

## The Role of Existing Land Use in Shaping Crime Trends in Jalandhar Commissionerate (City-1)

**Rajinder Sharma**

Department of Spatial Planning, Punjab Technical University, Jalandhar, India

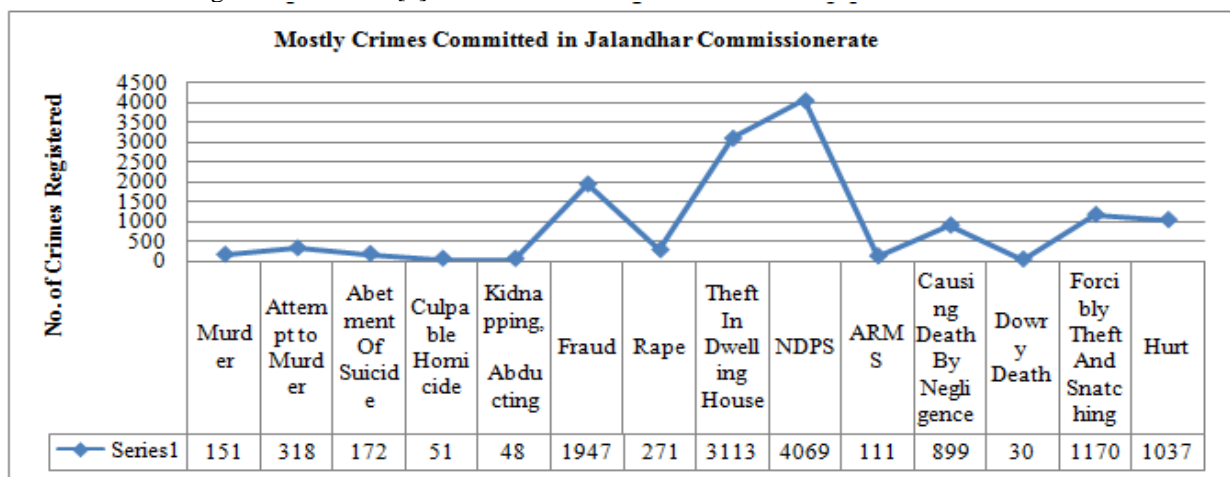
### ABSTRACT

The study of crime analysis or criminology with existing land use in the specific area like as Jalandhar Commissionerate with the help of GIS technology has vital role in the research of effect of physical environment and land use in crime. Up to now, mainly most of the periodically theories and researches are concentrated on the places, surrounding environment and existing built-up especially during crime studies and researches to find out the root causes of the occurrences of criminal activities in specific crime hotspot areas. The crimes committed by the offenders are differently studied as according to the different use of existing land and different built ups in the specific cities and regions. Like as the crimes related to theft and robberies are mainly occurred or committed in the streets of the cities with no dead ends and the drug addiction crimes are mainly committed by the peoples usually in agriculture lands near the urban settlements, Open spaces and vacant plots are present at particular distance from the high or medium density areas.

*Keywords: Google Earth, QGIS (Open Source), Crime data from Jalandhar Commissionerate and MS Office.*

### I. INTRODUCTION

Crime is describing as the social problem and which affect the society in several ways. There are many theories, which are mainly helps the police and public to control the crimes faster, which will be very helpful for the safety and security of the peoples. According to ShyamVaranNath[3], about 10% of criminals commit more than 50% of crimes. The increasing rate of crimes affect negative on the economic development of any specific Region/City or State etc. by bring down the economic progress activities. The police department can better control the crime rate by using the knowledge from information technology like as GIS (Geographic Information System) with GI Science, Remote Sensing data and other IT techniques etc. Mainly the Police department can adopt the new technologies and services by information technology to turn the police department into better Smart Police and can use their power to reduce crime and target the offenders [4].

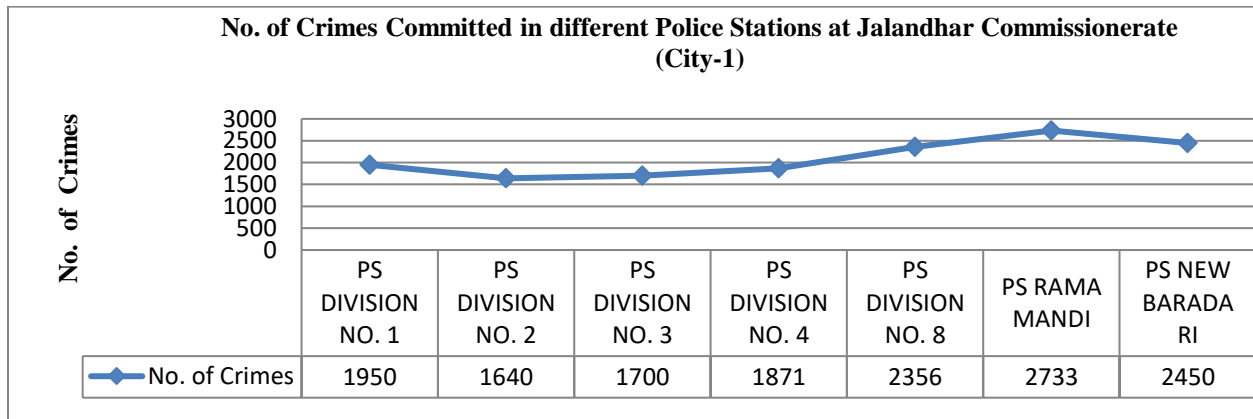


*Line Graph 1:-Most No. of case registered (with repetition) in Jalandhar Commissionerate (From Feb 2010 to Dec 2017).  
Source: - Primary Calculation from Jalandhar Commissionerate Data.*

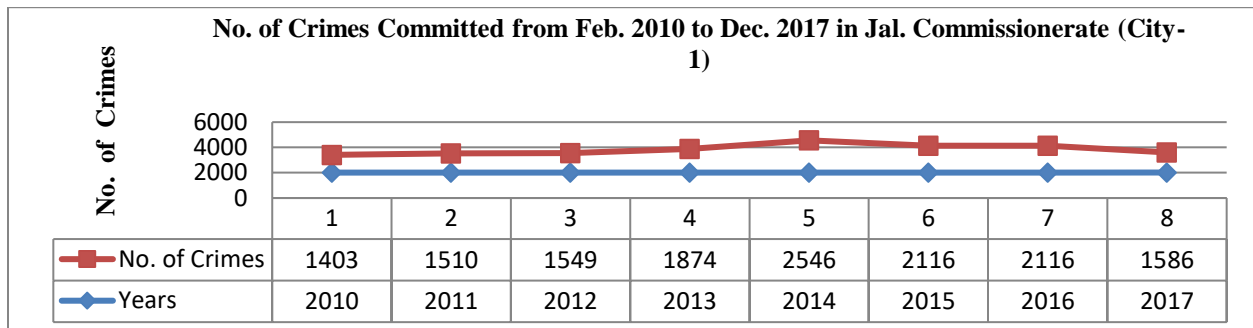
Mainly the opportunities of crimes are no more consistently nor haphazardly formulated in time and space. By which, crime surveyors and mapping experts can decipher the various types of geospatial patterns, land use effects and markings for an exceptional consideration of the opportunities of geographical role, along with permissive efficient solutions for crime prevention are related to specific areas. The emerging of new GIS technology of crime

mapping has new evolution for geospatial criminology and the importance of *area/place* as one of the keystone for imperative to a consideration of crime and criminality. This research mainly analyse the effect of the existing land use on crime or crime related activities happened in the specific areas of Jalandhar Commissionerate City 1 last from 7-8 years (from the date of formation of Jalandhar Commissionerate). It also takes some assumptions in their surrounding work environment in any specific area by link the neighbourhood zone and street block physical features with crime, fear of crime, and other related analysed data of crime. There are many types of crimes, which mainly occurs in some specific areas with repetition or again and again, which are mainly due to the surrounding environment of that specific place or region or their existing land use. So in this study we mainly focus on the relationship of the crimes occurred in the specific regions or places of the jurisdictions of each police station in Jalandhar Commissionerate City 1 with its existing land use. There are mainly some major sets of physical features, whicheffect the particular activity in any area or place like as urban design or block layout, land use and circulation patterns, resident-generated territorial features, and physical deterioration. In this paper we try to analyse some these kinds of physical features separately [7].

Mainly the mostly crimes committed in Jalandhar Commissionerate with repetition from last 7-8 years are to be shown in Line Graph 1, which includes the heinous crimes as well as the non- heinous crimes. The numbers of crimes occur in Jalandhar Commissionerate (City-1) in each Police station by its Police Station jurisdiction wise is shown in line graph 2.



Line Graph 2:-Number of crimes committed in different PS at Jalandhar Commissionerate City-1( Feb 2010 to Dec2017).  
Source: - Primary Calculation from Jalandhar Commissionerate Data



Line Graph 3:-No. of crimes committed in different Years at Jalandhar Commissionerate City-1(Feb 2010 to Dec 2017).  
Source: - Primary Calculation from Jalandhar Commissionerate Data

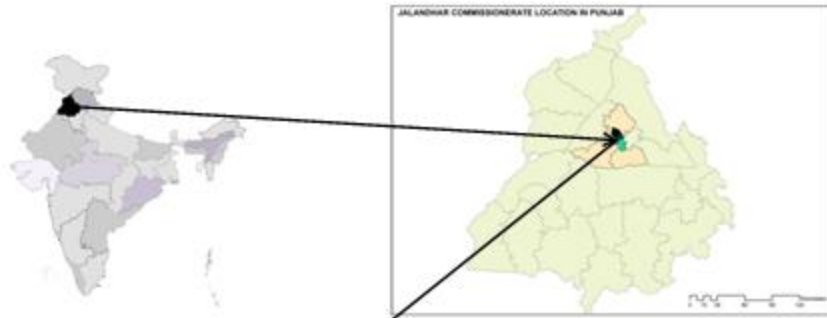


Fig. 1: Location of Punjab in India

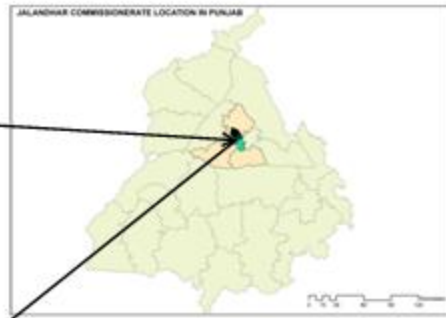


Fig. 2 Location of Jalandhar in Punjab



Fig. 3: Base Map of Jalandhar Commissionerate

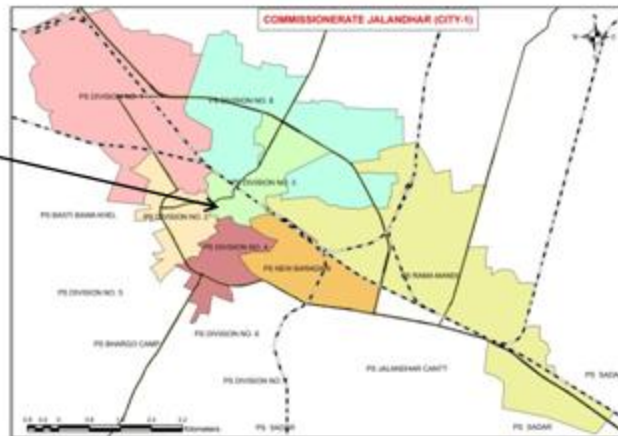


Fig 4. Base Map of Jalandhar Commissionerate (City-1).

## II. FACTORS THAT INFLUENCE CRIME IN JALANDHAR COMMISSIONERATE (CITY-1)

All the variables that can affect crime, particularly those that have nothing to do with police, need to be understood. For instance, the link between unemployment and crime is a long-standing discussion. Education was also discovered to decrease crime, particularly early childhood education (Yoshikawa 1995). Even debit cards were introduced as money replacements to decrease the quantity of criminal activity (Wright *et al* 2014)[10]. Specific areas with highest rate of unemployment in the youth like as Bhargo Camp area, BastiBawaKhel area, Division no. 4 area and Division no. 7 area has highest rate of crime in it. Areas with highest rate of alcoholic sale and sale of other types of narcotic drugs also influence the crime in that specific area like as area of Div. no. 2, Div. no. 4, Div. no. 8 and Bhargo Camp area.

### Categories of crimes

Table 1. Categories of crimes

Sr. No.	Category of Crime	Types of Crime
1.	Crime against Property	House-Breaking, Robbery, Theft, Shoplifting, Motor Vehicle Theft, Armed Robbery, Malicious Injury to property (MIP).
2.	Crimes against People	Rape, Common Assault, Assault to cause grievous bodily harm, Theft under false pretences.
3.	Drug related Crimes	Trading, Possession of illegal substances: e.g.; dagga (marijuana), cocaine, heroin etc.
4.	Crimes against public order	Public disturbances, Public indecency, gambling

Source: [9]

**2.4. Types of policing mechanisms responding to the crimes are:**

- a. City Thana Police
- b. Sadarthana Police
- c. Chowki units
- d. CIA
- e. Defence /security
- f. Patrolling force (Car and Bikes i.e. PCR)
- g. Mukhbir (Human as Source of information)

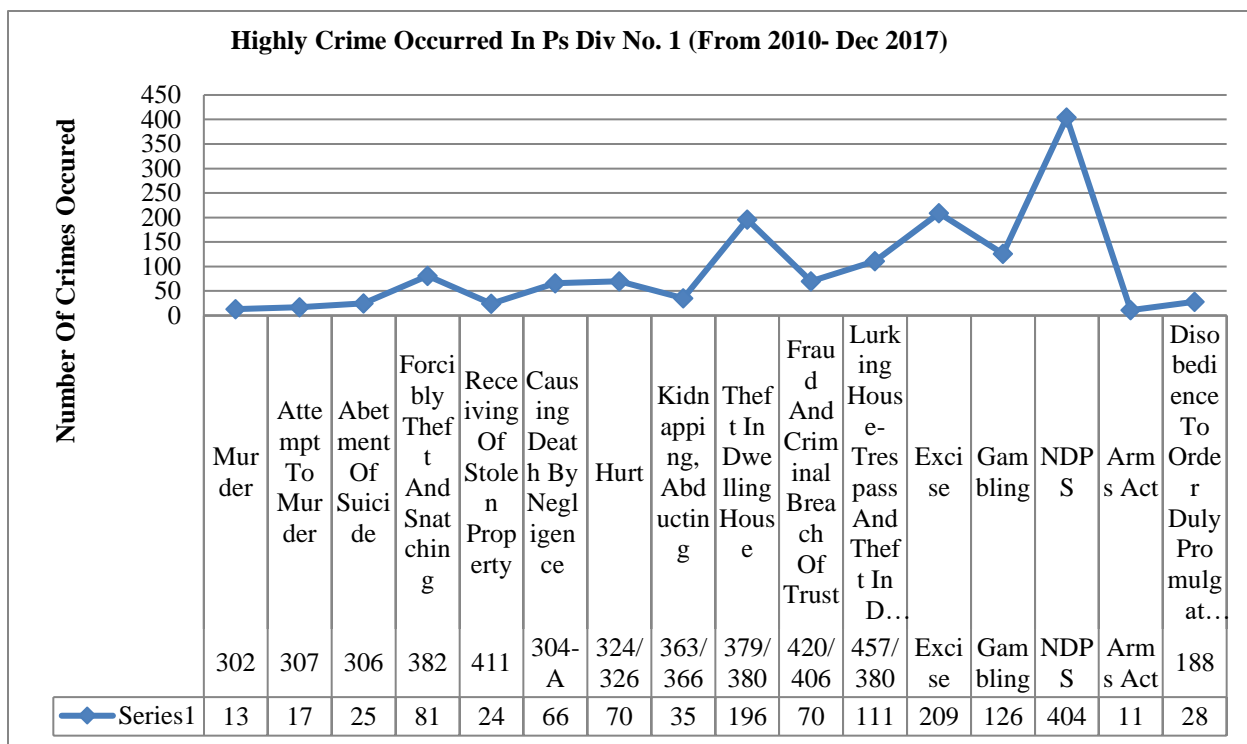
**III. INTEGRATED LAND USE OF POLICE STATION BOUNDARY AND CRIME**

**3.1 Police station division no. 1:-**

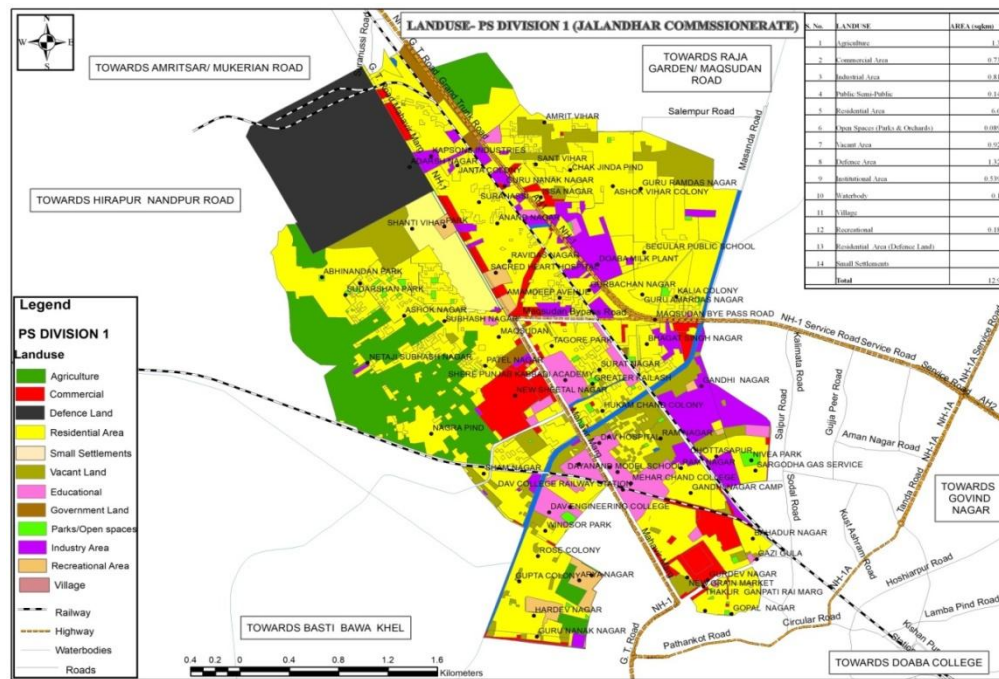
The PS Div No. 1 is situated at North-North West direction as geographical direction on Jalandhar Commissionerate Map. It mainly covers the areas like as Gandhi Nagar and Ravidas nagar etc. In this area the residential area is more, which is near to 51 % of total area. The vacant area is present in between the residential areas which is mainly near to 7 % (shown in Map 1) and Open spaces (Parks and open areas) covers mainly 1 % area only. Commercial Land use covers mainly 6% from total area and 10 % area is covers with Defence land (Army area). The mainly crimes were committed in area under PS Div no. 1 were low in 2010 but high in 2014 (Shown in line graph no. 4). The most of the crime activities committed in this area is hurt (323/324), Theft in dwelling units (379/380), causing death by negligence (304-A), Gambling and NDPS (related to drugs).

**3.1.1. Analysis:** Division 1 is situated in Northern part of Jalandhar,

**a. Non-conforming Land uses together:** Here Industrial Land use very high and haphazardly merged with Residential, they are non-conforming land uses, and has negative impact on surrounding. In Industrial units, there small worker works, variety of people from different background work there, some of them works on daily purposes, Causing social mix and lack of belongingness hence trigger the mentality to indulge in unsocial activities, such as Theft in Houses, Drugs, Snatching, negligence and other criminal activity.



Line Graph 4: Shows the highly crimes occurred in PS Div. No. 1 of the Jalandhar Commissionerate Source: - Primary Calculation from Jalandhar Commissionerate Data.



**Map 1: Land Use of PS Division 1**  
 Source: - Google Earth and Know Your App.

**b. Neighbourhood spaces:** As the space circles in the areas comes under Division no. 1 of Jalandhar in which the citizens tend to monitor and supervise start to overlap with their neighbours, increasingly, public spaces are subject to local unofficial control, decreasing crime incidence. Taylor's model assumes that road activity rises depending on residential and commercial density. Neighbourhoods of dense, blended use tend to boost pedestrian traffic while reducing the probability that occupants of the road will know each other. Similarly, Jacobs and Taylor define the relationship between land use trends and pedestrian activity. However, Taylor's model, however, differs from Jacobs in the way it views the roles of "outsiders" versus "regulars." For Taylor, as the prevalence of surprising faces increases, the sense of anonymity turns into extra pervasive.

Anonymity, in turn, leads to the withdrawal of those living in the neighbourhood, reduces the radius of accountability held by inhabitants and decreases the inclination and efficiency of social control. Even if anonymous pedestrian traffic is viewed as "lawful," it promotes a feeling of insecurity and diminishes the readiness of citizens to use public space. Weakening social control tendencies among inhabitants in the neighbourhood is followed by increased opportunities for victimization. In a context of increasingly absent guardianship (Felson2002 ;Felson and Cohen 1979), more road activity draws prospective offenders and victims together, increasing the danger of crime.

Moreover, according to Taylor, the combination of company and residential space creates gaps in territorial spatial allocation. When their companies are closed, owners will be less efficient in tracking the public space around their institutions. Unoccupied business establishments in the overlapping radius of liability generate interstices kept by the inhabitants. In turn, prospective offenders can exploit these weakly controlled spaces. Therefore, at greater concentrations, rises in residential and commercial concentrations are hypothesized as criminogenic to Taylor — a risk contrary to Jacobs' expectation [8].

**3.2 Police station division no. 2:-**

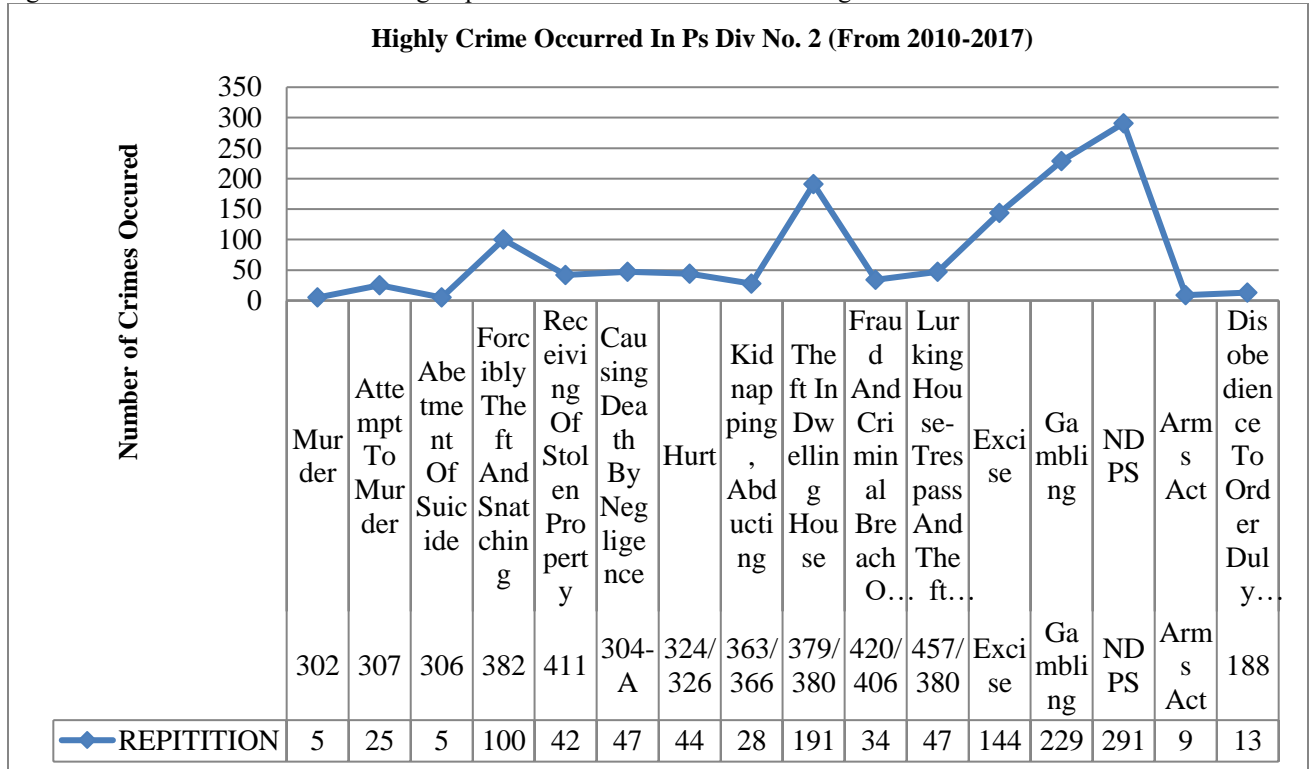
The PS Div No. 2 area is situated at North West (towards centre) direction just before PS Div No. 1 (near the Kapurthala road and Patel chownk) as geographical direction on Jalandhar Commissionerate Map. It mainly covers the areas like as Adda Basti road, Jail road and Tagore Hospital etc. In this area the residential area is more, which is near to 55 % of total area. The vacant area is present in between the residential areas which is mainly near to 3 % (shown in Map 2) and Open spaces (Parks and open areas) covers mainly 4 % area only. Commercial Land use covers mainly 10% from total area and 12 % area is covers with recreational areas land.

3.2.1. Analysis:-

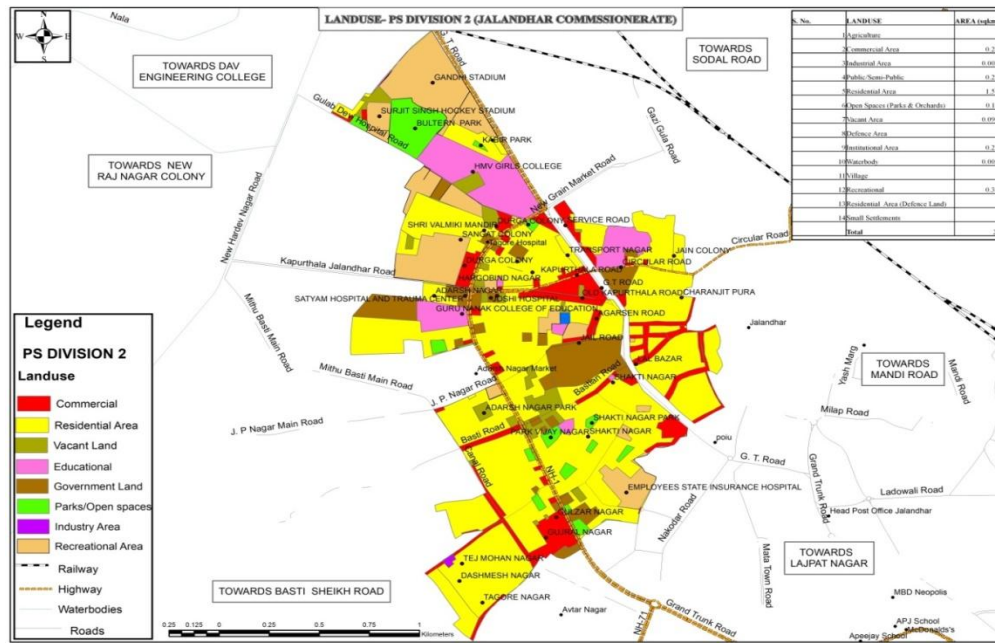
**a. Core area:** Narrow streets, congested environment, organic way of street pattern, more chaotic streets, commercial activity, and acting Regional Market invites many criminals for Theft and snatching is very high, due to sudden change of built environment. From Congested to the freeway Corridors gives motion to the snatchers and thieves to plot the crimes.

**b. Educational Institutes:** They are potential population affected buy Drugs.

**c. Mixed use Streets:** Inside the Residential areas there is mix uses are present in which as according to the expectations of Jacobs about the role of blended land use and the road activity it generates depend on the social organisational characteristics of urban groups. While Jacobs’s claims on average



Line Graph 5: Shows the highly crimes occurred in PS Div. No. 2 of the Jalandhar Commissionerate Source: - Primary Calculation from Jalandhar Commissionerate Data



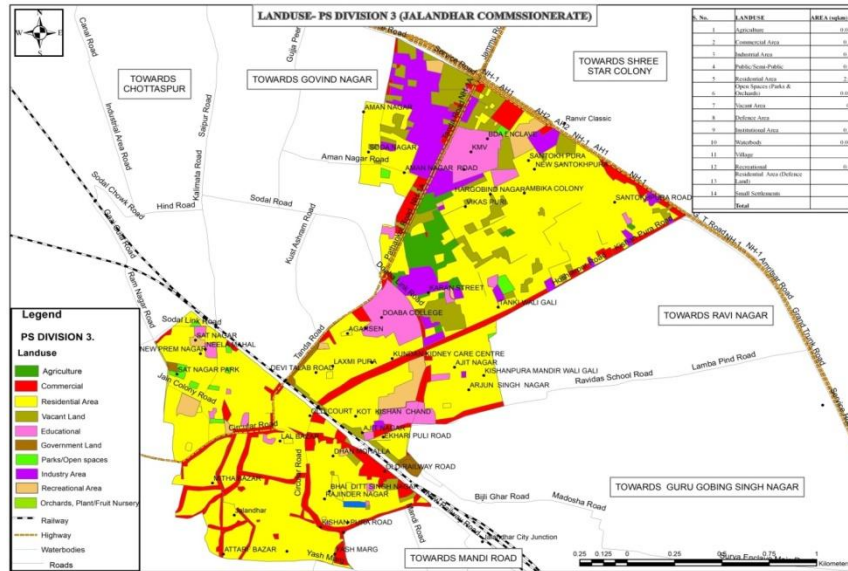
Map 2: Land Use of PS Division 2  
 Source: - Google Earth & Know Your police App

that higher rates of road activity contribute to the development of knowledge networks and informal social control standards, emphasizing the interdependence of street activity and informal social control guidelines in public space oversight. The monitoring advantages of "eyes on the road" are unlikely to translate into efficient social control without the expectation that others will support one in an intervention attempt. Similarly, shared expectations without the advantage of road activity and related tracking are likely to have less effect on street crime. Therefore, reduced rates of anonymity, more widespread casual networks of exchanges and commonly shared public space control standards are likely to amplify the advantages of road activity in crime control.

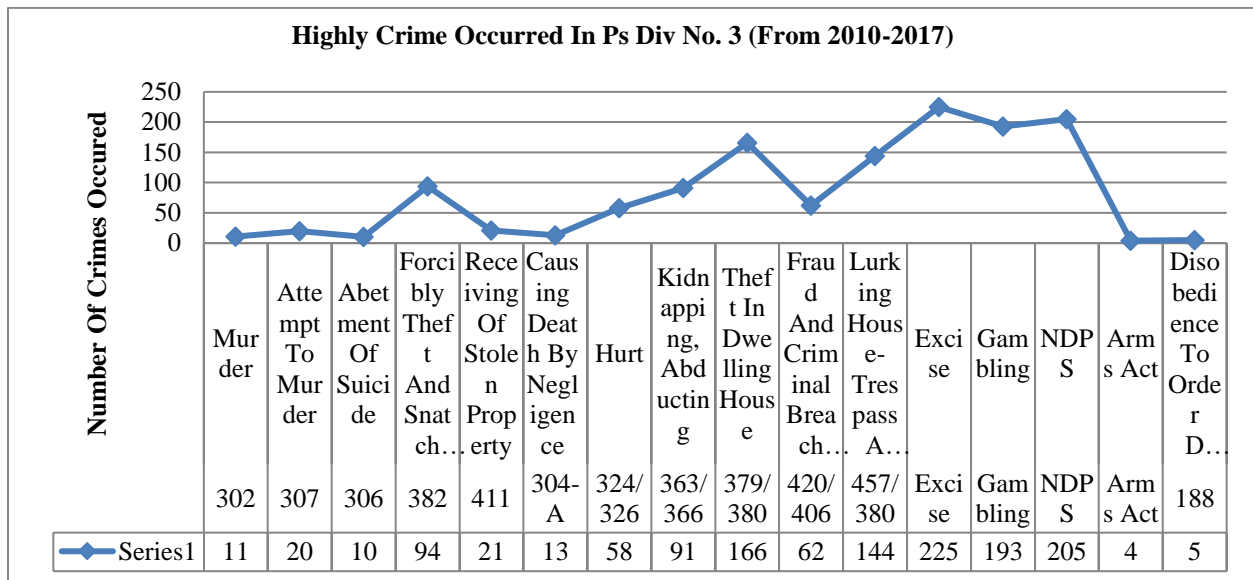
In comparison, growing road activity in neighbourhoods defined by minimal social control and stranger-dominated streets may face wider crime. Research has shown powerful connections between the socio-economic disadvantage of the neighbourhood and social organization levels, networks, including informal social control standards, intergenerational linkages and support, and feasible exchange (Sampson et al. 1997; Sampson, Morenoff, and Earls 1999). Given the reduced average social organization rates in socio-economically poor groups, the Jacobs model leads to expectations of less pronounced positive impacts of blended land use in these districts. Therefore, a significant objective of the present assessment will be to examine this prospective contingency by level of structural disadvantage in the effect of business and residential density. Despite its huge impact, the theoretical approach tests of Jacobs were comparatively restricted. Studies have shown that increased residential and commercial density is associated with increased pedestrian traffic (Frank and Pivo 1995; Kitamura, Mokhtarian, and Laidet 1997; Lund 2003; Shriver 1996). However, there is incipient and blended proof of the consequences of these variables for crime. Fowler (1987) examined the combination of neighbourhood structure and physical design features that Jacobs recognized as preconditions for road, neighbourhood and crime control. The results show that "physical diversity"—a measure that combines these characteristics—is favourably linked to neighbouring and negative to crime, in line with the expectations of Jacobs (although neighbouring is not linked to crime) [8].

**3.3 Police station division no. 3:-**

The PS Div No. 3 area is situated at North-East Centre area of Jalandhar Commissionerate (towards centre) direction in between center of PS Rama mandi, PS Div no. 8, PS Div no. 2, PS Div no. 4 and PS Div No. 1 (when move from Yash marg and Main Jalandhar City to NH-1 Bypass road via Kishanpura road and passing the Jalandhar city Railway junction) as geographical direction on Jalandhar Commissionerate Map.



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



Line Graph 6: Shows the highly crimes occurred in PS Div. No. 3 of the Jalandhar Commissionerate  
Source: - Primary Calculation from Jalandhar Commissionerate Data.

It mainly covers the areas like as Circular road, Kishan pura road and Aman nagar area etc.. In this jurisdiction the residential area is more, which is near to 63 % of total area. The Commercial land is 10% and the Industrial area near to 7 % along with 7% of Vacant land (shown in Map 3) and Institutional Land use covers mainly 6 % area. The mainly crimes were committed in area under PS Div no. 3 were low in 2010 but high in 2014 (Shown in line graph no. 9). The mainly crime activities were committed in this area Theft in dwelling units (379/380), Gambling and NDPS (related to drugs), Fraud-Breach of trust (420/406) and Excise related.

**3.3.1. Analysis:-**

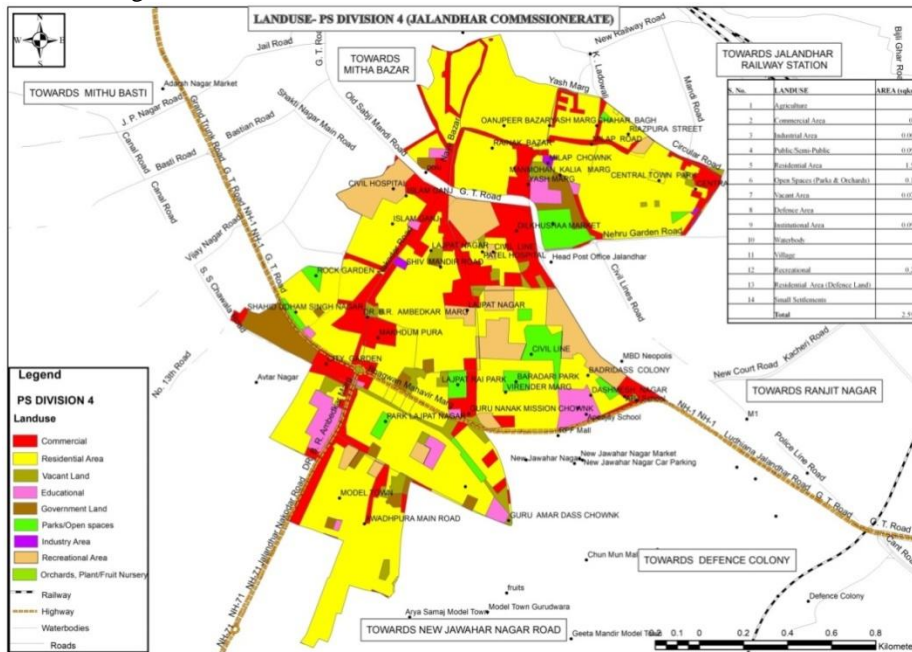
**a. Commercial area** along to major streets gives more exposure and less chaotic situation on the major streets, but in the core area situation is not good, snatching theft still very high as due to sudden change of built environment. From Congested to the freeway Corridors gives motion to the snatchers and thieves to plot the crimes. According to Felson (1987) routine exercises would make wrongdoing open doors for the guilty party. Property violations are higher at spots where there are scattered shopping and strip business advancements. Business regions in urban

communities have been observed to be inclined to robberies and burglaries while local locations are helpful for violations, for example, sexual offense and murders. Studies have likewise shown that kid sex offenses and adolescent wrongdoings are a lot higher close zones where secondary schools are found (Suryavanshi 2005). Theft at dwelling units are lesser. Death due to negligence is due to railway line (transportation) is unmanaged near the core.

**b. Less open spaces:** Creates more vulnerable area: Hotspots to the theft activity, helps criminals to hide between these dense areas.

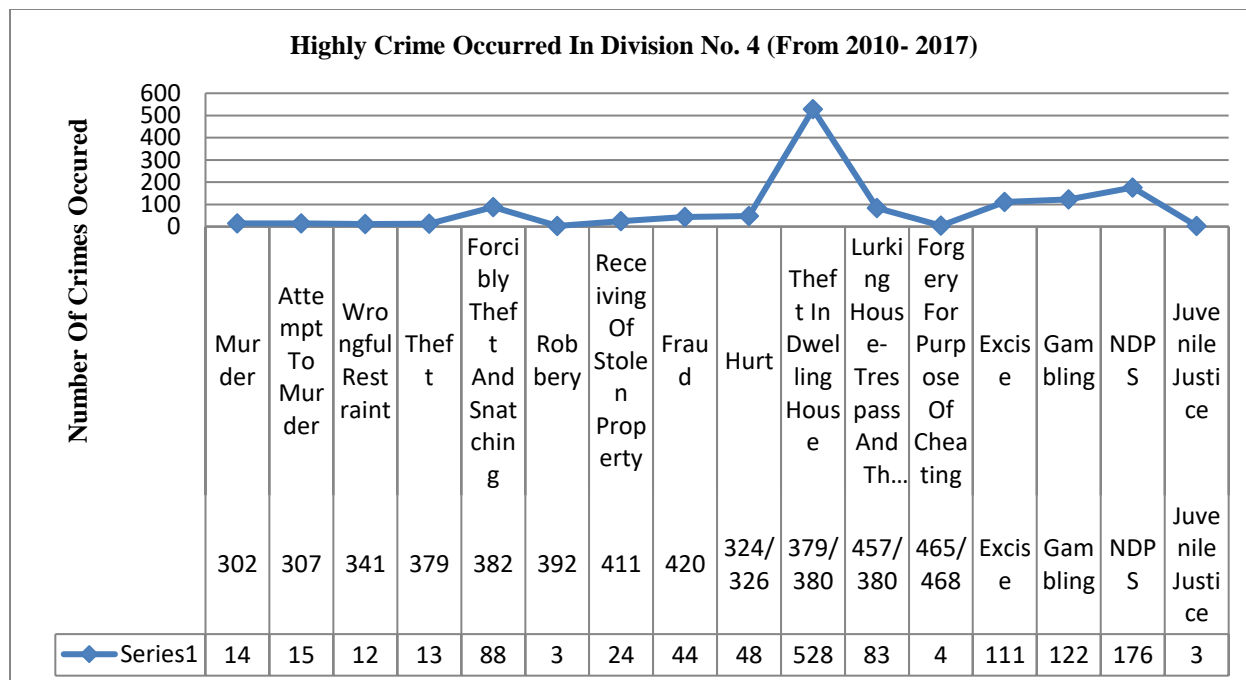
**3.4 Police station division no. 4:-**

The PS Div No. 4 area is situated at South-West (towards centre) direction just near to or in between PS New Baradari and Div. no. 2 (when move from Ladowali via Milap road to NH-71 bypass) as geographical direction on Jalandhar Commissionerate Map. It mainly covers the areas like as Bhagwan Mahavir road, Naya Bazar, Milap road and Dr. BR Ambedkar marg etc. In this area the residential area is more, which is near to 60 % of total area.



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

The Recreational land use area is 8 % (shown in Map 4). The crimes were committed in this area under PS Div no. 4 were low in 2010 but high in 2014 (Shown in line graph no. 4). The mostly crimes were committed like as Theft (379/380), Gambling, Excise related crimes, NDPS and Hurt (324/236) etc.



Line Graph 7: Shows the highly crimes occurred in PS Div. No. 4 of the Jalandhar Commissionerate Source: - Primary Calculation from Jalandhar Commissionerate Data.

**3.4.1 Analysis:**

**a. Theft and robbery** activity is very high, having Commercial and Residential activity the core area acting as regional market, attracts the regional population and different strata of population congregate in market space to access the services and Market, but it is also congested, streets are narrow as well as encroached. That attracts the criminal activities. Theft at housing dwelling, Forcibly theft and Snatching, Lurking House trespass and theft in dwelling house these are the major crimes here, also policing is very difficult, here proper arrangement of surveillances are more required.

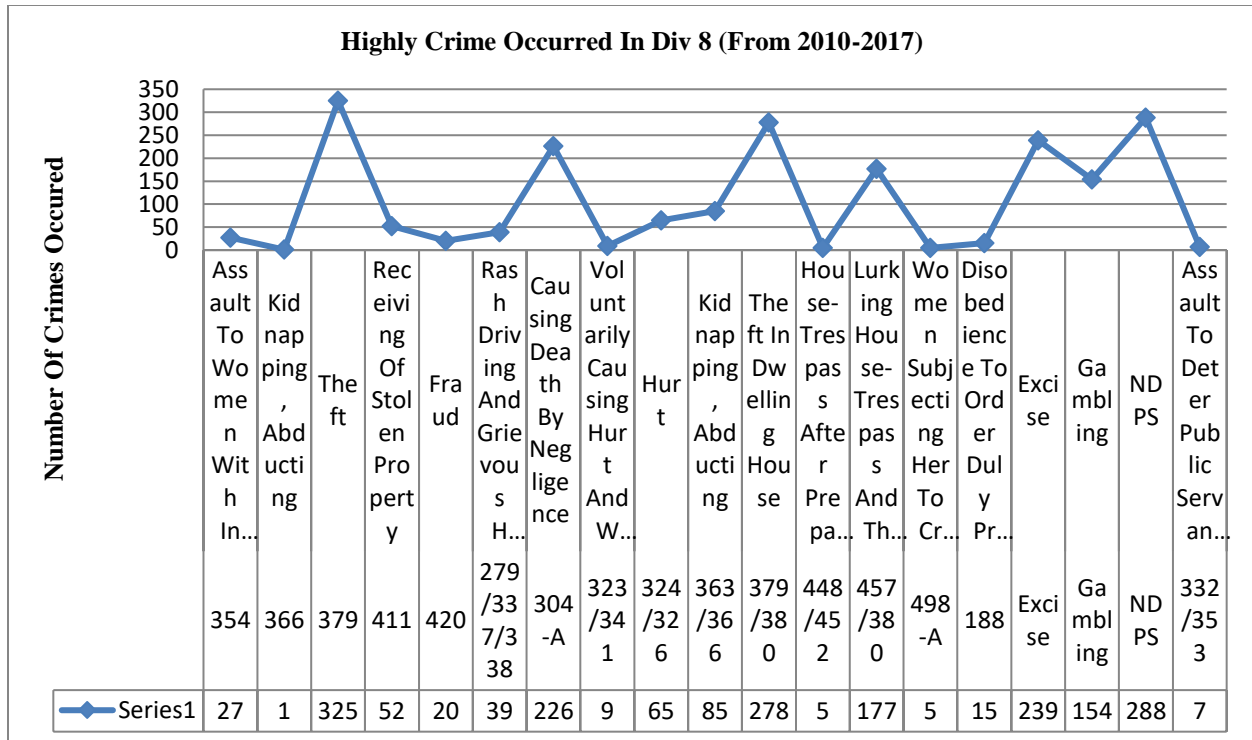
**b. Highest number of crime** registered in this area.

The **commercial area** is not organized, core area is organically developed

**c. Less open spaces:** Creates more vulnerable area: Hotspots to the theft activity, helps criminals to hide between these dense areas.

**3.5 Police station division no. 8:-**

The PS Div No. 8 area is situated at North & North-east (from the centre) direction adjoining with PS Ramamandi, PS Div no. 1 and PS div no. 3 as geographical direction on Jalandhar Commissionerate Map. It mainly covers the adjoining areas of NH-1 Pathankot Highwayroad, Tanda road and Amritsar Highway up to the Jurisdiction of Jalandhar Commissionerate. In this area the residential area is more, which is near to 40 % of total area. The Industrial land use area is present 29% (shown in Map 5) and Vacant land covers mainly 13 % area.

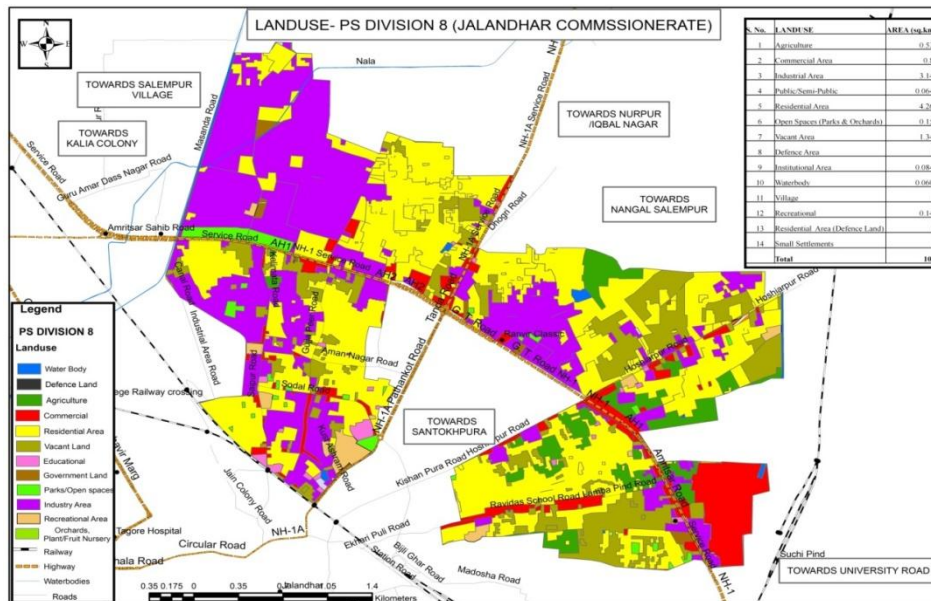


Line Graph 8: Shows the highly crimes occurred in PS Div. No. 8 of the Jalandhar Commissionerate Source: - Primary Calculation from Jalandhar Commissionerate Data.

3.5.1. Analysis:

Second highest crimes happen in this area in past years. City’s outer profile area and major NH passes through that gives free movement to the drivers and opening of commercial areas and institution are on the major road and, so rash driving cases are high and causing death by negligence is also very high.

- a. **Residential area** is abutting to the agriculture use, here increases the possibility of crimes like: theft, Lurking House trespass and theft in dwelling house and anti-social like gambling and NDPS.



Map 5: Land Use of PS Division 8 Source:- Google Earth & Know Your police App

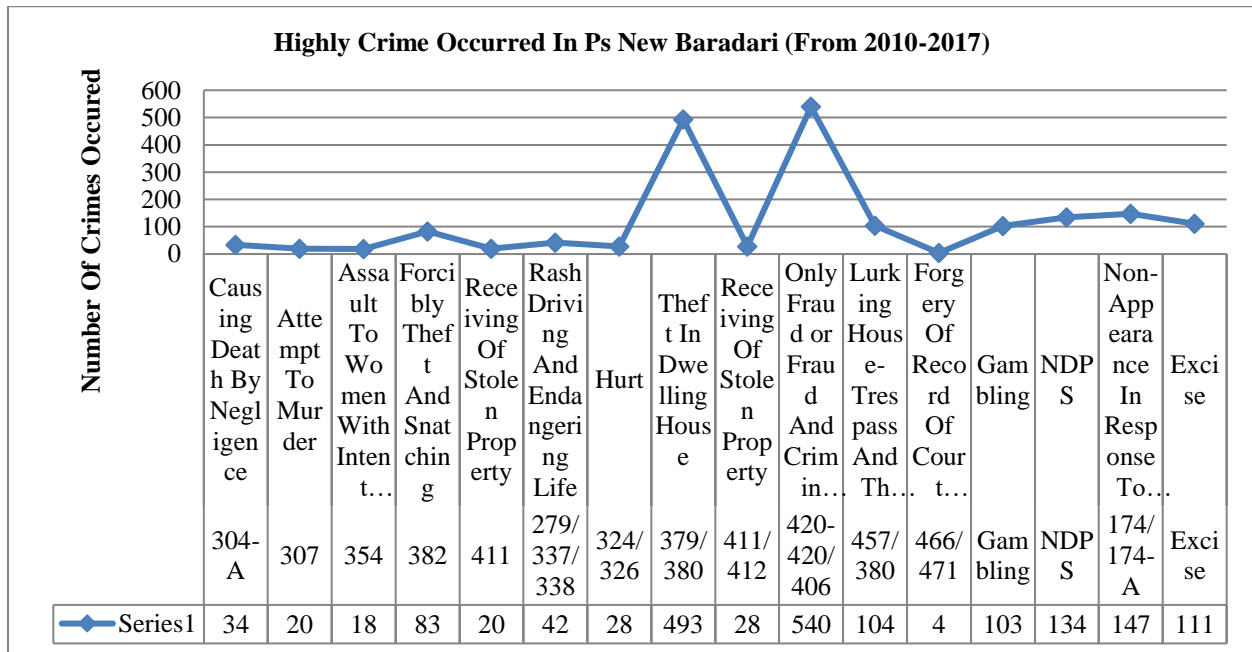
**b Industrial land:** In this area, there is a largescale of Industrial land use. Means there is an existing of migrated population in this area. For industries and factories, they mainly allow the cheap labour to come over there for work in the factories. In this portion of the Jalandhar Commissionerate, people connect with distinct kinds of people who have no resemblance with each other. With the rise in urbanization, the crime issue rises. Indeed, the growing trend in urban offenses tends to upset the cities ' peace and tranquillity and render them insecure to live primarily for females. In the present scenario, the urban crime issue becomes more complex because criminals are often sheltered by politicians, urban society bureaucrats and politicians. It primarily indicated that violent urban crimes like rape, assassination, abduction, dacoity, theft are more prominent in the nation's northern-central areas. In the north-central and peri-urban regions, even financial offences such as theft, cheating, and violation of confidence are focused.

**3.6 Police station new baradari:-**

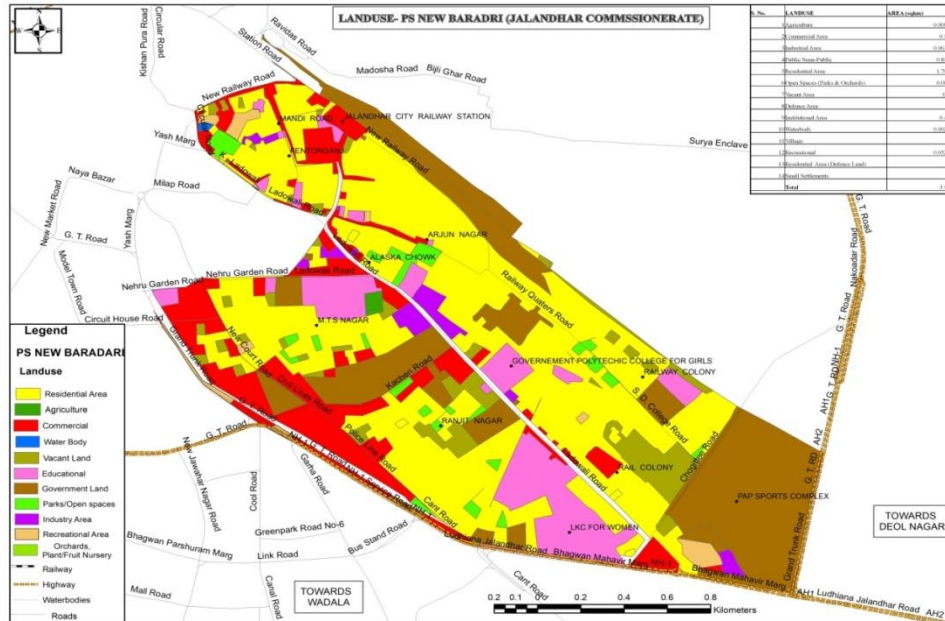
The PS New Baradari area is situated at South-South West (towards centre) direction adjoining with the Rama mandi, PS Div no.4 and PS Div no.3 on Jalandhar Commissionerate Map. It mainly covers the areas like as New Court road, Kachehri road Civil line road, Police line area and Ladowali etc. In this area the residential area is more, which is near to 43 % of total area. The PSP (Public-Semi Public) land use area is present 21% and Institutional land use covers 13% (shown in Map 5) and Vacant area covers mainly 5 % area. The mainly crime activity occur in this area is hurt (323/324), Theft in dwelling units (379/380), Excise related cases, Gambling and NDPS (related to drugs), Causing death by negligence (304-A).

**3.6.1. Analysis:**

**a). Theft and robbery** activity is very high, having Commercial and Residential activity the core area acting as regional market, attracts the regional population and different strata of population congregate in market space to access the services and Market, but it is also congested, streets are narrow as well as encroached. That attracts the criminal activities. Theft at housing dwelling, Forcibly theft and Snatching, these are the major crimes here, also policing is very difficult, here proper arrangement of surveillances are more required.



Line Graph 9: Shows the highly crimes occurred in PS New Baradari of the Jalandhar Commissionerate Source: - Primary Calculation from Jalandhar Commissionerate Data.



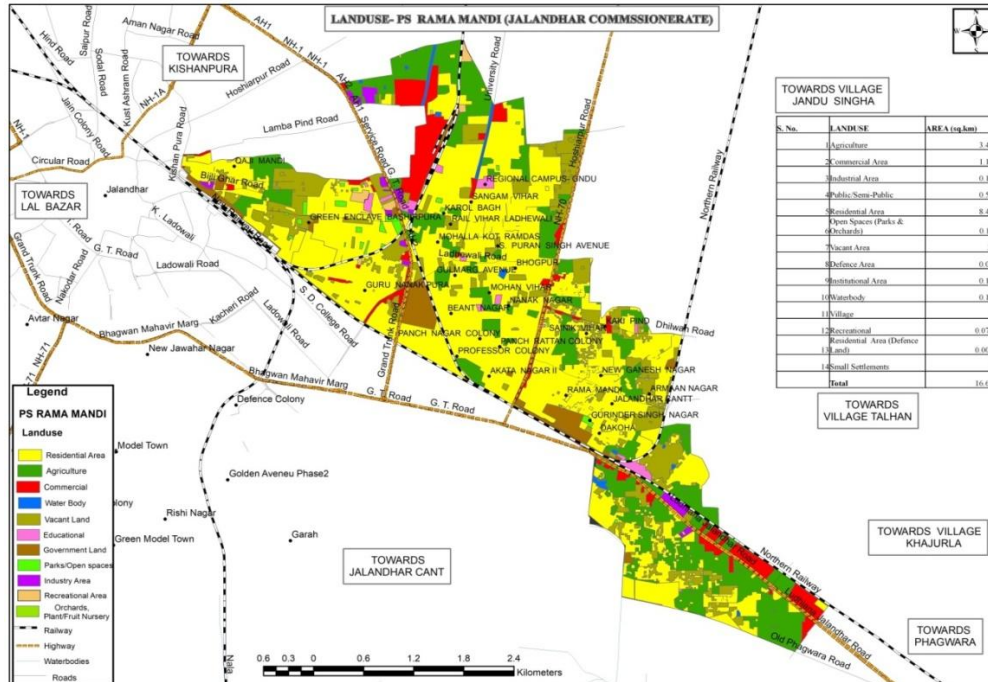
**Map 6: Land Use of PS New Baradari**  
 Source: - Google Earth & Know Your police App.

The **commercial area** is not organized, core area is organically developed

- b. Less open spaces:** Creates more vulnerable area: Hotspots to the theft activity, helps criminals to hide between these dense areas.
- c. Accidents Hot Spot Areas:** There are main vulnerable points and accidents hotspot areas in this region because of presence of educational institute on the both sides of the major sub arterial road like as LKC, KCL institute of management and technology and other schools along the main road. Which act as vulnerable points for accidents hot spots

**3.7 Police station rama mandi:-**

The PS Rama Mandi area is situated at South East (towards centre) direction on Jalandhar Commissionerate Map. It mainly covers the areas like as Rama Mandi, Dakoha, Ladhewali, Joginder Nagar and New Beant nagar etc. In this area the residential area is more, which is near to 51% of total area. The agriculture area is present 21 % (shown in Map 7) and Commercial land use covers mainly 7 % area only. The mainly crimes were committed in area under PS Div no. 1 were low in 2010 but high in 2014 (Shown in line graph no. 17). The mainly crime activity occur in this area is hurt (323/324), Theft in dwelling units (379/380), causing death by negligence (304-A), Gambling and NDPS (related to drugs).

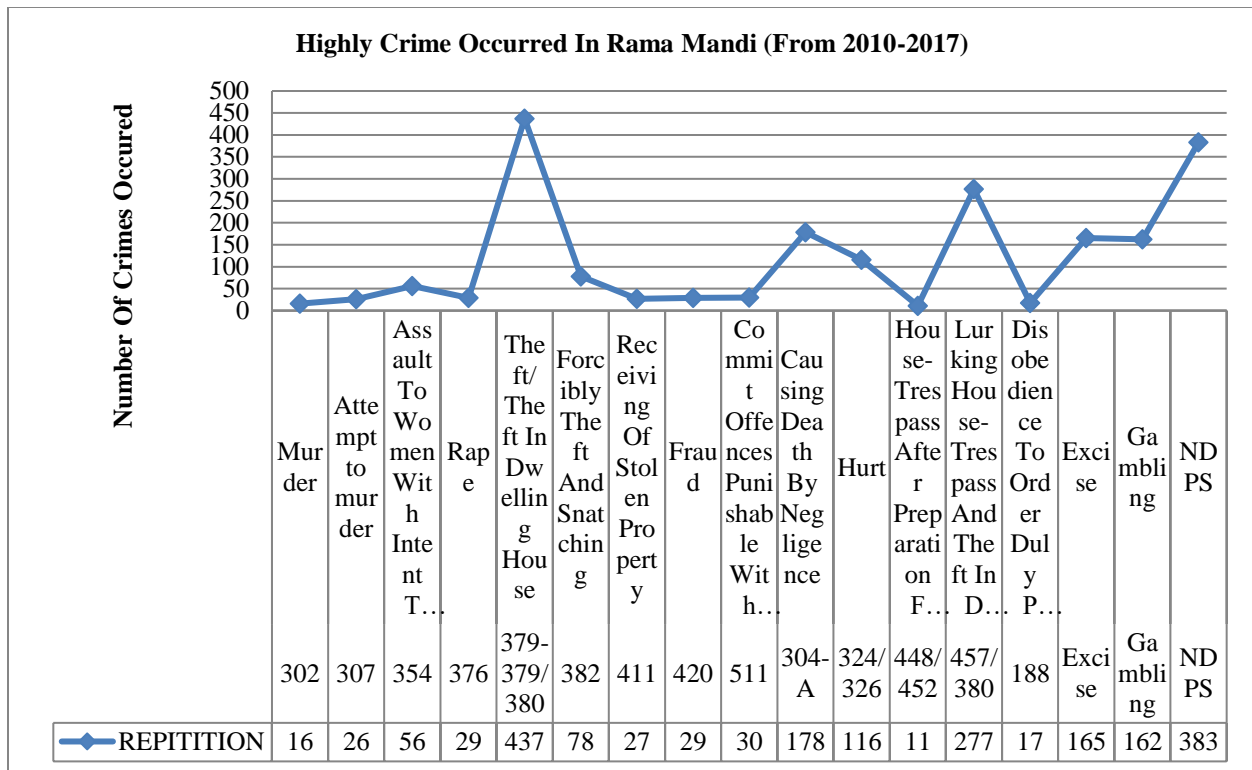


**Map 7. Land Use of PS Rama Mandi**  
 Source: - Google Earth & Know Your police App

**3.7.1. Analysis:** Rama Mandi area is situated near the outer periphery. There is haphazard and unplanned development, which is the main cause of crimes.

**a. Large availability of open spaces:** Creates more vulnerable area: Hotspots to the theft activity, helps criminals to hide between these open spaces behind the bushes and vegetation areas. It also influences the druggists and drunkard peoples to come over there for taking drugs and alcohol which make the positive cells dead in the mind of these peoples, which tends to increase the criminal activities like as theft, theft by dwelling units and assault to women by the criminals. Also there are not updated security measures which cause many theft incidents.

**b. Long Road Corridor:** Two Straight Corridors of road network in this part gives freeway movement, without proper Road ROW maintenance and direct opening of these Farms, Resorts and residential areas on this road creates problem of Speeding of vehicles and invites accidents and other mis-happenings like as causing death by negligence and NDPS activities.



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

#### IV. CONCLUSION

Quick and uncontrolled growth of urban areas is sine qua non to the urban crime upsurge. In the case of Jalandhar Commissionerate areas, an important connection between urban crime and urban planning was noted and deficiencies in growth on the one side, urban crime and neighbourhood socio-economic features on the other. It can also be found that the frequency and distribution of urban offenses are closely related to disadvantages in urban planning and development.

Security, security and justice issues are often outside municipal governments' jurisdictions. This obviously slows down activities aimed at preventing and reducing crime. Therefore, it is the responsibility of central officials (who exercise authority and decision in this regard) to collaborate, assist and include municipal officials in town crime prevention and control strategies. Urban security and security policies should address significant issues such as gender and poverty with a focus on at-risk people, including urban poor, females and young people who are most susceptible to these offences. Coordinated attempts need to be made to promote revision, upgrading and compliance with urban planning laws to guarantee appropriate access to neighbourhoods in an effort to curb the widespread incidence of crime.

Mainly there are many types of crime related problems in relation with the existing land use of Jalandhar Commissionerate City 1, which cause the repetition of crime or same type of crime in that specific area. It is very important for our administration to focus on that root causes in relation with physical environment and land uses to cover the crime hot spot areas. There is an urgent need to set the resources & information sources of police department like as City Thana Police, Chowki units, CIA, Defence /security, Patrolling force (Car and Bikes i.e PCR), Mukhbir (Human being as Source of information) in the city with proper planning of their requirement as on specific areas accordingly the pre analysis of crime data of that specific areas along with its root causes and their further chances of happening of the some specific crimes because of their existing surrounding physical environment and land use type.

Secondly as based on the analysis in this study, it is observed that there is a need for sound urban planning at the core of it, which provides space for coordinated growth. Such planning provides space for the growth of accessible and secure neighbourhoods and increased various possibilities for urban people. While infection and crime impact in the most towns to some extent, congestion is an issue everywhere. The city of Jalandhar city has traffic jams that can be as serious as those of Ludhiana city and Amritsar city area. In fact, without adequate leadership, these crime as well as traffic issues can readily worsen as the growth of haphazard development and inadequate land use type in the city. There is an important need to focus on this for reducing or controlling the criminal activities and other problems related to crime in fast growing cities like as Jalandhar.

## V. ACKNOWLEDGEMENT

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