

Relationship in Physical Built Up with Crime (Case Study of Jalandhar Commissionerate City-2)

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Abstract:

It's important to discover the hyperlink among land use and possibilities for crime so as to create safer dwelling environments in different towns and cities. Adjustments of land use in urban shape and this ends in adjustments within the ordinary activities of humans, which impact on the offenders by giving them the opportunities or chances to dedicate the different crimes in different areas. This connection is backed up by the different authors in different environmental criminology theories. In order to understand this link, there is a need of data and information for further analysis and to make decisions about strategies to be implemented to reduce opportunities for crime by offenders in different crime hot spot areas. GIS has emerged as a strong instrument for analysing crime prevention decision-making. This research paper is focus on the relationship of existing land use, urban forms and also about different activities in specific hot spots by the peoples in the urban areas or cities. The research examines whether it is possible to reduce the opportunities for crime by carefully considering land use, urban form and building design and thereby minimize the additional demand for law enforcement services that will be experienced as a result of urban growth. This is also a try to understand and examine the significance of criminology and its relation to city development factors including land use, zoning and infrastructure.

Keywords: Physical Built-up, Land Use, GIS, Urban Design & Planning, Crime.

1. Introduction:

Jalandhar Commissionerate is basically dividing into two phases or areas of jurisdictions under the command of 2 different DCP's (Deputy Commissioner of Police) supervised by the Commissioner of Police (IPS). These two phases are named as Jalandhar Commissionerate City-1 and Jalandhar Commissionerate City-2. There are total 14 Police Stations are in Jalandhar Commissionerate which covers the whole area of Commissionerate Jalandhar as according to their different realm or jurisdiction of each Police station.

As the relationship of land use and crime activities within the different kinds of areas in Jalandhar Commissionerate, the land use measures have periodically been based on the studies, which have assumed that non-residential land makes use of independently boom opportunities or lower the ability for casual social control. The land use have targeted on how precise land uses, such as commercial area integrated with more liquor shops and bars can increase the chances of crime by placing offenders and victims close to each other regularly in the absence of tutelage.

Mainly the effect of land use on crime may be influenced by the neighbourhoods, socioeconomic characteristics. If socio-economic drawback (a structural background of social disorganization) is usually associated with reduced rates of informal social control, then the potential for land use to generate crime will probably different and depending on the level of disadvantage in a region. Most of the time, many characteristics of social disorganization combine in relation to land use variables to impact the likelihood of road robberies and snatching type of crimes. Mainly the impact of hotels / motels and bars / restaurants / gas stations on robbery increased with the increase in the amount of single-parent households in a society, Whereas the impact on robberies of multi-family buildings, bars / restaurants / gas stations and vacant / park lots reduced with distance from the city centre. Crime in the Commissionerate can be divided into several kinds like as Crime against property, violent crimes against human beings, Crimes against government order and crimes related to traffic & its related offenses. The below figure no. 1 shows the powerful connection between land use planning problems and crime possibilities through two other significant variables, namely routine and urban form.

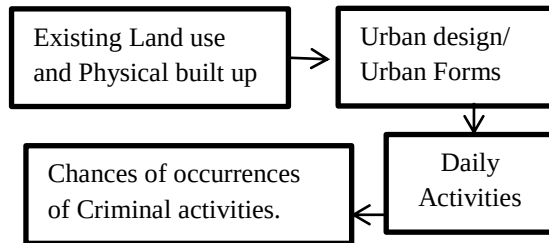
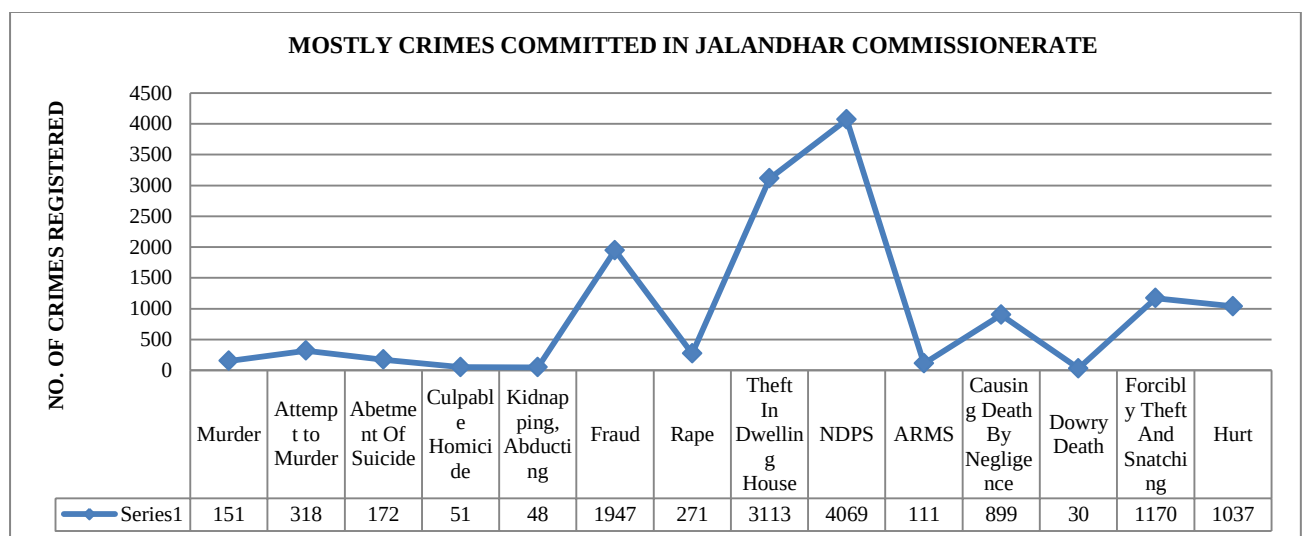


Figure 1: Relationship between Physical Built up and Occurrences of Criminal Activities.

Mainly the area of Jalandhar Commissionerate is partially planned area, in which many areas or locations have haphazard development or unplanned development which tends to increase the chances of occurrence of criminal activities in these areas. But many of the crimes are also occurred in the planned areas like GTB nagar, Urban Estate and even Guru Amardas nagar in Jalandhar City. These crimes are of many types like robberies, snatchings, theft in the houses, traffic related crimes, attempt to murder, kidnapping and NDPS related crimes. As the data, taken from Commissionerate Jalandhar shows that there were thefts in dwelling houses, Fraud, NDPS, Causing death by negligence and forcibly theft etc. are high in number from the year 2010 up to year 2017 as refer in line graph no. 1.



Line Graph 1:- Crimes Committed in Jalandhar Commissionerate (Feb 2010 – Dec 2017)

Source: - Primary Calculation from Jalandhar Commissionerate Data.

1.1 Aim of Study:-

To carry out the redundancy or low tendency of the crime rate in Jalandhar Commissionerate and try to find their relationship with land use..

1.2 Scope: -

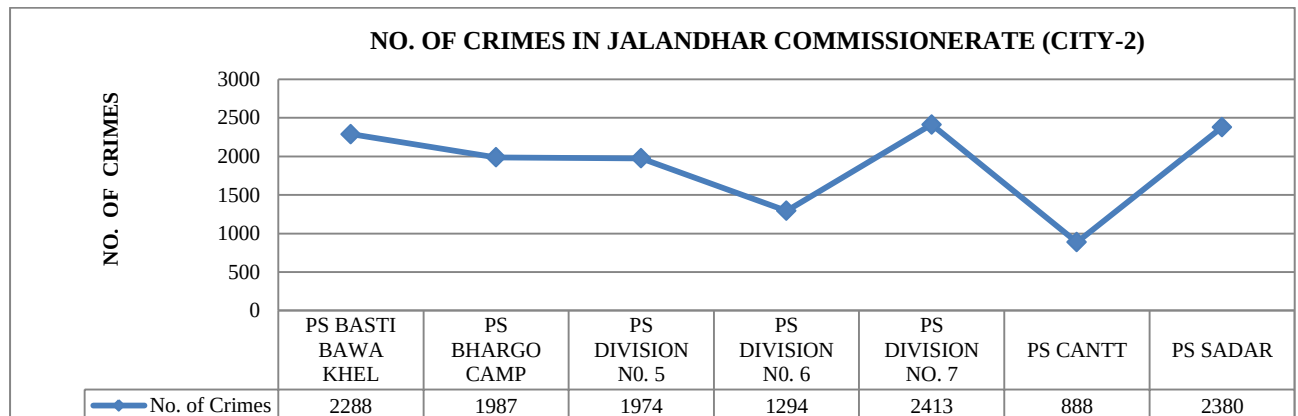
To relate the crime effected areas with the availability of existing land use as according to the different types of crimes occurred in the specific areas and determine the factors that affect the crime and criminal activities.

1.3 Limitations: -

Land use map are prepared by using GIS software and Google earth only. This is only a tentative land use map for research purpose or study purpose only without any legal authenticity in it. This given Land use Map is not authentic for any monetary or revenue purpose.

2. Study Area:

Jalandhar Commissionerate System came into existence in Jalandhar city on 15th Feb 2010. It is situated at the central eastern side of Jalandhar District as shown in figure no. 2. Mainly it covers the area of Jalandhar City along with some rural area also. Administratively Jalandhar Police Commissionerate is divided into 14 regular police stations and 2 special Police stations i.e. women police station and NRI police station. In City-2 Zone, there is existing seven police stations i.e. Division-5, Basti Bawa Khel, Bhargo Camp, Division-6, Division-7, Jalandhar Cantt and Sadar and two special police stations are women police station and NRI police station. In line graph 2, it shows the different types of total crimes occurred in different police stations in Jalandhar Commissionerate from year Feb. 2010 up to 2017. This shows that more crimes were occurred in PS division no. 7 and PS Sadar but less crimes was occurred in PS Cantt.



Line Graph 2:- Crimes Committed in Police Stations at Jalandhar Commissionerate in City 2(Feb 2010 – Dec 2017)

Source: - Primary Calculation from Jalandhar Commissionerate Data.

The location of Jalandhar Commissionerate is shown as under:-

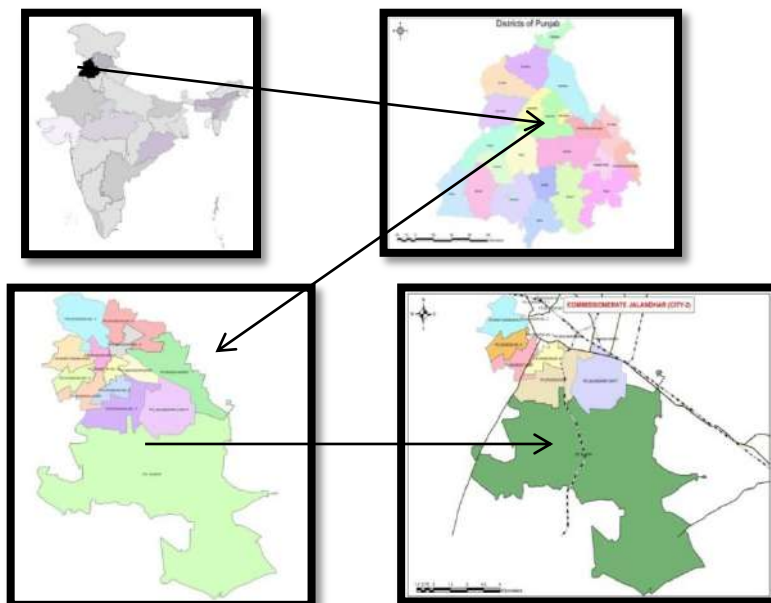
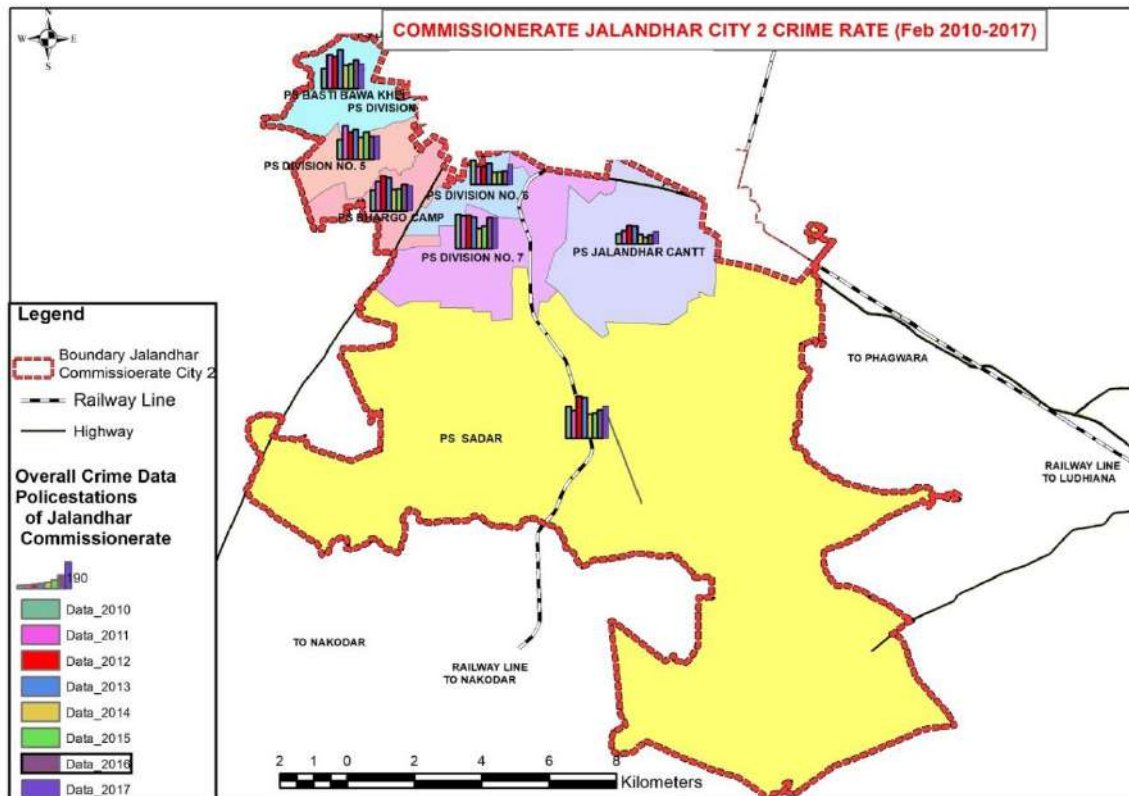


Figure 2: Location of Jalandhar Commissionerate (CITY-2) in India.

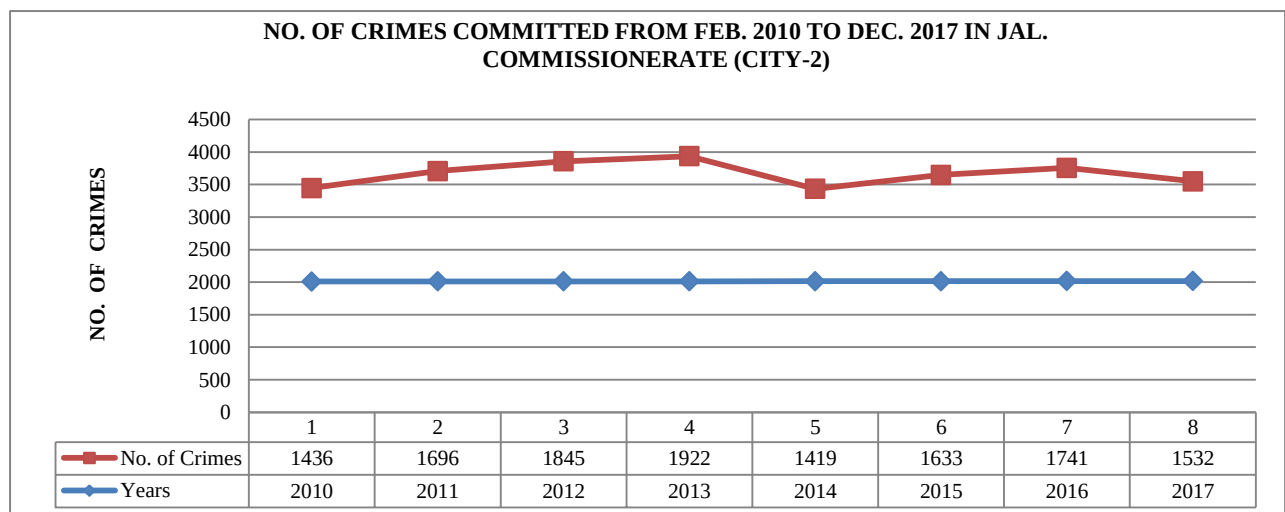
Source:- Map is Prepared by Author itself by using GIS

The line graph 3 below shows the number of crimes occurred from Feb. 2010 up to 2017 in Jalandhar Commissionerate zone 2 (City-2). In which it shows that the crime rate was high in year 2013 and low in year 2010. The crime rate was moderate as according to the below graph in year 2011 and year 2016. This year wise crime rate in Jalandhar Commissionerate City-2 is also shows at below Map no. 1, which shows the area of Police Stations, Jalandhar Commissionerate City-2.



Map no. 1: Existing crime rate in each Police Station in Jalandhar Commissionerate (From Feb. 2010 to 2017).

Source:- Map is Prepared by Author itself by using GIS



Line Graph 3:- Mostly Crimes Committed in different years at Jalandhar Commissionerate in City 2 (Feb 2010 – Dec 2017)

Source: - Primary Calculation from Jalandhar Commissionerate Data.

3. Major Issues Related to Traffic in Jalandhar Commissionerate: -

The issues related to traffic movement of different areas under various police stations of Commissionerate Jalandhar, which tends to increase the crimes related to traffic system and fatal road accidents in the city. As according to the primary survey conducted by the author with team in different areas of Jalandhar Commissionerate, the following results are come to existence as shown in table no. 1. As per the results shown in the below table, there is an encroachment along the junctions and round about which tends to increase the cases of fatal accidents by reducing the turning radii on these round about and junctions like as Rama mandi chownk, Guru Ravidas Chownk, Nakodar Chownk, Alaska Chownk, Junction near ISBT Jalandhar and T-point of Sodal Mandir.

There are also the static and mobile hawkers and even beggars, who create problems at various points on the road and along the roads/junctions by their hawking services like as this problem is moderate at PAP Chownk, Ravidas Chownk, Pathankot Chownk, Lamba Pind Chownk and BMC Chownk but this problem is on high scale on the junction of Bus stand, which tends to increase the chances of robberies from the moving vehicles (maximum occurred when a car or four wheelers stopped on red light at junctions) and snatching type of crimes. It also tends to increase the cases of accidents because of overcrowding on those junctions especially on junction near ISBT Jalandhar.

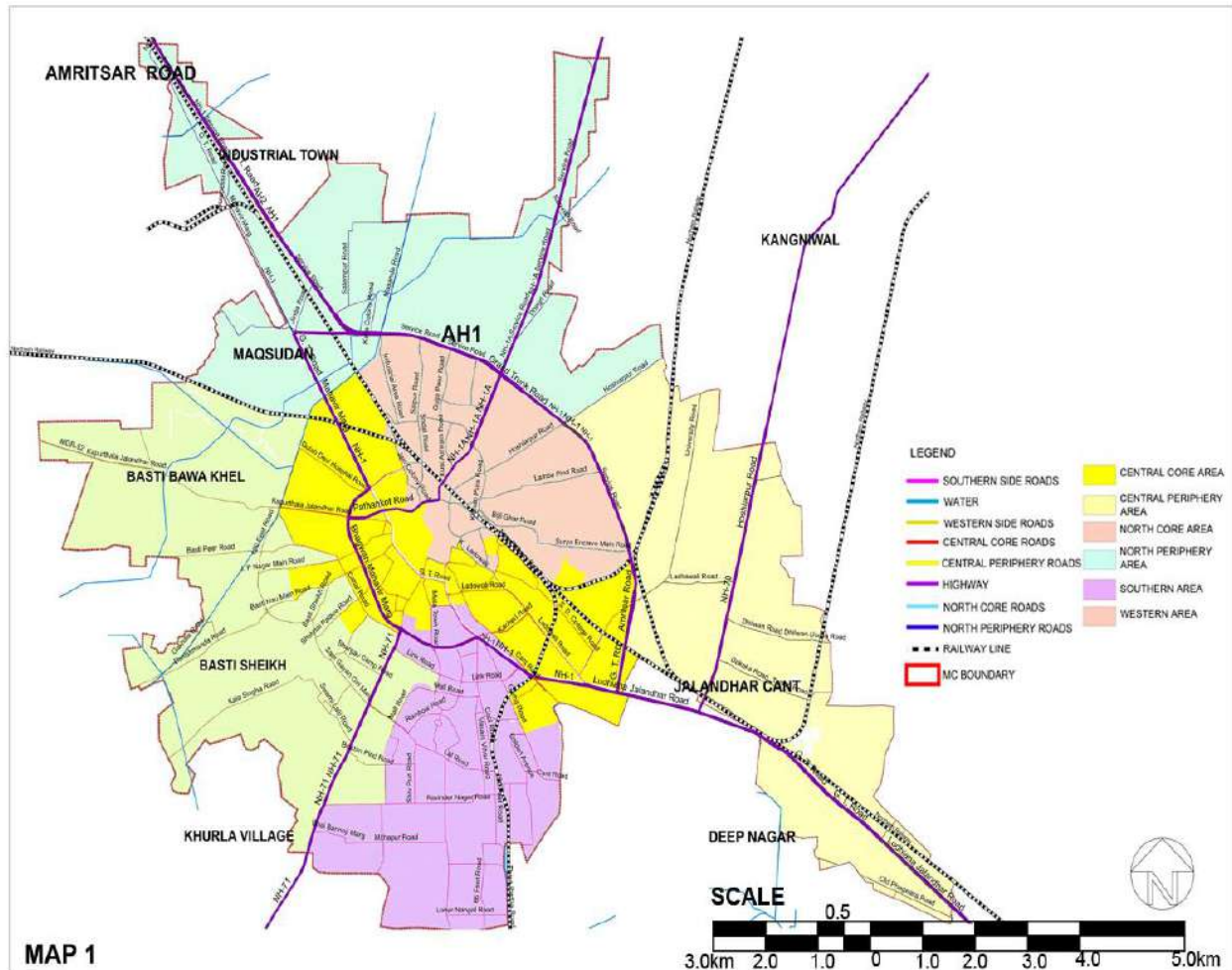
Many other types of traffic audits like as road marks are also presented everywhere in the below listed junctions as shown in table no. 1 of Jalandhar Commissionerate area.

Table No. 1: Different problems in the Major Junction of Jalandhar Commissionerate												
S r. N o.	Name of the Junction	N o. of si des	Roa d Mar king s	Tra ffic Sign age	Tra ffi c Signal Avail able	Veh icle Under Pass Faci lity	Functioni ng of Traffic Signals	Tra ffi c in Peak Hours (High/ Low)	Geometric Correction Required	Pro ble ms of Ha wke rs on Jun ctio n	Enc roch men t	Under the Jurisdi ction of PS
1.	T- Point PAP	3	Nil	Nil	Yes	Yes	Good	8 am to 8 pm (High)	Required in the Flyover from Ludhiana to Amritsar	Mod erat e	No	PS Cantt
2.	BSF Chownk	3	Nil	Nil	Yes	No	Moderate (Timer not Functioni ng Properly)	8 am to 8 pm (High)	Not Required	Mod erat e	No	PS New Barada ri
3.	Flour Mill Chownk	4	Nil	Yes	Yes	No	Moderate (Timer not Functioni ng Properly)	8 am to 8 pm (High)	Not Required	Nil	No	PS New Barada ri
4.	BMC Chownk	5	Nil	Yes	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	No	PS New Barada ri
5.	Guru Nanak Mission Chownk	4	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Mod erat e	No	PS Div No. 4
6.	Patel Chownk	4	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	No	PS Div No. 2
7.	Manbro Chownk	4	Nil	Nil	Yes	No	Good	Norm al	Not Required	Nil	No	PS Div No. 6
8.	Adarsh Nagar Chownk	4	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	No	PS Div No. 4
9.	Geeta Mandir Chownk	4	Nil	Nil	Yes	No	Good	8 am to 10 pm (High)	Not Required	Nil	No	PS Div No. 6
10.	Ravidas Chownk	4	Nil	Nil	Yes	No	Good	8 am to 8 pm	Not Required	Mod erat e	Yes	PS Bhargo Camp

								(High)				
1 1.	Maqsuda n Chownk	3	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	No	PS Div No. 1
1 2.	Pathanko t Chownk	4	Nil	Nil	Yes	Yes	Good	8 am to 8 pm (High)	Not Required	Mod erat e	No	PS Div No. 8
1 3.	Bus Stand Junction	4	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Hig h	No	PS Div No. 7
1 4.	Lama Pind Chownk	4	Nil	Nil	Yes	Yes	Good	8 am to 8 pm (High)	Not Required	Mod erat e	No	PS New Barada ri
1 5.	Kishan Pura Chownk	4	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	No	PS Div No. 3
1 6.	GPO Chownk	3	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	No	PS New Barada ri
1 7.	Basti Adda Chownk	4	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	No	PS Div No. 2
1 8.	PNB Chownk	3	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	No	PS Div No. 4
1 9.	Worksho p Chownk	4	Nil	Nil	Yes	No	Good	8 a m to 8 pm (High)	Not Required	Mod erat e	No	PS Div No. 2
2 0.	Nakodar Chownk	4	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	Yes	PS Div No. 4
2 1.	Kapurtha la Chownk	4	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Mod erat e	No	PS Div No. 2
2 2.	Football Chownk	4	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	No	PS Div No. 2
2 3.	Samra Chownk	4	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	No	PS Bhargo Camp
2 4.	Model Town Mkt. Chownk	3	Nil	Nil	Yes	No	Good	Norm al	Not Required	Nil	No	PS Div No. 6
2 5.	Urban Estate Phase 2	4	Nil	Nil	Yes	No	Good	Norm al	Not Required	Nil	No	PS Div No. 7
2 6.	T- Point Sodal Mandir	3	Nil	Nil	Yes	No	Good	8 am to 8 pm (High)	Not Required	Nil	Yes	PS Div No. 8
2 7.	Chun Mun	4	Nil	Nil	Yes	No	Good	Norm al	Flyover is under Construction	Nil	No	PS Div No. 6

	Chownk											
28.	Rama Mandi Chownk	4	Nil	Nil	No	Yes	Nil	8 am to 9 pm (High)	Not Required	Mod erate	Yes	PS Rama Mandi
29.	Alaska Chownk	3	Nil	Nil	No	No	Nil	Normal	Not Required	Nil	Yes	PS New Baradari

Source: Primary Survey (Field Survey)

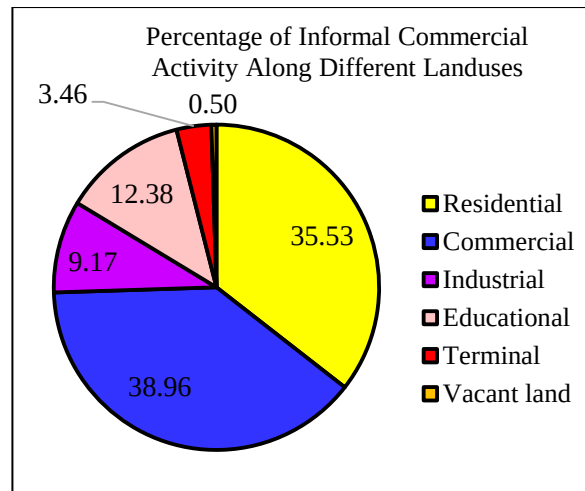


Map No. 2 : Directional Map of Jalandhar City.

Source: Prepared by author itself from Jalandhar LAP & PLU plan (2009-2031).

3.1. Effect of Haphazard and Unplanned development of Commercial areas in expansion of Crime:

According to surveyed data by using sampling method, the data of 725 numbers of informal vendors are used as in the various markets of Jalandhar City. The Jalandhar City areas is mainly divided into six zones, named as central core region, central periphery, north core area, northern periphery, southern area, western area (Refer map 2). Certain important land-use characteristics of the different areas of Jalandhar City were also explored along the path of this informal sector. Mushrooming of these informal business markets has been observed in and around trade, education, residential, cultural, etc. This mushrooming of informal sector effect the traffic problems in the city by their haphazard activities.



Pie Chart 1: Surrounding land use around informal activities along roadside
Source: Primary Survey

These vendors are mainly the major cause of creation of bottle necks or create different hindrances in the mobility pattern on the major roads like as Rama Mandi to Hoshiarpur State highway etc. These vendors are present in all types of land use areas in Jalandhar City. There are many small to large scale of accidents are occurring almost every day due to the haphazard growth and unplanned informal development by these vendors. They also use to encroach the areas along different hierarchy of roads in Jalandhar City, which also cause the formation of bottle necks on major roads and other hindrances, which may cause accidents and other traffic related problems shown in the figure no.3 as given below:

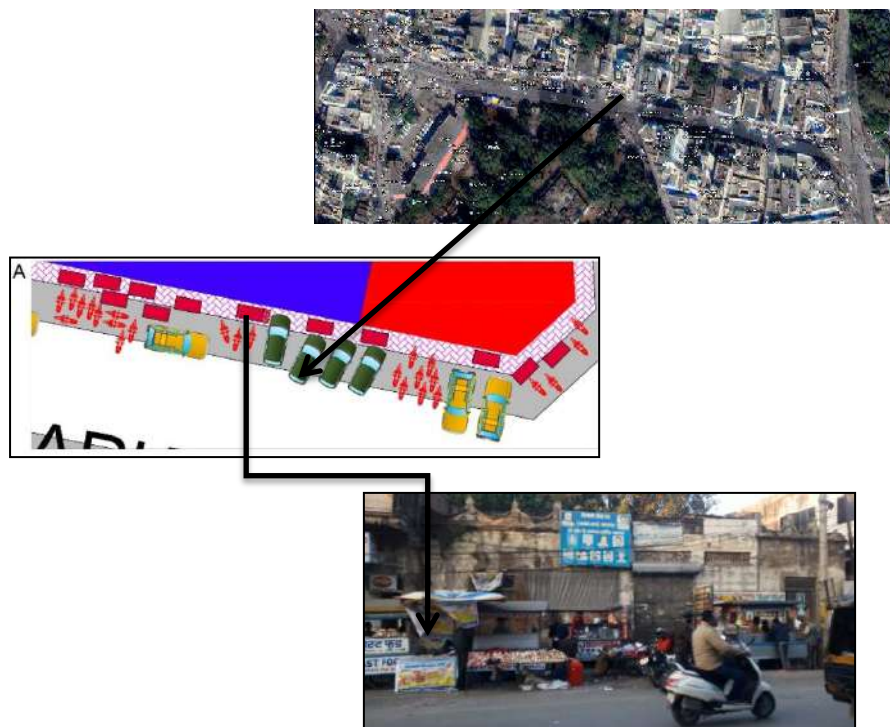


Figure No. 3: Nehru garden to Jyoti Chowk stretch (Encroachment by the haphazard growth of informal vendors on major road)

Comparative analysis was carried out between different areas that were identified and further different land uses were also considered and comparative analysis was carried out by showing that the vendors along the roads and carriage ways in different areas or hot spots or in the residential and commercial land use as showing in pie chart 1. These informal activities create hurdles in the smooth mobility and accessibility in different areas or major places in the city like as Jyoti chownk, Rama Mandi and Rainak bazar etc.

3.2. Major Crime Affected Areas in Different Police Stations in Jalandhar Commissionerate:

In table no. 2, it basically shows the issues with different Police stations in Jalandhar Commissionerate due to which certain hindrances were occurred in the duties of the police force of different police stations in Jalandhar Commissionerate while controlling the criminal activities in the areas or specific locations. Like as in police station division no. 5, the most crime affected areas are Basti Danishmanda and Basti Sheikh, which are hard to investigate during searching operations by the police force. The physical built up around the most crime affected areas are like as slum area, residential area and Vacant land. In police station division no. 6, the most crime affected areas are Main model town area and main road near Guru Gobind Singh stadium, which are hard to investigate during searching operations by the police force. The physical built up around the most crime affected areas are like as commercial area, residential area and recreational area in police station division no. 6. The physical built up around the most crime affected areas in police station division no. 7 are like as commercial area, residential area and small rural area. The most crime affected areas are ISBT Bus stand area, Khurla Kingra and Garha area. The most crime affected areas are Lal Kurti area and Main Dushehra ground of Cantt, mainly the Lal Kurti areas is hard to investigate during searching operations by the police force. The physical built up around most of the crime affected areas in police station Cantt are like as commercial area, residential area and recreational area. In police station Basti Bawa Khel, the most crime affected areas are Basti Bawa Khel residential area and Mithu Basti. The physical built up around the most crime affected areas are like as commercial area, residential area and mixed land use area in police station Basti Bawa Khel. In police station Bhargo Camp, the most crime affected areas are Bhargo camp area, Model House and Kala Sangya road. The physical built up around the most crime affected areas are like as slum area, residential area and Commercial area. The most crime affected areas in police station Sadar are Jamsher khas area and Pholriwal area is hard to investigate during searching operations by the police force. The physical built up around most of the crime affected areas in police station Sadar are like as commercial area, residential area and rural areas.

Table no. 2: Major Crime Affected Areas in Different Police Stations in Jalandhar Commissionerate													
Police Station	Crime Affected Areas			Areas Hard to Investigate		From Where Police Get Help During Emergency			Physical Built up in most of the crime locations.			Distance of Fire brigade office from PS	Distance of Civil Hospital from PS
	1	2	3	1	2	1	2	3	1	2	3		
Division No. 5	Basti Danishmand		Basti Sheikh	Basti Sheikh	Basti Danish manda	Police Line	Police Control Room		Slum Area	Residential Area	Vacant Land	5.3 KM	3.3 KM
Division No. 6	Main Model Town Area	Near Guu Gobind Singh stadium Area		Nil	Nil	Police Line	Police Control Room		Commercial Area	HIG & MIG Residential Area	Recreational Area	3.9 KM	2.9 KM
Division No. 7	Bus Stand	Khurla Kingra	Garha	Nil	Nil	Police Line	Police Control Room		Residential Area	Small Rural Area	Commercial Area	6.3 KM	6.2 KM
PS Cantt	Lal Kurti NH 1	Dushehra Area	Lal Kurti Area	Nil		Police Line	Police Control Room		Residential Area	Commercial Area	Recreational Area	6.7 KM	7.5 KM
PS Basti Bawa Khel	Mithu Basti	Basti Bawa Khel	Basti Bawa Khel Main	Mithu Basti		PS Division No. 5	Police Line	PS Bhargo Camp	Mixed Land Use	Commercial Area	Residential Area	4.2 KM	2.2 KM
PS Bhargo Camp	Bhargo Camp	Model House	Kala Sangyan Road	Main Bhargo Camp	Model House	Police Line	Sub Division		Slum Area	Residential Area	Commercial Area	4.4 KM	2.3 KM

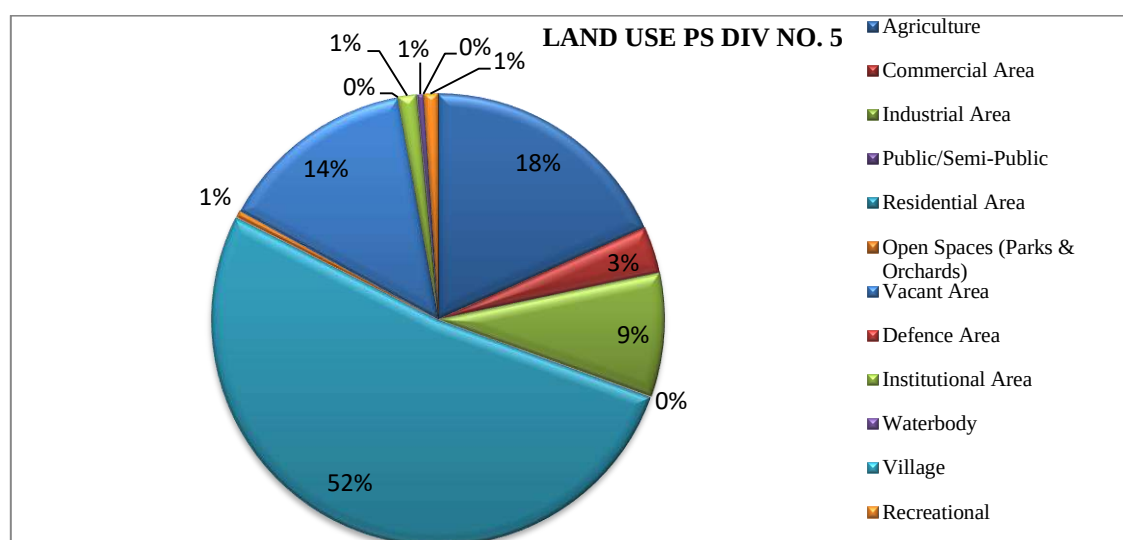
PS Sadar	Jamsher Khas	Pholriw al	Nil	Nil	Police Line	Police Control Room	Residential	Agricultural	Commercial Area	17 KM	12 KM
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Source: Primary Survey (Field Survey)

4. Jalandhar Commissionerate (Police Stations in City-2 Jurisdiction):-

4.1 Police Station Division No. 5:-

The PS Div No. 5 area is situated at West direction as geographical direction on Jalandhar Commissionerate Map. The existence features regarding PS Division no. 5 had given in above table no.2. In this area the residential area is more, which is near to 52 % of total area as shown in pie chart no. 2 and second is agriculture area which is near to 18% under the jurisdiction of PS division no. 5.



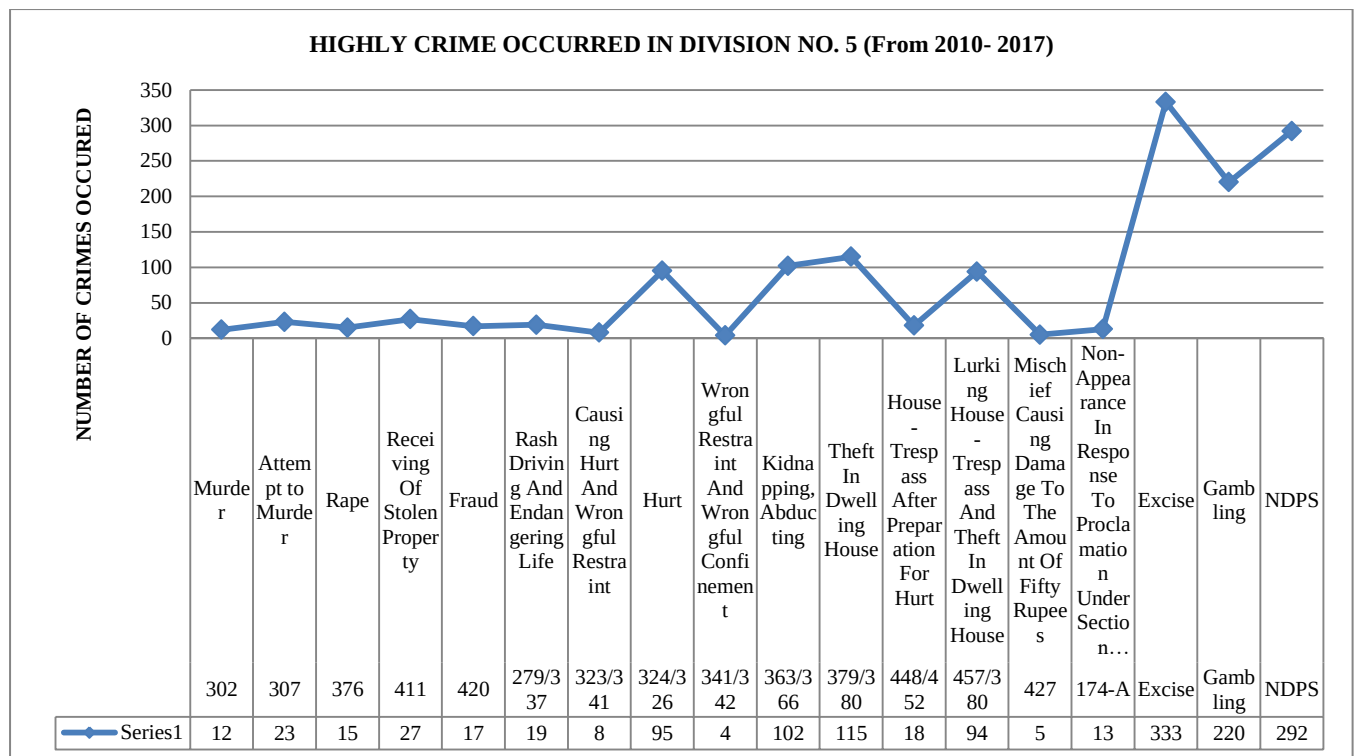
.Pie Chart 2: - Shows the different Land Use of PS DIV No. 5 in Jalandhar Commissionerate.

Source: - Primary Calculation from Jalandhar Commissionerate Data.

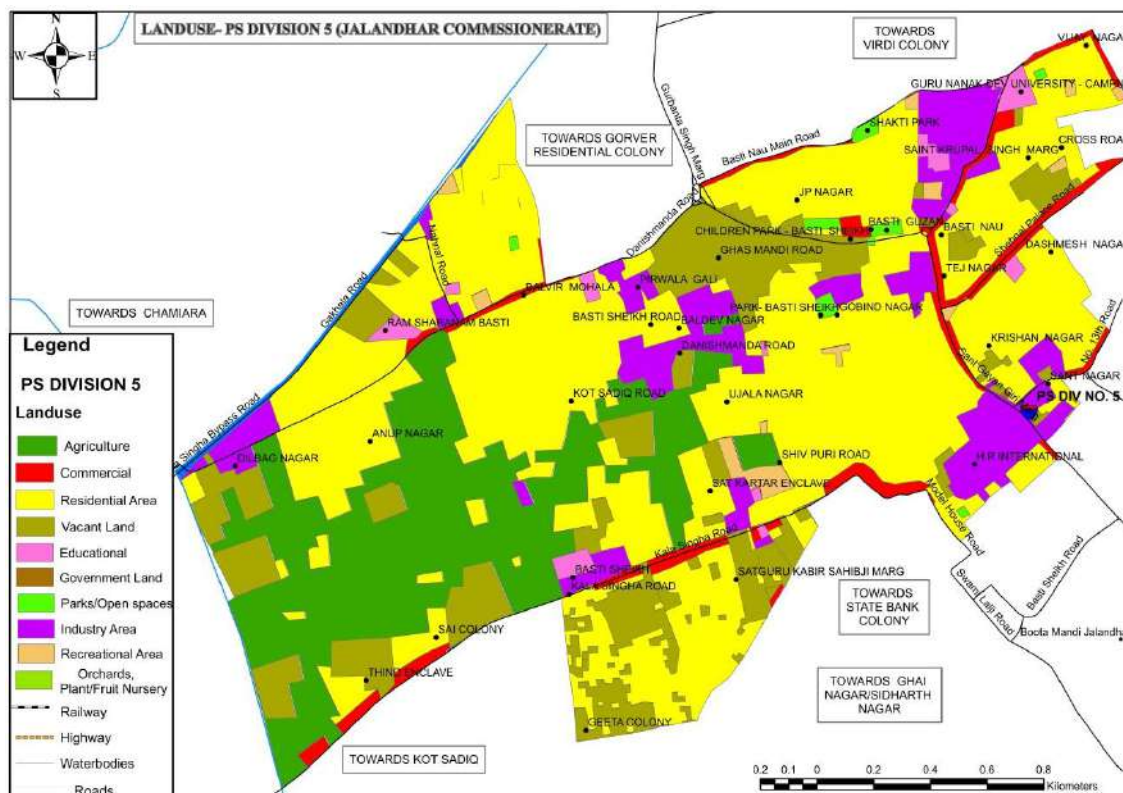
Mainly the crimes related to NDPS, theft in dwelling houses, Gambling, Excise, Kidnapping and Hurt are high in numbers as shown in line graph 4. This area is partially planned area and the presence of open space of agriculture land and vacant space near the residential area used by the drug addicts for taking drugs and even drug sellers use to sell their drugs in these places because of less movement of the police cops and peoples in this type of places.

Even there is an haphazard development in the areas of Basti Sheikh and Basti Danishmanda with narrow streets in many locations, which tends to increase the chances of crime in these areas and even these types of narrow streets areas provide safe shelters to the offenders, criminals or snatchers from Police cops because of less chances to enter the four wheelers or two wheelers vehicles of police cops in these areas.

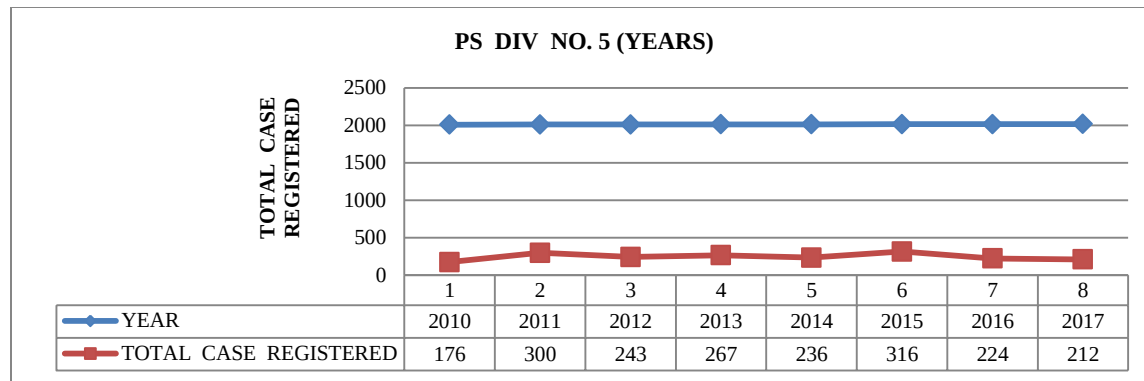
There is an also very haphazard and narrow street residential development is present in the Gobind nagar area and Tej Mohan area, this type of development also increase the chances of Hurt and attend to murder type of crimes in the areas because of less movement of patrolling unit of PCR or police cops in this type of areas, which give easy way to the offenders and criminals to run or escape just after the criminal activities. There is a most of the LIG population and illiterate peoples are used to reside in these Basti sheikh and Basti Danishmanda along with its neighbouring areas, due which some of these peoples are more indulge in criminal activities. Due to the some major roads passes through this area, the cases related to excise are occurred in this area. There is a less planned development in this area and lack of employment opportunities in this area with lack of good educational environment and adjoining rural areas like as Kala Sangya village & others, the cases of theft in dwelling houses are more in this area. Many offenders from neighbouring areas and some main nearest crime affected locations used to do theft in dwelling house in this area on large scale. Due to narrow streets and less develop infrastructure most of the areas and streets in this areas are without the street lights and even other useful infrastructure in this area tends to increase the theft cases in this area. But the crime cases are continuously decreases in this area even after the year 2015 as shown in line graph 5.



Line Graph 4: Shows the highly crimes occurred in PS Div. No. 5 of the Jalandhar Commissionerate
Source: - Primary Calculation from Jalandhar Commissionerate.



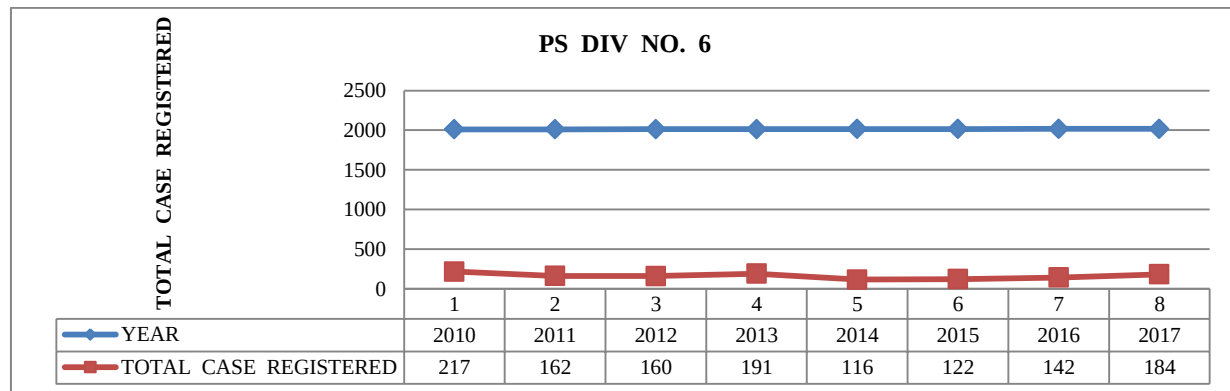
Map 3: Land Use of PS Division 5
Source:- Google Earth & Know Your police App



*Line Graph 5:- Total No. of case registered in DIV No. 5 (From Feb 2010 to Dec 2017).
Source: - Primary Calculation from Jalandhar Commissionerate Data.*

4.2. Police Station Division No. 6:-

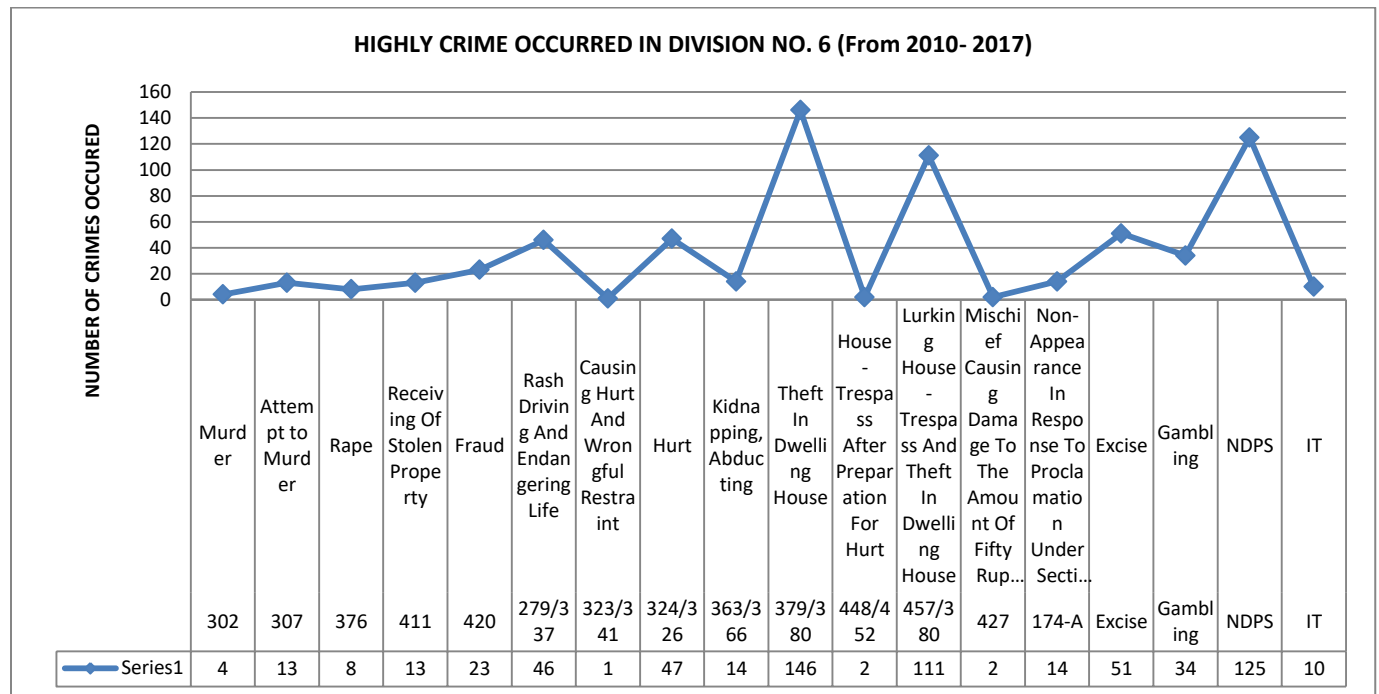
The PS Div No. 6 area is situated at South West (towards centre) direction as geographical direction in between PS New Baradari and PS Division no. 7 on Jalandhar Commissionerate Map. The existence features regarding PS Division no. 6 had given in above table no.2. Nearly it has 72 % of total residential area as shown in pie chart no. 3.



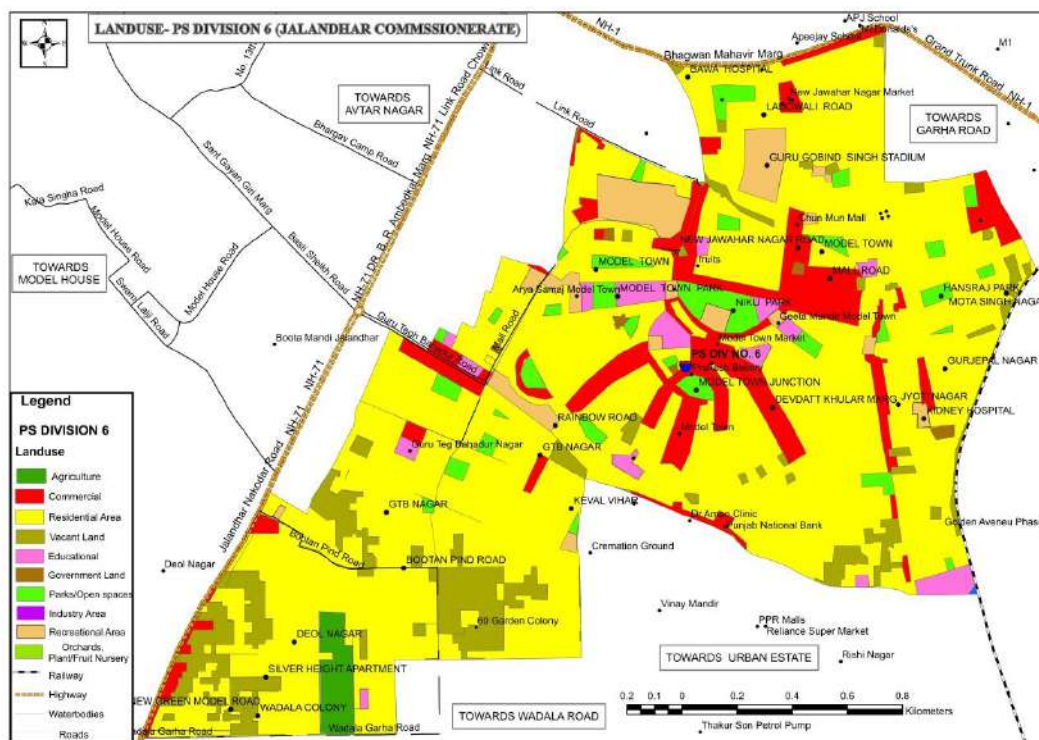
*Line Graph 6:- Total No. of case registered in DIV No. 6 (From Feb 2010 to Dec 2017)
Source: - Primary Calculation from Jalandhar Commissionerate Data.*

Mainly the crimes related to NDPS, theft in dwelling houses, Excise, Rash driving cases and Hurt are high in numbers as shown in line graph 7. The most of the part in this area is well planned area with high attraction of Commercial area of Model Town and HIG residential area like as GTB Nagar. The presence of Parks and recreational areas like as Nikku Park, Prithavi Planet and Guru Gobind Singh Stadium also have great attraction for the tourists in this area. The physical built up like as vacant space near the residential area and Commercial area is in high percentage in this area. Mostly the road infrastructure is good in this area as compare to the other areas under Jalandhar Commissionerate, which mostly includes the wide roads with proper functioning of street lights in the streets and in commercial area main Model town. Due to wide roads, some people use to do two wheeler and four wheeler racing on those roads and some peoples are used to do fast driving of their vehicles during night, which resulted the more accidents and rash driving cases in Model Town area, Near GTB Nagar and even near to Prithavi planet. Due to the presence of vacant plots and green spaces near Garden colony and Bootan pind in vicinity of residential areas tends to increase the chances of thefting cases and NDPS cases in the areas because offenders basically use these vacant places for their group meetings and for preparation of plans for theft in the dwelling units and to get drunk and for taking drugs. Due to the existence of night restaurants and bars in the areas, the cases of

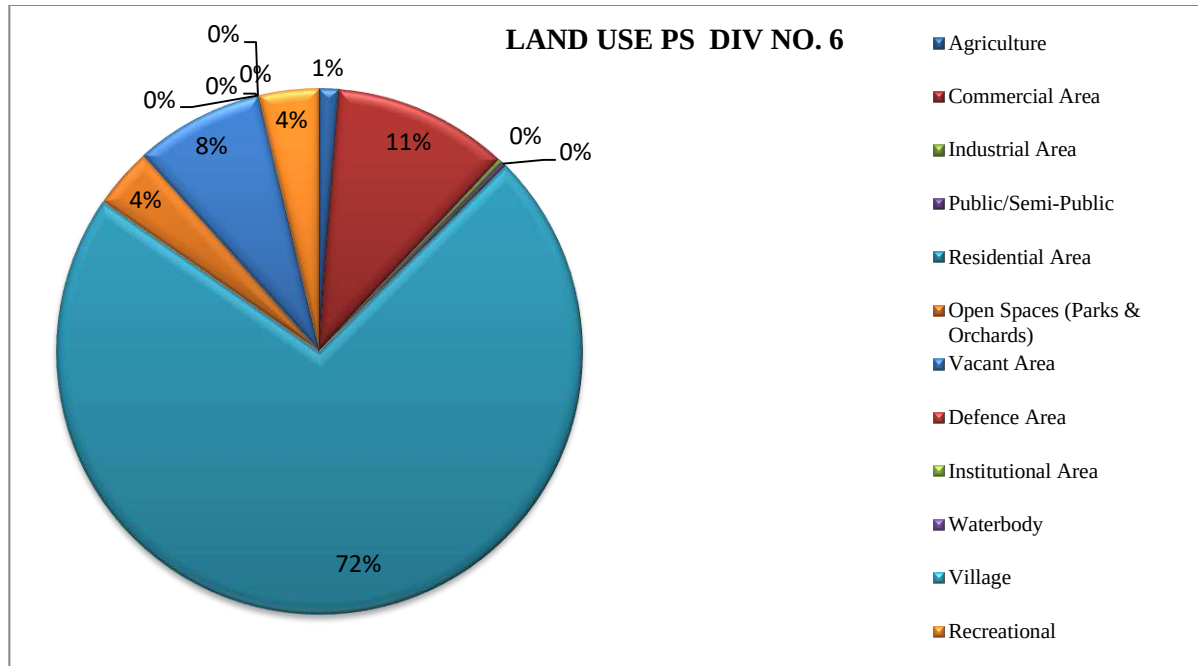
hurt are increases. The cases of different types of crimes are increased in year 2017 as compared to year 2015 and year 2016 as shown in line graph 7.



Line Graph 7: Shows the highly crimes occurred in PS Div. No. 6 of the Jalandhar Commissionerate
Source: - Primary Calculation from Jalandhar Commissionerate Data.



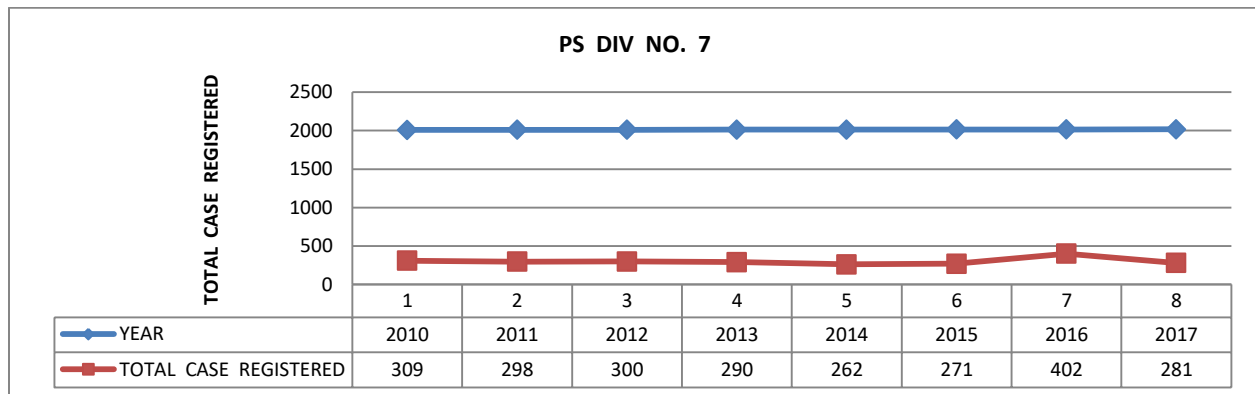
Map 4: Land Use of PS Division 6.
Source: - Google Earth & Know Your police App.



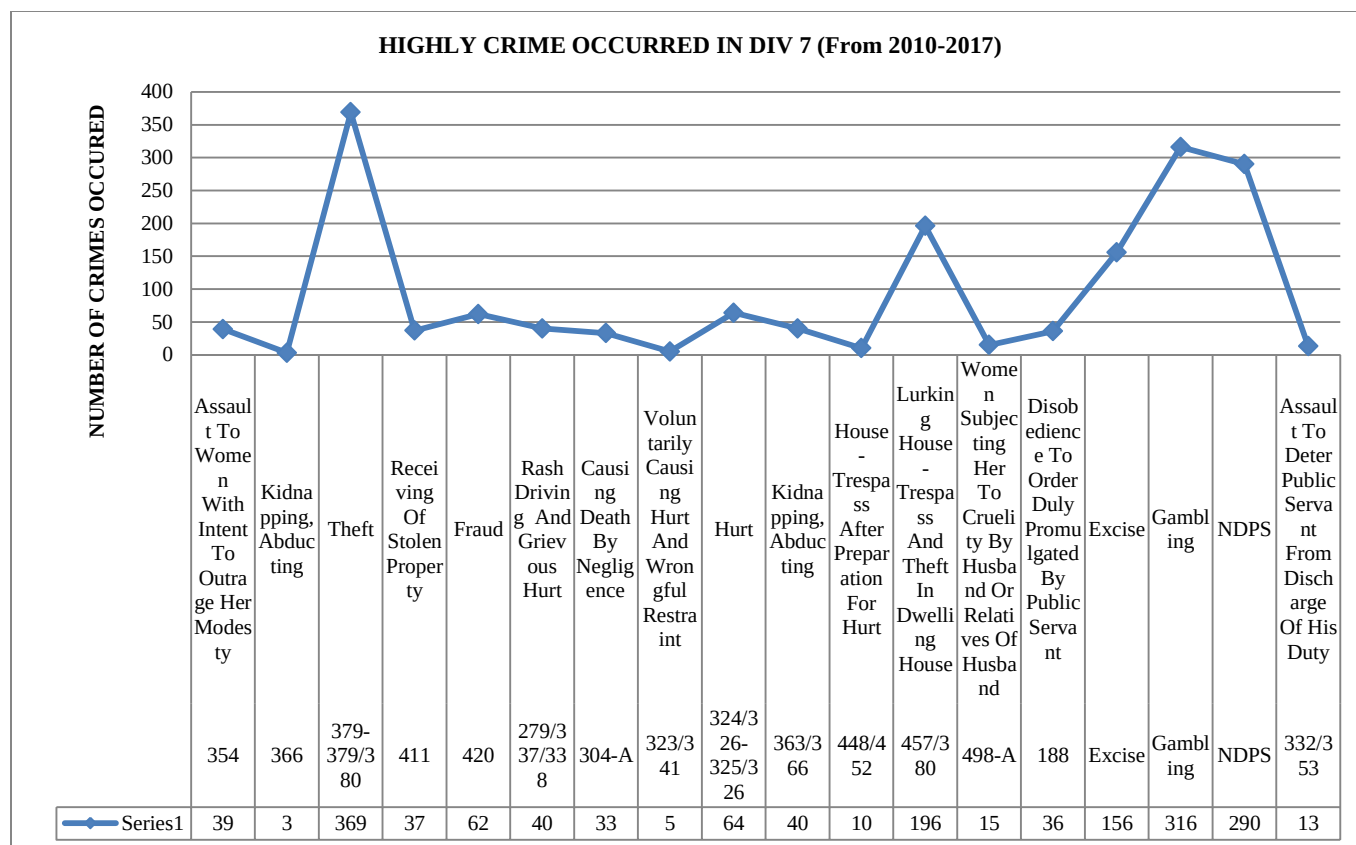
*Pie Chart 3: - Shows the different Land Use of PS DIV No. 6 in Jalandhar Commissionerate
Source: - Primary Calculation from Jalandhar Commissionerate Data.*

4.3. Police Station Division No. 7:-

The PS Div No. 7 area is situated at South West direction in between PS Div No. 6 and PS Sadar as geographical direction on Jalandhar Commissionerate Map. The existence features regarding PS Division no. 7 had given in above table no.2 In this area the residential area is more, which is near to 66 % of total area as shown in pie chart no. 4.



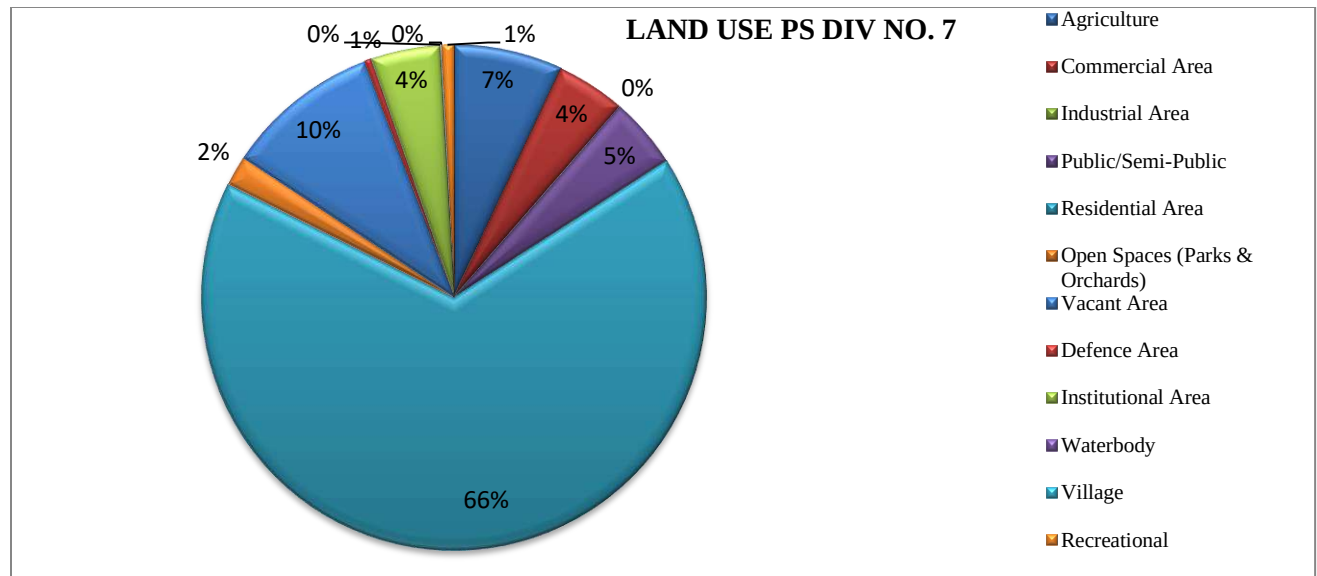
*Line Graph 8:- Total No. of case registered in DIV No. 7 (From Feb 2010 to Dec 2017)
Source: - Primary Calculation from Jalandhar Commissionerate Data.*



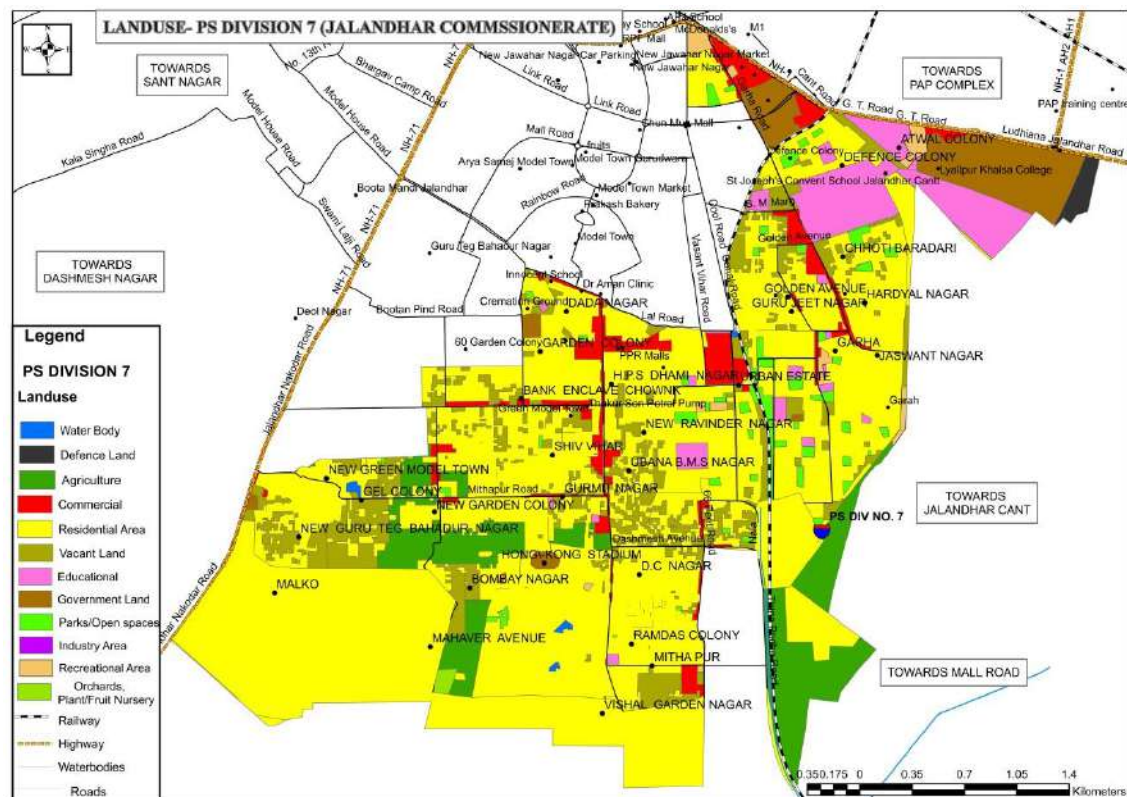
Line Graph 9: Shows the highly crimes occurred in PS Div. No. 7 of the Jalandhar Commissionerate
Source: - Primary Calculation from Jalandhar Commissionerate Data.

Mainly the crimes related to NDPS, theft in dwelling houses, Excise, Rash driving cases, Gambling, Kidnapping and Hurt are high in numbers as shown in line graph 9. The most of the part in this area is well planned area with high attraction of Commercial area of Urban Estate Phas1 & 2 along with its HIG & MIG residential area adjoining with Garha commercial market and village Sabana. The presences of Hi-Fi Commercial areas like as PPR Mall and Chotti Baradari also have great attraction for the tourists in this area. This area also have three big and popular PIIMS hospital, SGL Charitable hospital and Kidney hospital, which make this area as a hub of medical care hospitals. This area also has the ISBT bus stand and institutional areas like as Lyallpur Khalsa College for women and St. Joseph Convent School. The existences of parks are also in large numbers in the vicinity of residential areas. Mostly the road infrastructure is good in this area as compare to the other areas under Jalandhar Commissionerate, which mostly includes the wide roads with proper functioning of street lights in the streets and in commercial areas.

Due to wide roads, some people use to do two wheeler and four wheeler racing on those roads and some peoples are used to do fast driving of their vehicles during night, which resulted the more accidents and rash driving cases in Urban estate phase 1 & 2, Chotti Baradari, Jawahar nagar and Atwal colony. Due to lack of road infrastructure and over encroachments along the from Bus stand to Chotti Baradari road and lack of traffic audits near bus stand increase the chances of accidents in this area. Due to the existence of night restaurants and bars in the commercial areas of Chotti Baradari, the cases of hurt are increases. The cases of different types of crimes are increased in year 2016 but decreased in the year 2017 as shown in line graph 8.



Pie Chart 4: - Shows the different Land Use of PS DIV No. 6 in Jalandhar Commissionerate



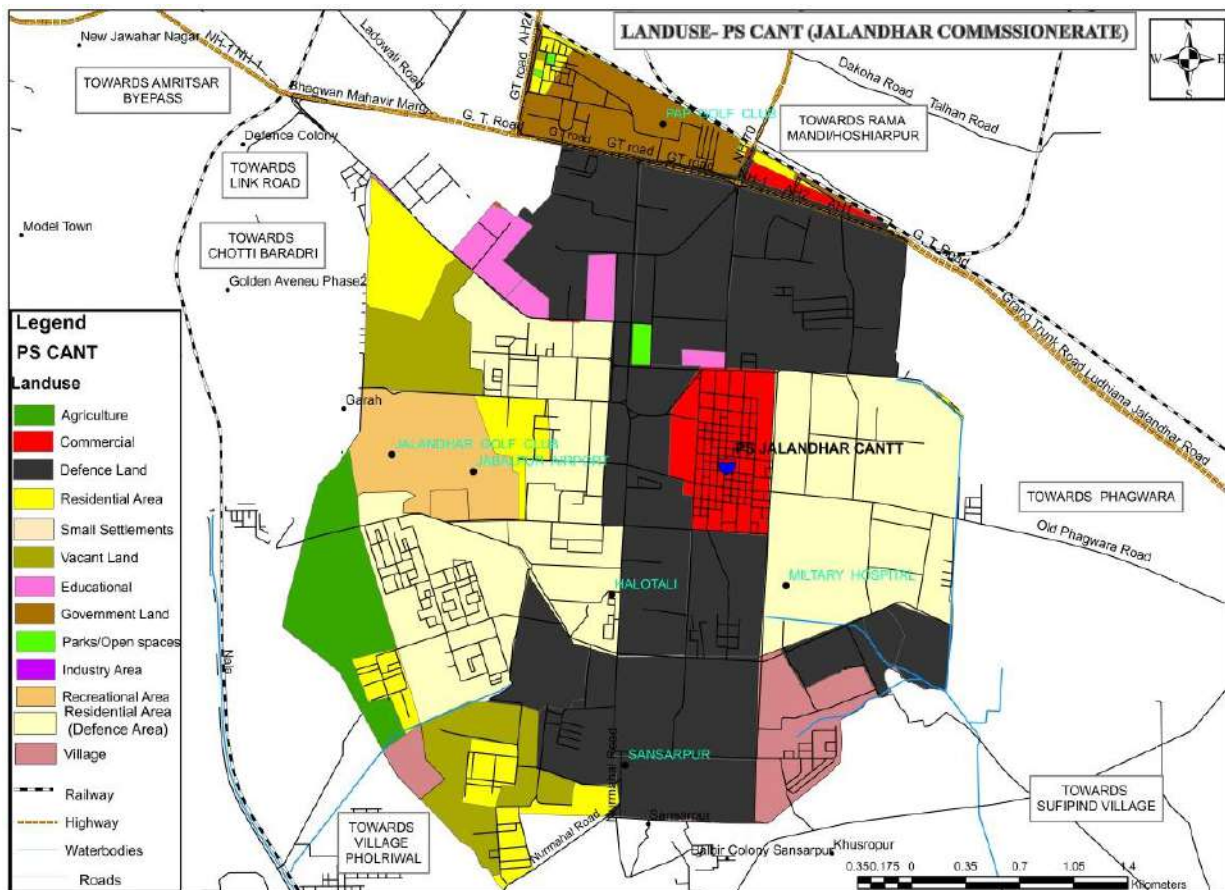
Map 5: Land Use of PS Division 7
Source:- Google Earth & Know Your police App

4.4. Police Station Cantt:-

The PS Cantt area is situated at South East (towards centre) direction as geographical direction on Jalandhar Commissionerate Map. The existence features regarding PS Cantt had given in above table no.2.

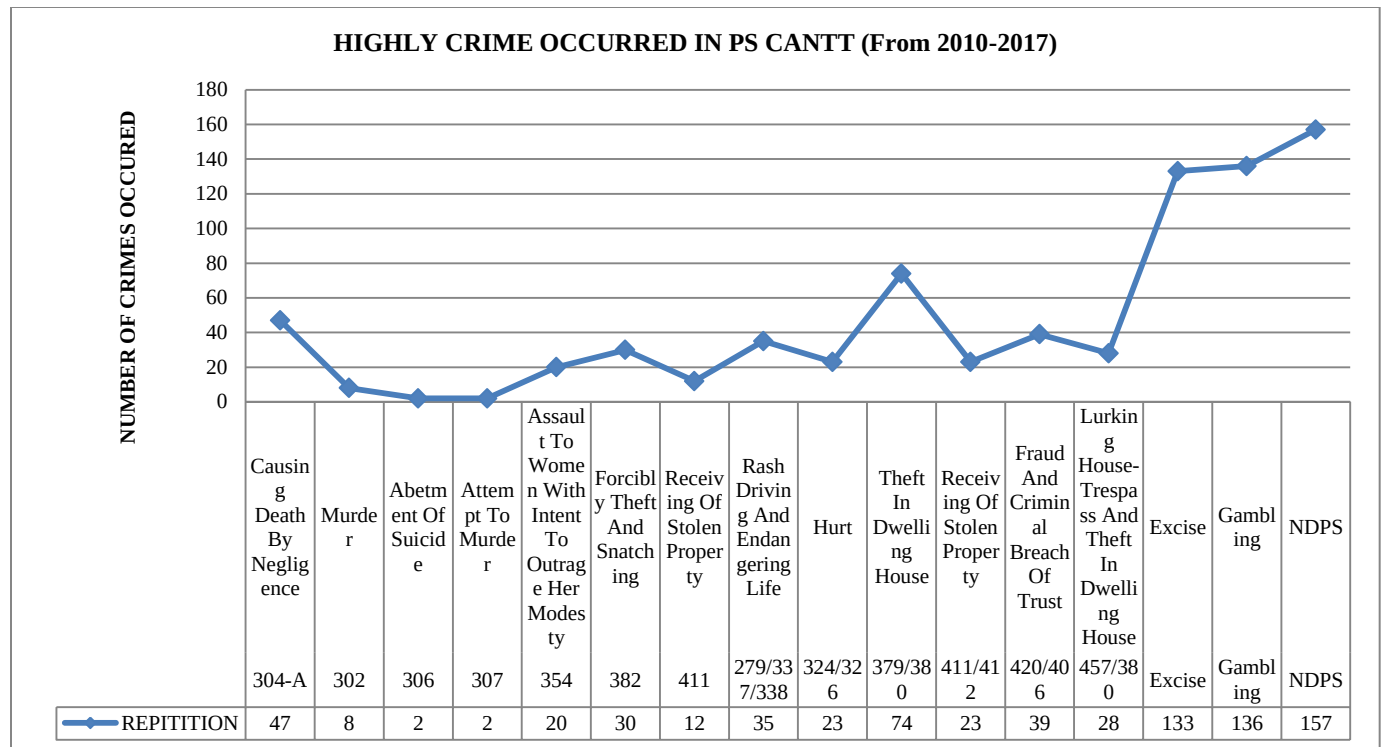
In this area the commercial area is more, which is near to 38 % of total area. The residential area (Defence/Government residential area) is mainly near to 27 % (shown in pie chart: 4).

Mainly the crimes related to NDPS, theft in dwelling houses, Excise, Rash driving cases, Gambling, Fraud and Hurt are high in numbers as shown in line graph 10. The most of the part in this area is Defence area with high attraction of Commercial area of Jalandhar Cantt. There are many parks are present in this area along with the army residential quarters and PAP (Punjab Armed Police) residential quarters. PAP is famous for hi-tech sports grounds for most of the sports events and Golf course. Mostly the road infrastructure is fair in this area as compare to the other areas under Jalandhar Commissionerate, which partially wide roads with proper functioning of street lights in the streets. The commercial areas have encroachments by the shopkeepers by shifted their shops beyond their actual boundaries. The cases of different types of crimes are increased in year 2012 and 2013 but decreased in the year 2016 and again increased in 2017 as shown in line graph 11.

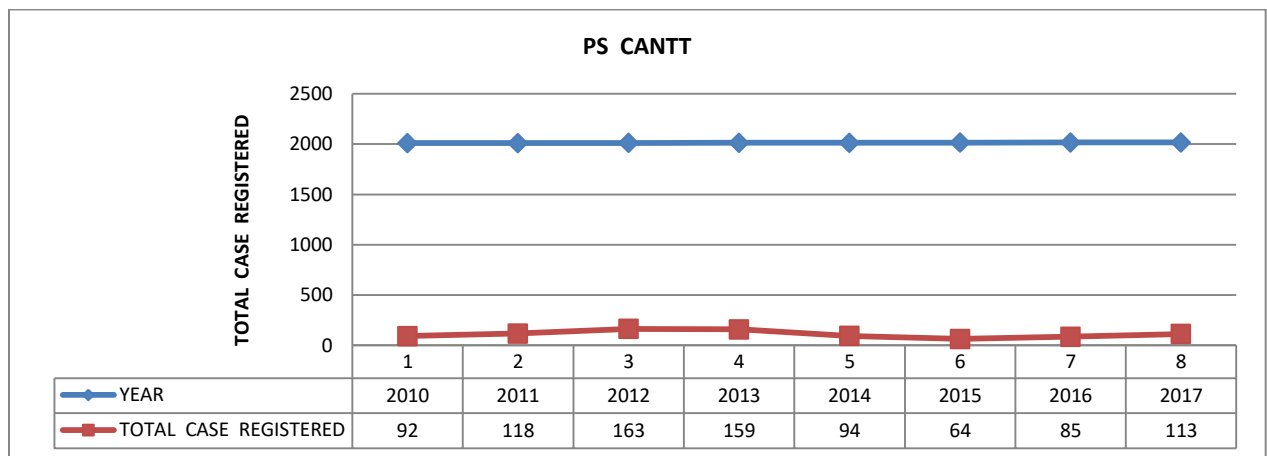


Map 6: Land Use of PS Cantt

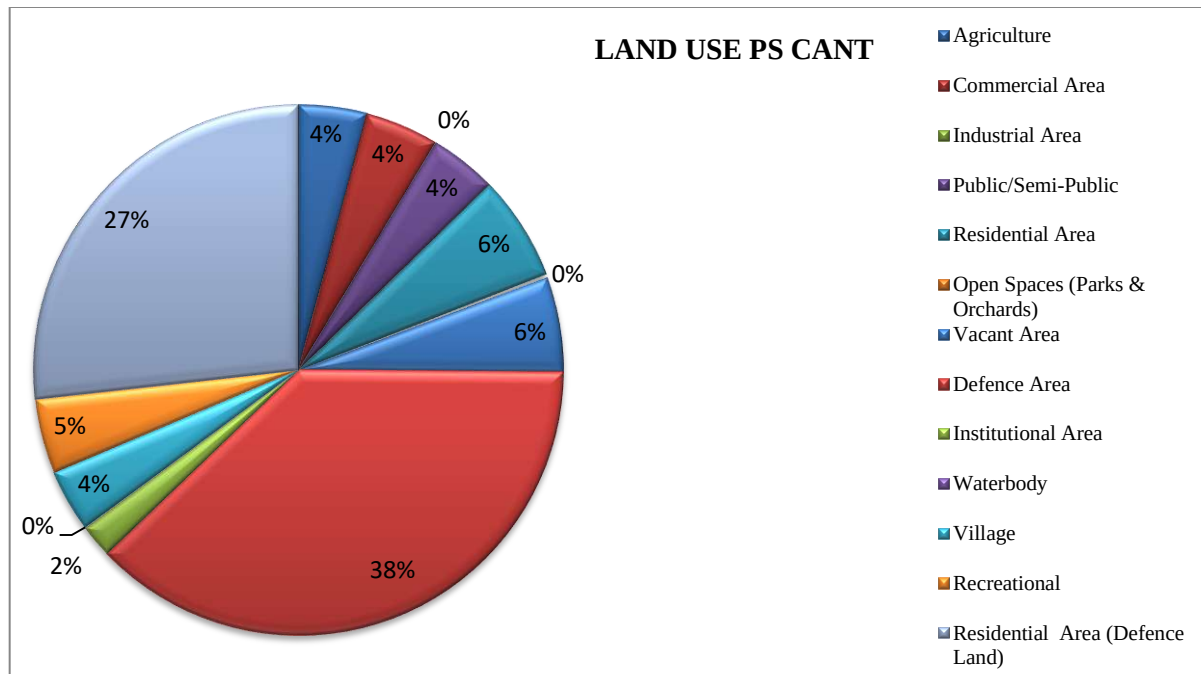
Source:- Google Earth & Know Your police App.



Line Graph 10: Shows the highly crimes occurred in PS Cantt of the Jalandhar Commissionerate
Source: - Primary Calculation from Jalandhar Commissionerate Data.



Line Graph 11:- Total No. of case registered in PS Cantt (From Feb 2010 to Dec 2017)
Source: - Primary Calculation from Jalandhar Commissionerate Data.



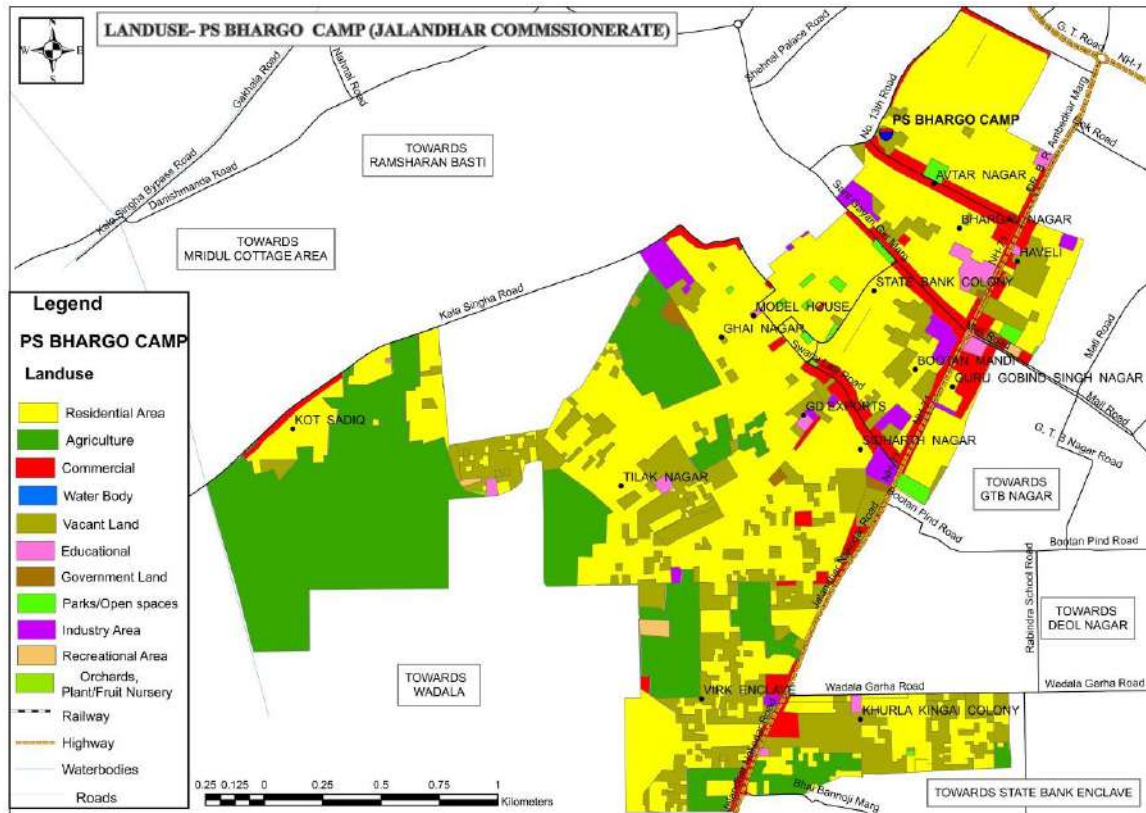
*Pie Chart 5: - Shows the different Land Use of PS Cantt in Jalandhar Commissionerate
Source: - Primary Calculation from Jalandhar Commissionerate Data.*

4.5. Police Station Bhargo Camp:-

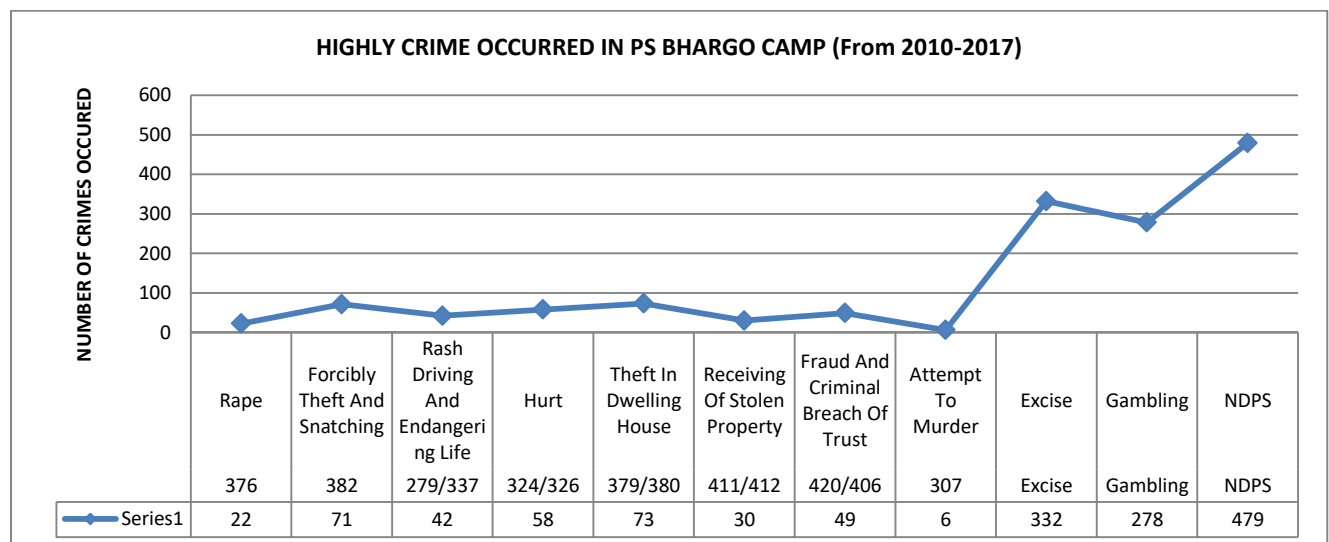
The PS Bhargo Camp area is situated at South West direction in between PS Div. no. 5 and PS Div. No. 7. The existence features regarding PS Bhargo Camp had given in above table no.2. In this area the residential area is near to 15% and Vacant Spaces Covers nearly 25% of total area as shown in pie chart no. 5.

Mainly the crimes related to NDPS, theft in dwelling houses, Excise, Rape, Gambling, Rash driving cases, Fraud and Hurt are high in numbers as shown in line graph 12. The most of the part in this area is not planned area because there is a haphazard development in this area. This area has. The cases of different types of crimes are increased in year 2012 but decreased in the year 2017 as shown in line graph 13. Mainly most of the land has vacant in this area as residential neighbourhood level. There is a high-crime neighborhoods had a much reduced percentage of housing buildings and a greater percentage of vacant property than low-crime neighborhoods that were demographically comparable and physically adjacent. They also had a much reduced percentage of houses with single families than neighborhoods with low crime. The socioeconomic status of division Bhargo Camp area with surrounding high-crime neighborhoods was smaller than those surrounding low-crime neighborhoods. There are mainly very less population reside in Bhargo Camp area with good education and with good socio economic level in the society. The most of the young population in this area are mainly involve in low wages works, which tends to increase their mind setup towards property crimes and economic crimes like as gambling, NDPS and Excise. It has mainly considerably more blocks with significant thoroughfares and fewer blocks with tiny roads in the neighbourhood level, which tends to increase the chances of crime in the area because of less visibility for general public and police cops on these tiny roads and even these types of areas are hard to investigate and patrolling by the police department. Blocks in neighborhoods with low crime tended are basically more homogeneous, while blocks in neighborhoods with high crime is more in mixed land use. It also has Vacant area integrated with agriculture land use and residential land use area, where the movement of general public and Police is less as compare to main residential areas integrated with commercial area. So due to less public on these places, the offenders use these types of locations for group meetings and doing snatchings with group and also use to do robbery in the near houses from where they could easily escape after the robberies. Due to lack of professional jobs near the

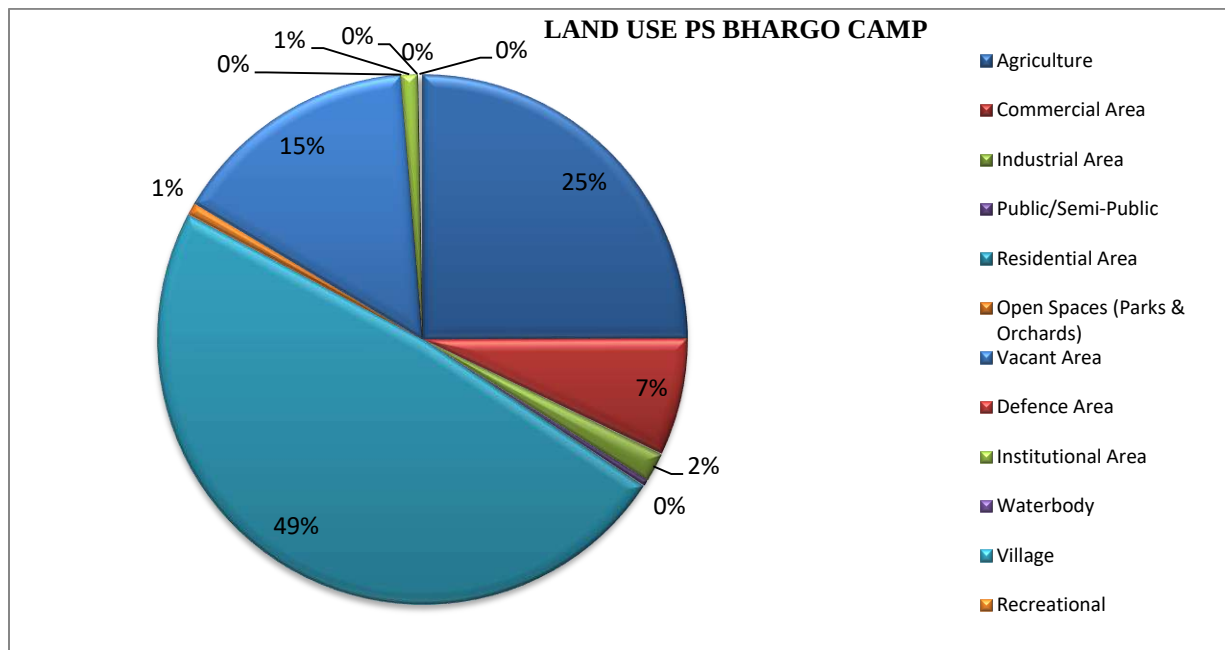
areas and lack of educated population in this area of Bhargo camp, some peoples do the fights and hurt the others on the small debates or tiny things.



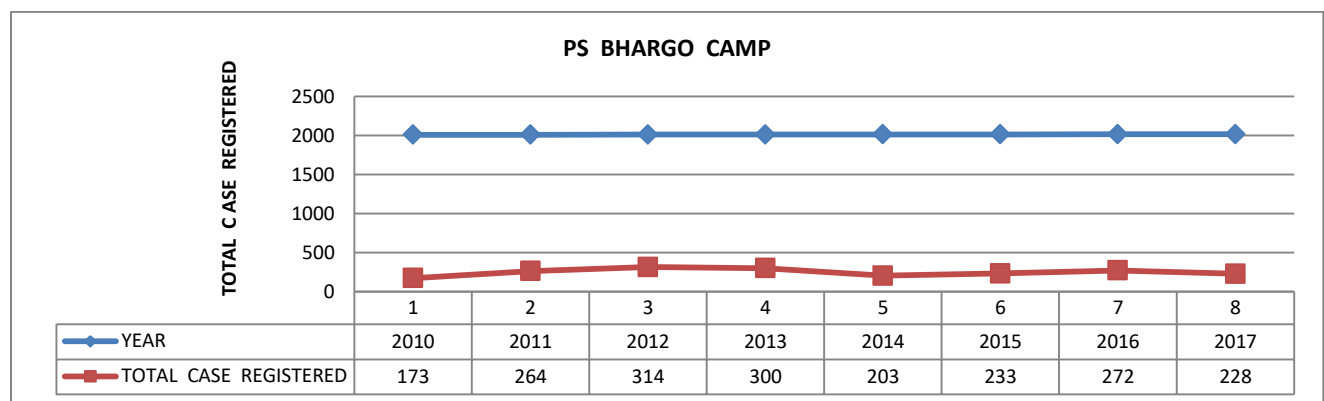
Map 7: Land Use of PS Bhargo Camp
Source:- Google Earth & Know Your police App



Line Graph 12: Shows the highly crimes occurred in PS Bhargo Camp of the Jalandhar Commissionerate
Source: - Primary Calculation from Jalandhar Commissionerate Data.



*Pie Chart 6: - Shows the different Land Use of PS Bhargo Camp in Jalandhar Commissionerate
Source: - Primary Calculation from Jalandhar Commissionerate Data*



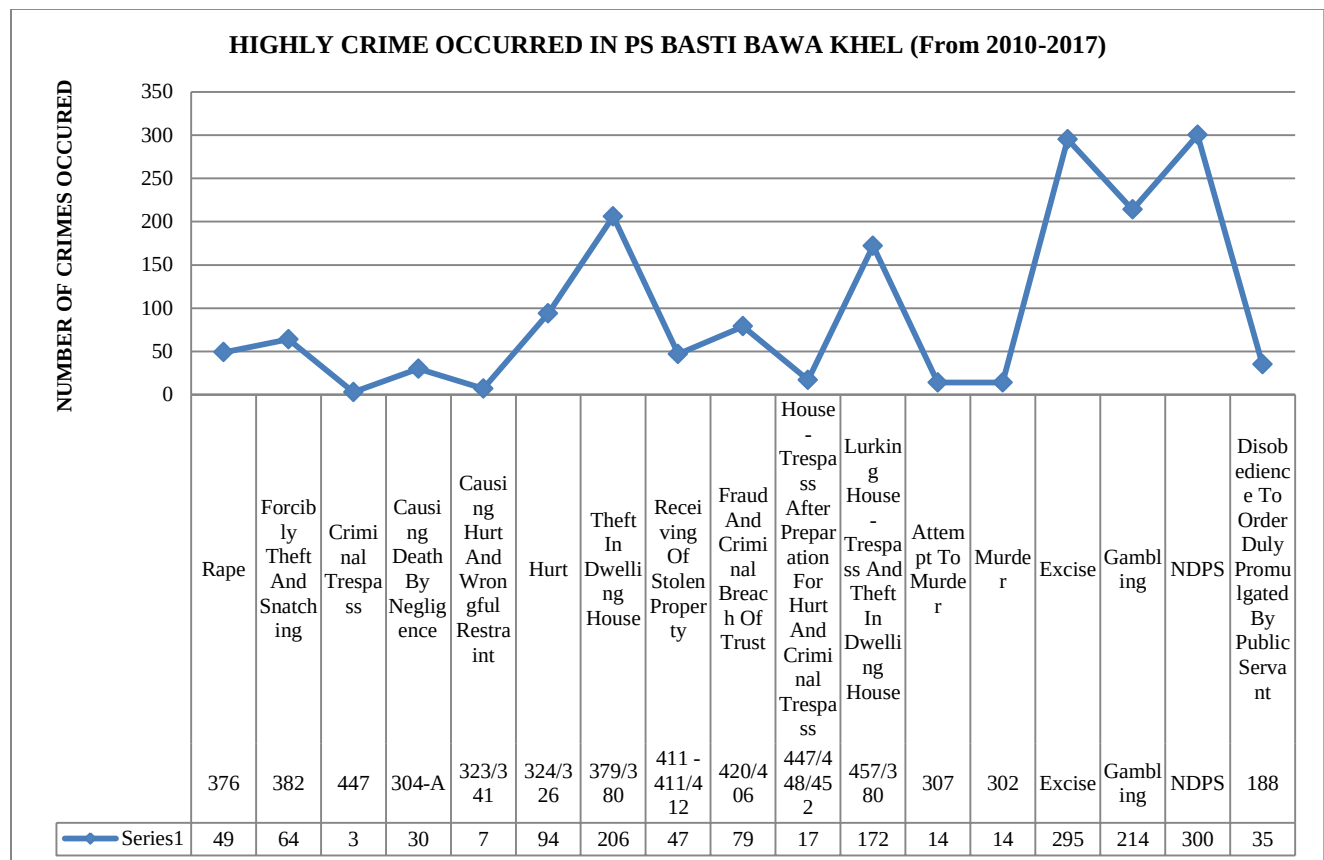
*Line Graph 13:- Total No. of case registered in PS Bhargo Camp (From Feb 2010 to Dec 2017)
Source: - Primary Calculation from Jalandhar Commissionerate Data.*

4.6. Police Station Basti Bawa Khel:-

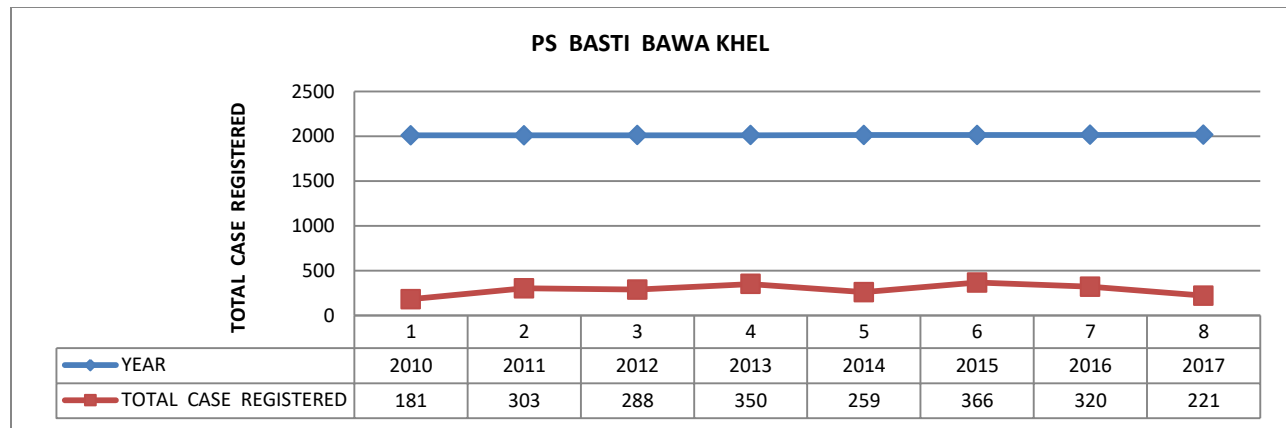
The PS Basti Bawa Khel area is situated at West-West North direction in between PS Div. no. 1 and PS Div. no. 5 as geographical direction on Jalandhar Commissionerate Map. The existence features regarding PS Basti Bawa Khel had given in above table no.2. Under this Police Station the rural area has more in percentage like as 62% and less in commercial areas and urban residential areas. It also includes 9% of Institutional area as shown in pie chart no. 6.

Mainly the crimes related to NDPS, theft in dwelling houses, Excise, Rape, Gambling, Rash driving cases, Fraud and Hurt are high in numbers as shown in line graph 14. The most of the part in this area is not planned area because there is a haphazard development in this area. This area has. The cases of different types of crimes are increased in year 2013 but decreased in the year 2017 as shown in line graph 15. Basti Bawa khel has also small scale and house hold industries with small business areas and blocks. Where the daily

commuters are founded more, who basically come for the job in this area. Mainly some offenders are also use to do robbery in the houses where the house owners & other family members are busy in doing their daily business activities and jobs. Due to existence of industries in this area, the cases of Excise related crimes are more in this division. Offenders or criminals also do kidnapping of the children's, small girls and female labourers, who are basically doing jobs in the industries in this division and many girls was also raped by the criminals after kidnapped them from this area. Many industrial locations and residential areas near to industrial areas had for the police patrolling unit to visited over there on patrolling basis because of narrow streets, which also tends to increase the chances of snatchings, hurt, attempt to murders and theft type of crimes. At the neighborhood level, if there is blended land use with high-volume roads and attractors and non-residential land use, such as shopping streets, in any particular region, as Green market in Jalandhar City, Where the movement of non-residential populations, local commuters for shopping purposes and attractors is more closely related to the inhabitants of the region, the likelihood of certain offences such as snatching and burglaries in this type of place is more due to the connection between physical builtup and crime level. The open spaces and vacant plots are also tends to increase the chances of illegal activities or their possibilities in different land use areas.

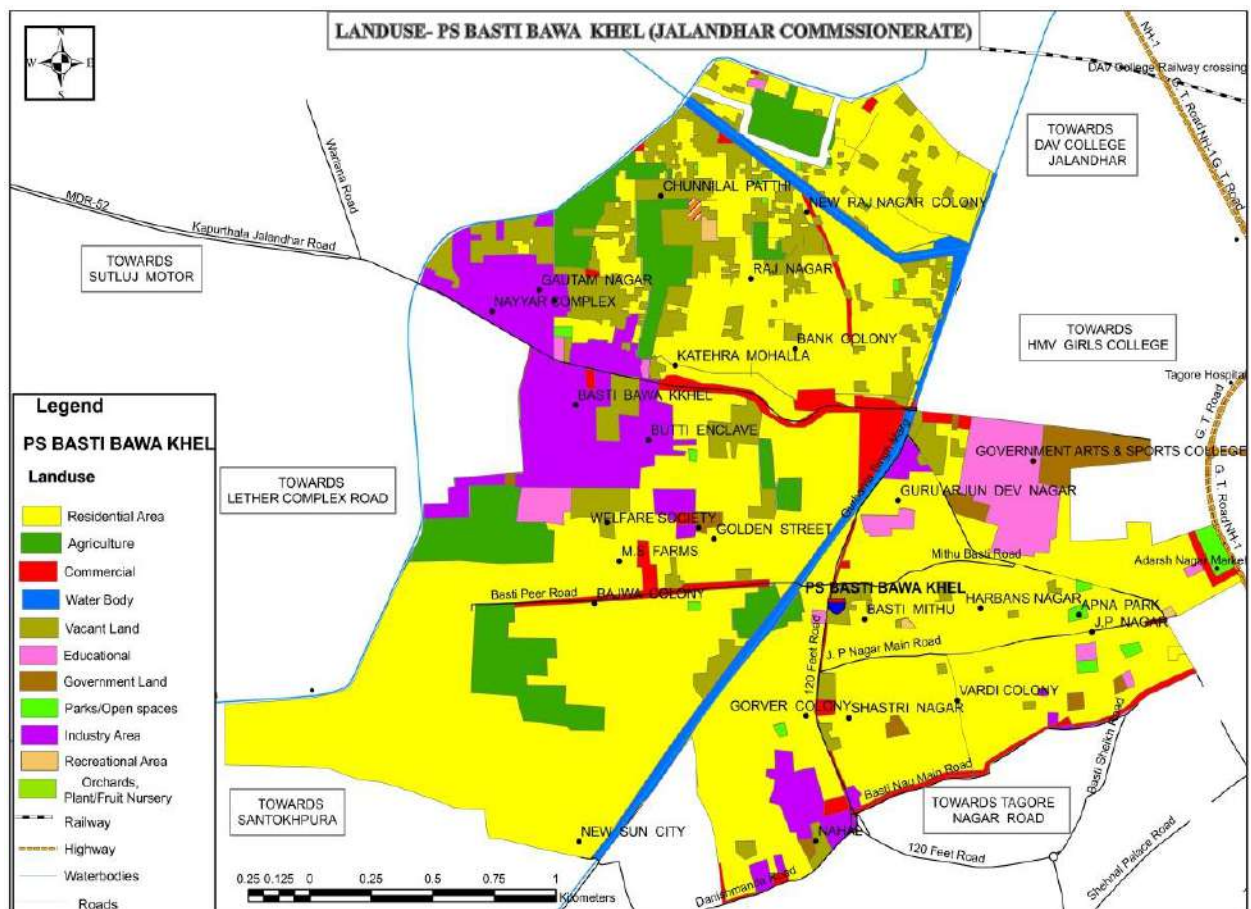


Line Graph 14: Shows the highly crimes occurred in PS Basti Bawa Khel of the Jalandhar Commissionerate
Source: - Primary Calculation from Jalandhar Commissionerate Data.



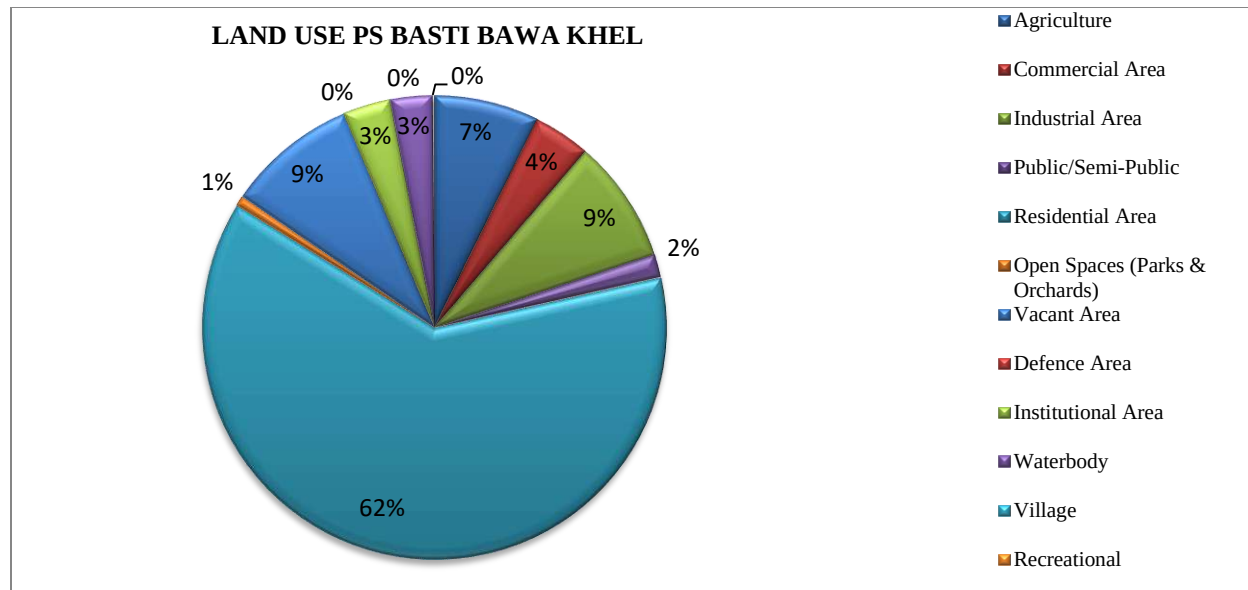
Line Graph 15:- Total No. of case registered in PS Basti Bawa Khel (From Feb 2010 to Dec 2017)

Source: - Primary Calculation from Jalandhar Commissionerate Data.



Map 8: Land Use of PS Basti Bawa Khel

Source:- Google Earth & Know Your police App

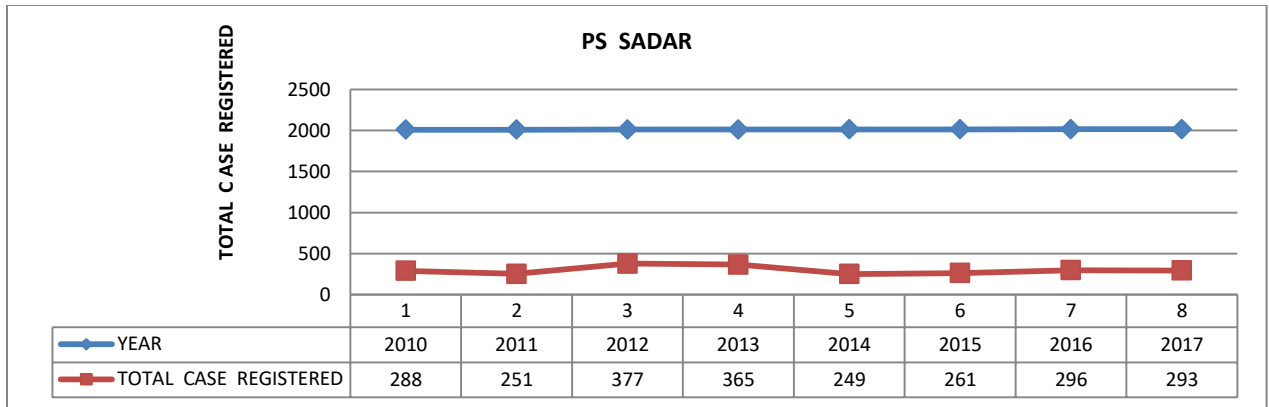


Pie Chart 7:- Shows the different Land Use of PS Basti Bawa Khel in Jalandhar Commissionerate
Source: - Primary Calculation from Jalandhar Commissionerate Data.

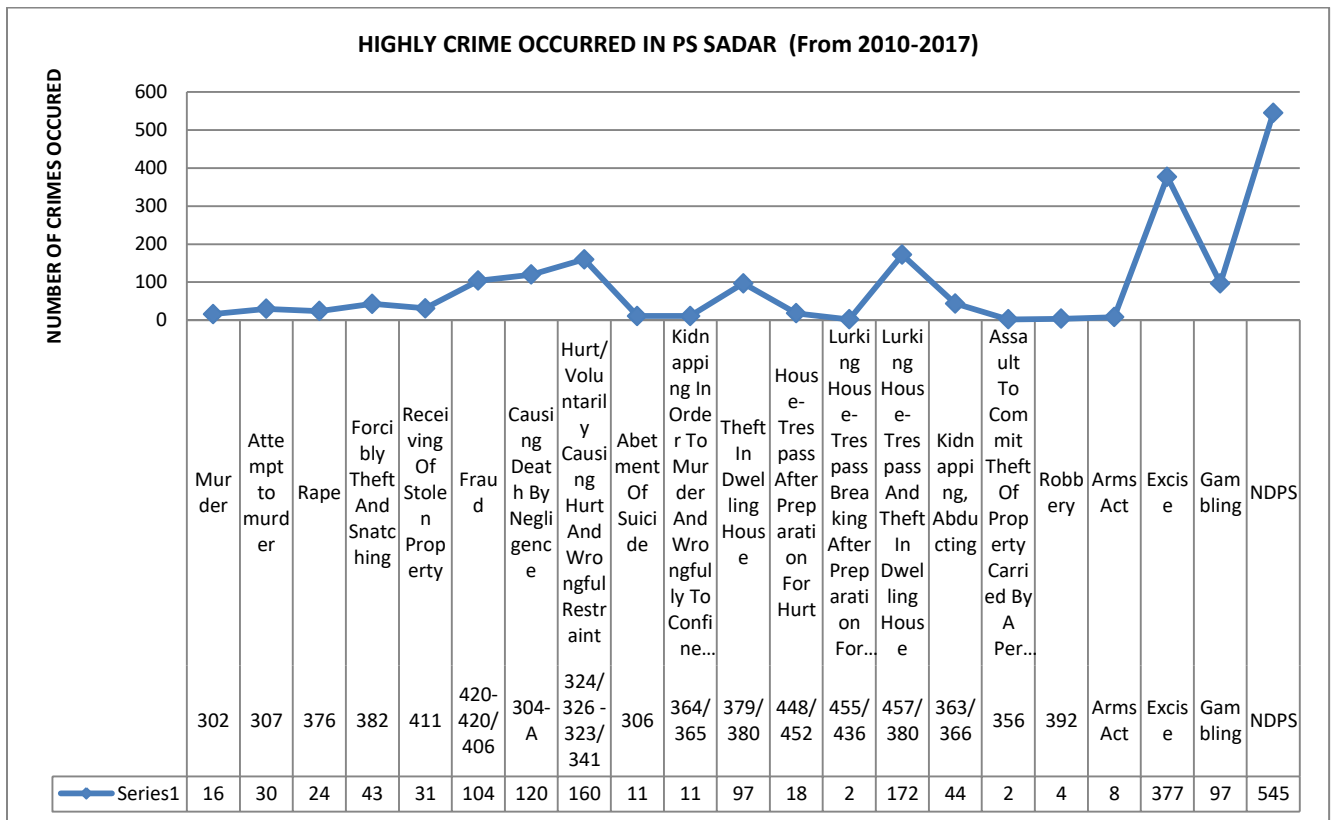
4.7. Police Station Sadar:-

The PS Sadar area is situated at North direction near with PS Cantt and PS Div. no. 7 as geographical direction on Jalandhar Commissionerate Map. The existence features regarding PS Sadar had given in above table no.2. In this area the Rural area is more, which is near to 87 % of total area. Mainly the crimes related to NDPS, theft in dwelling houses, Excise, Rape, Gambling, Rash driving cases, Fraud, Robbery and Hurt are high in numbers as shown in line graph 17. The most of the part in this area is not planned area because there is a haphazard development in this area. The cases of different types of crimes are increased in year 2012 but decreased in the year 2017 as shown in line graph 16.

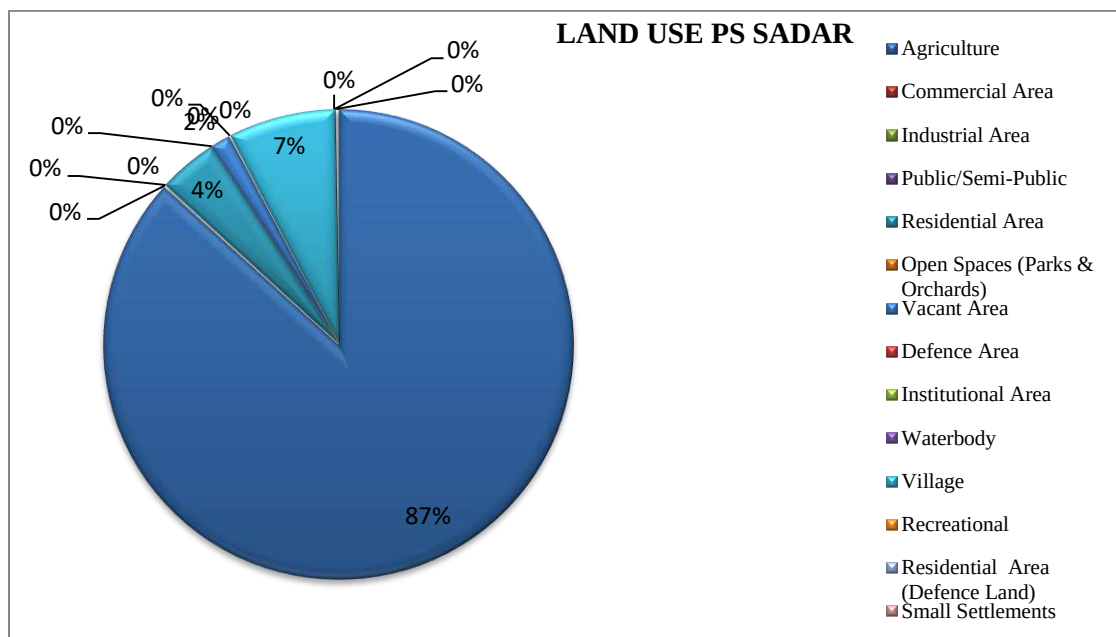
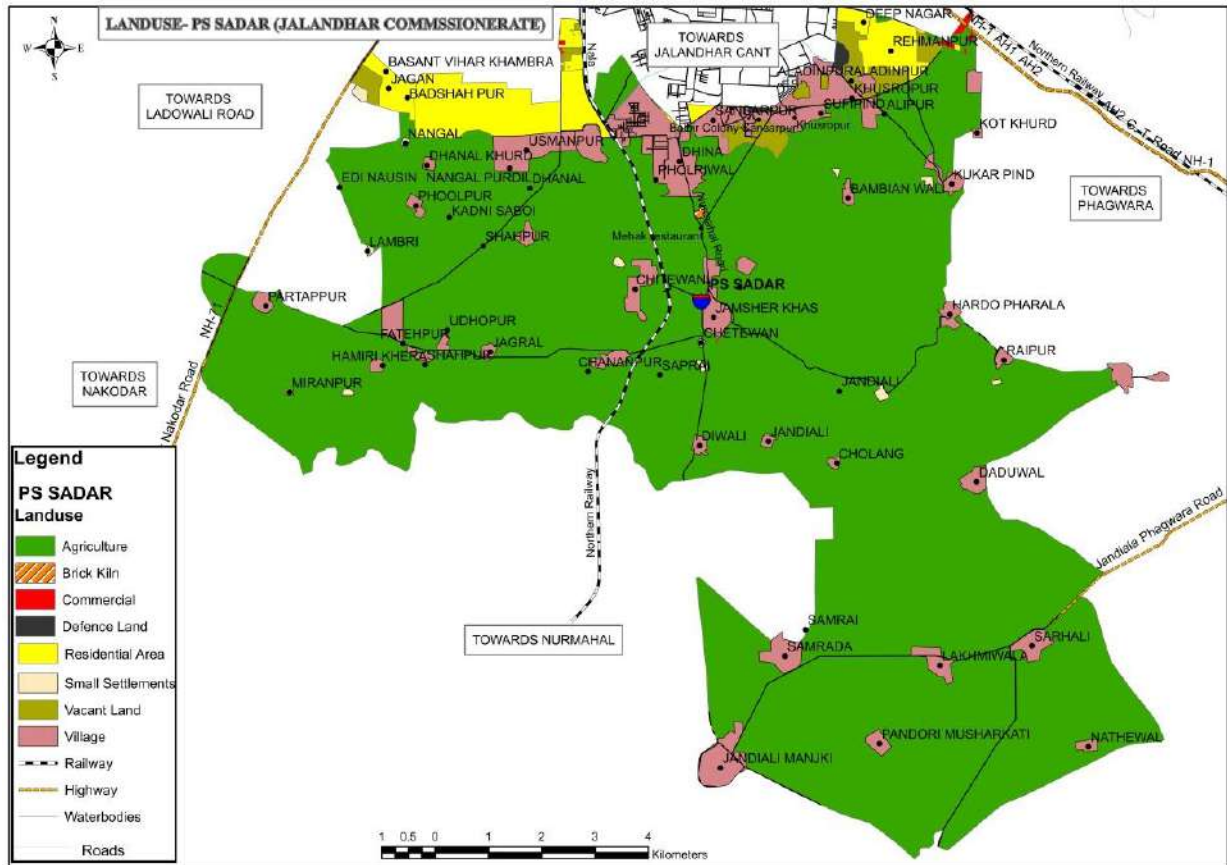
In this PS division Sadar, the maximum area is covered with Rural land and agricultural land, where the movement of general public is less as compare to other areas asnd land uses. Where the offenders are generally use to take drugs, sell their drugs and for the other criminal activities because from these type of less dense areas, they could easily escape from there in emergency. It is also in touch with Jalandhar rural areas or jurisdiction, where emplantment rate is not very high and not have any industrial jobs also due to which the some of the youngsters or young population from these villages or rural areas are indulge in criminal activities like as snatchings, NDPS and gambling etc. Regulating the worsening of the environment to weaken or slow the criminal strategy at particular places is susceptible to crime because residents are distressed because they are unable to stop any crime at their place. By physical and socially developing the region in order to decrease the susceptibility and increase in beneficial businesses. In all opportunities, physical depreciation not only affects criminals ' attention and intelligence, but also reshapes residents ' thinking for other inhabitants. This type of intension on physical coarseness or jumble symbol differs from the sectional face goal. Minimizing bad manners is home to the large issues. In the new developing areas in Jalandhar Commissionerate like as near Khusropur village and new development in the colonies at Dhina near Jamsheer Khas (where the maximum plots are still vacant) could create many problems by giving the shelter to the criminals. One significant thing regarding vacant plots and partially built houses is that they must be secured from trespassing, by constructing proper boundary wall or by other measures. otherwise these types of fields/plots could be the primary places for offenders to commit offences or for the group of perpetrators to plan offences primarily during Evening time.



Line Graph 16:- Total No. of case registered in PS Sadar (From Feb 2010 to Dec 2017)
Source: - Primary Calculation from Jalandhar Commissionerate Data.



Line Graph 17: Shows the highly crimes occurred in PS Sadar of the Jalandhar Commissionerate.
Source: - Primary Calculation from Jalandhar Commissionerate Data



5. Recommendations:

There is a need to follow and implement the street vending act 2014 by the government of India in Jalandhar city, to relocate the vendors in different land use areas in the city to control the hindrances or problems occurred due to the haphazard activities of street vendors like as creation of bottle necks, encroachment of parking areas and both sides of carriage ways etc.

- Use to put regular check points and barriers on different timings at main hot spot points in different land uses like as near to industrial land use areas, residential land use areas and commercial land use areas by the different units of police department and by PCR units as crime preventive measures.
- Use to put CCTV cameras at exit and entry points of the main hot spot areas, garden-parks, neighbourhood parks, parking lots (especially underground parking lots), near the shopping complexes, malls, junctions and cinemas with regular real time data collection and visual interpretation unit of police department IT cell.
- There is need to encourage all the divisions like as development authorities and PWD etc. to assist the Police department to share information required by cooperative endeavours to prevent crime more efficiently.
- Promote collaborative efforts and coordination amongst public groups at neighbourhood level, local level, state level and national level as crime preventive method by encourage global level communication. The social and non-profit organizations with police department in different areas and locations in an effort to support crime prevention through partnership efforts.
- Promote effective policies for exchanging data with all town agencies to promote the efficient and simple accessibility of decision-making data to each department.
- Promotion of public participation or involvement of the surrounding peoples in crime prevention through citizen surveys and public hearings for the safe living environment.
- Use the internet services and other IT technologies as an important tool for information sharing and giving the regular feedback about the surrounding criminal activities.
- Examine and become aware of the root motive of land use/physical built of our surrounding areas or locations and try to understand the habitual activities and concentration of different types of crimes in one of kind locations integrated with land use and physical built-up.
- Formation of a special groups in the areas or divisions for professional research studies on different types of crimes, The members of the group are to be professionals and experienced peoples such as planners, architects, urban designers, landscape designers, retired government officer etc. to investigate specific land use and crime-related issues in different zones & divisions of Police Commissionerate Jalandhar.
- Review and update regular zoning events in every 1 year and crime prevention policies in every 3 years of time and adapt new policies to changing trends and crime rates in various geospatial areas with technical factors.
- Frame suitable parcel development criteria based on possible evolution of criminal possibilities owing to loopholes in current regulations along with the study of surrounding physical and socio economic environment.
- Make adjustments to zoning ordinances based on changes in the city's socio-economic circumstances and changes in the land uses of different areas as according to the study of urban sprawl in the city to promote crime prevention through the changes.
- Use crime pattern analyses to make land use and zoning decisions while updating the city development plan and other plans by the development authorities (5).
- Proper fencing of the areas like as vacant plots, partially built houses with high walls around it or with barbed iron wirings to protect these places from the illegal shelter of the criminals & offenders.
- Use to put barriers and checking points on the major and minor roads passing through the agriculture land use areas in Jalandhar Commissionerate areas like as PS Sadar area along with the regular duties of mobile police units especially during the evening and night time. Put the same barriers and police checking points on the entry points and exit points on the streets and minor roads passing from the vacant plots areas and open land use areas as crime preventive measures.

6. Conclusion:-

Physical built up or land use in the different locations and possibilities of crime are linked by routine operations and changing in shape of urban form. The several connections between Physical environment, land use and crime opportunities with several other spatial factors are also linked together. It must take every effort to decrease crime in order to develop a secure living atmosphere in towns to provide excellent quality of life. This means that there is a need to analyse the crime integrated with surrounding physical environment and socio-economic factors to take better information on crime prevention. Information can be obtained from different sources, which requires agencies to share data and information about different locations or crime affected and vulnerable areas in the city to Police department to facilitate coordination and collaborative efforts to prevent crime. GIS is an analytical instrument that can facilitate the analysis and visualization of crime-data and planning-data on different land use maps, maps of vulnerable areas of the city and City crime maps for law enforcement and better planning choices. The connection between various factors in the different divisions of Police Commissionerate Jalandhar along with its physical environment, land uses, vulnerable points in reference with traffic accidents/crimes and main crime affected areas that affect the development and future of the city can be explored in relation to the significant link between land use and crime possibilities using GIS. In this paper there is a strong relationship of criminal activities integrated with existing land use areas had been showed with land use mapping of each police station of Police Commissionerate Jalandhar City-2 and data procured from the Commissionerate Jalandhar. To meet the data requirements engaged in making objective choices and planning in order to create safer communities (5).

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References:

1. *"Impacts of Urban Land Use on Crime Patterns Through GIS Application"*, [accessed May 25 2018]. <https://www.researchgate.net/publication/260230771>,
2. *"Crime in India"*, NCRB, Government of India, 2012. p. 200. Archived from the original (PDF) on 20 June 2014. Retrieved April 20, 2014.
3. Tiwary, Deepman, *"NCRB data: The odd case of crime in Uttar Pradesh, IPC rate very low, overall very high"*. Indian Express. Retrieved, (2016-09-26), 2017-02-14.
4. John Puchera, Nisha Korattyswaropama, Neha Mittala, Neenu Ittyerahb, Rutgers University, *"Urban transport crisis in India"*, New Brunswick, NJ 08901-1987, USA, Received 25 October 2004; revised 14 February 2005; accepted 25 February 2005, Available online 21 April 2005.
5. Vinay M. Suryavanshi, *Land Use and Opportunities for Crime: Using GIS as an Analysis Tool*, May 22, 2001, Blacksburg, Virginia, p.1-24.
6. Taylor, Ralph B., and S.A. Shumaker. (1990). *"Local Crime as a Natural Hazard: Implications for Understanding the Relationship between Disorder and Fear of Crime."* American Journal of Community Psychology 18:619–642.

7. Ralph B. Taylor, Adele V. Harrell, “*Physical Environment and Crime*” U.S. Department of Justice, Office of Justice Programs, National Institute of Justice,” (1996), P- 1.
8. Christopher R. Browning, Reginald A. Byron, Catherine A. Calder, Lauren J. Krivo, Mei-Po Kwan, Jae-Yong Lee, and Ruth D. Peterson, “*Commercial Density, Residential Concentration, and Crime: Land Use Patterns and Violence in Neighborhood Context*”, Journal of Research in Crime and Delinquency, (2010), 47(3), pp. 329-357, Reprints and permission:, sagepub.com/journalsPermissions.nav, DOI: 10.1177/0022427810365906.
9. Han Yue, Xinyan Zhu, Xinyue Yeand Wei Guo, “*The Local Colocation Patterns of Crime and Land-Use Features in Wuhan, China*”, ISPRS Int.J. Geo-Inf. 2017, 307; doi: 10.3390/ijgi6100307, www.mdpi.com/journal/ijgi.
10. Edward Glaeser and Helen Sims, “*Contagion, crime, and congestion: overcoming the downsides of density*”, May 2015, in IGC Growth brief.
11. Jude Ndzifon Kimengsi1, IsofaNdam, “*Spatial Variations and Planning Implications of Urban Crimes in the Bamenda Metropolis of Cameroon*”, Landscape Architecture and Regional Planning 2017; 2(4): 89-98, <http://www.sciencepublishinggroup.com/j/larp>, doi: 10.11648/j.larp.20170204.11.
12. Taylor, Ralph B., E. Kurtz, and B. Koon., “*Block-level Connections Between Land Use Arrangements, Physical Deterioration, and Crime.*” Paper presented at the Third International Meeting on Situational Crime Prevention, Rutgers University, Newark, NJ, June (1994).
13. Brown Mary Maureen & Brudney Jeffrey L., “*Learning Organizations in the Public Sector? A Study of Police Agencies Employing Information and Technology to Advance Knowledge*”. Public Administration Review 63 (1), 30-43, 2003.

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