PROJECT 1: CONSERVATION OF WATER

❖ Project was conceived at Operating Level

Major Reason behind the project –

- Haryana water resource authority (HWRA) has given No Objection certificate for water extraction to Jind LPG Plant . As per the NOC, plant can only extract 29 KL of water per day. So, monitoring the water usage and identifying areas of water wastage became important and acted as driving factors for this project.
- Introduction of more and more stringent guidelines for extracting water paved way for us to think of areas where we can save water and reduce dependance on groundwater.

Date of Commencement
May-2022
Date of Completion
December-2022

Uniqueness of Project –

- Water resources are getting depleted day by day because of negligence, lack of awareness and casual approach. This project aimed at identifying the loopholes and taking initiatives to plug them in order to conserve this precious resource. Need for such projects is increasing due to reduction in ground water levels. Significant Reduction in ground water extraction has been observed as a collective result of implementation of numerous control measures.

Major Milestones –

- Water extraction from Borewells has drastically reduced.

Year	Water Extracted from Borewells
Year 2020	29148
Year 2021	25340
Year 2022	14195.62
Reduction in '22 over '21 (in KL)	**11144.38**
% Reduction	**44**

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TANGIBLE BENEFITS

Water Savings

Month	Water drawn in 2021 (in kl)	Water drawn in 2022 (in KL)	Reduction in '22 over '21 (in KL)
January	1847	901	946
February	2282	1174	1108
March	2780	1766	1014
April	2737	1024	1713
May	1527	937	590
June	2031	1639.77	391.23
July	2942	1521.15	1420.85
August	2288	2394.94	-106.94
September	1604	847.76	756.24
October	1744	659.28	1084.72
November	1764	662.59	1101.41
December	1794	668.13	1125.87
Total	25340	14195.62	**11144.38**

There has been significant reduction of ground water extraction by **44%**. Reduction in absolute volumes by **11144.38 KL.**

Month	Treated Water from ETP (KL) - 2021	Treated Water from ETP (KL) - 2022
January	91.8	181.2
February	62.1	132
March	85.7	173
April	96.6	270.2
May	130.7	226.9
June	101.4	400
July	114.9	267
August	84.1	227
September	78 5	232
October	83 3	405
November	86.1	352
December	246.4	439
AVERAGE	**1099.8**	**3305.30**
Increase in ETP output (in KL)	**2205.50**	

There has been a significant Increase in ETP output by **200.53%**

	MONTH	YIELD FROM BOREWELL (KL)	AVERAGE (in KL)	
YEAR 2021	January	1847	2303	Q1
	February	2282		
	March	2780		
	April	2737	2098	Q2
	May	1527		
	June	2031		
	July	2942	2278	Q3
	August	2288		
	September	1604		
	October	1744	1767	Q4
	November	1764		
	December	1794		

	MONTH	YIELD FROM BOREWELL (KL)	AVERAGE (in KL)	
YEAR 2022	January	901	1280	Q1
	February	1174		
	March	1766		
	April	1024	1200	Q2
	May	937		
	June	1639.77		
	July	1521.15	1588	Q3
	August	2394.94		
	September	847.76		
	October	659.28	663	Q4
	November	662.59		
	December	668.13		

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Plugging water Leakage in Soap Trays

Category	Volume	Draining Frequency in a month		Water Consumption in KL		Water Saved
		Earlier	Current	Earlier	Current	
Soap Tray	4140	50	30	207.0	124.2	**82.8 KL**

Savings from Installation of Water Efficient Fixtures

Parameters	Tap Water Saving Comparison	
	Conventional Tap	Pressmatic Tap
Time Reqd. to Fill 1 litre container	10 seconds	25 seconds (Approx. presses = 5)
Time taken to wash hands using the tap	20 seconds	28 seconds
Water consumed (in Litres)	**2.00**	**1.12**
No. of employees	108	108
Average No. of times hands are being washed per day (assuming 6 times per person)	648	648
Water consumed in 1 Month (in KL)	38.88	21.7728
Water saved (IN KL)	**17.1072**	

Monetary Savings

	Year 2021	Year 2022
Total Water that can be extracted per hr in KL from all Borewells	52.0	52.0
Total rated capacity of all Borewell Motors in KW	18.7	18.7
Total Water Consumed in Year 2021	25340.0	14195.6
Total no. of running hours	487.3	273.0
Total Electricity consumed in Unit(KWh)	9112.7	5105.0
Total Electricity charges for Unit (kWh) consumed	60599.1	33948.0
AMOUNT SAVED	**Rs. 26651.1**	

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INTANGIBLE BENEFITS

Benefits to Contract Workmen

- Increased levels of awareness among contract workmen.
- Reduction in water wastages as a result of an increased sense of responsibility
- Sensitization
- Sense of satisfaction from fulfilling a moral responsibility and contributing towards environment

Skill Upgradation

Increased knowledge of ETP operations and it's functioning.
Better understanding of Plant Processes which consume water and they can be modified/innovated to conserve water. (Closed loop degassing, closed loop hydrotesting etc.)

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REPLICATION POTENTIAL

- The replication potential of the project is huge as initiatives such as arresting leakages, installation of water efficient fixtures, public awareness can be done at all locations. Flow meters with telemetry system can be installed on borewell lines for water monitoring and daily supervision. The project assimilation is at it's initial stages and project report is being shared at HQO and zonal level to initiate it's implementation

Flow Meter Installation

Arrangement for filling water in Soap Trays

Water efficient Fixture Installation

ETP Capacity Utilisation

Awareness Spreading

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REPLICATION POTENTIAL OF PROJECT WITHIN SECTOR

- Detailed Project report is being shared with senior management for initiating it's implementation across plants. The project is in it's review stages.
- Jind LPG Plant was awarded as "The Most Sustainable Plant" for it's efforts in the field of water conservation in the Plant Managers Meet held for LPG Plants across india. Jind Plant's Water conservation report was shared during the meet and benefits/milestones achieved were shared during the meet. The report was appreciated and commitment to undertake similar initiatives were made during the meet.

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CHALLENGES FACED AND CORRECTIVE ACTIONS

TECHNICAL –

I**. Water Accounting Issues** - Entire volume of water withdrawn not getting accounted and record keeping
Action taken - Installation of electromagnetic flow meter, logging of flow meter data

II**. Mapping out of processes consuming water** – Identification of plant processes that require water and quantifying process wise water consumption was a challenge in itself.
Action taken – Volume of water tanks provided for various processes were calculated along with Draining frequencies to calculate monthly consumption

III. **ETP Capacity utilization** - ETP was not being utilized to its full potential. ETP operations required improved monitoring. Also cleaning of tanks required better supervision.
Actions taken - Dedicated crew to supervise ETP operations, Improvement in process awareness among ETP operators, Daily supervision of ETP records, ETP quality monitoring, Reduction in idle time, Regular cleaning of Tank

ADMINISTRATIVE AND MAINTENANCE RELATED –

I. **Spreading awareness among Workmen-** Spreading awareness among the people working inside the plant played a major role in reducing water consumption and reduction in water wastage
Action taken - Contract Workmen, tanker drivers, truck drivers and staff were sensitized on the importance of minimizing water wastage and creating a sense of responsibility. Posters were placed in washrooms.

II. **NOC issued by HWRA** - NOC for groundwater extraction was obtained from HWRA. NOC was obtained for extraction of 29.00 m3/day.
Action taken - monitoring consumption/usage, water efficient fixture installation, plugging water leakage, spreading awareness among workmen, improved ETP quality and output, reduction in water wastage etc.

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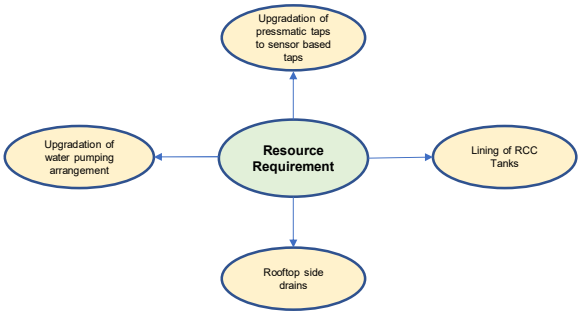
PRIORITY PLANS

◊ **Short term Plan**

- Monitoring and Reduction in water consumption.
- Eliminating and arresting leakages.
- Reduction in extraction of water from Borewells.
- Lining of Storage reservoir for rain water collection and storage.



◊ **Long Term Plan**

- Zero water extraction from Borewells

Currently water is being withdrawn using Borewells at Jind LPG Plant to fulfill plant water requirements. If the rainwater is collected, channelized and stored into underground RCC tanks for storage, the water saving potential will be immense. The

RCC tanks have a storage capacity of 3800 KL and 3000 KL. The entire quantity of water being extracted can be eliminated and this volume can be met from the water stored during rains in the underground RCC tanks. This will result in net zero water extraction from Borewells.

- Rooftop Rainwater harvesting

Water from shed rooftops shall be collected via rooftop side drains and diverted into open drains and using pumps, this water shall be sent to the underground RCC tanks for reuse within plant processes.

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BEST PRACTICES

1) Improved monitoring and constant supervision of plant processes to further reduce water consumption and plugging leakages.
2) Increasing the ETP output through regular maintenance and cleaning of tanks.
3) Increasing awareness levels among stakeholders and workmen.
4) Daily verification of Borewell and ETP records .
5) Better understanding of plant processes which consume water
6) Arresting leakages and reducing water wastage.
7) Ensuring proper pumping and transporting of water for storage and subsequent use in plant processes.
8) Setting up of rooftop rainwater harvesting network.

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MAJOR LEARNINGS

Jind LPG plant lies in the Pink Zone i.e., Moderately Ground Water Stressed Villages. Water Level has gone down by 3.10 m in a time span of 10 years. Water resources are getting depleted in the Jind Area. If measures to conserve water are not taken, it might lead to water scarcity in the area. So, monitoring of water withdrawn and consumed becomes essential. If every person plays his part, a huge amount of water can be saved.

With initiatives such as monitoring consumption/usage, water efficient fixture installation, plugging water leakage, spreading awareness among workmen, improved ETP quality and output, reduction in water wastage etc., Jind LPG Plant reduced water extraction from borewells to about one-third of earlier extraction.

Net water positive potential – Jind LPG plant has potential for becoming net water positive. . Jind Plant has rain water collection potential of 8022.78 KL. Current average water extraction from borewells in 7956 KL. Hence, the entire amount of water required to be extracted from Borewells can be met by rain water collection and storage in RCC tanks. Hence, Jind plant vision and mission is to become water positive. Calculation is shown on following page -

FUTURE MONETARY SAVING POTENTIAL	
Total Water that can be extracted per hr in KL from all Borewells	52.0
Total rated capacity of all Borewell Motors in KW	18.7
Annual Average extraction from Borewells in a year	7956.0
Total no. of running hours	153.0
Total Electricity consumption in Unit (KWh)	2861.1
Total Electricity savings for Units (kWh)	**Rs. 19026.3**

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Category	Rain water Harvesting Potential	Area (m²)
Rain water Harvesting Potential	Storage shed rooftop	2,163.33
	Filling shed rooftop	1,997.75
	Cold repair shed rooftop	1,169.77
	DPT shed rooftop	1,234.24
	TT Gantry Rooftop	627.16
	Compressor Shed Rooftop	257.89
	Admin Building Rooftop	291.13
	RO office building rooftop	188.37
	Fire engine shed Rooftop	990.29
	New compressor shed rooftop	738.27
	Loading-Unloading Platform Rooftop	1002.76
	TT parking Area	2,367.26
	Total	13,028.22
	Annual Rainfall in Jind District	0.590
	Volume of water available for pumping in KL	7686.6498
Mock Drill water Potential	Monthly water consumed in mock drill KL	150
	Annual consumption in KL	1800
Open Drain Water Potential	Drain length for water collection in m	1056.95
	Width of drain in m	1
	Area for pumping from drain for storage	1056.95
	Annual Rainfall in Jind District	0.590
	Volume of water for pumping in KL	623.6005
	Assuming 90 percent of water can be successfully pumped into the RCC tank	9099.22527
RCC Tank 1 Potential	RCC tank length in m	35
	RCC tank width in m	25
	C/s area of tank	875
	Annual Rainfall in Jind District	0.590
	Volume of water in KL	516.25
RCC Tank 2 Potential	RCC tank length in m	35
	RCC tank width in m	20
	C/s area of tank	700
	Annual Rainfall in Jind District	0.590
	Volume of water in KL	413
Total Water Collection that can be achieved	Total water collection that can be achieved	10028.47527
	Constant Coefficient for evaporation, spillage etc.	0.8
	Actual collection potential	**8022.78**
	Average Current Annual extraction from Borewell (663 KL per Month)	**7956**

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PROJECT 2: RAINWATER COLLECTION AND USAGE

- Project was conceived at Operating Level

Major Reason behind the project –

- Eliminating groundwater dependance
- Becoming a self sufficient industry in this category and not relying on water requirement from outside sources.
- Increasing the level of Groundwater table and enabling ground water recharge

Uniqueness of Project –

The rainwater is collected and stored in the RCC storage reservoirs, the majority portion of plant's water requirement shall be met from the collected rainwater supplemented with ETP output. As a result, the ground water extraction will significantly reduce and we could achieve our target of eliminating ground water dependance. Also, besides rainwater collection, focus has been put towards recharging groundwater table by constructing percolation pits at 3 locations inside our plant.

Date of Commencement
July-2022

↓

Date of Completion
March-2023

Major Milestones –

- After segregation of effluent and rainwater pipelines, rainwater can now be directly collected, pumped and stored in underground tanks for it's use within plant processes.
- Effluent water is channelized via closed pipes to ETP for it's treatment without coming in contact with rainwater.
- Ground water recharge via percolation pits

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TANGIBLE BENEFITS

Category	Rain water Harvesting Potential	Area (m^2)
Rain water Harvesting Potential	Storage shed rooftop	2,163.33
	Filling shed rooftop	1,997.75
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	Constant Coefficient for evaporation, spillage etc.	0.8
	Actual collection potential	**8022.78**
	Average Current Annual extraction from Borewell (663 KL per Month)	**7956**

Percolation Pits Recharge potential				
HPCL Jind LPG plant				
Rain water harvesting Potential of the Gravity Head Recharge Well				Data Source
Annual Rainfall in Jind District	A	590	mm	Weather atlas https://www.weather-atlas.com/en/india/Jind-climate
Rainfall Days in an year	B	73.7		Weather atlas https://www.weather-atlas.com/en/india/Jind-climate
Co-efficient for road/pavement	C	0.7		CPWD Design guidelines (Considering minimum value from range band 0.7-0.95)
Another constant co-efficient for evaporation, spillage etc.	D	0.8		CPWD Design guidelines
Recharge Potential Calculation				
Pit no. 1				
Catchment Area (estimated)	P1	4767.00	Sqm	
Volume of Rain fall over the area	V= P1 x A/1000	2812.53	M3	
Effective Harvesting/recharge volume	= V x C x D	1576.00	M3	
Pit no. 2				
Catchment Area (estimated)	P2	2752.00	Sqm	
Volume of Rain fall over the area	V= P2 x A/1000	1623.68	M3	
Effective Harvesting/recharge volume	= V x C x D	910.00	M3	
Pit no. 3				
Catchment Area (estimated)	P3	2088.00	Sqm	
Volume of Rain fall over the area	V= P3 x A/1000	1231.92	M3	
Effective Harvesting/recharge volume	= V x C x D	690.00	M3	
Total Groundwater Recharge Potential		3176.00	M3	

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INTANGIBLE BENEFITS

- Ground water recharge.
- Reduced ground water dependance.
- Self-sufficiency in terms of water.
- Enabling ground water recharge.
- Segregation of rainwater and effluent water pipelines.
- Proper utilization of rainwater

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REPLICATION POTENTIAL

- Moderate Requirement for Replication: Civil Work for Pipeline segregation Procurement of Pumps Civil Work for Construction of recharge pits and . Civil Work for Construction of Storage reservoirs for water collection. This project involves civil work, Engineering Application and Specialised Knowledge in Civil Construction. Industries tend to ignore collecting rain water but if industries were to construct rain water harvesting pits and storage reservoirs along with drain construction, it would reduce stresses on the ground water table

Excavation and Dismantling

Pipe laying

Effluent Collection Tank

Sump Construction

Percolation pit outer chamber

Percolation pit

Water reservoir of capacity 380 KL for rooftop rainwater and surface runoff water from parking area

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REPLICATION POTENTIAL OF PROJECT WITHIN SECTOR

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CHALLENGES FACED AND CORRECTIVE ACTIONS

Obstacles in Pipeline segregation project –
During preliminary survey, multiple obstacles were found in the path of the proposed effluent pipeline.
Entry/Exit pathways – overcame by drilling through the pathway.

Pre-existing cables - Alignment rerouting was done to ensure no damage is caused to the cable network.

Hydrant line - Alignment rerouting was done.

RCC road – Dismantling of the road (narrow patch) was done using JCB. Cutting of laid down iron bar reinforcements was also done to make way for laying of pipes.

Concrete Block – Drilling of a hole was done and plastic pipe was laid down in that section to overcome (conventional MS pipe laying was not feasible for that section)

Pre-existing Cables

RCC Road Dismantling Operation

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CHALLENGES FACED AND CORRECTIVE ACTIONS

Pipeline handling and cleaning –
Pipeline handling and cleaning was a major challenge during the construction phase. Due to impurities in the effluent from sheds, the pipes have a good chance of getting clogged. In order to prevent this, Sumps were constructed along the pipeline setup.

Sump Construction Phase.

Fully Constructed Sump

Water Seepage in storage reservoir -
Other major challenge was seepage of water into the cracks of storage reservoir. Proper lining of the tank was done to prevent seepage.

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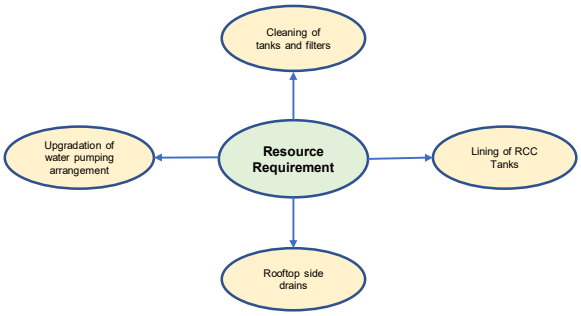
PRIORITY PLANS

◊ **Short term Plan**

- Regular Cleaning of tanks and filters
- Upgradation of pumping arrangement
- Monitoring and Reduction in water consumption.
- Eliminating and arresting leakages.
- Reduction in extraction of water from Borewells.
- Lining of Storage reservoir for rain water collection and storage.



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BEST PRACTICES

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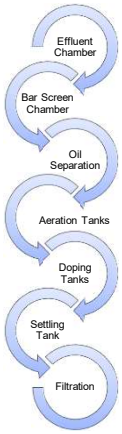
PROJECT 3 : Monitoring and Operation of ETP

Process of Effluent Treatment Plant



Effluent from various sources is received in these tanks

External agents like Mud/dust is screened primarily using bar filters.

Added Oil is allowed to form layer above the surface and is segregated

Oxidization of Volatile Organic Pollutants

Addition of Alum & Lime for Purification

Settler for Solid Sludge segregation

Sand filter and Activated Carbon Filter

Operation of ETP –

- Oil and Grease are separated from water.
- Primary settling tank is provided.
- In the collection tank, oxidation of impurities is done with the help of blowers and lime dosing.
- Suspended solids are further separated by adding alum and poly chemical in the Reaction tank.
- Water is then sent to Tube settling tank and subsequently to secondary settling tank for particle sedimentation.
- Water pumped through sand filter to make it free of suspended particles.
- Water pumped through activated carbon filter to make it odour free.
- Treated water can then be recycled

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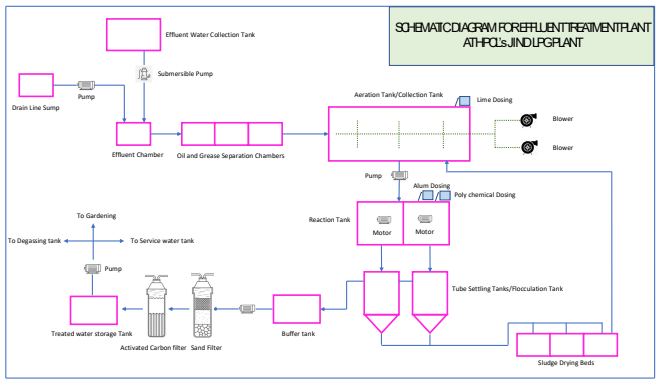
Schematic Diagram for ETP



EFFLUENT TREATMENT PLANT
AT
JIND LPG PLANT

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