EXECUTIVE SUMMARY FOR THE PROPOSED 45 KLPD GRAIN BASED DISTILLERY PROJECT BY 'GADHINGLAJ AGRO ALCOCHEM LTD.', GAT NO. 990 / 1, BERADWADI, A/P.:BHADGAON, TAL.: GADHINGLAJ, DIST.: KOLHAPUR.

THE PROJECT

'Gadhinglaj Agro Alcochem Ltd. (GAAL)', Gat No. 990 / 1, Beradwadi, A/P.:Bhadgaon, Tal.: Gadhinglaj, Dist.: Kolhapur, have planned to set up a 45 KLPD 'Grain Based Distillery'.

The proposed unit would manufacture a products and By-Products as mentioned below-

Sr. No.	Name of Products	Quantity
1	Rectified Spirit (RS)	45 KL / Day
2	Extra Neutral Alcohol (ENA)	40 KL / Day
Sr. No.	**Name of By-Products**	**Quantity**
1	Distiller's Wet Grains with Solubles (DWGS)	117 MT / Day
2	Distiller's Dry Grains with Solubles (DDGS)	40 MT / Day
3	Fusel Oil	2700 Lit / Month

They have planned for setting up a green field project to produce potable, industrial and fuel alcohol from renewable raw materials like Maize, Rice, Sorghum and Bajara. Moreover, in the district market of Kolhapur, grains in sufficient quantities are available which arrive from neighboring districts. The important crops that are grown in Gadhinglaj are mainly Rice, Sugarcane, Ground nut and maize.

With a thorough knowledge of alcohol technology and through an in-depth study of the market demand, the management of **'Gadhinglaj Agro Alcochem Ltd. (GAAL)'** has decided to set up an agro based industrial complex where Maize, Bajara, Rice and Sorghum could be commercially processed and converted into important industrial products such as potable and fuel alcohol.

The proposed distillery will crush about 135 MT of grains per day (i.e. 4050 MT / M) in the traditional dry milling process. The milled grain floor will be further subjected to enzymatic liquefaction followed by jet cooking to partly hydrolyze the starch. This slurry will then be further subjected to presaccharifiction with second enzyme. The monosaccharide thus liberated will be fermented with yeast to produce alcohol. Alcohol present in the fermented mash will then be recovered by distillation. CO_2 produced in the fermentation can be processed to produce food grade compressed CO_2 or dry ice. Thus, in light of the economic value; efficiency as well as competitive costs and market potential; the Project Proponents of 'Gadhinglaj Agro Alcochem Ltd.' have decided to take up a state of the art 'Grain Based Distillery'.

THE PLACE

The proposed distillery project of GAAL would be set up on Gat No. 990 / 1, Beradwadi, A/P.:Bhadgaon, Tal.: Gadhinglaj, Dist.: Kolhapur.

The total land acquired by the proponents is **30,000 Sq. M. (7.41 Acres).** Out of this total land area, an area of about **12,247.91 Sq. M. (3.02 Acres)** would be actually allocated for

the proposed distillery project activities. Permission for the proposed project activity has been obtained from the grampanchayat Bhadgaon, Tal.: Gadhinglaj, Dist.: Kolhapur.

Following aspects are taken in to consideration during selection of site of the proposed grain based distillery project –

- Adequate land for the proposed distillery project as per different purposes.
- Avoiding likely odor nuisance to the nearby residential areas and public in general.
- Convenient location on the South-East side of Gadhinglaj at a distance of about 5 Km. The proposed site is located near city viz. Gadhinglaj. Moreover, the National Highway NH_4 is about 15 Km from the site.
- The availability of utilities such as water and electricity.
- Proximity to the raw material availability.

The area requirement for various amenities and buildings under the proposed grain based distillery is as follows -

TABLE NO.: 1.1

Sr. No.	Description	Size (M)	Area (M^2)
1.	Grain Storage Silo	16 x16	256
2.	Grain Loading & Unloading Platform	21 x 4	84
3.	Milling Section	8 x 5	40
4.	Liquefaction Section	10.5 x 14	147
5.	Fermentation Section	48.8 x 10.5	512.4
6.	Cooling Tower For Liquefaction Section	3 x 3	9
7.	Cooling Tower For Fermentation Section	4.3 x 4.3	18.5
8.	Distillation & Evaporation Section	15 x 10	150
9.	Thin Stillage Section	10 x 5	50
10.	Decantation Section	4 x 5	20
11.	Dryer Section	8 x 20	160
12.	Condensate Polishing Unit (CPU)	10 x 15	150
13.	Coal Storage	15 x 10	150
14.	Boiler House Area	25 x 10	250
15.	Turbine	10 x 10	100
16.	Control Panel Room	20 x 5	100
17.	MSEB Transformer	6 x 6	36
18.	Warehouse	24 x 17	408
19.	Bottling Plant	40 x 30	1200
20.	Cooling Tower For Distillation Section	5 x 5	25
21.	Admin Building	17 x 15	255
22.	Excise Office	10 x 5	50
23.	Security Office	17 x 5	85
24.	Weigh Bridge	12 x 6	72
25.	Canteen	4 x 4	16
26.	Staff Quarter	25 x 15	375
27.	Rain Water Harvesting Pond	---	900
28.	Filtered Water Storage	13 x 20	260
29.	Bottle Storage Yard	48 x 10	480
30.	Raw Water Pond	---	326.41
31.	Bulk Grain Storage	10 x 20	200

Sr. No.	Description	Size (M)	Area (M^2)
32.	Temple	--	31.60
33.	Workshop & Stores	10 x 15	150
34.	Spent Wash Storage	15 x 20	300
35.	Guest House	10 x 12	120
36.	M.D. House	10 x 12	120
37.	Soft Water Storage	13 x 20	260
38.	D.M. Water Storage	10 x 15	150
	Total Built- Up Area	**--**	**8016.91**
	Area under Roads	**--**	**4231.00**
	Built up Area + Area under Roads (A+B)		**12247.91**
	Total Plot Area		**30000.00**
	Open Space in the Industry		**17752.09**
	Green Belt Area Required is 33 % of Open Space		**5858.18**

From the above table it could be seen that the land available is much more than actual requirement. In an area other than the project space requirement, infrastructure, green belt development and roads would be provided. Here a good network of internal as well as main approach roads would be prepared.

The unit would be designed in a versatile fashion by adopting latest process techniques as well as with state-of-the art machinery. The total capital investment would be to the tune of **Rs. 48.27 Crores** (Rs. Forty Eight Crores Twenty Seven Lakhs only). The project would be formulated in such a fashion and manner so that the utmost care of Safety Norms & Environment shall be taken. Refer **Annexure – I** for photographs and plot layout plan of proposed project site respectively.

THE PROMOTERS

The proposed project of grain based distillery would be undertaken & implemented by the management of 'Gadhinglaj Agro Alcochem Ltd.'. The promoters are well experienced in the field of distillery & have made a thorough study of entire project planning as well as implementation schedule.

The name and designation of the Promoter is as under -

TABLE NO.: 1.2

Sr. No.	Name	Designation
1.	Rakesh Goel	Director
2.	Arpit Goel	Director
3.	Madhuri Goel	Director
4.	Kshitij Khattar	Director
5.	Ravindra Rajaram Panari	Professional Director
6.	Swati Mahesh Kori	Professional Director
7.	Ajay Gupta	Technical director

THE PRODUCTS

The different products and by-products considered for manufacturing & their maximum production quantities are as under-

TABLE NO. 1.3

Sr. No.	Name of Products	Quantity
1	Rectified Spirit (RS)	45 KL / Day
2	Extra Neutral Alcohol (ENA)	40 KL / Day
Sr. No.	**Name of By-Products**	**Quantity**
1	Distiller's Wet Grains with Solubles (DWGS)	117 MT / Day
2	Distiller's Dry Grains with Solubles (DDGS)	40 MT / Day
3	Fusel Oil	2700 Lit / Month

The details of products, raw material required as well as the manufacturing process & flow chart for above products are enclosed separately at **Annexure - II and Annexure – III** respectively**.**

The Corn/Maize

Millions of bushels of corn / grains are rapidly replacing millions of barrels of oil in fuel, plastics, solvents and cleaners signaling the evolution from a petroleum-based economy to a carbohydrate-based economy. Research and improved refining technologies are uncovering new ways to convert the various components of corn into renewable, high-value products that are changing the face of manufacturing industry. As the demand for oil increases, the world's ability to produce an abundant and renewable supply of corn-based fuel, plastics and fibers signals a new age of innovation based on sustainability.

Corn is the most widely produced feed grain in India, accounting for more than 40 percent of total value and production of feed grains. Apart from human consumption, the crop is used as main energy ingredient in livestock feed. Corn is also processed into a multitude of food and industrial products, which include starch, sweeteners, corn oil, beverage & industrial alcohol and fuel ethanol.

The net energy value of corn ethanol has been rising due to technological advances in ethanol conversion and increased efficiency in farm production. Corn ethanol is energy efficient as indicated by an energy output: input ratio of 1:34, which means that the energy potential in every liter of ethanol is 34 percent greater than the energy used to produce it.

Corn / Sorghum is a good alcohol source because it is easily grown and averages about 14% fermentable sugar content. The corn ethanol yields a very net positive energy balance, and has a positive impact on energy supplies. The energy in corn ethanol was found to be 1.37 times the energy in fossil inputs, by research, it is found that corn farming and ethanol production are no exception, benefiting significantly from technological advancements. In fact, one finds that best practices in corn farming and ethanol production provide reason to believe that the improvements in energy efficiency that has been identified are likely to continue.

The most debatable issue on corn ethanol perhaps is how to deal with co-products from ethanol plants. Dry milling ethanol plants produce distillers' grains and soluble's together with ethanol, while wet milling plants produce corn gluten feed, corn gluten meal, corn oil and other high-value products together with ethanol. These products are currently sold in the marketplace as animal feeds and for other uses (e.g., corn oil for cooking). This assigns a co-product credit based on the input energy requirement of the feed product or goods that the ethanol co-product displaces.

In summary, with up-to-date information on corn farming and ethanol production and treating ethanol co-products fairly, it has been concluded that corn-based ethanol now has a positive energy balance of about 20,000 Btu per gallon. Corn ethanol achieves modest to moderate reductions in greenhouse gas emissions, relative to petroleum-based gasoline.

There are number of manufacturing technology options which cover Molecular Sieve Dehydration, Atmospheric, Multi-pressure, Azeotropic and Extractive Distillation for various grades of alcohol including Fuel Ethanol. In fact, ethanol plants produce food and energy. In ethanol production, only starch is removed from the corn. The corn is converted to 1/3 each by mass of ethanol, food and carbon dioxide. All of the protein, fiber, corn oil and trace nutrients in the corn are recovered as high-quality products for human and animal consumption.

It is now possible to create esters from the corn. Corn check off funds is supporting research on reactive distillation, a new process that can produce chemicals of high purity from complex product streams within a production plant. The process has several advantages over conventional separation technologies and could result in ethanol plants being able to produce esters, a class of chemicals used for making products such as solvents and plastics. Lower capital cost of reactive distillation means that smaller, grower-owned processing facilities can employ this technology-enhancing profitability while diversifying risk and using more corn. Better corn for a hungry world is not just growing more corn but it is growing corn that is even more nutritious for humans and livestock. Vitamin C and Vitamin E are now derived from corn and economical lysine from corn now helps supplement livestock feed. With the potential of drought-resistant corn hybrids and corn with pharmaceutical characteristics, it's clear that solutions to major challenges in health, hunger and nutrition are growing in the world's cornfields.

Corn is a natural resource that is fueling change. Ethanol is, without a doubt, the biggest success story in the corn industry since the development of corn hybrid technology in the early 20th century. Now-a-days ethanol is having a dramatic and positive effect on the world's energy security, air quality and economic vitality. There is no doubt that the ethanol is poised to be the hydrogen source of choice in new automotive fuel cell technology.

Moreover, the corn is replacing petroleum in plastics. PLA, a corn-derived polymer, is being used to create fibers and plastics that are biodegradable-and 100% renewable. Food packaging, clothing, bedding, dishes, cutlery and carpeting are being made from this innovative corn-based product. Asia has been especially receptive to PLA. Taiwan's new environmental policies restricting the use of traditional plastics have led them to embrace PLA products. In Japan, one can even purchase CD players made from PLA!

Due to recent developments it is possible now to have more corn with fewer chemicals. In 2004, farmers all over the world planted more acres of biotech corn hybrids than ever before. But it's not just about achieving higher yields. Biotech hybrids reduce the use of pesticides, thus lessening the impact of chemicals on the environment and improving human safety. Growers have accepted the responsibility for managing biotech hybrids in a manner that allows them to enjoy the benefits, while maintaining the delicate balance of nature. By enhancing production on existing acres, biotechnology also helps preserve biodiversity on

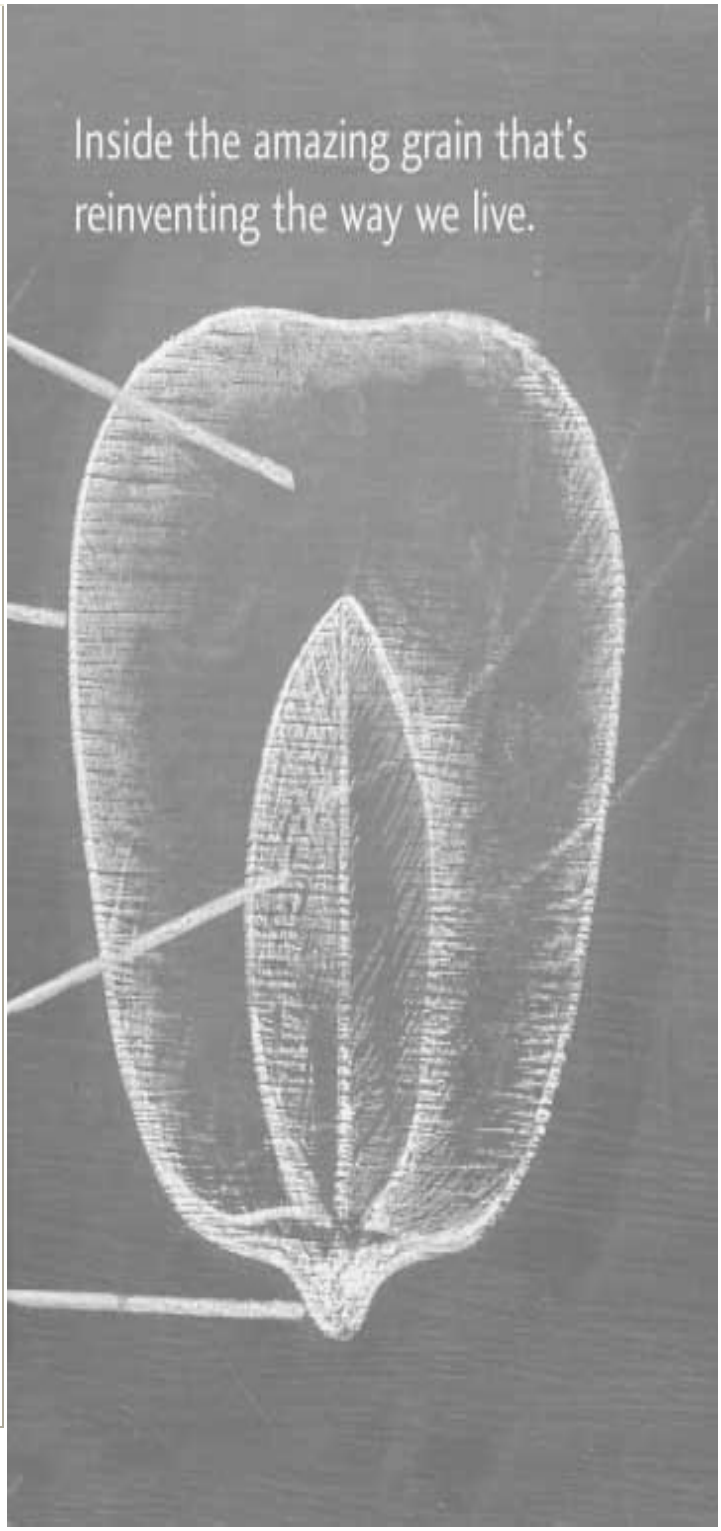
acres that don't have to be converted into cropland to meet world demand for food, feed, fiber and fuel.

The endosperm accounts for about 82 percent of the kernel's dry weight and is the source of energy (starch) and protein for the germinating seed. Starch is the most widely used part of the kernel and is used as a starch in foods—or as the key component in fuel, sweeteners, bioplastics and other products.

The pericarp is the outer covering that protects the kernel and preserves the nutrient value inside. It resists water and water vapor—and is undesirable to insects and microorganisms.

The germ is the only living part of the corn kernel. The germ contains the essential genetic information, enzymes, vitamins and minerals for the kernel to grow into a corn plant. About 25 % of the germ is corn oil—the most valuable part of the kernel, which is high in polyunsaturated fats and has a mild taste.

The tip cap is the attachment point of the kernel to the cob, through which water and nutrients flow—and is the only area of the kernel not covered by the pericarp.



THE PURPOSE

Till now, molasses is used as raw material for alcohol production. Molasses, a by–product from cane sugar processing, is brownish black in colour with an extremely strong odour. It is used for its sugar content, either as an ingredient in cattle feed or for production of alcohol. Some of the derivatives from alcohol that have been in commercial production are based on molasses as a raw material. Molasses based distilleries produce effluent, which has high BOD/COD as well as dark brown colour and is very difficult to treat. Molasses production in the country is around 70 to 75 Lakh MT per annum. Some of the molasses is consumed to manufacture animal feed. If all of the molasses produced in the country were used for alcohol production, it would produce maximum 1,750 million liters of alcohol. The demand for alcohol in the country is expected to go up to almost 3000 to 3500 million liters by year 2012. Under such circumstances, raw materials other than molasses will have to be used for alcohol production. Though alcohol can be produced directly from sugar cane juice it is not an economic proposal because of its minimum statutory price. On an average, in Maharashtra, the landing price of sugarcane to the sugar factories varies from Rs. 2,000 to 4,000 / MT depending up on availability. In addition, it is a seasonal crop available for about 160 days in a year. Sugar cane cultivation also requires good irrigation facilities. If sugar cane juice is used directly for alcohol production, there will be no by-products produced except Bagasse. In addition, the effluent produced from distillery using sugar cane juice, though not as strong as molasses based distillery, will have to be properly treated to meet the norms laid down by the pollution control authorities.

Taking in to consideration the changing scenario of demand of sugar and alcohol, the project proponents of 'Gadhinglaj Agro Alcochem Ltd.', have decided to use grains such as corn (maize), sorghum (jowar), bajara for alcohol production. The management of GAAL has decided to implement an integrated grain-processing unit i.e. 'Grain Based Distillery' to produce superior quality potable alcohol, industrial spirit, fuel ethanol, food grade carbon dioxide and animal feed (DDGS).

There are some distinct advantages of using corn or sorghum for alcohol production.

It produces a by-product called **'Distillers Dry Grain with Soluble's (DDGS)'** which can be sold as high protein containing animal feed. The whole integrated approach and production of DDGS will result in **'Zero Discharge'** of effluent when compared with spent wash generation from conventional molasses based distilleries. Further, there will be process effluent in the form of spent lees, which would be recycled in process after pH correction and remaining effluent evaporated in evaporation system for achieving Zero Discharge.

In light of effluent generation pattern, the distillery operation could be carried out on round the year basis. This is especially because there shall not be any limitation of monsoon months on the composting activity for effluent treatment and disposal as in the case with molasses based distillery processes where the composting operations and manufacturing processes in turn have to be stopped owing to rainfall on the compost yard during June, July, August & September. Quality of alcohol produced from grains is far better than that produced from molasses and thus fetches higher price. CO_2 produced during grain alcoholic fermentation after proper processing is of food grade quality.

Maize or sorghum or bajara crop cultivation period is about four months and requires comparatively very less irrigation water. New corn and sorghum varieties with higher starch

content and better yield per acre are also available and therefore GAAL has decided to use maize, sorghum, bajara and rice for alcohol production in its proposed distillery.

The process water requirement in case of a grain-based distillery is quite less than its molasses based counterpart, which ultimately saves cost component towards water charges. Further, energy conservation and maximization of production by using vacuum / multi-pressure distillation technique could be achieved. Moreover plant automation based on PLC / DCS system could render consistency in product quality.

During the crop season, when corn / sorghum / bajara / rice prices are low, adequate raw material will be purchased from local market or by establishing direct tie-up with the farmers. Sufficient storage capacity for the grains is also considered under the proposed project. In light of these considerations, GAAL has decided to set up a distillery project in the Gadhinglaj taluka, which not only will help in attaining sound economic condition of the company but also would, in turn, benefit the promoter, farmers and people in the surrounding areas.

ENVIRONMENTAL ASPECTS

Environmental degradation is the greatest concern world over and as a citizen of India, it is the responsibility of one and all to strive and bring about a balance between Environment, Industrial Growth and Development of Economy thereby.

Keeping in view the above fact**,** GAAL has proposed to implement an effective 'Environmental Management Plan.' The various aspects of the same are as follows,

A) Water Use and Effluent Generation:

The details of water usage and effluent generation per day would be as follows

WATER CONSUMPTION AND EFFLUENT GENERATION
TABLE NO.: 1.4

Purpose	Description	
	Water Consumption	**Effluent Generation**
Domestic	10 M^3/ Day	8.5 M^3 / Day
Industrial	• Process - 500 M^3/ Day • EC dilution - 32 M^3/ Day • Scrubber & Decanter - 18 M^3/ Day • Cooling - 327 M^3/ Day • Boiler Feed - 69 M^3/ Day • CIP water - 2 M^3/ Day • Gardening - 20 M^3/ Day	• Process Effluent - 500 M^3 /Day [a) PRC Less + RC Less + FOC Less = 129 M^3/Day b) Condensate water = 371 M^3/Day 500 M^3/Day] • Cooling Water Blow Down - 15 M^3/ Day • Boiler Blow Down - 2 M^3/ Day • CIP wash - 2 M^3/ Day
Total	***968 M3/ Day***	***519 M3/ Day (#500 M3/ Day recycled in process after pH correction + 19 M3/ Day forwarded to stillage evaporation feed tank)***
Grand Total	***978 M3/ Day (*478 + #500)***	

Refer **Annexure – IV** for water budget.

B) Effluent Treatment:

i) Domestic Effluent -

The domestic effluent of **8.5 M^3** / **Day** would be treated separately in septic tank followed by soak pits in a decentralized manner. The treated effluent would be used for gardening.

ii) Industrial Effluent -

The total effluent generated from proposed distillery activities shall be to the tune of **519 M^3/Day**. Out of this total effluent, **500 M^3/Day** would be in the form of condensate water, PRC lees, RC lees and FOC lees. This entire effluent shall be recycled in process at liquefaction section after pH correction. Remaining Effluent to the tune of **19 M^3/Day** would be in the form of boiler blow down, cooling blow down & CIP Wash. The same shall be evaporated in evaporation system. Their by achieving Zero Discharge**.**

Along with the main product i.e. alcohol, the distillery would also manufacture animal feed called as 'Distiller's Dry Grain with Solubles (DDGS)'. This DDGS production would be mainly responsible for elimination of process effluent discharge. For more details regarding production of DDGS refer **Annexure - III**. The whole integrated approach and production of DDGS would result in **"Zero Discharge"** of effluent from process.

C) Air Emissions :

The steam required for proposed distillery activities would be taken from a 12 TPH boiler to be installed in the premises. The steam would be available at a pressure of 3.5 Kg/cm^2. The boiler would be provided with Bag Filter as Air Pollution Control (APC) equipment followed by a chimney of 40 M height.

Moreover, two D.G. Sets of capacity 600 KVA each would be provided in the proposed Industry, which would be operated only during power failures. The same would be provided with silencer and chimney of 5 M height above roof level. Thus, no nuisance to the surrounding area would be created due to the air pollution aspect.

Details of air pollution aspect and its control measures are given in following Table –

TABLE NO. 1.5

Sr. No.	Fuel	HSD	Coal	Bagasse
(a)	Fuel consumption (TKD/KLD)	65 Lit/Hr (for each)	3 MT/Hr	6 MT/Hr
(b)	Calorific value	10,200 Kcal/Kg	4500- 5500 Kcal/Kg	2100-2700 Kcal/Kg
(c)	Ash content %	0.1 %	6 - 8 %	3-5 %
(d)	Sulphur content %	1 %	< 0.5 %	Nil
(e)	Other (specify)	--	--	--
	Details of Stack			
(a)	Stack number (s)	1.	2.	
(b)	Attached to	Boiler	D.G. Sets (2 Nos.)	
(c)	Capacity –	12 TPH	600 KVA each	
(d)	Fuel type	Coal / Bagasse	HSD	
(e)	Fuel quantity (MT/hr.)	3 / 6	65 Lit / Hr. each	

(f)	Material of construction	M.S.	M.S.
(g)	Shape (round/rectangular)	Round	Round
(h)	Height, M (from ground level)	40 M	5 M above roof level
(i)	Diameter/size, in meters	0.2 M	0.1 M
(j)	Control equipment preceding the stack	Bag Filter would be provided to boiler.	
(k)	Nature of pollutants likely to present in the stack gases	SPM, SO_2, NO_X	SPM, SO_2, NOx

D) Noise Pollution Aspect:

1. In proposed unit very high noise generating sources will not exist. Diesel Generator Set (D. G. Set) will be one of the sources of noise pollution. But the operation of D.G. Set will be only in the case of power failure. Expected noise levels in the section will be about 72 dB (A). Adequate noise abatement measures like silencer will be implemented in this section. Moreover, enclosures to the machinery will be provided wherever possible.

2. Dry milling section and distillation section will be the other minor noise generating sources. The expected noise levels in these sections will be in the range of 70 to 85 dB (A). All preventive measures such as regular operation and maintenance of pumps, motors, and compressors will be carried out and enclosures will be provided to abate noise levels at source.

3. It is predicted from an experience elsewhere that the magnitude of noise levels, from various sources in the proposed unit, to the human habitation at a distance of 0.5 Km would be around 12 dB (A). Therefore, there will not be any significant change in the background noise levels in the premises of proposed industrial unit.

E) Hazardous Wastes:

Hazardous waste generated during the entire process would include -

TABLE NO. 1.6

Information about Hazardous Waste (Management & Handling) Rule, 2008 as amended in 2010.							
Type / Category of Waste as Per		Method of					
Schedule –I	Qty. (Kg / day)	Collection	Reception	Storage	Transport	Treatment	Disposal
Category - 5.1 – Used Oil	0.5 MT/ Year	Manually	----	----	----	----	It would be dispatched to CHWTSDF

As specified above, the Hazardous Wastes would consist of Used Oil. It would be disposed off by dispatch to 'Common Hazardous Waste Treatment, Storage & Disposal Facility' (CHWTSDF).

F) Solid Wastes :

Solid wastes from the Industries are categorized as hazardous and non-hazardous. Wastes that pose substantial dangers immediately or over a period of time to human, plant, or animal life are classified as hazardous wastes.

Non- hazardous waste is defined as the waste that contributes no damage to human or animal life. However, it only adds to the quantity of waste.

The solid waste from proposed distillery activities would be in the form of boiler ash to the tune 5 MT/Day. The same would be sold to brick manufacturer for secondary use.

G) Compliance with the Norms:

All the relevant acts & rules, with respect to the solid wastes as well as emission characteristics, wherever applicable, as specified by the Maharashtra Pollution Control Board (MPCB) or any other concerned authority would be strictly followed in the proposed Industry. It would be observed, every time, that the characteristics of treated effluent and those of the emissions always remain as per the stipulations of MPCB.

H) Environmental Management Cell:

A separate environmental cell will be established to monitor and control the environmental quality. This cell would comprise of following members: -

TABLE NO. 1.7

Sr. No.	Description	Number of Working Person
1.	Environment Officer	1
2.	Safety Officer	1
3.	Chemist	3
4.	Supporting Staff	5
	Total	**10**

Members of the Environmental cell would be well qualified and experienced in the concerned fields.

The capital as well as O & M costs towards environmental aspects under the proposed industrial setup would be as follows –

TABLE NO. 1.8

SR. NO.	DESCRIPTION	COST COMPONENT	
		CAPITAL	ANNUAL O & M
01.	Air Pollution Control Equipment (APC) and Infrastructure.	Rs. 65 Lakhs	Rs. 10 Lakhs
02.	Noise Pollution Control	Rs. 10 Lakhs	Rs. 2 Lakhs
03.	Environmental Monitoring & Management	---	Rs. 5 Lakhs
04.	Green Belt Development & Rain Water Harvesting	Rs. 30 Lakhs	Rs. 5 Lakhs
	TOTAL	**Rs.105 Lakhs**	**Rs.22 Lakhs**

I) Rainwater Harvesting Aspect:

As mentioned in the above paragraphs the total area of plot would be 30,000 M^2. Out of this area the actual activities of industry would be carried out on 12247.91 M^2 areas and a space of about 17752.09 M^2 would be left as open space.

As far as the rainwater harvesting aspect at the project site of 'Gadhinglaj Agro Alcochem Ltd.,' is concerned, the details are as follows -

The rain harvesting could be of two types namely harvesting from ground and harvesting from rooftops. The quantity of harvested rainwater that becomes available during and after precipitation depends upon a number of factors such as area of land, nature of soil, impervious or paved areas, plantation on the land, average annual rainfall in the region, ambient temperatures of the region, wind direction and speed etc.

A. The Rooftop Harvesting:

Here collection of the rainwater getting accumulated from direct precipitation on the total roof area is taken in to account. The rainwater thus becoming available from terraces as well as roofs of various structures and units in the industrial premises would be collected through arrangements of channels and pipes to be provided as per appropriate slopes at the roof level. The collected rain water would then be taken to ground and either stored in open excavated tanks / ditches in the ground or charged directly to bore wells to be provided in the premises.

For the calculation of rain water quantity that is going to become available subsequent to rooftop harvesting, a computation method from the **'Hydrology and Water Resources Engineering'** has been adopted. Thereunder, A.N. Khosala's formula has been followed. The allied calculations are as under -

Average annual rainfall in the area = 931.1 mm.

Now, as per "A. N. Khosla's Formula", the average annual accumulation can be calculated by using the following equation:

$$R = (P - t / 2.12)$$

Where,

R=Average annual accumulation in cm, for the catchment area.
P=The corresponding average annual rainfall or precipitation, in cm, over the entire catchment. (In current case it is 931.1 mm i.e. 93.11cm)
t = Mean annual temperature in deg. Centigrade. (In current case it is 37^0C.)

∴The accumulation on the entire catchment area will be,
R= (93.11 – 37/2.12)

= 75.66 say 76 Cm.

∴ Volume acquired by this accumulation water will be,
= 76 Cm × Roof Top Area
= 0.76 M × 3339 M^2
= 2537.64 M^3

Thus, about 2537.64 M^3 of rainwater could become available during every season from the 'Roof Top Harvesting' operations. This when charged to open / bore wells would definitely have a positive impact on the ground water quantity.

B. <u>Surface Harvesting:</u> Under this type of harvesting, the rainwater getting accumulated through surface runoff, from land area in the industrial premises, would be collected and stored in open excavated tanks / pits to be provided in the industrial plot. This harvested rainwater would recharge the ground water through actions namely seepage and infiltration to the aquifers. On the open land in the premises counter bunding, terracing and dressing would be done so as to divert the rainwater as per natural slopes to various tranches excavated on the plot in a decentralized manner. The entire industrial premises would be divided in zones and the harvested water from such zone would be directed to the nearest available ditch / tank constructed as mentioned above. Further, the recharge points would be located as per geometry of zones.

(Total Plot Area) – (Built - up Area + Area under Roads) = Open Land Area
30,000 M^2 – 12,247.91M^2 = 17752.09 M^2

Now,

a. Average annual rainfall in the Gadhinglaj area - 931.1 mm
b. Open land area in the industrial premises – 17752.09 M^2
c. Type and nature of the Area with about 30% area being impervious (paved). Here areas under curing yard and storage yards as well as roads comes in the category of paved surfaces.
d. Type of Land- On an average, the land in Gadhinglaj belongs to flat land with 0 to 5% slope.
e. Value of Runoff Co-efficient based on type and nature of area as well as the land – 0.40
f. Runoff getting accumulated from the land area under Point No. b above-

17752.09 M^2 X 0.931 M x 0.4 **= 6610.87 M^3 say 6611 M^3**

Hence, the total water becoming available after rooftop and land harvesting would be

2537.64 M^3 + 6611 M^3 = 9148.5 M^3

J) The Green Belt:

A comprehensive 'Green Belt Development Programme' would be implemented in a phase wise manner under the proposed project of M/s. Gadhinglaj Agro Alcochem Ltd., in the Village : Bhadgaon at Tal.: Gadhinglaj & Dist.: Kolhapur.

Features of Proposed Green Belt Development Programme.

- Trees would be planted in the proposed project's premises along roads as well as along the fence.
- A thick barrier of trees would be created along the entire periphery of the plot.
- The Industry would plant trees of commercial importance.
- In the immediate vicinity of ash storage sections / godowns, the trees tolerant to dust would be planted.

- As per the recommendations by Central Pollution Control Board (CPCB) and Ministry of Environment & Forests (MoEF), the Green Belt would cover more than 33 % of open land available with the Industry. Based on the above assumption, the Green Belt Development Plan has been designed.

The Criteria for Green Belt Development Plan

Emission of SPM, SO_2 is the main criteria for consideration of green belt development. The green belt development is provided to abate effects of the emissions of SPM & SO_2. Moreover, there would also be control on noise from the industry to surrounding localities as considerable attenuation would occur due to the barrier of trees in proposed Green Belt. The species of trees that would be planted under the proposed Green Belt Development Plan, based on SPM, SO_2 and Noise consideration, are as follows -

From actual area calculations under Green Belt as per the plan, it could be seen that the 'Green Belt' under proposed distillery unit of ''Gadhinglaj Agro Alcochem Ltd.', would cover an area of **7699.4 M^2**. Further, about **2889 Trees** would be planted under the proposed Green Belt development plan in a phase wise manner.

In present case, the open space available with industry is **17752.09** Sq. M. (Refer Table 1.1). As per the norms, the industry will have to cover an area of **5858.18** for Green Belt. However, as per design and calculations, the actual area under **Green Belt would be 7699.4 Sq. M.** This accounts for **43.37% of the Open Space** available with the industry.

In all about **2889 Nos.** of Trees would be planted in a phase wise manner and as per the style already mentioned so as to develop a thick, good looking Green Belt.

K) House Keeping & Management In General :

To provide continuous stable and efficient plant operation electronic instruments and a central PLC based control system has been proposed. All field sensors will be electronic and from reputed international brands. The control action will be provided through pneumatically controlled valves. All critical parameters will be constantly monitored by the system and required control action will be automatically decided on basis of programmed algorithms. Proven systems developed in Plants will be utilized in the design.

The milling section of the plant would have the necessary equipment for cleaning of the raw materials and screening the milled floor so as to get the desired particle size.

Moreover, all the equipment of water storage and distribution system, steam supply and distribution systems, storage and handling of raw materials and finished goods, laboratory instruments and testing facilities as well as firefighting equipment would always be maintained so as to get performance at their desired efficiencies.

Along with the main product i.e. Alcohol the distillery will also produce animal feed called as 'Distillers' Dry Grain with Solubles (DDGS)', which will fetch additional income. The whole integrated approach and production of DDGS will result in zero discharge of process effluent as in the case of conventional distilleries based on molasses.

Type and Quantity of the wastes generated from the proposed unit would be,

- Hazardous Wastes in the form of Used Oil to the tune of 0.5 MT/Year.
- Non-Hazardous Solid Waste i.e. Boiler Ash – 5 MT/Day.

The non-hazardous sludge would be used as manure in own premises for plantation under Green Belt. Hazardous waste will be sent to CHWTSDF. Thus the land environment will not be affected due to it.

L) Socio-Economic Development:

a. The Gadhinglaj Agro Alcochem Ltd. would undertake a number of activities related with social welfare such as arranging Blood Donation Camps, Aids Awareness Campaigns, Health Checkup Camps, Distribution of Education Materials among economically deprived students in the command area etc.

b. Medical and health care facilities in the industry would be extended to the residents of nearby areas.

c. The industry would frequently conduct lectures, workshops as well as seminars related to health and hygiene in its premises as well as at nearby villages to create public awareness.

d. The Project Proponents have always taken lead in donating funds for noble causes such as Earthquake and Flood Relief operations etc.

e. The industry would also encourage Infrastructural Development Activities in its Operational Area. This would include construction of Water Supply & Transportation Facilities like Roads, Permanent Shelters for Bus Stops etc.

f. The Integrated Project would provide direct or indirect employment opportunities to local people.

Implementation of above measures as well as certain other socially beneficial aspects would definitely have a positive impact on the Socio-Economic environment in the area around the proposed distillery unit.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Impact on Topography

No major topographical changes are envisaged in the acquired area except some leveling and landscaping. In acquired area, the changes would be due to the manmade structures, like administrative buildings, distillery structure and ancillary units. It may be noted that the industrial activity would invite positive benefits in the form of land leveling and tree plantation in the plant vicinity. The actual area under Green Belt would be 7699.4 Sq. M. This account for 43.37 % of the Open Space available with the industry there under about 2889 Nos. of trees would be planted.

B. Impact on Climate

Impact on the climate conditions due to the proposed grain based distillery unit is not envisaged, as emissions to the atmosphere, of flue gases with very high temperatures are not expected.

C. Impact on Air Quality

To determine the impacts, we have consider an area of 10 Km radius with the proposed industrial unit at its center.

i. Baseline Ambient Air Concentrations

The 24 hourly 98th percentile concentrations and averages of PM_{10}, $PM_{2.5}$, SO_2 and NO_x in Ambient Air, recorded during the field study conducted for the season October, November and December 2012 are considered as baseline values.

The existing baseline concentrations are summarized in the following table:

Table No. 1.9

Baseline Concentrations

Parameter	Concentration
PM_{10}	43.7
$PM_{2.5}$	26.9
SO_2	10.5
NO_X	13.1

Concentrations are in $\mu g/M^3$

ii. Air Polluting Sources

Generally, in any distillery unit, the source of air pollution is boiler house. In the proposed distillery project, the steam required for various operations in distillery unit would be taken from the Boiler of 12 TPH capacity. The Boiler would be provided with Bag Filter as the APC Equipment. Two nos. of D.G. Sets of capacity 600 KVA each would be provided in the proposed industry, which would be operated only during power failures. The same shall be provided with stack height of 5 M height above roof level.

D. IMPACT ON WATER RESOURCES

i. Impact on Surface Water Resources

The water requirement of the proposed distillery would be met from the Hiranyakeshi River. Total water (fresh & recycled) requirement of the proposed distillery would be 978 M^3/Day (*478 + # 500). This water would be needed in the manufacturing process operations, to compensate for the evaporation losses, cooling purpose, domestic purposes etc.

The quantity of domestic effluent would be 8.5 M^3/ Day. The effluent will be treated in septic tank followed by soak pit. The treated effluent would be used for gardening purpose on own land in the premises.

The stillages produced after alcohol stripping would be concentrated, decanted and shall be used in production of Distiller's Dried Grains with Solubles (DDGS) which is a by-product along with the main product i.e. alcohol. When compared with other

conventional distilleries, this is the major benefit with the grain based distillery operation. There would be no any process effluent coming out of the proposed distillery in comparison with conventional distilleries based on molasses. The whole integrated approach and production of DDGS will result in zero discharge of effluent (in light of spent wash generation from conventional distilleries).

However, the total effluent generated from proposed distillery activities shall be to the tune of **519 M^3/Day**. Out of this total effluent, **500 M^3/Day** would be in the form of condensate water, PRC lees, RC lees and FOC lees. This entire effluent shall be recycled in process at Liquefaction Section after pH correction. Remaining Effluent to the tune of **19 M^3/Day** would be in the form of Boiler Blow Down, Cooling Blow Down & CIP Wash. The same shall be evaporated along with the stillage in evaporation system. Their by achieving **Zero Discharge**.

ii. Impact on Ground Water Resources

Water required for the industry would be 978 M^3/ Day. Out of this total water requirement, 478 M^3/ Day would be taken from Hiranyakeshi River and 500 M^3/ Day would be the recycled water. As ground water will not be a source of raw water for the proposed distillery unit, there will not be any impact on ground water level.

E. IMPACT ON SOIL

Impact on the soil characteristics is usually attributed to air emissions, wastewater discharges and solid waste disposal. Increase in chemical constituents of soil is not likely through deposition of air pollutants. Moreover, there will not be any process emissions, worth mentioning. Hence the impact on soil characteristics would be nil.

Solid waste generated would be in form of boiler ash to the tune of 5 MT / Day, the same would be sold to brick manufactures. Moreover, hazardous wastes in the form of used oil, to the tune of 0.5 MT/Yr would be sent to Common Hazardous Waste Treatment, Storage & Disposal Facility (CHWTSDF).

The domestic effluent would be treated in septic tank followed by soak pit. The treated domestic effluent would be used for gardening. Secondly, the industrial effluent would be fully recycled back in process thereby by achieving zero discharge. Here, no any major impact is envisaged. Hence, effect of wastewater discharges on soil and agriculture would not be significant.

F. IMPACT ON NOISE LEVELS

The noise levels in the Work Environment are compared with the standards prescribed by Occupational Safety and Health Administration (OSHA-USA), which in turn were enforced by Government of India through model rules framed under Factories' Act. These standards were established with the emphasis on reducing hearing loss. It should be noted that each shift being of 8 hours duration, maximum permissible limits should not be exceeded. The maximum permissible limit of 115 dB (A) should not be exceeded even for a short duration. Adequate care is taken by providing ear muffs and separate rooms, as sitting place for the operators/workers working on high noise generating machines, should be provided. This will significantly reduce the exposure levels.

The resultant noise levels at the receptor in different areas/zones are envisaged to be within permissible limits, as identified by MoEF.

Thus, it can be stated that the noise impact due to the proposed activity could be significant on Working Environment without control measures, while the noise impact on Community would be negligible.

G. IMPACT ON LAND USE

Proposed distillery would be situated in village Bhadgaon. The present use of the land is non - agricultural. The distillery would be established on the same acquired land and hence no change in the land use pattern is expected. Therefore the impact on land use is non significant.

H. IMPACT ON FLORA AND FAUNA

Any unfavorable alteration in the quality of soil, water or air will lead the change in quality of habitat for plants and animals. This alteration may favor growth of some species and may reduce/eliminate others. The resilience to this change will depend on the extent of unfavorable change.

In the case of proposed distillery, particulate emissions would be of concern; however this would be well within the limits specified by concern authority. No significant loss to the productivity of surrounding agricultural crops is envisaged.

I. IMPACT ON HISTORICAL PLACES

The Samangad fort is situated nearly six miles away towards south-east of the Gadhinglaj and 4.14 Km from project site. The fort is surrounded by trees; it is developed by the government of Maharashtra as a tourist place. There would be no any significant impact on historical place by the proposed project.

ENVIRONMENTAL MONITORING PROGRAMME

Reconnaissance survey of the study area was undertaken in the month of October 2012. Field monitoring for measuring meteorological conditions, ambient air quality, water quality, soil quality and noise levels was initiated in October 2012. The report incorporates the data monitored during the period from 1st October 2012 to 31st December 2012 and secondary data collected from various sources which include Government Departments related to ground water, soil, agriculture, forest etc.

A. Land Use

Land use study requires data regarding topography, zoning, settlement, industry, forest, roads and traffic etc. The collection of this data was done from various secondary sources viz., Census books, Revenue records, State and Central Government Offices, Survey of India toposheets as well as high resolution satellite image and through primary field surveys.

B. Land Use/ Land Cover Categories of Study Area

Table No.: 1.10

Sr. No.	Land use land cover	Percentage (%)
1	Vegetation	4.955
2	Water Body	3.567
3	Settlement	15.073
4	Plantation	20.767
5	Barren Land	21.821
6	Agriculture	31.615
7	River	2.202
	Total	**100.0**

C. Meteorology

The methodology adopted for monitoring surface observations is as per the standard norms laid down by Bureau of Indian Standards (BIS) and the India Meteorology Department (IMD). On-site monitoring was undertaken for various meteorological variables in order to generate the data. Further, meteorological data has been taken from IMD, Mumbai.

The meteorological parameters were monitored during the period from1st October 2012 to 31st December 2012. The details of parameters monitored, equipments used and the frequency of monitoring are given below-

Table No.: 1.11
Meteorology Parameters

Sr. No.	Parameters	Instrument	Frequency
1.	Wind Speed	Counter Cup Anemometer	Twice a day
2.	Wind Direction	Wind Vane	Twice a day
3.	Temperature	Min./Max.: Thermometer	Once in a day
4.	Relative Humidity	Dry/Wet bulb Thermometer	Twice a day

Secondary information on meteorological conditions has been collected from the IMD station, Mumbai. Temperatures, relative humidity, rainfall intensity have been compiled from the same. Similarly data on solar radiation, inversion, cloud cover and evaporation rates are compiled from climatological tables from the nearest IMD station, Kolhapur.

D. Air Quality

This section describes the selection of sampling locations, includes the methodology of sampling and analytical techniques with frequency of sampling. Presentation of results for the October 2012 to December 2012 survey is followed by observations. All the requisite monitoring assignments, sampling and analysis was conducted through the laboratory of M/s. Horizon Services, Pune. The lab has been approved

by MoEF; New Delhi and has also received ISO 9001–2008 and ISO 14001 – 2004 accreditation by DNV.

Ambient air monitoring was conducted in the study area to assess the quality of air for PM_{10}, $PM_{2.5}$, SO_2, NO_x and CO. The various monitoring stations selected are shown in following table

Table No.: 1.12
Ambient Air Quality Monitoring (AAQM) Locations

AAQM Station Code	Name of The Station	Distance from the Site (Km)	Direction w.r.t. the Site
A1	Industrial site	--	--
A2	Chinchewadi	4.8	ESE
A3	Naukud	8.4	ESE
A4	Mahagaon	4.8	SW
A5	Gijawane	5	NW
A6	Ainapur	6.1	W
A7	Masewadi	6.5	SSE

Table No. 1.13
Summary of the AAQ Levels for Monitoring Season [October 2012 to December 2012]

Sr. No.	Location	PM_{10} µg/M^3				$PM_{2.5}$ µg/M^3				SO_2 µg/M^3				NOx µg/M^3			
		Max.	Min.	Avg.	98%	Max.	Min.	Avg.	98%	Max.	Min.	Avg.	98%	Max.	Min.	Avg.	98%
1.	Site	44.6	42.8	43.7	44.6	27.6	26.2	26.9	27.6	11.7	9.3	10.5	11.6	14.5	11.6	13.1	14.3
2.	Chinchewadi	25.2	22.2	23.7	25.2	11.5	9.5	10.5	11.5	12.6	10.0	11.3	12.4	15.3	12.5	13.9	15.2
3.	Naukud	22.4	20.2	21.3	22.4	10.5	8.3	9.4	10.4	12.3	9.2	10.8	12.0	13.7	10.5	12.1	13.5
4.	Mahagaon	30.0	21.2	25.6	29.4	15.8	12.7	14.3	15.7	14.4	11.4	12.9	14.2	18.3	16.2	17.3	18.2
5.	Gijawane	38.5	36.5	37.5	38.4	16.9	15.5	16.2	16.8	12.2	9.2	10.7	11.9	18.6	16.8	17.7	18.6
6.	Ainapur	25.1	21.6	23.4	25.0	14.7	13.4	14.1	14.7	12.3	9.2	10.8	12.1	18.2	16.2	17.2	18.1
7.	Masewadi	24.6	22.1	23.4	24.5	10.5	8.2	9.3	10.4	11.4	9.5	10.4	11.3	14.6	12.4	13.5	14.5

Note:

- PM_{10}, $PM_{2.5}$, SO_2 and NO_x are computed based on 24 hourly values.
- CO is computed based on 8 hourly values.
- The CO concentrations were observed to be well below detectable limits and hence the same are not mentioned in the above table.

Table No. 1.14
NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) SPECIFIED BY CENTRAL POLLUTION CONTROL BOARD NOTIFICATION (NEW DELHI, THE 18TH NOVEMBER, 2009)

Sr. No.	Zone Station	PM_{10} µg/M^3		$PM_{2.5}$ µg/M^3		SO_2 µg/M^3		NOx µg/M^3		CO mg/M^3	
		24 hr	A.A.	24 hr	A.A.	24 hr	A.A.	24 hr	A.A.	1 hr	8 hr
1.	Industrial and mixed use zone	100	60	60	40	80	50	80	40	4	2
2.	Residential and rural zone	100	60	60	40	80	20	80	30	4	2

Note: A.A. represents “Annual Average”

E. Water Quality

Sampling and analysis of water samples for physical, chemical and heavy metals were undertaken through MoEF; New Delhi approved laboratory- M/s. Horizon Services, Pune - that has also received ISO 9001–2008 and ISO 14001 – 2004 accreditation by DNV. Four locations for surface water and five locations for ground water were selected. The same are listed below-

Table No. 1.15

MONITORING LOCATIONS FOR SURFACE WATER

Station Code	Name of the Station	Distance from the Center of Proposed Site (Km)	Direction w.r.t. the Proposed Site
SW1	Dundage	8.2	NNE
SW2	Saroli	6.9	WSW
SW3	Narewadi	7.1	ESE
SW4	Hunhingal	2.3	NW

Table No. 1.16

MONITORING LOCATIONS FOR GROUND WATER

Station Code	Name of the Station	Distance from the Center of Proposed Site (Km)	Direction w.r.t. the Proposed Site
GW1	Site	-	-
GW2	Gadhinglaj	5.4	NNW
GW3	Mahagaon	4.8	SW
GW4	Vairagwadi	2.8	S
GW5	Dundage	8.2	NNE
GW6	Hebbal	9	NE

F. Noise Level Survey

The study area of 10 Km radius with reference to the proposed plant site has been covered for noise environment. The four zones viz. Residential, Commercial, Industrial and Silence Zones have been considered for noise monitoring. Some of the major arterial roads were covered to assess the noise due to traffic. Noise monitoring was undertaken for 24 hours at each location.

The main objective of noise pollution impact assessment in the study area is to assess the impact of total noise generated by industries and vehicular traffic on the human settlements within 10 Km radius. The details of noise monitoring stations are given in **Table 1.17.**

Table No.: 1.17
NOISE SAMPLING LOCATIONS

Station Code	Name of the Sampling Point	Distance, w.r.t. the Plant Site	Direction w.r.t. the Plant Site
N1	Site	-	-
N2	Vairagwadi	2.8	S
N3	Chinchewadi	4.8	ESE
N4	Shindewadi	4.8	NE
N5	Kadal	5.9	SE
N6	Ningudage	6.8	WSW
N7	Gadhinglaj	5.4	NNW
N8	Lakudwadi	7.2	SSW
N9	Hebbal	9	NE
N10	Kaulge	7.9	W

Table No. – 1.18
AMBIENT NOISE LEVELS

Sr. No.	Location	Average Noise Level in dB(A)					
		L_{10}	L_{50}	L_{90}	$L_{eq(day)}$	$L_{eq(night)}$	L_{dn}
1	N1	44.25	47.55	48.7	53.3	42.6	53.4
2	N2	43.65	47.85	49.05	53.5	43.4	53.9
3	N3	44.55	47.3	48.95	52.1	43.2	53.0
4	N4	43.45	46.95	48.9	52.3	42.7	53.1
5	N5	42.95	47.5	48.65	52.3	42.8	52.9
6	N6	43.45	46.55	48.9	51.4	42.9	52.7
7	N7	45.3	47.8	49.15	53.4	42.7	53.7
8	N8	43.4	47.1	48.65	52.7	42.7	53.1
9	N9	42.55	46.45	49.15	51.8	42.8	53.1
10	N10	42.65	45.5	48.15	50.1	42.2	51.7

G. Socio-Economic Profile

Socio-economic status of the population is an indicator for the development of the region. Any developmental project of any magnitude will have a bearing on the living conditions and on the economic base of population in particular and the region as a whole.

As per the scope of this study, the information on socio-economic aspects has been gathered and compiled from several secondary sources. These include Taluka Office, Collectorate, Agriculture Department, Irrigation Department, Central Ground Water Board, Department of Mines and Geology etc. The demographic data has mainly been compiled from the District Census Report, 2001 for District Kolhapur as these documents are comprehensive and authentic.

H. Ecology

The ecological impact assessment presented in this report is based on

- Data generated during the monsoon and winter season for the year 2012. It involved a detailed study of 10 Km radius area with the proposed Distillery as center.
- Data collected from secondary sources.

Based on the criteria, following terrestrial and aquatic sites were selected for detailed study.

Table No. 1.19

LIST OF TERRESTRIAL LOCATIONS

Location Code	Location	Distance & Direction w.r.t. Site
T1	Kadgaon	9 NNW
T2	Tupurwadi	7.08 SE
T3	Mahagaon	4.8 SW
T4	Dundage	8.1 NNE

Table No. 1.20
LIST OF AQUATIC LOCATIONS

Location Code	Location	Distance & Direction w.r.t. Site
AQ1	Dundage	8.2 NNE
AQ2	Saroli	6.9 WSW

Terrestrial sites were studied by employing random sampling and/or using least count quadrate method. List of flora was done by visual observation and classification of species into life forms was done according to Braun-Banquet's modification of Raunkiaer's classification. The importance of species for various uses was noted from secondary sources and on consulting the local people. The terrestrial fauna was studied by sighting, noting pug-marks, calls, sounds, droppings, nests, burrows and interrogating local people as to presence and abundance of animals.

ADDITIONAL STUDIES & INFORMATION

Risks Assessment -

Risk to human health is inherent. It is safe only when the installation is dismantled at the end of its useful life. The following principles should be used as guidelines for the selection of risk criteria -

1. The increase in risk, caused by the presence of the plant to local community (i.e. neighboring public) should be negligible in comparison to the risk they already have in their daily life.

2. The work force on the plant should be expected to accept a potentially greater risk than the members of the local community since the work force have been trained to protect themselves from the possible hazards and thus reducing the actual risk to themselves.

The risk criteria considered by Green A.G. (1982) are given as below:

1. Risk to Plant: This risk is to be given priority only when it is proved beyond doubt that the risk to life is so low that reducing this risk may not be justified. Under this consideration, the risk to economic damage may be considered.

2. Risk to Public and Employees: The scale used for risk to employee and public is Fatal Accident Rate (F.A.R.) or more commonly Fatal Accident Frequency Rate. (F.A.F.R.). The F.A.R. and F.A.F.R. is defined as number of deaths from industrial injury expected in a group of 1000 men during their working period.

Following care should be taken-:

a. Electricity wiring will be flame-proof.
b. Ventilation will be provided.
c. Ware –house will be kept in good conditions.
d. Adequate fire fighting equipment will be kept.
e. Warning signs and instructions will be displayed at appropriate locations.
f. Solvents shall be stored in good quality and leak proof steel tanks. Bund walls shall be constructed around the tank.
g. If there is increase in temperature beyond 300C external cooling of tanks shall be provided. A temperature recorder will be provided to the tanks.
h. If there is leakage –

- Leakage shall be collected and cleaned.
- Replacing of leaky gaskets, joints, shall be done strictly by following work permit system.
- Leakage of pipelines, welding repairs shall be attended out side the plant.
- Leakage through gland should be regularly attached. It should be perfectly stopped by adopting improved techniques such as mechanical seals.

To attend all major leakage in tanks the following procedure shall be followed –

a. Transfer the material to other tank.
b. Prepare the tank for welding repairs and this shall be done by skilled workers.

Boiler operations: -

I. Personal protective equipment's shall be given to workers.
II. Pilot lights shall be provided on electrical panel boards.
III. Hand operable fire fighting cylinders shall be provided.

Others: -

I. Frequent checking of pipe lines and storage units should be done.
II. Welding should not be done near combustible material storage.
III. Ash generated from fire should always be placed in metal receptacles and removed as soon as possible.
IV. Fuel pipes provided should be as short as possible and should be separated from any unprotected combustible material by a distance of 3 times the diameter of fuel pipe.

Project Benefits:-

The market opportunities for products, including their excellent export potential, help in:

- Higher value addition on the company's product range.
- Diversification of market risks, as it adds to the range of customers for the products.
- Higher realizations & profitability from export markets.

Salient Features of EMP

i. Management during Construction Phase

During construction phase, following recommendations are suggested-

- During construction phase, there is a scope for local dust emissions. Suitable measures would be taken to protect workers against dust arising from leveling, drilling, crushing, excavation and transportation. Water would be sprinkled frequently in the vicinity of the construction activity and on kuccha internal roads.
- Industry would go for extensive tree plantation program at the outset of the project itself along the boundaries of proposed unit site and along internal roads to mitigate dust from construction activities.
- The construction site would be provided with sufficient and suitable sanitation facilities for workers to maintain proper standards of hygiene. It is advisable that on site workers using high noise construction equipment like bulldozers, concrete mixers should adopt noise protection devices. Noise prone activities would be restricted during night particularly between the periods 12 hrs. to 06 hrs in order to have minimum adverse impact.
- It would be ensured that both petrol and diesel powered construction vehicles are properly maintained to minimize pollutants in the exhaust emissions. The vehicle maintenance area would be located in such a manner to prevent contamination of surface and ground water resources by accidental spillage of oil. Unauthorized dumping of waste oil would be prohibited.
- As soon as construction is over, overburden would be utilized to fill up low-lying areas. The rubbish would be cleared and all open surfaces would be leveled and cleaned. Appropriate vegetation would be planted and all such areas would be landscaped. Hazardous materials, if any (e.g. acids, paints and explosives), would be stored and disposed off in designated areas.

Management during the Post Construction Phase

Additional measures to be taken during the post construction phase are given below-

1. Air Pollution Management

The steam required for the proposed project would be taken 12 TPH boiler. Fuel used for same would be Coal/ Bagasse.

2. Water Management

The total water requirement for proposed project would be 978 M^3/ Day, which includes domestic demand of 10 M^3/Day and industrial demand of 968 M^3/Day. Out of this total water requirement, 478 M^3/ Day would be taken from Hiranyakeshi River and 500 M^3/ Day would be the recycled water.

3. 3. Noise Level Management

Mitigation measures for noise levels are of following types:

- Preventive measures at source
- Control of transmission path
- Protective measures in the work environment
- Administrative control

Prevention at source not only reduces the cost of measures but also alleviates the danger of possible exposure to high noise levels.

The baseline levels monitored at different places are well within the limits. The likely increase, in noise levels, due to proposed project at the site is expected to be negligible. Hence, impact of noise from the project at the nearby villages will be very minimal.

The following measures would be adopted by the industry -

a. The industry would take care while procuring major noise generating machines / equipments to ensure that the manufacturers have taken adequate measures to minimize generation of noise.
b. Surrounding / concealment of noise generating machinery with artificial, non-permanent arrangement like noise insulation structures; shock absorbing techniques would be adopted to reduce the impact.
c. Provision of insulating caps and lids at the exit on noise source on the machinery and providing polystyrene, etc. as noise insulation material would be adopted. All the openings like covers, partitions would be acoustically sealed. Reflected noise would be reduced by the use of noise absorbing material on roofs, walls and floors.
d. The distance between source and receiver would be increased and the relative orientation of the source and receiver would be altered.
e. Thick bushy trees would be planted in and around the industrial area to intercept noise transmission to the nearby villages.
f. Workers would be provided with Personal Protective Equipments like earmuffs & earplugs, noise helmets etc.
g. Allocation of work would be managed so that no worker is exposed to noise more than 90 dB (A) for more than 8 hours.

h. Restructuring of work patterns such as job switching etc. would be adopted, so, can reduce pressure on few workers.
i. Creating awareness about noise pollution among the workers.
j. The overall noise levels in and around the plant area would be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation wherever feasible.

4. Land Management

Impact on the soil characteristics is usually attributed to air emissions, wastewater, solid waste and hazardous waste disposal. Increase in chemical constituents of soil is unlikely through deposition of air pollutants.

As mentioned above, no any impact on soil characteristics is envisaged due to proposed activities.

5. Operation Control and Equipment Maintenance

It is also necessary to highlight the importance of proper plant operation and maintenance. The lubricants used for various equipments would contribute to pollution. A care would be taken at the source by looking after possible spillage, drippings, leakage etc. in the plant. The entire plant and machinery would be maintained in proper condition so as to deliver performance at expected efficiencies.