

# Study of Effect of Bhandewadi Dump Yard on Ground Water

Shubham Gillurkar<sup>1</sup> Chiranjeev Mohota<sup>2</sup> Vicky Baraskar<sup>3</sup> Nilesh Pal<sup>4</sup>

<sup>1,2,3</sup>Final Year Student <sup>4</sup>Assistant Professor

<sup>1,2,3,4</sup>Department of Civil Engineering

<sup>1,2,3,4</sup>JD College Of Engineering & Management, Katol Road, Nagpur- 441501

**Abstract**— Now day’s solid waste management and its proper disposing is major concern in the developing countries. The general method of disposing the solid waste is by land filling in dump yard. In this method the disposing site should be far away from the residential area. The present study is conducted on the ground water, in the vicinity of Bhandewadi Dump Yard in Nagpur. Urbanization and improper disposal of solid wastes lead to contamination of groundwater and surface water resources in this region. Municipal solid wastes of the city are presently disposed as open landfills at Bhandewadi region near Pardi east Nagpur. The leachate form due to solid waste is directly infiltrate into the ground and contaminate the ground and surface water resources which results into unsuitability of water for drinking and other utility purposes. This study is made for the convenience of residential people near by the solid waste disposing site and to make evaluation of the impact of this leachate on surrounding ground water.

**Key words:** Leachate, Solid Waste, Ground Water

## I. INTRODUCTION

Water is also named as “life”. The importance of water is primary in the all living things. The water is utilize for various purposes such as drinking, bathing, cooking and various industrial production activities. This water should be free from any objectionable impurity. This water we get from many sources like river, lakes, & from ground water sources. Ground water sources are well, bores, etc. The ground water sources are consider as more reliable and purest type of water. But in many developing countries due to poor management of solid waste this ground water is getting contaminated day by day. The Municipal solid waste (MSW) generated by any city should be properly disposed off at the site which should be located far away from the city and any residential area. Ground water level is maintained by the infiltration of water from surface water bodies and rain water. But when rain water fall on the open dump site the rain water is first percolate through this waste and get contaminated layer by layer. When this rain water reached to the ground through different layers of municipal solid waste, get contaminated to a very high concentration. This contaminated rain water is known as “Leachate”. This leachate is then infiltrate into the ground and finally mixed with ground water which makes ground water impure and contaminated. This effect of contamination is up to certain radial distance from the dumping site. Many people in the surrounding is directly depending on the ground water sources by well or by bores. Their health due this contamination of ground water is at high risk.

## II. STUDY AREA

Bhandewadi is a village located in Nagpur district, state Maharashtra, India. It is located 8 km away from Nagpur

city headquarter towards east. Many major highway passing through Bhandewadi such as NH-07 (Mumbai- Varanasi) NH-06 (Jabalpur highway) and rail route Nagpur-Nagbhid. Bhandewadi having landmark like Swaminarayana Temple, etc. It also having a very huge industrial area. There are close to 3000 families which live within a proximity of 500m from the dump yard. The regions mainly under the influence of this dump yard are Gurukrupa Nagar, Antuji Nagar, Abbumiya Nagar, and Sangharsh Nagar.

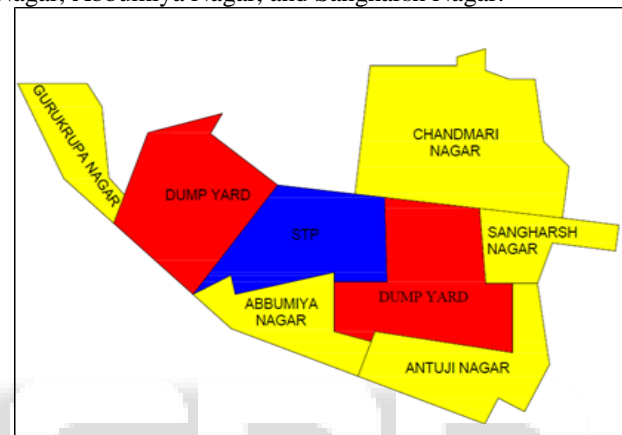


Fig. 1: Regional Map of Study Area, Bhandewadi

### A. About Dumping Site

Bhandewadi dumping yard was started in 1994. This dumping yard spread over 22 hectares of area of land. The site is well connected by road network and have complete wall boundary. The municipal solid waste is dump on this site about 2 to 5m of high and spread about 239891 sq. m. area.



Fig. 2: Open Landfills at Site

## III. OBJECTIVE

- Effect on ground water due to Bhandewadi dumping yard
- The adverse effect of solid waste disposal on locality

#### IV. NECESSITY

Nagpur is the second capital and the third largest city of the Indian state of Maharashtra after Mumbai and Pune. It is the 13<sup>th</sup> largest urban agglomeration in India and the largest city in Vidarbha Region. It has one of the highest literacy rate of 91.92% among all the urban agglomerations in India and one of the proposed Smart Cities from Maharashtra. The Bhandewadi area where the dump yard resides is located 8 km away from Nagpur. Due to ever increase in urbanization and high cost of land in major part of the cities, people started moving in the out course region of cities where the land cost is less. Currently more than 3000 families are living in the Bhandewadi area close to the dump yard and population of Bhandewadi is increasing day by day. Families residing in Bhandewadi region are only dependent on the ground water source for their domestic purposes like drinking, bathing, cooking etc. Disposing of solid waste as open landfills is contaminating the ground water. And usage of this contaminated water by the people residing in Bhandewadi leads to various health problems and air pollution. Considering the health of the people living in Bhandewadi as first priority it is important to analysis the quality of ground water frequently and to take some preventive measures to reduce the effects of dumping yard on groundwater.

#### V. PROCESS OF CONTAMINATION OF GROUND WATER DUE TO DUMP YARD

Solid waste contains many hazardous components like chemicals extracted from hospitals, industries and many households. These hazardous waste is collected from different regions of the city and then it is collectively disposed far away from the residential areas. But due to urbanization and high cost of land the nearby areas of the dumping site are occupied by the people for living purpose. As the main source of water for domestic uses like drinking, bathing, cooking, etc is only the groundwater. In standard the dump site should be well covered by geosynthetic sheets but due to poor management system and adoption of cheaper method it leads to contamination of ground water. Not only this, but it also contaminates the soil and air due to open burning of waste. Groundwater contamination is mainly due to leachate infiltration in the ground. Leachate is generated in the dump yard when the solid waste comes in contact with water. When rainfall occurs the intensity of formation of leachate is high and due to this the intensity of contamination of ground water is more.

The intensity of contamination of ground water is highly dependent upon the concentration of leachate.

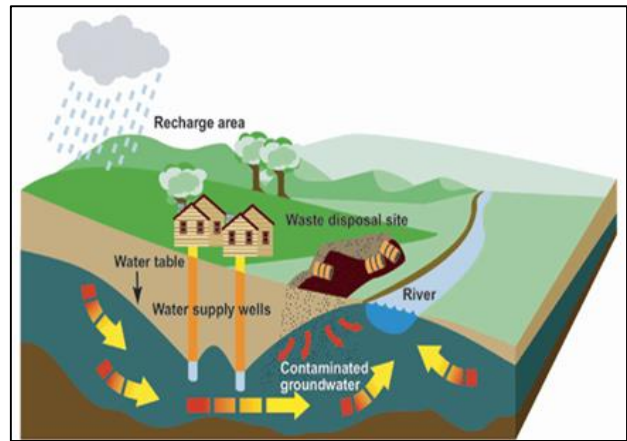


Fig. 2: Groundwater Contamination from a Waste Disposal Site



Fig. 3: Leachate

#### VI. EFFECTS OF DUMPING YARD

In the environment, chemicals and other contaminants found in solid waste can seep into groundwater and can also be carried by rainwater to rivers and lakes that provide essential wildlife habitat. These contaminants can also end up in our ground water, rivers and lakes that are our sources for drinking water. Dumped solid waste, when visible from roadways, is aesthetically unpleasing. Waste that is not properly managed, especially excreta and other liquid and solid waste from households and the community, are a serious health hazard and lead to the spread of infectious diseases. Unattended waste lying around attracts flies, rats, and other creatures that in turn spread disease. Normally it is the wet waste that decomposes and releases a bad odour. This leads to unhygienic conditions and thereby to a rise in the health problems. The plague outbreak in Surat is a good example of a city suffering due to the callous attitude of the local body in maintaining cleanliness in the city. Plastic waste is another cause for ill health.

##### A. Impacts of Solid Waste on Health

- Chemical poisoning through chemical inhalation
- Uncollected waste can obstruct the storm water runoff resulting in flood
- Congenital malformations
- Neurological disease
- Vomiting
- Increase in hospitalization of diabetic residents living near hazard waste sites



Fig. 4: Disease Cause by Contaminated Water

#### B. Effects of Solid Waste on Animals and Aquatics Life

- Degrades water and soil quality
- Plastic found in region ingested by birds
- Resulted in high algal population in rivers



Fig. 5: Animal Hazards

#### C. Impacts of Solid Waste on Environment

- Waste breaks down in landfills to form methane, a potent greenhouse gas
- Change in climate and destruction of ozone layer due to waste biodegradable
- Littering, due to waste pollutions, illegal dumping
- Leaching i.e. A process by which solid waste enter soil and ground water and contaminating them
- Degrades water and soil quality

### VII. CONCLUSION

Bhandewadi landfill site in Nagpur, which is being operated as a dump site, is expected to become cause of serious groundwater pollution in its vicinity. The leachate from Bhandewadi landfill dumping yard is infiltrating in the ground which leads to contamination of ground water. Proper disposal of waste should be done and preventive measures should be taken so to minimize the effect of contaminated ground water on locality. As the main source of water of the people in this region for domestic uses is ground water source only. So urgent attention therefore, needs to be paid to the groundwater supply from this region.

### ACKNOWLEDGEMENT

I express my sincere gratitude to my Guide Prof. Nilesh Pal and Head of the Department, Civil Engineering Prof. Vikas M. Thakur, JD College of Engineering and Management, Nagpur for all their affectionate encouragement and guidance during the entire thesis. Their views and inputs are very helpful throughout the process. I would like to thank them for helping us sharing their knowledge about Analysis of Contamination of Ground Water due to Dump Yard and spending his valuable time in correcting our mistakes and posing new challenges which really made us work hard on it. Their guidance, both in terms of technical advice on our project and in terms of professional advice, was invaluable. They always raised the bar inspiring me to strive for the best, and was always among the first ones to applaud any accomplishment. With their valuable remarks the work was finally completed. I would also like to thank him for allowing us to use resources of department.

### REFERENCES

- [1] Kalpana P. Deshmukh, analysis of underground water pollution of Bhandewadi dumping yard Nagpur, Indian Streams Research Journal ISSN: 2230-7850 Impact Factor : 3.1560(UIF) Volume - 5 | Issue - 11 | Dec - 2.
- [2] N.Rajkumar Groundwater Contamination Due to Municipal Solid Waste Disposal – A GIS Based Study in Erode City, international journal of environmental sciences volume 1, no1,2010.
- [3] Health impacts of solid waste, UNEP Report, 1996.
- [4] Bharat Jhamnani, Groundwater Contamination due to Bhalaswa Landfill Site in New Delhi, International Journal of Civil and Environmental Engineering 1:3 2009.