the DCS as per control schemes provided by the STG vendor.

#### 7.6 **Bagasse Handling System**

The Bagasse handling systems can be operated from DCS at central control room.



**7.7 Ash Handling System**

The Ash Handling System can be operated from DCS at central control room.

**7.8 Water Treatment Plant**

The WTP can be controlled manually through Local control panel. The important signals of WTP are connected to DCS through hardwired.

**7.9 Cooling water system**

The cooling water system shall be controlled from DCS.

**7.10 Fire Protection system**

Stand alone microprocessor based control system shall be provided for control of Fire Protection system at fire water pump house. The important parameter shall be connected to DCS through hardwired.

**7.11 AC and Ventilation system**

Stand-alone microprocessor based control system shall be provided for AC and Ventilation system. This system shall be interfaced with DCS for Monitoring through Hardwired.

**7.12 Compressed Air System**

The Control and Operation of compressed air system shall be from DCS at central control room.

**7.13 Switchyard**

All important parameters shall be connected to DCS through SCADA system.

**7.14 Steam and Water Analysis System (SWAS)**

Steam and Water Analysis System shall be furnished for continuous monitoring of water and steam purity in the plant.

The system shall comprise of all items like conductivity, pH, Silica and Hydrazine analysers, sample conditioning components and other accessories.

7.15 The following details on the electrical signals shall be processed / monitored by the DCS for interlock / data acquisition purpose:

- Safety Relay status
- Breaker status
- Generated Voltage, Current, KiloWatt, KVAR, Power factor, Frequency
- Line Voltage, Current, KiloWatt, KVAR, Power factor, Frequency
- Synchronization

Various electrical inputs from the transducers and the digital signals from MCC panels shall be processed in the DCS system for achieving the necessary interlocks / controls.

7.16 The Distributed Control system is proposed for Control and Instrumentation system, keeping in view the safety, reliability and availability for comprehensive presentation of plant operation status, trends and essential operator interaction facility.

## **8 Site Features and Plant Layout**

### **8.1 Rail and Road Facilities**

All plant and machinery has to be transported only by road. All the imported equipment have to be brought to the port of Karachi and then transported by road. The Plant is located at Jetha Bhutta, Khanpur, District Rahim Yar Khan. Road connectivity to the plant is very good. In addition the nearest railway station is Jetha Bhutta, Khanpur. Rahim Yar Khan is the nearest airport from HSML's plant.

**9. Cost of the Project and Financial Capacity of Project Sponsors**

- 9.1 The total expected investment is expected to be approximately US\$ 29.79 Million i.e. Pak Rs.3187.53 Million ( @ 1 US\$ = Rs.107).
- 9.2 HSML has installed 2x60, 5x80 & 2x25, 23 bar boilers for in-house consumption and sale of surplus 2.5 MW power to MEPCO. Further HSML has completed development of 15MW Co-generation Power Plant based on high pressure boiler technology. By the grace of Almighty Allah, HSML has developed all of these power plants from its own resources without involvement of any borrowing from the financial institutions.
- 9.3 HSML has shall be developing the proposed 30MW Co-Generation Power Plant (Phase-II) from its own sources without involvement of any borrowing from banks / financial institutions etc.

**ENVIRONMENTAL PROTECTION AGENCY**  
**Government of Punjab**

**30 MW HIGH PRESSURE  
COGENERATION POWER PLANT  
AT HAMZA SUGAR MILLS LTD.  
KHANPUR, RYK**

**INITIAL ENVIRONMENTAL EXAMINATION (IEE)  
REPORT**

***Submitted by:***

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***April 2017***

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Annexure 2: Planting Program/Estimate

Annexure 3: National Environmental Quality Standards

Annexure 4: Design Layout

Annexure 5: Land Ownership Certificate

Annexure 6: list of machinery to be installed

Annexure 7: Concerned Department Permission

Annexure 8: Environmental Approval from EPA (Existing 15mw  
Power Plant)

## **LIST OF ABBREVIATIONS**

NCS – National Conservation Strategy

OHS – Occupational Health and Safety

NOC – No objection certificate

EPA – Environmental Protection Agency

IEE – Initial Environmental Environmental

NEQS – National Environmental Quality Standards

EMP – Environmental Management Plan

GOP – Government of Pakistan

KM – Kilometer

M – Meters

NGO – Non Government Organization

NGVS – No Guideline value set

EC – European Community

HSM – Hamza Sugar Mills

WHO – World Health Organization

KSA – Saudi Arabian Standards

CFU – Colony forming unit

BDL – Below Detection Limit

## GLOSSARY

**Act** means the Pakistan Environmental Protection Act, 1997.

**Contamination** introduction of impurities in the environment.

**Environment** means (a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the inter-relationships between any of the factors in sub-clause (a) to (f).

**Environmental Assessment** a technique and a process by which information about the environmental effects of a project is collected, both by the developer and from other sources, and taken into account by the planning authority in forming their judgments on whether the development will go ahead.

**Hydrocarbon** an organic compound containing only carbon and hydrogen

**Impact on Environment** means any effect on land, water, air or any other component of the environment, as well as on wildlife harvesting, and includes any effect on the social and cultural environment or on heritage resources.

**Mitigation Measure** means a measure for the control, reduction or elimination of an adverse impact of a development on the environment, including a restorative measure.

**Pollution** the presence in the environment or the introduction into it, of substances that have harmful or unpleasant effects.

**Regulations** mean the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environment Impact Assessment Regulations, 2000.

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## **EXECUTIVE SUMMARY**

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<i>Initial Environmental Examination Report</i>	<i>30MW Power Plant by HSM Khan pur</i>	<i>Executive Summary</i>
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## EXECUTIVE SUMMARY

### 1. INTRODUCTION

Project is construction of high pressure bagass based cogeneration power plant of 30 MW Capacity. The project consists of a bagasse cogeneration facility that will be constructed alongside the existing Hamza Sugar Mills, Jetha Bhutta Khan pur Rahim yar Khan established before promulgation of PEPA 1997.

Detailed plan layout has been annexed in **Annexure 4**. Documentary proof of establishment pf the sugar mills has been attached.

### 2. LOCATION

The proposed project will be located within project boundary of Hamza Sugar Mills Location is selected because of ease in transfer of bagasse from sugar plant through conveyors and supply of power & steam to the sugar mills.

### 3. PROJECT TITLE

30MW HIGH PRESSURE BAGASS BASED COGENERATION POWER PLANT AT HAMZA SUGAR MILLS.

### 4. NAME OF THE PROPONENT

Details of project proponent are as under;

M.N Kashif

Manager (HR)

Hamza Sugar Mills

Jetha Bhutta, Tehsil Khan pur.

District Rahim yar Khan.

### 5. NAME OF Organization Preparing Report

The Company is proposing to add power plant with in project premises with the aim to achieve the better efficiencies in terms of utilities consumption and production. In keeping with the regulatory requirement of the country the company has engaged Environmental and

<i>Initial Environmental Examination Report</i>	<i>30MW Power Plant by HSM Khan pur</i>	<i>Executive Summary</i>
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socio-economic Technical Services (ESETS) to undertake an Initial Environmental Examination (IEE) Report.

## **6. Brief Outline of the proposal**

Fossil energy resources consist primarily of natural gas and furnace oil. Domestic oil supply is considered negligible and natural gas resources are becoming scarce in Pakistan. However, substantial coal deposits are available in the country, but mining of all of them is quite expensive. Moreover, domestic coal is very high in sulphur and ash content, which will lead to severe environmental hazards. The project's proposal for using bagasse, is the best option for environmental and economic reasons. In the absence of any cheaper fuel, bagasse utilization is of prime importance.

## **7. Recommendations for Mitigation Measures**

The safe operation of the power plant is an essential part of an environmental, health, and safety program. Facilities should be met with certain minimum standards to satisfy diverse regulations.

- The management of the Project will capitalize on the positive attitude of the people of area towards proposed Project by offering them maximum employment opportunities at the construction stage and stage of operational phase of the power plant.
- Insufficient and inadequate socio-economic structure of the community of the area also provides ample opportunities to Company management to win sympathies of local people in their favor, by introducing meaningful and manageable plan of community development.
- Comprehensive plantation plan will also lessen fear of local people towards environmental issues.
- Plant management will explore direct or indirect chances of female employment opportunities. Such efforts can be fruitful to minimize negative social impacts.
- Sustainable development approach through conservation of natural resources would be the best strategy to compensate negative socio- environmental impacts.
- Plant management will offer technical training opportunities to the local youth, if possible, to remove relative sense of deprivation.

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- Prior to action of the Project installation a comprehensive awareness campaign will be launched at masses level to avoid any conflict.

## **8. Proposed Monitoring**

The environment, safety and health-monitoring programme for the operational phase of the power plant are as follows:

1. Regular monitoring of stack emissions
2. Frequent monitoring of water and wastewater
3. Quality monitoring of ambient air, noise and work place air
4. Monitoring of occupational safety

The project management, being aware and conscious of its responsibilities to environment, is committed that the project operations will be made keeping in line with the internationally accepted sustainable measures/practices and methods thus leaving negligible adverse impacts on any segment of environment due to proposed activity.

## **9. Restoration and Rehabilitation Plan**

Land is already property of proponent and proposed plant will be situated within Hamza Sugar Mills boundary. Hence no restoration / rehabilitation plan is required.

## **10. Potential Environmental Impact**

Potential Environmental Impacts are given below in tabular form;



**Table E-1: Potential Air quality impacts during the Project's Construction Phase**

Receptor / Resource (Sensitivity of Receptor)	Potential impact	Severity	Impact (no mitigation)	Mitigation/ Enhancement	Significance of residual effect
Local communities (Moderate)	Health effects from increased particulate matter pollution	Low	Minor Adverse	EMP	Negligible
Ecological Receptors (Moderate)	Adverse impacts due to deposition of dust on vegetation surface	Low	Minor Adverse	EMP	Negligible

**Table E-2: Potential Air Quality impacts during the Project's Operation Phase**

Receptor / Resource (Sensitivity of Receptor)	Potential impact	Magnitude of Impact	Impact (no mitigation)	Mitigation/ Enhancement	Significance of residual effect
Local communities (Moderate)	Health effects from increased airborne pollution	Low	Minor Adverse	Stack height set to ensure adequate dispersion; abatement of NOx emissions; combustion optimisation; use of low Sulphur content fuel	Negligible

**Table E-3: Potential Noise impacts during the Project's Construction Phase**

Receptor / Resource (Sensitivity of Receptor)	Potential impact	Severity	Impact (no mitigation)	Mitigation/ Enhancement	Significance of residual effect
Noise Sensitive Receptors	Increased ambient Noise Levels during the construction phase	Minor	Minor	Noise mitigation to follow techniques identified in EMP	Not significant

**Table E-4: Potential Noise impacts during the Project's Operation Phase**

Receptor / Resource (Sensitivity of Receptor)	Potential impact	Magnitude of Impact	Impact (no mitigation)	Mitigation/ Enhancement	Significance of residual effect
Noise Sensitive Receptors	Increased ambient Noise Levels during the operational phase	Ranges between Negligible to Moderate	Ranges Between Negligible to Moderate	Embedded mitigation as identified, plus additional mitigation in the form of an acoustic screen	Negligible - Not significant

**Table E-5: Potential Water Quality Impacts**

Source	Potential Pollutant(s)	Pathway(s)	Receptor(s)
Construction / Decommissioning			
On-site civil Works	Silt / sediment Oils and grease	Uncontrolled surface water run-off	Nearby water bodies / Ground water table
	Changes to surface water drainage patterns	Change of surface type  Compaction of soils Creation of new drainage Pathways Material stockpiling Changes to existing drainage ditches (re-routing, culverting)	
Operation			
Effluent discharge	Concentration of dissolved solids	Direct release	Nearby water bodies / Ground water table
Fuel / Chemicals	Other Oils	Uncontrolled surface water run-off	Nearby water bodies / Ground water table

**Table E-6: Potential water resources impacts during the Project's Construction Phase**

Receptor / Resource (Sensitivity of Receptor)	Potential impact	Severity	Impact (no mitigation)	Mitigation/ Enhancement	Significance of residual effect
Local communities (low)	Pollution of watercourse	Low	Low	Best practice construction methods	Negligible
Construction Workers (low)	Pollution of watercourse	Low	Low	Best practice construction methods	Negligible

**Table E-7: Potential Water Resources Impacts during the Project's Operation Phase**

Receptor / Resource (Sensitivity of Receptor)	Potential impact	Magnitude of Impact	Impact (no mitigation)	Mitigation/ Enhancement	Significance of residual effect
Ground water table	Pollution	Low	Low	Water treatment prior to discharge	Negligible

**Table E-8: Potential Waste impacts during the Project's Construction Phase**

Receptor / Resource (Sensitivity of Receptor)	Potential impact	Severity	Impact (no mitigation)	Mitigation/ Enhancement	Significance of residual effect
Waste materials: non-hazardous (Low)	Solid waste	Low	Minor adverse	Seek opportunities to provide local communities with any waste materials which may have other uses.  Contractor to develop Waste Management Plan.	Minor adverse

**Table E-9: Potential Waste Impacts during the Project's Operation Phase**

Receptor / Resource (Sensitivity of Receptor)	Potential impact	Magnitude of Impact	Impact (no mitigation)	Mitigation/ Enhancement	Significance of residual effect
Waste materials: non-hazardous (Low)	Solid waste	Low	Minor adverse	Use of waste hierarchy to maximise opportunities to avoid waste, re-use of recycle, particularly with other operators.	Minor adverse

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**Chapter 1**  
**INTRODUCTION**

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## CHAPTER – 1

### INTRODUCTION

#### 1.1 INTRODUCTION

Project consist of provision of new 30 MW High Pressure baggas based co-gen power plant in the premises of existing Hamza Sugar Mills and 30MW will be generated and supply to National Grid (MEPCO). The installed capacity of the plant will comprise of one unit of 30 MW which would deliver maximum net power of 27 MW to the grid.

To prepare Initial Environmental Examination Report, Terms of References are;

- (a) To provide the Environmental and Social Baseline conditions of the project area.
- (b) To identify adverse Environmental and Social impacts.
- (c) To develop an Environmental Management Plan for adverse environmental impacts
- (d) To prepare Environmental Examination Report (IEE) as per guidelines 2000

#### 1.2 PURPOSE OF THE REPORT

The specific objectives of the Initial Environmental Examination (IEE) Study are to:

- a. To provide the environmental and social baseline conditions of the project area.
- b. Identify adverse environmental and social impacts associated with proposed project and to propose mitigation measures for potential impacts of the project during the construction and operation phases.
- c. To develop an Environmental Management Plan (EMP) for adverse environmental impacts and to enhance the capacity building.

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### 1.3 IDENTIFICATION OF PROJECT AND PROPONENT

The proposed Power Plant belongs to the HSM operating its Sugar Mills Limited (HSML) at Jetha Bhutta, Tehsil Khan pur District Rahim Yar Khan District of Southern Punjab region of Pakistan. The HSM own its existing 15 MW Power Plant which is environmentally approved (copy of Environmental Approval attached). The HSML was incorporated in Khanpur before promulgation of PEPA 1997. Its documentary proof is provided in Annexure. The proposed Power Plant project will be located in the campus of HSM.

### 1.4 PROJECT PROPONENT

M.N Kashif

Manager (HR)

Hamza Sugar Mills

Jetha Bhutta, Tehsil Khan pur.

District Rahim yar Khan.

### 1.5 CONSULTANT PROFILE

To conduct the study a multidisciplinary team was involved comprising, Environmentalists, Environmental Engineers, Ecologist, Wildlife Experts and Sociologists. List of team members involved to prepare the report are provided in Table below

<b>SR. NO.</b>	<b>NAME</b>	<b>DESIGNATION</b>
1.	Dr. M. Jahangir Ghauri	Senior Forestry Expert / Environmentalist
2.	Obaid ur Rehman	Environmentalist / Ecologist
3.	Malik Muhammad Hayat	Wildlife Expert
4.	Qurrat-ul-Ain Shahid	Senior Environmental Engineer
5.	Uzair Ahmed	Senior Sociologist
6.	Secretariat Staff/ Computer Experts	



## 1.6 BRIEF DESCRIPTION OF NATURE SIZE AND LOCATION

Hamza Sugar Mills aims to install another 30 MW unit, in the same region, and go for high pressure cogeneration in the sugar mills with the aim of exporting 27 MW power to the grid during the crushing season and a little while after it i.e. for the months of April to August depending on the availability of bagasse. 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 MEPCO through 132 kV grids, as that of Khanpur, and Liaquatpur, available in the vicinity of this project. Details are given in **Chapter 3**

## 1.7 REPORT STRUCTURE

The report is structured as follows:

**Chapter 1** gives introduction of the Project.

**Chapter 2** describes the legislative and policy framework governing the project;

**Chapter 3** provides an overall description of the project in the light of Master Plan;

**Chapter 4** provides general environmental baseline conditions of the Project;

**Chapter 5** provides general Social baseline conditions of the Project;

**Chapter 6** assesses the overall environmental impact of the project and recommends appropriate mitigation measures.

**Chapter 7** Environmental Management Plan, defines responsibilities of the Project proponent, contractor(s) and other key players; specifies supervision and monitoring mechanisms and parameters.

**Chapter 8** Conclusion and Recommendation

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## **Chapter 2**

# **POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK**

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## Chapter – 2

### POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This section provides an overview of the policy framework and national legislation that applies to the proposed project. The project is expected to comply with all national legislation relating to environment in Pakistan, and to obtain all the regulatory clearances required.

#### 2.1 NATIONAL POLICY AND ADMINISTRATIVE FRAMEWORK

The Pakistan National Conservation Strategy (NCS) that was approved by the federal cabinet in March 1992 is the principal policy document on environmental issues in the country (EUAD/ IUCN, 1992). The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment. The core areas that are relevant in the context of the proposed project are pollution prevention and abatement, restoration of rangelands, increasing energy efficiency, conserving biodiversity, supporting forestry and plantations, and the preservation of cultural heritage.

Two organizations, the Pakistan Environmental Protection Council (PEPC) and the Pakistan Environmental Protection Agency (Pak-EPA), are primarily responsible for administering the provisions of the Pakistan Environmental Protection Act, promulgated by the Government of Pakistan in 1997. The PEPC oversees the functioning of the Pak-EPA. Its members include representatives of the government, industry, non-governmental organizations, and the private sector. The Pak-EPA is required to ensure compliance with the NEQS and establish monitoring and evaluation systems. As the primary implementing agency in the hierarchy, it is responsible for identifying the need for, as well as initiating legislation whenever necessary. The Pak-EPA is also authorized to delegate powers to its provincial counterparts, the provincial EPAs (environmental protection agencies). One of the functions delegated by the Pak-EPA to provincial EPAs is the review and approval of environmental assessment reports of projects undertaken in their respective jurisdictions.

##### 2.1.1 Pakistan Environmental Protection Act, 1997

The Pakistan Environmental Protection Act, 1997 (1997 Act) empowers the Pak-EPA to:

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- Delegate powers, including those of environmental assessment, to the provincial EPAs.
- Identify categories of projects to which the IEE/EIA provision will apply.
- Develop guidelines for conducting initial environmental examinations (IEE) and EIAs procedures for the submission, review and approval of the same.
- Develop environmental emission standards for parameters such as air, water and noise.
- Enforce the provisions of the Act through environmental protection orders and environmental tribunals headed by magistrates with wide-ranging powers, including the right to fine violators of the Act.

Under the provisions of the 1997 Act, the Pak-EPA has empowered four provincial EPAs to manage the environmental concerns of their respective provinces. The provincial EPAs can frame environmental regulations tailored to the requirements of their province, provided these regulations meet or exceed the minimum standards set by the Pak-EPA. Provincial EPAs are required to review and approve EIAs of all development projects undertaken in their respective provinces, including those projects implemented by federal agencies.

#### • **Regulations for Environmental Assessment**

Under Section 12 (and subsequent amendment) of the 1997 Act, a project falling under any category specified in Schedule I (SRO 339 (10/2000), requires the proponent to file an IEE with the federal agency concerned (the Pak-EPA). Projects falling under any category specified in Schedule II require the proponent to file an EIA with the federal agency. Within ten working days of the IEE or EIA having been deposited, the federal agency will confirm that the document submitted is complete for the purpose of review. During this time, should the federal agency require the proponent to submit any additional information, it will return the IEE or EIA to the proponent for revision, clearly listing those aspects that need further discussion. Subsequently, the federal agency shall make every effort to complete an IEE review within 45 days and an EIA review within 90 days of filing.

Recognizing that the Pak-EPA has delegated powers to the provincial EPAs to enforce the provisions of the 1997 Act, an EIA must be submitted to one of the relevant Provincial EPA based on the location of the project.

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At the time of application, the project proponent is also required to pay a specified fee to the EPAs concerned.

- **Guidelines for Environmental Assessment**

The Pak-EPA has published a set of environmental guidelines for conducting environmental assessments and the environmental management of different types of development projects. The guidelines that are relevant to the proposed project are listed below, followed by comments on their relevance to the proposed project:

Guidelines for the Preparation and Review of Environmental Reports, Pakistan Environmental Protection Agency, 1997.

The guidelines on the preparation and review of environmental reports target the project proponents, and specify:

- The nature of the information to be included in environmental reports
- The minimum qualifications of the IEE/EIA conductors appointed
- The need to incorporate suitable mitigation measures at every stage of project implementation
- The need to specify monitoring procedures.

The terms of reference for the reports are to be prepared by the project proponents themselves. The report must contain baseline data on the project area, a detailed assessment thereof, and mitigation measures.

- Guidelines for Public Consultation, Pakistan Environmental Protection Agency, May 1997

These guidelines deal with possible approaches to public consultation and techniques for designing an effective program of consultation that reaches out to all major stakeholders and ensures that their concerns are incorporated in any impact assessment study.

- Sectoral Guidelines: Pakistan Environmental Assessment Procedures, Pakistan Environmental Protection Agency, October 1997

- The guidelines for 'Manufacturing plant' are structured to assist in identifying key environmental issues related to Manufacturing Plant, as well as the various mitigation measures and alternatives that should be considered and applied accordingly.

### 2.1.2 National Environmental Quality Standards, 2000

The National Environmental Quality Standards (NEQS), 2000 specify the following standards:

- Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged into inland waters, sewage treatment facilities, and the sea (three separate sets of numbers)
- Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources
- Maximum allowable concentration of pollutants (two parameters) in gaseous emissions from vehicle exhaust and noise emission from vehicles.
- Maximum allowable noise levels from vehicles.

These standards also apply to the gaseous emissions and liquid effluents generated by generator, process waste etc. The standards for vehicles will apply during the construction as well as operation phase of the project. Standards for air quality have not been prescribed as yet.

### 2.1.3 National Resettlement Policy and Ordinance

There is no such kind of land acquisition or resettlement of Project Affected Persons. Therefore, no further details have been discussed.

The provisions of the Draft Resettlement Policy are consistent with the requirements of the World Bank's OP 4.12 on involuntary resettlement. After becoming law, these provisions will apply when addressing the resettlement issues that arise in the project.

## 2.2 INTERACTION WITH OTHER AGENCIES

The client is responsible for ensuring that the project complies with the laws and regulations controlling the environmental concerns. This chapter describes the nature of the relationship between the client and line departments concerned.

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## **2.2.1 Federal and Provincial EPAs**

The client will be responsible for providing the complete environmental documentation required by the Pak-EPA, and Punjab Environmental Protection Department (EPD) and remain committed to the approved project design. No deviation is permitted during project implementation without the prior and explicit permission of the EPAs concerned.

## **2.2.2 Provincial Revenue and Other Departments**

Since the issue of land acquisition and contacts with Agriculture, Horticulture and Forestry Deptt. are not involved in this project, hence they are not elaborated.

## **2.2.3 Provincial Governments**

The client must ensure that the project meets the criteria of the Punjab provincial government as related to the safe disposal of wastewater, solid waste, and toxic materials. The client will coordinate and monitor environment-related issues.

## **2.2.4 Local Government and Municipalities**

The client will work with local government/administration and municipalities on the resettlement of squatters and removal of encroachments or sources of congestion if any. In such cases, the Client will frame an agreement with the municipality, local government, or other service provider concerned on the resettlement of displaced squatters.

## **2.3 OTHER ENVIRONMENT-RELATED STATUTES**

This section outlines statutes apart from the Pakistan Environmental Protection Act, 1997, which are relevant to the project.

### **2.3.1 Antiquities Act, 1975**

The Antiquities Act relates to the protection, preservation and conservation of archaeological/historical sites and monuments. It prohibits construction (or any other damaging) activity within 200 m of such sites unless prior permission is obtained from the Federal Department of Archaeology and Museums. The Antiquities Act also binds the project proponent to notify the department should anything of archaeological value be excavated during project construction.

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### **2.3.2 Provincial Local Government Ordinances, 2001**

These ordinances, issued following the devolution process, establish regulations for land use, the conservation of natural vegetation, air, water, and land pollution, the disposal of solid waste and wastewater effluents, as well as matters related to public health and safety.

### **2.3.3 Pakistan Penal Code, 1860**

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

### **2.3.4 Factory Act, 1934**

The clauses of this act relevant to the project are those that concern the health, safety and welfare of workers, disposal of solid waste and effluent, and damage to private and public property. The Factories Act also provides regulations for handling and disposing of toxic and hazardous materials. Given that construction activity is classified as "industry" these regulations will be applicable to the project contractors.



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## **Chapter 3**

# **DESCRIPTION OF THE PROJECT**

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## Chapter – 3

### DESCRIPTION OF THE PROJECT

#### 3.1 GENERAL

This Chapter provides an overview of the project including main components, description and other related developmental activities to be carried out. It also provides Project justification and its need, phasing and other relevant information etc.

#### 3.2 TYPE AND CATEGORY OF THE PROJECT

According to PEPA 1997 "List of projects requiring an IEE" and this project falls under category of projects requiring IEE. Furthermore proponent is required to fulfill the legal requirement of Section 12 of PEPA 1997 (Amended 2012).

#### 3.3 OBJECTIVES OF THE PROJECT

- The main objective of the proposed project is to generate cleaner, economical and reliable energy from indigenous biomass fuel which will not only provide a better alternate source of energy but also boost to agriculture sector and save millions which is wasted to import expensive oil to be used as fuel for producing electricity. It will also reduce environmental hazards caused by burning furnace oil as fuel for producing electricity.
- Provide labour employment in remote areas of Southern Punjab.
- To provide electricity at a cheaper rate to MEPCO.

#### 3.4 ALTERNATIVES CONSIDERED REALISTICALLY AND REASONS FOR REJECTION

This Section describes alternatives to the location proposed for the project. It includes a discussion on the site selection and technological criteria that were required to ensure that project design would meet the desired results, within defined economic, environmental health and safety constraints. In particular it outlines the following project elements:

- The "No-Development Option"
- Alternative locations

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### 3.4.1 Alternate Locations

#### Proposed Power Plant Site

When the need for additional power generation capacity was confirmed, HSM had reviewed a number of siting options prior to the selection of the final proposed location.

Selection of site for installation of a cogeneration power plant is based on following criteria:

- Availability of land;
- Availability of fuel;
- Availability of water for cooling process;
- Access to electric grid station and transmission system;
- Availability of infrastructure;
- Availability of managerial and skilled personnel.

The cogeneration power plant, under reference of this IEE is intrinsically linked with the sugar mills as discussed within the project description. This linkage is twofold, firstly the supply of bagasse from the factory to the cogeneration power plant and secondly the provision of steam to the mills from the cogeneration plant with the return of good quality condensate.

Due to the physical restrictions within the HSM factory site and the requirements for the two plants to be in close proximity, no practical alternative site locations exist, except the site that has been proposed.

Major relocation of the plant, away from the HSM, would add significant additional capital and operational costs (steam/condensate pipe work and bagasse transport) and was not therefore considered a practical or reasonable option.

The proposed site; adjacent to the HSM; has all the infrastructure available. Water will be available from tube-wells (ground water) and an alternative surface water source of nearby canal; NTDC proposed grid station is located nearby; adequate workshop and maintenance facilities, along with trained, experienced and skilled workshop technicians are available who are already running the workshop available at HSM. Similarly, experienced and skilled managerial manpower is also available in the area.

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## **Cogeneration Option**

Cogeneration has been adopted as standard means of energy generation since long by the sugar industry. With the use of efficient processing and energy management systems, energy from bagasse, over and above the sugar factory needs, is available and can be exported conveniently in the form of electric power. Application of sugar cogeneration will replace a part of fossil-based electricity generation leading to a more sustainable mix in power generation.

Cogeneration with power export will assist in reducing greenhouse gases (GHGs) emissions. In order to continue reliable, efficient and safe operation, the existing steam and power generation system will be closed down and replaced with the more efficient system in proposed power plant.

Presently, sugar industry world-wide except for Pakistan uses high-pressure boilers by burning bagasse and the high pressure steam for power generation and the low pressure steam for process heat. Introduction of high-pressure technology in Pakistan will result in more power production to supply to the national grid and less emission of GHG

## **Location Option**

The location of the proposed project was decided after deliberations for the suitability of the site, considering the following factors.

- Legal status of the available land
- Commercial importance of location
- Availability of utilities
- Easily approachable for prospective customers
- Availability of Sufficient space

So the site is best situated for this addition of 30MW Power Plant.

## **3.5 LOCATION & SITE LAYOUT OF THE PROJECT**

Proposed project is situated within the project premises of Hamza Sugar Mills, Jetha Bhutta Tehsil Khan Pur District Rahim yar Khan. Site Layout has been given in **Annexure 4**

### 3.6 LAND USE ON SITE

Project site is Commercial in nature, as site is inside boundary of existing Hamza Sugar Mills Ltd.

### 3.7 ROAD ACCESS

Proposed Project is very well connected with Bahawalpur – Rahim yar Khan Road N-5 Highway.

### 3.8 VEGETATION FEATURE AT SITE

There is no vegetation at project premises as land is already property of Hamza Sugar Mills Ltd. Sufficient land is available for the power plant installations inside HSM (See Land Ownership Document in **Annexure 5**)

### 3.9 SCHEDULE OF IMPLEMENTATION

The project is completed in one phase as under:

- Site preparation and construction works. (however construction will take 06 months);
- Commercial operation – 2 months.

### 3.10 INVOLVEMENT OF LABOR DURING CONSTRUCTION

During construction of building, fixing and installation of machinery, approximately 60 skilled & unskilled labor will be involved directly.

### 3.11 JOB OPPORTUNITIES

Unit will create employment opportunities for local community. Initially planned to hire about 55 persons and will increase with the passage of time, more people will find better and new sources of employments and income.

### 3.12 DESCRIPTION

❖ Electrical Grid Studies by Hamza Sugar Mills for the Total 60 MW capacity has already been approved and vetted by NTDC via Letter No. GMPP/CEMP/TRP-333/Hamza Sugar/2119-22 dated 15-05-2014. (copy attached)

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- ❖ Phase-I of 15 MW Hamza Sugar Mills (Environmentally Approved) has already been installed for the supply of 13.5 MW to the National Grid. Hamza Sugar Mills now intends to add another unit of 30 MW at the same location i.e within HSM Project premises.
- ❖ It will like to go for high pressure cogeneration in the sugar mill with the aim of exporting power nearly 27 MW to the national grid during both the crushing season and Non-crushing seasons. Crushing season will be from November to March and Non-Crushing season will be from April to onward depending upon the availability of Bagasse.
- ❖ The nearest grid facility is the 132 kV substations of Khanpur. It lies at about 12 km from the site of Hamza Sugar Mills.
- ❖ Due to the location of Hamza Sugar Mills., the most feasible interconnection scheme would be looping in-out one of the existing 132 kV double circuit between Liaqatpur to Khanpur at Hamza PP, as had been done for Hamza Sugar Mills.
- ❖ The two breaker bays of 132 kV at Hamza PP to connect with the 132 kV circuits each from Liaqatpur and Khanpur respectively are already installed for Hamza Sugar Mills.
- ❖ In view of planned COD, of the Hamza Sugar Mills Phase II 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.
- ❖ Steady state analysis by load flows, short circuit and stability criterion reveals that proposed scheme is adequate to export 27 MW output of the plant under normal and contingency conditions.
- ❖ Since the plant operates during summer as well, the high-water season, its detail analysis has also been carried out for September 2018.
- ❖ In an extended term scenario, September 2021 and January 2022 have also been studied to evaluate the performance of the proposed interconnection scheme. In these cases 15 MW Hamza PP Phase III has also been modeled. 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 and dynamic stability analysis have been carried out for a complete check of the system.
- ❖ The short circuit analysis carried out to calculate maximum fault levels at Hamza Sugar Mills and the substations of 132 kV in its vicinity reveals currents for the proposed scheme are much less than the rated short circuit capacities of switchgear installed at these substations. There are no violations of exceeding the rating of the equipment due to contribution of fault current from Hamza Sugar Mills.

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❖ 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 Hamza Sugar Mills substation followed by the final trip of 132 kV circuits emanating from this substation 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 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. The stability of system for far end faults of 3-phase occurring at Khanpur 132 kV and Liaqatpur 132 kV bus bar has also been checked.

#### **Background Hamza Sugars Mills Ltd.**

Power Plant is a Cogeneration plant near Khanpur in District Rahim Yar Khan embedded in the distribution network of MEPCO. Currently, it has a generation capacity of 15 MW (Environmentally approved). It has one generating unit, which provides a spillover of 13.5 MW to the national grid. The plant will successfully achieve its COD in the first quarter of 2017. It is located nearly 11-12 km from the existing Khanpur 132 kV Substation in the concession area of Multan Electric Power Company (MEPCO). A general idea of the location of plant and grid stations in its vicinity.

Hamza Sugar Mills aims to install another 30 MW unit, in the same region, and go for high pressure cogeneration in the sugar mill with the aim of exporting 27 MW power to the grid during the crushing season and a little while after it i.e. for the months of April to August depending on the availability of bagasse. 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 MEPCO through 132 kV grids, as that of Khanpur, and Liaqatpur, available in the vicinity of this project.

#### **Planning Criteria**

The planning criteria required to be fulfilled by the proposed interconnection is as follows:  
Steady State: Voltage  $\pm 5\%$ , Normal Operating Condition  $\pm 10\%$ , 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

#### **Short Circuit**

132 kV Substation Equipment Rating 31.5 kA or 40 kA

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,

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transformer, or circuit breaker. It is assumed that such a fault shall be cleared by the associated circuit breaker action in 5 cycles.

Failure of a circuit breaker to clear a fault ("Stuck Breaker" condition) in 5 cycles after fault initiation.

#### **DETAILED LOAD FLOW STUDIES**

The base cases have been developed for the peak conditions of January 2018 using the network data of NTDC and MEPCO available with PPI. The peak loads of the year 2018 for MEPCO have been modeled as per the latest PMS Demand forecast as provided by NTDC. Detailed load flow studies have been carried out for January 2018, September 2018 and future cases of September 2021 and January 2022.

#### **LIST OF MACHINERY TO BE INSTALLED**

1. Turbines 15 MW and 30 MW All Item Imported
2. Through Siemens/ABB
3. Transformer 31.5/40 MVA
4. 132 GIS BAY Unit (4CB BAX) 8DN
5. C.T For 132 KV
6. Metering For 132 KV
7. Voltage Transformer
8. All Steel Structure
9. All Type of Control Panels
10. All Type of Cable Accessories
11. Earthling Equipment
12. Bank Batteries
13. RTU/Skada System
14. Telecommunication System
15. Boilers 100 Ton and 150 Ton Different Capacity
16. Connection Lines
17. Poles
18. Cooling Tower
19. Heavy civil structure for machines
20. Fire fighting machines and equipments
21. Tractors for Ash Handling
22. Complete Unit Set



### 3.13 Process Flow Diagram

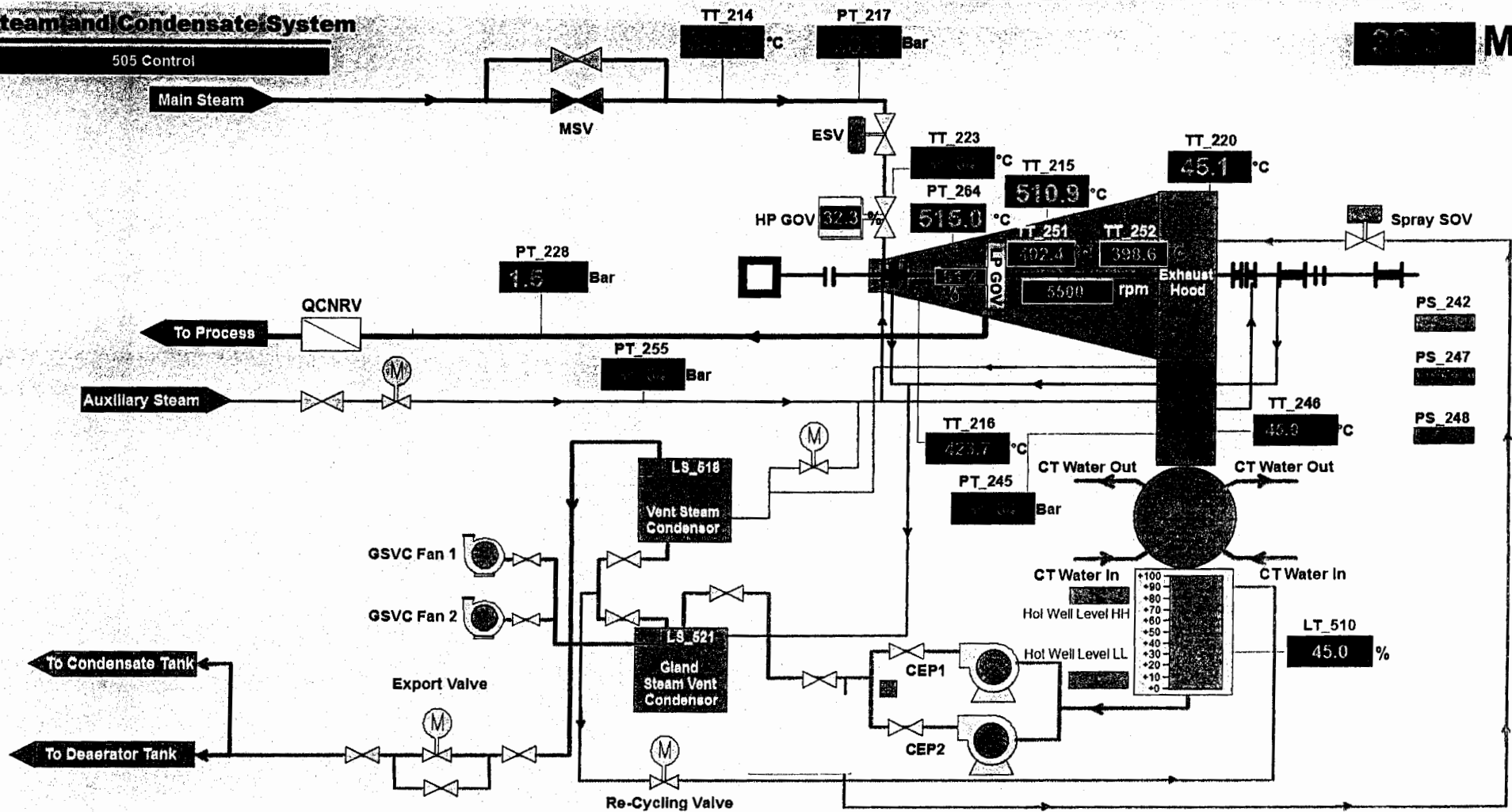
**HAMZA CO GEN POWER PLANT**  
SUGAR MILLS LIMITED

Main OverView	Pumps	Start Permissive	Protection	ACK
Condensate Sys	Alarms	Digital Status	Reset	
Lube Oil System	Trends	Parameters	FIFO RST	

**HAMZA**  
CO-GEN POWER PLANT

#### Steam and Condensate System

**220 MW**



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### **3.14 WATER/ WASTE WATER AND SOLID WASTE GENERATION**

The site will require make up and cooling water for the operation. The water requirement of the proposed power plant is to be met from tube-wells. The ground water availability is good and reliable.

Due to plentiful availability of water, it has been decided to go with water cooled condensing system for the cogeneration plant. The raw water supply has been planned to be provided by tube-wells installed within the proposed plant boundary. The raw water will be used as a source for make up water for the losses in the process steam, boiler blow down, cooling tower blow down, service water, etc.

Waste water will recirculate within the proposed unit. A very less amount of waste water from washrooms or from kitchen will be primarily treated in septic tank and then finally disposed off in TMA disposal system. Waste water will not have any hazardous chemicals in it and it will not be injurious to health.

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**CHAPTER 4**

**ENVIRONMENTAL BASELINE**

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## Chapter – 4

### ENVIRONMENTAL BASELINE

#### 4.1 INTRODUCTION

The district can be divided into three main parts. These are the riverain area, the canal irrigated area and the Cholistan area. The riverain area of the district lies close to the river Indus and Panjnad. To the South West of this area lies the canal irrigated area. The land in this area is higher than that of the riverain area. The approximate height of this area is 150 to 200 meters above sea level. The desert area lies in the South-East of the district. It is called as the Cholistan. It extends into Bahawalpur and Bahawalnagar districts, occupying the South-Eastern part of the two districts. The surface of the desert consist of a succession of sand dunes rising in places to a height of about 150 meters and covered with the vegetation peculiar to sandy tracts.

#### 4.2 GENERAL BASELINE SURVEY

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

Information regarding physical environment is collected within project area as well as study area. While in case of biological and social environment, efforts were made to collect the information in 2 km around the project area and even upto 10 km in case any direct or indirect impacts were envisaged.

#### 4.3 PHYSICAL FEATURES AND TOPOGRAPHY

The Indus River flows on the North-West side of district Rahim Yar Khan and forms its boundary with Rajanpur and Muzaffargarh districts. On its South-West lies the Province of Sindh. The Cholistan desert is located on the South-East side up to the Indian Territory and the Bahawalpur district. District Rahim Yar Khan is spread over an area of 11,880 square kilometres comprising of following four tehsils:

- i) Rahim Yar Khan
- ii) Khanpur
- iii) Liaqatabad
- iv) Sadiqabad

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This district is divided into three main physical features i.e. (a) Riverine area. (b) Canal irrigated area and (c) Desert area which is called Cholistan. The Riverine area of the district lies close on the southern side of the Indus River mainly falling in the river bed. The canal irrigated area lies on the South and is separated by main Minchan Bund. The approximate height of the irrigated area is 150 to 200 meters above the sea level. The third part of the area called Cholistan lies in the south of the irrigated tract upto the Indo-Pak border. The surface of the desert consists of a succession of sand dunes rising at places to a height of 150 meters and covered with the vegetation peculiar to sandy tracts.

#### **4.4 GEOLOGY**

The land of Pakistan provides a fascinating exhibition of geological evolution. It is a bonanza of different lithospheric plates, which have been accreted together in such a way that has a rare parallel in the world with respect to its structure, relief, rock types and landscape. It has an assemblage of rocks, which probably has a complete succession of rocks ranging from the deep mantle of the earth to rock of the upper lithosphere.

Punjab Province mostly comprises of plain areas lying in Indus Basin formation. This District lies in this Indus basin formation which is alluvial deposit formed due to river action. Ground is almost flat and 40% of the area is Desert of Cholistan.

#### **4.5 LAND USE**

Major portion of the Punjab Province falls in the Indus Plain, which geologically originated in Late Pleistocene period by deposition of sediments from the Himalayas into abyssal sea. In early days the sediments were carried by two river systems, viz., Indus and Ganges. Later in the geological history, the Ganges River changed its course from westward to eastward.

Later, the Indus River and its five major tributaries, viz., Jhelum, Chenab, Ravi, Bias and Sutlej, carved the deposits of the early river systems. These river systems are spread in the Punjab Plains like fingers of a hand, consequently dividing the whole province into four masses of lands called Doabas (meaning the lands between two rivers).

About 50 % of the project area is uncultivated while remaining 50 % is being cultivated by irrigation water as well as ground water through tubewells. The main crops being cultivated in the study area include wheat, sugar cane, cotton, rice, maize, etc.

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## **4.6 WATER RESOURCES**

### **4.6.1 Surface Water**

The social and economic life of the country mainly revolves round this Indus Basin plain as it generates about 90% of the Punjab's total agricultural income

The Indus Plain does not have a well-defined natural drainage. The introduction of irrigation system therefore resulted in surface and sub surface drainage problems resulting in water logging and salinity, which has continued to aggravate over the period. This has adversely affected the socio-economic conditions of the large rural population by impairing agricultural production and also creating health hazards. Massive efforts have been undertaken since 1960 to overcome this problem by implementing a large number of surface and sub-surface drainage projects.

In spite of these efforts, water logging has not been completely eradicated. Consequently, pockets of wetlands resulting from the water logging are encountered in plains of Punjab. Main Canal and its distributory runs across the project.

### **4.6.2 Ground Water Quality**

The microbiological analysis results of ground water are not upto the mark. Groundwater is brackish and not fit for use. Only at few places the sub-soil water is sweet and fit for drinking purposes.

## **4.7 RAINFALL**

Out of the eight climatic zones of Pakistan, Rahim Yar Khan District is located in hot arid climatic zone, associated with 100 mm rains. 100% of the site falls in this zone.

Broadly, there are four well marked seasons in Pakistan. These are:

1. Cold season (December to March)
2. Hot season (April to June)
3. Monsoon season (July to September)
4. Post-Monsoon season (October and November)

## **4.8 AMBIENT AIR QUALITY**

Information on ambient air quality in rural areas particularly related with the traffic on the highways and the roads is totally missing. This is mainly because air pollution is primarily a

hazard for urban areas where the increasing number of industries and vehicles is increasingly concentrating the pollutants in air and also prevents them from being dispersed. As far as rural areas are concerned the air quality has not been a problem, except near sources of noxious and large emissions

## 4.9 BIOLOGICAL RESOURCES

### 4.9.1 General

Once rich in natural vegetation the land use pattern of the Indus Basin and other areas has greatly been modified for want of land for cultivation. This has changed the pattern of flora wherever irrigation was possible.

### 4.9.2 Flora

The flora of the district characteristics two major ecological divisions, northern, southern. The botanical life found in the northern half identifies itself with that of the rest of the irrigated tracts at central Punjab. The human interference in the form of irrigation network has virtually wiped out the old plantation without much revolutionization of the phytophysiology in the area. Due to factors such as waterlogging and salinity, only the salt resistant plants can survive in most of the area. The southern half is characterized by sand dunes, more or less barren of vegetation except in the rainy season when multitudes of ephemeral or short lived plants come up and transform the bare land into a lush green carpet. In general, the vegetation in this part of the arid region is sparse. The bulk of the vegetation consists of stunted, thorny or prickly shrubs and perennial herbs capable of withstanding drought with grown in open clump formation with plenty of vacant spaces between them. Distinctly scattered trees of stunted growth are found along the depression technically known as desert scrub.

Plants found in Cholistan are as under:

1. Phatokar: Cholistan aborigines use its puddings for (halva) the removal of worms from the alimentary tract.
2. Katran: A shrub with aromatic leaves (fragrance). Its ark is used for asthma and the Sharbat is given to patients suffering from prolonged fever.
3. Chapri: Cholistanis consider it as a Soghat. It is used in rheumatic pain and as diuretic. It is believed to increase sexual potency.
4. Baren Dandi: it is a medicinal plant, particularly useful in liver trouble.

5. Gor gopan: it is considered as a Thandi Booti. It is used in liver trouble. Some take it as substitute of tea.
6. Bo Phali: Cholistanis take it for the cure of urinary tract troubles.
7. Rat Sat: It is believed that this weed contains ingredients of certain minerals. Chemists are generally found interested in this plant, perhaps due to some minerals of medicinal significance.
8. Phali: Indian bustard's favorite food (seeds), also eaten by camels.
9. Olatee: Seeds eaten by desert partridges.
10. Phag: The flower is cooked as pot herb (sag) and tates like eggs.
11. Khip: it is being tried as a substitute of jute: its seeds are considered to be a rich source of fat.
12. Pelu: The fat from Pelu seeds is being studied for its utilization in soap making.
13. Boara: Gum is extracted from this plant.
14. Pepoon: It is a fungus which grows on decaying roots of capperis and is eaten as a vegetable. Chatni is also prepared from it.
15. Agaricus: (Khumbi) This fungus is also cooked and taken as food.
16. Monyan: Serves as fodder for animals.

#### 4.9.3 Fauna

An unblemished geographical feature of a vast arid land, popularly known as Cholistan desert provides an ideal opportunity for a variety of wildlife. A wild cat still exists in the area which as the desert traditions say, is very fond of ripping apart the newly born young goes of Chinkara deer. Pig known as Hirhoon, Jitama, Bhoondin or Soor in this area is found in a fairly large number in government plantation near the desert. Jackal (Geeder), fox (Loomeri), badger (Bijjoo), also exist in the desert. Wolfe locally known as Mahr is negligible now. Porcupile (Seh), squirrel (Golhari Fubhri) and jerbils musk rat (Chhachhoondar), wild rat (Choocha) of brownish color mongoose (Neola), are generally visible. Mongoose has half a dozen of varieties in this area. Though small, it readily attack much larger animals. It kills large number of poisonous snakes and rodents. A duel between mongoose and cobra used to be a familiar attraction in village festivities generating enthusiasm of no less than a bull fighting.



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Some of the animals such as hog deer (Parha), blue bull (neel Ghaee) and ravine deer (Heron) are more or less non-existent now and are rarely witnessed across the Indian borders. Black buck, once a beauty of the desert has been totally eliminated. Chinkara is a fine specimen of antelopes, though not as original as the black buck, commonly known as Ghazaal.

Black crow, sparrow and dove are numerically common as in other parts of Punjab, Green parrots are also found and generally damage the crops. Myna is however a useful bird for cultivators. Lark is another bird which charmingly charts in the early morning hours. Owl has also established its existence in the specific types such as Chibri and Ghug. Falcons here are of various species known as Baz, Shikra and Shaheen etc. Tanny eagle, spotted eagle, bonelli's eagle, laggar eagle, white and black vultures, mash harrier and kestrel are generally spotted in the area. Falcon used for hunting the bustard is especially trained for this purpose. It is caught hold of at tender age, through interesting indigenous methods which are otherwise banned under the law protecting the wild life.

Wild lizards are witnessed here in a number of species including Goh, Kirli and Kirla. Another species is locally called gohira and yet another Sanda. A very deadly poisonous snake Padam is also found in the district as the local saying goes "Jen Ko dangia Padam, Chalan Noa Ditha Qadam", (he whom Padam has bitten, will not go another step). White egrets, little egrets and black wing stilts are common and feed on insects and fish. Amphibians generally include on y frogs and toads.

Over 40 varieties of fishes are found in the district. Rahu, Thaila, Mori, Mullee, Khagga and Sanghara are however found in abundance in river, canals and ponds.

#### **4.10 ADMINISTRATIVE SETUP**

The total area of the district is 11,880 square kilometers. The district comprises four Tehsils namely Rahim Yar Khan, Sadiqabad, Liaquatpur and Khanpur. All the Tehsils are under Tehsil Municipal Administration (TMA).

Tehsil wise area in Acres is as under:

<b>Name of Tehsil</b>	<b>Total Area (Acres)</b>	<b>Cultivated Area (Acres)</b>	<b>Uncultivated Area (Acres)</b>
Rahimyarkhan	4,94,497	4,44,098	50,399
Sadiqabad	5,33,179	4,50,804	82,375

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Khanpur	3,77,003	3,00,930	76,073
Liaquatpur	3,62,805	3,30,860	31,945
<b>Total</b>	<b>17,67,484</b>	<b>15,26,692</b>	<b>2,40,792</b>

#### 4.11 TEHSIL WISE REVENUE SETUP

Tehsil	Qanungois	Patwar Circles	Revenue Estates	Area in Square Acres
Sadiqabad	10	86	319	5,33,179
Rahimyarkhan	10	88	322	4,94,497
Khanpur	10	75	261	3,77,003
Liaquatpur	8	75	248	3,62,805
<b>Total</b>	<b>38</b>	<b>324</b>	<b>1150</b>	<b>17,67,484</b>

#### 4.12 CLIMATE

##### 4.12.1 Weather

The climate of the district is hot and dry in the summer and cold and dry in the winter. The summer season is comparatively lingered. Its starts in April and continues till October. The winter season goes from November to March. However, the months of March and November are pleasant. Dust Storms are frequent during summer season. The average rain fall is about 100 millimeters.

Following table (Table 4.1) shows minimum and maximum temperature, precipitation and relative humidity:

Table 4.1: Month wise Temperature, Precipitation and Relative Humidity, 1960-98

Month	Avg Temperature		Precipitation (in millimetres)	Relative Humidity (%)
	Maximum	Minimum		
January	21.8	4.4	4.4	57.5
February	24.4	7.3	5.3	52.0
March	30.2	12.8	5.5	46.4
April	37.0	18.5	2.7	35.2
May	41.7	23.6	5.1	33.4
June	42.4	27.2	2.8	41.7
July	30.9	27.3	27.5	53.4

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August	38.4	26.3	23.0	57.7
September	37.0	23.1	15.5	56.9
October	4.8	16.3	1.2	50.0
November	20.4	10.1	0.7	53.7
December	23.5	5.3	3.3	59.5

*Source: Data processing Centre, Pakistan Meteorological Department, Karachi, 1961-90*

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## **Chapter 5**

# **SOCIAL BASELINE**

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## Chapter – 5

### SOCIAL BASELINE AND PUBLIC CONSULTATIONS

#### 5.1 SOCIAL BASELINE CONDITIONS

##### 5.1.1 Administrative Setting

Rahim Yar Khan comprises of 4 Tehsils, 3 Municipal Administration and Town Committee and 136 union councils. Project site is located in Rahim Yar Khan Tehsil. Its area is 1715 sq. km. and population was 985655 in the year 1998. Total (male and female) population consists of more than 90% Muslims and Majority are Punjabi. Total population of Tehsil is 274666, literacy ratio is 60.4, and education primary (Male + Female) is 46000, Matric & above is 39000. Housing pattern mostly pacca, potable water for 11774, and electricity, 32503 & latrine facility for 21919 persons. Average household size is 7.4.

#### 5.2 SOCIAL INFRASTRUCTURE & ITS IMPACTS

##### 5.2.1 Social Impacts

- a) Impacts which result in a change in the community's demographic structure
- b) Environmental impact that may cause substantial change or disruption to the community behavior (loss of neighbor cohesion, access to facilities, links to other communities, community identity or cultural character)
- c) Impacts which result in some individuals or communities being significantly being disadvantaged
- d) Impacts on the health, safety, security, privacy or welfare of individuals or communities because of factors such as:
  - (i) Air pollution, odor and noise
  - (ii) Vibration, blasting, electromagnetic fields or radiation
  - (iii) Release of disease or genetically modified organisms
  - (iv) Disease causes due to dust problem.
- e) Impacts that result in a change in the level of demand for community resources (e.g. facilities, services and labor force)
- f) Any other social impacts.

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### **5.2.2 Heritage, Aesthetic, Cultural Impacts**

- a) Impacts on a locality, place, project or natural landmark having aesthetic, anthropological, architectural, cultural, historical, scientific, recreational, scenic or social significance or other special value for present or future generations
- b) Any other heritage, aesthetic, cultural impacts

### **5.2.3 Land Use Impacts**

- a) Any major changes in land use
- b) Any curtailment of other beneficial uses
- c) Any property value impacts with land use implications
- d) Any other land use impacts

### **5.2.4 Transportation Impacts**

- a) Substantial impacts on existing transportation systems (road, pedestrian-both public and private), altering present patterns of circulation, modal split or movement of people and/or goods
- b) Directly or indirectly encouraging additional traffic
  - during construction
  - during operation
- c) Any other impacts on transport or traffic.

### **5.2.5 Temporary Land Acquisition**

- a) Impacts due to change of site or access of land during construction/ operation/ study.
- b) Negotiations and related delays associated with land acquisition issues.

## **5.3 DEMOGRAPHIC CHARACTERISTICS OF THE POPULATION IN AREA OF INFLUENCE**

Due to the social and Jagirdari set-up in the project area, it was difficult to collect the relevant information on this socially sensitive part of the questionnaire; however, an effort was made to get the desired information relating to the demographic features of the

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population resided along the project corridor. The demographic features include the information on ethnicity/tribes, size of households, gender composition, and literacy status of the population in the project area.

### 5.3.1 Family Size

In the proposed project corridor, the population is living in an extended, joint and nuclear family system. An extended family system refers to the households where parents and grandparents are living together in a household, while joint family system includes the households where, parents, brothers, sisters, sons, daughters are living together. The nuclear family includes only a single family, i.e. husband, wife & kids.

In the survey, it was observed that in the project corridor; mostly the population is living in a joint family system. As depicted in **Table 4.5**, the average size of the population residing along the project corridor.

### 5.3.2 Gender Composition

As regards the gender composition, on the whole, the proportion of male and female population in the ratio of 52 percent and 48 percent males and females respectively residing along the project corridor.

**Table 5.1: Demographic Analysis of Sample Population**

Area	Gender Composition		Literacy Rate (%)		
	Male (%)	Female (%)	Overall	Male	Female
Project Area	52	48	60	65	35

### 5.3.3 Education Status

Literacy is not just attaining the skills of reading and writing but providing people with the skills to learn, protect and empower themselves in society and effectively contribute in decision making at various levels. The general disparity in education exists in low-income communities.

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#### 5.3.4 Nature of Occupation

In the project area, the major occupations include business (shops, stores, kiosks, medical stores etc.), service (government, private, drivers), labour (skilled & unskilled), farming and others (i.e. abroad, artisans etc.). The socioeconomic baseline survey results summarized in Table 5.2 reveal that on overall basis in the project area, 5 percent of population settled along the project corridor operated business (general stores, shops etc); 10 percent are labourers/tenants, 3 percent are engaged in farming, while 11 percent are in service sector.

**Table 5.2: Major Occupations of Sample Population**

Area	Main Occupation (%)			
	Service	Business	Labour	Farming
Project Area	11	5	10	3

### 5.4 AGRICULTURE

#### 5.4.1 Land Use Pattern along the Project Corridor

The optimum cropping pattern refers to the allocation of cultivated area under different crops during the year in order to attain maximum output within the existing resources. There are only three main crops being grown along the project corridor. In Rabi season, wheat is the main crop, in Kharif season the main crop is cotton, sugarcane and in few cases rice.

#### 5.4.2 Cropping Intensity

The extent of cultivated area due to its less developed irrigation system is less due to terrain of most of the area being sandy desert. The average cropping intensity is estimated as below as compared to other Districts of Punjab.

#### 5.4.3 Crop Yield

Crop yield is one of the key performance indicators to assess the productivity of land. As discussed above, there are the main species grown in the area like as wheat, rice, maize, cotton and fodder crops. The average yield of wheat crop is 1600 kgs per acre, rice (paddy) is estimated as 1400 kgs per acre and sugarcane is estimated as 2500 kgs per acre along the project corridor.



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Cotton crop yield is about 4000 Kgs per acre.

#### 5.4.4 Household Expenditure

The annual expenditure and pattern of expenditure provides an indication for assessing the standard of living of a household. The expenditure on food items includes cereals, pulses, flour, sugar, cooking oil/ghee, milk etc., while the non-food items consist of expenditure on education, medical treatment (if any), clothes, shoes, cosmetics etc. In this respect, survey results are depicted in Table 5.3.

Table 5.3: Average Monthly Expenditure

Area	Food Expenditure (Rs)	Non-Food Expenditure (Rs)	Occasional Expenditure (Rs)	Total Expenditure per Month (Rs)
Project Area	3711	1594	1600	7482

#### 5.4.5 Extent of Credit Utilization

Generally, the credit is obtained to supplement the income to meet routine and some occasional expenditure of the household including investment, social needs and other unforeseen situations. Credit is obtained from formal (banks/institutions) and informal sources (friends, relatives, land owners etc.). Mostly people do not like to get credits from the government saying that the mark up rate is very high.

#### 5.4.6 Access to Social Amenities

Generally, in the project area, drinking water is available to the population. In the survey it was noted that along the project corridor, the major sources of drinking water were "hand pumps, wells/electric motor, tube wells, electric wells (motor) etc.

Table 5.4: Access to Social Amenities along the Project Corridor (Percentage)

Social Amenities	Available	Satisfactory	Non Satisfactory	No Access
Electricity	100	20	77	1
Sui Gas	75	36	37	23
Water Supply	0	0	0	100

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Telephone	65	12	24	64
Sewerage/Drainage	47	7	33	49
Health Unit	99	13	87	1
School	99	43	56	0

#### 5.4.7 Women Participation and Decision Making

During survey, it has been disclosed that the women participation in household activities, child caring and local representative varies from 60 to 70%, whereas in decision making she is not given so much weighted. In rest of the activities, her share remains from 20 to 40%. Therefore it is quite clear, there is such remote districts women participation is not upto the desired international standards.

**Table 5.5: Women Participation and Decision Making (Percentage)**

Activities	Participation	Decision Making
Household Activities	75	72
Child Caring	75	70
Farm/Crop Activities	34	17
Livestock Rearing	34	28
Sales & Purchase of Properties	38	17
Social Obligations	69	63
Local Representation	68	44

#### 5.4.8 Perceptions of Respondents for Action associated with the Project

During field survey, it has been observed that the overall benefits of the project are much more and nearly about 100 percent plus points go in favor of the project.

**Table 5.6: Perceptions of Respondents for Action associated with the Project (Percentage)**

Perceptions of Respondents	Increase	Decrease
Employment Opportunities	99	0
Marketing Facilities	100	0
Living Standard	100	0

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Unemployment	0	100
Income Generating Activities	100	0
Rehabilitation Works	100	0
Mobility	100	0

#### 5.4.9 Gender Analysis and Issues

Overall about one-half (49.0 percent) of the total population are women. Women are participating to alleviate poverty and enhance economic growth and human well-being of the households. Women participation relating to the income generation/development activities and decision-making remained commendable with respect to the different development projects/ program such as:

It can be concluded that along the project corridor the women are heavily involved in several households and income generation activities. Some of the major activities are as below:

- a) Agricultural/Farming Activities - Wheat harvesting, rice transplanting, harvesting and threshing, and vegetables picking.
- b) Livestock rearing - Collection of fodder, grazing, washing buffaloes, processing the milk products.
- c) Poultry - Cleaning cot, supervise hatching, feeding & health care.
- d) Other Activities - washing clothes, fetching water, cooking, child caring, cleaning and repairs of household items, participation in social obligations/ gathering etc.

An effort was made during the field survey to explore the potential for the women development. Women were of the view that along with the execution of the project some supplementary works be undertaken to establish some cottage industries in the area, which could have a significant positive impact on the women development. Some of the preferable cottage industries/ factories as identified by the local women are as below:

- 1. Garments (Hosiery)
- 2. Textile
- 3. Stitching, Lock & Embroidery
- 4. Carpet manufacturing

Thus keeping in view the above discussion regarding women development in the project

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area, their role should not be underestimated. Furthermore, the women activists after providing necessary training and capacity building can facilitate the rural women/ women-farmers in the following activities:

- a) Interaction/coordination & understanding amongst the women
- b) Social /community mobilization, training & capacity building of women
- c) Upfront contribution for the installation of some income generation small projects like cottage industries along with the project activities
- d) Fund raising for the community development
- e) Educating to other women to make the best use of available resources
- f) Enhance the household savings and investment on some development works in the area.
- g) There is a need to address gender-related issues at all levels of the project design, implementation and operation.

## **5.5 STRUCTURES AND POTENTIAL AFFECTEES**

In the social assessment survey, the inventory of structures including houses, business shops, public and social infrastructure, etc. located within the COI and ROW was recorded.

## **5.6 SOCIO ECONOMIC SURVEY**

The categories of stakeholders which are not directly located inside the project area have also been interviewed. They include farmers, tenants, labourers, vendors, drivers, students, shop keepers and females etc.

## **5.7 GENERAL CONCERNS DURING CONSULTATION**

The public expressed their views. The main concerns enlisted below:

- a) Overtime allowance should be doubled for the workers
- b) Arrangements should be made to control the noise and air pollution by providing suitable measures.
- c) There should be free health facilities for workers against all diseases.
- d) Trees should be planted in the facility premises.
- e) Salary of workers may be raised according to the market inflation.

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- f) Special allowance may be paid to workers for this laborious work.
- g) Salary of workers should be paid 5 days before end of month so that we can pay utility bills in time.
- h) Women jobs should be provided specially in less laborious works like office etc.
- i) Measures should be provided for workers to against the diseases.
- j) Special allowance may be paid to workers in Eid and other special occasions.
- k) Education should be provided free for workers' children.

## **5.8 CULTURAL AND RELIGIOUS STRUCTURES**

No such site is located near the design of the project.

## **5.9 INDIGENOUS AND WOMEN HEADED HOUSEHOLDS**

During the social field survey of the project, efforts were made to identify the indigenous and women headed households along the Project corridor. But no indigenous group of people was identified which comes under the definition of "Indigenous People"

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## **Chapter 6**

# **Environmental Impact Assessment and Mitigation Measures**

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## CHAPTER - 6

### ENVIRONMENTAL IMPACTS ASSESSMENT AND MITIGATION MEASURES

#### 6.1 GENERAL

This Chapter identifies the potential impacts due to the implementation of the project on the physical, ecological and social environment. The chapter also identifies measures that will help to mitigate the project's adverse environmental effects and enhances positive impacts.

#### 6.2 LAND RESOURCES

This section explains how the proposed project will affect the land use, soil erosion and contamination, and describes mitigation measures to manage these impacts.

##### 6.2.1 Impact on Land Use and Resources

###### *A. Land Productivity and Use*

Open pits containing water are potential sources of mosquito breeding if left stagnant, and can create health problems.

##### 6.2.2 Mitigation Measures

The mitigation measures, which will be carried out in design stage, construction as well as operation stages for land resources are as under:

###### *A. Land Productivity and Use*

- a) As far as possible, waste/barren land i.e. areas not under agricultural, residential or forestation use, and natural areas with a high elevation will be used for borrow material.
- b) The excavation of earth fill will be limited to an approximate depth of 50 cm. This practice will be applied uniformly across the entire extent of the land unit acquired for borrowing earth material.

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### **B. Soil Contamination**

The following practices will be adopted to minimize the risk of soil contamination:

- a) The proponent will be required to instruct and train their workforce in the storage and handling of materials potentially cause soil contamination.
- b) Solid waste generated during construction and at campsites will be properly treated and safely disposed of only in demarcated waste disposal sites.

Proper solid waste storage will be adopted for the project such as:

- a) All garbage or other waste should be securely wrapped in similar material bags.
- b) All cans, bottles, or other food containers would be rinsed free of food particles and drained before being placed in collection containers.
- c) Collection containers should be kept tightly sealed or covered at all times. Solid waste must not protrude or extend above the top of the container.

### **C. Primary Collection**

The solid waste from the area would be collected by the staff arranged by Proponent. The staff would be made readily available on call.

### **D. Public Awareness**

For a safe and systematic disposal of Solid Waste, the public awareness can play a vital role. Press releases, seminars, social organizations and ground breaking ceremony can be the major sources of public awareness. All such type of public awareness sources for safe and systematic disposal of solid waste should be used.

## **6.3 WATER RESOURCES**

This section explains how the proposed project will affect the water resources use, contamination of water bodies and groundwater, siltation of surface water resources and alterations in drainage pattern; the section also describes mitigation measures to manage these impacts.



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### 6.3.1 Impact on Water Resources

The surrounding land's drainage system and water resources will be affected by construction activities as follows:

#### *Contamination of Surface and Ground Water Resources*

- a) During operation stage, disposal of wastewater into natural streams/canal will deteriorate the surface water quality.
- b) Seepage of polluted water during monsoon season through garbage areas will deteriorate the groundwater quality during operation stage of the Project.

### 6.3.2 Mitigation Measures

Measures to mitigate the adverse impact on water resources and surface drainage patterns will be incorporated into the project design and are discussed below:

#### *A. Use of Local Water Supplies*

- a) In the project area, prior to start of construction activities, the availability of water will be assessed to evaluate the impacts on the community resources. A tube well will be installed for the purpose.
- b) No existing water resources under the use of community will be exploited by the Contractor for construction purposes without consultation with concerned community.

## 6.4 AMBIENT AIR QUALITY AND NOISE LEVEL

This section discusses the impact of the construction and operation on the ambient air quality and noise levels in the proposed Project Area. It also describes the mitigation measures to manage these impacts.

### 6.4.1 Impacts during Construction and Operation Stages

#### *Ambient Air Quality*

Air quality will be affected by the fugitive dust and emissions from the construction machinery during the construction phase. Emissions may be carried over long

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distances, depending on wind speed and direction, the temperature of the surrounding air, and atmospheric stability.

### **Noise Level**

Noise generated by the construction machinery during the project construction and subsequently by vehicular traffic during operation stage is likely to affect the project area particularly the sensitive receptors like schools, hospitals etc. However, no sensitive receptor has been observed within the project area.

## **6.4.2 Mitigation Measures**

The following measures will be implemented to mitigate the impacts on the ambient air quality and noise level:

### **Ambient Air Quality**

- a) Vehicles and other construction machinery should be properly tuned and maintained, so as not to emit any smoke.
- b) The NEQS applicable to gaseous emissions generated by the construction vehicles, equipment and machinery will be enforced during the construction works.

## **6.5 BIOLOGICAL ENVIRONMENT**

The impact on flora and fauna and corresponding mitigation measures are described in the following paragraphs:

### **6.5.1 Impacts on Flora and Fauna**

- (a) Flora

#### **Trees & Shrubs**

The mill has fewer trees and has walled boundary. The trees existing in the area are Shisham, Kikar, Eucalyptus etc. The selected area is devoid of shrubs.

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**(b) Fauna**

The existing sugar mills is walled and surrounded by village settlement and road. Therefore, there will be no adverse affect on their existence as they have already vanished.

**6.5.2 Mitigation Measures**

**(a) Flora**

***Trees and Shrubs***

The plantation programme for the vacant sites which are mentioned on the design has been prepared and which will be implemented.

**(b) Fauna**

As already mentioned, there will be no affect on fauna of the area.

**6.6 SOCIOECONOMIC AND CULTURAL ENVIRONMENT**

This section describes the impact of the proposed Project on local communities, construction workers, indigenous and vulnerable people as well as on structures or sites of cultural and religious significance.

**6.6.1 Social Impacts**

**(a) Impacts on Local Communities/Workforce**

- a) Community will have to face the noise and dust problems during the construction phase and air and noise emissions during operation stage.
- b) Pollution of community resources during construction and operation stages.

**(b) Gender Issues**

As the project area lies close to the rural areas and rural community, women activities in the field may become affected due to the construction activities.

**(c) Indigenous, Vulnerable and Women Headed Households**

During the social field survey of the project, no indigenous group of people was identified. So, no impact on the indigenous people is envisaged due to the implementation of the project.

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**(d) Safety Hazards**

Occurrence of accidents/incidents during the construction and operation stages may occur to the workers.

**(e) Religious, Cultural and Historical Sites**

No such site will be adversely affected.

**(f) Sensitive Areas, Game Forest Reserves**

No such area exists in the vicinity.

**6.6.2 Mitigation Measures**

**(a) Local Communities/Workforce**

The presence of migrant construction workers inevitably causes some degree of social unease and even active disputes with the local community as a result of cultural differences. Potential social conflict will be contained by implementing the measures listed below:

The Proponent will be required to maintain close liaison with the local communities to ensure that any potential conflicts related to common resource utilization for the project purposes are resolved quickly.

Proponent will take care of the local community and sensitivity towards the local customs and traditions will be encouraged.

Effective construction controls by the Proponent to avoid inconvenience to the locals due to noise, smoke and fugitive dust.

**(b) Loss of Income**

No such problem is foreseen. Rather income source will increase.

**(c) Gender Issues**

The Proponent will have to select the specific timings for the construction activities so as to cause least disturbance to the local population particularly women considering their peak movement hours.

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**(d) Indigenous, Vulnerable and Women Headed Households**

As referred earlier, no indigenous people have been identified in or along the Project corridor, so no mitigation is required.

**(e) Safety Hazards**

Complying with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62, as far as applicable to the project.

Training of workers in construction safety procedures, environmental awareness, equipping all construction workers with safety boots, helmets, gloves, and protective masks, and monitoring their proper and sustained usage.

Contractor will ensure the provision of medicines, first aid kits, vehicle, etc. at the site.

A contingency plan will be prepared by the Contractor to handle any abnormal situation like fire, storm, etc.

**(f) Relocation of Private/Public Infrastructure**

No such issue will arise.

**(g) Religious, Cultural and Historical Sites**

No such site is located in near vicinity of proposed site.

## **6.7 ENVIRONMENTAL AND SOCIAL EMERGENCY CONTINGENCY PLAN**

To cater for the environmental and social issues during construction stage, special emergency contingency plan will be prepared by the Contractor at construction and operation stages respectively. The plan will be prepared for the following main items:

- a) Availability of ambulance, first aid box, etc at project site for carriage of workers to the hospital in case of any accident/incident.
- b) For firefighting arrangements during construction and operation stages in case of any emergency.
- c) Arrangements for leakage of any hazardous emissions/gasses from unit during operation stage.

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d) Arrangements to cater for any storm or natural disaster like earthquake, etc.

e) Arrangements for any safety and security risks, etc

## **6.8 ENVIRONMENTAL IMPACTS ASSESSMENT DURING OPERATION PHASE**

This section discusses the potential impacts from regular operation of the proposed power plant and associated facilities on the natural resources and environment of the site and vicinity. Power plants invariably have potential for environmental impacts during the operational phase of the project.

During the operational phase the following impacts are normally of significance:

- Air quality impacts
- Landscape / Ecological impacts
- Impacts associated with the abstraction and discharge of water
- Impacts arising from solid waste management
- Noise and vibration impacts
- Soil, groundwater and surface water contamination
- Accidents/explosions
- Socio economic impacts

For the purpose of evaluating the impacts from the proposed project, National Environmental Quality Standards (NEQS) Pakistan will be used.

National Environmental Quality Standards (NEQS) Pakistan are presented in Annexure – 3

### **Anticipated impact**

Landscape

### **Mitigation Measures**

1. 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 climate requiring just minimum water to survive.

### **Anticipated impact**

Ambient Air Quality

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The combustion of fuels for power generation inevitably results in emission of gaseous pollutants to the atmosphere. The pollutants of potential concern are sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>) and particulate matter (PM).

In general, the most significant emissions from the combustion in boilers of the proposed project are sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), carbon dioxide

(CO<sub>2</sub>) and particulate matter. Smoke and carbon monoxide (CO) are much less problematic as developments aimed at improving combustion efficiency in the boilers have also addressed these pollutants.

### **Mitigation Measures**

1. Continuous monitoring of ambient air for SO<sub>2</sub>, NO<sub>x</sub>, CO and PM to be carried.
2. Height of the stacks to be maintained at 100 meters, as indicated in the project feasibility report, for enhanced dispersion of pollutants.

### **Anticipated impact**

Surface Water

### **Mitigation Measures**

1. Waste water treatment, as described in this report, to be carried out continuously and monitored before mixing with water in the recipient water body.

### **Anticipated impact**

Ground Water

### **Mitigation Measures**

1. Regular inspection of facilities for intercepting leaking and spilled liquids.
2. Hazardous chemicals (if any) shall be handled only in appropriate segregated, sealed and bundled areas at site.

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### **Anticipated impact**

Solid Waste

### **Mitigation Measures**

1. 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.
2. 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 environmentally sustainable way.

### **Anticipated impact**

Noise

### **Mitigation Measures**

1. Equipment will be acoustically shielded and /or lagged as far as possible.
2. Workers will be obliged to use ear protection in areas within the plant and for specific work that exceed the tolerable maximum noise limits.

### **Anticipated impact**

Coal Bagasse Handling

### **Mitigation Measures**

1. Adequate measures, will be adopted to eliminate the possibility of generation of coal & bagasse dust during handling, conveying and storage.
2. Coal handling at the port; including its unloading and transferring to the trucks for shipment to the project site should be done with extreme precautions to avoid any fugitive dust and spillage to the sea or on land. Internationally operative best practices including maximum reduction of distances between the conveyor belts and its upper cover should be adopted. Keep minimum drop distances at off loading coal from ships & trucks as well as at the stacking point. This will drastically reduce fugitive coal dust



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3. In order to avoid any damage to the sea water quality from the vagrant coal occasionally falling into it through the narrow gap between the rail of the barge and the dock, regular surveillance should be carried out. In case excessive piling of such vagrant coal on the sea bed is found then it should be salvaged.

#### **Anticipated impact**

#### **Ash Disposal**

#### **Mitigation Measures**

1. Adequate measures for collection, loading, transporting, unloading and storage of fly ash and bottom ash should be adopted to ensure minimum possible emissions of ash and dust, and reduction of its adverse impact on environment. In order to reduce fugitive dust, drop distances at trucks ash loading points and unloading points should be minimized. During transport of the ash from point of transfer to the unloading point, the trucks/trolleys should be adequately covered preferably with tarpaulins and on surface spray of water, if possible with further help to reduce fugitive dust. Workers to perform duties relating to ash handling should be protected by providing them all necessary protective gears and their use should be made mandatory.

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## **Chapter 7**

# **Environmental Management Plan**

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## Chapter - 7

### ENVIRONMENTAL MANAGEMENT PLAN

#### 7.1 GENERAL

This chapter deals with the policy framework for environmental management and monitoring. This also discusses that Client will be responsible for implementing and/ or monitoring the environmental mitigation actions.

#### 7.2 ENVIRONMENTAL MANAGEMENT PLAN

##### 7.2.1 General

Before implementation, every project has to obtain environmental clearance from the appropriate quarters of the Environmental Protection Agency (EPA). The letter of environmental clearance is to be seen as a conditional agreement between the project proponent and the EPD, wherein the project proponent declares that all care would be taken to avoid causing unnecessary damage to the ambient environment while implementing the given project and the EPD accepts it. The Environmental Management Plan (EMP) is vital so that the project proponent may provide a concrete and comprehensive plan and adequate budget for environmental management. This plan should state the procedure and the manner in which the project proponent would carry out the management of environment in the context of the given project.

Keeping in view the objectives, the Environmental Management Plan has been prepared that summarize the adverse environmental impacts of the Project and measures required to mitigate such impacts and to enhance the benefits of the Project. These have been expressed in the light of discussions on various aspects given in relevant Chapter. More specifically the EMP includes the following components:

- (a) Environmental Impacts;
- (b) Proposed mitigation and enhancement measures;
- (c) Organization responsible for implementing the EMP items;
- (d) Monitoring requirements and;
- (e) Organization responsible for monitoring.

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Environmental protection and enhancement are achieved in various ways. Generally speaking, these aspects need to be addressed right from the embryonic stage, i.e., i) design, specifications and tender/contract documents, ii) pre-construction phase, iii) construction activities and iv) post-completion O&M. Appropriate environmental management measures are required to be exercised in a cascading order by Client at each stage of the project.

In this way it is envisaged that the project will achieve maximum ongoing cost-effectiveness, environmental sustainability and social soundness. All stages of the project would be managed by adopting proposed environmental mitigation measures,

The crucial issues that need addressing at various stages of the project development are given in the subsequent paragraphs.

#### **7.2.2 Design Related Issues**

It is envisaged that besides considering the detail design from engineering point of view the contractors will also be reviewing and incorporating the environment related aspects.

#### **7.2.3 Drainage Aspects**

It is desirable that the drainage aspects should not only be considered from the angle of protection of building but also be reviewed from environmental standpoint. It should be ensured that appropriate drainage structures of adequate capacities are provided to avoid flooding.

#### **7.2.4 Construction Related Impacts**

The environmental and social issues relating to the construction activities and mitigation measures, therefore, have been discussed in **Chapter 6**. These have also been identified in **Table 7.1**.

#### **7.2.5 Operational and Maintenance Activities and Related Impacts**

Design and construction related activities are pursued within a pre-defined time frame. The quantum, magnitude and methodology of such like activities had made many transformational changes due to newly emerging modes of mitigation system.

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### **7.3 ADJUNCT MEASURES FOR ENVIRONMENTAL ENHANCEMENT**

#### **7.3.1 Public Participation and Awareness**

The inclusion of environmental considerations in this sector is a new initiative in Pakistan. Masses are largely unaware of environmental functions, and the value of environmental protection. They will pay more attention to erosion and the role of trees, or the woodland plantations. During a recent amendment in Environmental Protection Act 1997 GoP has made the community participation mandatory at all stages of project development<sup>1</sup>.

Public awareness is achieved through employing a number of tools, i) participation at the required levels of involvement in the process of decision making, ii) consultative dialogues, iii) publicity campaign, primarily through signboards and regional drama troupe giving performances in environmentally oriented stage plays and iv) through community based organizations. Graphical and visual media are preferred, rather than print media, for the reasons of its powerful visual impact and circumvention of illiteracy.

#### **7.3.2 Natural Resource Management and Environmental Conservation**

Natural Resource Management (NRM) is being conducted at different levels of the government in accordance with their placement in the list of constitutional responsibilities. Some unlisted residual resources are being placed under provincial resources. The provinces, in turn, have delegated some responsibilities to local bodies and other provincial agencies, through specific local bodies ordinances and specific legislative measures. During the recent era, the assignment of these responsibilities has been undergoing an evolutionary process, commonly known as "Devolution Plans", which have been assigned to various federal and provincial departments.

It was in 1974 that GOP realized about environmental conservation when Environmental and Urban Affairs Division (EUAD) was established. Due to growing global and national concerns, in 1983 a higher mandate was awarded to yet another organization, i.e. Pakistan Environmental Protection Agency (PEPA), which is making positive contributions till this day.

### **7.4 ENVIRONMENTAL MONITORING**

In the light of pre-determined criteria, NEQS and EPA rules, monitoring will be conducted at construction and maintenance stages to include, i) atmospheric conditions, ii) noise levels, iii) water quality and iv) soil contamination.

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<sup>1</sup> Gazette Notification No.SRO 339 (1)/2000 of 15 June 2000, Clause 10

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Through monitoring Client's capacities for overseeing and evaluating environmental impacts at all stages of the project will be enhanced.

However, adoption of proposed mitigation measures at each project stage, in itself, will ensure healthy environments for all stakeholders. These approaches include followings:

- Design must have environment friendly orientation, covering its all allied aspects, including protection, conservation and enhancement of green foliage.
- Public awareness is an on-going campaign, starting from construction right through operations. Initiating a consultative dialogue with the respective stakeholders and imparting environmental education can achieve it. Due to low literacy levels of rural masses, the latter can be achieved through publicity campaign by adopting cost-effective techniques of visual graphics.

## **7.5 ENVIRONMENTAL MONITORING PLAN**

### **7.5.1 General**

Environmental monitoring programme is an integral component of an environmental management plan. It will comprise three phases. Phase-I of the monitoring plan will cover the pre-construction phase. This will be implemented in association with concerned agencies. Phase 2 of the monitoring plan will cover the construction phase and will be implemented by the contractor through approved monitoring agency under the supervision of the Client. The monitoring will also ensure that the contractor has fulfilled his obligations as contained in the EMP. Phase 3 will cover the operation.

The major objectives of the pre-construction and construction phase monitoring plan are:

- i) To ensure effective implementation of EMP.
- ii) To monitor actual impacts on physical, biological and socio-economic receptors. These will be used to evaluate the adequacy of IEE.
- iii) To suggest appropriate mitigation measures for any impacts not anticipated in the IEE or where levels exceed the anticipated values.
- iv) To ensure compliance with legal and community obligations, if any.
- vii) Plantation of trees, ornamental bushes.

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The operational phase monitoring (Phase 3) will be a long-term plan and will be the responsibility of the proponent. The primary objectives are:

- i) to evaluate the performance of mitigation measures proposed in the EMP;
- ii) to evaluate the adequacy of IEE with respect to predicted impacts;
- iii) to suggest improvements in the EMP, if needed;
- iv) to monitor the survival rate of plantations

However, the detailed programme for specific issues is discussed in subsequent paragraphs.

### **7.5.2 Performance Indicators**

Effective monitoring of the EMP can be achieved by evaluating the parameters that have a significant impact on the social, physical, environmental and biological resources. These parameters may be termed as Performance Indicators, which for the current project are listed below:

- Ambient air quality – PM<sub>10</sub>, CO, NO<sub>x</sub>, HC and SO<sub>2</sub>
- Water Quality – TDS, TSS, COD, Oil and grease, chloride, lead, zinc, and cadmium
- Noise Levels
- Soil Quality – Lead, chromium, cadmium, hydrocarbons
- Tree plantation and survival rate

### **7.5.3 Ambient Air Quality Monitoring**

Important air quality parameters with respect to project are particulates (PM<sub>10</sub>), carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), hydrocarbons (HC), sulphur dioxide, and lead.

### **7.5.4 Water Quality Monitoring**

The physical, chemical, and bacteriological parameters of water quality that need to be monitored through the construction and operation phases include pH, total solids, total dissolved solids, total suspended solids, oil and grease, BOD, COD, chlorides, lead, zinc, cadmium, total coliforms, and fecal coliforms. The purpose of this monitoring is to ensure that:

- i) water abstracted for drinking purposes conforms to the relevant drinking water quality standards/guidelines;

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- ii) water being used in construction, including sprinkling, is of quality approved by the engineer;
- iii) there is no deterioration in quality of surface and groundwater due to leakages, spillages, accidents etc., during construction activities and later due to operation; and
- iv) There is no deterioration in the quality of surface and ground waters due to disposal of liquids and solid wastes at the construction camps.

In so far as the drinking water quality is concerned Pakistan does not have national standards and the current practice in the country is to follow WHO Guidelines.

#### **7.5.5 Noise Measurements**

Noise is an environmental pollution of significant concern during the construction as well as operation phases of the project. It needs to be regularly monitored as detailed in the Monitoring Plan (Table 7.1)



Table 7.1: ENVIRONMENTAL MONITORING PLAN

Environmental Component	Project Stage	Parameters	Special Guidance	Standards	MONITORING			Institutional Responsibility
					Location	Frequency	Duration	
Air	Pre-Construction	PM <sub>10</sub> SO <sub>2</sub> NO <sub>x</sub> , CO, HC, O <sub>3</sub>	Monitoring at pollution source	NEQs	Project site	Quarterly	Continuous 24 hours/or for 1 full working day	Contractor through approved monitoring agency
	Construction Stage	PM <sub>10</sub> SO <sub>2</sub> NO <sub>x</sub> , CO, HC, O <sub>3</sub>	High volume sampler	NEQs	Project site	Quarterly	Continuous 24 hours or for 1 full working day	Contractor through approved monitoring agency
		PM <sub>10</sub>	High volume sampler	NEQs	Project Site	Quarterly	Continuous 24 hours/or for 1 full working day	Contractor through approved monitoring agency
	Operation Stage	PM <sub>10</sub> SO <sub>2</sub> NO <sub>2</sub> , CO, HO	Monitoring at pollution source	NEQs	Project site	Quarterly	Continuous 24 hours	Proponent

Environmental Component	Project Stage	Parameters	Special Guidance	Standards	MONITORING			Institutional Responsibility
					Location	Frequency	Duration	
Water Quality	Pre-Construction	pH, BOD, COD, TDS, TSS, DO, Oil & Grease, Pb, Chlorides, zinc, cadmium, total coliforms, and faecal coliforms	Grab sample collected from source and analyze as per Standard Methods for Examination of Water and Wastewater	WHO Drinking Water quality Guidelines	Project site	Quarterly	-	Contractor through approved monitoring agency
	Construction stage	pH, BOD, COD, TDS, TSS, DO, Oil & Grease, Pb, Chlorides, zinc, cadmium, total coliforms, and faecal coliforms	Grab sample collected from source and analyze as per Standard Methods for Examination of Water and Wastewater	WHO Drinking Water quality Guidelines	Project Site	Quarterly	-	Contractor through approved monitoring agency

Environmental Component	Project Stage	Parameters	Special Guidance	Standards	MONITORING			Institutional Responsibility
					Location	Frequency	Duration	
Noise Levels	Operation stage	pH, BOD, COD, TDS, TSS, DO, Oil & Grease, Pb, Chlorides, zinc, cadmium, total coliforms, and faecal coliforms	Grab sample collected from source and analyze as per Standard Methods for Examination of Water and Wastewater	WHO Drinking Water quality Guidelines	Project site	End of summer before the onset of monsoon every year.	-	Proponent
	Pre-Construction	Noise levels on dB(A) scale	Equivalent noise levels using an integrated noise level meter	WHO Noise Guidelines.	Project site	Quarterly	-	Contractor through approved monitoring agency
	Construction Stage	Noise levels on dB(A) scale	Equivalent noise levels using an integrated noise level meter	WHO Noise Guidelines PEPA	Project site	Quarterly	-	Contractor through approved monitoring agency
	Operation Stage	Noise levels on dB(A) scale	Equivalent noise levels using an integrated noise level meter	WHO Noise Guidelines.	Project site	Once every year.	-	Proponent

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## **Chapter 8**

# **CONCLUSION AND RECOMMENDATIONS**

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## CHAPTER - 8

### CONCLUSIONS AND RECOMMENDATIONS

#### 8.1 CONCLUSIONS

Based on the Preliminary Design, environmental and social field surveys, and impacts assessment of the proposed Project, it may be concluded that although there are some significant negative impacts but would be of short term during the construction stage. However, there are a few negative impacts that would be expected during the operational stage but their intensity can be reduced by taking appropriate measures. The environmental issues related with the Project Activities are summarized as under:

##### Environmental Impacts

During operation stage, disposal of waste will become a problem. Therefore, proper mitigations may be adopted in the preliminary design including safe and environmental friendly disposal of solid waste.

##### Physical Impacts

Physical impacts like soil contamination, water contamination, air pollution, high noise level, etc. are of temporary nature during the construction stage. However, during the operational stage by adopting abatement technologies such as air bags or cyclones and development of buffer zones and green areas intensity of negative impacts can be minimized.

##### Biological Impacts

No forest area or wildlife sanctuary exists within the vicinity of the Project Area, which may be affected by the Project. Few reptiles like lizards and snakes and few birds like Mynah and house sparrows will be disturbed by the Project activities and may have to move into nearby areas. This will be a temporary insignificant impact. Anyhow the blank area is to be covered with green trees so project site will not give barren look.

##### Social Impacts

The other social issues like safety of general public and workers, security problems, community accessibility issue, women accessibility to fields for their daily routine life etc. will be of temporary nature.

## 8.2 RECOMMENDATIONS

Although comprehensive mitigation measures have been proposed in the report to minimize the negative impacts and to enhance the positive impacts of the Project, however, major recommended mitigation measures are summarized as under:

1. Water contamination, air pollution and high noise levels will be controlled with the use of good engineering practices.
2. Proponent will take due care of the local community and its sensitivity towards local customs and traditions.
3. Environmental Management Plan proposed will be implemented in the true spirit.
4. The machinery will be maintained well for good efficiency.
5. Safety signs or boards will be placed wherever needed within the premises of the project.
6. Personal Protective Equipments will be provided and ensured that they are used by the workers during working hours.
7. Proper measures will be taken to control the air emission or high noise levels.
8. High temperature zones will be highlighted.
9. Transportation vehicles will be maintained and tuned well.
10. No parameters above NEQS will be allowed in any case.
11. The parameters of the effluent will be within the permissible limits defined in the NEQS.
12. Regular monitoring and auditing will be taken by the management to ensure the compliance of all the mitigation measures.

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13. Plantation will be done at the project site and the barren areas will be turned grassy.
14. Workers working near the noise generating machines will be strictly required to use ear muffs/ plugs.
15. Fire extinguishers or firefighting equipment will be provided at well notified specific points.
16. Fire evacuation sites will be properly mentioned to control all types of emergency situations.
17. Good housekeeping will be ensured by the management.
18. First aid medical facility will be provided at the project site.