Prefeasibility Report

Proposed 60 KLPD Grain Based Distillery

Pernod Ricard

Pernod Ricard India Pvt. Ltd.

VILLAGE KARORA, TEHSIL BEHROR, DISTT ALWAR, RAJASTHAN

Content

1. Executive summary

PernodRicard India Private Limited (PRIPL) isproposing Modernization and capacity expansion of existing 22 KLPDGrain based distillery to 60 KLPD by installing modernized plant based on latest technologies for Grain distillery with advanced effluent tretment schemes with DWGS Dryer.

PRIPL have existing 22 KLPD Grain based at Village Karora, Tehsil Behror, Distt Alwar, Rajasthan. The plant was setup in the y 1997/98. At present, the plant operation is unviable due to higher operating cost, lesser efficiencies and non-availability of byproduct like DDGS.

Also over the years the effluent treatment schemes have been upgraded which facilitate to recycle, reuse more water. Now days DWGS dryer play major role in viability of Grain distillery and become an important part of Grain distillery.

Grain requirement for the proposed project will be **160 MT/day**. The area around distillery grows bajara,Jowarand paddy the raw material is available from the nearby area.

2. Introduction

2.1 Project proponent

Pernod Ricard is world leaders in the wines and premium Spirits Industry. It operates in more than 85 affiliates and 100 production sites. Pernod Ricard has chosen to focus on sustainable growth through a large portfolio of international brands and a high end strategy, of premiumisation.

Pernod Ricard India Private Limited (PRIPL) proposes Modernization and capacity enhancement to 60KLPD grain distillery plant at village Karora, Tehsil Behror, Distt Alwar, Rajasthan. Due to emerging market for Extra Neutral Alcohol in the state of Rajasthan and the potable market in the adjoining states, it is proposed to modernize and expansion of existing distillery

2.2 Nature of the project

Proposed production of 60 KLPD distilleries with 2 MW captive power Generation plant will be based on grain as the basic raw materials. Other raw material will be used as grains, water, antifoam agents, urea and H_2SO_4, enzymes. Rice husk /coal/Natural gas will be used as fuel in Boiler

The distillery proposes to achieve zero discharge by decantation, multi effect evaporation followed by DWGS dryer and the entire spent wash shall be used to achieve zero discharge.

2.3 Need of the Project

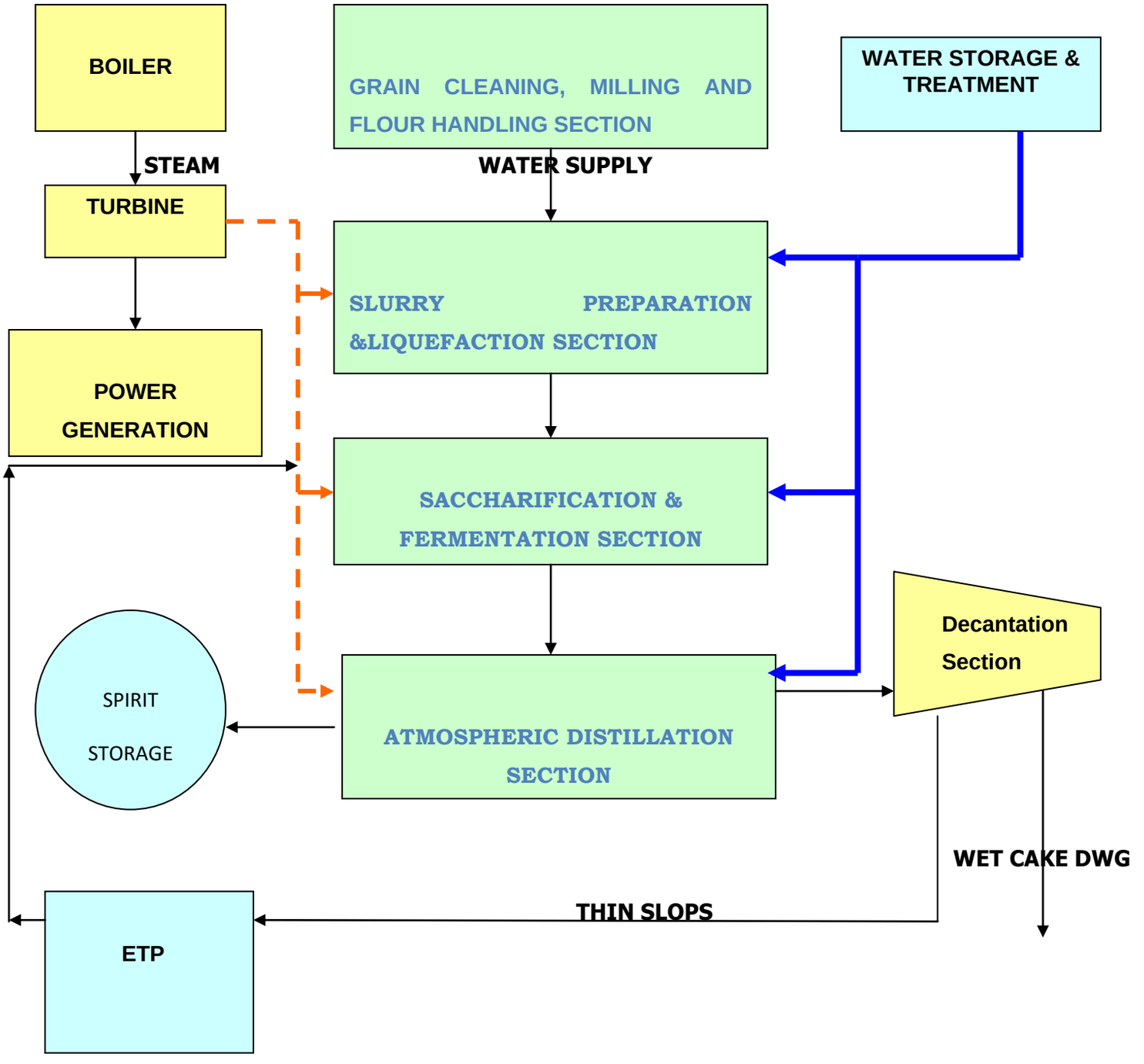
Alcohol production in the country has been lagging behind around 1500-1700 million liters per annum. Ethyl alcohol, alcohol, ethanol, spirit, denatured spirit etc., these are various descriptions for this agriculture-based product. It is a globally traded commodity and finds its way in pharmaceutical and chemical industries, across the world.

The company has existing 22 KLPD distillery installed in year 1996. The existing plant has higher cost of production of ethanol due to higher energy requirement and non-availability of Byproduct like DDGS.

The following table shows the difference in present energy consumption vs proposed energy consumption after modernization. Also existing scheme and proposed scheme has been described in following process flow diagram.

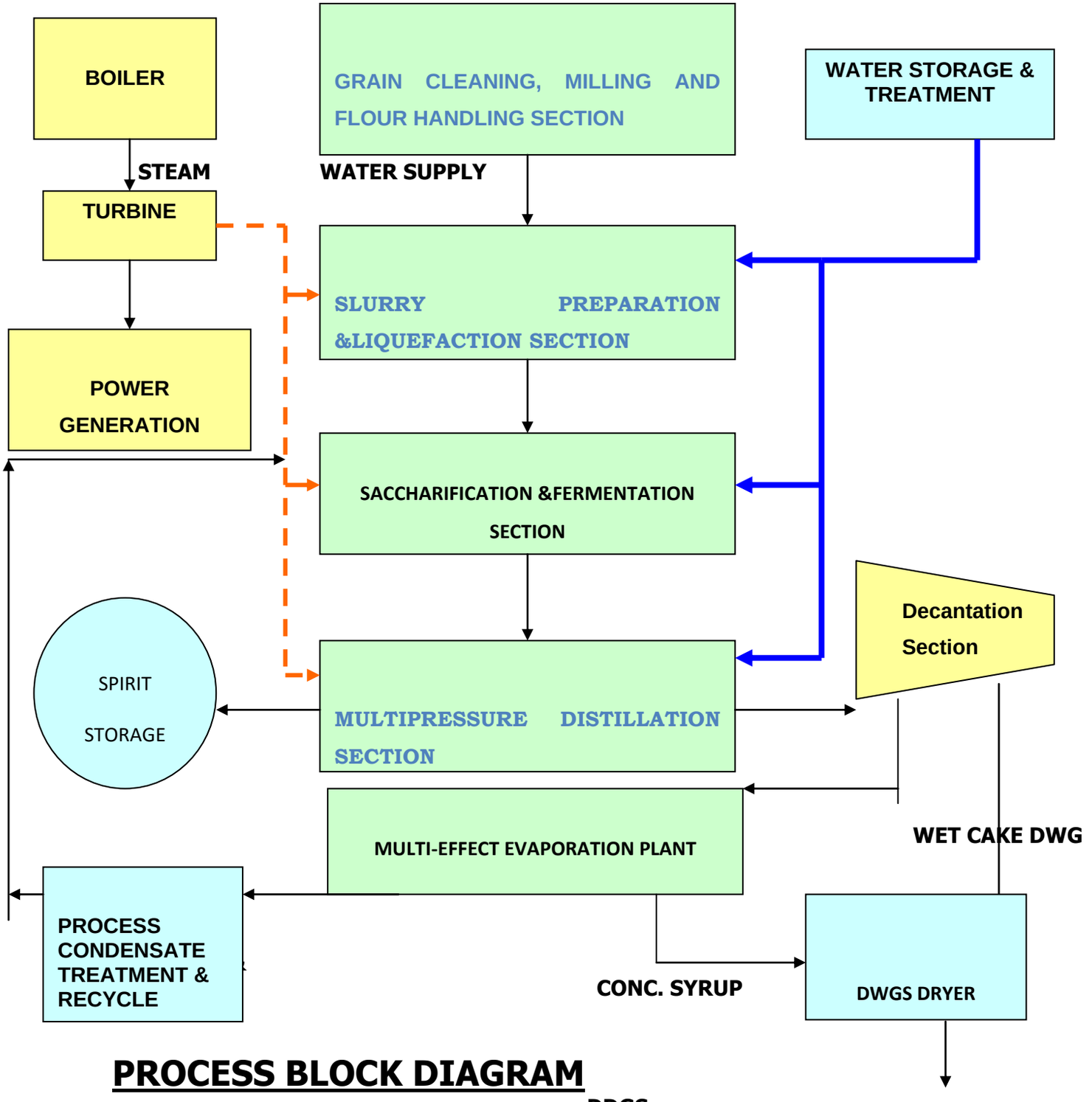
	Steam Consumption (Dry, Saturated):	Present Scheme	Proposed Scheme
	COOKING AND LIQUIFACTION	1.1 Kg/lit of TS	0.45 Kg/lit of TS
	DISTILLATION AND INTEGRATED EVAPORATION	5.5 Kg/lit of TS (without Evaporator, not available in present scheme)	2.8 Kg/lit of TS (With Multi effect integrated Evaporator))
	DWGS DRYER	NOT AVAILABLE IN PRESENT SCHEME	2.2 Kg/lit of TS
	TOTAL STEAM REQUIREMENT	6.6 Kg/lit of TS	5.45 Kg/lit of TS (With Multieffect Evaporator and dryer)

EXISTING PROCESS SCHEME



PROCESS BLOCK DIAGRAM

PROPOSED PROCESS SCHEME



PROCESS BLOCK DIAGRAM

2.4 Demand and supply gap

Alcohol has assumed very important place in the country's economy. It is a vital raw material for a number of chemicals. It has been a source of a large amount of revenue by way of excise duty levied by the Govt. on alcoholic liquors.

The present availability of alcohol cannot meet the entire demand. The alcohol industry situation in India is characterized by continued demand supply gap, despite capacity additions over the years. Quantitative information for demand and supply gap for the alcohol is given in Table 1.

Table 1: Demand and supply gap

		Alcohol production from			Total production	Total demand	Short fall
1.	2011-12	1677	55	30	1762	3123	1361
2.	2012-13	1719	185	60	1964	3312	1348
3.	2013-14	1823	370	90	2283	3515	1231
4.	2014-15	1934	740	120	2794	3731	937
5.	2015-16	2052	1300	150	3502	3964	462

2.5Employment generation (Direct)

The total man power required for the proposed distillery is around 220nos.

3. Project description

3.1 Type of the Project

The proposed based on fermentation of grain starch for producing rectified spirit/ENA/technical alcohol.

3.2 Location of the project

The project is located at village Karora, PO Barrod, Tehsil Behror, District Alwar, Rajasthan

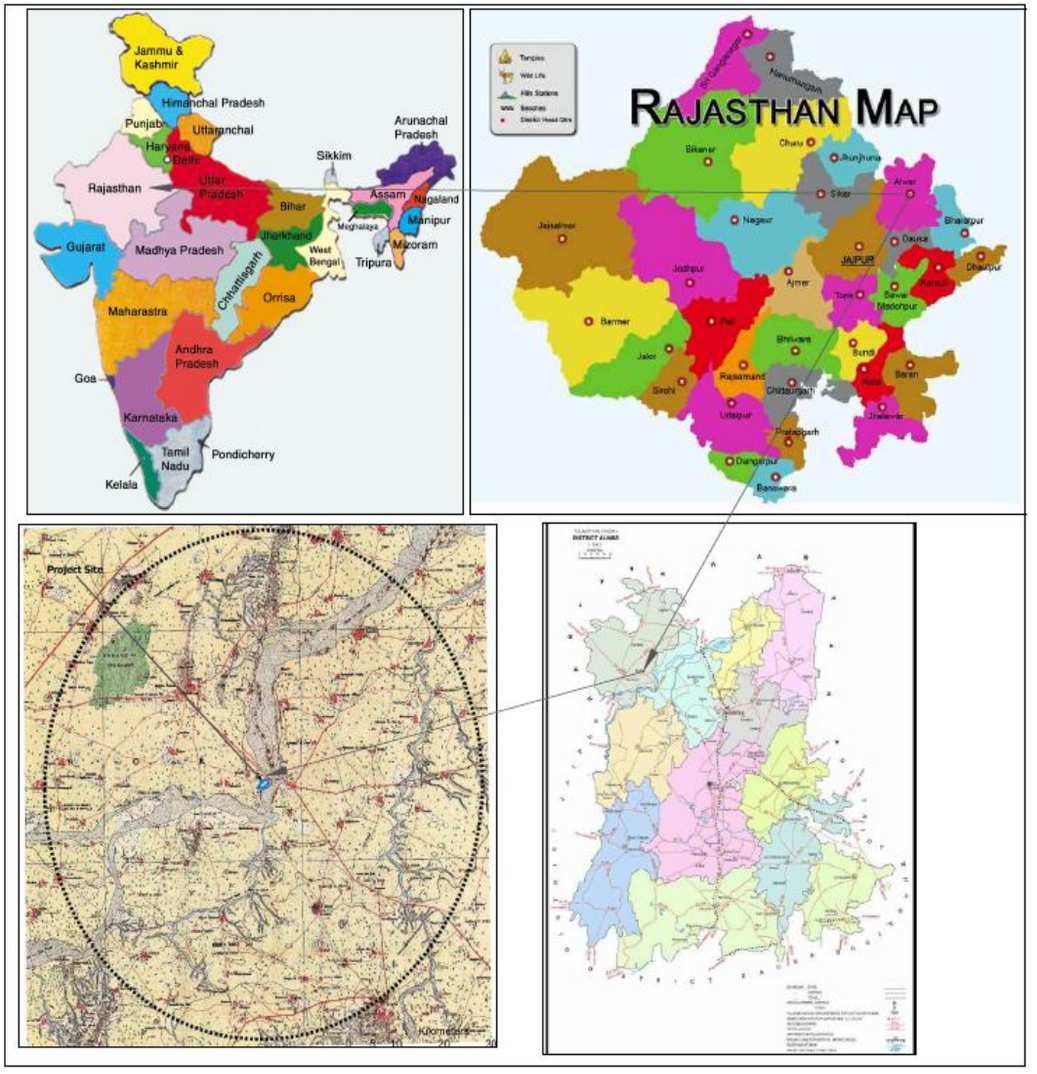


Figure 1: Location map of the proposed project

3.3 Details of the alternate sites

No alternate sites have been examined.

3.4 Size or magnitude of operation

The company proposes 60 KLPD distillery to manufacture GNS(ENA), rectified spirit, technical alcohol from grains like corn, bajra, broken rice etc. The products and by-products considered for manufacture are as given below,

- Rectified Spirit/ impure spirit /GNS(ENA)/ technical alcohol
- DWGS/ (distilleries wet grain with soluble) / DDGS (distilleries dry grain with solubles)

3.5 Manufacturing process details

The distillery will use grains as raw material in the production of GNS. The process description of alcohol production in using grain as raw materials is as follows,

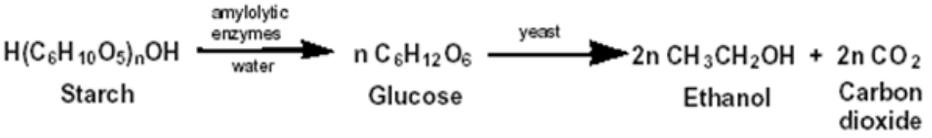
3.5.1 Milling and flour handling

The incoming grain is first cleaned with the help of de-stoner and magnetic separators to remove stones and other material which may damage the hammers during milling. The grain is fed to hammer mill in controlled manner. In milling grains are crushed to flour of uniform size. Oversized screening rejects are segregated with the help of vibratory screen. These are taken to coarse bin before sending it to mill again. Intermediate hopper is provided for buffer capacity for flour storage. The flour is transferring to the mixing tank for slurry preparation process.

3.5.2 Slurry preparation/liquefaction

Slurry from pre-masher is taken to slurry cum liquefaction tank where both steam &liquefying enzyme are added. The mixture of slurry and steam is then provided with the desired retention time at a given flow rate. The cooking process, accomplished in the above manner, converts the slurry into a hydrated, sterilized suspension and is therefore susceptible to enzyme for liquefaction. Liquefied mash is cooled in slurry cooler and transferred to fermentation section.

The complete reaction of conversion of starch into ethanol can be represented as follows,



3.5.3 Saccharificationand fermentation

Yeast Propagation

Yeast seed material is prepared in water cooled vessels by inoculating sterilized mash with culture yeast. Optimum temperature is maintained by cooling water. The contents of the yeast vessel are then transferred to pre-fermentors. The pre-fermentors are filled with mash and loaded with contents of the yeast. The prefermentor contents are transferred to the main fermenters.

Fermentation

The purpose of fermentation is to convert the fermentable substrate into alcohol. To prepare the mash for fermentation, it may have to be diluted with water. The pH of the mash is adjusted to about 5.0 accomplished primarily by recycled slops (which also provides for nutrients) and by the addition of acid. Yeast is available in sufficient quantity to initiate fermentation rapidly and complete it within 54 hours.

Significant heat release takes place during fermentation. This is removed by forced circulation cooling in external heat exchangers to maintain an optimum temperature of 30^0C. The re-circulating pumps also serve to empty the fermentors into beer well. After the fermentors are emptied, they are cleaned with water and caustic solutions and sterilized for the next batch.The carbon dioxide evolved during the process is scrubbed to prevent ethanol emissions by process water, which is taken to beer well. The flow diagram of process description of grain spirit production is shown in Fig. 2.

Wash toGNS(ENA)– MPR - Multipressure Distillation

The distillation scheme consists of seven columns namely

1. **Degasifying-cum-analyzer column**- Operation under vacuum
2. **Pre-rectification-** Operation under vacuum
3. **Exhaust column**- Operation under vacuum
4. **Extractive Distillation Column-**Operation under pressure
5. **Rectifier-cum- Exhaust column-** Operated under pressure
6. **Recovery/Fused Oil Column-** Operated under pressure
7. **Simmering Column-** Operated under atmospheric or vacuum

The Fermented wash is preheated in a fermented wash pre heater and fed to the analyzer column. The vapors of the analyzer are fed to pre-rectifier column. Bottom liquid from pre-rectifier column is fed to stripper column. Impure spirit and fuseloil liquid streams from various columns are introduced in recovery column for processing. Steam is supplied at the bottom of R/E column re-boiler, simmering column re-boiler &direct steam sparging is done in the recovery column.

For the ENA production top product of pre-rectifier is fed to purifier column whereas bottom liquid is fed to impurespirit purification column. Technical alcohol from the top of purifier column as well as fusel oil draws from pre-rectifier & R/E is fed to recovery. Final technical alcohol cut is taken from the top of impure spirit purification column whereasGNS is drawn from the bottom of the simmering column.

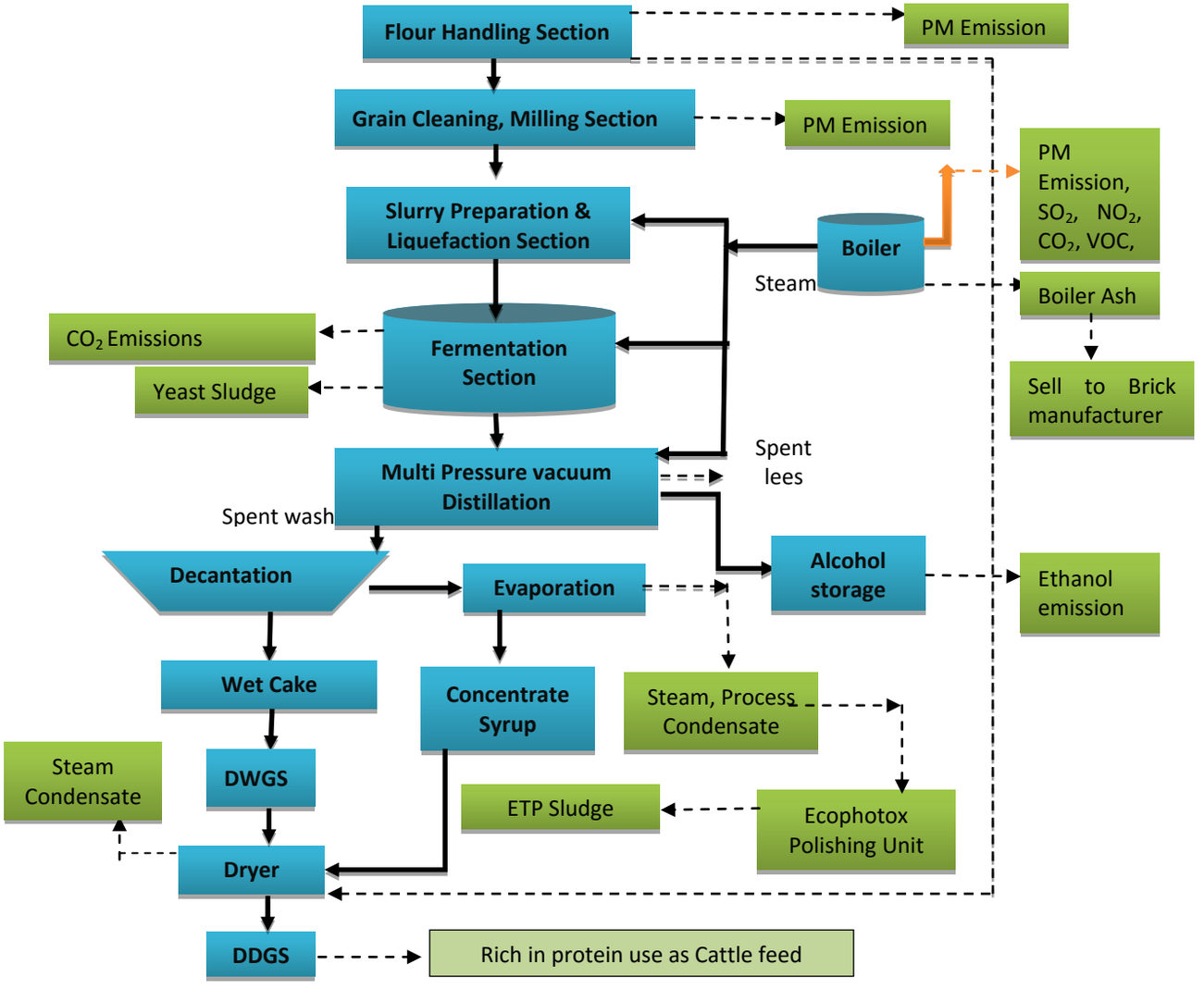


Figure 2: Process flow chart

3.6 Raw material requirement

The raw material requirement is given below,

Table 2: Raw materials

Sr. No.	Raw material	Quantity
1.	Grains	160MT/day
2.	Water	550m^3/day
3.	Electricity	1600 KW
4.	Rice Husk or	110-120 TPD

Sr. No.	Raw material	Quantity
5	Coal	85-90 TPD
6	or Natural Gas	48-50 TPH
7	Steam	16 TPH
8.	**Enzymes**	
	- Alpha Amylase	60 kg / day
	- Amyoglucosidase	80 kg / day
	- Neutrase	10 kg / day
	- Viscozyme	20 kg / day
9.	Sodium Hydroxide	70 kg / day
10.	Antifoam Agent	200 Liter/ day
11.	Sulphuric Acid	70 kg / day
12.	Urea with 46% Nitrogen	150 kg / day
13.	Dry Yeast	1kg/KL of spirit produced.

3.7 Resource Optimization / recycling and reuse

Spent wash generated during the process of fermentation, will be treated in multiple effective evaporators to concentrate the solids and concentrated syrup along with wet cake will be dried in dryer. This is known as distilleries dry grain with Solubles(DDGS). This will be sold as cattle feed/poultry feed/ Fish/ prawn farms. The condensate generated during the process of multiple effective evaporators and drying will be reused in the process thus decreasing the net water requirement.

3.8 Project requirement

3.8.1 Availability of Water

Fresh Water requirement for the proposed project after recycle of process streams will be **550**m^3/day**.**Water requirement for theproposed project will be met fromexisting Borewells**.** A waterstorage tank will be proposed on site to ensure adequate water supply. Efforts will be taken tominimize & conserve water as per MOEFCC/CPCBguidelines.

3.8.2 Power requirement

The power required for the industry is estimated to be 2500 KVA. The power requirements will be met using the captive system2.0 MW located on the premises with back up with DG Sets of equivalent capacity and state electricity board.

3.9 Quantity of wastes generation

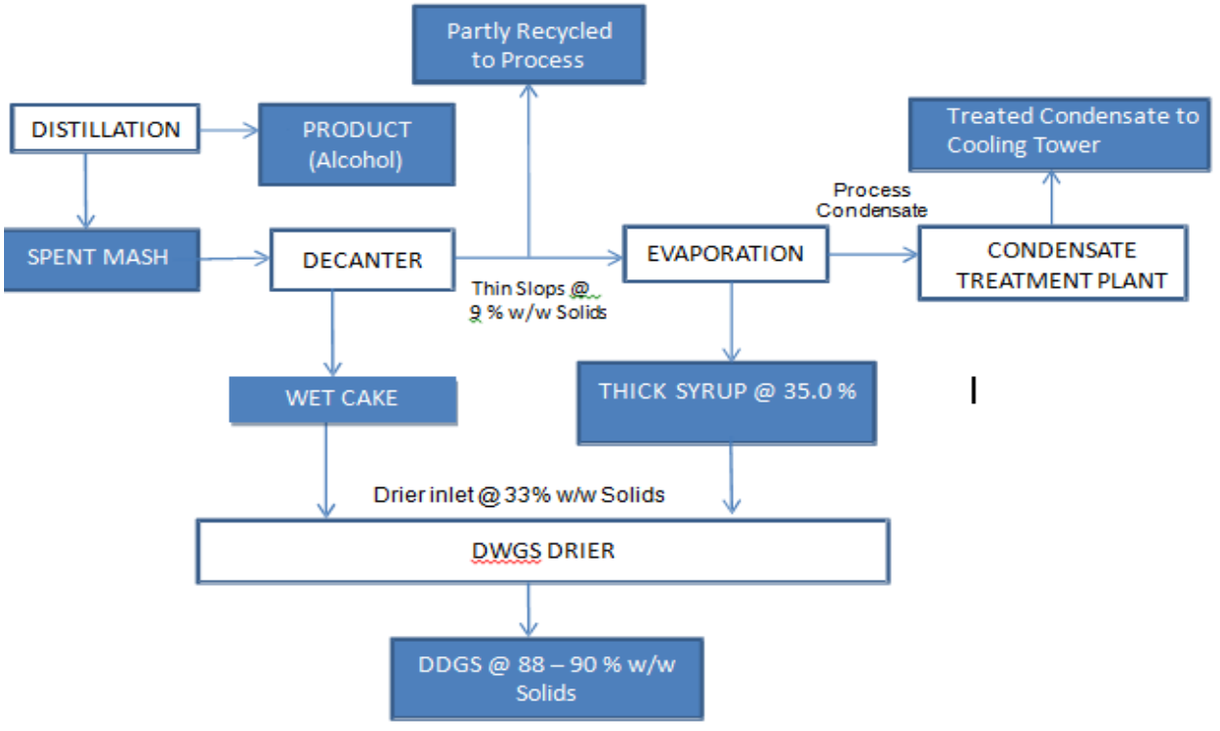
3.9.1 Liquid Waste Generation

The spent wash from proposed grain distillery will be subjected to decantation to separate out wet cake and6-7% w/w solid thin slopwill be fed to evaporator. The thick syrup @ 35-40 % solids after the evaporation would then fed to DWGS drier to produce DDGS at 88-90% w/w solids which will be sold as cattle feed.

The boiler blow down, DM plant, softener regeneration water will be treated in a **neutralizationtank and** after treatment it will be used as cooling water makeup water.

Process condensate from evaporation section will be partly recycled and balance will be treated in process condensate treatment plant, treated water will be used as dilution water in slurry preparation and as cooling water makeup water**and steam condensate will be recycled back to the boiler.**

ETP Capacity and Effluent Generation



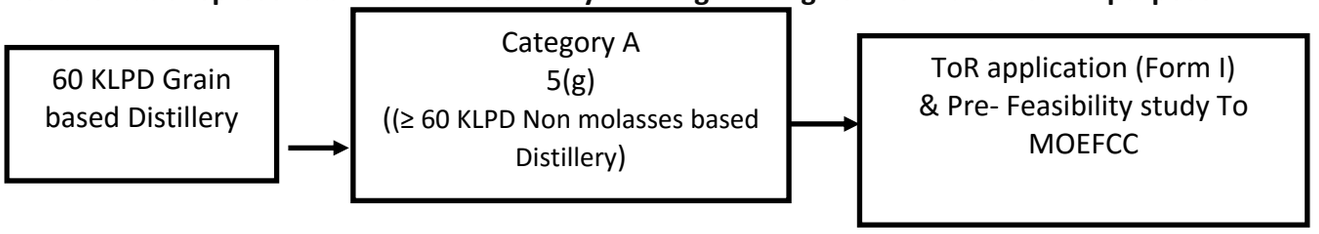
3.9.2 Solid Waste generation and management

The following will be the solid waste generation & disposal,

Table 3: Solid waste generation and disposal

Solid waste	Quantity	Disposal
ETP sludge	50 kg/day	Used as manure
Boiler ash	22-25TPD from coal **or** 18 -22TPD from R husk	Coal ash will be sent to cement manufacturing unit Rice HuskAsh generated will be sold to brick manufacturers/ land filling
DDGS	**30-35 TPD**	Will be sold as cattle feed / Fish feed

3.10 Schematic representation of the feasibility drawing which give information of EIA purpose



Site analysis

4.1 Connectivity

Details of connectivity towards proposed site is given below

Road	Behror- Alwar Road on highway, NH 8 -13 Km
Railway	Hasrauli Railway stations : 21 Km
Air	Indira Gandhi Airport, New Delhi : 104 Km aerial distance
Nearest town/city	Bardod 5km, Behror 13 Km

4.2 Land form, land use and land ownership

The total land is in possession with management. Land isuse for industrial use, roughly plane with some scanty vegetation.

4.3 Topography

The topography of the land is flat without any undulations.Toposheet is attached as **Annexure II.**

4.4 Existing land use pattern

The area of land considered for distillery is industrial use land.

4.5 Existing Infra structure

Maximum resources like water, power and road connectivity are available.

4.6 Soil classification

The soil at the site is Dry alluvium

4.7 Climate

The climate of Alwar district is characterized, by semi-Arid with average rainfall of above 570 mm. The drainage pattern is dendritic to Sub Dendritic. The maximum temperature in summer is 43°C and minimum temperature in winter is less than 5^0C.

4.8 Social infrastructure available

Social infrastructure like community center, hospital and electricity is available inKarora and Bardod.

5.0 Planning Brief

5.1 Planning Concept

The proposed grain based distillery will be manufacturing rectified spirit/ENA/absolute alcohol/ impure spirit viz. fermentation, multi pressure distillation, spent-wash evaporation through MEE and decanter. Concentrated spent wash called as DDGS and it will be used as cattle feed.

5.2 Population projection

The proposed activity will generate total**220** skilled and unskilled employee opportunities. No influx, migration of population is expected as labor shall be deployed from the local villages.

5.3 Land use planning

Total area available with existing distillery is 18 Acres. Total build up area is **15546m^2**and green belt area is 22000 **m^2**.

5.4 Amenities/Facilities

Facilities like canteen, rest rooms and recreation facilities will be provided for the proposed project.

6.0 Proposed infrastructure

6.1 Industrial area

The major plant & machinery required for the proposed project is as given below,

List of machinery and equipment's

1.Grain Storage Section –Silo
2. Grain Handling Section
4. Liquefaction Section

5. Fermentation Section
6. Distillation Section
7. Steam Boiler with Accessories
9. Steam condensers
10. Air compressor
11 Storage section (Daily Receiver Section, Bulk Storage tanks)
12. Centrifugal Machines
14. DDGS Drying section
15. Multiple Effect Evaporation Section
16. Raw water treatment plant
17. R.O. Plant for boiler water
18. Fire protection equipment's for entire plant
19. Weigh bridge
20. Water storage tanks
21. Electricals
22. Piping works
23. Lab equipment's

6.2 Residential area

Facilities like canteen, rest room and indoor games facilities will be provided in the proposed project. Local labor from nearby villages will be hired in project activity.

6.3 Green belt

Total 5.94 acre (33% of total area) of Green belt will be developed in proposed project premises.

6.4 Social Infrastructure

Factory will identify the need of the villagers and execute the CSR activity.

6.5 Connectivity

Site is well connected with by state highway-NH 8(New Delhi - Jaipur) 13 km,and on Behror-Alwar state HighwayNo. 14 from the project site.

6.6 Drinking water management

Drinking water required for the workers will be met from borewells inside factory with proper water treatment system.

6.7 Sewerage system

Domestic waste water generated will be treated in septic tank via soak pit and we have already STP facility

6.8 Industrial waste management

Spent wash will be passed through decanter and then the thin slop from decanter will be sent to Multiple Effect Evaporators (MEE) followed by Dryer.The dried solid product solid is known asDDGS and it will be used as feed for cattle feed/Poultry/fish.

Process condensate from evaporation section will be partly recycled and balance will be treated in process condensate treatment plant and steam condensate will be recycled back to the boiler,water treatment plant rejectswill be treated in secondary effluent treatment plant. Spent lees recycled back in cooling tower make up water.

6.9 Solid waste management

Solid waste generation details described earlier in 3.9.2**,** Table3.

6.10 Power requirement & Supply / Source

Power requirement will bemet through own 2.0 MW captive power plant, RSEB and back up DG sets 1600 KVA.

7.0 Rehabilitation & resettlement plan

No rehabilitation or resettlement will occur.Hence no rehabilitation or resettlement plans.

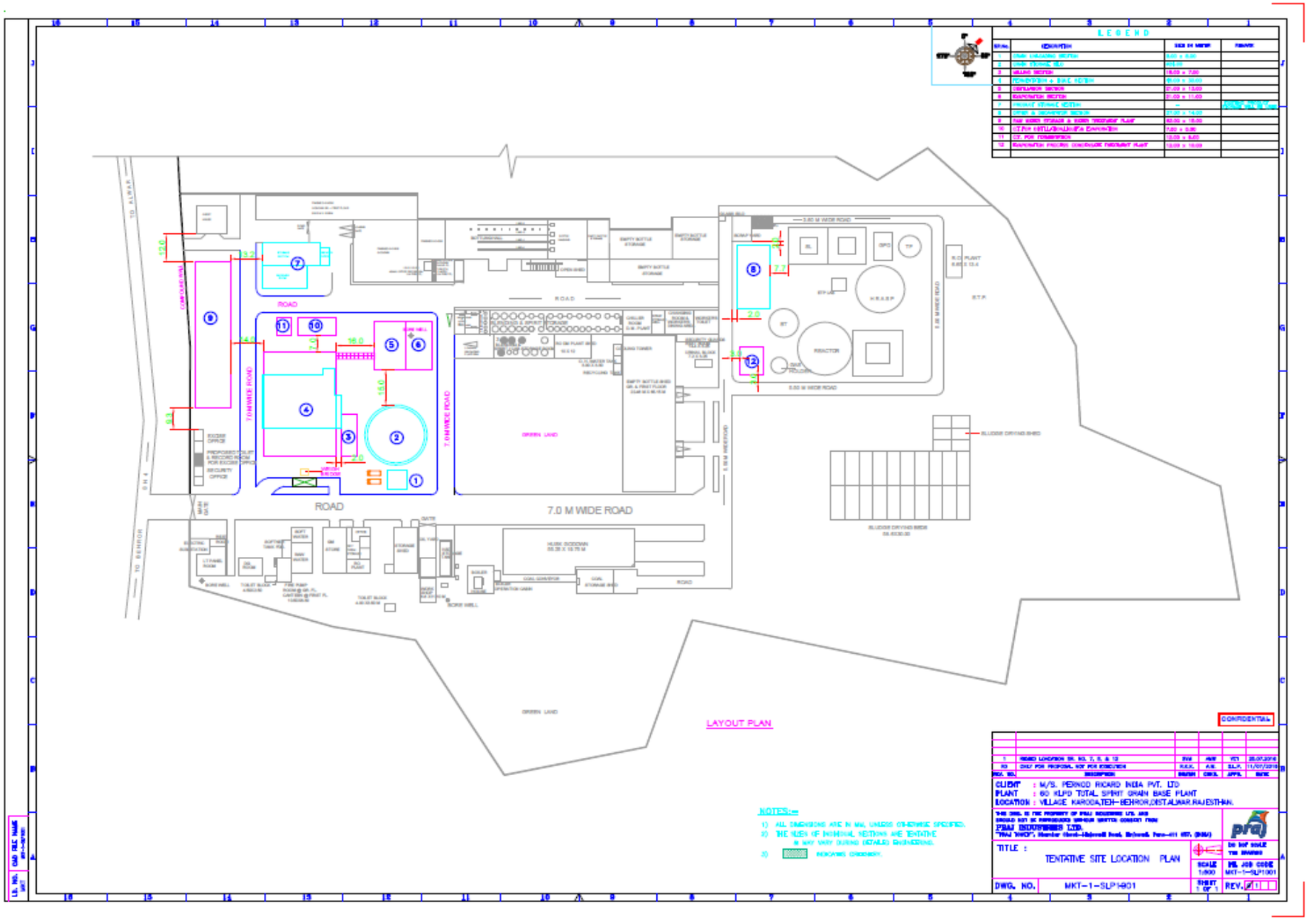
8.0 Project schedule and cost estimate

The cost of project has been estimated at Rs. 90.00 crore, which comprises of civil construction, plant & machineries, misc. fixed assets, pre-operative expenses & margin money for working capital. A provision for contingency has been made to take care of inflation and changes due to delays if any. Cost for environment management has been estimated to 2.59 crore.

9.0 Analysis of Proposal

A financial and social benefit has been considered while analyzing the proposal.The proposal is environmental compatible and will helps to people improving their financial statusof the local people. Ancillary developmental activities likeCattle feed plants will be created due to the establishment of the proposed unit.Corporate Social Responsible (CSR) programshall be executed on need base.

ANNEXURE III



PLANT LAYOUT

10.0 Man power Requirement:

The manpower required for production, maintenance, procurement, quality control has been estimated based on the work content, time estimates and the production target. Manpower for marketing, finance and administrative functions has been estimated considering the importance of these functions. The total manpower requirement considering the nature of operation and skills required for the work is estimated based on Existing Operation of Distillery has been worked out which includes manpower requirement for all the departments in the proposed unit. It is proposed that the qualified & experienced staff will be employed by the unit to take advantage of their experiences.

A detailed requirement of manpower has been estimated as below. The job contents and qualification requirements has been worked out for various levels.

S No	Section & Role	Nos.
A	**Regular Manpower**	
1.0	Grain Handling / Milling	
1.1	Shift Supervisor	3
1.2	Operator	3
1.3	Fitters	3
	Sub Total –I	**9**
2.0	Fermentation and Distillation & ENA Plant	
2.1	Shift Chemist	3
2.2	Operator	3
	Sub Total –II	**6**
3.0	Evaporation and Wet Cake	
3.1	ETP Incharge	1
3.2	Operators	3
3.3	Helper	3
	Sub Total -III	**7**

4.0	General Shift (Adinistration)	
4.1	General Manager	1
4.2	Administrative Officer	1
4.3	Security Officer	1
4.4	Production Manager	1
4.5	Purchase Manager	1
4.6	Purchase Officer	1
4.7	Excise Officer	1
4.8	Accounts Manager	1
4.9	Accounts Officers	1
4.10	Office Peon	1
4.11	Time Keeper	1
4.12	Excise Peon	1
	Sub Total -IV	**12**
5.0	Power House	
5.1	Shift Engineer	3
5.2	Boiler Attendant	3
5.3	Fireman	1
5.4	Pump man / Waterman	3
5.5	Electrician	3
	Sub Total -V	13
	Total For Regular Man Power	**47**
B	**Contract Manpower**	
6.0	Security Staff	
6.1	Security Guard	3
6.2	Supervisor	2
6.3	Bottling	150
	Sub Total – VI	**155**
7.0	General Work	
7.1	Grain Handling Section	6
7.2	Cleaning of PHE	3
7.3	Drivers -	3
7.4	Misc Labour	6
	Sub Total – VII	**18**
	Total For Contract Manpower	**173**
	TOTAL REGULAR + CONTRACT	**220**