

2015

PREFEASIBILITY REPORT
OF PROPOSED 2x300MT
MOUNDED BULLETS STORAGE
VESSELS FOR LPG

**At IOCL, PONDICHERRY LPG
BOTTLING PLANT, Pondicherry (UT)**

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- &
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1. Executive Summary

Incorporated as Indian Oil Corporation Ltd. on 1st September, 1964, Indian Oil and its Subsidiaries account for approximately 48% Petroleum Products' market share, 34% national Refining Capacity and 71% downstream sector pipelines capacity in India. It is India's flagship national Oil Company and downstream Petroleum Major thus being India's largest Commercial Enterprise.

As the flagship national Oil Company in the downstream sector, Indian Oil reaches precious petroleum products to millions of people every day through a countrywide network of about 35,000 sales points. They are backed for supplies by 167 bulk storage Terminals and Depots, 101 Aviation Fuel Stations and 89 LPG Bottling Plants. It is a Fortune-500 Company of India.

The Indian Oil Group of Companies own and operate 10 of India's 20 Refineries with a combined refining capacity of 60.2 million metric tons per annum (MMTPA, .i.e. 1.2 million barrels per day). These include two Refineries of subsidiary Chennai Petroleum Corporation Ltd.

The Corporation's cross-country network of crude oil and product pipelines, spanning over 10,000 kms and the largest in the country, meet the vital energy needs of the consumers in an efficient, economical and environment-friendly manner.

As a leading Public Sector Enterprise of India, Indian Oil has successfully combined its corporate social responsibility agenda with its business offerings, meeting the energy needs of millions of people everyday across the length and breadth of the country, traversing a diversity of cultures, difficult terrains and harsh climatic conditions.

Indane Bottling Plant, Pondicherry, a Unit under Indian Oil Corporation Limited, was commissioned in October 1993. It is involved in receipt, storage, bottling and distribution of Liquefied Petroleum Gas (LPG). The bottling capacity of Plant is 36,000 MT per annum. It caters to the packed Liquefied Petroleum Gas (LPG) requirement of PONDICHERRY, CUDDALORE, CHIDAMBARAM, THURUKOVILUR and VILUPPURAM Districts of Tamil Nadu State and Union Territory of PONDICHERRY

Nearest inhabited locality is village VILLINUR which has the maximum population of 10,000. The staff strength of the Plant comprises of 20 Plant personnel including Officer, field staff, 40 contract worker. Apart from those 10 Security personnel including supervisor deputed for safety of the Plant.

At present, the Bulk LPG required for bottling is transported to the Plant by road tankers of 18 MT capacity, which are specially fabricated for LPG transportation. LPG road tankers received from IPPL, Chennai and CPCL, CHENNAI is decanted to the LPG storage vessels (Mounded Bullets) by the pressure differential method using the LPG

Vapour Compressors provided for the purpose. The requirement of LPG is about 132 MT/day.

LPG from the storage vessels will be pumped to the 18 point electronic filling machines and the empty gas cylinders will be filled using the pneumatically operated filling guns. Each cylinder for Domestic use will be filled with 14.2 kg of LPG, weight being automatically adjusted. The cylinders for Industrial use will be filled with 19.0 Kg of LPG. After filling, the cylinders pass through various quality checks including the weight check, leak test, etc., before sealing. Packed cylinders are delivered in a Truck with a capacity of 306 cyls. to the market.

The gas leak detection, fire prevention and control system at Pondicherry LPG Bottling Plant are the latest and comply with the OISD norms. The same shall be extended to the new LPG vessels. All LPG storage vessels, cylinder storage/ filling/ repair sheds, LPG Pump House and TLD are fully covered by medium velocity water spray system. This Bottling Plant will also cater to the non-domestic LPG demand, Bulk LPG and Auto LPG demand of Pondicherry & few districts in Tamil Nadu.

LPG is a mixture of commercial butane and commercial propane having both saturated and unsaturated hydrocarbons. LPG marketed in India is governed by Indian Standard Code IS-4576. LPG is in vapor form at ambient temperature but is normally maintained in liquid state by application of moderate pressure or reduction in temperature. The power supply to the terminal is from Punjab State Electricity Board during emergency DG sets will be used for emergency purpose only. The water required for the terminal operation such as fire water, domestic water shall be sourced from local municipal sources & other local sources.

No significant emissions are anticipated from the proposed project activities which are used only during emergencies. Emissions from the DG sets shall be vented out through exhaust as per statutory norms and will be monitored. Fugitive emissions from project activity is envisaged and adequate control measures will be in place. Solid waste viz. Hazardous solid waste & non hazardous solid waste generated in terminal will be collected, segregated and disposed of through authorized agency as per Hazardous waste rule. The proposed terminal has adequate safety & fire fighting systems in place to control any toward incidents. These systems are in line with the requirements of OISD.

The proposed project will not lead to additional employment during operation phase. Manpower required for proposed expansion shall be positioned out of sanctions already available for Pondicherry BP. Local manpower will be preferred during construction phase. The proposed project will be completed in approximately 24 months from the date of approval, environmental & other statutory clearances, whichever is later. The total cost of the proposed project is around 1500 lakhs.

2. Introduction

Pondicherry LPG Bottling Plant was commissioned in the year 1993 with a total Area of 17 Acres of Govt land, about 10 Kms. from Pondicherry (5 Kms. from village

Villianur) in the village Thirukanchi, Villiyannur Taluk, on the banks of the River Sankarabarani. The licensed area is 32,266 Sq.m, the delicensed area is 5,300 Sq.m. and the Green Belt area is 31,260 Sq.m.

SURROUNDING AREAS

North : Sankara Vidyalaya School & Kasi Vishwanathar Temple

South : River Sankarabarani

East : Promboke Land

West : River bed

Geological Settings:

Pondicherry is a Union Territory of India and is located on the Coromandel Coast in South India.

Topography :

The topography of Pondicherry is the same as that of coastal Tamil Nadu.

Pondicherry's average elevation is at sea level, and a number of sea inlets, referred to as "backwaters" can be found.

Pondicherry experiences coastal erosion. The City is protected against the sea by a 1.25 mile (2-kilometres) long seawall, first completed by the French in 1735, which reaches a height of 27 feet above sea level.[1] A weather-beaten cement plaque with the year 1952 is still visible along a section of the seawall. The seawall is protected from the direct onslaught of waves by rows of granite boulders, which are reinforced every year to stop erosion. Whenever gaps appear or the stones sink into the sand, the Government adds more boulders to keep it strong.

Capacity

There will be no chemical process involved and the operation carried out will be receipt of LPG in bulk form through pipe line (or in road tankers), storage in mounded bullets and filling of LPG into cylinders using carousel and associated systems. The MSDS of the LPG to be stored is as showcased in Annexure I. The cylinders filled will be checked for quality and then dispatched. In the LPG Bottling Plant the additional storage will be pressurized form in mounded storage. The mounded storage will be in 3 bullets of 100 MT each with a total capacity of 300 MT. The system of mounded storage has been recognized as one of the safest form of storage of LPG.

TABLE-1
PROJECT CAPACITY

Type of Vessel	Existing/Proposed	Nos.	Capacity	Total Capacity
Mounded Bullets	Existing	3	100 MT	300 MT
Mounded Bullets	Proposed	2	300 MT	600 MT
Total				900 MT

Nature of Project

Pondicherry Bottling Plant operates strictly as a storage & packing facility for LPG. No by-products / additional products are generated / manufactured during the operations. Hence, the present proposal is classified under Schedule 6(b) & Category 'B' according to EIA Notification 2006 & subsequent amendments.

3. Site Information

M/s IOCL Pondicherry Bottling Plant has proposed to set up an additional LPG mounded Bullets

- **Infrastructure**

For establishment and successful operation of Pondicherry Bottling Plant, it is imperative to ensure availability of the following infrastructure:

- Rail/ road accessibility;
- Availability of water and proximity to source;
- Availability of land;
- No populated city in vicinity;
- Power evacuation plan; and
- Environmental consideration.

- **Connectivity**

The project site is located at distance of about 10 Kms from Pondicherry (5 Kms. from village Villianur). The site is well connected to Chennai by NH road through Tindivanam 40 Km. The nearest Airport is Pondicherry Airport located at 10 KM

- **Environmental Setting**

The Environmental Setting in 10 km radius of project site is presented in **Table-2**.

TABLE-2
ENVIRONMENTAL SETTING

Sr. No.	Particulars	Details
1	Plant location	Area of 17 Acres of Govt land, about 10 Kms. from Pondicherry (5 Kms. from village Villianur) in the village Thirukanchi, Villianur Taluk, on the banks of the River Sankarabarani. The licensed area is 32,266 Sq.m, the delicensed area is 5,300 Sq.m. and the Green Belt area is 31,260 Sq.m.

Sr. No.	Particulars	Details
2	Site Coordinates	Latitude : 11°89'57.81"N, Longitude: 79°76'78.51"E
3	Climatic conditions at Pondicherry	
4	Maximum temperature	35.7° C
5	Minimum temperature	20.9° C
6	Annual rainfall (total)	1,240 mm (49 in).
7	Relative humidity	Maximum- 82.8 % Minimum- 67 %
8	Predominant wind directions	From East to West
9	Present land use at the site	Land use pattern is notified for industrial use
10	Nearest highway	NH-45A
11	Nearest railway station	Railway station: Puduchery (~10.0 km,NE)
12	Nearest Airport	Airport: Puduchery (~12 km, N)
13	Nearest major water bodies	Sangarabarani River 0.147 KM Sea – 7 Km
14	Nearest town/City	Odiyamputti (~2.00 km,N)
15	Archaeologically important places	Manakula Vinayagar Temple – 10Km
16	Protected areas as per Wildlife Protection Act, 1972 (Tiger reserve, Elephant reserve, Biospheres, National parks, Wildlife sanctuaries, community reserves and conservation reserves)	Nil
17	Reserved / Protected Forests	• NA
18	Defence Installations	Nil
19	List of major Industries in 10 km radius	•
20	Seismicity	Seismic Zone-III as per IS 1893 (Part I): 2002

Land Use and Land Ownership

The proposed expansion will be carried out in the vacant land of existing plant. Hence, no alternate sites were considered for the project. The land use is industrial and no new land

acquisition is required for the project. The land required for the expansion of the storage facilities is already in possession of IOCL.

Water requirement:

Water for the project will be supplied by IOCL Pondy BP

Power requirement:

The power required for the proposed project met from power grid

3. Project Description

The capacity of the Bottling Plant at Pondicherry is currently 34,000 MT/Annum. There will be no chemical process involved and the operation carried out will be receipt of LPG (Liquid Petroleum Gas) by IPPL Ennore. After receiving of bulk LPG in isolated storage vessels and filling of LPG into domestic and non-domestic cylinders using electronic carousel and associated systems. The cylinders filled will be checked for quality and then transported with packed trucks to Indane distributors, where filled cylinders are transported to individual customers. In the Proposed LPG bottling plant the storage will be pressurized form in mounded storage. The additional mounded storage will be in 3 bullets of 100 MT each with a total capacity of 300 MT. Process flow diagram is shown in **Figure-1**.

The process involved can be divided into 4 Stages:

- Receipt of finished LPG products through pipeline.
- Storage of LPG products in storage tanks as per OISD norms.
- Packaging of the LPG into cylinders.
- Dispatch of LPG products through packed trucks

Transport and handling through piping system, handling techniques, specific equipment used and standard operating procedures etc. the details are given below:

Bottling/filling of LPG in packed cylinders

LPG is transferred from storage vessel to carousels, where filling of cylinders takes place with help of LPG pump and also to increase the discharge pressure of LPG pump, pressurization takes place from the other bullet to this delivery bullet with help of LPG compressors.

Dispatching of filled cylinders by stake trucks

The filled cylinders are loaded in stake trucks and are sent to distributors. The movement of cylinders from one place to other place shall be done with help of trolley without rolling

Loading/unloading from bullet trucks

During any maintenance of issue in pipeline, bulk LPG is received through road movement by bullet truck from IPPL, Chennai. And also some time, requires to send bulk LPG through road movement by bullet trucks to Hyderabad bottling plant.

The piping system and instrumentation drawing of plant is shown in **Figure-2**.

Basically there are four types of storage methods:

1. Above ground bullets;
2. Mounded bullets;
3. Cavern type storage; and
4. Cryogenic type storage.

Cryogenic type of storage is normally suitable for low temperature places, this type of storage is used in ships where bulk LPG is transported. Hence it is not suitable here, Cavern type storage is used to store the huge quantity of bulk LPG in underground in rack area. Basically this type of storage is for storing huge quantity and normally used near refinery. Hence it is not suitable.

The above ground bullets are normally suitable for storing of low quantity of bulk LPG and are installed above ground. It requires more safety as the bullet shell plates are directly exposed to the atmosphere.

4. Need for Project Activity

The existing Pondy BP currently has 2.5 days cover against a bottling capacity. This poses the following inconveniences:

- Any disruption in supplies from Ennore, there can be dry-out situations and may also lead to procure bulk LPG from non-economical sources.
- With small size vessels and dead stocks (unpumpable), the effective transfer/receipt quantity is even less which calls for frequent, switch-over between vessel under receipt and vessel engaged for cylinder bottling.
- Residual lives of 3 nos existing old Mounded bullets are limited. Any further reduction in storage would lead to severe constraint in day-to-day operation and a crisis situation.

In view of the foregoing, the Div has proposed for provision of additional 2 nos of mounded bullets with 300 MT capacities each in the plant will ensure 7-8 days cover on a stand-alone basis against total bulk LPG storage capacity of 900 MT.

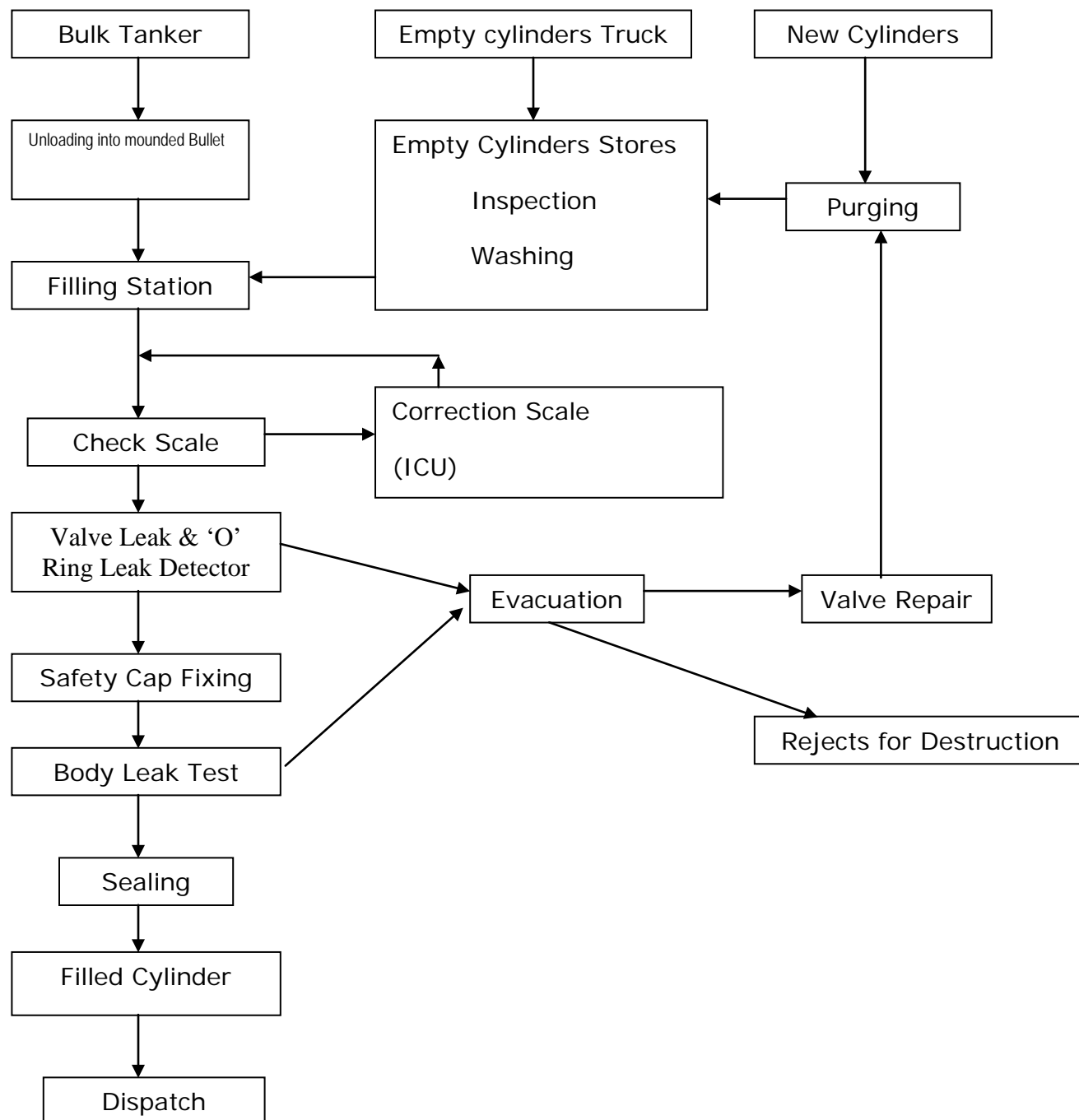


FIGURE-2
PROCESS FLOW CHART

5. Environment Control Measures

- During construction phase there will be fugitive emissions due to movement of equipment at site, dust emitted during the leveling, grading, earthworks, foundation works and other construction related activities. These impacts will however, be marginal and temporary in nature.
- Periodic LDAR survey shall be carried out to detect & control such measures.
- Sewage generation is envisaged during operation phase and hence STP along with soak pit is proposed to cater the sewage load. Sewage from the administration building will be routed to the septic tanks followed by soak pits and the sludge generated from the septic tank will be dried and used as manure for green belt area.
- Storm water drains are provided at Terminal. These drains carry storm water from Tank dykes/other areas outside the terminal premises in a controlled manner.
- The DG sets shall be acoustically insulated resulting in reduction of noise as per limits prescribed by State Pollution Control Board. The exhaust pipe from DG sets shall be taken above the building as per State Pollution Control norms.
- No process / manufacturing involved. Hence no solid waste generated.
- All conditions & pre-requisites of water and air consents together with certificate to handle hazardous products issued by State Pollution Control Board shall be strictly adhered to.

6. Fire & Safety Measures

Fire Prevention system-

The gas leak detection, fire prevention and control system at Pondicherry LPG Bottling Plant are the latest and comply with the OISD norms. The following systems are provided at Pondicherry Bottling Plant:-

❖ **GAS MONITORING SYSTEM:**

The system consists of gas detecting sensors linked to a computerized processing unit and with alarm panels at control room, filling shed, plant manager's cabin as well as security gate having audio / visual alarms and MIMIC Panel to alert the plant personnel. The sensors are located at sensitive or potential hazard areas in the plant.

❖ **AIR/VAPOUR EXTRACTION SYSTEM:** It is a blower with ducts extended to different operating points in filling shed. The blower extracts any leaking LPG vapour from the floor level and cold flares the same to the free atmosphere at the height of 1.5 meter from the highest points of eaves of the shed. This system is interlocked with filling system, such that the blower has to be started before the carousel is started for filling operation. A standby blower is also given to meet situations where one of the blower is out of order. In this way there is no accumulation of LPG at plant floor level and any minor leaks due to operating operation is immediately evacuated and not allowed to reach the lower explosive limit.

❖ **REMOTE CONTROL VALVES:** These are pneumatically operated quick shut off valves provided on LPG pipelines with actuating points located both remotely and nearer to operating facilities in plant. When actuated, the valves will close within 25 seconds, stopping the flow of LPG in pipelines. In case of leakage of LPG through flange joint or rupture of pipeline, the remote operated valves are operated restricting the leakage of LPG to the sections between two ROVs only and the LPG in upstream area and the storage bullet area is cut off from the leaking point, thereby preventing major leakage or fire.

❖ **HIGH LEVEL ALARM:** This kind of alarm is installed in storage bullets and other vessels. In case of filling of more than 85 % the alarm will be actuated at Pump Housed which is a manned location and REMOTE OPERATED VALVES installed in storage vessel will close the flow of LPG to vessel. The actuation of REMOTE OPERATED valve and alarm is interlocked with the level of LPG liquid in vessel.

❖ **EMERGENCY TRIP BUTTONS & MANUAL CALL POINTS:** These emergency push buttons are provided at strategic places in the plant. In case of emergency, when the emergency trip button is actuated action takes place as specified in the clause 11.11 of OISD 144 which involves tripping of electricity to all the operating equipment in the hazardous area of the plant, closure of all remote operated valves on the LPG pipelines and sounding of siren. Operation of manual

call point will denote a abnormal situation alerting the plant personnel and will involve the sounding of siren only. These points are provided at strategic locations in the plant.

❖ **MEDIUM VELOCITY SPRAY SYSTEM:** This sprinkle system is provided in the operating areas of hazardous areas of plant like al sheds involving filling, storage and operation on cylinders, tank lorry decantation shed, expose flanges of mounded storage, LPG pump house, etc., as per the specifications given in OISD 144 / 150.





Adequate storage of fire water in exclusive above ground tanks is maintained as per the fire water calculation. There is a fire water pipeline system which is constantly kept pressurized with a minimum of 7 kg per centimeter square using jockey pumps which start and stop automatically at preset pressures. The fire water pipeline is connected to the MV spray system through deluge walls where an air water balance is maintained. The MV Spray system is equipped with a quartzoid bulb fire detection system. When the temperature reaches 79° C the bulb will be burst releasing the air water balance at the deluge valve and thereby starting the sprinkling of water. This will reduce the pressure in the pipeline which will start the fire water pumps. Thus the entire system of fire protection is automatic. In case of actuation of sprinkler either by bursting of quartzoid bulb, or operating sprinkler manually, all plant machineries will trip electrically, electric siren will be sounded , fire engine will be started ,all remote operated valve in liquid LPG line will be closed and emergency light will be activated (At night). This system is called Interlocked Shut down System.

❖ **MUTUAL AID** - Mutual Aid agreement will be made with other oil sector units in and around PONDICHERRYI and also larger units in Industrial Area,

Fire Fighting Water Calculation for Proposed BP

All LPG storage Vessels, Cylinder Storage/ Filling/ Repair Sheds, LPG Pump House, TLD are fully covered by medium velocity water spray system.

The main components of the fire water system are:

-  Fire Water Storage
-  Fire Water Pumps
-  Water Sprinkler/ Deluge system.
-  Fire Hydrant/ Monitor distribution piping network.

Flow Rate Design:

MV sprinkler system with automatic heat detection having remote/ local operated deluge valve with spray density of Minimum 10.2 LPM/ Sq.M are provided at all facilities excluding LPG Pump house (i.e., storage Vessels, Cylinder Storage/ Filling/ Repair Sheds, TLD) where as LPG Pump house is provided with 20.4 LPM/ Sq.M.

The fire water system in the plant designed to meet the highest fire water flow requirement of a single largest risk i.e., Filling Shed plus 288 Cu.M/Hr. for operating 2 Nos. Fire water Monitors/ Supplementary Hose requirements.

FIRE WATER STORAGE AT Pondicherry BP:

Total three numbers of fire water tanks with capacity of 1100KL each.

Total fire water storage = 3300 KL.

FIRE WATER PUMPS CAPACITY AT PONDICHERRY BP:

There will be three Fire water pumps of 410 cum per hour capacity out of which two will be in the main pumps and one fire pump will be a standby. There will be two Jockey pumps (one main and one standby) with a capacity of 10 Cum/Hr which start and stop automatically to maintain the water pressure at minimum 7 kg per sq cm in the fire hydrant line at the farthest end. There will be three diesel engine fire water pumps with a capacity of 410 Cum/Hr. Layout of fire water system is shown in **Figure-3**.

DELUGE VALVE SYSTEM:

Different Modes of Operating Deluge Valve are

- ✚ By Remote operation.
- ✚ By Breakage of Quartzoid Bulb.
- ✚ By draining water locally.

The actuation of detectors shall initiate the following:

- ✚ Opening of deluge valve of the affected zone as well as adjacent zones.
- ✚ Audio-visual alarm indicating the affected zone at the fire pump house and manned control panel.
- ✚ Fire siren of 1 km range
- ✚ Tripping of main power supply barring the emergency power
- ✚ Closure of all Remote Operated Valves in affected facility.
- ✚ The water spray from all nozzles within 30 seconds.
- ✚ The fire water pump(s) shall start based on their set pressure to supplement/ to maintain the fire water pressure in the ring main.

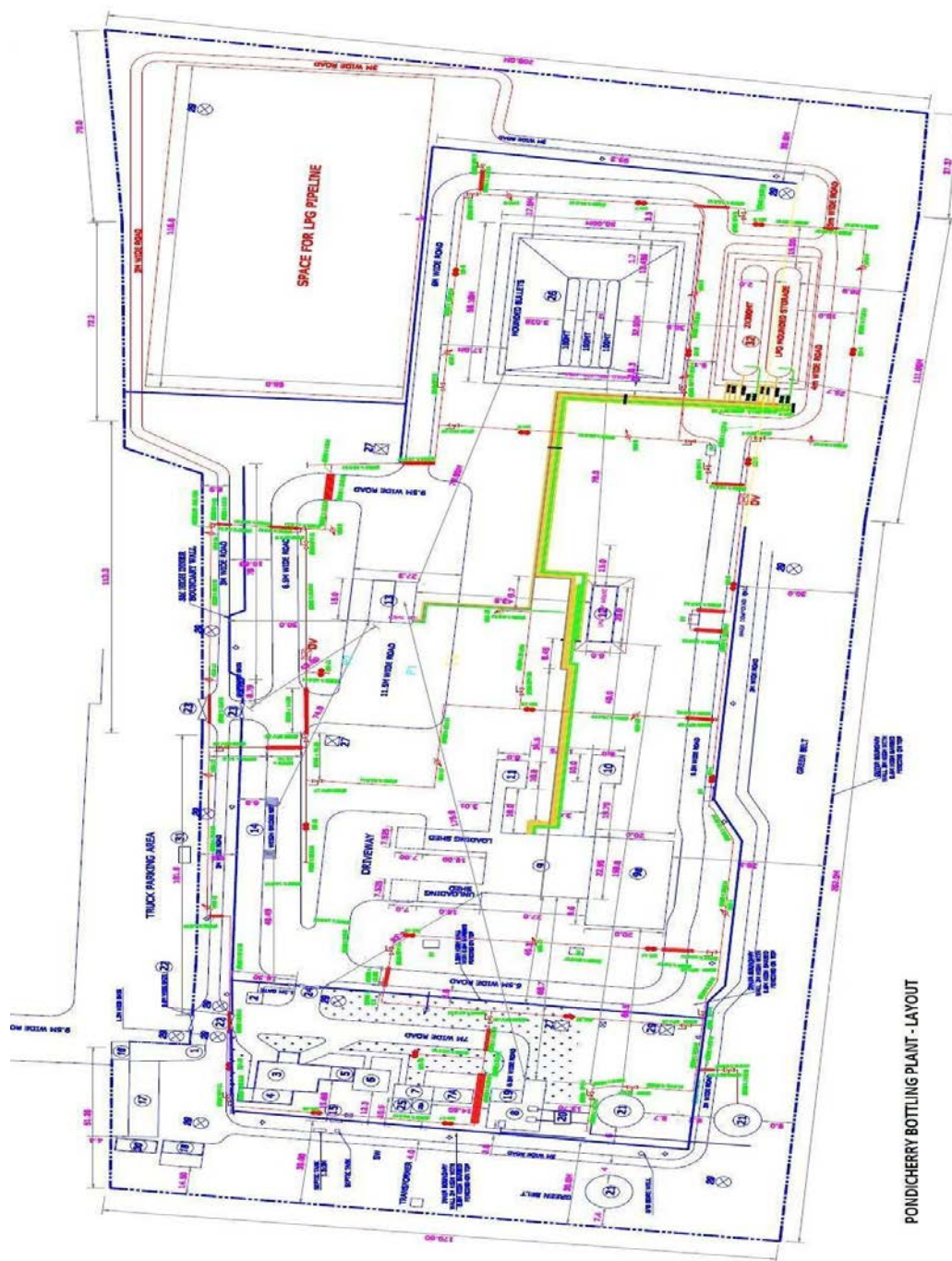
FIRE ALARM SYSTEM:

- ✚ **MAJOR FIRE:** A wailing siren for two minutes. Siren will be sounded 3 times for thirty seconds with an interval of fifteen second in between.

- ✚ **DISASTER:** Same type of siren as in case of major fire but the same will be sounded for three times at the interval of 2 minutes.
- ✚ **ALL CLEAR (FOR FIRE):** Straight run siren for 2 minutes.

PERIODICITY OF VARIOUS TEST/AUDIT:

- ✚ Fire Drill Record - Monthly
- ✚ Fire Hose testing record –Once in 6 Months
- ✚ Pressure gauge Testing Record - Once in 6 Months
- ✚ Sprinkler Testing Record – Once in 3 Months
- ✚ Explosive meter & meter Pressure Gauge (Dead Weight tester) –Once in a year
- ✚ POP Action valve Testing - once in a year
- ✚ LPG Hose Testing – Once in 4 Months
- ✚ Fire Pump log Book – Daily
- ✚ Fire Extinguisher record – Monthly Visual Check
- ✚ Fire Extinguisher Servicing Record – Once in 3 Months
- ✚ Strainers of Hydrants and LPG Lines- Once in 3 Months
- ✚ Hot Work/Cold/Height Work Permits – Immediately
- ✚ Daily Safety Audit
- ✚ Cap Audit - Monthly
- ✚ Safety Committee Meeting - Once in 2 Months
- ✚ Safety Circle Meeting - Once in month
- ✚ SRV Testing – Once in year
- ✚ ERD- Once in Months



POONDICHERRY BOTTLING PLANT - LAYOUT

FIGURE-3
FIRE WATER SYSTEM LAYOUT MAP

8. Project Justification, Schedule and Cost

The proposed project shall yield following benefits:

- ✚ Maintain continuity in supply of LPG gas cylinders to the consumers through distributors and quality of services to the consumers.
- ✚ Ease in availability of filled LPG cylinders during crisis period.
- ✚ Help to overcome the scarcity of bulk LPG due to huge gap between demand and supply.
- ✚ Increase safety measures for hazard detection and prevention system.
- ✚ Storage of LPG in Mounded Bullet is intrinsically and technologically proven safe device
- ✚ Possibility of BLEVE is ruled out in case of storage of LPG in mounded bullets.

The proposed project is estimated to be completed within 24 months from obtaining all the regulatory clearances.