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KUNDLAS LOH UDYOG
an ISO 9001 : 2015 Certified Co.
Vill. Balyana, P.O. Brotiwala, Teh. Baddi, Distt. Solan (H.P.)
Cell : 9882844974, 98166 00115, 9876003335

Date: 07/01/2020

To,
The Director,
Expert Appraisal Committee (EAC) Industry-1,
Ministry of Environment Forest & Climate Change,
Vayu Wing, JorBagh Road, New Delhi-110003.

Subject: Expansion of Total Production Capacity and augmentation of integrating melting and rolling facility (from 54,000 TPA to 92,500 TPA) by M/s. Kundlas Loh Udyog located at Village Balyana, Post Barotiwala, Tehsil Baddi, District Solan, Himachal Pradesh- **Environmental clearance regarding- Reply to ADS.**

Reference: 1. MoEF&CC File No. J-11011/350/2017-IA.II(I)
2. 13th Re-constituted EAC (Industry-I), Item No. 13.2

Dear Sir,

Our Project for Expansion of Total Production Capacity and augmentation of integrating melting and rolling facility (from 54,000 TPA to 92,500 TPA) by M/s. Kundlas Loh Udyog was Re-considered for appraisal of environmental clearance in the 13thmeeting Re-constituted EAC (Industry-I) held on 27th November, 2019 at item No. 13.2 wherein the EAC had rose some observations. The point-wise reply of observations is as follow:

S. No.	Observation	Reply
1	Reply to the ADS for ground water permission is not acceptable	Proponent has obtained water permission from I&PH Department (State Water Department) videletter no. IPH-SE-P & I-II-EEGWA/2019-20: 676-79 dated 21.09.2019. Water Permission Letter is enclosed as **Annexure 1.**
2	The rain water harvesting plan needs to be improved	The total groundwater utilized by the project annually is 21450m^3/year i.e. 65m^3/year and by adoption of pond, the project proponent may recharge almost 29951.98 m^3/year (Proposed Pond + inside Plant) of ground water annually which is approx. 139.63% of the ground water utilized by the project. Detailed Rainwater Harvesting and recharging plan is enclosed as **Annexure 2.**
3	Space provided for the green belt development is less than 33% of the plant area.	The total area of factory is 7789.41 sqm and 2570.51 sqm green areas (33 % of total factory area) will be developed. As per MoEF norm of 80 sqm of plot area per tree about **97** trees are required and about **353** trees will be planted in the greenbelt including all

For Kundlas Loh Udyog

Partner

		around the factory boundary and inside the plant premises. Selection of the plant species would be done on the basis of their adaptability to the existing geographical conditions and the vegetation composition of the forest type of the region earlier found or currently observed. Detailed Greenbelt development plan is enclosed as **Annexure 3.**
4	Cost earmarked towards CER related activity is not as per the O.M. of MoEFCC dated 1.5.2018	This project is Brownfield Project and Total project cost is about Rs. 1019.75 Lakhs, hence as per OM dated 01.05.18 regarding Corporate Environment Responsibility (CER), a budget of Rs. 13.5 Lakhs (appro. 1.32 % of total project) shall be spent under Corporate Environment Responsibility (CER). Deatiled CER Budget is enclosed as **Annexure 4.**

Yours Truly

M/s Kundlas Loh Udyog

For Kundlas Loh Udyog

Partner

Annexure 1

No. IPH-SE-P&I-II-EE-GWA/2019-20: 676-79
Government of Himachal Pradesh
I&PH Department
Dated : Shimla the 21.09.2019

To

M/S Kundlas Loh Udyog,
Village Balyana-Buranwala,
PO. & Tehsil Baddi, Distt. Solan (HP).

Subject:- Registration of existing tube well under Section 8 of H.P. Ground Water (Regulation and Control of Development and Management) Act, 2005.

Sir,

Enclosed please find herewith **Certificate of Registration No. HPGWA-EU/420** on prescribed form-6 for extraction of ground water for **Industrial purpose.** You are requested to abide by the instructions conveyed in the registration of certificate which shall commence from the date of the issuance of the certificate of registration.

DA:- As above.

Your's faithfully,

Member Secretary HPGWA-cum-
Superintending Engineer,
P&I-II, I&PH Deptt., Jal Shakti Bhawan,
Shimla-5.

Copy following to:-

1. Executive Engineer, I&PH Division, Nalagarh for information alongwith copy of certificate of registration. He is requested to monitor the following instructions conveyed to the applicant in the grant of certificate of registration issued and send a report to the authority in this respect.
2. Sr. Hydrogeologist, Ground Water Organization, IPH Deptt., Una for information as per his report & his office letter No. 1946 dated 06.04.2019.
3. The Secy. Gram Panchyata Barotiwala, Tehsil Baddi, Distt. Solan (HP) for information.

Member Secretary HPGWA-cum-
Superintending Engineer,
P&I-II, I&PH Deptt., Jal Shakti Bhawan,
Shimla-5.

"SAVE WATER SAVE LIFE"

Annexure 1

FORM-6
(See Rule 25 (2)
CERTIFCATE OF REGISTRATION OF THE GROUND WATER SOURCE

THE HIMACHAL PRADESH GROUND WATER AUTHORITY SHIMLA

Registration No. HPGWA-EU/420. **Dated:- 21.09.2019**

Whereas, the GROUND WATER SOURCE known as existing **1 No. Tube well** located in premises **M/S Kundlas Loh Udyog, Village Balyana-Buranwala, PO. & Tehsil Baddi, Distt. Solan (HP)** located at Latitude N 30°54'58.4" & Longitude E 76°49'58.9" in the area Mauza **Khata No. Khatoni No. 68/71 Khasra No. 414,** of **Village Balyana-Buranwala, PO. & Tehsil Baddi, Distt. Solan (HP)** was drilled before the date of notification i.e. 09.08.2011 of areas under HP Ground Water Act, 2005 for Ground Water extraction and its use.

And whereas the 8 civil sub-divisions namely Nahan, Paonta, Solan, Nalagarh, Una, Amb, Nurpur & Jawali were notified vide HP Govt. Notification No.IPH-B(F)-5-8/2008 Dated Shimla- 171002, the 9th August, 2011 under Section 5 of Himachal Pradesh Ground Water (Regulation and control of Development and Management) Act- 2005 (Act No. 31 of 2005) for Ground Water extraction and its use.

And whereas, the provisions of the Act are not applicable to the applicant/firm since the firm has constructed the water abstraction structure during in the 2007. But, the Ground Water abstraction structure is required to be registered.

Therefore, the water abstraction structure from where water is being extracted and used for the purpose of **Industrial use** is hereby registered with this Authority vide **registration No. HPGWA-EU/420** of **2019-2020 Year** subject to the following terms and conditions: -

(a) The applicant is allowed to extract maximum 70,000 ltrs/day of ground water from above mentioned well.
(b) The applicant shall construct a rainwater harvesting structure for conservation and re-charge of ground water in his premises as per section-15 of the Himachal Pradesh Ground Water (Regulation and Control of Development and Management) Act, 2005 within six months and will intimate Executive Engineer, IPH Division, Nalagarh on its completion.
(c) The applicant shall have to pay royalty through Executive Engineer, IPH Division, Nalagarh for the use of ground water to the Member Secretary, Himachal Pradesh Ground Water Authority as per the Himachal Pradesh Ground Water (Regulation and Control of Development and Management) Rules, 2007 as per the log book of tube well. Provided that a user of ground water (Farmer) who irrigates less than one hectare of land, whether owned or leased or both shall be exempted from the payment of royalty.
(d) The applicant shall install a **water meter** on the ground water extraction pipe so as to check the water drawl at any time and will maintain its log book.
(e) In case of Industrial connection, the firm shall not use waste water of the Industry for recharging of Ground Water.
(f) That the permission/sanction can be withdrawn or the quantity of water to be extracted in LPD can be restricted in case of the area declared as Over-exploited for Ground Water activity.

The holder of the registration of certificate shall be duly bound to maintain the aforementioned source in an efficient, coordinated and economical manner and to use the water for the purpose for which certificate of registration has been given. The applicant shall abide by all provisions contained in the Himachal Pradesh Ground Water (Regulation and Control of Development and Management) Act- 2005 (Act No. 31 of 2005) and the rules framed there under; and the conditions of the registration of certificate issued or specified by this Authority failing which the Authority shall have the full powers to withdraw the registration and the amount deposited as registration fee and royalty charges shall be forfeited.

Given under the seal of Himachal Pradesh Ground Water Authority.

Place : Shimla
Dated : 21.09.2019.

Himachal Pradesh SEAL Ground Water Authority Shimla-9

"SAVE WATER SAVE LIFE"

Member Secretary
HP Ground Water Authority,
Kasumpti, Shimla-9

RAINWATER HARVESTING REPORT

INTRODUCTION:

Rainwater harvesting is the accumulation and deposition of rainwater for reuse on-site, rather than allowing it to runoff. Rainwater can be collected from surface runoffs or roofs, and in many places the water collected is redirected to a deep pit (well, shaft, or borehole), a reservoir with percolation, or collected from dew or fog with nets or other tools. Its uses include water for domestic use, irrigation purpose, industrial uses etc. The harvested water can also be used as drinking water, longer-term storage and for other purposes such as groundwater recharge.

M/s Kundlas Loh Udyog requires to conduct a study to implement and install rainwater harvesting schema to recharge the groundwater resources in the vicinity of 5 km radius buffer zone of their project located at Khasra No. 414, 415, 416, 418 and 133 of Mauza Baliana, Vill. Baliana, Tehsil Baddi, Distt. Solan, Himachal Pradesh. The total project area of the project is 8017.11 m^2. The total ground water requirement of the project is 65 m^3/day i.e. 21450 m^3/annum considering 330 operational days in a year.

ADVANTAGES OF RAINWATER HARVESTING:

Rainwater harvesting provides an independent water supply during regional water restrictions and in developed countries is often used to supplement the main supply. It provides water when there is a drought, can help mitigate flooding of low-lying areas, and reduces demand on wells which may enable groundwater levels to be sustained. It also helps in the availability of potable water as rainwater is substantially free of salinity and other salts. Application of rainwater harvesting in urban water system provides a substantial benefit for both water supply and wastewater subsystems by reducing the need for clean water in water distribution system, less generated storm water in sewer system, as well as a reduction in storm water runoff polluting freshwater bodies.

There has been a large body of work focused on the development of Life Cycle Assessment and Life Cycle Costing methodologies to assess the level of environmental impacts and money that can be saved by implementing rainwater harvesting systems.

Figure-1: Water Balance

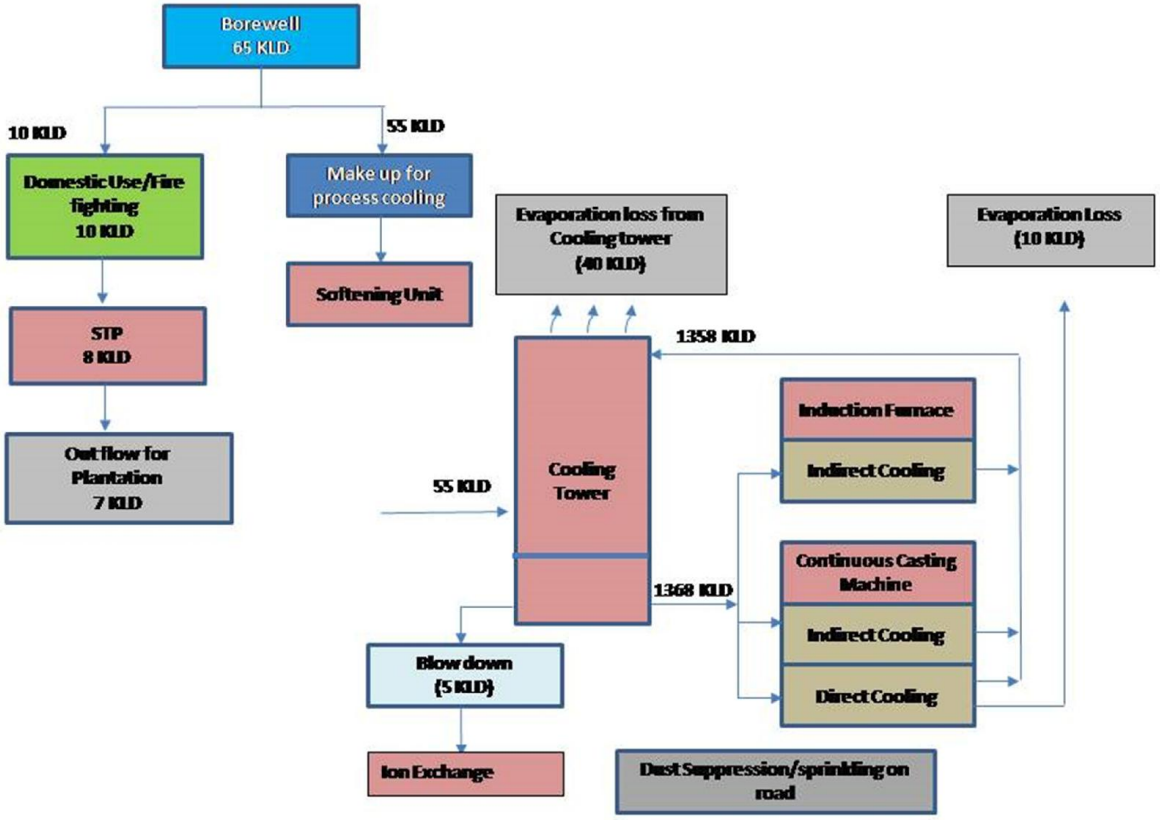
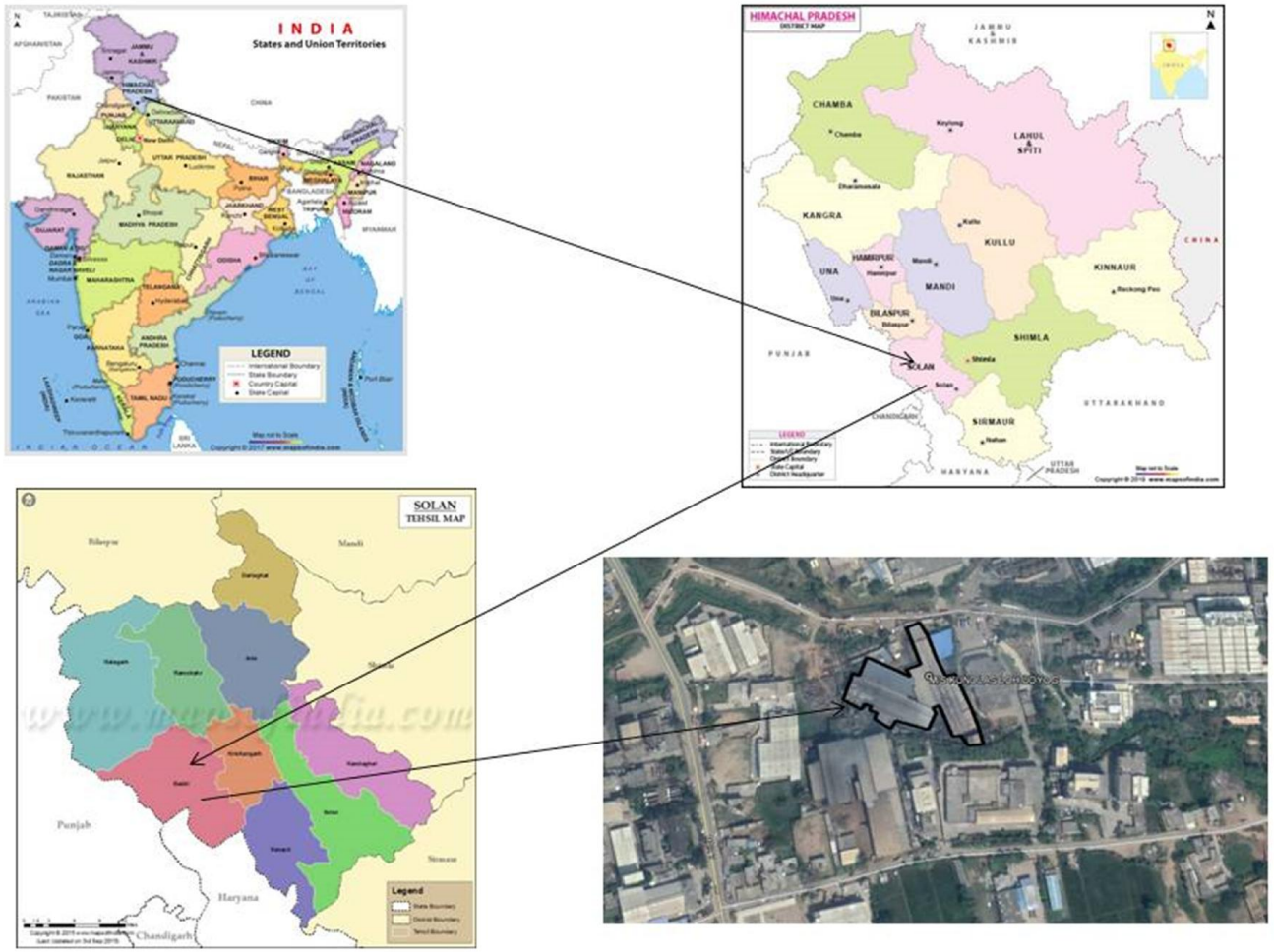


Figure-2: Location Map of Project Area



M/S KUNDLAS LOH UDYOG,
VILLAGE BURANWALA & BALYANA ,
TEHSIL BADDI, DISTT SOLAN, (H.P.)

RAINWATER HARVESTING

Figure-3a: Site Layout-

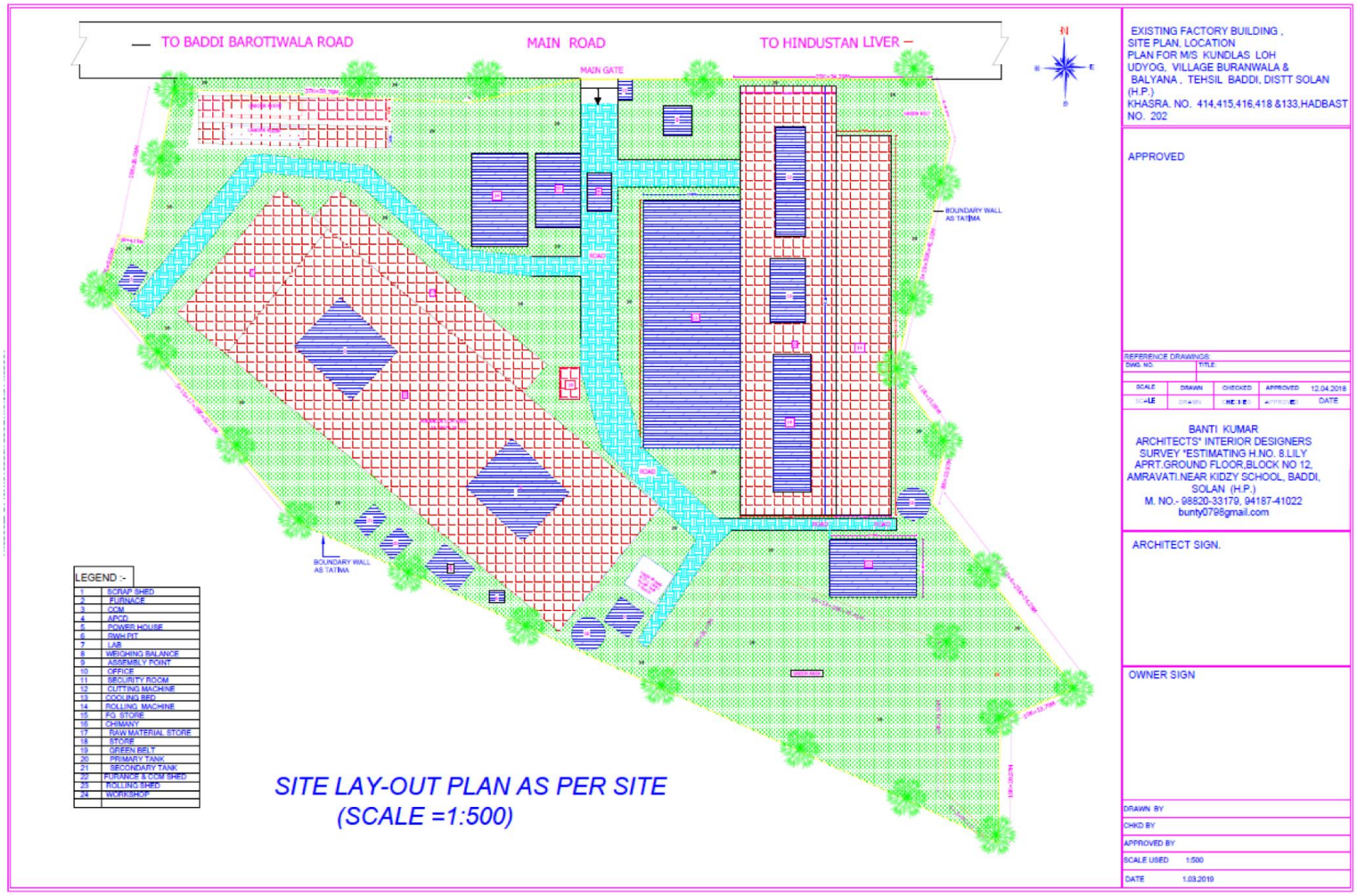


Figure-4: Project Location on Google Map

Figure-5: Google Earth Image of Project Location

Figure-5: Topography map of Project Area

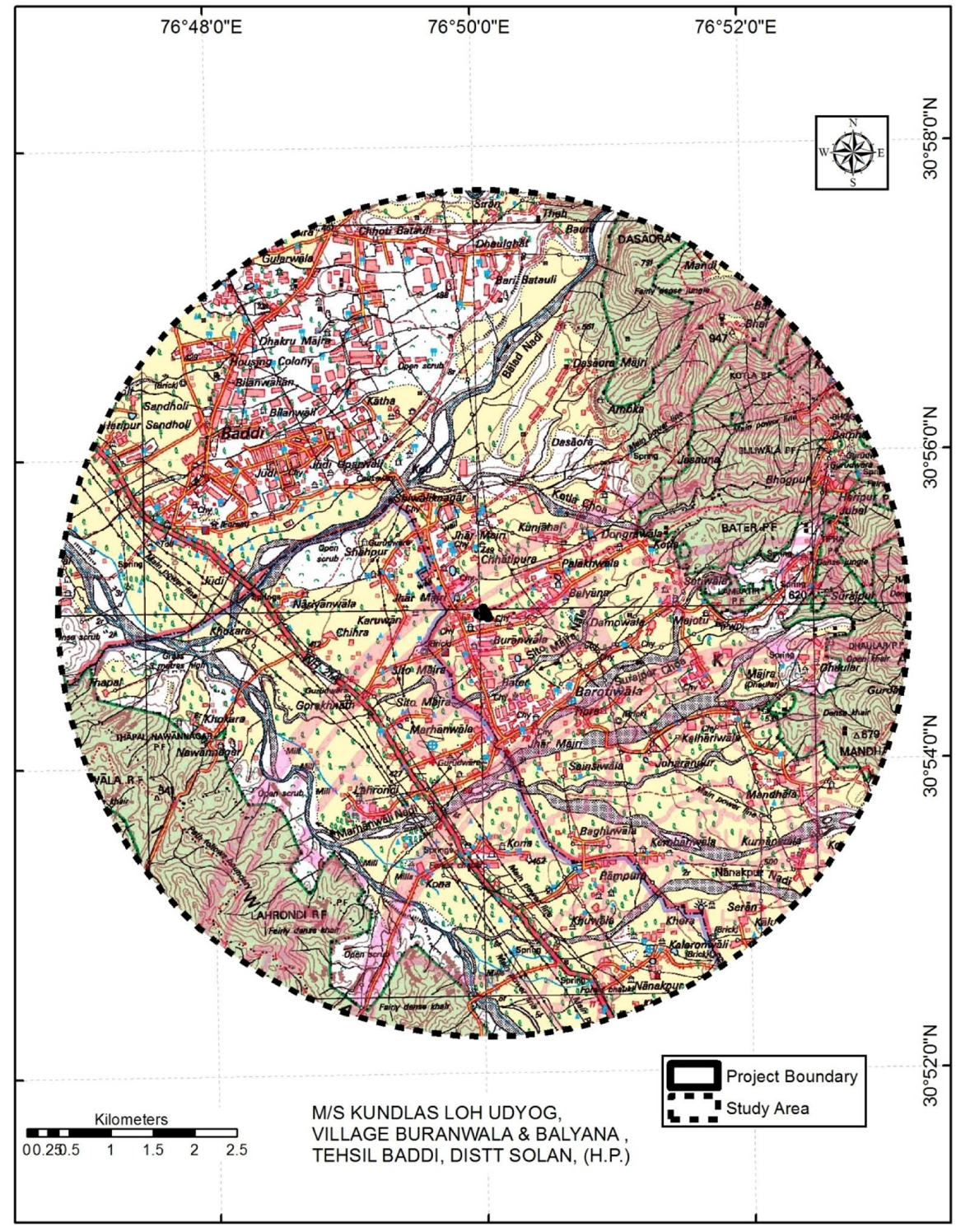
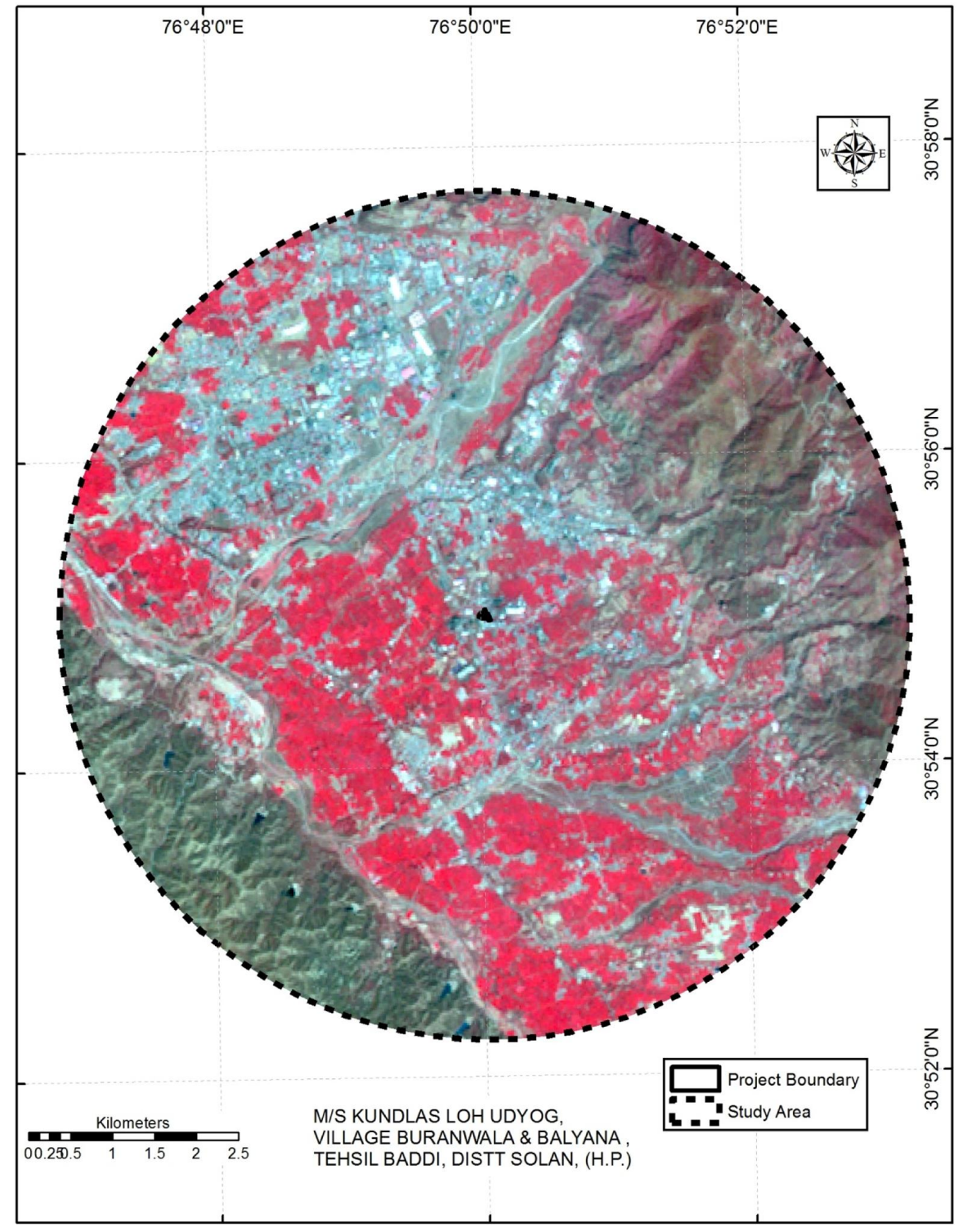


Figure-5: Satellite Map of Project Area



DESIGNING OF RAINWATER HARVESTING SYSTEM:

In designing any rainwater harvesting structure, capturing rainfall and runoff for local use is the key concept. Hard surface such as roof pavements and roads that decrease groundwater percolation constitute catchments and generate the high runoff which has to be diverted in to the storage tank & recharged in to ground water regime through simple filtration & injection well system for subsequent extraction by service wells. To improve water availability, rainwater harvesting is the most imminent & long-term solution.

In view of above, rainwater-harvesting structures at this point can serve the purpose of arresting roof top rainwater and runoff generated through roads in the area. The design is based on average annual rainfall, peak rainfall intensity and the intake capacity of the water by the aquifers. In order to determine intake capacity of water by unsaturated zone & aquifers zone, the recharge tests were carried out in the investigated area.

For good design of rainwater harvesting, following points are to be kept under consideration:

a) Ideal location with good ground slope.
b) The location has adequate subsurface permeability of the aquifer to accommodate maximum recharge of rainwater through injection well.
c) Rate of filtration should exceed average rainfall intensity.
d) Clogging of filtration media should be cleaned periodically.
e) Ground water pollution does not take place.

ROOFTOP RAIN WATER HARVESTING:

Total rooftop area in project area is 3108.35 m^2 that may be connected through pipes and drains to Rainwater harvesting structures which has storage chamber and the percolation pits as per sites having rooms for recharge in resonance with average rainfall, catchment area and average rainfall intensity. Looking in to the average rainfall in this region and roof top area of the building rain water harvesting structures are designed in such a way that the cumulative runoff has to be preserved in such a way that water does not spill over and the entire rainwater falling over the total area goes in

to the ground water body. Following dimensional parameters are considered for design of Rainwater harvesting system in the plant premises.

Total Rooftop Area	3108.35 m^2
Average Rainfall	1140.86 mm = 1.14 m
Catchment factor for Roof top	0.80
Co-efficient of evaporation, spillage and first flush wastage	0.80
Total Runoff from rooftop	3108.35 x 1.14 x 0.80 x 0.80 = 2267.85 m^3/Annum

OPEN AREA RAINWATER HARVESTING:

The total open area of plant premises is 4908.76 m^2 which may be connected through pipes and drains to rainwater harvesting structures which has storage chamber and the percolation pits as per sites having rooms for recharge in resonance with average rainfall, catchment area and average rainfall intensity. Following dimensional parameters are considered for design of open area rainwater harvesting system in the plant premises.

Total Open Area	4908.76 m^2
Average Rainfall	1140.86 mm = 1.14 m
Catchment factor for Open Area	0.30
Co-efficient of evaporation, spillage and first flush wastage	0.80
Total Runoff from Open Area	4908.76 x 1.14 x 0.30 x 0.80 m^3 = 1343.036 m^3/Annum

Design of Rain Water Harvesting Pit

Design considerations:

The important aspects to be looked into for designing the rain water harvesting system to augment ground water resources are:

- Hydrogeology of the area including nature and extent of aquifer, soil cover, topography, depth to water level and chemical quality of water.

- The availability of source water one of the prime requisite for ground water recharge, basically assessed in terms of non committed surplus monsoon runoff.
- Area contributing runoff like area available, land use pattern, industrial, green belt, paved areas, roof top area etc.
- Hydrometrological characters like rainfall duration, general pattern and intensity of rainfall.

Computation of Rainfall & approach for Artificial Recharge to Groundwater:

As per Dynamic Ground Water Resources of India (2011) of CGWB District Solan, the stage of groundwater development is 52% respectively and falls under safe category, whereas stage of ground water development of Sialba Majri Block is 46 % and falls in safe category. The normal annual rainfall in the said area is **1140.86 mm**. The implementation of rain water harvesting structures are generally done by diverting the runoff generated from the catchment area, roof top areas, and open area for recharging into the ground water system.

Rain Water Harvesting & Artificial Recharge within Project premises:

Based on the site plan of the project area, the computation of rainfall runoff of entire project premises has been worked out and the details are tabulated below:

Sr.No	Area Type	Area in Sq. m	Runoff Coefficient	Annual Rainfall in Meter	Total Available Runoff in m^3 /year
1	Roof Top	3108.35	0.80	1.14	2267.85
2	Open Area	4908.76	0.30	1.14	1343.036
Total		8017.11			3610.88

From the above computation, it is evident that a total quantum nearly of 3610.88 m^3 of rain water can be generated annually. In order to design the recharge structure, hourly

intensity of rainfall is considered to be 25 mm/hr has been taken into account and the details are tabulated below:

Sr.No	Area Type	Area in Sq. m	Runoff Coefficient	Hourly Rainfall Intensity	Total Available Runoff per hour
1	Roof Top	3108.35	0.80	0.025	62.17
2	Open Area	4908.76	0.30	0.025	36.82
Total		8017.11			98.98

It has been worked out that total runoff generated within project premises per hour with 25 mm/hr intensity of rainfall shall be 98.98 m^3/hr.

Quantam of Rainwater recharge through individual recharge Structure:

1. Volume of water within free Board (Settlement Chamber)

= 2 m x 2 m x 3m = 12 m^3

2. Volume of water in Gravel filled Part

i.e. Volume of water within the pore spaces of sand, gravel filled part @35% (Filter Chamber)

= 2 m x 2 m x 3m x 0.35 = 4.2 m^3

3. Volume of water in Recharge Well through which recharge will be done

Intake capacity of recharge well = 36 lph = 36 m^3/hr.

Therefore, Total volume to be recharge through a individual structure will be

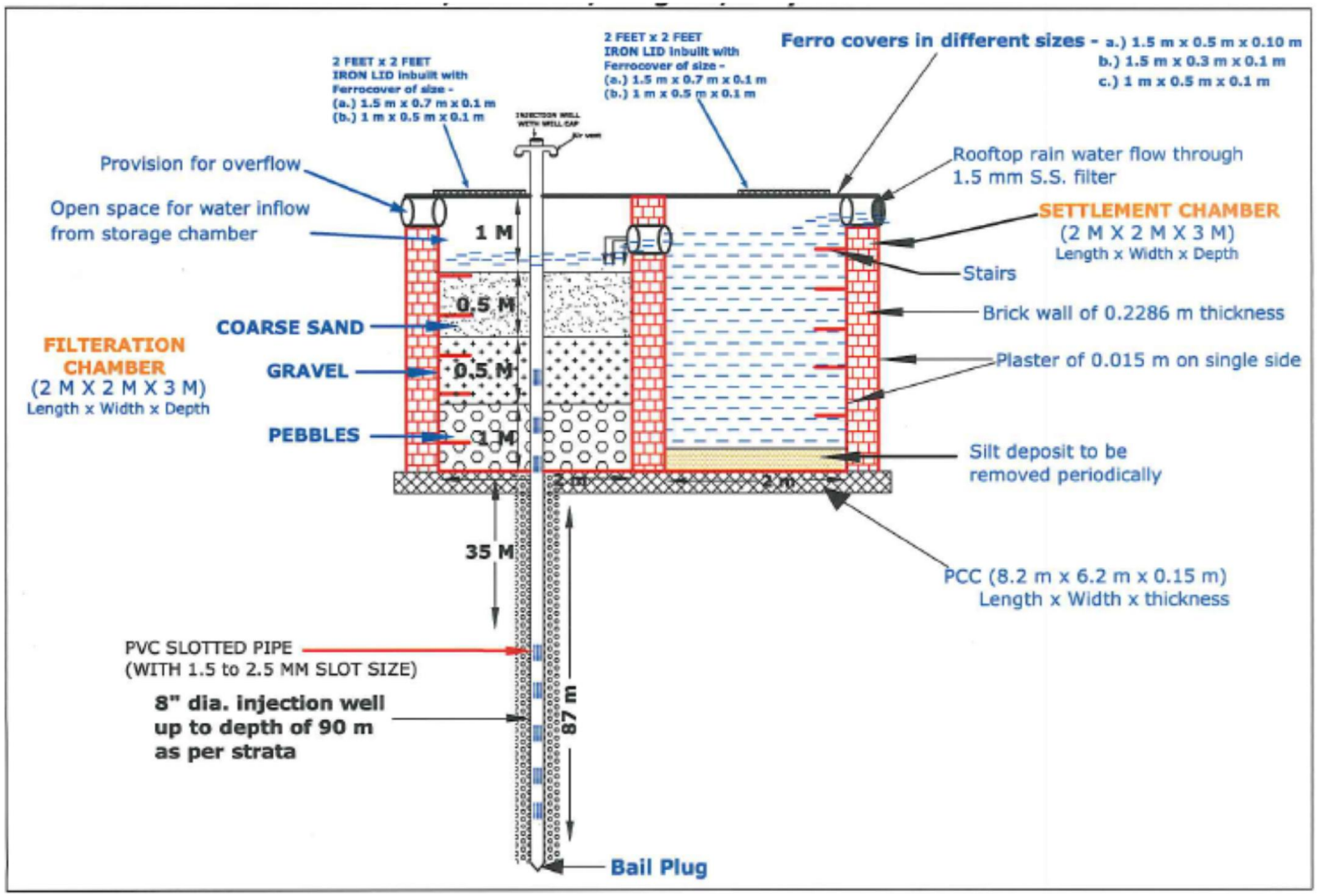
= (12+4.2+36)

= 52.2 m^3/hr

Thus, the rain water recharging pit can accommodate 52.2 m^3/hr of the rain water.

Therefore, 2 Rainwater harvesting Structures require to accommodate the storme generated by storm inside project area.

Figure-7: Schematic Diagram of Recharge Pit



EXECUTION OF RAINWATER HARVESTING THROUGH RECHARGE BORE WELL:

- Rooftop/Terrace water is diverted through PVC pipes to rainwater harvesting unit.
- The rooftop rainwater passes through screen chamber, filtration chamber and then transferred to recharge well through gravitational force.
- The screen chamber act as settling chamber from where water passes through MS screen to filtration chamber.
- Filtration chamber act as de-silting unit then water passes through gravel filter towards recharge well.
- Filtered water flows to aquifer through 'Vee' wire screens, which is installed in the Recharge well.
- Valve Chamber will be provided to drain off first rainwater to storm water drain.
- There is a provision to drain off excess rainwater during heavy rain fall to storm water drain through overflow pipes.

OBSERVATIONS:

- The total groundwater utilized by the project annually is 21450 m^3/year where as at the same time the total runoff available for groundwater recharge is 3610.88 m^3/year, which is only 16.83% of the abstraction per year.
- The total available runoff to be recharged per day considering 25 mm/hr intensity of rainfall is 98.98 m^3/day.
- At present there are 1 rainwater harvesting structures present in project premises to accommodate the storm generate during rainy season.
- Project proponent is recharging almost 16.83 % of groundwater from its existing rainwater harvesting schema while comparing to actual runoff available per year.
- The additional rain water recharging will be implemented by adopting pond outside the project premises as per the CGWA guidelines.

Adoption of Ponds for Rainwater Harvesting

Ponds are surface water bodies, submerging a land area with adequate permeability to facilitate sufficient percolation to recharge the ground water. They may arise naturally in floodplains as part of a river system, or they may be somewhat isolated depressions. They might contain shallow water with marsh and aquatic plants and animals.. Surface run-off water can be diverted to this natural depression. Water accumulating in the pond percolates in the solid to augment the ground water.

A pond can be defined as an naturally created surface water body submerging a highly permeable land area so that the surface runoff is made to percolate and recharge the ground water storage. They are not provided with sluices or outlets for discharging water from the tank for irrigation or other purposes.

These are the most prevalent structures in India as a measure to recharge the ground water reservoir both in alluvial as well as hard rock formations. The efficiency and feasibility of these structures is more in hard rock formation where the rocks are highly fractured and weathered.

The hydro-geological condition of site for percolation pond is of utmost importance. The rocks coming under submergence area should have high permeability. The degree and extent of weathering of rocks should be uniform and not just localized. The purpose of percolation pond is to conserve the surface run off and diverts the maximum possible surface water to the ground water storage. Thus the water accumulated in the pond after monsoon should percolate at the earliest, without much evaporation losses.

The location of tank and its submergence area should be in non-cultivable land and in natural depressions requiring lesser land acquisition. There should be cultivable land downstream of the tank in its command with a number of wells to ensure maximum benefit by such efforts.

The average recharge capacity of the tank will be preserved, provided the pond bottom will undergo desiltation by removing accumulated sediment and debris prior to the annual monsoon. Best results were obtained from systems located in areas of vesicular or fractured basalt.

Ponds suitable for recharge has been adopted in the listed villages. NOC/agreement from Sarpanch/Panchayat regarding the adoption of pond has been taken with specific dimention of pond mention in the agreement. The ponds has been identified and mapped to evaluate the catchment and compute the total runoff. 1 Ponds have been identified with area 3114.15 sq m. The catchment area of pond calculated by using SRTM DEM model in ArcGIS platform and premeditated to be 409651.31 sq m.

Calulation

Total Area of Percolation pond = 3114.15 m^2

Average Depth of Percolation Pond = 3 m

Volume/Storage capacity of Pond = 9342.45 m^3

The minimum contribution of inflow of water in the percolation pond will be the catchment area of Pond

Catchment Area = 409651.31 m^2

Rainfall = 1061 mm = 1.061 m

Coefficient for initial and runoff losses = 0.20

Therefore total storm generated/ year = 409651.31 X 0.20 X 1.14086

= 93470.96 m^3

Therefore, total volume of runoff available for recharge per year is 93470.96 m^3

Recharge due to percolation from ponds is estimated based on following formulae (GEC2015)

R_{TP} = AWSA x R X RF X Number of Fillings (Max 3)

R_{TP} = Recharge due to tanks and ponds

AWSA = Average water spread area (Pond Area)

R = Number of days water Available in Pond

RF = Recharge Factor (1.4mm/day) GEC97

= 3114.15 x 180 x 0.00014 X 3 = 2354.30 m^3 per year

Therefore total estimated ground water recharge through these ponds annually is 2354.30 m^3 per year

Table-7: Combined Runoff Computation

Catchment	Average Depth	Area (Pond Water Spread Area) 'II'	Volume of Pond	No. of Fillings	Available surface runoff from catchment area of Pond (m3/annum) "A"
409651.31	3.00	3114.15	9342.45	3	93470.96

Table-8: Recharge Computation for Pond

Catchment	Average Depth	Area (Pond Water Spread Area) 'II'	Days	Rainfall	Coefficient	No. of Fillings	Rainfall Coefficient	Available surface runoff from catchment area of Pond (m3/annum) "A"	Recharge due to Percolation m3/annum
409651.31	3.00	3114.15	180	1.14086	0.0014	3	0.2	93470.96	2354.30

Demarcation of Catchment Area of Pond

The source of water for ponds is surface runoff. These ponds are formed in lower and mid-slope positions to intercept and collect runoff by gravity (Blanco and Lal, 2008). Topography plays an important role in the distribution and flux of water within natural land surfaces. The quantitative assessment of surface runoff depends on the topographic configuration of the land surface. Many topographic parameters can be computed directly from a digital elevation model (DEM). This information is very useful to study the hydrological characteristics of a watershed. The automated extraction of topographical parameters from DEM is recognised as a viable alternative to traditional

surveys and manual evaluation of topographic maps, particularly as the quality and coverage of the DEM data increases. There are several techniques available for extracting topographical parameters from DEM such as the slope characteristics, catchment areas, drainage divides, channel networks, etc. (Jenson and Domingue, 1988). These techniques are faster and provide more precise measurements than the traditional manual techniques applied to topographic maps (Tribe, 1991).

The hydrological modelling by using ArcGIS platform to analysis DEMs which represent landscapes at a resolution that allows the extraction of hydrologic variables. DEM of the project premises has been prepared by overlapping a square grid over the area and attributing point elevation data to the nodes. The elevation data have been referenced from Google Earth application which has a vertical resolution of 1 m. The accuracy of elevation information has been checked by tallying with the benchmarks in the Survey of India (SOI) topographical map (1:50,000 scale) and it has been found that RLs (reduced level) of the points in the map matches exactly with Google earth data. A DEM free of sinks, i.e., a depressionless DEM is the desired input to the flow simulation process.

There are several models for defining a grid of flow directions based on a DEM. The simplest and most widely used method is termed as the D8 (deterministic eight-neighbor) method developed by Fairfield and Leymarie (1991). The flow vector algorithm scans each cell of the modified DEM (after sink removal) and determines the direction of the steepest downward slope to an adjacent cell. The D8 flow direction function is available in ArcGIS software and is used for flow direction. In the D8 model, eight possible flow directions are assigned for a single cell and it is assumed that a water particle in each DEM cell flows towards one and only one of its neighbouring cells that cell being the one in the direction of steepest descent. To assign a flow direction value to a cell, the “distance weighted drop” to each of eight neighbouring cells is computed by taking the difference in elevation values and dividing by for a diagonal cell and 1 for a non-diagonal cell. The flow direction for a cell is assumed to be in the direction with the highest distance weighted drop. Where more than one downward slope maxima exist, the flow vector is arbitrarily assigned to indicate the direction of the

maximum first encountered. At cells on the edge of the defined DEM (i.e., cells in the outer rows or columns), the flow vector points away from the defined DEM if no other downward slope to a neighbour is available. All flow originating on or entering a cell is assumed to move in the direction indicated by the flow vector, and no divergent flow out of a cell is accommodated (Jenson and Domingue, 1988).

The catchment area of each grid cell is determined using the method of Martz and de Jong (1988). The flow vectors are used to follow the path of steepest descent from each cell to the edge of the DEM, and catchment area of each cell along this path is incremented by one. After a path is initiated from each cell, the catchment area value accumulated at each cell gives the number of upstream cells which contribute overland flow to that cell.

The boundary of the watershed to be analyzed is also determined from the flow vectors. The user specifies the location of the grid cell at the watershed outlet, and all grid cells which contribute overland flow to the outer cell are identified. In this case, the cells representing the ponds are treated as watershed outlet and the drainage channels which contribute flow into the Pond are identified and subsequent catchment area demarcation is carried out.

Figure-9: Location of Pond for Water Harvesting-Google Imagery

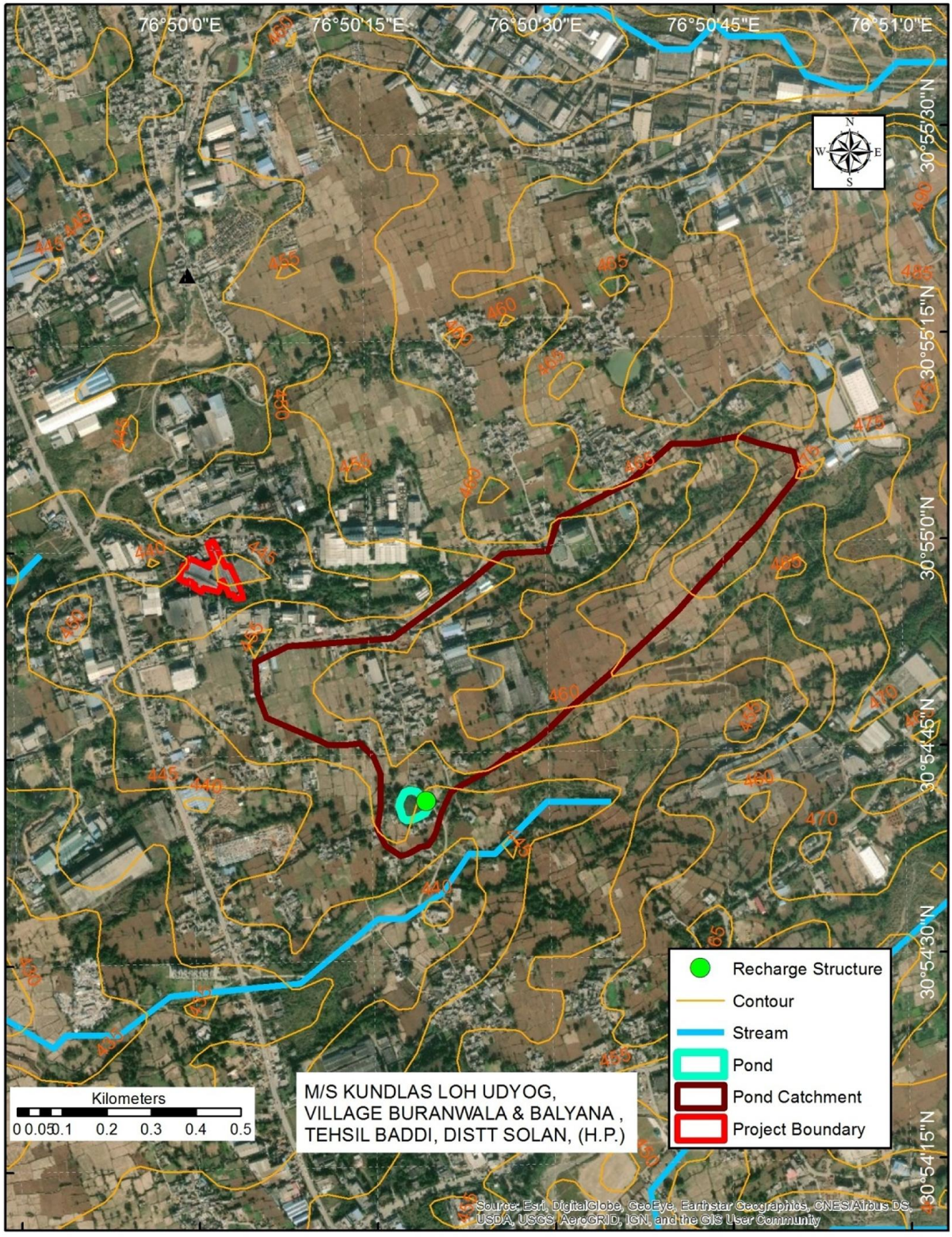


Figure-11: Demarcation of Catchment Area of Pond

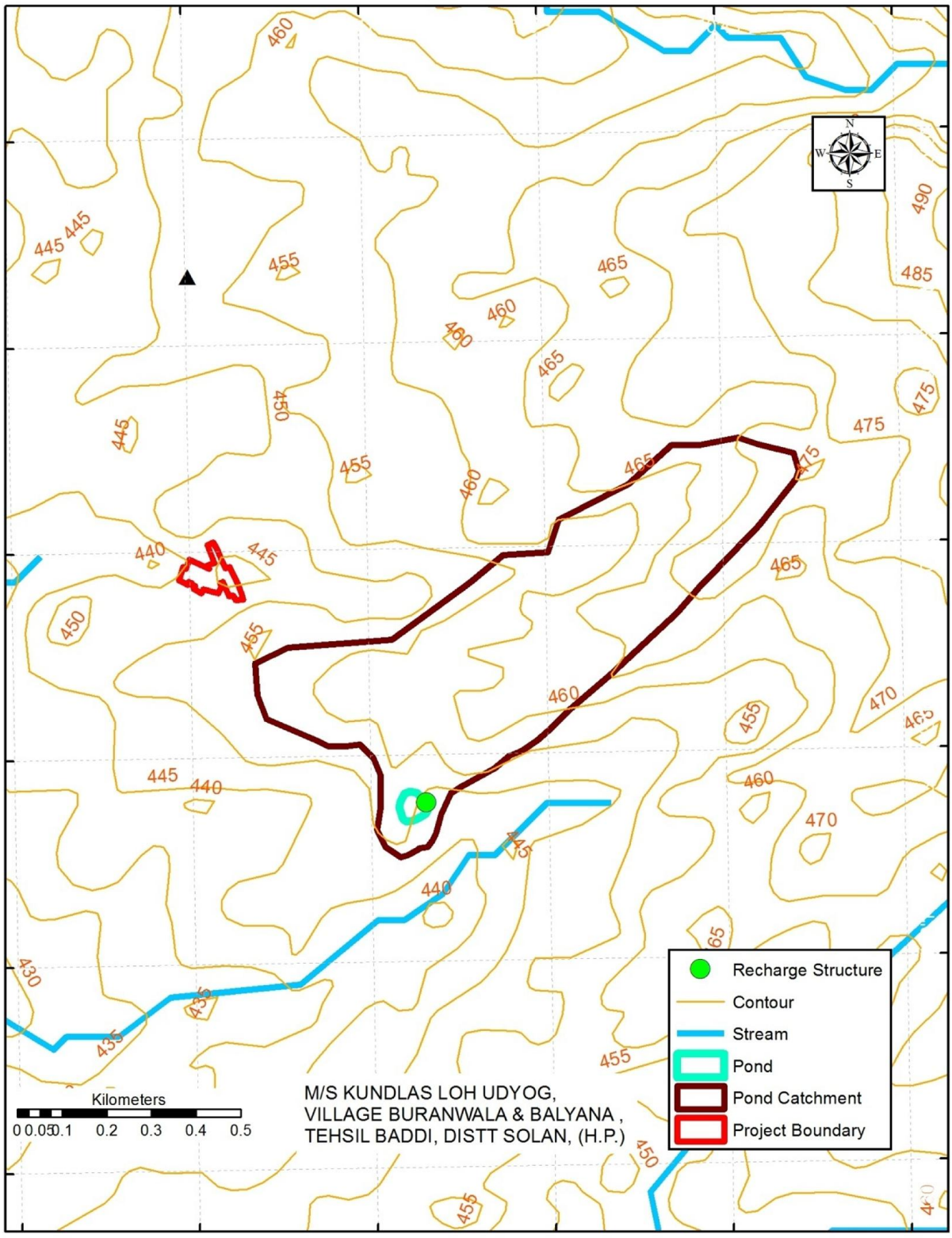


Figure - : Location of Pond for Water Harvesting-Satellite Imagery

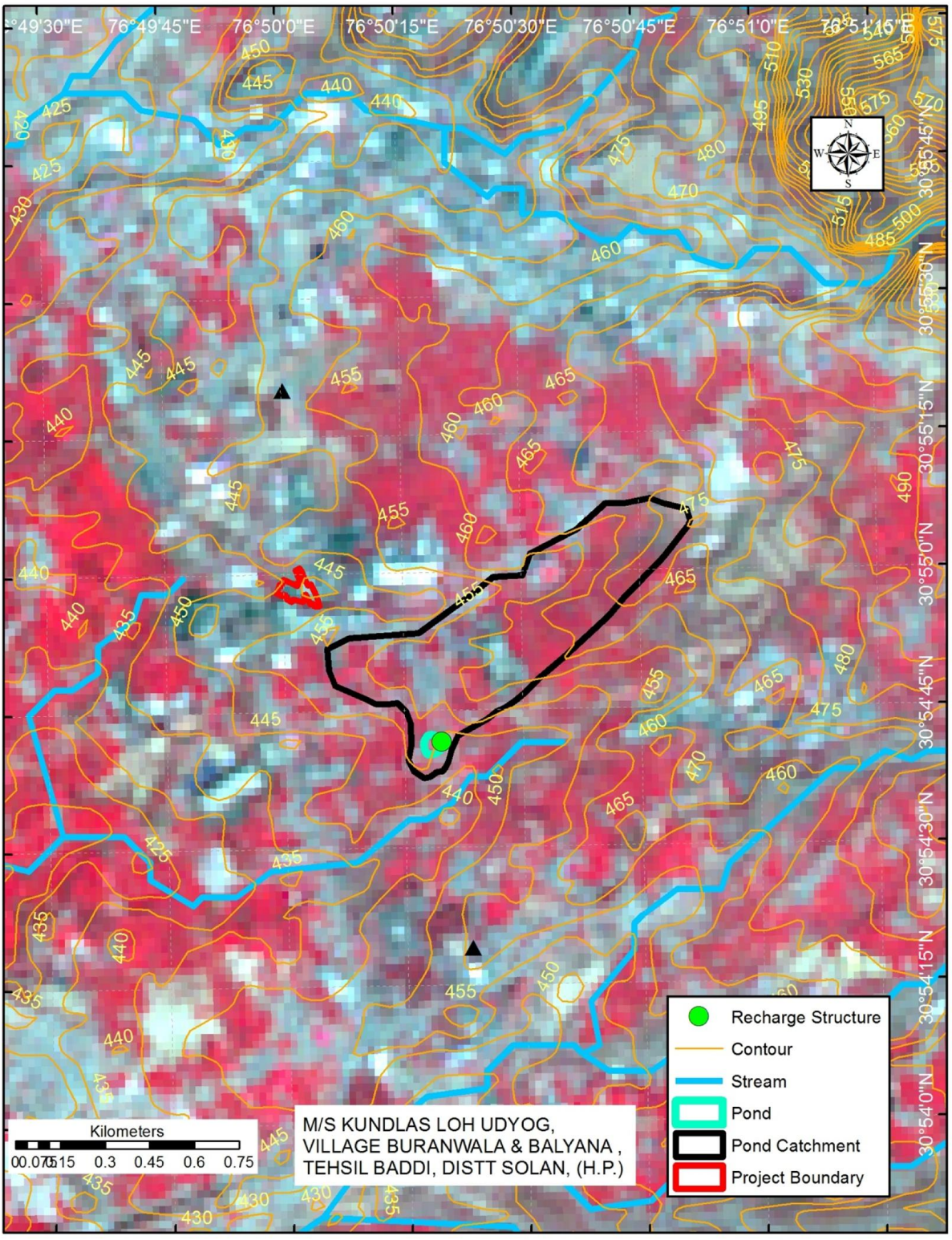


Figure - : Location of Pond for Water Harvesting-Toposheet

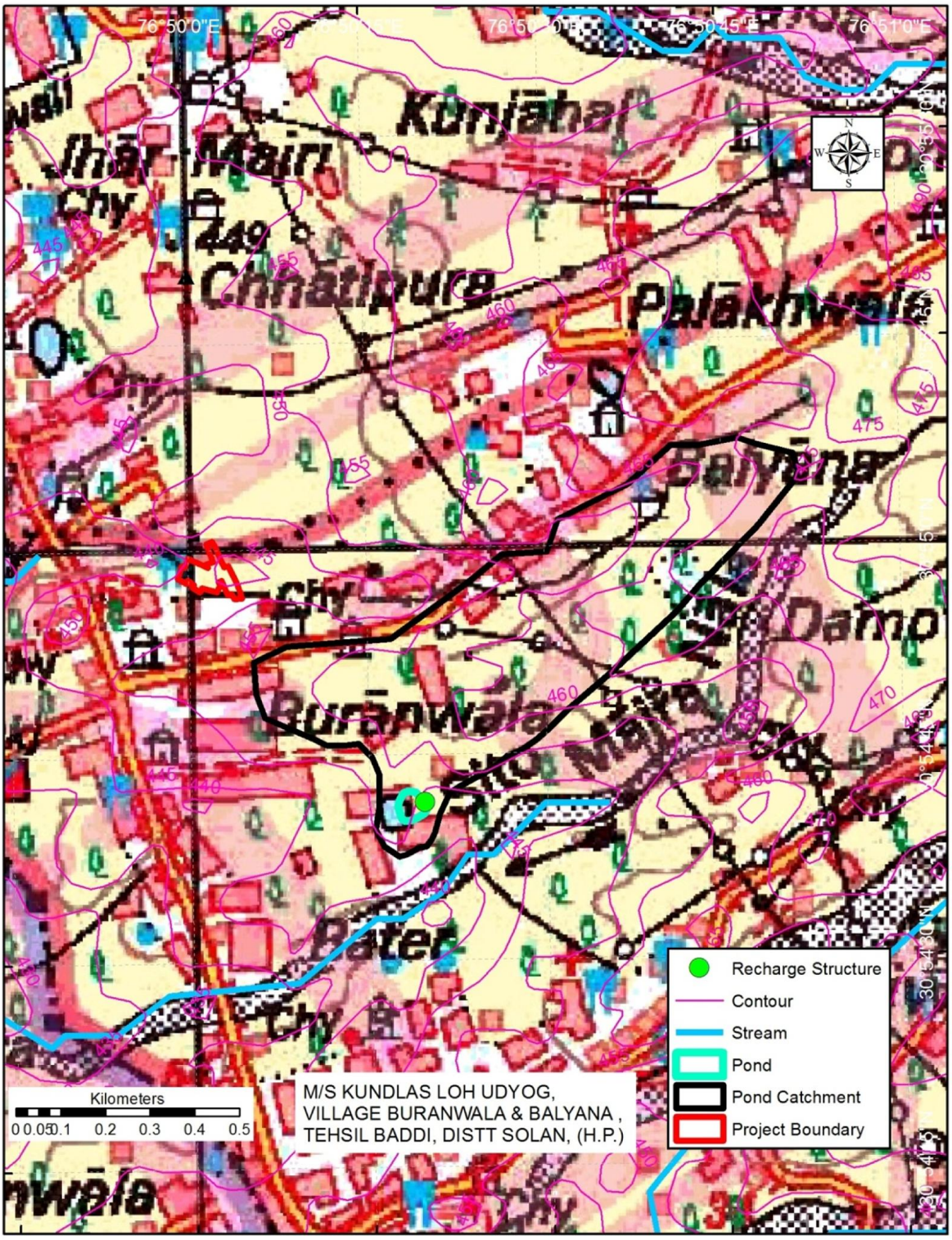
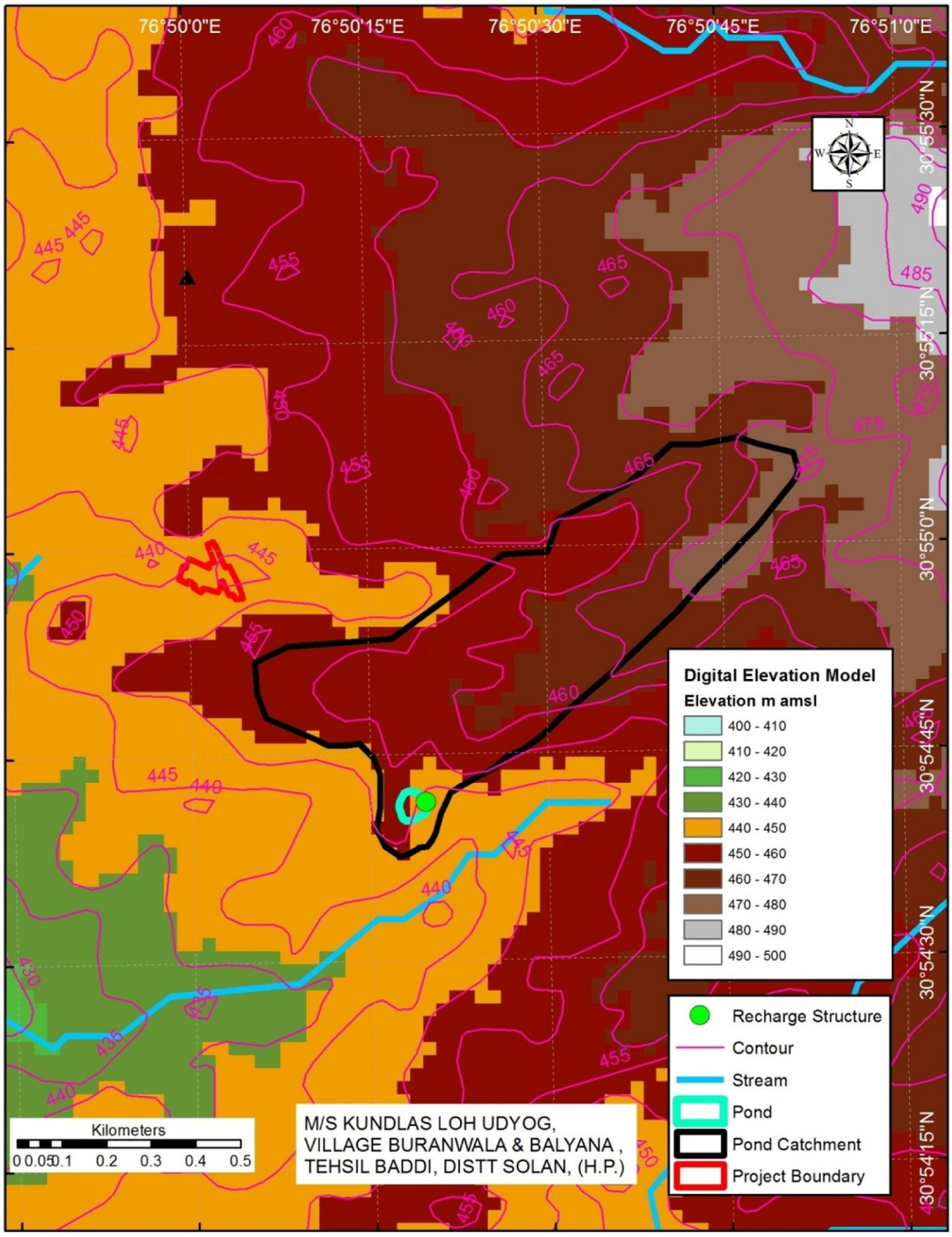


Figure - : Location of Pond for Water Harvesting-Elevation Profile



Losses due to evaporation, Seepage & Dead Storage

In the study area, the evaporation losses from water bodies' surface area are considered @ 0.0055 m per day (0.66 m column for maximum 180 filling days) as per Basin Planning & Management Organization, Central Water Commission, Govt. of India, About 1 m dead storage has to left in the ponds for desiltation& villager's use.

Details of Recharge Well/Recharge Shaft Installed inside the Pond

The additional recharge potential created by developing ponds as artificial recharge sites by installing percolation pits in the pond. This would increase storage capacity of the pond. The percolation(recharge pits) having recharge shaft are recommended in the pond for fast & efficient recharge at deeper level. The Recharge pits and shafts are artificial recharge structures commonly used for recharging shallow phreatic aquifers, which are not in hydraulic connection with surface water due to the presence of impermeable layers. They do not necessarily penetrate or reach the unconfined aquifers like gravity head recharge wells and the recharging water has to infiltrate through the vadose zone. Recharge Shafts are constructed to augment recharge into phreatic aquifers where water levels are much deeper and the aquifer zones are overlain by strata having low permeability. Further, they are much smaller in cross section when compared to recharge pits. Detailed design particulars of a recharge shaft are shown in figure.

Recharge shafts may be dug manually in non-caving strata. For construction of deeper shafts, drilling by direct rotary or reverse circulation may be required. The drilled shafts, diameter may not exceed 1m. Shaft drilled diameter of about 1m, allowing the insertion of a 0.5m diameter PVC casing pipe. The average depth of bores is about 6m. Commercially available perforated screen and gravel pack should be inserted in the bottom of about 6m. The shaft should reach the permeable strata by penetrating the overlying low permeable layer, but need not necessarily touch the water table. Shafts lined with perforated PVC pipes may be back-filled with an inverse filter, comprising boulders/cobbles at the bottom, followed by gravel and sand. The upper sand layer may be replaced periodically.

Dimensional parameter of percolation pit is kept as 1m(length) x1m(width)x2m (depth) with 0.15m dia recharge shaft of 6m depth. The inlet of the structure would be 1m above pond's deepest level leaving average1m water column as dead storage for desiltation. As per yield & alluvium formation thickness(70m) at pond sites, the intake capacity of recharge shaft is consider to be 2.72m3/hour for average180 filling days.

Figure - 14 : Recharge Shaft

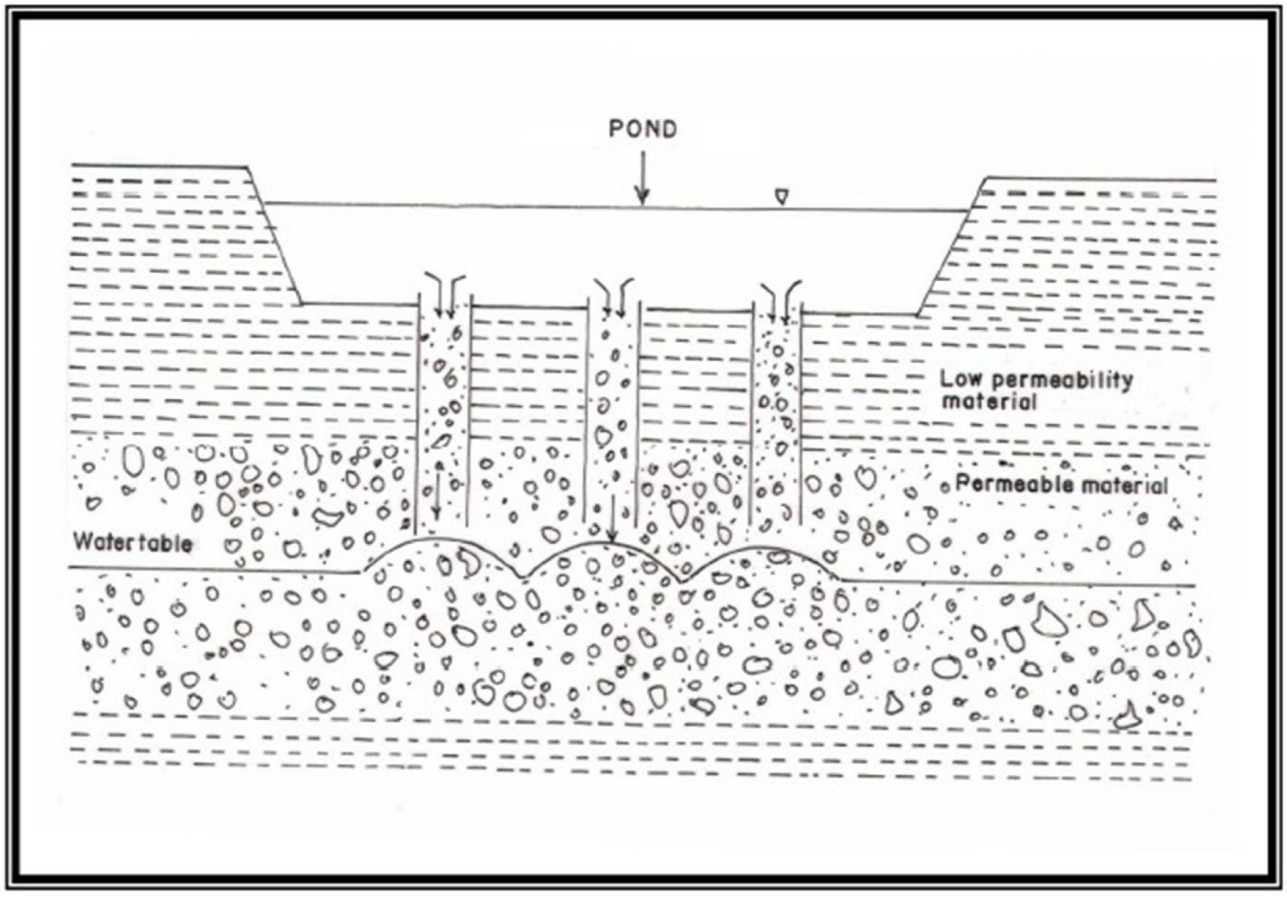
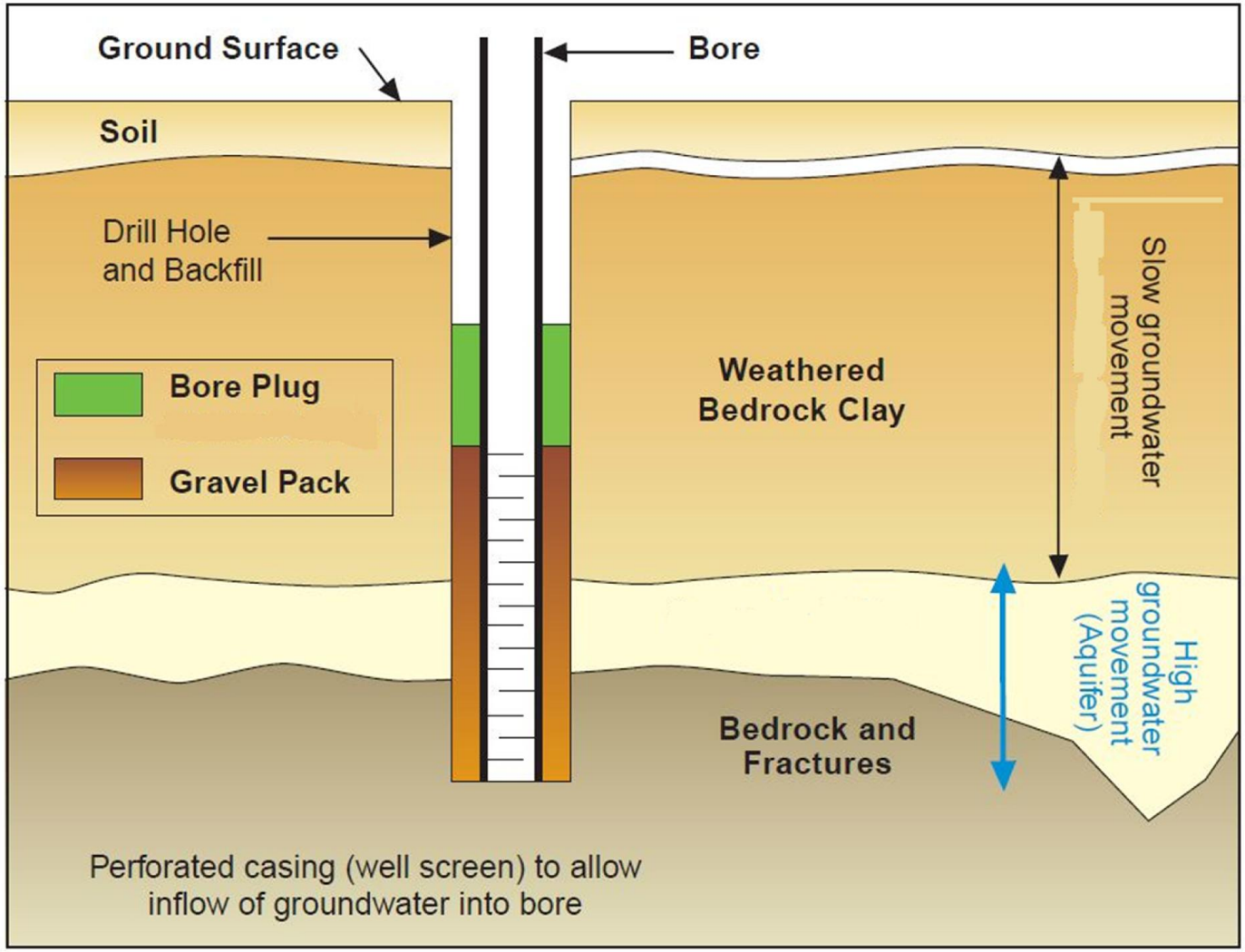


Figure - 15 : Cross-section showing bore installation, with the Perforated pipe



Quantam of Rainwater recharge through individual recharge Structure:

1. Volume of water within free Board (Settlement Chamber)

= 1m x 1m x 1 m = 1 m^3

2. Volume of water in Gravel filled Part

i.e. Volume of water within the pore spaces of sand, gravel filled part @35%.

= 1m x 1m x 1 m x 0.35 = 0.35m^3

3. Volume of water in Recharge Well through which recharge will be done

Intake capacity of recharge well = 2.72 m^3/hr = 65.28m^3/day

Therefore, Total volume to be recharge through a individual structure will be

= (1+0.35+65.28)= 66.63 m^3/hr

Therefore No. of Filling Days = 180 = 66.63 x 180 = 11993.4 m^3/annum

Evaporation and seepage loss from pond inside the plant area.

= 5169.49 m^3 /annum

Available runoff left after losses

= 88301.47 m^3 /annum

Recharge due to percolation in ponds

= 2354.30 m^3 /annum

Available runoff left after percolation,

= 85947.17 m^3 /annum

Additional recharge after installing 1 Recharge shaft

= 11993.4 m^3/annum

2 Recharge Shaft has been proposed , therefore total recharge

= 2 x 11993.4

= 23986.80 m^3/annum

Figure - 16 : Design of Recharge Shaft

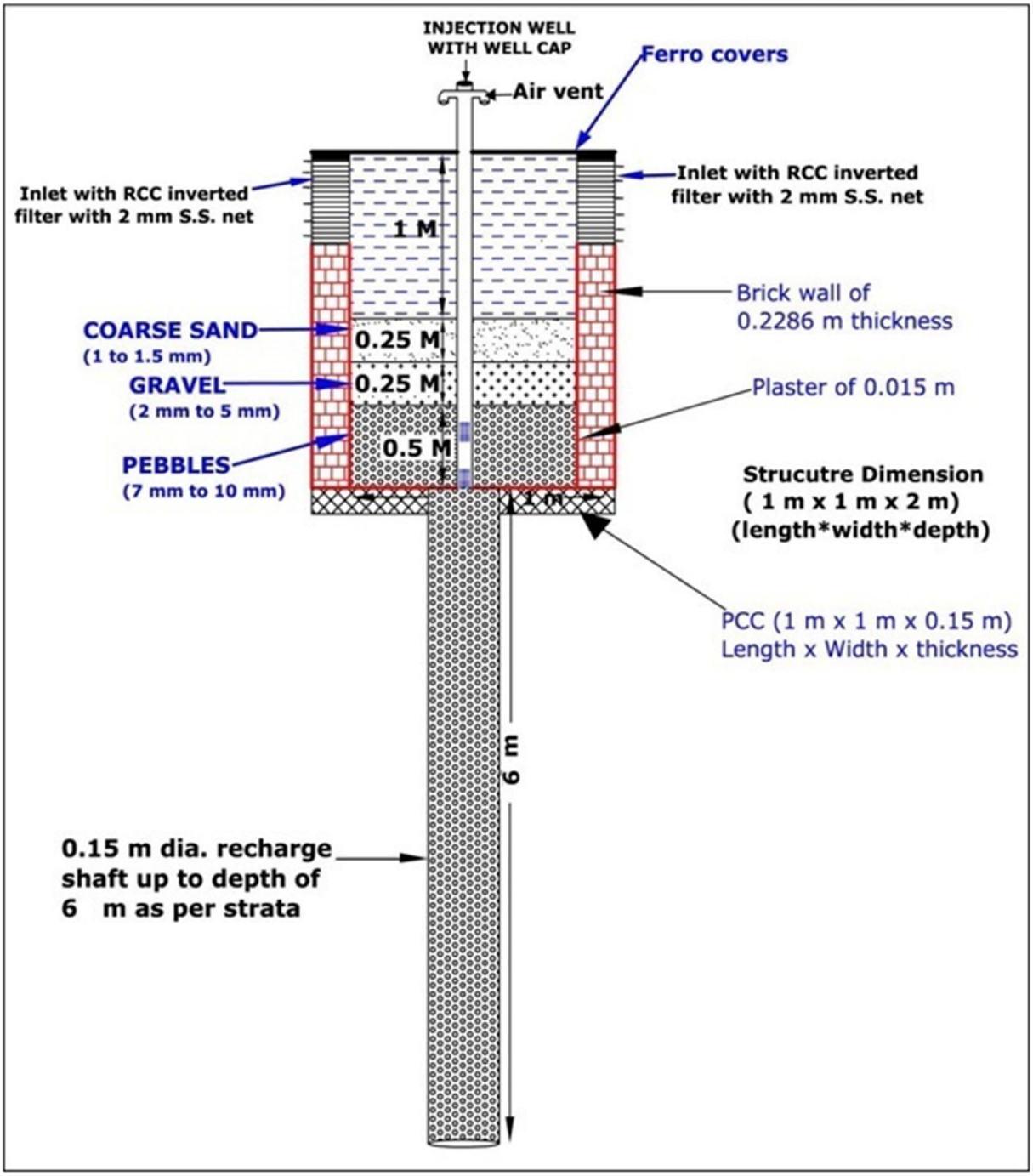


Table-9 : Recharge Potential of Pond after installing Recharge Pit/Recharge Shaft

Village Name	Structure	Available surface runoff from catchment area of Pond (m3/annum) "A"	Recharge due to Percolation m3/annum	Total column loss during 180 filling days (m/annum) "I"	Net Loss of available runoff volume for storage in pond (m3/annum) "B" (I x II)	Available runoff volume (m3/annum) for artificial recharge "C" = A - B	Recharge left after percolation	Recharge Rate m3/day	Recharge from 1 Structure	No. of Recharge Structures	Recharge from all structure	Total Recharge
Baddi	Pond	93470.96	2354.30	1.66	5169.49	88301.47	85947.17	66.63	11993.4	2	23986.8	26341.09

RESULTS

The Final ground water recharge after implementing the schema will be

1. Recharge due to percolation from pond.
2. Recharge by installing additional recharge shaft in proposed ponds, 2 units.
3.By installing rainwater harvesting structure inside project area.

Table-13:Final Recharge

Recharge Structures and Conditions	**Ground Water Recharge cubic meter/annum**
Rainwater Harvesting inside Plant	3610.88
Natural Percolation from Pond	2354.30
Additional Recharge after installing 2 units of recharge shafts	23986.80
Total	**29951.98**

Conclusion

- The total groundwater utilized by the project annually is 21450 m^3/year where as the total runoff available for pond adopted for ground water recharge is 3610.88 m^3/year.
- In total pond from 1 location have been identified for the adoption, the area of pond is 3114.15 m^2. The catchment area of pond is demarcated and calculated to be 409651.31 m^2.
- By adoption the project proponent may recharge almost 23986.80 m^3/year of ground water annually which is 111.82 % of the ground water utilized by the project.
- Therefore, total recharge after combining both inside and outside plants recharge structures will be 29951.98 m^3/year which is 139.63 % of the ground water utilized by the project.

Recommendation

1. Periodic maintenance of recharge structures is essential because infiltration capacity is rapidly reduced as a result of silting, chemical precipitation, and accumulation of organic matter. In the case of spreading structures, annual maintenance consists of scraping the infiltration surfaces to remove accumulated silt and organic matter.
2. Steps should be taken to prevent severe soil erosion through appropriate soil conservation measures in the catchment. This will keep the tank free from siltation which otherwise reduces the percolation efficiency and life of the structure.
3. In India, an important factor in the design of recharge structures is the consideration of their stability during probable, high flow storms during years of above average rainfall and occasional flash floods. Such structures should also be designed in such a manner as to minimize the accumulation of silt and organic matter within the structure.
4. Village drainage and waste water should not be allowed to be disposed in these ponds. Bunds of the pond should be elevated and maintained.

Annexure 2

No Objection Certificate

This is to certify that, I Ram Ratan Choudhary S/o Sh. Lekh Ram Sarpanch/ Pardhan village. KOTLA tehsil. BADDI, District Solan, Himachal Pradesh having that no objection to establish Rain water Harvesting system on Empty Panchyat Land and Govt. School and own Panchyat Bhawan by M/s Kundlas loh Udyog who wants to establish a Rain water Harvesting system.

I herewith declared that I have no objection for establishment of Rain water Harvesting system.

RR Choudhary

प्रधान
ग्राम पंचायत बरोटीवाला
वि० ख० धर्मपुर (हि०प्र०)

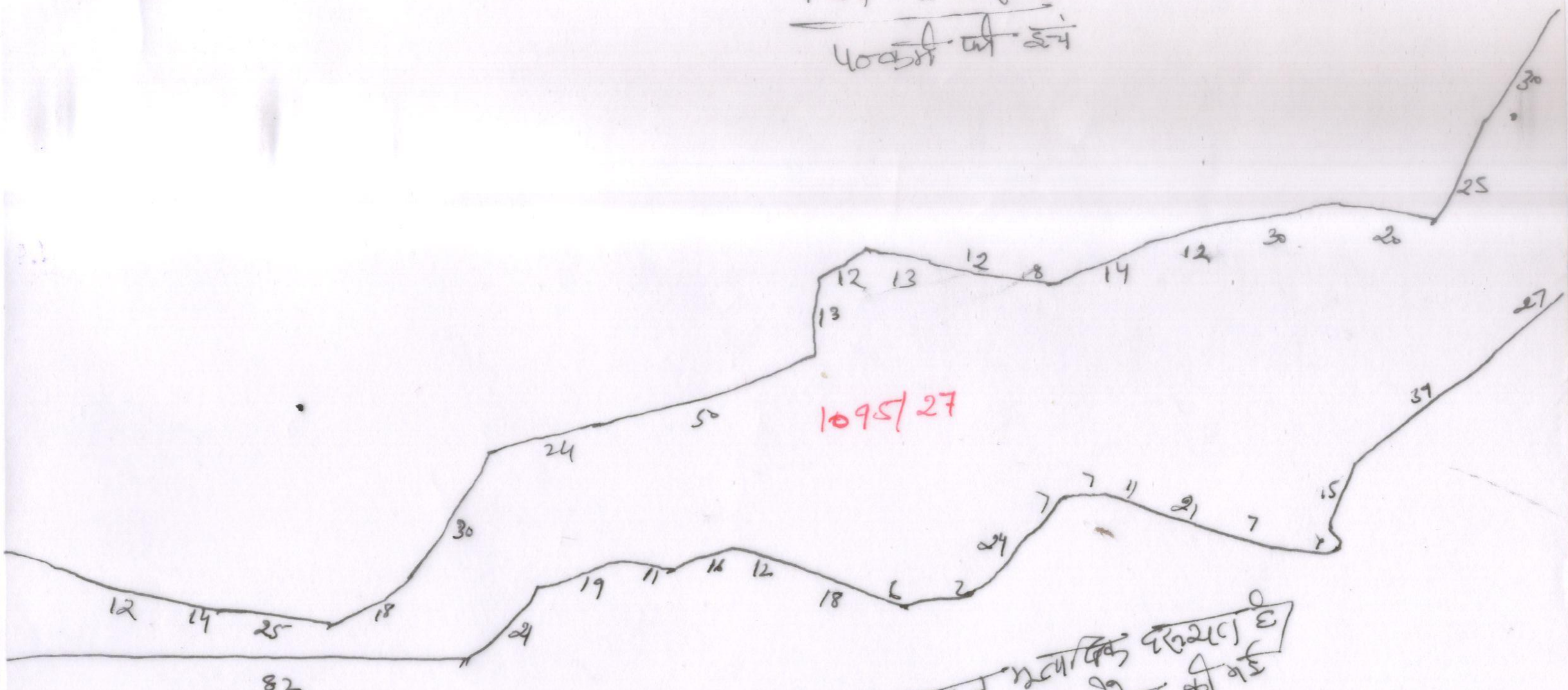
Authorized Signatory

(Ram Rattan Choudhary)

Pardhan, Gram Panchyat

नकल अक्स शजरा किश्तवार मौजा कटेड न- हि. 20 परगना दून तहसील बद्दी जिला सोलन हि॰ प्र॰

पैमाना बा हिसाब
40 करम फी इंच



नकल असल मुताबिक दरुस्त है
दस्त मनला सायल तैयार की गई
बिला उजरत वसूल शुदा

PATWARI P.C RAPOTIWALA
TEH.BADDI DISTT.SOLAN (H.P.)

स्लीप नं. ९१
रपट नं. २५१

Annexure 2

राजस्व विभाग, हिमाचल प्रदेश - नकल जमाबंदी

एस.सी.ए रसीद संख्या: 4380912201920601
नाम : ABC
पिता/पति : ABC

नकल शुल्क : 1
सेवा शुल्क : 10
कुल शुल्क : 11

जिला : सोलन
तहसील : बद्दी
कानूनगोवृत : बरोटीवाला
पटवार वृत : बरोटीवाला
हदबस्त न. : 200 मोहाल : बटेड़

साल : 2016-2017 रकबा ईकाई: बीघा-बि.-बि.

खेवट नं. नाम पती या तरफ मय नाम नम्बरदार मुंताबला व शरह मुआमला व हबूब	खतौनी नं. लगान जो मुजारा अदा करता है व तफसील शरह व तदाद	नाम मालिक व एहवाल	नाम काश्तकार व एहवाल	नाम चाह व दीगर वसायल आबपाशी	नम्बर खसरा हाल	रकबा हर खेत व मिजान खाता मय किस्म अराजी मीट्रीक ईकाइयों में	हिस्सा या पैमाना हकीयत व तरीका बाछ	कैफियत
1	2	3	4	5	6	7	8	9
375 मिन 336 ..... बशरहा खेवट न. (1) ..... 9.09 माल 5.51 स्वाई	385 मिन 348	हिमाचल प्रदेश सरकार	मकबूजा वाशिन्दगान देह		1095/27	119-02-00 118-01-00 गै.मु.नाला 01-01-00 गै.मु.सड़क	कब्जा व पड़ता बशरह खेवट न.(1)	नोट : - सालम खेवट टी.सी.पी. नोट : - सालम खेवट टी.सी.पी. के अधीन आती है।

Greenbelt Development of Kundlas Loh Uyog

Operation Stage

Improvement of the current ecology of the proposed expansion project site will entail the following measures:

- Plantation and Landscaping
- Green Belt Development

The section below summarizes the techniques to be applied to achieve the above objectives:

Plantation and landscaping

The total area of factory is 7789.41 sqm and 2570.51 sqm green areas (33 % of total factory area) will be developed. As per MoEF norm of 80 sqm of plot area per tree about **97** trees are required and about **353** trees will be planted in the greenbelt including all around the factory boundary and inside the plant premises. Selection of the plant species would be done on the basis of their adaptability to the existing geographical conditions and the vegetation composition of the forest type of the region earlier found or currently observed.

Green Belt Development Plan

The green belt will be developed as per the guidelines for developing green belt by CPCB, 2007. The plantation matrix adopted for the green belt development includes pit of 0.3 m × 0.3 m size with a spacing of 2 m x 2 m. In addition, earth filling and manure may also be required for the proper nutritional balance and nourishment of the sapling. It is also recommended that the plantation has to be taken up randomly and the landscaping aspects could be taken into consideration.

Plantation comprising of medium height trees (7 m to 10 m) and shrubs (5 m height) are proposed for the green belt. In addition, creepers will be planted along the boundary wall to enhance its insulation capacity.

Plant Species for Green Belt Development

The selection of plant species for the development depends on various factors such as climate, elevation and soil. The plants would exhibit the following desirable characteristics in order to be selected for plantation

1. The species should be fast growing and providing optimum penetrability.
2. The species should be wind-firm and deep rooted.
3. The species should have dense foliage with round canopy.
4. As far as possible, the species should be indigenous and locally available.
5. Species tolerance to air pollutants like SO_2 and NO_2 should be preferred.
6. The species should be permeable to help create air turbulence and mixing within the belt.
7. There should be no large gaps for the air to spill through.
8. Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces.
9. Ability to withstand conditions like inundation and drought.
10. Soil improving plants (Nitrogen fixing rapidly decomposable leaf litter).
11. Attractive appearance with good flowering and fruit bearing.
12. Bird and insect attracting tree species.
13. Sustainable green cover with minimal maintenance.

Description of Greenbelt Area and Plantation to be done in Plant Area.

S. No	Particular	Area Sqm	No. of Trees
1	Peripheral area	1635	273
2	Lawn Area	935.51	80
Proposed Green area (33 % of Net Plot Area)		**2570.51**	**353**

Area Details			
S. No	**Particular**	**Area Sqm**	**In terms of percentage (%)**
1	Ground coverage	2882.41	37
2	Green Area	2570.51	33
3	Surface Parking Area	1557.88	20
4	Under Roads & Paved	778.94	10
Total Plot Area		**7789.41**	**100**

Greenbelt development Plan around the boundary of plant and inside the plant shown in layout plan and enclosed with this report.

The unit is located in Sub Tropical zone (agro-climatic zone) of western Himalayan region having an average annual rainfall of 2000 mm with humid climate. Major soil type in the area is Sub- Mountainous Soil. The Soil is generally sandy loam in valley areas of Baddi and in rest of the hilly and mountainous areas, soil is skeletal. Soil depth is generally shallow, except in areas having good vegetative cover. It is generally dry, shallow and deficient in organic matter. Soils are rich in nutrients and thus are fertile. Accordingly, suitable trees selected and proposed for greenbelt development.

List of trees suggested for development of Greenbelts

S. No.	Binomial Name	Family	Common Name	Vernacular Name	Sensitive/ Tolerant	Height (Meters)	Regeneration By	Flowering Season	Crown shape	Crown surface area (sqm)	Leaf Area sqc)	Stomatal Index
1	*Acer compbellii* Hook F. and Thoms.	Aceraceoe	Himalayan maple	Angu	S	12m	By Seeds.		Spreading			
2	*Acacia nilotica* (Linn) Willd.	Mimoseae	Indian Gum-Arabic-tree	Babul	T	8m	By Seeds.	Aug-Jan.	Spreading	8293.74	135.7	11.23
3	*Dalbergia latifolia* Roxb	Fabaceae	Sissoo	Indian Rosewood	T	20m	By seeds, Stem and Root cutting	Aug-sept	Round	21723.2	187.9	10.12
4	*Ficus elastica* Roxb	Moraceae	Indian Rubber Tree		T	12m	By Cutting		Spreading/ Round	6028.18	94.2	19.43
5	*Ixora arborea* Roxb	Rubiaceae			T	6m	By Cutting	Throughout the year	Oblong to spreading	57.04	54.2	17.3
6	*Ixora coccinea* L	Rubiaceae		Rangan	T	6m	By Cutting	Throughout the year	Oblong	183.26	69.7	23.3
7	*Milletia pequensis* Ali	Fabaceae			T	10m	By Seeds.	Aug. - Oct.	Round / Oblong	42311.52	167.2	12.2
8	*Prosopis cineraria* Linn.	Mimosaceae		Khejri	T	12m	By seeds, root sucker	Dec. - April.	Spreading	13430.6	54.23	18.1

S. No.	Binomial Name	Family	Common Name	Vernacular Name	Sensitive/ Tolerant	Height (Meters)	Regeneration By	Flowering Season	Crown shape	Crown surface area (sqm)	Leaf Area sqc)	Stomatal Index
9	*Sapindus emarginatus* Vihl	Sapindaceae	Soapnut		T	10m	By seeds	Oct. - Dec.	Oblong / Round	43,789.24	110.6	23.6
10	*Sesbania grandiflora* Pers	Fabaceae	Swamp-pea, Agathi	Ogosti (Oriya)	T	10m	By Seeds	Sept. - Dec.	Oblong	4694.87	130	20.45

Source: Guidelines for developing greenbelt- CPCB-2007

List of shrubs suggested for development of Greenbelts

S.No.	Binomial Name	Family	Common Name	Vernacular Name	Sensitive/ Tolerant	Height (Meters)	Regeneration By	Flowering Season	Crown shape	Crown surface area (sqm)	Leaf Area sqc)	Stomatal Index
1	*Bougainvillea spectabilis* Willd	Nyctaginvillea	Bougainvillea		T	8m	By cuttings	Through the year	Oblong/ Round	939.25	33.15	32.53
2	*Lawsonia inermis* Linn	Lythraceae	Henna	Mehendi	T	5m	By Seeds, Cutting	April -July	Round	71.85	77.8	17
3	*Murraya paniculata* Linn	Rutaceae		Marchula	T	5m	By Seeds, Cutting	June - Oct.	Round	1354.61	35.3	10.31
4	*Nerium indicum* Mill	Apocynaceae	Pink oleander	Kaner	T	5m	By Seeds, Cutting	Throughout the year	Oblong / Round	5747.63	32.62	15.7
5	*Tabernaemontana divaricata* Linn	Apocynaceae		Tagar	T	3m	By Cutting	Through the Year	Round	128.67	47.81	30.2

Source: Guidelines for developing greenbelt- CPCB-2007

TITLE : - SITE PLAN LOCATION PLAN
EXISTING FACTORY BUILDING , SITE PLAN, LOCATION PLAN FOR M/S KUNDLAS LOH UDYOG, VILLAGE BURANWALA & BALYANA , TEHSIL BADDI, DISTT SOLAN (H.P.) KHASRA. NO. 414,415,416,418 &133,HADBAST NO. 202

1	SCRAP SHED
2	APCD
3	FURNACE
4	CCM
5	POWER HOUSE
6	RWH PIT
7	LAB
8	WEIGHING BALANCE
9	ASSEMBLY POINT
10	OFFICE
11	SECURITY ROOM
12	CUTTING MACHINE
13	COOLING BED
14	ROLLING MACHINE
15	FG STORE
16	CHIMANY
17	RAW MATERIAL STORE
18	RAW MATERIAL
19	LT ROOM
20	GREEN BELT
21	PRIMARY TANK
22	SECONDARY TANK
23	STORE
24	STORE

Area Details

S. No	Particular	Area Sqm
1	Peripheral	1635
2	Lawn Area	935.51
	Proposed Green area (33 % of Net Plot Area)	2570.51

S. No	Particular	Length (m)	Width (m)	No of Rows	Area Sqm (L x W)	Spacing B/w Trees (m)	No. of trees (L/2X No Rows)
1	PE-1	62	3	1	186	2	31
2	PE-2	26	3	1	78	2	13
3	PE-3	6	3	1	18	2	3
4	PE-4	10	3	1	30	2	5
5	PE-5	52	3	1	156	2	26
6	PE-6	69	3	1	207	2	35
7	PE-7	12	3	1	36	2	6
8	PE-8	26	3	1	78	2	13
9	PE-9	38	3	1	114	2	19
10	PE-10	32	3	1	96	2	16
11	PE-11	12	3	1	36	2	6
12	PE-12	21	3	1	63	2	11
13	PE-13	14	3	1	42	2	7
14	PE-14	34	3	1	102	2	17
15	PE-15	11	3	1	33	2	6
16	PE-16	15	3	1	45	2	8
17	PE-17	41	3	1	123	2	21
18	PE-18	11	3	1	33	2	6
19	PE-19	34	3	1	102	2	17
20	PE-20	19	3	1	57	2	10
	Total				1635		273

Tree spacing Details

In Periphery (PE)	
Tree Spacing	2m
No. of Trees	273
in Lawns (L)	4m
No. of Trees	80
Total No. of Trees (PE+L)	353

Area Details

S. No	Particular	Area Sqm	In terms of percentage
1	Total Plot Area	7789.41	100
2	Ground coverage	2882.41	37
3	Green Area	2570.51	33
4	Surface Parking Area	1557.88	20
5	Under Roads & Paved	778.94	10

Species of Trees

1.	Angu		4
2.	Babul		2
3	Indian Rosewood		3
4	Khejri		2

SITE LAY-OUT PLAN AS PER SITE (SCALE =1:500)

REFERENCE DRAWINGS:	
DWG. NO.	TITLE:

SCALE	DRAWN	CHECKED	APPROVED	12.04.2018
SCALE	DRAWN	CHECKED	APPROVED	DATE

BANTI KUMAR
ARCHITECTS* INTERIOR DESIGNERS
SURVEY *ESTIMATING H.NO. 8.LILY
APRT.GROUND FLOOR,BLOCK NO 12,
AMRAVATI.NEAR KIDZY SCHOOL, BADDI,
SOLAN (H.P.)
M. NO.- 98820-33179, 94187-41022
bunty0798gmail.com

ARCHITECT SIGN.

OWNER SIGN

DRAWN BY	
CHKD BY	
APPROVED BY	
SCALE USED	1:100
DATE	6.07.2018

M/s Kundlas Loh Udyog **Annexure 4**

REVISED CER ACTIVITIES

This project is a Brownfield Project and an amount of Rs. 13.5 Lakhs (approx. 1.32 % of total project cost) out of project cost of Rs 1019.75 Lakhs (as per Ministry's Office Memorandum vide F. No. 22-65/2017-IA.III dated 1st May 2018) has been earmarked for Corporate Environment Responsibility (CER) based on need based assessment and public hearing issues. The details of CER proposed are as follows:

S. No.	Major Activity Heads	Amount to be spent (Rs. in Lakhs)	
		1st Year	2nd Year
1.	**Employment** (Vocational Training for Skill development for self employment like Sewing, Pickle making, Craft making for Women Empowerment of village Balyana)	1.50	1.50
2.	**Educational Facility** (Distribution of School dress & books to Poor students of Village Balyana.)	2.50	2.00
3.	**Community Development** (Rain Water Harvesting Structure & providing 2 No's of Solar Light to Gram Panchayat Bhawan)	2.00	1.50
4.	**Health Camp** (Health, & Eye check up camp will be organized for villagers)	1.50	1.00
Sub-Total		**7.50**	**6.00**
Total		**13.50**	

The Project Proponent shall complete these CER activities within 2 years.