2.1 Introduction:

Sonipat, located in northern part of India, is one of the important cities of the state of Haryana. It is also called Educational city. Sonipat city is the headquarter of Sonipat district which lies in the National Capital Region. As per 2011 census, the total population of the city is 2,89,333 persons and the literacy rate is 75.24 per cent, whereas sex ratio is 875 females per thousand males. It is close to National Capital Territory. Easy and fast accessibility to it through N.H. 1 has led to fast urbanisation of the city. The impact of the urbanisation is reflected in the high literacy rate, easy access to technology, and a better quality of life. The Government of Haryana has drawn up a master plan for the development of Sonipat city as a satellite town of the National Capital Region (NCR) and proposed as many as 38 sectors for accommodating the increase in population in the industrial and commercial areas.

2.2 Location and Extent:

The district of Sonipat came into existence on December 22, 1972. It was a part of Rohtak district till December 21, 1972. It is bounded by 28° 48’ 15” to 29° 17’ 10” North latitude and 76° 28’ 40” to 77° 12’ 45” East longitude. It falls in the Survey of India topo sheets bearing numbers as 53C, 53D, 53G and 53H covering an area of 2260.53 sq. km. Sonipat is one of the smallest districts in Haryana state and covers 5.11 per cent area of the state. The district is surrounded by Panipat district in the North, Jind district in the West, Rohtak district in the South-West direction and Delhi in the South. The river Yamuna marks the eastern boundary of the district and across the river lies Bagpat district of Uttar Pradesh. The NH-1 and New Delhi - Amritsar railway track pass through the district. It is connected by metalled road with important cites of the state and to Delhi. Gohana, Ganaur, Rai and Kharkhoda are the other important towns in the district. The district comes under Rohtak division administratively. It was carved out of the Rohtak district to which Sonipat tehsil was attached since 1912. By taking 69 villages from Sonipat tehsil, Ganaur as a sub-tehsil was created in February, 1980. Kharkhoda with 38 villages was created as a sub-tehsil on March 30, 1982. The sub-tehsil of Ganaur was upgraded to the level of tehsil on
April 19, 1982. Gohana sub-division of Sonipat district was included in Rohtak district.

2.3 Location of Sonipat City in NCR Region:

Located close to the National Capital, New Delhi, at about 30 km north, Sonipat is an important town in Haryana. It is the district headquarters of Sonipat District. The town is well connected by both roads and railways. National Highway 1 (NH 1), connecting Delhi and Wagah Border in Punjab, and connecting many important cities passed near the town (Fig.2.3).

2.4 Historical Background of Sonipat City:

Sonipat can historically be divided into three periods like – Ancient, Medieval and Modern periods. The evolution of Sonipat has been seen in different periods, which are:

- Ancient Period (Till the close of the 12th century A.D.).
- Medieval Period (13th century to the 18th century A.D.).
- Modern Period (Since the 18th century A.D. to till date).

2.4.1 Ancient Period (Till the Close of the 1200 A.D.):

In the context of Sonipat, it is believed that it was founded as Suvarnaprastha by the five Pandavas brothers during the times of Mahabharata. Another legend ascribes it to Raja Soni, the thirteenth descendent of Arjuna, one of the Pandavas brothers. It is often believed that Sonepat (now spelt as Sonipat) was one of the five Preasthas or towns demanded by Yudhisthira from Duryodhana as the price of peace. Both the traditions are without substance and there is no mention of Sonipat in the Mahabharata, although it has been noted much earlier by the great grammarian Panini in his celebrated Ashtadhyayi. It is a part of the Eastern Haryana Plain. The town was therefore already in existence around 600 B.C. The parts of the Sonipat were inhabited by different people, some of these parts show continuity while in others there is a break. The evidences so far available--archaeological as well as literary-- are quite meager even to provide any clear outline of the historical growth of the Sonipat during the early phases.
Fig. 2.1 Location Map of Study Area
Figure 2.2 Sonipat City in Sonipat District

Source: Census of India, District Census Abstract, 2001
Figure 2.3 Location of Sonipat City in NCR of Haryana
It might possibly have been included in the Kingdom of the Pandavas who ruled from Indraprastha and later from Hastinapur, but there is absolutely no evidence in support of the belief that Sonipat was one of the villages asked for by Yudhisthira as a pre-condition for concluding peace with his cousins, the Kauravas (District Gazetteer Sonipat, 1990).

The earliest literary reference to Sonipat is, of course, in the Paniniya Ashtadhyayi where it has been mentioned along with towns whose names end in Prastha (Sonaprastha). The discovery leaves no doubt that the Greeks attacked the region during the second century B.C. and continued to rule there towards the last quarter of the first century B.C. or the beginning of the first century A.D. (District Gazetteer Sonipat, 1990). The Kushanas and the Yaudheyas also seem to have ruled over parts of the regions. With the rise of Samundragupta, the Yaudheya domination ended. The region might possibly have come under the domination of the Guptas and thereafter of the Hunas till the rise of the Vardhanas in the Srikanthajanapda with their capital at Thanesar sometime in the second part of the 6th century A.D. During this time there comes across for the first time a historical document from this region namely the Sonipat Copper Seals of Harshavardhan. It was recovered by J.F. Fleet from the possession of Mehar Singh Ramrattan Mahajan, a merchant of Sonipat city. At the top of the seal is a bull and below is the inscription.

The language is Sanskrit and the composition is in prose throughout. It provides the genealogy of the dynasty from Rajyavardhana I to Harsha also providing their political status as well as their religious leanings. After the shifting of the Vardhana capital of Kanauj sometime in A.D. 606-607, the decline of the region began and continued to be so till the establishment of the Sultanate at Delhi (District Gazetteer Sonipat, 1990). There is no literature about the explanation of the Sonipat city of ancient period; However, Gazetteer of Delhi throws some light about the etymology of the name of the town as follows. “Sonipat is a town of great antiquity and was founded apparently by the early Aryan settlers. The town is picturesquely situated on the side of a small hill which, standing out as it does in a level plain, is evidently formed from debris of buildings that have crumbled to decay on this one site during the town’s long life of 300 years.” Among the ancient monuments, mention may be made of the mosque of Abdullah Nasiro–ud-din and the tomb of Khawaja
Khizar, a local saint and celebrity, built by Ibrahim Lodhi. Sonipat is proud of having the oldest Muslim shrine – Dargah Mamu Bhaanza (Bhat & Bhargav, 2006).

2.4.2 The Medieval Period (1200 – 1800 A.D.):

The development of Sonipat during the Medieval Period can be examined in two phases, viz. (i) Delhi Sultanate Period (1200 – 1526 A.D.); and (ii) Mughal Period (1526 – 1800 A.D). The Tomra Rajputs ruled over ‘Haryana’ from Delhi when the Ghaznavids invaded from North-West. The kingdom of Lahore was annexed by the Ghaznavids. Sultan Masud, the successor of Ghaznavids, with the aim to extend his power and territory advanced towards Hansi (District Hisar) and invaded the fort. After the fall of Hansi, he marched to Sonipat and defeated his Governor, Dipal Har. The Delhi Sultanates, establishment in 1206, depended on the support of Muslim nobles. On account of their nearness to Delhi, Sonipat areas influenced the struggles among the aspirants for the throne of Delhi. Haryana in general and the Sonipat area with its population of Jats and Rajputs in particular could, therefore, be a source of strength or weakness to the Sultans depending on the political circumstances (District Gazetteer Sonipat, 1990). After Delhi Sultanate, with the establishment of the Mughal dynasty in Delhi in 1526 A.D., the political centre shifted from Multan to Lahore which fashioned the climax of the Delhi – Multan – Lahore triangle. Lahore was directly associated to Delhi via Sonipat. This resulted in the loss of the advantage of being located on an important route, which the city had enjoyed earlier. However, the influence of the Muslims as the ruling class continued (Singh, 2012). Sonipat provided a link between the mountains of Multan (North West) and Delhi through its location. This route made way for the expansion and growth of the Sonipat city, which acted as an essential linkage between the two cities i.e. Multan and Delhi.

During the Mughal period (1526), there was no major change in Sonipat city. But the social position of the Hindus was pitiable in these days. The Hindus were relegated to an inferior position and were prohibited to observe their religious rites. They were also prohibited from building new temples and repairing old ones (District Gazetteer Sonipat, 1990). Taking advantage of the chaotic conditions, Babar made a strong attack on India on the last day of the year 1525 A.D. He passed through Punjab without meeting any opposition and reached Ambala in the early part
of 1526. From this place, Babar marched via Shahbad along the river Yamuna to Karnal. Then Babar left for Sonipat where the unsettled conditions were prevailing. When Babar arrived at Sonipat, the Chiefs and Chaudharis of the Sonipat city, together with the soldiers and bankers and other classes, went to visit him, and were treated with honour and kindness. After settling the chaotic condition at Sonipat, Babar proceeded towards Delhi. During Akbar’s time, the present Sonipat was a part of Delhi Subah. Sonipat was the paraganas of Delhi Sarkar. After the death of Aurangzeb in 1707, his successors could not check the chaotic conditions. The Sonipat areas were outwardly under the Mughals but, in fact, nobody cared for the authority of the Government (King) (District Gazetteer Sonipat, 1990). In July, 1710, the emperor appointed Jain-ud-Ahmad Khan Governor of Sirhind. Kokaltash Khan was given the charge of Sonipat. After the death of Banda in 1716, Farrukh Siyar settled the chaotic situation in the Sonipat area in particular and Haryana in general.

In 1753, Marathas assumed the role of the Chief Power in India. After the battle of Taraori, Datta Ji wound up his camp at Kunjpura on 27th December, 1759, and reached Sonipat on 29th December, 1759. He stayed at Sonipat for five days to get exact information about the Durrani movements. The impact of the third battle of Panipat was far-reaching on the people of Haryana in particular and on the whole country in general. Historians’ assume that the Third Battle of Panipat (1761) decided the fate of India. If Plassey had sown the seeds of British supremacy in India, Panipat offered time for their maturing and striking roots. Among the most notorious adventurers in the northern India towards the end of the 18th century, was George Thomas, an Irish, known in Haryima as Jahaz Sahib. After facing many ups and downs in life, George Thomas became the protege of a Maratha leader, Appa Khandi Rao. Consequently, before the close of 1798, George Thomas carved out an independent principality for himself in a tract always covered with green grass, and for that reason called Haryana. Gradually, he extended his sway over the areas of Sonipat.

2.4.3 **British Period (1800-1947 A.D.):**

The rising power of Sindhia in northern India was completely broken by the British forces under General Lake in the second Maratha War. The Gohana areas of Sonipat district passed on to British East India Company by the treaty of Surji
Arjungaon in 1803. The British East India Company exercised direct control only over the assigned territory which comprised of the paraganas of Sonipat region. Sonipat provided military basis for security of company's possessions within its location from the Sikhs and others in the north-west and the Rajputs. The Grand Trunk Road passed through the city of Sonipat, the rebels could greatly impede the passage of men and material from Punjab to Delhi. It was, therefore, considered very essential from the military point of view that the city be recovered without any loss of time. Delhi-Ambala-Kalka Railway Line is the oldest railway line in the Sonipat. This railway line passing through Sonipat was completed and opened for traffic on October 14, 1870. This line runs almost along the Grand Trunk Road.

During this period, the city growth in term of built up area was formally within the railway station on the north-eastern side. The growth was initiated by the establishment of the Civil Road and construction of Railway Station. The city grew in two directions from the core part of the city towards north-eastern and towards south-eastern direction. The expansion towards the northern-east and south-eastern direction was due to the Grand Trunk Road whose distance was about 6 km. from the city and at that time it was the main road from Delhi to Multan and Lahore. With the establishment of grain market and sugar factory, the city has extended in the south-western direction. Sugar factory and grain market has paved the way to growth of the city. For the duration of this time, the city was provided with basic urban amenities, such as educational and medical institution, drinking water and sewerage etc. A power station for electric supply established at Sonipat in 1939, it also encouraged the growth of the city, but it was closed in 1953 when hydroelectric power became available to the town (District Gazetteer Rohtak, 1961). A number of educational institutions were established in the city by governmental as well as non-governmental agencies.

2.4.4 Post Independence Period (After 1947):

Before independence, the city had no large scale industry. The economy of city was agricultural based. The industries were mainly confined to cottage sector. The partition shattered the entire economic structure of Punjab of which the Sonipat area was as a part of Rohtak District. After independence, 148.5 acres of land was acquired to establish Industrial Area in Sonipat city. Just after partition with a view to
rehabilitation the displaced persons from Pakistan, the area at Sonipat had 123 plots which were sold on free hold basis and easy terms. An ‘Industrial-cum-housing’ scheme at Sonipat was considered by the Government in 1961. Various factors such as the requirement of land for the new industries, housing facilities for workers, controlling industrial overcrowding and solving the problems of industrial development led to the origin of this scheme. For this purpose, Government acquired 500 acres of land at Bandipur on Rathdana road. A number of small scale industries connected with bicycles parts, assembling of complete bicycles, hand tools, barbed wire, sewing machine parts, bolts and nuts, steel re-rolling, glass and ceramics, rubber goods, food processing and cotton textiles. The proximity of Sonipat to Delhi, which is a big market for consumer goods, gives the city advantageous position and has greatly contributed to its industrial growth.

The Atlas Cycles Industries Limited, Sonipat was established in 1952 for manufacturing bicycles and bicycle component and parts. The bicycles manufactured here are exported to various countries. The Milton Cycle Industries Limited was establishment in 1963, Macro Private Limited Industries was set up in 1956 for manufacturing piston pins, gudgeon pins and other kind of pins. The Rubber reclaim of India Ltd. was established in 1968 for manufacturing rubber reclaim, rubber crumbs etc. These industries gave a direction to physical growth of the city. Chotu Ram Arya College was established in 1951, and Hindu College was established in 1956. The college is affiliated to Panjab University for Pre-University (Arts and Science), Pre- Engineering, B.A., B. Com. and B.Sc. classes. It provides good education and attracts people for quality education from peripheral parts of the city. Government Industrial School for Girls and Training Centre for Adult Blind, is also attracting people towards technical education from surrounding villages of the city. The Model Town of the city was developed by the government for high income group. The MC boundary of Sonipat has been changed from time to time. At present, Sonipat is a part of Sonipat-Kundli complex plan for 2021.

2.5 Physical Characteristics:

Sonipat is characterized by great diversity in its physical features. The diversities have their own impact on the ground water occurrence in different areas. Several factors viz., physiography, climate, soil cover drainage system and natural
vegetation control the availability of ground water in an area. Knowledge of such hydro-geological and physiographic data of an area is of utmost importance for scientific and planned ground water studies.

2.5.1 Physiography:

Physiography means description of natural features in their causal relationship. The area forms a part of the Indo-Gangetic plains and exhibits flat terrain with general slope North to South. The area is divided in many prominent topographic features. However, a natural depression exists north and north-west of Gohana (29° 8’ 22” N & 76° 42’ 55” E). The maximum elevation of the plain is 230 m above mean sea level. Topographically, the district can be divided into the following defined physiographical units:

2.5.1.1 The Khadar:

Along the river of Yamuna which is a narrow flood plain ranging from 2 to 4 miles in width and is formed by the river along its course. The Khadar plain is 20 to 30 feet lower adjoining upland plain. The soil left behind by the receding floods of the Yamuna River is fine clay loam. Most of the farmers in the Khadar area cultivate rice and sugar cane. Recently, the farmers have started planting banana, papaya and other fruit trees in this area.

2.5.1.2 The Upland Plain:

It consists of those areas of Sonipat lying to the west of the Khadar and is the most extensive of the three regions. The upland plain is covered with old alluvium, which is properly irrigated and is highly productive. There is an extensive farming of crops like oil seeds, horticultural plants, vegetables and flowers are grown in this region. The ridges in Gohana tehsil represent the northern most extension of the Aravallis.

2.5.1.3 The Sandy Region:

A much smaller part of the district is covered with the soil consisting of sand or sandy loam. This region has high PH value leading most of the parts consisting of ‘kallor’ land.
2.5.2 Climate:

The area enjoys the sub-tropical monsoon type of climate which is denoted by symbol CWg under the Koppen’s system of climate classification.

2.5.2.1 Temperature:

The winter season starts in December, when day and night temperature falls rapidly. January is the coldest month with mean daily maximum temperature 21.3 °C and mean daily minimum temperature 7.3 °C. During cold waves, the minimum temperature may go down to the freezing point of water, and frost can occur. In the middle of March, the temperature begins to rise rapidly. The hot westerly wind locally known as ‘Loo’ blows in the month of April. May is the hottest month with mean daily temperature of 26.6 °C. In the month of May and June, the maximum temperature sometimes reaches about 47 °C. The temperature drops considerably with the advancement of monsoon in the month of June. However, the night temperature during this period continues to be high.

2.5.2.2 Humidity:

The humidity is considerably low during the greater part of the year. The district experiences high humidity during the monsoon period. The period of minimum humidity (less than 20 per cent) is between in the month of April and May.

2.5.2.3 Rainfall:

The normal annual rainfall of the district is based on the record for the period of 1998-2008 is 525 mm recorded in 30 rainy days in a year. The annual rainfall varies considerably from year to year. There is no meteorological observatory in the district. Therefore, the climatological data obtained from the nearby observatory at Delhi has been taken as representative of the climatological conditions of the district. The annual-- rainfall about 76 per cent --is recorded during the south-west monsoon from June to September. July is the wettest month of the year.

2.5.2.4 Cloudiness:

During the monsoon period particularly in the month of July and August, the skies are heavily clouded. The skies are generally clear or lightly clouded in rest of the year. In January, February and early March, the skies become cloudy and sometimes overcast in association with passage of western disturbances.
2.5.2.5 Winds:

During the monsoon period, the sky is heavily clouded and winds strongly blow in this period. Winds generally blow light during the post-monsoon and winter period.

2.5.3 Relief and Slope:

Sonipat is a part of the smooth undistinguished area of the Yamuna- Satluj divide, which is a part of the great Indo- Gangetic plain. Its average elevation is 225 meter from sea level. The gradient is extremely gentle in the study area. Relief and slope has been represented in Fig. 2.4.

2.6 Drainage System:

The drainage system of the Sonipat is also very significant. Main water system in the district comprises of Yamuna and the irrigation canals flowing out of it. The source of sub-surface irrigation is shallow tube wells, numbering 55315 in 2009. The main source of surface irrigation in the district is Blalaut sub-branch, Bhainswal distributory, Sardhana distributory, Raipur distributory and Butana branch etc. This network of canals system work continuously to contribute towards ground water recharge. There is no perennial river in the district. The Yamuna, which makes the boarders in the east, also contributes to ground water recharge in the district. The district is drained by drain No.8 which was constructed to take out excess monsoon runoff from uplands to the Yamuna. The areas east of upland plains are more prone to flooding because of its low-lying nature.

2.7 Soil Profile:

Soil is the topmost layer of the earth’s outer crust spreading over the rocks exposed at the surface. It is a natural body of different thickness composed of disintegrated rock material together with different proportion of organic matter, mostly unconsolidated, generally differentiated in to zones or layers, the lowest of which passes imperceptibly in to the parent rock beneath. The soil in Sonipat is rich and quite suitable for all types of agricultural crops as well as forest cover. The types of soil may be classified according to textures as: 1. Sandy (Raitali), 2. Sandy loam (Bhuri), 3. Loam (Rausli), 4. Clay loam (Karti) 5. Clay (Dakar). The main soil of the district is a good alluvial loam with sufficient moisture and is mostly loamy in texture. The soil originated due to the deposition of transported inorganic materials by the
Soils of the Sonipat vary from sandy to clayey loam, because of its presence on the banks of the Yamuna and being a part of Indo-Gangetic alluvial plain. About 67 per cent soil in the district is sandy loam, 25.5 per cent sandy and 7.25 per cent clay. The soil is deficient in organic matter, salinity and alkalinity.

2.8 Surface Water:

The Yamuna in the eastern side and Western Yamuna Canal passing through the district are the major sources of surface water. The drains constructed in the district take out excess monsoon water to Yamuna. The water quality near National Highway No. 1 in Yamuna is presented in Table 2.1. Cadmium, Nickel, Chromium, Zinc and Iron are the heavy metals observed in the Yamuna near the Sonipat district.

Table 2.1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Location along NH-I (Sonipat)</th>
<th>Permissible Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C)</td>
<td>14.0 to 32.0</td>
<td>&gt; 4</td>
</tr>
<tr>
<td>Dissolved Oxygen (mg/l)</td>
<td>5.7 to 12.0</td>
<td>6.5 to 8.5</td>
</tr>
<tr>
<td>pH</td>
<td>7.04 to 8.42</td>
<td>6.5 to 8.5</td>
</tr>
<tr>
<td>Free Ammonia (mg/l)</td>
<td>BDL to 1.77</td>
<td></td>
</tr>
<tr>
<td>Total Kjeldhal Nitrogen(mg/l)</td>
<td>0.28 to 3.05</td>
<td></td>
</tr>
<tr>
<td>COD (mg/l)</td>
<td>4 to 49</td>
<td>&lt; 3</td>
</tr>
<tr>
<td>BOD (mg/l)</td>
<td>1 to 6</td>
<td>&lt; 3</td>
</tr>
<tr>
<td>Conductivity (μmho/cm)</td>
<td>192 to 619</td>
<td></td>
</tr>
<tr>
<td>Total Coliform (Nos./100ml)</td>
<td>2,900 to 8,100</td>
<td>&lt; 5,000</td>
</tr>
<tr>
<td>Faecal Coliform (Nos./100ml)</td>
<td>560 to 1,10,000</td>
<td></td>
</tr>
</tbody>
</table>

Source: [http://ncrpbnic.in](http://ncrpbnic.in), Environmental Assessment Document, pp. 10

2.9 Natural Vegetation:

The variation in vegetation from place to place depends to a large extent on rainfall and temperature characteristics. In this way, there are many kinds of flora found in the district. Ak or Madar (*Calotropis procera*), shisham (*Dalbergia sissoo*), babul or kikar (*Acacia nilotica*), Lasura (*Cordia dichotoma*), mango or aam (*Mangifera indica*) and jamun (*Syzygium cumini*) are the important species grown in the region, Safeda (*Eucalyptus hybrid*) has been introduced recently on waste lands along the road-side as well as on private lands. The biggest and the most conspicuous grass Saccharum munja is grown in the region. This grass is put to various uses and yields fiber from which strong ropes are made.
Figure 2.4 Relief and Slope of Sonipat District

2.10 Ground Water:

Ground water is an important resource for meeting the water requirements for irrigation, domestic and industrial uses. Ground water is annually replenishable resource but its availability is non-uniform in space and time. In Sonipat, ground water occurs in alluvium as well as in hard rocks. Ground water at shallow depths occurs under unconfined conditions, whereas at deeper levels confined/conditions prevail. Ground water occurs in depths of 10-25m in the Sonipat. The quality of ground water in shallow dug wells is fresh in the eastern and north, northwest parts and gradually gets deteriorated in the western and southwestern parts. The total replenishable ground water resource in the district is 449.58 mcm, while the total existing ground water draft by all means is 511.10 mcm. The shallow ground water of the district is alkaline in nature and with moderate to high mineral content with EC ranging from 597 to 6710μS/cm at 25°C. Ground water occurring in the southern and north-western parts of the district is more saline as compared to ground water occurring in the rest of the district. 68% of the ground waters are not suitable for drinking due to salinity, fluoride (13 mg/l) contents above permissible limits. The concentration of Arsenic (2 mg/l) and Iron (6 mg/l) are observed more than permissible limits in few areas.

2.11 Ambient Air quality:

TSPM and PM10 observed in Sonipat were above the standard limits. Concentrations of SO₂ and NO₂ were found below the permissible limits. Higher concentration of TSPM and SO₂ observed during winter seasons causes respiratory diseases. Ambient air quality observed in Sonipat is depicted in the Table 2.2.

Table 2.2

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Observed in Sonipat</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSPM (μ/m3 )</td>
<td>158.3 – 1,756.6</td>
<td>50 – 100</td>
</tr>
<tr>
<td>PM10(μ/m3 )</td>
<td>74.2 – 430</td>
<td>………….</td>
</tr>
<tr>
<td>NO₂</td>
<td>19.7 – 78.4</td>
<td>30 – 120</td>
</tr>
<tr>
<td>SO₂</td>
<td>4.8 – 87</td>
<td>30 – 120</td>
</tr>
</tbody>
</table>

Source: ncrpb.nic.in/latest_news/VOLUME%20VI.pdf
2.12 **Agriculture:**

Paddy, wheat, sugarcane and bajra are the major crops of the study area due to good water holding capacity of the soil. Other crops include jawar, maize, cotton, moong gram, barley, oil seeds (such as Sarson, toria and tarmira/tira), robi pulses, and vegetables (such as tar or kakri, ghia, kadoo, tori, Petha, tinda, karela, brinjal, tomato, Bhindi (lady finger) and sweet potato in summer and radish, turnip, carrot, Palak, methi, cabbage in winter). Fruits grown include malta-orange, sweetlime, kaghzi lime, mango, guava and ber, pomegranate, grape and phalsa.

2.13 **Disasters:**

According to the Vulnerability Atlas of India, Sonipat town and districts falls in the
- High damage risk zone (MSK VIII) for earthquakes.
- Very high damage risk zone B (Vb = 50m/s) for wind and cyclone hazards.
- Areas liable to floods, which are more site specific and consist of low-lying areas and the flood plain.

2.14 **Transport Network:**

Transport network is an important component in the development of a city and region. It has a network of roads, streets and railways. Sonipat city has fast transport connectivity and accessibility through roads and railways. So urbanisation is very fast in this area. Transport networks of Haryana have been shown in Fig.2.5. This shows that Sonipat is located very advantageously in proximity to National Capital, New Delhi and its location along a very important national road transport corridor – NH 1. Sonipat is well connected with other parts of the State and Country. NH 1 - from Delhi to Wagah Border (with Pakistan) in Punjab- passes near the town; it connects to all important cities and hinterland in Haryana and as well in Punjab State. It is also well connected to various towns of Haryana State and its hinterland with three State Highways (SH-11, SH-14 and SH-20) and other major and minor roads. The town is also well connected by national rail network. The Delhi-Ambala railway line passes through the town. There are regular and frequent train services from Sonipat Railway Junction connecting various parts of the country. Nearest Airport is at Delhi, about 45 km south of Sonipat.
There are regular bus services to Delhi and other towns and cities and hinterland of Haryana as well as in neighbouring states operated both by state-run and private transport services. Within the town, commuters mainly depend on Auto Rikhsha and Cycle Rikhsha, besides the private vehicles for intra-city travel.