Progress Report of the Joint Committee in the matter of O.A. No. 169/2021; H.C. Arora vs. State of Punjab & Ors, in compliance of Hon'ble National Green Tribunal Order dated 20/07/2021.

1. Background and the Directions of Hon'ble NGT:

The matter is related to a grievance against failure to take remedial measures against contamination of ground water in village Aloarakh, Block Bhiwanigarh, District Sangrur.

According to the media report dated 08.07.2021 in Hindustan Times titled 'Sangrur tube-well spews out polluted water; PPCB blames dismantled factory', highlighting that that the ground water is contaminated and colored water is coming out of the tube-wells which has potential for damage to the public health. The problem has been existing for more than 10 years.

According to the State PCB, a private factory which was closed 15 years ago, is responsible for contamination. It is also reported that compensation of Rs. 2 Crore imposed by Hon'ble NGT on the said factory for restoration of the environment was not recovered.

The Hon'ble National Green Tribunal observed that:

> *"If the report is correct, the polluted water has potential for adversely affecting the inhabitants. In such a situation, it is the responsibility of the state to take remedial measures to enforce the right of the citizens to clean water"*

In the above matter, Hon'ble NGT vide order dated 20/7/2021 (Copy attached as **Annexure-1**) directed as under:

> *"Accordingly, we direct a five-member joint Committee comprising CPCB, Regional Officer, MoEF&CC, Chandigarh, State PCB, a nominee of Secretary Environment Department, Punjab, and District Magistrate, Sangrur to visit the site, interact with the stake holders, assess the ground situation and recommend the measures required to be taken. The report may be furnished within two months by e-mail at judicial-ngt@gov.in preferably in the form of searchable PDF/ OCR Support PDF and not in the form of Image PDF. The Committee may ascertain the number of tube wells discharging coloured water, depth of such wells, aquifer status in terms of movement and extent of contamination, characteristics of contaminated water with reference to effluent sludge disposed by the industry in question - dyes and dye intermediate, effect on agricultural crops, bio- magnification in agro products. It may suggest short and long-term basis considering agronomy and public health, remediation plan, cost of such remediation. A copy of the report be forwarded to the Chief Secretary, Punjab for ensuring remedial measures, based on the facts found. The CPCB and State PCB will be the nodal agency for coordination and compliance. First meeting of the committee may be convened within two weeks."*

As per above order of Hon'ble NGT in the above matter, the following directions were required to be complied with:

i. Constitution of a five member Joint Committee and to convene the first meeting of the Joint Committee within two weeks.

ii. Site visit and interaction with the stakeholders.

iii. To ascertain the number of tube wells discharging coloured water, depth of such wells, aquifer status in terms of movement and extent of contamination, characteristics of contaminated water with reference to effluent sludge disposed by the industry in question - dyes and dye intermediate.

iv. Study the effect on agricultural crops.

v. Study the bio- magnification in agro products.

vi. To suggest short and long-term remediation plan considering agronomy and public health and the cost of such remediation.

vii. The report be forwarded to the Chief Secretary, Punjab for ensuring remedial measures, based on the facts found.

2. Compliance of the Directions of Hon'ble National Green Tribunal:

2.1. Constitution of the Joint Committee and the first meeting of the Committee:

In compliance of the directions of Hon'ble NGT, a Joint Committee comprising of the following members was constituted:

i. District Magistrate, Sangrur

ii. Sh. Saurabh Gupta, IFS, Director, Directorate of Environment & Climate Change, Chandigarh (Nominated by Principal Secretary, Science and Technology)

iii. Dr. Vimal Kumar Hatwal, Scientist - E, Ministry of Environment, Forest & Climate Change (MoEF&CC), Integrated Regional Office, Chandigarh

iv. Dr. Narender Sharma, Additional Director, CPCB, Regional Directorate, Chandigarh

v. Dr. Rajeev Gupta, Regional Officer, PPCB, Sangrur

The first meeting of the Joint Committee was held in the office of District Magistrate, Sangrur on 17/8/2021, wherein it was proposed and decided as follows:

- Sh. S.K. Mohiddin, Senior Hydro-geologist, Central Ground Water Board, Sector-26, Bhujal Bhawan, Chandigarh be co-opted as member to assist the committee w.r.t. ground water issues.

- M/s Ramky Enviro Engineers Ltd, Unit - PWMP, Village- Nimbua, PO-Rampur Sanian, Teh-Derabassi, Distt-Mohali (Punjab) be requested to supply the data w.r.t. lifting of hazardous waste by the industrial units namely M/s Matharu Chemical Industries, M/s Mahaluxmi Orgochem, Matharu Steel

Pvt. Ltd., Village Aloarakh, Tehsil Bhawanigarh, Distt. Sangrur, so that illegal disposal of hazardous waste by the said industrial units can be estimated.

- PPCB, RO, Sangrur to arrange analysis report of the ground waste prepared by Local Department of Agriculture, based on which it was concluded that the ground water under reference is fit for irrigation.
- PPCB, RO, Sangrur to provide copies of i) Application of CTE/CTO and Copy of the CTE/CTOs issued to the unit; ii) Violation done/recorded by the unit and action taken thereof by the PPCB and iii) Qualitative data/annual returns/records of Hazardous Waste Generation submitted by the unit under Hazardous Waste Management Rule.
- The site visit of the joint Committee alongwith CGWB Expert, to be conducted within two weeks, to prepare further plan of action, to conclude the matter, as per time-line given by Hon'ble National Green Tribunal.

Besides above, the Joint Committee also referred to previous reports/studies conducted by CPCB, Thapar Institute of Engineering and technology (TIET), CSIR-NEERI and PPCB, on the same issue.

The **Approach followed by the Joint Committee** for arriving at conclusion in this matter involved:

1) **Site visit and interaction** with the local farmers to determine the affected area.
2) **Ground water sampling** from various bore-wells up-stream and down-stream of the closed Matharu Chemical Industry by involving CGWB expert, to establish the number of affected tube wells, depth/aquifer status, movement of contaminants and affected area. The water quality parameters alongwith heavy metals and TOC were analyzed by CGWB laboratory, whereas pollution parameters were tested by PPCB laboratory.
3) **Sampling of agriculture Soil** of the affected area established from the above Point No. 2, to determine the accumulation of contaminants in the soil over a period of time, by irrigation with contaminated water.
4) **Sampling of agriculture crops and the produce (grains),** to estimate the bio-magnification of contaminants in plant (fodder) and produce (seeds).
5) **Calculation of Transfer Factor (TF)**, for determining the bio-accumulation of metals/contaminants in plants from soil and **Health Risk Index (HRI)** by considering daily intake and reference oral dose.

6) **Preparation of short term and long term remediation plan** and cost involved, considering agronomy and public health in the affected area, The control samples in the all the above cases (Point No. 2-4) were also taken from the area, which is not affected with the contaminated water, to establish the impact of contamination and the quantum of remediation required.

2.2. Progress Report and submission of Joint Committee:

The progress made by the Joint Committee in compliance of the directions of Hon'ble national Green Tribunal, in this matter, is submitted as follows:

1) The site visit of the Joint Committee for determining the affected area and interaction with stakeholders was conducted on 1/9/2021. The sampling locations were decided with the involvement of CGWB Expert. Interaction with the Farmers were also held with the local farmers regarding impact of coloured water on the yield and quality of the produce. While the farmers were satisfied with the yield of the crops, they were not aware of any impact of using the contaminated water on the quality of fodder and grains and also on human and animal health.

2) The ground water samples were collected jointly by CGWB and PPCB teams during September, 2021 from 22 locations including shallow hand pumps and deep bore-wells, for analysis of water quality parameters and pollution parameters respectively . The CGWB team also conducted a detailed study of the area to establish the affected area and aquifer.

3) The results of analysis 15 major parameters and TOC have been received from CGWB, whereas the analysis of heavy metals is under progress. The results of analysis of pollution parameters have also been received by the Joint Committee.

4) A number of parameters were considered for identification of contaminated tube-wells. Important parameters considered are colour, Total Organic Carbon (TOC), Electrical Conductivity, Chemical Oxygen demand (COD), Biological Oxygen demand (BOD), and Nitrate in this preliminary report. As the results of analysis of heavy metals is yet to be received, these parameters will be considered in final report. Presence of all the above parameters were examined against the BIS Standards prescribed for drinking water quality.

5) Water from five locations out of total 22 locations/tube wells was found be reddish colour, indicating contamination. All these 5 borewell were also found be having

9/11/21

high Total Organic Carbon (TOC), thereby, further indicating contamination with organic compounds, though there is no limit prescribed in BIS standard for TOC.

6) Two bore-wells out of the five mentioned in the above point, were also found to be having significant concentration of Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD), whereas three bore-wells were found be having high nitrate concentration and hence confirming contamination of ground water.

7) With regard to depth and aquifer affected with the contaminants, hydro-geology and concentration of various contaminants were considered for arriving at conclusion by CGWB Expert. The sampling has been done from the tube-wells varying between shallow (46 m below ground level) to very deep (183 m below ground level). **It is observed that the tube-wells affected by contamination are having depth of about 130 m below ground level in the vicinity of Industry**. As the area is having single aquifer system upto a depth of about 200 m with a thin clay layer at around 110 m to 120 m depth. Considering the general depth of the most of the tube-wells and hydro-geological conditions and aquifer disposition, **it can be inferred that aquifers upto a depth of 130 m below ground level are contaminated. Considering the average water levels of about 40 m below ground level about 80 to 90 m thick aquifer zones have been contaminated**. The detailed preliminary report of CGWB expert is attached as **Annexure-2**. The final report will be available after concluding the analysis of heavy metals.

8) The sampling of the soil, agriculture crops (Plant) and produce (grains) to determine the accumulation of contaminants in soil, crops and produce by the Joint Committee was conducted on 27/10/2021, after determining the affected area based on CGWB Expert report and the samples have been sent to Punjab Biotechnology Incubator (PBTI) Laboratory, Mohali. The results of analysis are expected by November 25, 2021.

9) Accumulation of contaminants in Soil, transfer of contaminants in the agriculture crops and bio-magnification in agro-products will be calculated after receipt of results from PBTI.

10) Based on outcome of the analysis of heavy metals in the ground water, outcome of accumulation and bio-magnification studies, the remediation plan and cost

9/11/21

estimation will be prepared by the Joint Committee, for taking further remedial measures by the Chief Secretary.

3. Prayer:

The Joint Committee has completed the field work and established the affected area, depth and aquifer. The sampling of soil, agriculture crop and produce has been completed. The analysis of samples collected by the Joint Committee is under progress and the report of analysis is expected by November 25, 2021. The Joint Committee will required 15 days' time for calculation of accumulation of contaminants in soil, bio-magnification in the agro-products, health risk involved and preparation of short term and long term remediation plans alongwith cost of remedial action.

In view of the above, it is humbly prayed that the the above progress report may be considered by Hon'ble Nation Green Tribunal and grant of time upto December 10, 2021 for submission of authentic and conclusive report by the Joint may kindly be considered.

The Joint Committee will abide by further directions of Hon'ble national Green Tribunal.

9/11/2021	9/11/21	-Sd	-Sd	
Dr. Rajeev Gupta	Dr. Narender Sharma	Dr. Vimal K. Hatwal	Saurabh Gupta, IFS	Ramvir, IAS
PPCB	CPCB	MoEF&CC	DECC	DC, Sangrur

Dated: November 9, 2021

Item No. 01 (Court No. 1)

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

(By Video Conferencing)

Original Application No. 169/2021

H. C. Arora Applicant

Versus

State of Punjab & Ors. Respondent(s)

Date of hearing: 20.07.2021

CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON
HON'BLE MR. JUSTICE SUDHIR AGARWAL, JUDICIAL MEMBER
HON'BLE MR. JUSTICE M. SATHYANARAYANAN, JUDICIAL MEMBER
HON'BLE MR. JUSTICE BRIJESH SETHI, JUDICIAL MEMBER
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER

Applicant: Mr. H.C. Arora, Applicant in person

ORDER

1. Grievance in this application is against failure to take remedial measures against contamination of ground water in village Aloarakh, Block Bhiwanigarh, District Sangrur. The applicant has referred to the media report dated 08.07.2021 in Hindustan Times titled 'Sangrur tubewell spews out polluted water; PPCB blames dismantled factory'. It is stated that the ground water is contaminated and colored water is coming out of the tubewells which has potential for damage to the public health. The problem has been existing for more than 10 years. According to the State PCB, a private factory which was closed 15 years ago, is responsible for contamination. It is also reported that this Tribunal had imposed compensation of Rs. 2 Crore on the said factory for restoration of the environment but the amount was not recovered.

2. If the report is correct, polluted water has potential for adversely affecting the inhabitants. In such a situation, it is the responsibility of the State to take remedial measures to enforce the right of the citizens to clean water.

3. Accordingly, we direct a five-member joint Committee comprising CPCB, Regional Officer, MoEF&CC, Chandigarh, State PCB, a nominee of Secretary Environment Department, Punjab, and District Magistrate, Sangrur to visit the site, interact with the stake holders, assess the ground situation and recommend the measures required to be taken. The report may be furnished within two months by e-mail at judicial-ngt@gov.in preferably in the form of searchable PDF/ OCR Support PDF and not in the form of Image PDF. The Committee may ascertain the number of tube wells discharging coloured water, depth of such wells, aquifer status in terms of movement and extent of contamination, characteristics of contaminated water with reference to effluent sludge disposed by the industry in question - dyes and dye intermediate, effect on agricultural crops, bio- magnification in agro products. It may suggest short and long-term basis considering agronomy and public health, remediation plan, cost of such remediation. A copy of the report be forwarded to the Chief Secretary, Punjab for ensuring remedial measures, based on the facts found. The CPCB and State PCB will be the nodal agency for coordination and compliance. First meeting of the committee may be convened within two weeks.

A copy of this order be forwarded to the Chief Secretary, Punjab CPCB, State PCB, Secretary Environment Department, Punjab, Regional Officer, MoEF&CC, Chandigarh and District Magistrate, Sangrur by email for compliance.

The applicant may serve a set of papers on the CPCB, State PCB, Secretary Environment Department, Punjab, Regional Officer, MoEF&CC, Chandigarh and District Magistrate, Sangrur and file affidavit of service within one week.

List for further consideration on 12.11.2021.

Adarsh Kumar Goel, CP

Sudhir Agarwal, JM

M. Sathyanarayanan, JM

Brijesh Sethi, JM

Dr. Nagin Nanda, EM

July 20, 2021
Original Application No. 169/2021
A

Preliminary Report on Ground Water Contamination around Matharu Industries, Alorakh, Bhawanigarh Block, Sangrur district as per Hon'ble NGT Order dated 20/07/2021 in OA No.169/2021, in the matter of H.C. Arora Vs State of Punjab & others

A complaint has been filed by Sh. H.C. Arora in the Hon'ble NGT regarding failure to take remedial measures against contamination of ground water in village Alorakh, Block Bhawanigarh, Dist.. Sangrur (OA No. 169/2021). The Hon'ble tribunal vide order dated 20-07-2021 has constituted five member Joint committee comprising CPCB, Regional Officer, MoEF & CC, Chandigarh, SPCB, a nominee of Secretary, Environment Department and Punjab District Magistrate, Sangrur to visit the site, interact with the stake holders assess the ground situation and recommend the measures required to be taken. The Hon'ble NGT ordered that the Committee may ascertain the number of tubewells discharging coloured water, depth of such wells, aquifer status in terms of movement and extent of contamination, characteristics of contaminated water with reference to effluent sludge disposed by the industry i.e dyes and dye intermediate, effect on agricultural crops, bio-magnification in agro products.

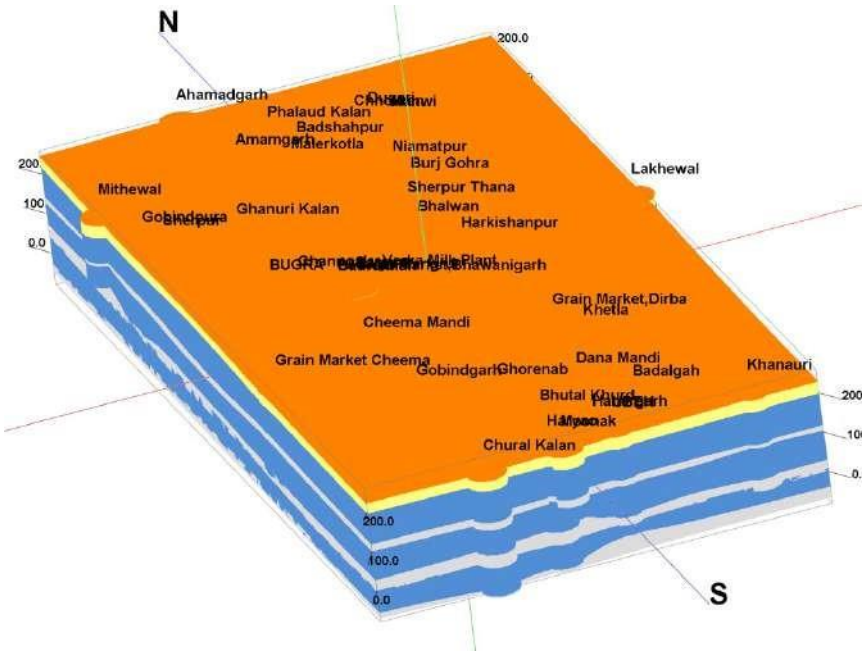
The five member committee has co-opted CGWB as Expert Member in the Joint Committee for concluding the matter scientifically and as per the order of Hon'ble NGT. Sh. S. K Mohiddin, Sr.Hg (Sc C) and Sh. Rishi Raj, Assistant Chemist have been deputed to carry out the studies around the area of Matharu Chemical Industry and to prepare the report. This report embodies the findings of the studies carried out during September, 2021.

CGWB has takenup the detailed study around the Refinery and collected 22 ground water samples around the Matharu Chemical Industry to assess the ground water contamination. Groundwater sampling for 15 major elements, heavy metals and Total Organic Carbon (TOC) and analysis was done by Sh. Rishi Raj, Assistant Chemist CGWB during September, 2021 for 15 major elements and Total Organic Carbon (TOC). Analysis for heavy metals in ground water is under progress. Apart from these parameters samples were collected by PSPCB from the same locations for getting them analysed for BOD, COD, Phenolic compounds and SAR.

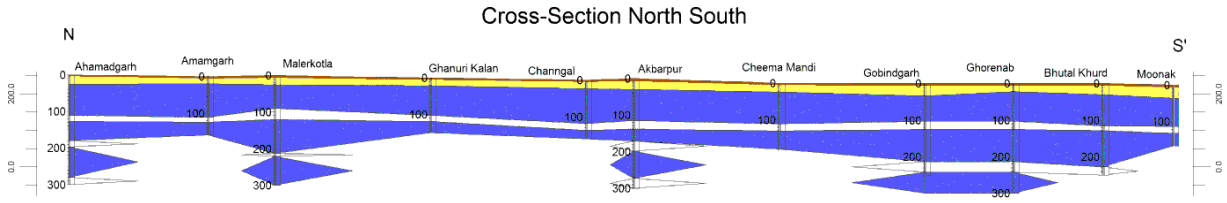
Hydrogeological condition around the Matharu Chemical Industry: The area is flat alluvial plain underlain by arid brown soil. The ground water occurs in alluvium formations comprising fine to coarse sand, which forms the potential aquifers. In the shallow aquifer (up to 50m) ground water occurs under unconfined/water table conditions, where as in deeper aquifer, semi-confined/confined conditions exist. In Sangrur district, CGWB has drilled 3 exploratory boreholes, 4 Piezometers to delineate and determine potential aquifer zones, evaluation of aquifer characteristics. The permeable granular zones comprising fine to medium grained sand and occasionally coarse sand and gravel. Ground water in the district occurs in the alluvium under water table and semi confined to confined conditions. The discharge of deep tube well in the area varies between 2400 and 2680 Ipm. The tranmissivity values ranges from 1670 m^2/day and storativity ranges from $7.5*10^{-2}$.

The depth to water level ranges in the surrounding area is very deep i.e. about 40 to 42 m bgl. The long-term water levels trends in the Sangrur district indicates average fall of 0.50 m/year.

To know the broad picture of the aquifer disposition, inter-relationship of granular zones, nature, geometry and extension of aquifers in the Sangrur district, the aquifer grouping has been done using the sub-surface lithology and a three-dimensional aquifer model has been prepared. The first aquifer is water table aquifer and extends all over the area. The aquifer is mainly composed of fine to medium grained sand.



Three dimensional aquifer model in Sangrur district, Punjab



Cross Sections of Aquifer Map of Sangrur District

3. Ground Water Quality:

Ground water samples from 22 shallow handpumps and deep tubwells were collected for analysis. Data collected by PSPCB has also taken into consideration for pollution studies. The data and interpretation along with the maps are at Annexure-1.

4. Tubewells Contaminated: A number of parameters are considered for identification of contaminated tubewells. Important parameters considered are colour, Total Organic Carbon (TOC), Electrical Conductivity, Chemical Oxygen demand (COD), Biological Oxygen demand (BOD), and Nitrate in this preliminary report. As the heavy metals analysis is yet to be carried out, these parameters will be considered in final report. Presence of all the above parameters are examined against the BIS Standards prescribed for drinking water quality.

Colour of ground water from the contaminated tubewells is reddish. Ground water from the tubewells serial number 1,2,3, 5 and 8 (refer Annexure-1) is reddish in nature and thus these tubewells are contaminated.

The Electrical Conductivity: The acceptable limits of Electrical Conductivity for drinking water is 1000 ms/cm (Total Dissolved Solids – 500 mg/lt) and 3000 ms/cm is permissible if any alternative source of drinking water is not available (TDS is 2000 mg/lt). In general, the Electrical Conductivity values ranges between 560 ms/cm to 1995 ms/cm within the vicinity of industry. The Electrical conductivity of tubewells affected by contamination have high values of Electrical Conductivity. Thus the increased value of Electrical Conductivity within the vicinity of industry shows contamination.

Chemical Oxygen Demand (COD) is another parameter which is considered for demarcation of polluted tubewells. The water samples of two tubewells (sr. No. 1& 2) are having COD values of 262 mg/lt and 284 mg/lt. In all other tubewells, the COD is below the detectable limits. In tubewell No. 14 located in the campus of Gurudwara Singh Sabha, COD is 24 which can be attributed to some other source of contamination. The data analysed by PSPCB was used for interpretation of COD.

Biological Oxygen Demand (BOD) is another parameter which is considered for demarcation of polluted tubewells. The water samples of two tubewells (Sr. No. 1& 2) are having BOD values of 33 mg/lt and 22 mg/lt. In all other tubewells, the BOD is below the detectable limits. The data analysed by PSPCB was used for interpretation of BOD.

Another parameters considering for study of ground water contamination by the effluents is Total Organic Carbon due to contamination by organic products/effluents. Total Organic Carbon values range between 0.29 mg/lt to 97 mg/lt. Tubewells at Sr.No. 1, 2, 3, 5 and 8 have TOC in higher concentrations. All the samples collected around the industry are having the TOC but in less quantity which is less than 1 mg/lt. No limit has been prescribed by BIS for TOC in drinking water. Presence of TOC shows the organic contamination of ground water.

Nitrate is another parameter considered for identification of contaminated tubewells. Nitrate concentration of tubewells at Sr. No. 1, 2 and 5 are having high concentrations.

The depth upto which the contamination has also been arrived at based on hydrogeology and presence of above parameters. The sampling has been done from the tubewells varying between shallow (46 m below ground level) to very deep (183 m bgl). It is observed that the tubewells affected by contamination are having depth of about 130 m below ground level in the vicinity of Industry. As the area is having single aquifer system upto a depth of about 200 m with a thin clay layer at around 110 m to 120 m depth. Considering the general depth of the most of the tubewells and hydrogeological conditions and aquifer disposition, it can be inferred that aquifers upto a depth of 130 m bgl are contaminated. Considering the average water levels of about 40 m bgl about 80 to 90 m thick aquifer zones have been contaminated.

5. Drinking water supply in the villages

Ground water samples from water supply tubewells in Alorakh village and Bakhtari village have been collected and analysed. All the parameters anlayed are under the permissible limits of drinking water standards. The water supply in all the villages surrounding the industry are based on ground water from deeper aquifers which is being supplied by PHED Department of Government of Punjab. As the ground water of deeper aquifers are meeting the standards prescribed by BIS (ISO10,500 of 2012) which is being supplied for drinking and domestic water requirements by piped water system.

Annexure-1

Ground Water Quality in and around Matharu Industry

The quality of shallow/deep ground water in the surrounding area upto a distance of about 5km. of industry has been studied and 22 no's of water samples were collected from shallow/deep aquifers during September, 2021. All the collected samples were analyzed by adopting standard methods of analysis (APHA) in the Regional Chemical Lab of CGWB. The Total Organic Carbon content in the ground water samples is presented at Annexure-2. Chemical analysis data of samples are given in Annexure-3. Apart from these, analysis data of water samples collected from the PSPCB is also utilised for interpretation purpose (Annexure-5). The various maps prepared based on the chemical analysis are at Annexure-4.

pH

In the study area and surrounding area villages pH values of ground water ranges between 7.42 to 8.42.

Specific Conductance

The Electrical Conductivity varies between 560 µS/cm at 25^{o}C to 1995 µS/cm.

Chloride Concentration

The concentration of Chloride in all samples is less than 250 mg/l which is within the maximum permissible limit of BIS for drinking water purpose.

Fluoride Concentration

The minimum Fluoride Concentration of 0.35 mg/l and maximum concentration of 0.70 mg/lt is observed. In all the samples Fluoride is within the permissible limits of drinking water standards.

Nitrate Concentration

Nitrate is another parameter considered for identification of contaminated tubewells. Nitrate concentration of tubewells at Sr. No. 1, 2 and 5 are having high concentrations.

Bacteriological Contamination: Chemical Oxygen Demand (COD) is another parameter which is considered for demarcation of polluted tubewells. The water samples of two tubewells (sr. No. 1& 2) are having COD values of 262 mg/lt and 284 mg/lt. In all other tubewells, the COD is below the detectable limits. In tubewell No. 14 located in the campus of Gurudwara Singh Sabha, COD is 24 which can be attributed to some other source of contamination. The data analysed by PSPCB was used for interpretation of COD. Biological Oxygen Demand (BOD) is another parameter which is considered for demarcation of polluted tubewells. The water samples of two tubewells (Sr. No. 1& 2) are having BOD values of 33 mg/lt and 22 mg/lt. In all other tubewells, the BOD is below the detectable limits. The data analysed by PSPCB was used for interpretation of BOD.

Total Organic carbon: Total Organic Carbon values range between 0.29 mg/lt to 97 mg/lt. Tubewells at Sr.No. 1, 2, 3, 5 and 8 have TOC in higher concentrations. All the samples collected around the industry are having the TOC but in less quantity which is less than 1 mg/lt. No limit has been prescribed by BIS for TOC in drinking water. Presence of TOC shows the organic contamination of ground water.

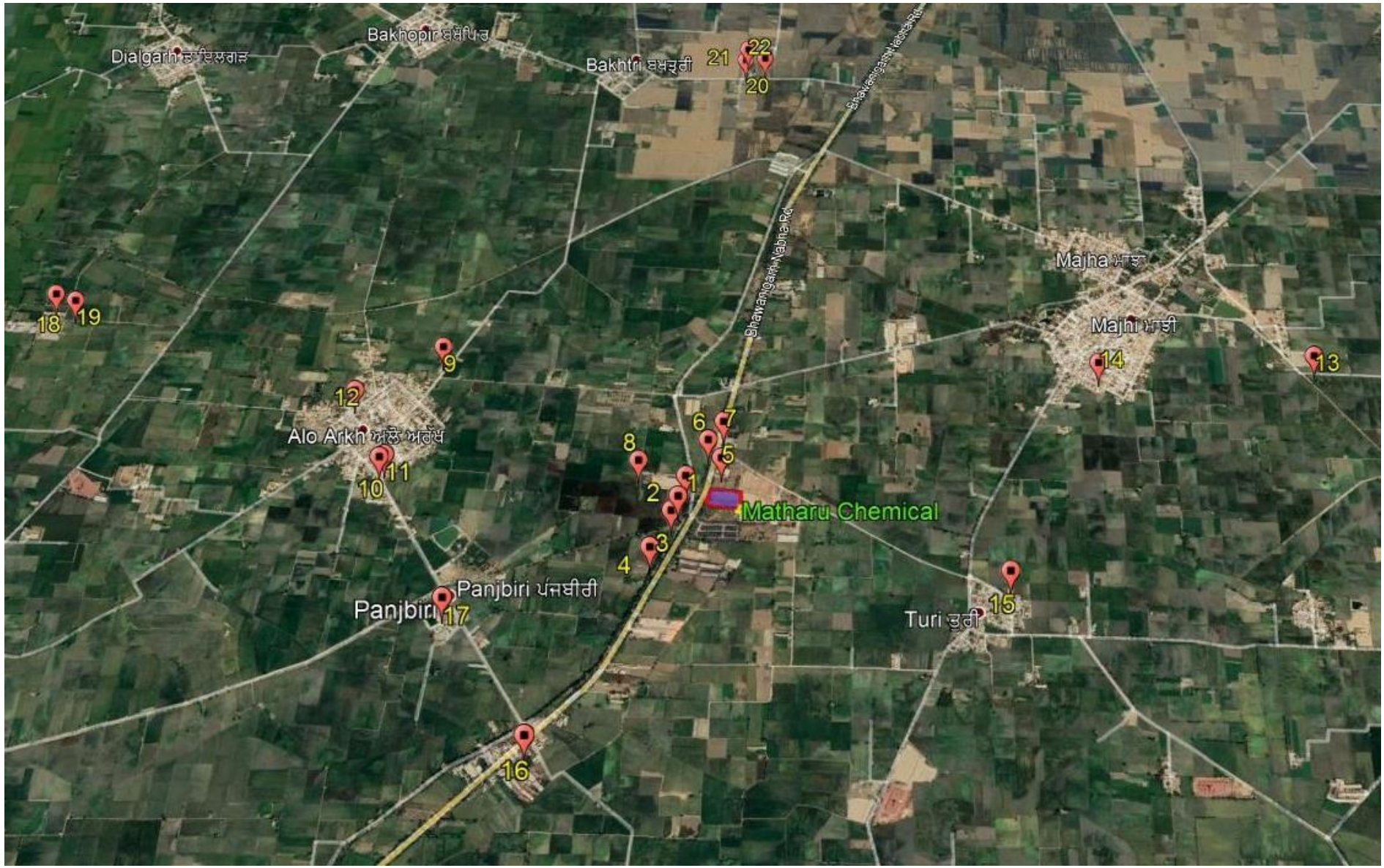
	Annexure-2						
Test Report of Chemical Analysis of Ground Water Samples							
S. No	**Location**	**Source**	**Longitude**	**Latitude**	**Depth in (m)**	**Analysis Date**	TOC(NPOC) mg/l
1	Sh. Kulwinder Singh S/o Sh. Jang SinghAlowrkh	TW	76.079	30.281	116	21-Sep	97
2	Sh. Amrit Pal SinghS/o Sh. Rajwant SinghAlowrkh	TW	76.0777	30.281	83	21-Sep	29
3	Sh. Amrit Pal SinghS/o Sh. RajwantSinghAlowrkh	TW	76.0772	30.281	131	21-Sep	7.35
4	Sh. Kulwinder SinghS/o Sh. Balbir Singh,Alowrkh	TW	76.0772	30.2806	113	21-Sep	0.38
5	M/S Super Pipes Right Side of Mathuru Chemical Industries Alowrkh	TW	76.079	30.2835	107	21-Sep	12.4
6	M/S Randhawa Filling Station Alowrkh	TW	76.0785	30.2848	54	21-Sep	0.67
7	Sh. Kulwinder SinghS/o Sh.Gurnam Singh,Alowrkh	TW	76.0796	30.2831	54	21-Sep	0.76
8	Sh. Dilbag SinghS/o Sh.Jagar Singh,Alowrkh	TW	76.0759	30.2832	61	21-Sep	3.61
9	Sh. Darsan SinghS/o Sh.Lal Singh,Alowrkh	SB	76.0675	30.2877	68	21-Sep	0.55
10	Sh. Kashmir Singh/o Sh.Joga Singh,Alowrkh	SB	76.0655	30.283	61	21-Sep	0.7
11	Water Works , Alowrkh	Water Supply TW	76.0657	30.2831	183	21-Sep	0.76
12	Sh. Devinder Singh/o Sh.Jaspal Singh,Alowrkh	SB	76.0641	30.2858	106	21-Sep	2.31
13	Water Supply Majhi Vill.	TW	76.1038	30.2873	152	21-Sep	0.33
14	Sh.Karam Singh S/o S.Sukhdev Singh,Majhi vill.	SB	76.0948	30.287	42	21-Sep	0.47

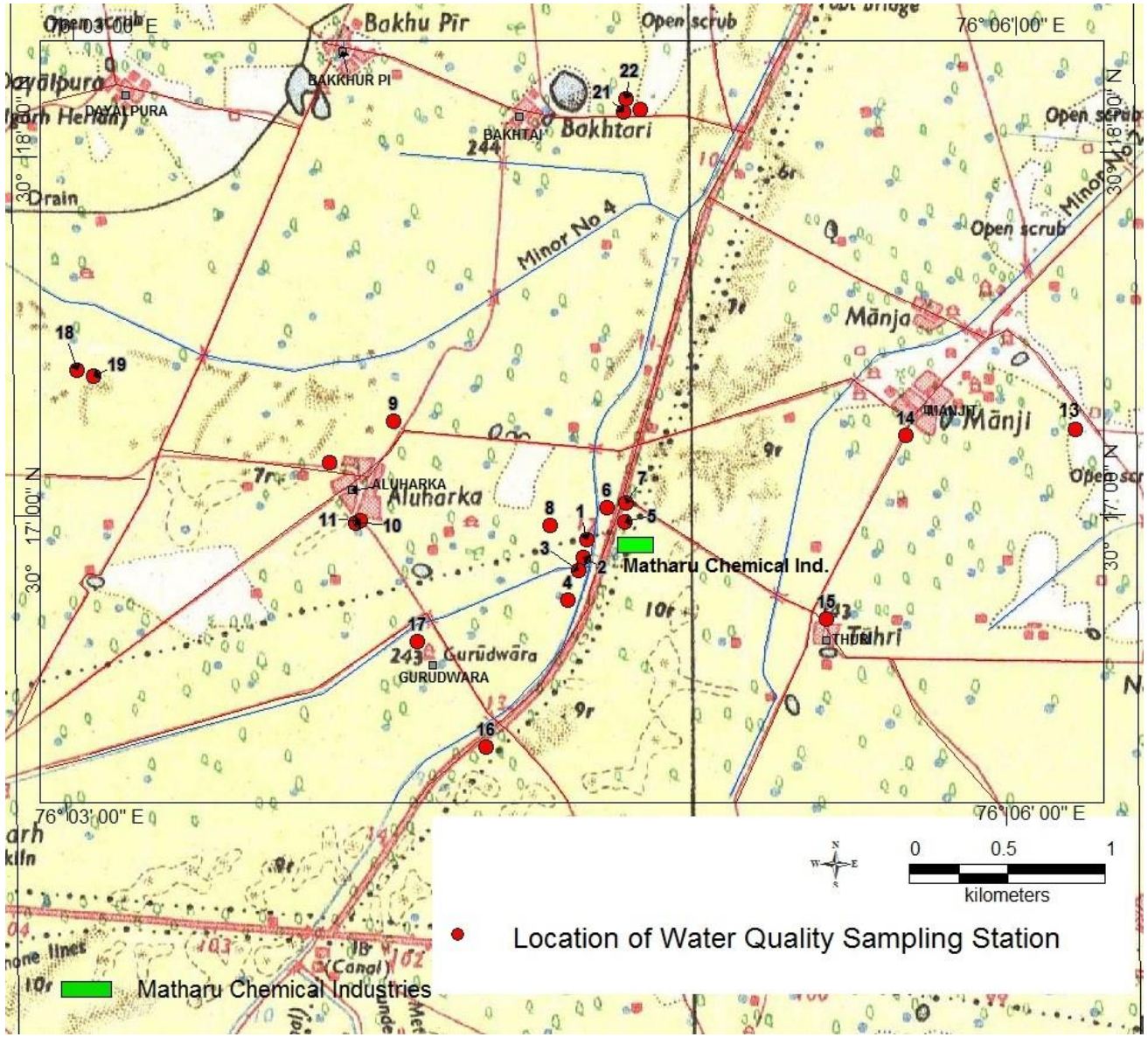
15	Singh Sabha Gurudwara Vill. Turi.	SB	76.0905	30.2785	55	21-Sep	0.58
16	M/S Gupta Interprises Filling Station Alowrkh	SB	76.0723	30.2726	49	21-Sep	0.29
17	Manji Shahib Gurudwara SahibVill. Alowrkh	TW	76.0687	30.2775	130	21-Sep	0.56
18	M/S Durga Das Poltry Farm, Vill. Dayalgarh	TW	76.0507	30.2901	61	21-Sep	2.34
19	Sh.Ajit Singh S/o Joginder Singh,. Vill. DayalgarhS	SB	76.0516	30.2898	91	21-Sep	0.58
20	Water Supply Bakhtari Vill.	TW	76.0808	30.3021	137	21-Sep	0.36
21	Sh.Gurjant Singh S/o S.Bachan Singh,Bakhtari vill.	SB	76.0799	30.302	91	21-Sep	0.44
22	Smt. Asha Singh W/O S.Makand Singh,Bakhtari vill.	SB	76.08	30.3026	46	21-Sep	0.39

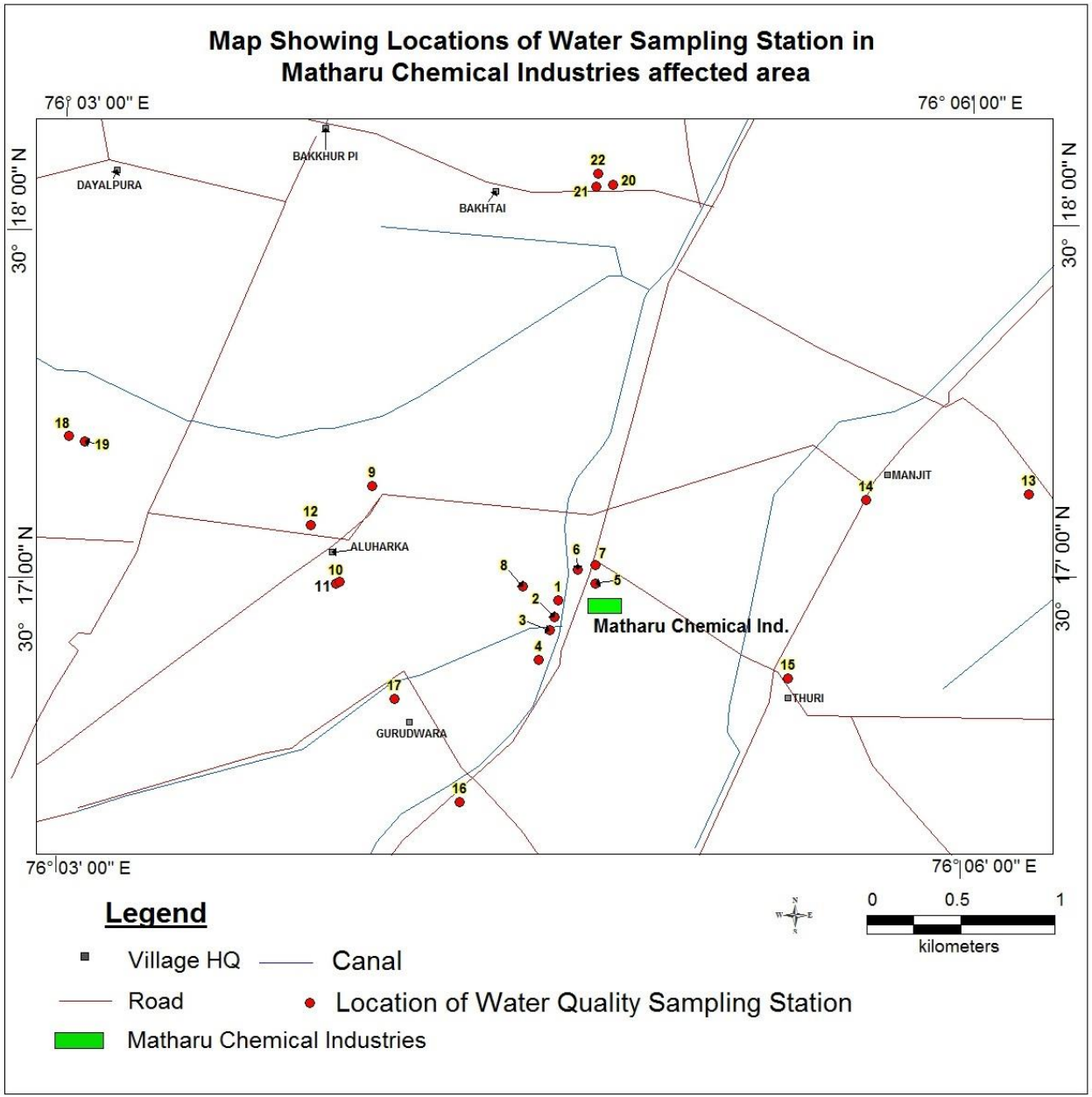
Ground Water Quality around the Matharu Industries, Alorakh, Bhawanigarh Block, Sangrur Annexure-3																		
S. No	**Location**	**Source**	**Depth**	**pH***	**EC* in µS/cm at 25^0 C**	**CO_3**	**HCO_3**	**Cl***	**SO_4**	**NO_3***	**F***	**PO_4**	**Ca***	**Mg***	**Na**	**K**	**SiO_2**	**TH *as $CaCO_3$**
						mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1	Sh. Kulwinder Singh S/o Sh. Jang SinghAlowrkh	TW	116	7.48	1995	*	*	*	*	352	0.35	*	*	*	210	9.4	*	*
2	Sh. Amrit Pal SinghS/o Sh. Rajwant SinghAlowrkh	TW	83	7.57	1578	*	*	*	*	124	0.50	*	*	*	190	9.2	*	*
3	Sh. Amrit Pal SinghS/o Sh. RajwantSinghAlowrkh	TW	131	7.97	714	-	342	21	40	42	0.48	0.05	80	32	24	7.5	24	330
4	Sh. Kulwinder SinghS/o Sh. Balbir Singh,Alowrkh	TW	113	7.52	685	-	342	21	61	29	0.48	0.20	44	44	58	5.9	21	290
5	M/S Super Pipes Right Side of Mathuru Chemical Industries Alowrkh	TW	107	8.00	950	-	464	42	74	95	0.39	B.D.L.	76	61	70	7.3	26	440
6	M/S Randhawa Filling Station Alowrkh	TW	54	7.42	803	-	464	28	B.D.L.	41	0.38	0.25	92	32	35	14	23	360
7	Sh. Kulwinder SinghS/o Sh.Gurnam Singh,Alowrkh	TW	54	7.68	750	-	403	21	5	48	0.40	0.26	60	36	38	20	23	300
8	Sh. Dilbag SinghS/o Sh.Jagar Singh,Alowrkh	TW	61	7.98	902	-	525	12	15	35	0.70	B.D.L.	48	29	108	27	22	240
9	Sh. Darsan SinghS/o Sh.Lal Singh,Alowrkh	SB	68	7.85	950	-	598	21	B.D.L.	27	0.55	0.22	60	27	128	6.6	23	260
10	Sh. Kashmir Singh/o Sh.Joga Singh,Alowrkh	SB	61	8.00	996	-	586	42	12	28	0.55	0.25	36	27	170	6.5	24	200

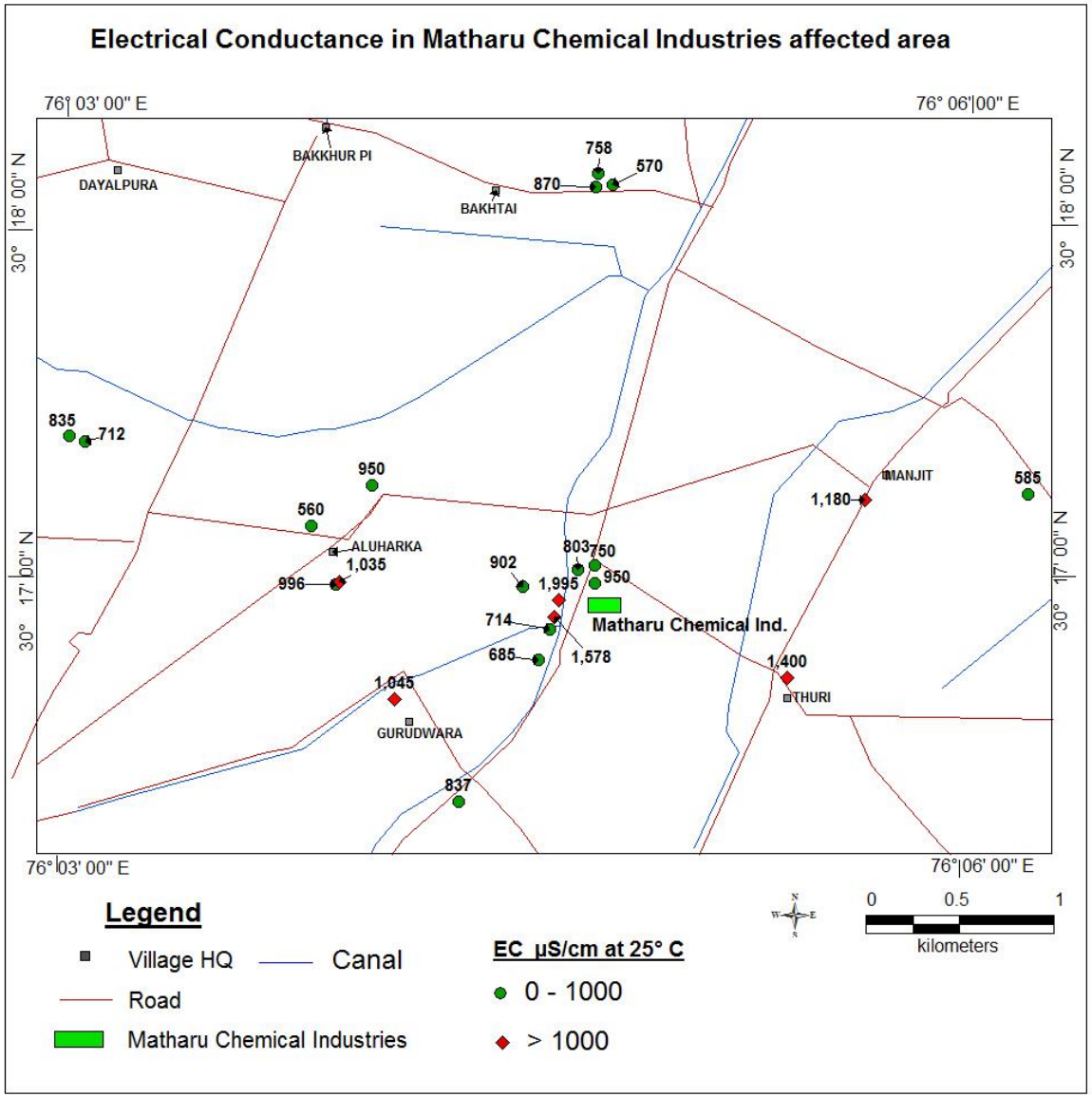
11	Water Works , Alowrkh	Water Supply TW	183	7.78	1035	-	647	28	35	22	0.60	0.22	56	29	165	6.3	23	260
12	Sh. Devinder Singh/o Sh.Jaspal Singh,Alowrkh	SB	106	8.12	560	-	391	14	B.D.L.	B.D.L.	0.58	0.18	28	24	78	4.4	20	170
13	Water Supply Majhi Vill.	TW	152	8.42	585	-	378	7	30	B.D.L.	0.60	0.20	16	24	98	2.8	17	140
14	Sh.Karam Singh S/o S.Sukhdev Singh,Majhi vill.	SB	42	7.62	1180	-	757	69	B.D.L.	17	0.58	0.25	68	34	192	7.2	25	310
15	Singh Sabha Gurudwara Vill. Turi.	SB	55	7.88	1400	-	659	132	40	30	0.55	0.26	68	39	210	7.5	25	330
16	M/S Gupta Interprises Filling Station Alowrkh	SB	49	7.68	837	-	488	14	B.D.L.	43	0.42	0.22	76	36	51	6.3	24	340
17	Manji Shahib Gurudwara SahibVill. Alowrkh	TW	130	7.32	1045	-	586	28	45	33	0.48	0.19	80	39	100	15	24	360
18	M/S Durga Das Poltry Farm, Vill. Dayalgarh	TW	61	7.38	835	-	513	14	15	55	0.48	0.23	68	56	43	7.1	24	400
19	Sh.Ajit Singh S/o Joginder Singh,. Vill. DayalgarhS	SB	91	8.00	712	-	452	14	B.D.L.	34	0.52	0.22	52	46	44	6.7	23	320
20	Water Supply Bakhtari Vill.	TW	137	8.20	570	-	403	10	B.D.L.	B.D.L.	0.55	0.18	28	27	75	4.3	19	180
21	Sh.Gurjant Singh S/o S.Bachan Singh,Bakhtari vill.	SB	91	7.85	870	-	488	17	35	41	0.70	0.15	80	39	60	6.8	19	360
22	Smt. Asha Singh W/O S.Makand Singh,Bakhtari vill.	SB	46	7.78	758	-	439	14	32	30	0.47	0.20	80	34	43	6.4	24	340

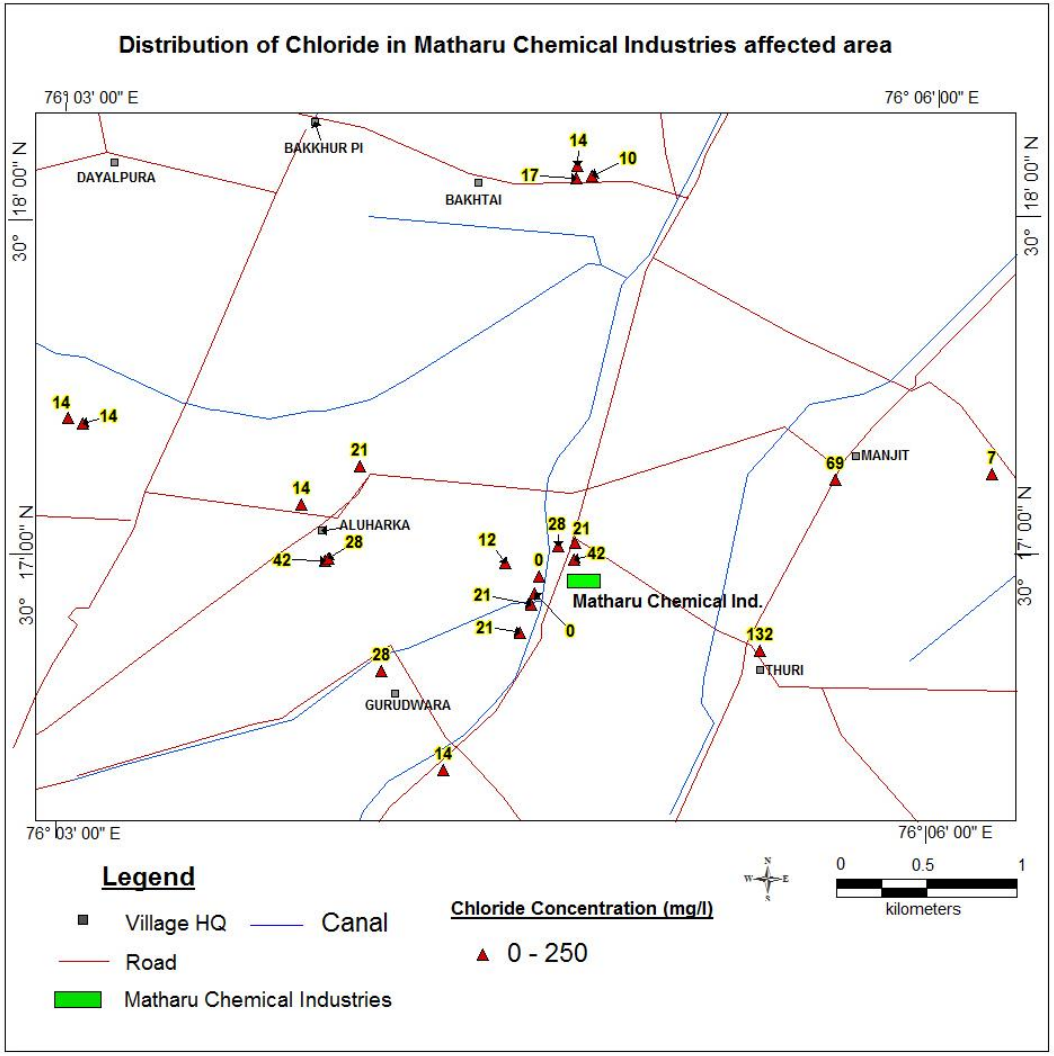
Annexure-4.


Dialgarh ਡਿਆਲਗੜ੍ਹ
Bakhopir ਬਖੋਪੀਰ
Bakhtri ਬਖਤ੍ਰੀ
21
22
20
Bhawangarh Nabha Rd
Majha ਮਾਝਾ
Majhi ਮਾਝੀ
18
19
9
12
Alo Arkh ਅਲੋ ਅਰੱਖ
10
11
8
6
7
5
2
1
Matharu Chemical
3
4
14
13
Panjbiri ਪੰਜਬੀਰੀ
Panjbiri
17
Turi ਤੁਰੀ
15
16


76°03'00" E
76°06'00" E
30° 18' 00" N
30° 17' 00" N
Bakhu Pīr
Open scrub
BAKKHUR PI
DAYALPURA
BAKHTAJ
Bakhtari
Drain
Minor No 4
Aluharka
ALUHARKA
Gurūdwāra
GURUDWARA
Mānja
MANJI
Mānji
Matharu Chemical Ind.
Tahri
THRI
Canal
Matharu Chemical Industries
Location of Water Quality Sampling Station
0
0.5
1
kilometers


Map Showing Locations of Water Sampling Station in
Matharu Chemical Industries affected area
76° 03' 00" E
76° 06' 00" E
30° 18' 00" N
30° 17' 00" N
BAKKHUR PI
DAYALPURA
BAKHTAI
ALUHARKA
MANJIT
THURI
GURUDWARA
Matharu Chemical Ind.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
0
0.5
1
kilometers
Legend
Village HQ
Canal
Road
Location of Water Quality Sampling Station
Matharu Chemical Industries


Electrical Conductance in Matharu Chemical Industries affected area
76° 03' 00" E
76° 06'00" E
30° 18' 00" N
30° 17' 00" N
BAKKHUR PI
DAYALPURA
BAKHTAI
758
570
870
835
712
950
560
ALUHARKA
1,035
996
902
803
750
1,995
950
714
685
1,578
Matharu Chemical Ind.
1,045
GURUDWARA
837
MANJIT
1,180
585
1,400
THURI
0
0.5
1
kilometers
Legend
Village HQ
Canal
Road
Matharu Chemical Industries
EC µS/cm at 25° C
0 - 1000
> 1000
Location of Water Quality
TOC Concentration (r

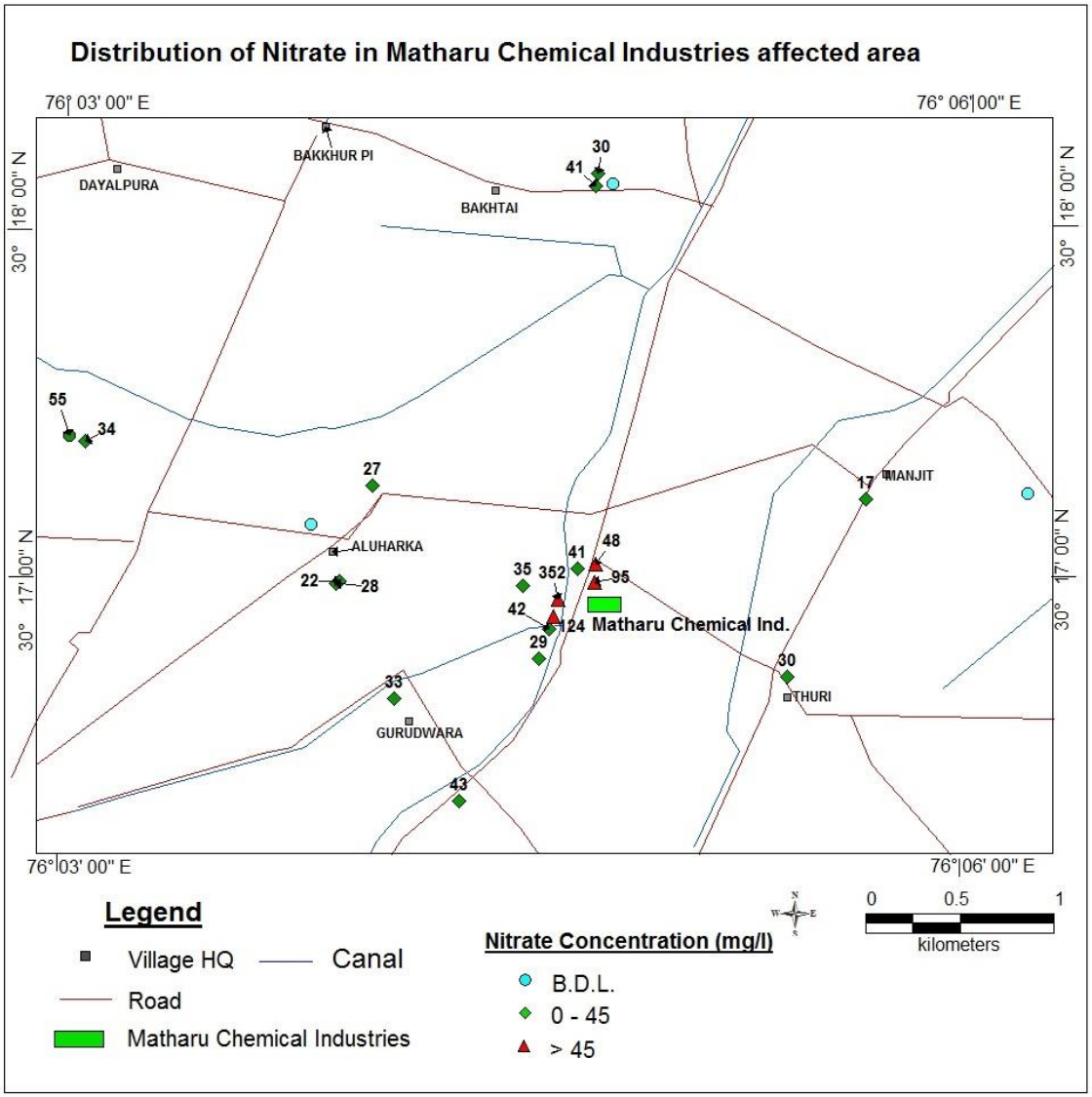


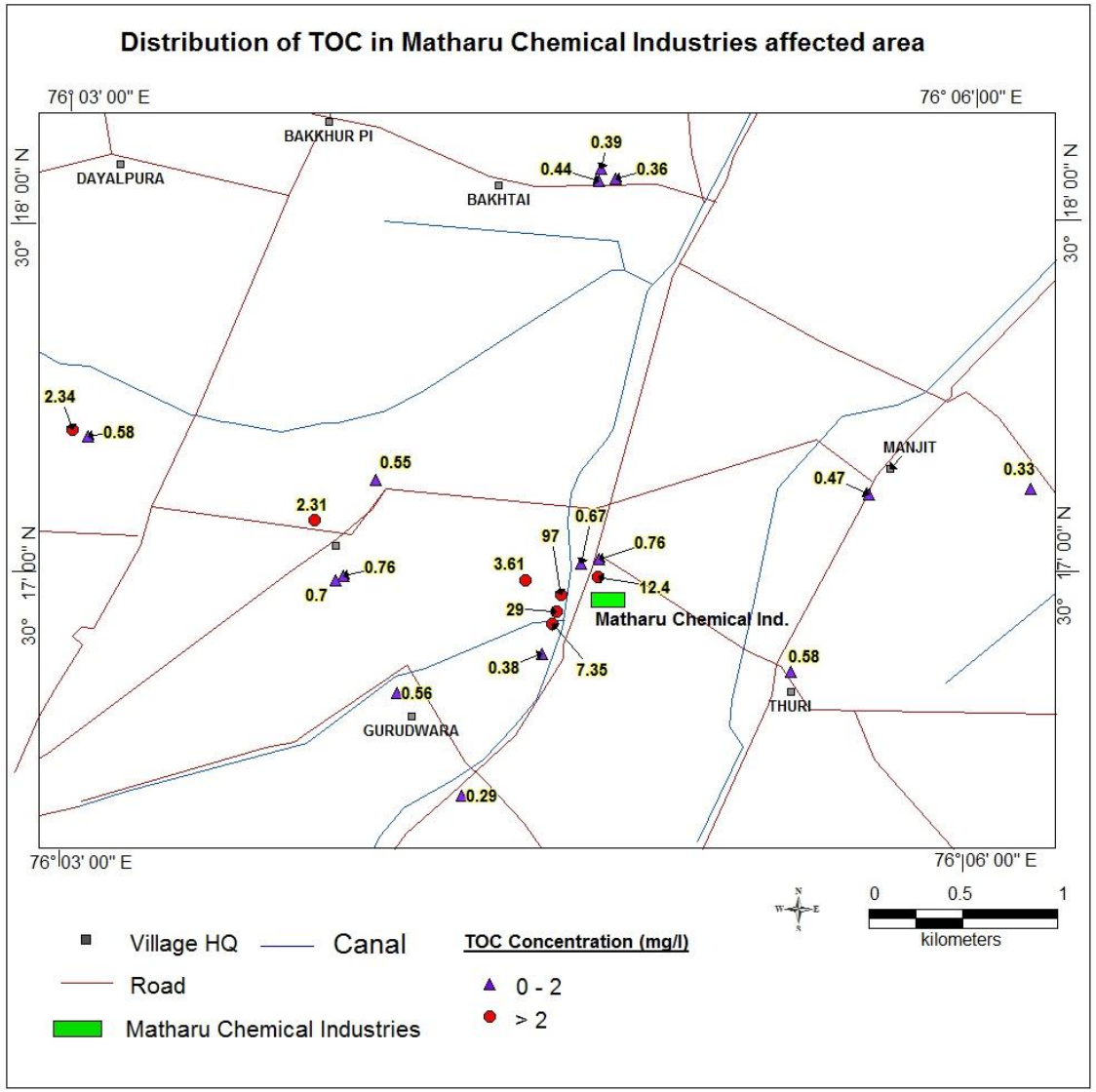
B.D.L.

Location of Water Quality Sampling

> 45

TOC Concentration (mg/l)


Distribution of Nitrate in Matharu Chemical Industries affected area
76° 03' 00" E
76° 06' 00" E
30° 18' 00" N
30° 17' 00" N
BAKKHUR PI
DAYALPURA
BAKHTAI
ALUHARKA
MANJIT
THURI
GURUDWARA
Matharu Chemical Ind.
30
41
55
34
27
17
48
35
352
95
22
28
42
124
29
33
43
Legend
Village HQ
Canal
Road
Matharu Chemical Industries
Nitrate Concentration (mg/l)
B.D.L.
0 - 45
> 45
0
0.5
1
kilometers


Distribution of TOC in Matharu Chemical Industries affected area
76° 03' 00" E
76° 06' 00" E
30° 18' 00" N
30° 17' 00" N
BAKKHUR PI
DAYALPURA
BAKHTAI
MANJIT
THURI
GURUDWARA
Matharu Chemical Ind.
0.39
0.44
0.36
2.34
0.58
0.55
2.31
0.67
97
0.76
3.61
0.76
0.7
12.4
29
0.38
7.35
0.56
0.29
0.47
0.33
0.58
0
0.5
1
kilometers
Village HQ
Canal
Road
Matharu Chemical Industries
TOC Concentration (mg/l)
0 - 2
> 2

PUNJAB POLLUCTION CONTROL BOARD VATAVARAN BHAVAN,
NABHA ROAD, PATIALA
GROUND WATER REPORT

1. Laboratory Sample No.	GW 872-885/ H.O Lab Monitoring/2021
2. ULR Number	ULR-TC70451800000003890
3. Name of Industry	Ground Water Samplee collected from the vicinity of M/s Matharu Chemical Industries, Bhawanigarh (Now in Dismantled Condition) Distt, Sangrur.
4. Name of Sample collecting Officer	Er. Sachin Singla, AEE
5. Designation of authorizing Test	EE, RO,Sangrur
6. Date & Time of Sample collection	09.09.2021
7. Date & Time of Sample receipt in Lab.	09.09.2021
8. Period of Analysis	09.09.2021 to 20.09.2021
9. Test Methods	As per relevant parts of IS:3025 & Methods of APHA

AEE-2
ਠਵੀਂ ਗਾਰ
21/9/2021

Results

As per Annexure-A

2080
22/9/21

Analyzed by

--End of Report--

Scientific Officer
20/9/21

Endst. No: 20714-16

Dt. 21/9/2021

A copy of the above is forwarded to the:-
1 The Chief Environmental Engineer (Water), Punjab Pollution Control Board, Ludhiana.
2. The Senior Environment Engineer, Punjab Pollution Control Board, Zonal Office-II, Patiala.
3. The Environment Engineer, Punjab Pollution Control Board, Regional Office, Sangrur.

Asst. Scientific Officer
20/9/2021

(GW 872-885)

(M/s Matharu Chemical Industries Bhwanigarh)

Sr. no.	Parameters	BOD mg/l	SAR	Phenolic Compound mg/l	COD
1	Village Aloarkh (In front of M/s Matharu Chemical)	33	2.04	BDL	284
2	Village Aloarkh (Dept of Tubewell) 280 Ft	22	1.77	BDL	262
3	Village Aloarkh (Sh. Amrit Pal Singh S/o Rajwant Singh)	BDL	0.68	BDL	BDL
4	Village Aloarkh (Tubewell of Farmer Sh. Kulwinder Singh)	BDL	0.75	BDL	BDL
5	M/s Super Pipes Industries, Tehsil Bhawanigarh, Sangrur	BDL	0.89	BDL	BDL
6	M/s Randhawan Transport Services, Petrol Pump, Village Majhi, Nabha Road,	BDL	0.79	BDL	BDL
7	Kulwinder Singh S/o Gurnam Singh, Vill. Majhi Bhawanigarh	BDL	0.83	BDL	BDL
8	Village Aloarkh (From Tubewell of Sh. Dilbagh Singh)	BDL	1.07	BDL	BDL
9	Residence of Darshan Singh S/o Lal Singh Village Aloarkh, Bhawanigarh	BDL	1.17	BDL	BDL
10	Residence of Sh. Kasmir Singh S/o Jaga Singh, Village Alorkh, Bhawanigarh	BDL	1.36	BDL	BDL
11	Site of Construction of Water Storage tanks of Village Aloarkh	BDL	1.34	BDL	BDL
12	Residence of Sh. Davinder Singh S/o Jaspal Singh	BDL	0.86	BDL	BDL
13	Water Tank Village Majhi, Tehsil Bhawanigarh	BDL	1.05	BDL	BDL
14	Gurdwara Singh Sabha, Village Turi Bhawanigarh.	BDL	1.64	BDL	24