Road Traffic Collision Analysis

Powered-2-Wheelers in the Eastern Region

Version 2.2

Funded by

Produced by

Contents

Executive summary

The aim of this document is to provide an analysis of fatal and serious-injury collisions involving powered-2-wheelers (P2W) in the Eastern Region. This is to support a Highways England led initiative to reduce the number of P2W riders killed or seriously injured (KSI) on all roads across the region.

This document draws on published STATS19 collision data for the Eastern Region, spanning the most recent 5 year period available which is from 2011-2015. The trends identified in this document are long-term in nature, suggesting they will continue into 2017 and beyond if left unchecked. This document also uses other datasets that help understand rider profiles and demographics. It examines *riders* (as opposed to casualties) involved in KSI collisions in order to determine trends in risk resulting from the net-effect of exposure and behaviour. The vast majority (96%) of P2W riders involved in KSI collisions are themselves a KSI casualty[1], so understanding the role of the rider is an effective way of understanding the casualty.

Riders of powered-2-wheelers are consistently and considerably over represented in KSI collisions compared to other types of road user. These collisions cost the public sector in the Eastern Region £38 million per year, and although rider risk has reduced since the early 1990s, this reduction has been at a slower rate than it has been for other road users.

The analysis identifies three main rider groups, which between them are involved in 76% of P2W KSI collisions. The group termed "Young Riders" are aged 16-25 and tend to ride relatively short distances on low capacity bikes in the urban areas where they live and have most of their collisions. "Commuters" are aged 26-65 and have their collisions on weekdays, mostly during morning and afternoon commuting times on urban roads. "Leisure Riders" are mainly aged 26-55 and are the group most likely to have collisions on rural roads, riding bikes with 500cc+ engines, at the weekend.

Average engine capacity, proportion of KSI on rural roads, and severity ratio[2], all increase with rider age until riders reach their late 50s. These trends are reversed for the small number of riders aged 60+, but only slightly. Younger riders tend to live in more deprived areas, ride smaller capacity bikes, and are more likely to have collisions in winter, compared to middle aged and older riders.

Overall 56% of P2W KSI are on urban roads, with the biggest urban-road issue being collisions at junctions involving other vehicles[3], often when the other driver is making a right hand turn and failing to give way to the motorcycle. Errors made by P2W riders most frequently lead to rear-end collisions with other vehicles, head-on collisions when overtaking, loss of control (both with and without the involvement of other vehicles), and collisions when filtering through heavy traffic.

Large urban areas have the greatest concentration of P2W KSI collisions, and these are most likely to occur during weekday commuting times. There is a smaller, secondary issue involving larger capacity bikes, often on rural roads during the afternoons at the weekend.

[1] The remaining 4% are involved in KSI collisions where one or more pedestrian, other vehicle occupant or other P2W rider is injured. They themselves may be uninjured or suffer a slight injury.
[2] The proportion of all casualties which are fatal or serious.
[3] "Other vehicles" defined as all motorised traffic, excluding other P2Ws. 86% of "other vehicles" are cars, and 7% are vans.

Conclusions & Recommendations

1. The following areas have specific local issues with P2W casualties; Norwich, Bedford, Colchester, Ipswich, Southend-on-Sea, Epping Forest, Hertsmere and Three Rivers. These eight areas account for 20% of the KSI collisions analysed for this report.

   ***Recommendation**: Use the local profile documents available from the author, for the areas listed above, to inform bespoke local interventions.*

2. P2W KSI collisions are geographically most concentrated in urban areas; 56% of P2W KSI take place on urban roads. All types of rider are involved in urban collisions, although collisions on urban roads are the ones most likely to take place during weekday commuting times or involve the smaller bikes most commonly used by younger riders. Most of these collisions involve another vehicle (usually a car), often turning right at a junction into the path of a P2W, or failing to give way at a roundabout. When P2W riders contribute to collisions involving other vehicles it is often while carrying out a manoeuvre such as overtaking, filtering through slower or stationary traffic, or running into the rear of vehicles when traffic is slowing or stopping. Peak times for urban collisions are usually during afternoon commuting times on weekdays.

   ***Recommendation**: Enforcement activity addressing driver distraction and poor manoeuvres by drivers and riders to concentrate on urban areas during afternoon commuting times.*

   ***Recommendation**: Publicity campaign to encourage other vehicle drivers to look out for motorcycles, particularly at junctions.*

   ***Recommendation**: Consider campaign to lobby for the introduction of a "vulnerable road users" element to the driving test, requiring new drivers to demonstrate an understanding of how to fulfil their duty of care to vulnerable road users, including P2W riders.*

   ***Recommendation:** Campaign aimed at normalising good practice for P2W riders when riding on busy urban roads, such as safe filtering/overtaking and avoiding rear end collisions with slowing traffic. Campaign media and content to be tailored for main Mosaic groups identified in this document.*

3. Middle aged riders have the lowest individual rider risk per vehicle mile, but they are the most numerous on the road. They are the group most likely to ride 500cc+ bikes and are prevalent in the rural road collisions most likely to result in serious or fatal injuries. Causes of rural road collisions away from junctions are more likely to be attributed to the P2W rider than drivers of other vehicles. Loss of control, including on bends, is a common type of collision and is consistent with excess speed. It is likely these riders know the risks, and enjoy the risks, so simply discouraging excess speed is unlikely to have a long term impact outside of a specific speed enforcement campaign. Better riding skills, road craft and judgement of potential hazards may be a way of preventing rider behaviour turning into KSI casualties.

   ***Recommendation**: Rear facing average speed systems to be considered for routes identified in figure 13 on page 16 of this document.*

   ***Recommendation**: Campaign to increase participation in rider skills courses, focussing on road craft and hazard perception, using main Mosaic groups identified in this document to help target engagement.*

4. Young riders are a very high risk group but many only ride a P2W for a few years, possibly deterring some from investing in training and equipment. Inexperience dealing with risks posed by other road users and careless or reckless behaviours appear to be the root cause of the mainly urban collisions young riders are involved in. This group are most over represented in low income areas.

   ***Recommendation**: Create and incentivise participation in road craft, bike handling and hazard perception training tailored for young riders.*

   ***Recommendation**: Publicity and engagement materials to be designed to appeal to young males, particularly those living in lower income areas.*

Background

Prevalence

The chart below shows that with the exception of Bedfordshire and Essex, there are around 1.5-2.0 P2W riders involved in a KSI collision per million vehicle miles. Since 2012/2013 Bedfordshire and Essex have seen an increase in the rate of P2W riders involved in KSI collisions on their roads.

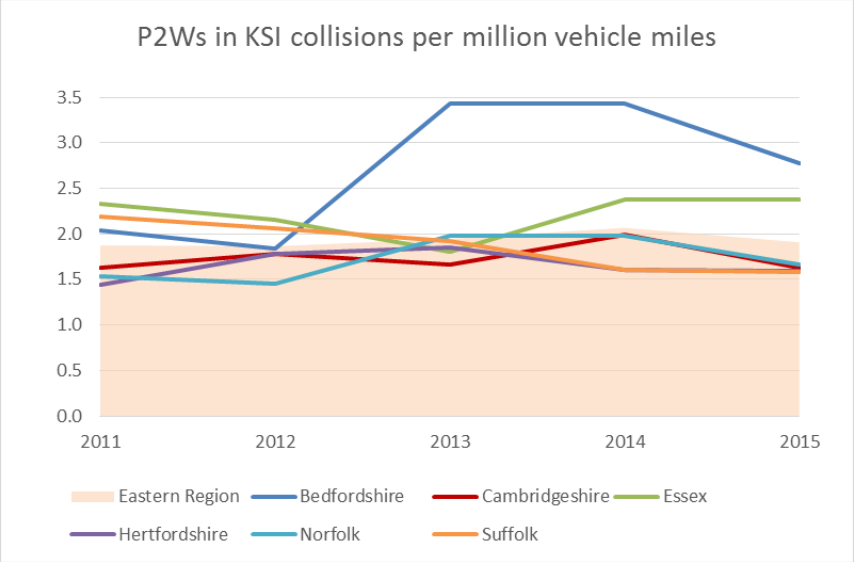


Figure 1: P2W KSI collision involvements per vehicle mile

It is important to note that vehicle mileage data is derived by applying national travel survey data to local population estimates. This can result in a loss of accuracy for smaller areas, or areas with different demographics and geography to the UK average – a higher than average rate of P2W owner/ridership in a local area may result in an artificially inflated rate of collisions-per-vehicle-mile.

To adjust for this effect we can use an alternative measure of "P2Ws in KSI collisions per registered bike" (using DVLA registration data[4]). This gives the following chart:

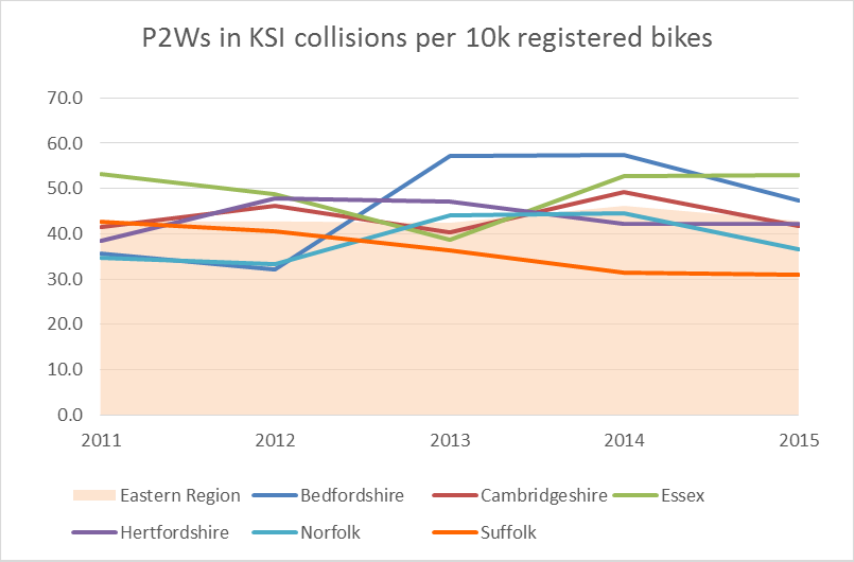


Figure 2: P2W collision involvements per 10k registered bikes

[4] See appendix for DVLA registration data.

This measure shows much less variation between different areas, indicating the number of P2Ws involved in KSI collisions in a given area[5] is fairly dependent on the number of bikes registered in that area. However, this still shows Bedfordshire and Essex as having above average rates of P2W KSI collision involvement.

The chart below shows the proportion of all KSI collisions which involve a P2W rider usually varies between 23% and 29%. In contrast, P2W riders account for around 0.6% of private motorised traffic by miles travelled[6]. This means that P2W riders are considerably over-represented in KSI collisions. This graph also shows the proportion of KSI involving a P2W increased sharply in Suffolk in 2015.

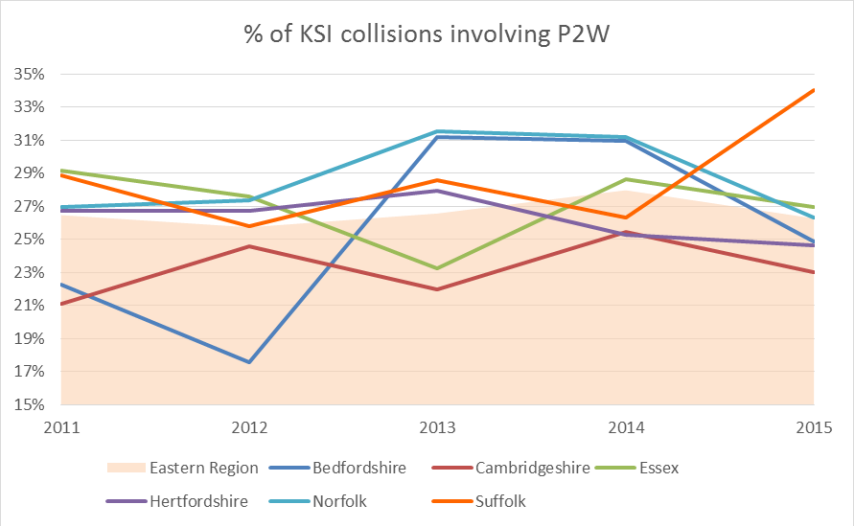


Figure 3: Percentage of all KSI collisions involving a P2W

Key Findings:

Across the Eastern Region there are around 1.5-2.0 P2W riders involved in a KSI collision per million vehicle miles. The number of P2Ws involved in KSI collisions in a given area is fairly dependent on the number of bikes registered in that area.

Bedfordshire and Essex have above average rates of P2W KSI collision involvement.

P2W riders are consistently over-represented in KSI collisions as they only account for around 0.6% of vehicle miles but 23-29% of KSI casualties.

[5] Applicable to areas the size of any of the Eastern Region Police forces, may not be applicable to smaller areas.
[6] National Travel Survey, table NTS0305, 2014.

The chart below shows the proportion of P2W riders involved in KSI collisions in the Eastern Region, by the Police force in which the collision took place.

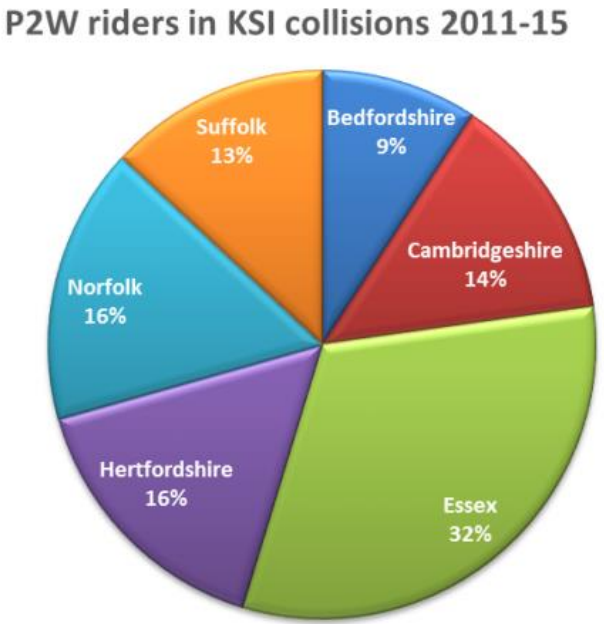


Figure 4: Proportion of P2W KSI collision involvements by Eastern Region Police force area

This shows nearly a third of P2W riders involved in KSI collisions had their accident in Essex. The next busiest areas (Norfolk and Hertfordshire) each have only half the number of rider KSI involvements as Essex.

Despite its higher rate of involvements per vehicle mile and slightly higher rate per registered bike, the *total number* of rider involvements in Bedfordshire is relatively small, due to it having the smallest population in the region – see table below. Essex combines a relatively high rate of P2W KSI involvement with the largest population in the region.

Police Area	Population (2015 mid-year estimate)	P2W riders in KSI collisions 2011-15	Involvements per 100k population
Bedfordshire	654,984	275	0.42
Cambridgeshire	841,218	405	0.48
Essex	1,787,037	952	0.53
Hertfordshire	1,166,339	475	0.41
Norfolk	884,978	486	0.55
Suffolk	741,895	390	0.53

Figure 5: Eastern Region populations and P2W KSI involvements

Key Finding:
Norfolk, Suffolk and Essex have the highest rates of P2W riders involved in KSI per 100k local population. Essex accounts for 32% of P2W KSI in the region and 29% of the population.

National comparison

National data for the relative risk of different modes of transport for 2015[7] in the graph below shows P2W riders to be at considerably higher risk than users of other modes of transport. The risk in the Eastern Region is slightly higher than the average P2W risk nationally.

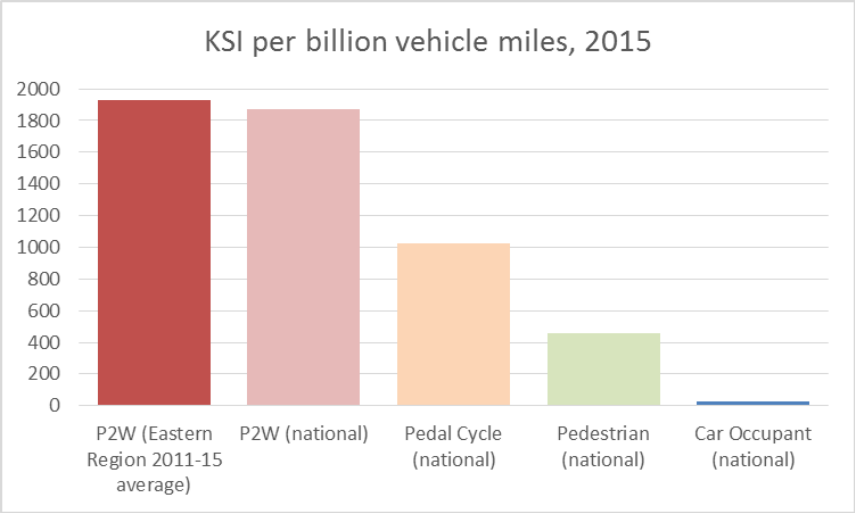


Figure 6: KSI per billion vehicle miles by transport mode

The document "Motorcyclists involved in collisions on the Strategic Road Network"[8] examines reported injury collisions involving motorcycles on Highways England's Strategic Road Network (SRN), nationally, between 2010 and 2014 (with some 2015 data). It provides detailed analysis of P2W issues on the types of road referred to here as "trunk roads". As such most of the results are not directly comparable with the findings of this document, so the two should be read in conjunction as complementary pieces of work. However, the following findings are worthy of note:

- Severity ratio is very similar in both documents; East of England trunk roads: 38%. National SRN: 37%.
- Peak time analysis shows similar patterns with peaks around weekday commuting times and afternoons at the weekends.
- The SRN document shows an October peak for smaller bikes and summer peak for larger bikes. This is similar, albeit not identical to the seasonal trends described in this document which show a September peak for younger riders (who tend to be on smaller bikes) and a summer peak for older riders (who tend to be on larger bikes).
- The SRN document identifies 5 main types of rider, compared to the 3 identified in this document[9]. The 5 rider types in the SRN document have clear equivalents in the 3 types identified here.

SRN Document	This Document
Middle aged male, modest income, commuting on a small bike.	Commuter
Middle aged male, higher income, riding a more powerful bike for leisure at the weekend.	Leisure Rider
Young male living with his partner on a very low income, using a bike with a small engine for commuting.	Young Rider
Young male student living with parents using a bike with a small engine to get to school, part time work and to meet friends.	
Young male, very similar to #3 but on a slightly higher income and with a higher level of education.	

[7] https://www.gov.uk/government/publications/reported-road-casualties-great-britain-annual-report-2015
[8] Author: Tanya Fosdick, Road Safety Analysis Limited.
[9] Commuter, Leisure Rider, and Young Rider

Long term trends

Data from the DfT below shows long term national trends in P2W rider casualties. This shows a long term reduction in P2W KSI casualties at a time when miles travelled by P2W have fluctuated but returned to values close to the 1990-94 average, in recent years. This data also indicates that KSI reductions enjoyed by other road users have been greater than those recorded for P2W riders, as the proportion of all KSI that involve a P2W has increased by 50%.

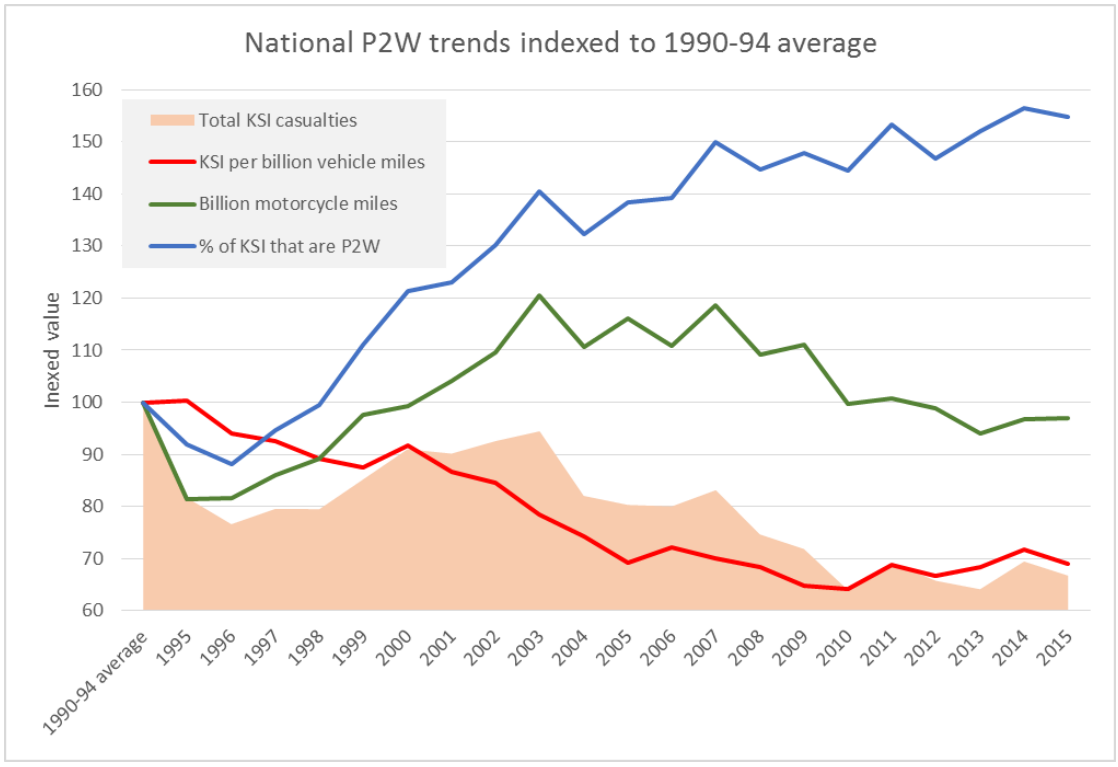


Figure 7: Long term national P2W trends

Financial cost

The DfT document "Transport Analysis Guidance" (TAG) provides a breakdown of the costs associated with road traffic collisions. Each cost element is defined as follows:

- **Lost output** – Days of lost productivity by workers due to injury and death. Calculated on a *per casualty* basis.
- **Human costs** – Includes ongoing health and social care costs but most of this is made up of the intangible, non-cashable value of "costs people would be willing to incur to prevent the casualty". Calculated on a *per casualty* basis.
- **Medical and ambulance** – Immediate emergency response and treatment in hospital. Does not include ongoing social care costs resulting from life-changing injuries, or other rehabilitation costs. Calculated on a *per casualty* basis.
- **Police cost** – The cost of emergency response and scene management, as well as subsequent collision investigation costs. Calculated on a *per collision* basis.
- **Damage to property** – Cost of replacing or repairing property damaged in the collision. Calculated on a *per collision* basis.
- **Insurance and admin** – Additional costs of insurance not included under property damage. Calculated on a *per collision* basis.

The document *Evaluating the costs of incidents from the public sector perspective, IAM Roadsmart – August 2016*[10] provides a figure for the ongoing health and social care costs per casualty by severity. This figure combines the tangible cashable component of Human Costs, with the Medical & Ambulance costs, it is shown as the item "Total Health & Social Care" in the table below. Using this figure allows us to estimate to total financial burden on the public purse from collisions involving P2Ws. A full breakdown of costs is shown in the appendix, with annual averages summarised below:

Cost element: P2W casualties and collisions	Eastern Region Annual Average			
	Fatal	Serious	Slight	Total
Lost Output	£27,213,404	£15,442,080	£4,518,671	£47,174,155
Total Human costs	£53,484,344	£105,215,884	£21,530,936	£180,231,164
Intangible Human costs	£53,349,450	£82,657,350	£20,509,211	£156,516,012
Medical & Ambulance	£241,786	£9,268,431	£1,916,875	£11,427,092
Social Care	£134,894	£22,558,533	£1,021,724	£23,715,152
Total Health & Social Care	£376,680	£31,826,965	£2,938,599	£35,142,244
Police costs	£738,475	£1,269,634	£771,388	£2,779,497
Damage to Property	£453,538	£3,030,150	£4,215,337	£7,699,025
Insurance & Admin	£12,394	£112,949	£161,528	£286,870
Total cost to society	***£82,143,941***	***£134,339,127***	***£33,114,735***	***£249,597,803***
Total financial cost	***£28,794,491***	***£51,681,777***	***£12,605,523***	***£93,081,791***
Total public sector cost	***£1,115,155***	***£33,096,599***	***£3,709,988***	***£37,921,741***

Figure 8: Summary of costs resulting from P2W collisions

The total cost to society is the sum of all exclusive[11] cost items in each column, the total financial cost excludes the intangible human costs, and the public sector cost is the sum of Police, Health and Social Care costs.

Key Findings:

P2W riders are at considerably higher risk of being killed or seriously injured than users of other modes of transport. This risk has reduced since the early 1990s, but by a smaller factor than the risk for other road users.

Injuries to P2W riders on the roads in the Eastern Region cost the public sector £38 million per year.

[10] From https://www.iamroadsmart.com/docs/default-source/research-reports/evaluating-the-costs-of-incidents-from-the-public-sector-perspective.pdf?sfvrsn=0 Accessed 6th January 2017.

[11] Includes Total Human costs and Medical & Ambulance costs, excludes Social Care (part of Total Human costs) Total Health & Social Care (this is the sum of Medical & Ambulance and Social Care) and Intangible Human costs (part of Total Human costs).

Geographic analysis

KSI Collision Locations

Hotspot areas

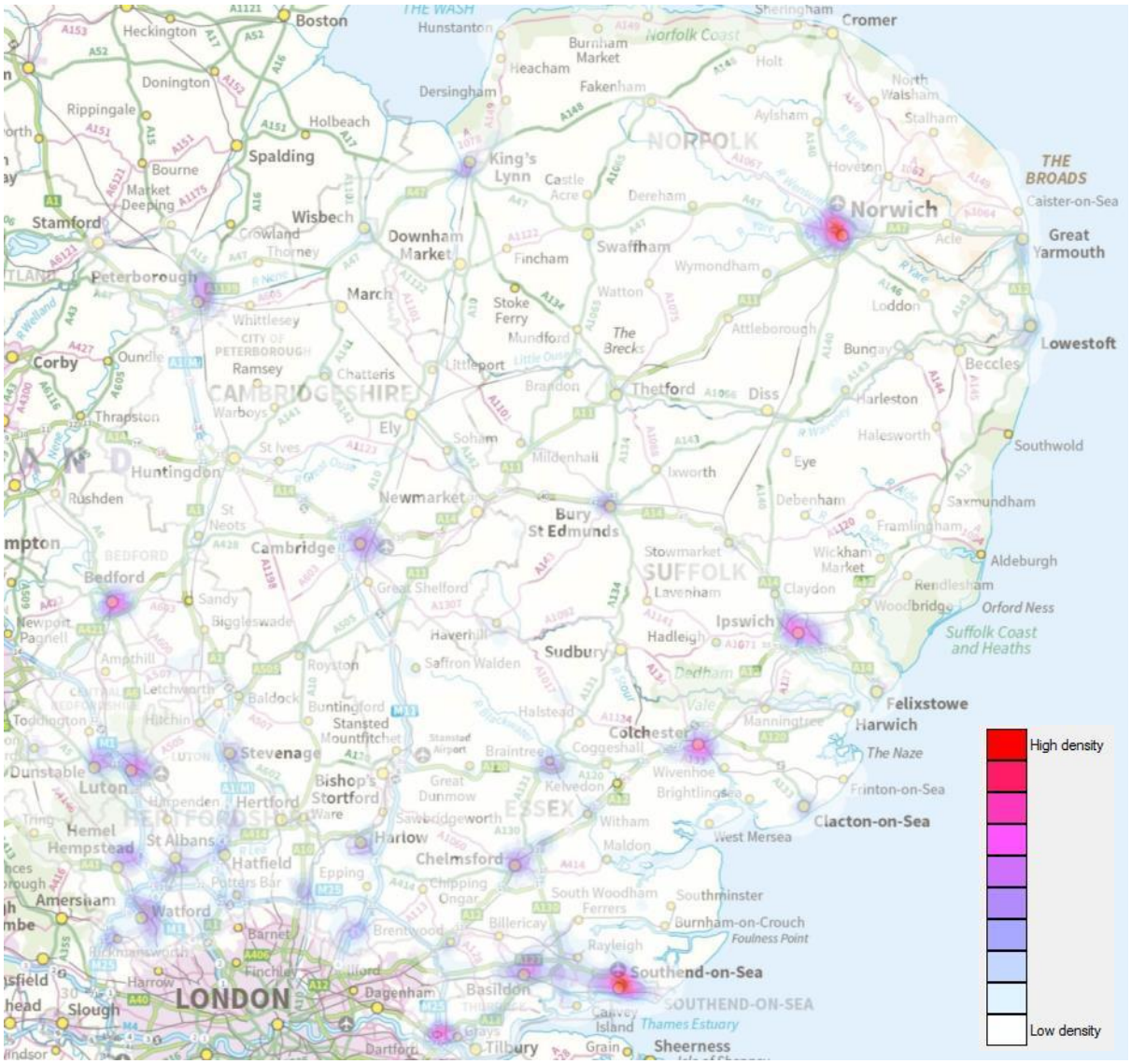


Figure 9: Hotspot map for KSI collisions involving a P2W

The map above shows most KSI collision hotspots to be located in larger urban areas, particularly Norwich, Southend, Ipswich, Bedford and Colchester. There are a number of smaller hotspots and these are concentrated in the southern part of the region. There is also a concentration in the vicinity of the Dartford River Crossing, which includes the A282, M25, A13 and roads around the Lakeside shopping centre.

These are the areas where any localised initiatives aimed at drivers and riders on the road should be concentrated.

Road types

The table below gives a breakdown of the proportion of P2Ws involved in a KSI collision, by the type of road where the collision took place, for each Police Force area in the Eastern Region. These road types are defined as:

- **Urban:** All roads up to and including 40mph speed limit.
- **Rural:** Roads with a 50-60mph speed limit, excluding dual carriageways and slip roads.
- **Trunk:** Dual carriageways and slip roads with a 50-60mph speed limit, and all roads with a 70mph speed limit.

Area	Urban	Rural	Trunk
Bedfordshire	60%	33%	7%
Cambridgeshire	44%	40%	16%
Essex	60%	27%	13%
Hertfordshire	60%	23%	17%
Norfolk	54%	43%	3%
Suffolk	56%	39%	5%
Eastern Region	***56%***	***33%***	***11%***

Figure 10: Percent of P2Ws involved in KSI collisions by road type for each force area

This shows there is some variation between areas, which may reflect the differing highway network across the region. The following table shows the number of P2W KSI involvements per 100km of carriageway, broken down by urban, rural and trunk roads.

Key Finding:
KSI collision hotspots tend to be located in larger urban areas, particularly Norwich, Southend, Ipswich, Bedford and Colchester, with over half of all KSI collisions being on urban roads. 56% of P2W KSI are on urban roads and 33% on rural roads.

Area	Urban	Rural	Trunk	All roads
Bedfordshire	14	6	19	10
Cambridgeshire	13	4	26	7
Essex	15	5	50	10
Hertfordshire	11	5	68	10
Norfolk	20	2	9	5
Suffolk	16	3	16	6
Eastern Region	***14***	***4***	***32***	***7***

Figure 11: P2W KSI collision involvements per 100km of carriageway

The table above shows the greatest concentration for collisions by mile of carriageway is on trunk roads. However in the Eastern Region there is a traffic density[12] of 19.4 million vehicle miles per mile of carriageway for trunk roads, compared to 0.8 for rural roads and 1.3 for rural roads. Traffic density may therefore explain much of the difference between urban, rural and trunk road collision involvement rates.

[12] Calculated using national statistics tables TRA01 and RDL02

Figure 10 shows the majority of collisions in all Police Force Areas except Cambridgeshire are on urban roads. Most of the variation between Police Forces is in the proportion of KSI on rural and trunk roads. This data suggests advice for different types of riding should be focussed as follows:

- Urban riding – Bedfordshire, Essex, Hertfordshire, Norfolk, Suffolk
- Rural riding – Cambridgeshire, Norfolk, Suffolk
- Trunk road riding – Cambridgeshire, Essex, Hertfordshire

Severity factor is a measure of the proportion of all recorded injury collisions that resulted in serious or fatal injuries. Comparing severity factor for the three main road types shows:

- Urban road P2W severity factor 26%
- Rural road P2W severity factor 43%
- Trunk road P2W severity factor 38%

Therefore collisions on rural roads are the ones most likely to result in a KSI. This is likely to be related to vehicle speed and traffic segregation; urban roads tend to have the lowest speeds hence the lowest severity factor (least likely that any given casualty is a KSI), trunk roads tend to have the highest speeds but have segregation of traffic flows, rural roads combine higher vehicle speeds with a lack of "Safer Systems" features, resulting in the highest severity factor.

The following table gives a breakdown of total KSI collision involvement for the 5 year period by P2W engine size and road type.

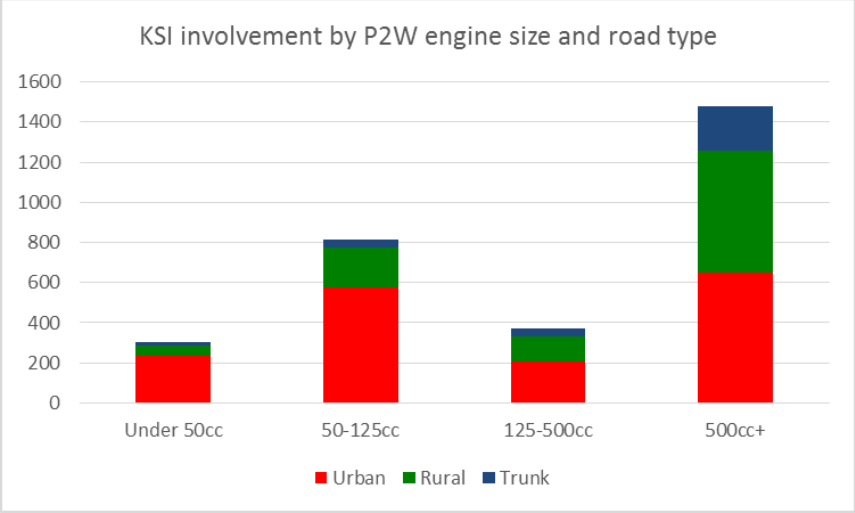


Figure 12: P2W KSI involvement by engine size and road type

Despite comprising only 38% of bikes in all KSI collisions, P2Ws with engines up to 125cc account for 49% of urban KSI. While half of all bikes involved in a KSI have 500cc+ engines, these are under-represented in urban road collisions (39% of urban KSI), but over represented in rural-road collisions (62% of rural KSI) and trunk road collisions (70% of trunk road KSI).

Key Findings:
Collisions are more likely to occur on roads with higher traffic densities. However, higher vehicle speeds and absence of traffic segregation means that collisions on rural roads are the ones most likely to result in a KSI.

Bikes with engines up to 125cc are over represented on urban roads, while bikes with 500cc+ engines are over represented on rural and trunk roads.

Routes

The following table shows the classified roads with the highest number of P2W KSI collisions during the 5 year period. In order to avoid double counting with the urban hotspots identified previously, this routes analysis only includes roads with speed limits of 50mph or above. Between them, these 22 routes account for 16% of *all* P2W KSI collisions in the region.

Route	% of total P2W KSI
A47	1.7%
A12	1.3%
A414	1.1%
A10	1.0%
A1	0.9%
A14	0.9%
M25	0.8%
A127	0.8%
A143	0.8%
A142	0.7%
A149	0.7%
A505	0.7%
A507	0.6%
A120	0.5%
A140	0.5%
M11	0.5%
A131	0.5%
M1	0.5%
A13	0.4%
A41	0.4%
A428	0.4%
A5	0.4%

Figure 13: Non-urban routes with most P2W KSI collisions

Figure 13 shows which routes had the greatest number of P2W collisions on them, regardless of route length. Therefore some high risk routes may not appear on this list if they are short roads.

The following map shows collision frequency along these routes, highlighting the sections which see a relatively high frequency of P2W collisions. This map also includes a number of major roads not included in the table on the left, which are relatively short in length so would not feature in the table due to having a low total number of collisions despite a potentially high frequency of collisions per mile of carriageway. A full list of these roads can be found in the appendix.

Key Finding:
Around 16% of the collisions in the region take place on a group of 22 classified major roads, outside of urban areas.

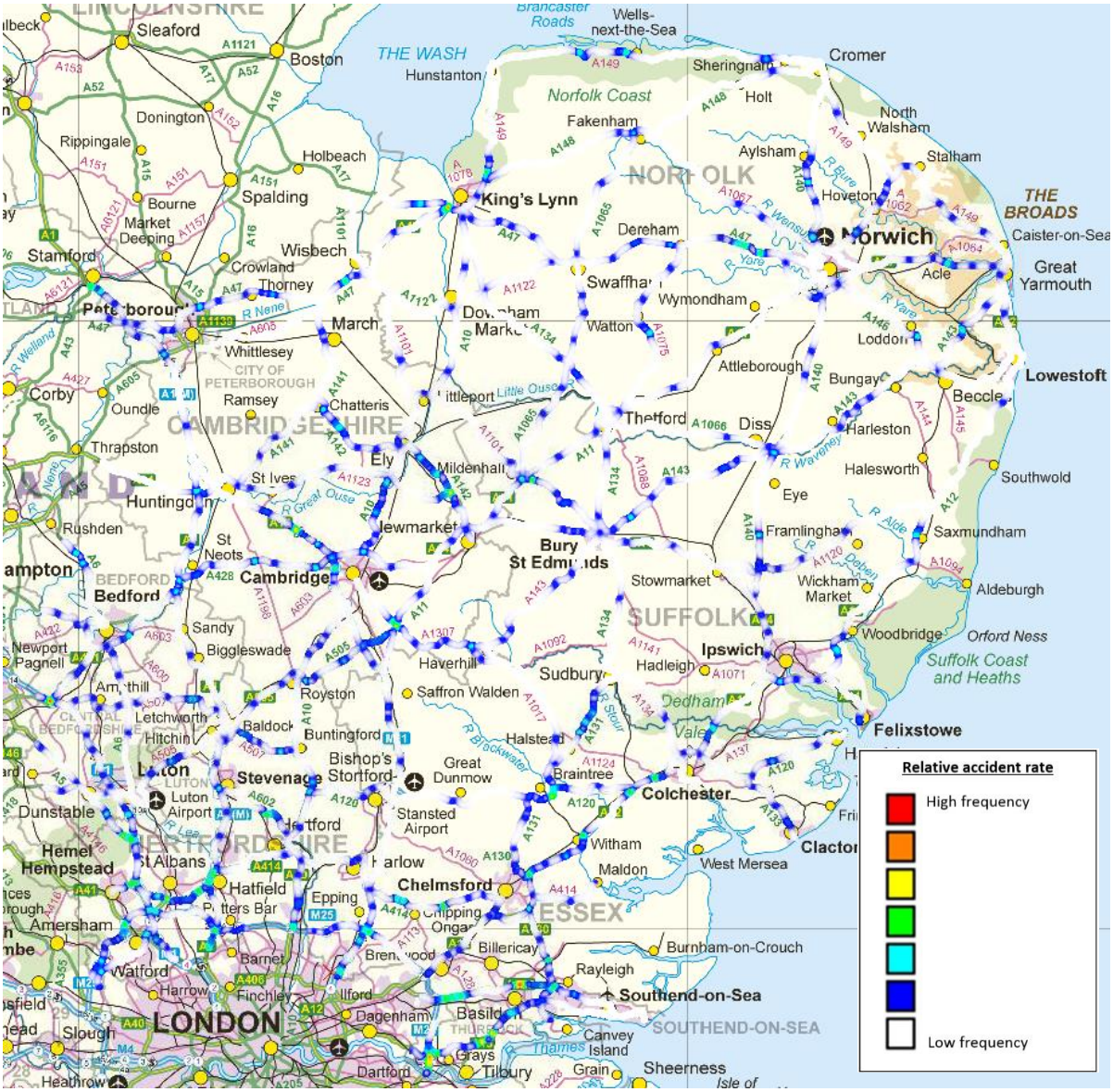


Figure 14: P2W Route analysis

The route analysis shows the stretches of road with the greatest collision frequency include the following:

- A17 / A47 junction west of Kings Lynn and A149 north of Kings Lynn
- A47 west of Norwich
- A142 south of Mildenhall
- A14 north-west of Cambridge
- A11 junction with A505
- A5 south of Dunstable
- A1 Hatfield
- A127 west of M25
- A127 Basildon
- A13 and M25 DRC approach
- A13 Stanford-le-Hope
- A120 Braintree

Close-up images of these areas can be found in the appendix.

Rider home address

The map below shows collision locations colour coded by the Police Force area where the rider's home address is located. For example a green square in Norfolk shows a Norfolk collision involving a Suffolk-based rider. ***This indicates where riders involved in specific collisions come from.***

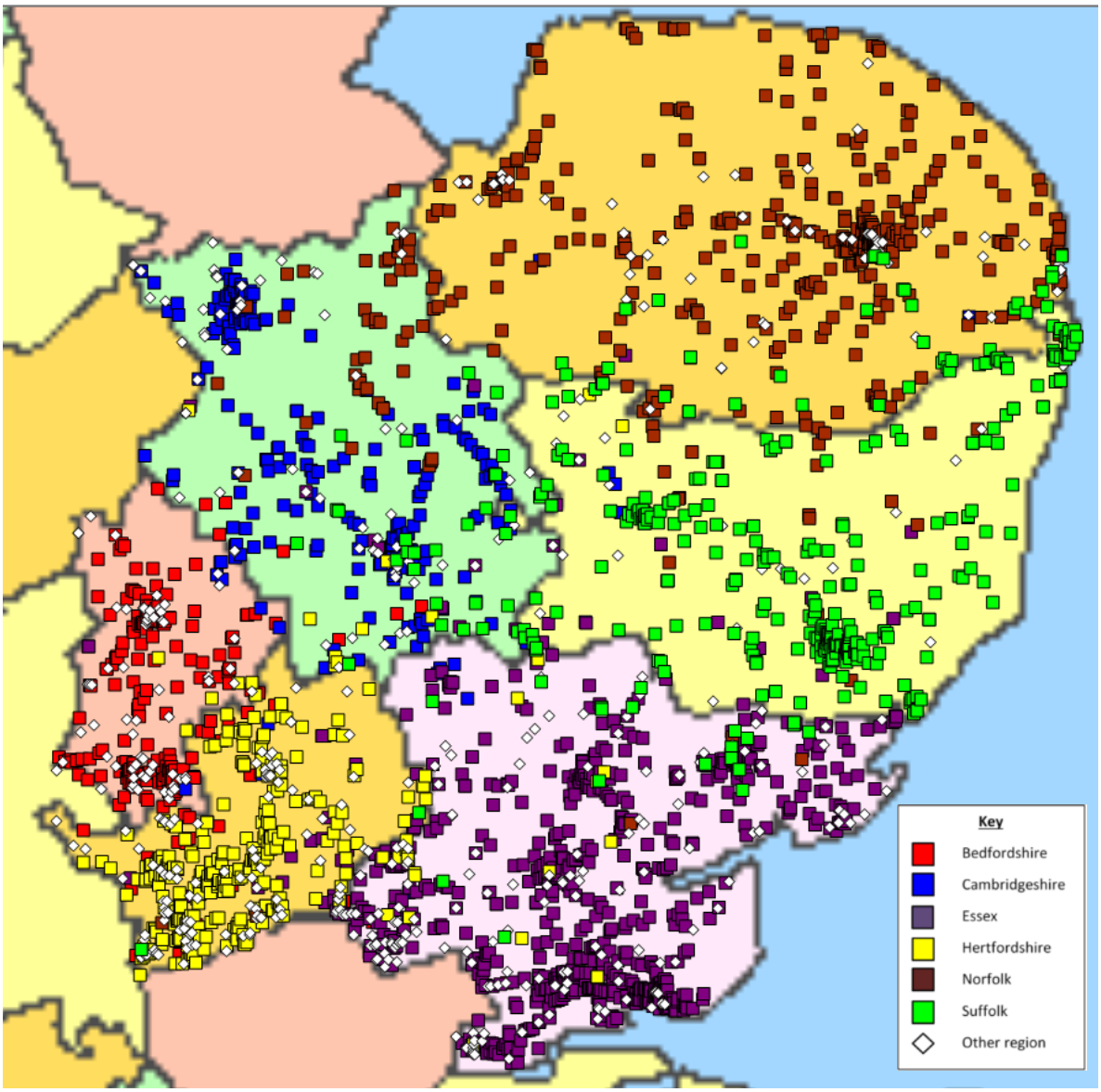


Figure 15: Collision location by home Police Force for P2W riders involved in KSI collisions in the Eastern Region

This shows most collisions involve riders from the same Police Force area as where the collision took place. Most cross border activity is close to the borders indicating there is *not* much impact on local figures from long distance riders.

Essex, Hertfordshire and Bedfordshire see most riders from outside the region, this is likely because these areas include most of the region's border area.

There is a fair degree of overlap involving Suffolk, with many riders from Suffolk having collisions in Norfolk, Cambridgeshire and Essex, while a number of riders from Norfolk and Essex have collisions in Suffolk. North-East Cambridgeshire sees a majority of its involved riders coming from Norfolk and there is a lot of movement from Bedfordshire into North Hertfordshire.

The map below reverses the key of the previous map, showing approximate home address locations for P2W riders involved in KSI collisions in the Eastern Region, colour-coded by the police force area where they had their collision. In other words the location of the square shows where the rider lives, and colour indicates the Police Force area where they had their collision. For example a green square in Norfolk shows a Norfolk-based rider had a collision somewhere in Suffolk. ***This indicates where riders in specific areas go to for their collision.***

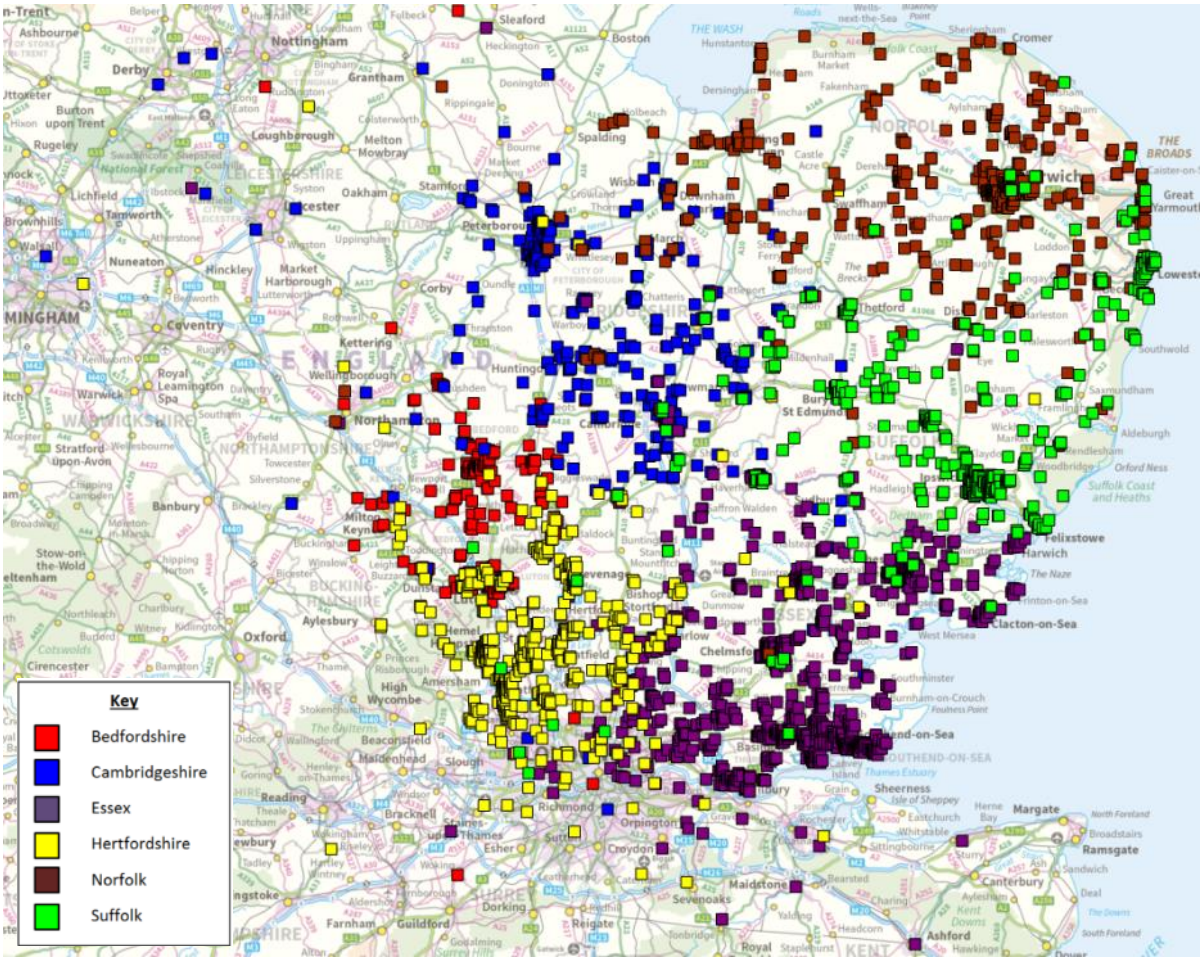


Figure 16: Home address locations for P2W riders involved in KSI collisions in the Eastern Region

This shows the vast majority of riders come from within the region and parts of London north of the River Thames. Most riders from outside of the region are from East London (collisions in Essex), North London (Hertfordshire) and Northamptonshire (Bedfordshire).

The map also shows most riders have their collision in their home force, with the majority of 'cross-border' riders living near the border and having their collision in a *neighbouring* force area. A very small number of riders travel across the region or from other regions to have their collision.

The following map shows where the hotspot locations for rider home-addresses are.

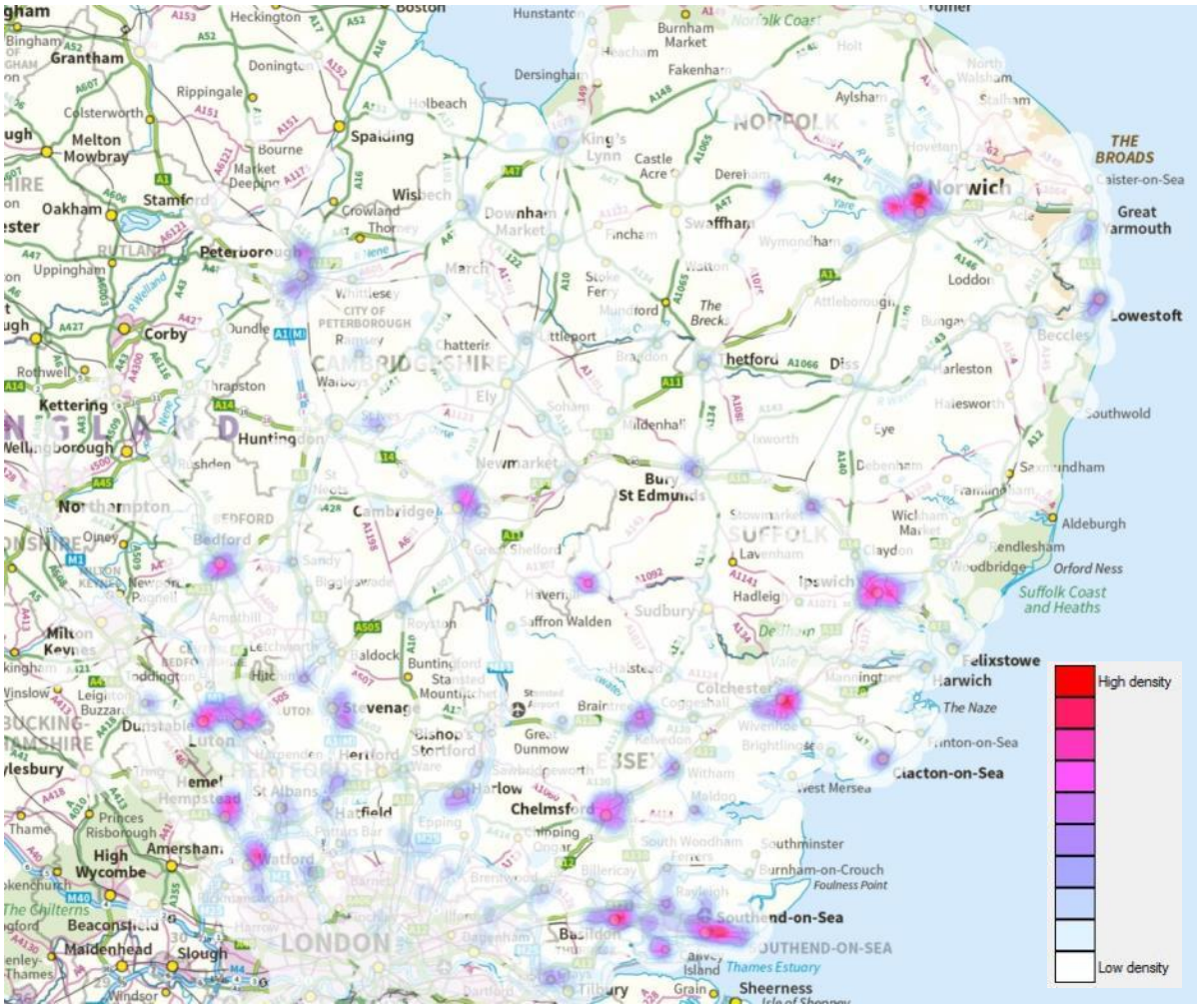


Figure 17: Hotspot map for home address of P2W riders involved in KSI collisions

The map above shows the pattern of rider-home-address hotspots are more dispersed than the pattern for collision location. Hotspots are still concentrated in urban areas, but places like Luton, Hemel Hempstead, Watford, Chelmsford, Basildon and Cambridge are more prominent than they are on the collision location map.

This suggests riders who live in Luton, Hemel Hempstead, Watford, Chelmsford, Basildon and Cambridge are more likely to have collisions in areas away from the town where they live.

All the hotspot areas shown above are the areas where a campaign aimed at *local resident* P2W riders should be focussed.

Key Findings:
Most cross border activity is close to the borders indicating there is *not* much impact on local figures from long distance riders. Furthermore most riders have their collision in their home Police Force area, with the majority of 'cross-border' riders living near the border and having their collision in a *neighbouring* force area.

There is a more dispersed pattern of rider home hotspots compared to collision location hotspots, but they are still most concentrated in urban areas.

Rider neighbourhood types

The graph below shows the proportion of P2W riders involved in a KSI by *Income* deprivation decile[13] of their home address. The data used includes just those riders who live in the Eastern Region.

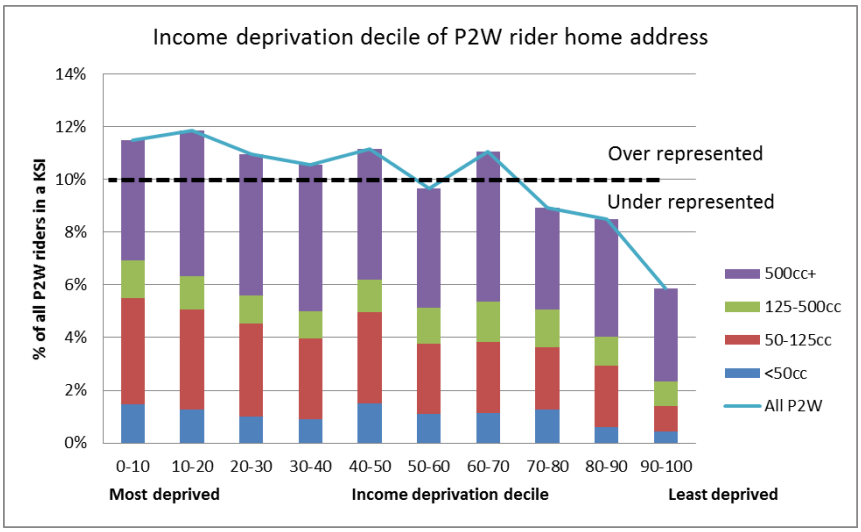


Figure 18: Deprivation decile of P2W riders by motorcycle engine size

The general population of the Eastern Region is evenly distributed across the deprivation deciles (i.e. not *normally* distributed, so there are the same *number of people* in each decile). This indicates P2W riders involved in a KSI are slightly more likely to come from areas with average to lower levels of income. Although it is only at the very highest levels of income that P2W rider involvement in a KSI becomes notably less likely. This data suggests engagement designed for people with average to lower incomes would be most likely to find the target audience.

The next graph shows the same data split by Mosaic[14] grouping.

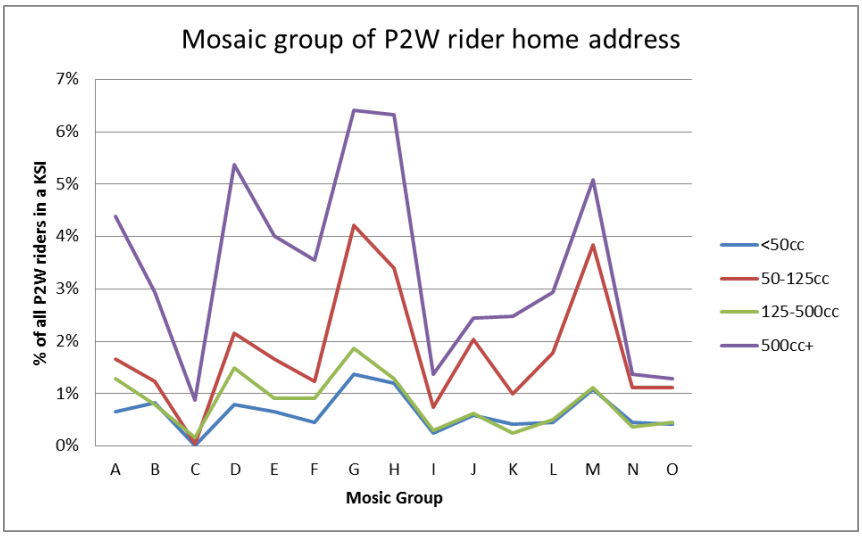


Figure 19: Mosaic grouping of P2W riders by motorcycle engine size

[13] IMD – Indices of Multiple Deprivation. This is a measure of how deprived or affluent an area is. Areas are sorted in order of deprivation and divided into 10 equal deciles, with 0-10 being the most deprived and 90-100 being the most affluent. These deciles are for the population of the Eastern Region.

[14] Mosaic is a socio-economic tool for categorising the predominant types of household in a residential postcode area.

For the most common type of motorcycle (500cc+) the most common Mosaic types are:

- A: Well-off owners in rural locations enjoying the benefits of country life
- D: Thriving families who are busy bringing up children and following careers
- G: Householders living in inexpensive homes in village communities
- H: Younger households settling down in housing priced within their means
- M: Families with limited resources who have to budget to make ends meet

This shows riders of 500cc+ bikes are from a range of areas, from well-off rural communities to areas where people live on tight budgets.

For the second most common type of motorcycle (50-125cc) the most common Mosaic types are:

- D: Thriving families who are busy bringing up children and following careers
- G: Householders living in inexpensive homes in village communities
- H: Younger households settling down in housing priced within their means
- J: Educated young people privately renting in urban neighbourhoods
- M: Families with limited resources who have to budget to make ends meet

This shows riders of 50-125cc bikes also come from a range of areas, although these tend to be less affluent than the places where 500cc+ riders live.

Communications strategies for these Mosaic groups can be found in the appendix.

Key Findings:
P2W riders involved in a KSI are slightly more likely to come from areas with average to lower levels of income, although it is only at the very highest levels of income that P2W rider involvement in a KSI becomes notably less likely. Riders of 500cc+ bikes are from a range of areas, from well-off rural communities to areas where people live on tight budgets. Riders of small bikes up to 125cc also come from a range of areas, although these tend to be less affluent than the places where 500cc+ riders live.
The over-representation of riders in lower income areas reflects a wider trend in deprivation being a predictor of collision risk for all road users. Although not possible to test using STATS19 data, it is possible deprivation may be linked to specific risk factors such as level of bike ownership, behavioural trends, bike maintenance and quality and usage of protective equipment.

Distance from home

Rider distance

The distance "as the crow flies" from the rider's home address[15] to the location of their KSI collision can be calculated for the majority of cases where an accurate postcode has been recorded. The following chart summarises this information and compares it to trip distance range distribution data for motorcycles from the national travel survey ("All P2W journeys" field):

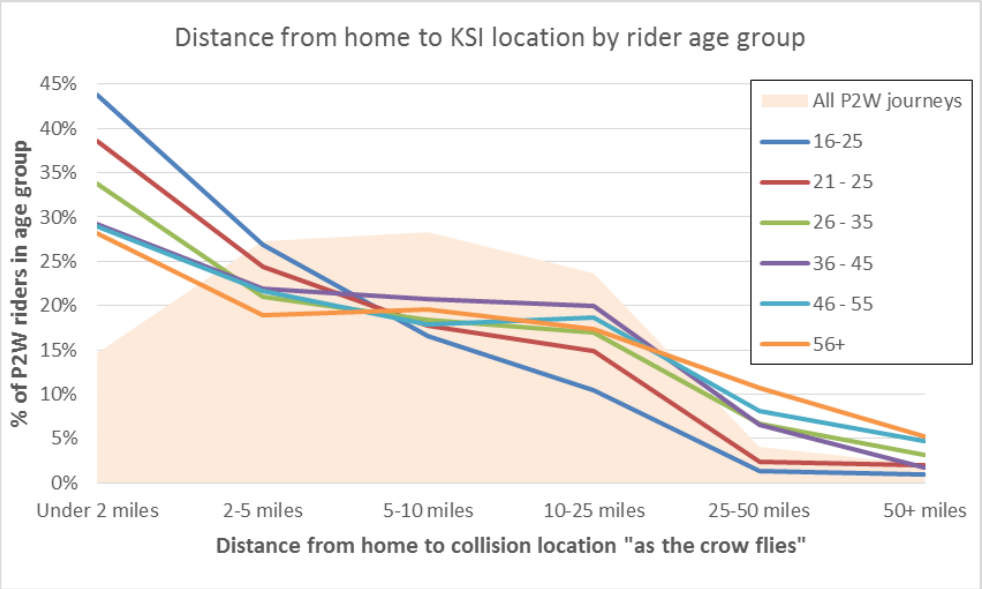


Figure 20: Distance from home to collision by rider age group

This graph and the data it is based on, illustrates the following:

- Across all age groups, 59% of riders involved in a KSI have their collision less than 5 miles from home, this is compared to 42% of all P2W journeys being in this mileage range.
- A further 36% of riders involved in a KSI have their collision between 5 and 25 miles from home, this is compared to 52% of all P2W journeys being in this mileage range.
- All age groups see a decrease in collision numbers with increased distance from home. However there is a clear trend of larger proportions of riders having collisions at greater distances from home as rider age increases. For example Younger riders, aged 16-25 are the biggest group in the under 5 miles range, while riders aged 56+ are the biggest group in the 25+ miles range. The order of age groups converges between the 5 and 10 miles range, before reversing in order.
- Comparison with national travel survey trip distance data indicates the under 2 miles range is the most risky.

The average distance from home to collision location for each age group is as follows:

	Age Group	16 - 20	21 - 25	26 - 35	36 - 45	46 - 55	56 - 65	66 - 75
Average distance (miles) from home to collision location	**P2W Riders**	3.7	7.7	10.6	9.7	12.3	14.9	9.3
	Car Occupants	7.7	11.8	12.8	11.4	13.0	13.3	11.6

Figure 21: Average distance from home to KSI collision location

[15] Using the grid reference of their postcode centroid. It is not possible to determine actual distance ridden.

This shows riders aged 56-65 travel the furthest from home to collision locations so are the age group most likely to be involved in non-local collisions. This is reflected in the reversal of order in the age groups in figure 20 between the 5 and 50 miles ranges.

Comparing this with the distances for car occupants, overall there is not a lot of difference in the average distances, with most variation being in the younger age groups. This is manifested in shorter distances for young P2W riders – suggesting they ride more 'locally' than young car drivers.

Average distances increase with age up to and including the 56-65 year old group, **therefore any cross-border casualty reduction initiatives directed at P2W riders should focus on those aged 46-65**.

Key Finding:
Although riders of all ages tend to have their collision within 15 miles of home there is a clear trend of older riders travelling further distances between home and collision location. Most young rider collisions are close enough to home to be in the same town as where the rider lives, suggesting these riders are best helped by localised initiatives and cross border initiatives should focus on older riders.

Cross border activity

There is some variation across the region in the percentage of collisions involving 'local'[16] riders. For each district/unitary two measures have been applied to determine cross border activity:

- Percentage of collisions in district/unitary involving riders who live elsewhere – **"Import rate"**
- Percentage of riders living in district/unitary, involved in a collision elsewhere within the Eastern Region – **"Export rate"**

An area with low import and export rates may be relatively isolated from the rest of the region in terms of P2W activity. If this is combined with a high rate of P2W rider involvements per local population it would indicate the area has a problem with *local* P2W rider safety. **This type of area may benefit from initiatives targeting local *resident P2W riders***. The top areas in this group are as follows[17]:

			KSI involvements per 10k population	
Local Authority Area	**Import Rate**	**Export Rate**	**Selected area**	**Regional average**
Ipswich	29%	37%	5.11	
North Norfolk	32%	32%	3.69	
Peterborough	29%	13%	4.52	4.96
Southend-on-Sea	39%	27%	5.23	
Waveney	19%	27%	4.92	

Figure 22: Local authorities with low rider import and export rates

This highlights Ipswich and Southend-on-Sea as having a particular issue with local P2W riders, both with an import and export rate of less than 40% and an above average rate of involvement per 10k population.

[16] Defined as living in the same local authority district/unitary as their collision
[17] See appendix for full tables of import and export rates by district/unitary.

An area with a high import rate and a low export rate, combined with a high rate of P2W rider involvements per local population, is likely to be attracting P2W riders from elsewhere. **This type of area may be more likely to see the benefits of a P2W safety campaign for *riders on the road* in the area** as well as a wider regional campaign targeting all riders. The following areas were identified as having a combination of an import rate of over 55% and an export rate of under 45%[18]:

			KSI involvements per 10k population	
Local Authority Area	**Import Rate**	**Export Rate**	**Selected area**	**Regional average**
Brentwood	60%	39%	4.63	
Broxbourne	57%	20%	2.92	
Epping Forest	73%	34%	7.77	4.96
Hertsmere	62%	23%	5.08	
Three Rivers	67%	43%	5.42	

Figure 23: Local authorities with high rider import and low rider export rates

This highlights Epping Forest, Hertsmere and Three Rivers as being areas particularly attractive to P2W riders, with import rates of over 60%, low export rates and KSI involvement rates above the regional average.

Key Findings:
Ipswich and Southend-on-Sea appear to have issues with local riders; relatively few local riders have collisions elsewhere and relatively few riders from elsewhere have collisions in these areas. They also have above average rates of P2W KSI involvements per 10k population.

Epping Forest, Hertsmere and Three Rivers also have above average rates of P2W KSI involvements per 10k population and relatively few local riders being involved in KSI elsewhere, but in contrast they see relatively large numbers of riders from other areas. This suggests these areas are an attractive destination for many P2W riders.

[18] See appendix for full list of P2W rider KSI involvements per 10k population by local authority area.

Peak time analysis

Peak times by Police Force area

The table below summarises the peak times for all P2W KSI collisions:

	Peak times	Peak Days	Peak periods
Bedfordshire	1700-1900	Monday Wednesday Thursday	Thursday and Friday 1700-2000
Cambridgeshire	1700-1800 1200-1400	Tuesday Thursday Sunday	Monday, Tuesday and Friday 1700-2000 Weekends 1000-1400
Essex	1600-1800	Tuesday Wednesday Friday	Weekdays 1600-1900 Weekends 1200-1700
Hertfordshire	1600-1900	Friday	Tuesday and Friday 1600-1900 Wednesday, Thursday and Friday 0700-0900
Norfolk	1700-1900	Monday Saturday	Weekdays 1700-1900 Weekends 1200-1700
Suffolk	1400-1800	Saturday Sunday	Monday 1500-1800 Weekends 1200-1700

Figure 24: Peak time summary for P2W KSI collisions by Police Force area

Although there are differences between each area, peak times across the region are generally during weekday afternoon commuting times, and during the afternoon at weekends.

These peak times suggest a mix of commuting traffic, and social/leisure riding at the weekend.

Key Finding:
There is some variation in peak times for collisions but they are largely around afternoon weekday commuting times, and through the afternoon at weekends.

Peak times in main hotspot areas

The table below summarises peak times for P2W KSI collisions in the *collision hotspot* areas identified in the Geographic Analysis section.

	Peak times	Peak Days	Peak periods
Norwich	1600-1800	Monday Tuesday	Thursday and Friday 1600 - 1800 Tuesday 0900 - 1200
Ipswich	1600-1900	Friday	Thursday and Friday 1600 - 1900
Bedford	1700-2000	Thursday	none
Colchester	1600-1900	Friday	none
Southend	1600-2000	Wednesay Thursday Friday	Tuesday to Friday 1600 - 2000 Saturday 2000 - 2200
Thurrock / DRC	none	none	none

Figure 25: Peak time summary for P2W KSI collisions by main collision hotspot area

NOTE: Where the table states there are no peak periods, this means the peak times are spread over most days and/or the peak days have collisions at various times that day.

This data shows the urban hotspots tend to have peak times around the weekday afternoon commute.

Key Finding:
The urban hotspots tend to have peak times around the weekday afternoon/evening commute.

Peak times by road type

The table below shows a summary of peak times by road type.

	Peak times	Peak Days	Peak periods
Urban	1600-1900	Tuesday Friday	Weekdays 1600-1900 Weekends 1200-1400
Rural	1600-1800	Saturday Sunday	Weekends 1100-1800
Trunk	1500-1900	Friday	Friday 1600-1900

Figure 26: Peak time summary for P2W KSI collisions by road type

This shows peak times in line with expected road use:

- Urban roads peaking during weekday commuting times
- Rural roads peaking at times when weekend leisure riders would be expected to ride
- Trunk roads peaking on Friday afternoon with people getting away for the weekend on longer trips.

Key Finding:
The peak times for each road type are in line with the expected road use; urban roads peaking during weekday afternoon/evening commuting times, rural roads peaking at times when weekend leisure riders would be expected to ride, and trunk roads peaking on Friday afternoon when it is possible some people are getting away for the weekend on longer trips, or riding further because they have more time.

Seasonal trends

This section examines seasonal trends for P2W KSI collisions, comparing Police Force area, road types and rider ages. The graphs in this section show the percentage of the total annual KSI collision involvements for each category, for each month of the year.

Police force area

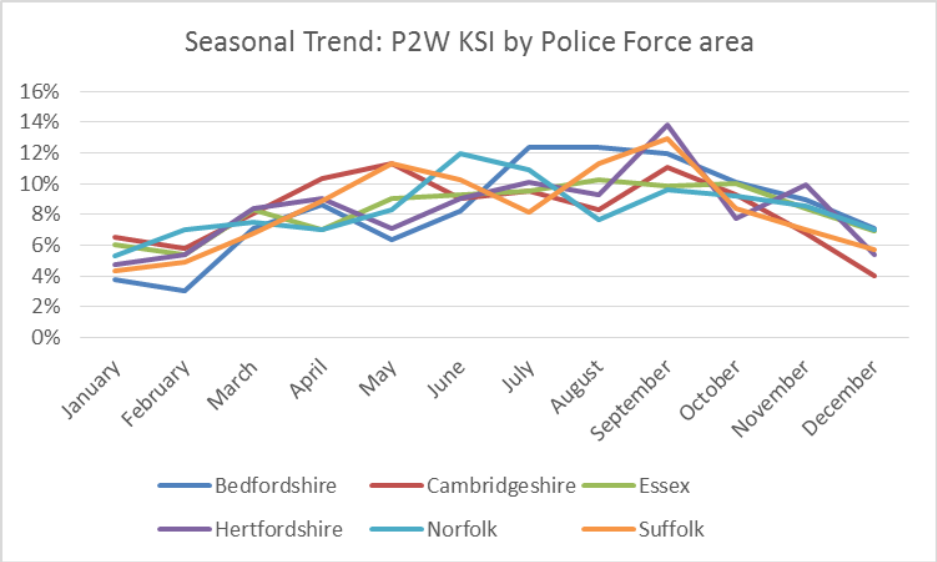


Figure 27: Seasonal trend by Police Force area

This shows all areas broadly follow the same trend of more P2W KSI collisions during summer months. The effect is particularly noticeable in Bedfordshire for the July-September period, with Suffolk and Hertfordshire seeing notable peaks in September.

This trend is likely to be because of the following factors:

- More miles are ridden on P2Ws during summer months, especially when trips are for leisure purposes. This is consistent with usage survey data shown in the appendix.
- Riders may be more inclined to take risks or ride at higher speed in the good conditions more common during summer months.

Road type

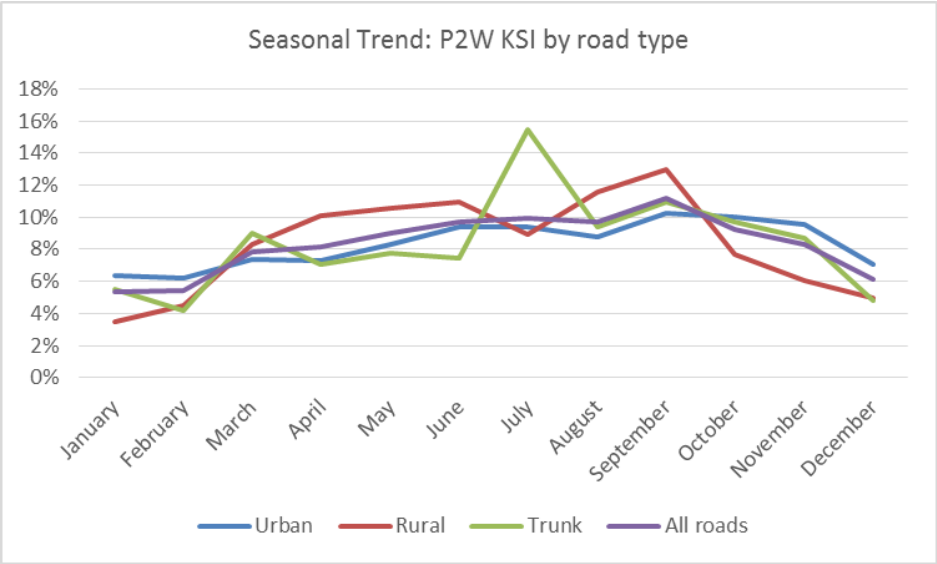


Figure 28: Seasonal trend by road type

This shows the same seasonal trend as before, but is particularly pronounced for rural and trunk roads. This is consistent with collisions on urban roads being more likely to involve year-round commuter traffic, with rural and trunk roads seeing more seasonal leisure riders. It is also worth noting that July sees a big switch from rural road collisions to trunk road collisions. **This would suggest July is the ideal month for running any campaigns focussed on P2W safety on trunk roads**.

Rider age

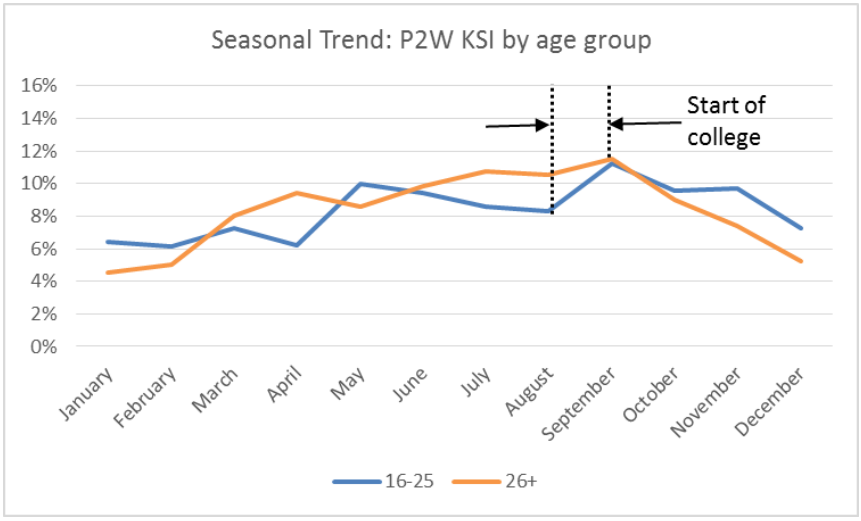


Figure 29: Seasonal trend by age group

This graph shows the seasonality of rider KSI involvements is less pronounced for younger riders than it is for those aged 26+ i.e. the line for 16-25 year olds is flatter than the line for riders aged 26+.

This seasonality tends to increase with age. For example 14% of involved riders aged 56+ have their KSI collision in July, compared to 10% of riders aged 26-35. While only 2.7% of involved riders aged 56+ have their collision in January, compared to 5% for riders aged 26-35. This increased seasonality

suggests that for older riders P2Ws are more of an optional leisure activity they can chose to save for good weather, whereas younger riders may rely on them for year-round transport.

So although all riders are more likely to have their collision in summer, younger riders are more likely than older riders to have a collision in the 'off-season' during winter. This suggests a combination of the following factors may have an effect:

- Younger riders are more likely to ride through the year, possibly because they rely on the P2W as their primary means of transport.
- Younger riders are likely to be less experienced, and therefore less able to safely deal with adverse road, lighting and weather conditions encountered during winter.
- Older riders may be more likely to ride for pleasure and therefore less likely to go out in the adverse weather conditions more common in winter.

Key Findings:
There are more P2W KSI involvements during summer months (April to September) as more miles are ridden by P2W during the summer. This is especially true of leisure riding, but it still applies to commuter traffic albeit to a lesser extent.

There is a more distinct seasonal trend for the rural roads associated with leisure riding, compared to the less pronounced seasonal trend for urban roads associated with commuters.

The seasonal trend is most pronounced for older riders, with younger riders more likely to ride through the whole year. This suggests younger riders are more likely to rely on their P2W as a means of transport, while older riders are more likely to ride for leisure.

Collision Analysis

Collision type

The chart below gives a breakdown of the P2W KSI collision types as defined by road, junction and presence of other vehicles. The inner ring shows whether it was a single or multiple vehicle collision, the middle ring shows if it was at a junction or not for each group in the inner ring. The outer ring shows road type for each group in the middle ring.

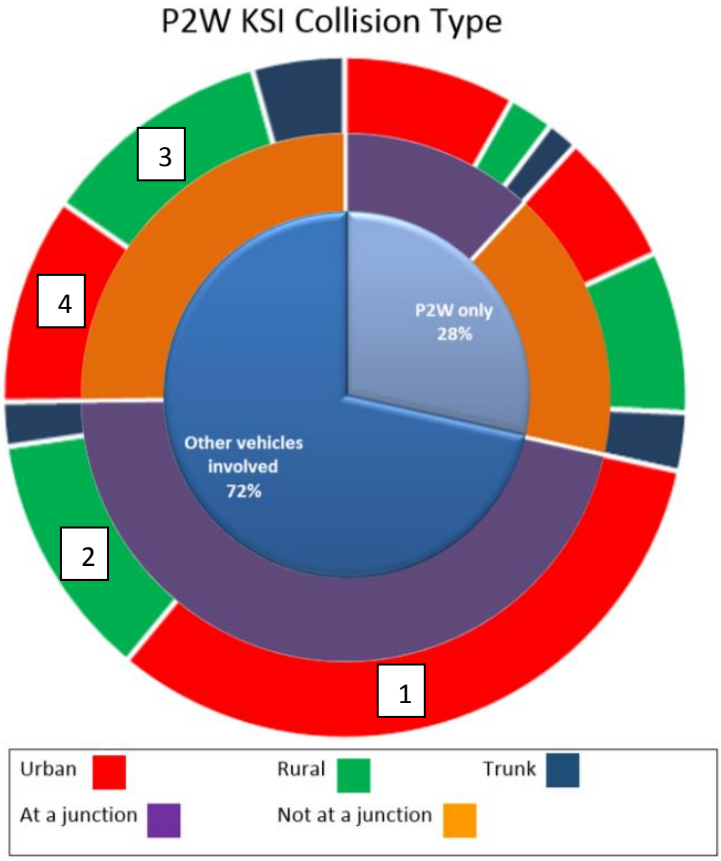


Figure 30: P2W KSI collision type

This data shows 72% of P2W KSIs involved other vehicles, 58% were at junctions and 57% were on urban roads.

This data also shows the four most common types of collision are:

1. Other vehicles involved, at a junction, urban road (33%)
2. Other vehicles involved, at a junction, rural road (12%)
3. Other vehicles involved, not at a junction, rural road (11%)
4. Other vehicles involved, not at a junction, urban road (10%)

The behaviours behind these types of collision will be examined in the next section.

Key Finding:
The most common type of P2W KSI collision involves a non-P2W vehicle at a junction on an urban road, with the second most common type involving a non-P2W vehicle at a junction on a rural road. 72% of P2W KSI collisions involve other non-P2W vehicles.

Road user behaviour

In theory matching combinations of vehicle-manoeuvre, points of impact and vehicle-position-in-the-road data as recorded in STATS19 should tell us the most common ways in which collisions occur between P2Ws and other vehicles. However, due to the number and ambiguity of options in these fields there are many ways of recording essentially the same collision, and various ways of interpreting each combination of vehicle location and manoeuvre data.

Therefore this section will only be able to identify broader themes in vehicle manoeuvre and position, and then infer what the most dominant types of collision mechanics are likely to be.

Urban junctions (multi vehicle)

Urban junction, multi vehicle	P2W Riders	Other vehicles
Top contributory factors	Failed to look properly (14%) Misjudged path/speed (12%) Careless/reckless (11%) Exceeding speed limit (9%)	Failed to look properly (38%) Misjudged path/speed (15%) Careless/reckless (11%) Poor manoeuvre (11%)
Share of contributory factors	46%	54%
Collision types	Other vehicle right turn into path of P2W (40%) P2W loss of control/head on impact (19%) P2W filtering through traffic (11%)	
P2W rider profiles	32% aged 16-25 on bikes up to 125cc 26% aged 26-55 on 500cc+ bikes	

This data indicates the biggest issue at urban junctions to be other vehicles pulling into the path of P2Ws, primarily due to poor observational practices.

In some cases recklessness and excess speed on the part of the P2W rider may make it difficult for other drivers to correctly judge the speed of the P2W, and in other cases result in a loss of control by the P2W rider. Filtering and loss of control by P2W riders has also led to P2Ws crossing into oncoming traffic resulting in some head-on collisions. Around 1 in 10 of these collisions involve a P2W filtering through traffic or overtaking.

A range of rider types are involved in these collisions, but the biggest group are young riders on lower capacity bikes.

Rural junctions (multi vehicle)

Rural junction, multi vehicle	P2W Riders	Other vehicles
Top contributory factors	Misjudged path/speed (14%) Failed to look properly (13%) Poor manoeuvre (10%) Careless/reckless (10%)	Failed to look properly (34%) Misjudged path/speed (19%) Poor manoeuvre (15%) Careless/reckless (9%)
Share of contributory factors	44%	56%
Collision types	Other vehicle right turn into path of P2W (42%) P2W loss of control/head on impact (17%) P2W filtering through traffic (16%)	
P2W rider profiles	51% aged 26-65 on 500cc+ bikes	

This data indicates the main issue at rural junctions to be other vehicles pulling into the path of P2Ws, primarily due to poor observational practices.

The issues appear similar to those for urban junctions, albeit with filtering/overtaking a bigger issue on rural roads than urban roads, and a bigger proportion involving middle aged riders on 500cc+ bikes.

Rural open road (multi vehicle)

Rural no junction, multi vehicle	P2W Riders	Other vehicles
Top contributory factors	Loss of control (16%) Poor manoeuvre (11%) Failed to look properly (10%) Misjudged path/speed (10%)	Failed to look properly (25%) Careless/reckless (13%) Poor manoeuvre (12%) Misjudged path/speed (10%)
Share of contributory factors	67%	33%
Collision types	P2W loss of control on a left hand bend (25%) Head on impact (possible overlap with above) (22%) P2W filtering through traffic (18%)	
P2W rider profiles	50% aged 26-65 on 500cc+ bikes	

This data indicates that, unlike collisions at junctions, it is the P2W riders who contribute most to these collisions occurring. Filtering/overtaking is an even bigger issue, but loss of control is the main problem. This suggests behaviours such as excess speed and risky manoeuvres are more of an issue for rural open road collisions. The biggest rider group involved is middle aged riders on 500cc+ bikes.

Urban open road (multi vehicle)

Urban no junction, multi vehicle	P2W Riders	Other vehicles
Top contributory factors	Failed to look properly (12%) Misjudged path/speed (9%) Loss of control (9%) Careless/reckless (9%)	Failed to look properly (26%) Poor manoeuvre (13%) Careless/reckless (12%) Misjudged path/speed (15%)
Share of contributory factors	62%	38%
Collision types	P2W loss of control/head on impact (19%) P2W shunt other vehicle (16%) P2W filtering through traffic (14%)	
P2W rider profiles	34% aged 16-25 on bikes up to 125cc 29% aged 26-55 on 500cc+ bikes	

This data indicates this is the type of scenario where P2W riders are most likely to contribute to a collision. This includes a range of collision types including head-on collisions, P2Ws shunting other vehicles and collisions occurring when P2Ws are filtering through traffic.

A range of rider types is involved in these collisions, but the biggest group are young riders on lower capacity bikes.

Key Findings:
Where P2Ws are involved in collisions with non-P2Ws at junctions, the driver of the non-P2W is the party most likely to contribute to the collision. However the opposite is true for collisions away from junctions.

Younger riders are the biggest user group in urban collisions, and riders of 500cc+ bikes are most prevalent in rural collisions.

The main issues for car/non-P2W drivers appear to be observational failings and making poor manoeuvres, particularly when performing right hand turns. Careless and reckless behaviour also feature in some cases.

The main issues for P2W riders appear to be poor observation while carrying out more risky manoeuvres (such as overtakes and filtering) and also when approaching junctions. Excess speed and loss of control (not always at the same time) also appear to put P2Ws in conflict with other traffic, especially on the rural roads away from junctions where bikes with 500cc+ engines are more frequently involved. On some occasions the excess speed is linked to the loss of control, but in other cases the loss of control occurs at normal road speed. Careless or reckless riding (including excess speed), misjudging speed and direction of other traffic, and loss of control are the most prevalent factors attributed to P2W riders on urban roads where young riders are most prevalent.

Non P2W Road users

This section examines the demographics and behaviours of non P2W road users involved in KSI collisions with P2W riders.

Demographics

The chart below gives a breakdown of vehicle type involved in P2W KSI collisions. It shows the vast majority (93%) are cars, taxis vans and minibuses.

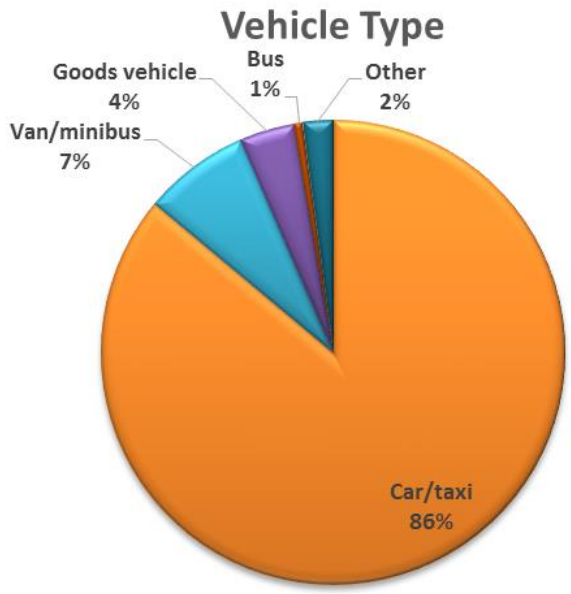


Figure 31: Types of non-P2W vehicle involved in P2W KSI collisions

The graph below shows the age distribution of non-P2W motorists involved in KSI collisions.

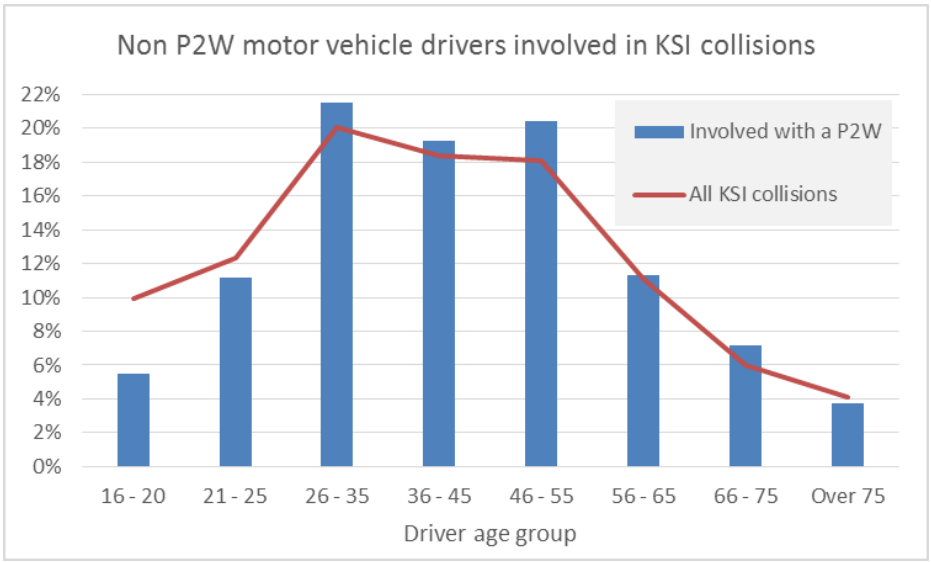


Figure 32: Non-P2W motor vehicle drivers involved in KSI collisions

This indicates that the middle three age groups spanning ages 26-55 are over represented in collisions involving P2Ws, with younger drivers seemingly better at avoiding P2W collisions. This

observation may be because younger drivers tend to make more 'unforced' errors in the absence of other vehicles, so have a higher proportion of single vehicle collisions[19]. These 'extra' single vehicle collisions for younger drivers effectively dilute the proportion of KSI collisions that involved any other road user type, including P2Ws.

The graph in figure 32 may appear to contradict the established fact of young drivers posing a higher risk to others than middle aged drivers. However this graph shows total number of collision involvements; *collisions per vehicle mile* is the measure normally used to determine driver risk. Younger drivers account for fewer miles driven than middle aged drivers which is the reason for the lower overall number, despite their higher risk.

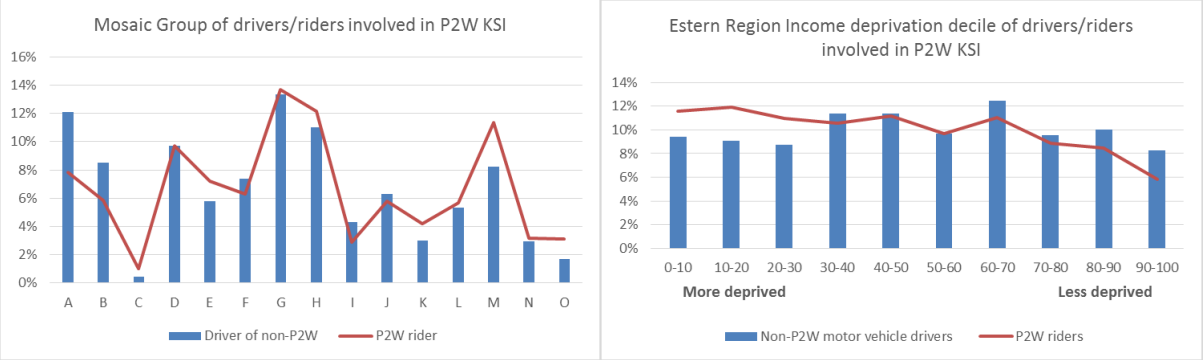


Figure 33: Mosaic and income deprivation comparison of drivers and riders involved in P2W KSI collisions

The graphs above show that compared to P2W riders, other vehicle drivers are more prevalent among the more affluent Mosaic types A and B, and less prevalent in the less affluent types K, M and O. This trend is reflected in income deprivation data showing P2W riders are much more likely than other vehicle drivers to come from the poorest 30% of the Eastern Region population. Other vehicle drivers are more likely than P2W riders to come from the wealthiest 40% of the population.

Overall, non P2W drivers are most likely to live in Mosaic type G, H and A areas, and are over represented in income deprivation deciles 30-50 (slightly below average income) and 60-70 (slightly above average income).

Key Finding:
93% of drivers of non-P2Ws involved in a P2W KSI were driving a car, taxi or van. They are slightly more likely than people involved in all types of KSI collision to be aged 26-55. They are less likely to come from areas of high income deprivation than P2W riders and more likely to come from the affluent Mosaic type A and B areas.

[19] 2011-15 KSI data for the Eastern Region shows 33% of collisions involving car drivers aged 17-25 are single vehicle collisions, compared to 21% for drivers aged 26+

Manoeuvres

Overall, 63% of P2W KSI collisions involving other vehicles were at junctions. Nearly half of these (48%) involved the non-P2W turning right at a crossroads, T-junction or private drive. These types of collision comprise mainly vehicles turning right into the path of the P2W (fig. 34), but can also include P2Ws filtering through traffic (fig. 35).

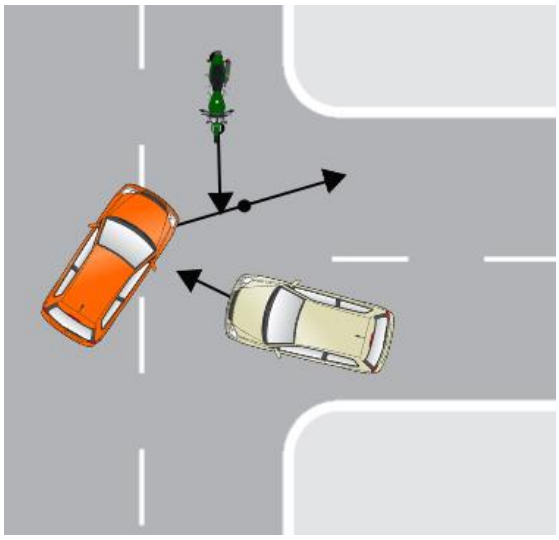


Figure 34: Other vehicle right turn

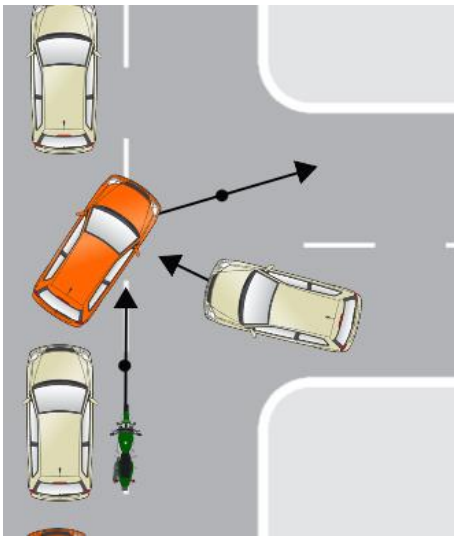


Figure 35: P2W filtering

Other types of collision can occur with P2Ws filtering through traffic, such as non P2W making a U-turn away from a junction (fig. 36) accounting for a further 3% of collisions.

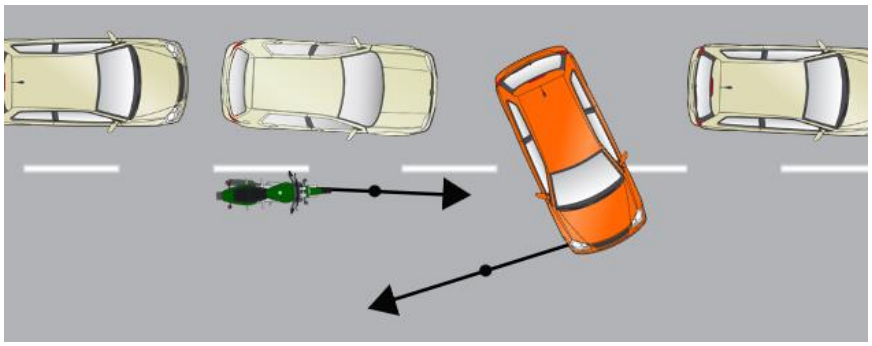


Figure 36: P2W filtering other vehicle U-turn

"Shunts" where P2Ws go into the back of other vehicles slowing or stopping account for 15% of collisions, these occurred both on junction approaches and away from junctions. Other vehicles going into the back of P2Ws only accounted for 3.5%. Failures to give way at roundabouts accounted for a further 7% of P2W KSI involving other vehicles.

Road Type	P2Ws involved in KSI	Other vehicle involved in P2W KSI
Urban	56%	58%
Rural	33%	31%
Trunk	11%	11%

Figure 37: Road type for P2W KSI collisions involving other vehicles

Figure 37 shows there is very little difference in the road type breakdown of P2W KSI collisions when other vehicles are involved. The only difference is a slightly higher proportion of other vehicle involvements on urban roads.

Key Finding:
63% of P2W KSI collisions involving other vehicles were at junctions. Nearly half of these involved the non-P2W turning right at a junction, usually into the path of the P2W. P2Ws going into the back of other vehicles account for a further 15% of P2W KSI where non-P2Ws are involved.

Contributory Factors

The table below shows the main contributory factors attributed to non-P2W drivers involved in P2W KSI collisions. The highlighted cells show where factors in the three main collision types are more prevalent than they are in the "Other collision type" column.

Contributory Factor	P2W into rear of other vehicle	Other vehicle right turn into P2W at a junction	Roundabout collisions	Other collision type
Failed to look properly	17%	30%	29%	19%
Misjudged P2W path/speed	15%	16%	15%	10%
Careless/reckless/in a hurry	10%	11%	8%	8%
Poor manoeuvre	7%	10%	11%	8%
Sudden braking	9%	1%	1%	5%
Other misc. factors	42%	32%	34%	51%

Figure 38: Proportion of contributory factors attributed to non-P2W riders involved in P2W KSI collisions

In all cases, a failure to look properly is the most common factor. However this factor is fairly ubiquitous, so the columns where this factor is greatest indicate the areas where this is most likely to be a major issue. This shows that failing to look properly is mainly an issue at junctions. Misjudging the path or speed of an approaching P2W is also an issue at junctions, and may reflect the investigating officer's differing interpretations of the same circumstances where "failed to look properly" may be recorded as an alternative. Carelessness or recklessness and poor manoeuvres also each feature in around 10% of collisions at junctions.

Sudden braking is not a particularly common factor, but is present in almost 1 in 10 cases where a P2W goes into the back of another vehicle. Sudden braking is a factor in 7% of Bus/HGV>P2W KSI collisions and also in 7% of trunk road P2W>Other-vehicle KSI collisions. This is consistent with situations where drivers of smaller vehicles may be unable to see past larger vehicles, so have no prior warning of traffic ahead slowing before a larger vehicle appears to brake suddenly.

Key Finding:
The main issue for drivers of non-P2Ws at junctions is observation skills; either noticing the P2W approaching or accurately judging its path and speed. Careless driving and poor manoeuvres feature in about 1 in 10 P2W KSI collisions involving non-P2Ws at junctions.

Rider profiles

Comparing national travel survey data[20] showing the ages of all P2W riders with the ages of P2W riders involved in KSI collisions, indicates the risk of being involved in a KSI collision for riders within each age group. This is illustrated on the chart below.

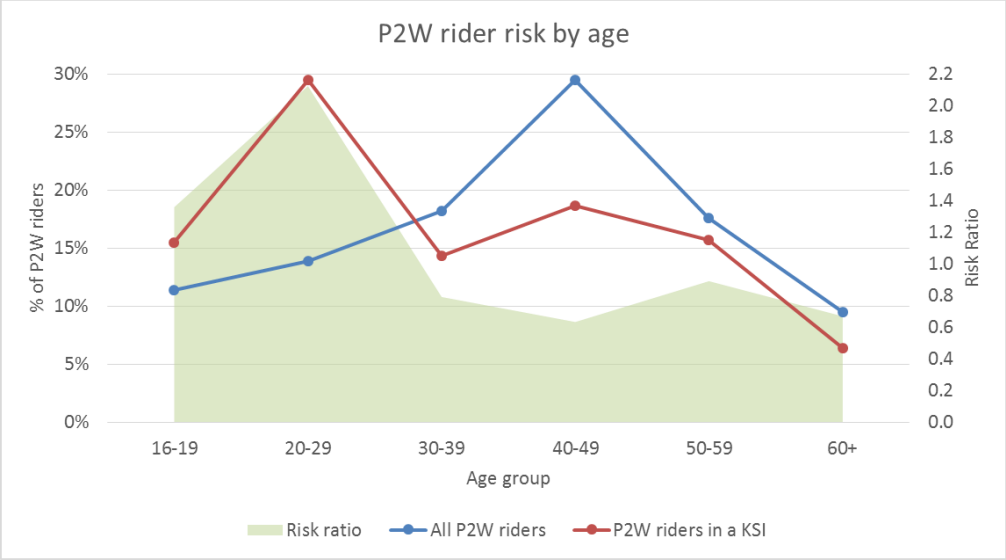


Figure 39: All-rider and KSI involved rider age distribution

This shows riders under the age of 30 are involved in a disproportionate number of collisions, even for P2W riders. ***With a risk ratio of 2.1, riders aged 20-29 have more than double the average risk of all P2W riders***. It also shows that nearly 30% of *all* riders (not just those involved in a collision) are in their 40s, and this age group has the lowest risk ratio.

There is a notable increase in risk from the 16-19 year old group to the 20-29 year old group. This may be influenced by factors including:

- More miles travelled by group – "All P2W riders" refers to the proportion of all P2W riders who are in each age group. It is a measure of the number of people in each age group and is not weighted for differences in total distance travelled. Although riders aged 40-60 appear to make the longest journeys by P2W, Riders in their 20's appear more likely to use their bikes all year 'round, so may travel more miles overall.
- A shift towards more powerful bikes as riders enter their mid 20s.
- Bad habits or over-confidence developing over time.

Key Finding:
Riders aged 20-29 have double the average risk of all P2W riders and are the age group which account for the greatest number of KSI. Riders aged 40-49 account for the second greatest number of KSI, but are the largest age group on the road and have about 60% the average risk for a P2W rider, and less than 30% of the risk of 20-29 year olds.

[20] Table NTS0610 – Number of respondents who were motorcyclists.

The graph below shows average engine capacity of motorcycles involved in collisions of all severities, by rider age group.

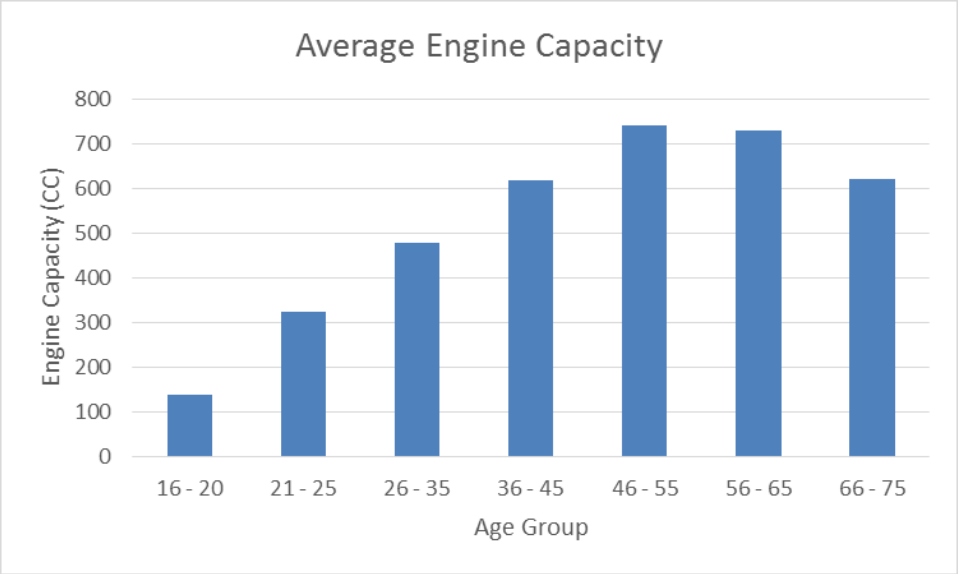


Figure 40: Average engine capacity by age group - all collision severities

This indicates riders continue to graduate onto bigger and bigger machines as they get older. After riders reach their mid-50s it appears many opt for slightly smaller bikes, but they are not returning to small capacity bikes in large numbers as the average engine size for the 66-75 year old age group is still over 600cc.

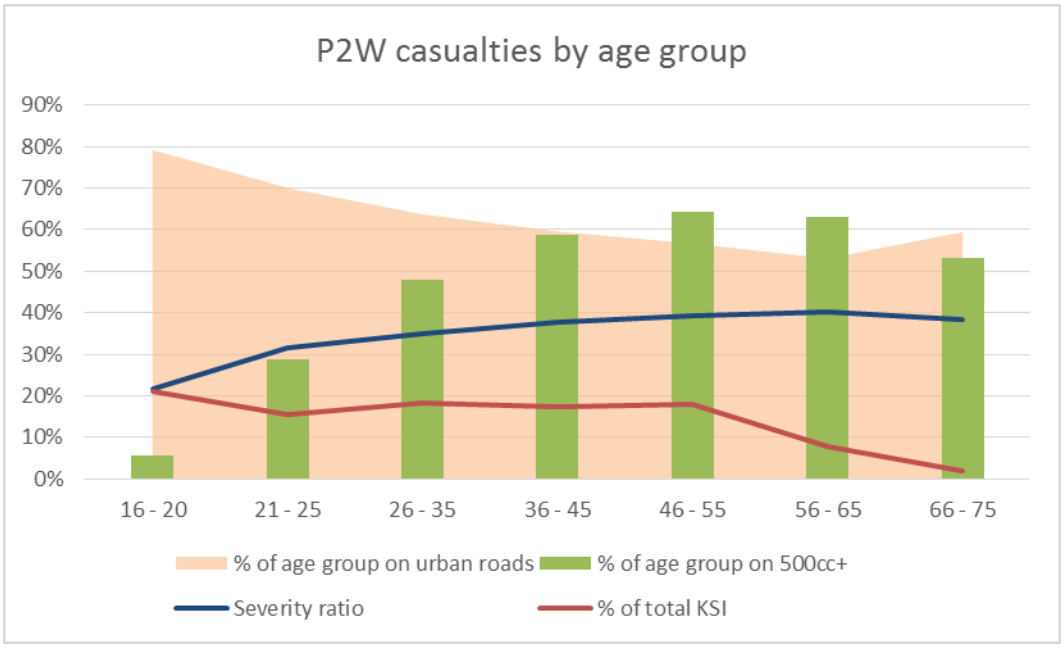


Figure 41: Various P2W casualty measures by age group

The graph above highlights the following age related trends among P2W riders involved in collisions of all severities:

- Severity ratio[21] has a 98% correlation with the percentage of the age group riding bikes with engines over 500cc. This is consistent with the idea that bigger bikes = greater speed = more severe injuries. However, older riders tend to ride bigger bikes, and there may also be an effect resulting from reduced resilience to injury among older riders due to the physical ageing process of the body. This is consistent with the fact that "Statistically, older athletes are much more likely to injure themselves than younger athletes who are doing the same sport"[22].
- The contribution to the total KSI figure made by each age group gradually reduces as riders get older. Referring back to figure 39 shows this cannot be a result of reduced numbers of riders since rider numbers increase between the ages of 16 and 49. This is a strong indicator that rider experience is a major factor in riders avoiding becoming involved in a KSI. This is consistent with the findings of a study[23] conducted by the European Transport Safety Council.
- The percentage of riders involved in collisions on urban roads is inversely proportional to the percentage on bikes with 500cc+ engines. This indicates smaller engines are more commonly used in urban areas, while larger engines are more commonly used on rural roads.

Key Finding:
Average engine size increases as riders approach their mid-fifties, as does the proportion having collisions on rural roads and the severity ratio of casualties.

The table below shows the breakdown of rider KSI involvements by engine size/age group combination.

Rider Age	Up to 50cc	50-125cc	125-500cc	Over 500cc
16 - 20	7%	10%	2%	2%
21 - 25	1%	6%	2%	6%
26 - 35	1%	5%	2%	11%
36 - 45	1%	3%	2%	11%
46 - 55	0%	2%	2%	13%
56+	1%	1%	2%	6%

Figure 42: Rider age / engine size combination

This shows two distinct groups, which between them account for over half of rider KSI involvements:

- Riders aged 26-55 on bikes over 500cc (35% of KSI involvement) – "Established riders"
- Riders aged 16-25 on bikes up to 125cc (24% of KSI involvement) – "Young riders"

Across all groups, 83% of involved riders are male

Most of the "Young Riders" group are on bikes with 50-125cc engines. Riders aged 17 or older can ride a bike up to 125cc, while those aged 16 are limited to 50cc machines. Riders of 50cc bikes tend to be at the younger end of this group, with more than two thirds of them being aged 16 or 17.

[21] The percentage of casualties of all severities that were either serious or fatal.
[22] *Sports Injuries and the Aging Athlete*. John E. Morley, M.D. September 2000. From http://www.thedoctorwillseeyounow.com/content/aging/art2075.html accessed 24th January 2017.
[23] *Young road user risks: Is age the only fix?* Twisk, D. 2015. European Transport Safety Council. From http://etsc.eu/wp-content/uploads/ETSC-lecture-versie-2.pdf accessed 24th January 2017.

Peak time analysis for the "Established riders" group shows two clear trends; 23% of collisions occur during the afternoon at weekends and 29% occur during weekday commuting times. There is also a greater proportion of collisions on rural roads at weekends. This suggests "Established riders" may comprise two groups – "Commuters" (weekdays) and "Leisure Riders" (weekends). The following table compares these sub-groups:

	Commuter	Leisure
Average Engine capacity (cc)	738	823
Average distance (miles) home to collision	9.1	16.1
Average age of rider	41.1	42.4
Collision road type		
% Rural	36%	50%
% Urban	48%	33%
% Not at a junction	41%	53%
Rider home area type		
% Rural	12%	17%
% Small town	23%	16%
Least deprived 30%	25%	37%
Middle 40%	41%	34%
Most deprived 30%	34%	29%

Figure 43: Comparison of commuter and leisure sub-groups within experienced riders group

The table above shows that leisure riders are more affluent, rider bigger bikes longer distances, and live and ride in less urban areas than commuter riders, confirming that "Established riders" comprise two distinct groups. Therefore the groups that will be examined in detail are:

- Young Riders (aged 16-25 bikes up to 125cc) – 23% of rider KSI involvements
- Commuters (weekday collisions, aged 26-65, any engine size[24]) – 42%
- Leisure Riders (weekend collisions, aged 26-55, 500cc+ bikes) – 11%

Key Finding:
76% of P2W riders involved in a KSI fall within one of three groups; "Young Riders" aged 16-25 on bikes up to 125cc, "Commuters" aged 26-65 having weekday collisions on various bikes, and "Leisure Riders" aged 26-55 having weekend collisions on 500cc+ bikes. 83% of involved riders are male.

[24] Expanded from the initial scoping of 500cc+ engines and aged 26-55 to include all potential commuters who are not young riders, so will be based on slightly different data to that used in figure 43.

"Commuters" Rider profile

- Riders aged 26-65 on weekdays account for 42% of all riders involved in a KSI.
- The chart below shows the age distribution of the commuters group.

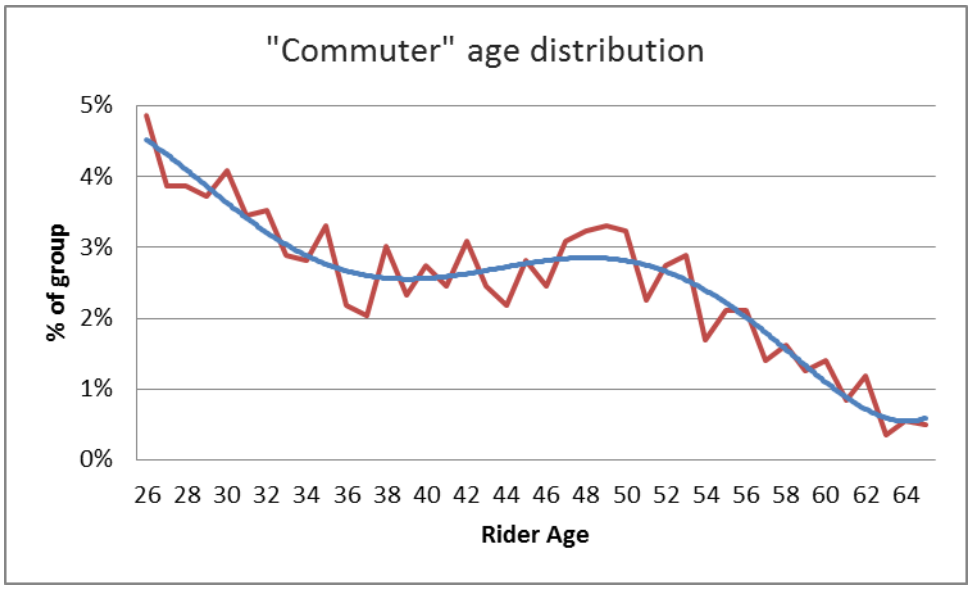


Figure 44: Commuters age distribution

The graph above shows a gradual reduction in rider numbers with age. This is consistent with some riders moving to other modes of transport as they become more affluent, and others becoming better at avoiding collisions with more experience.

- The most common Mosaic profiles for this group are:
  - **Type H:** Younger households settling down in housing priced within their means (12.5%).
  - **Type G:** Householders living in inexpensive homes in village communities (11.9% of group).
  - **Type M:** Families with limited resources who have to budget to make ends meet (10.2%).

  A table showing a breakdown of all Mosaic groups, and communications strategies for the groups highlighted above, can be found in the appendix.
- Average distance: Home address > KSI Collision location = **10.2 miles**. *This is compared to 3.7 miles for the Young Rider group and 16.1 miles for the leisure riders group.*
- Peak time analysis: As per the definition of this group, peak times are Monday to Friday 1600-1900, with a lesser peak from 0700 to 0900.

➢ The maps below compare home address hotspots with collision hotspots for commuters.

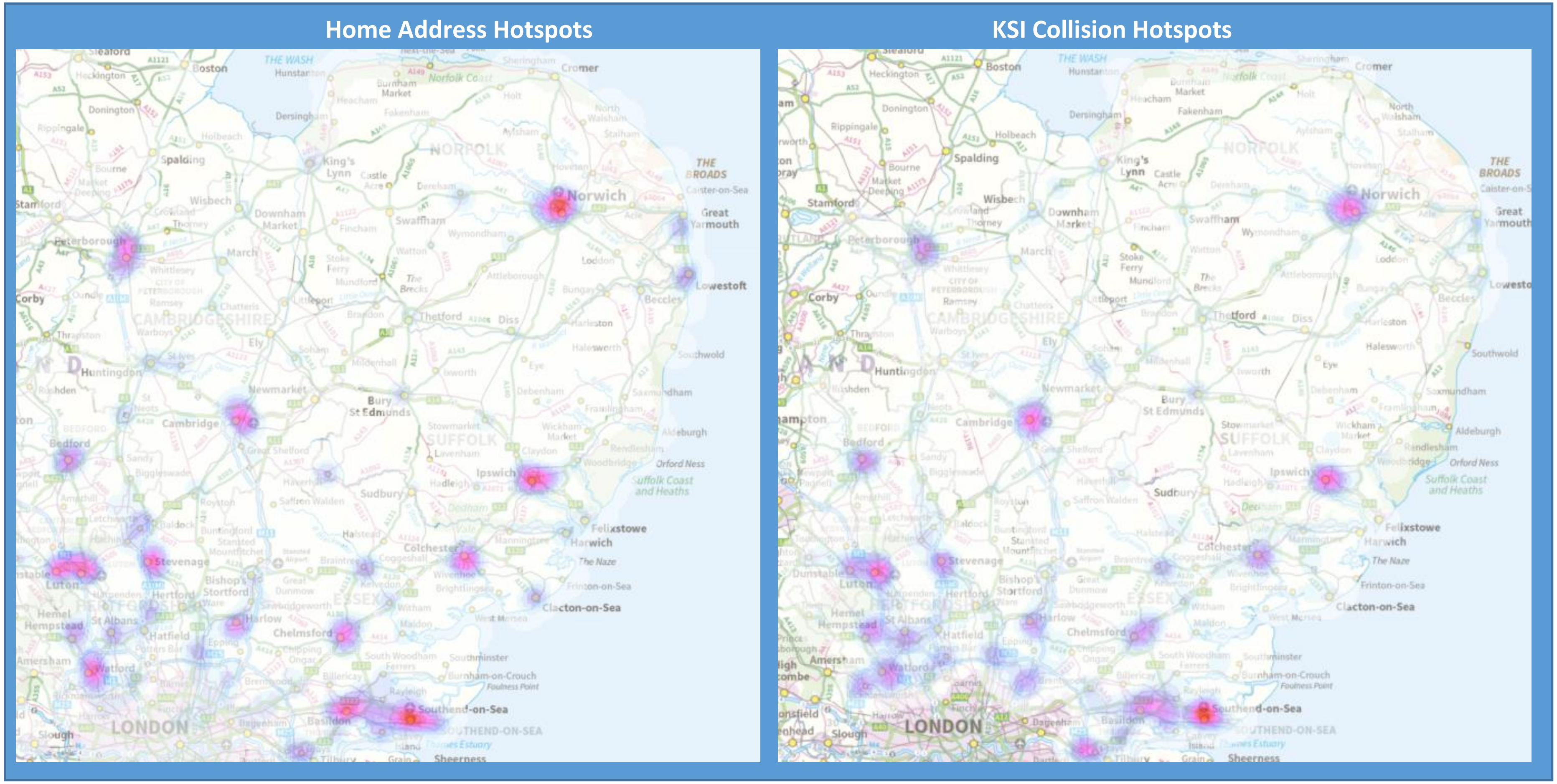


Figure 45: Home address and KSI collision hotspots for riders in the "Commuters" group

These hotspot maps show commuter riders home addresses are concentrated in the main towns of Luton, Watford, Stevenage, Norwich, Ipswich, Cambridge, Peterborough, Chelmsford, Colchester, Basildon and Southend. Collision hotspots are similar, but show a slightly more dispersed pattern, with a greater number of less intense hotspots.

- Road type: The chart below shows that over half of commuter KSI collisions occur on urban roads.

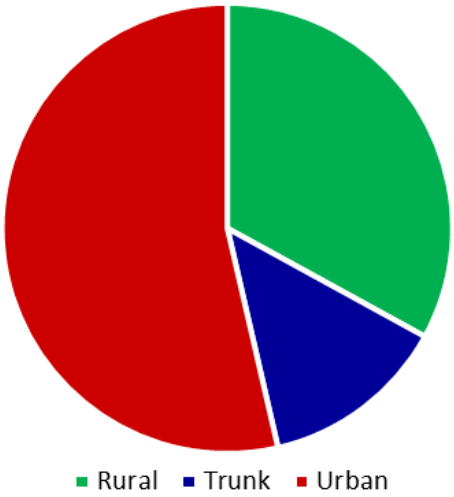


Figure 46: Road type – Commuters KSI collisions

- Deprivation data shows this group is slightly over represented in deciles 0 to 50, and under represented in more affluent areas.

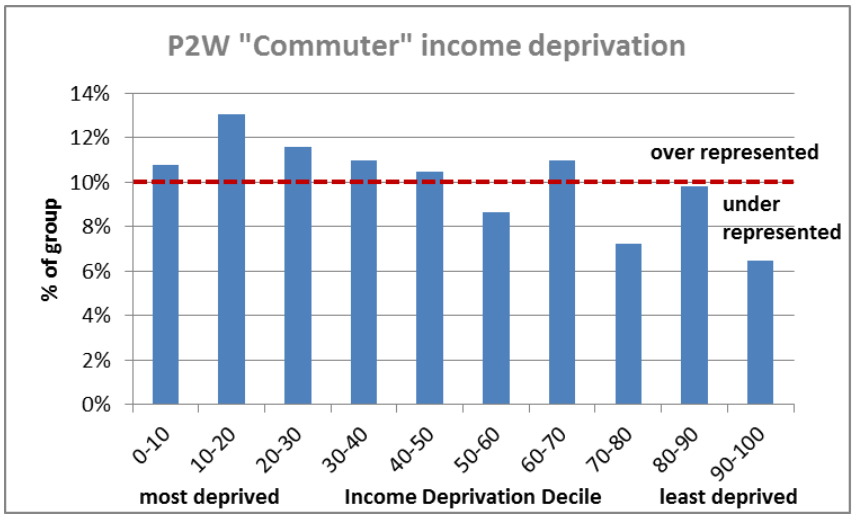


Figure 47: Income deprivation deciles - "Commuters"

Key Finding:
Riders in this group are concentrated at the younger end of the 26-65 age group, but with a secondary peak age in their mid to late forties. They tend to have collisions on urban roads during afternoon commuting times, with a smaller morning peak, an average of about 10 miles from where they live. These riders tend to live in areas of lower than average incomes. Almost 12% live in Mosaic type G areas (village communities) some of which may be underserved by affordable public transport alternatives.

"Leisure Riders" profile

- Riders aged 26-55 on 500cc+ bikes at weekends account for 11% of all riders involved in a KSI.
- The chart below shows the age distribution of the leisure riders group.

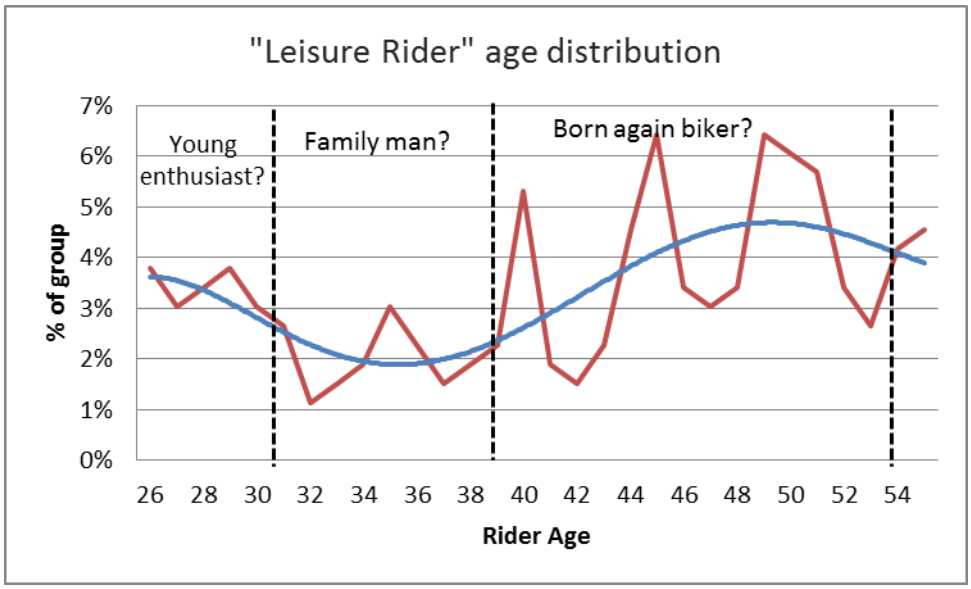


Figure 48: Leisure riders age distribution

The graph above shows that engagement for the Leisure Riders group will have the most potential impact if designed to appeal to riders aged 45-55.

- The most common Mosaic profiles for this group are:
  - **Type G:** Householders living in inexpensive homes in village communities (12.9% of group).
  - **Type H:** Younger households settling down in housing priced within their means (11.6%).
  - **Type D:** Thriving families who are busy bringing up children and following careers (11.6%).

  A table showing a breakdown of all Mosaic groups, and communications strategies for the groups highlighted above, can be found in the appendix.
- Average distance: Home address > KSI Collision location = **16.1 miles**. *This is compared to 3.7 miles for the Young Rider group and 10.2 miles for the commuters group.*
- Peak time analysis: Peak times for this group are Saturdays and Sundays from 1100 to 1700, with a slightly more collisions on Sundays.
- The hotspot maps on the next page show leisure rider home address hotspots concentrated in the main towns in the region, with a particular concentration in Norwich. Although a hotspot in Norwich would be expected due to it being the biggest city in the region, it is much more pronounced than it is for the "Commuters" group. The level of dispersal when looking at the collision location map is much more pronounced, reflecting the greater distances, and more rural routes travelled by leisure riders compared to commuters. This makes targeted intervention on the road more problematic, pointing towards interventions based on rider home addresses, rather than where they have collisions.

  However there are still some clear targetable hotspots including Southend, Thurrock, Watford and Kings Lynn, as well as the local authority areas of Epping Forest, Hertsmere and Three Rivers identified in the Cross Border Activity section of this document.

- The maps below compare home address hotspots with collision hotspots for leisure riders.

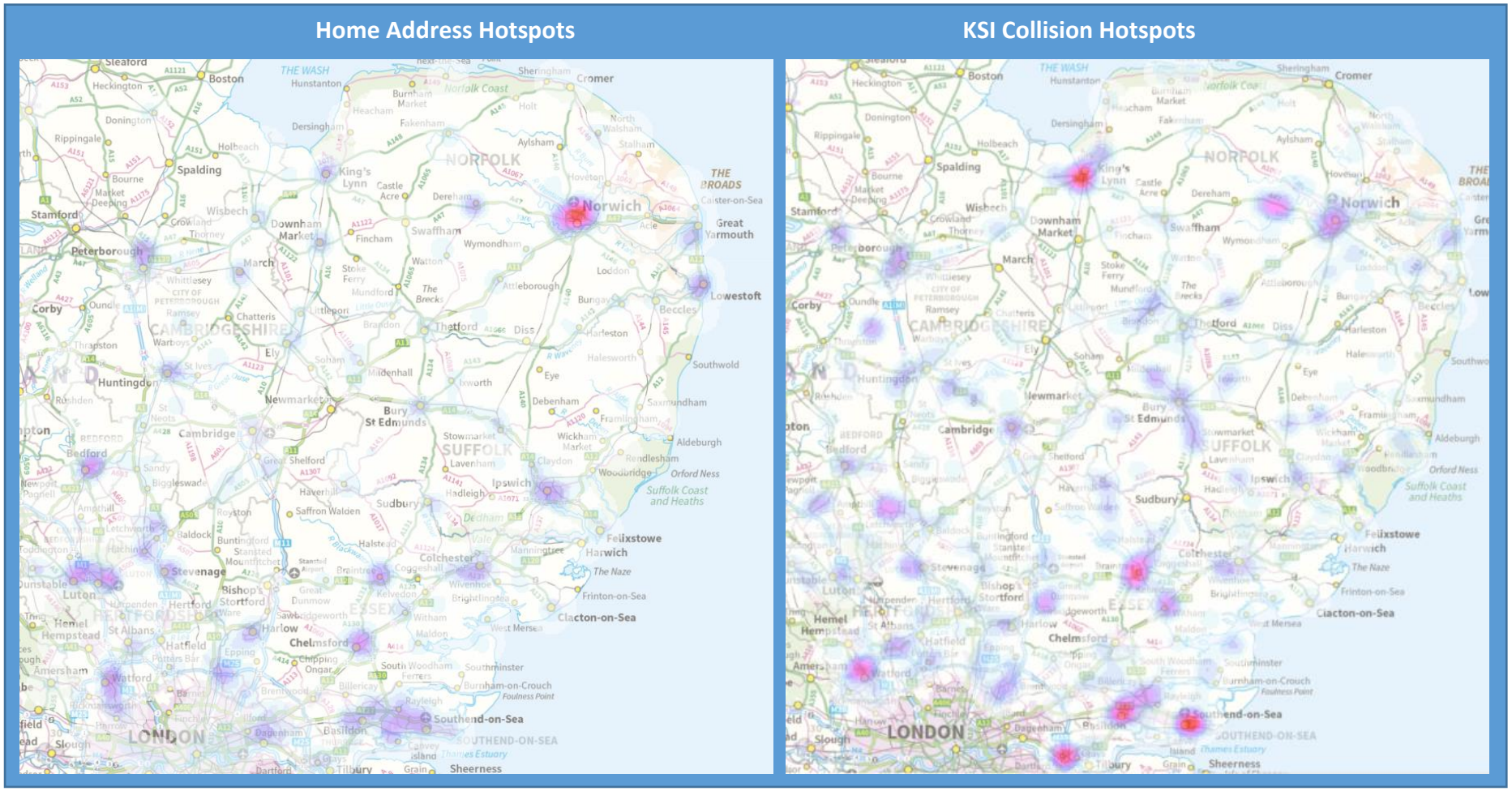


Figure 49: Home address and KSI collision hotspots for riders in the "Leisure Riders" group

- Road type: The chart below shows that around half of the leisure riders collisions occur on rural roads.

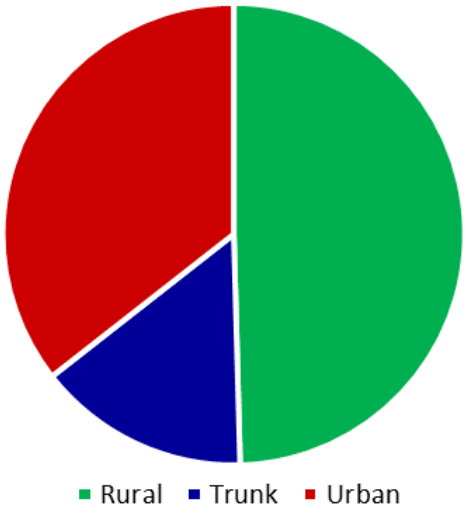


Figure 50: Road type – Leisure Riders KSI collisions

- Deprivation data shows this group is slightly over represented in deciles 10 to 50 and 60-70. This shows Leisure riders are the least deprived of the three main groups, but are still over represented in more deprived areas, and under-represented in more affluent areas.

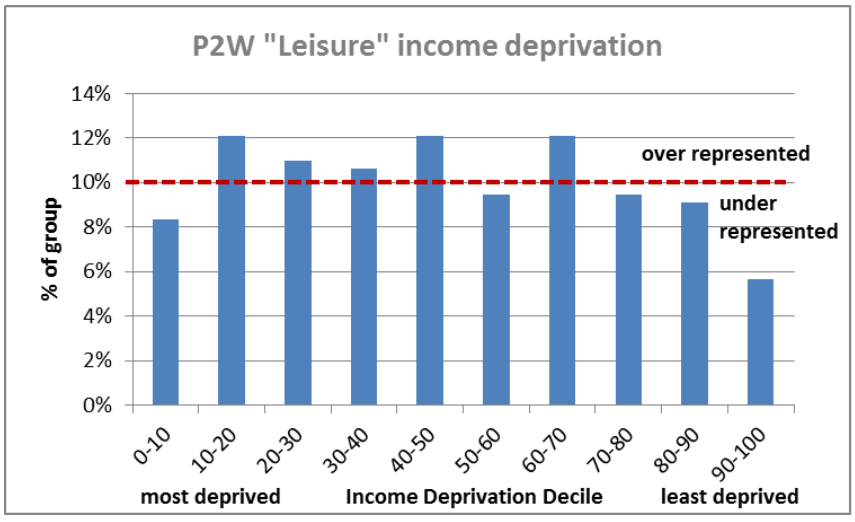


Figure 51: Income deprivation deciles - "Leisure riders"

Key Finding:
Riders in this group are most likely to be aged in their mid-forties to early-fifties. They tend to have collisions on rural roads during afternoons at the weekend, particularly Sundays. Consequently their collision locations are fairly dispersed, resulting in fewer areas suitable for on-the-road interventions. They appear to ride further than the commuter group, averaging 16 miles from home to collision location. Although over represented in areas of lower than average incomes, they are on average more affluent than other P2W rider groups.

"Young Riders" Rider profile

- Riders aged 16-25 on bikes with engines up to 125cc account for 23% of riders involved in a KSI.
- The chart below shows the age distribution of the young rider group.

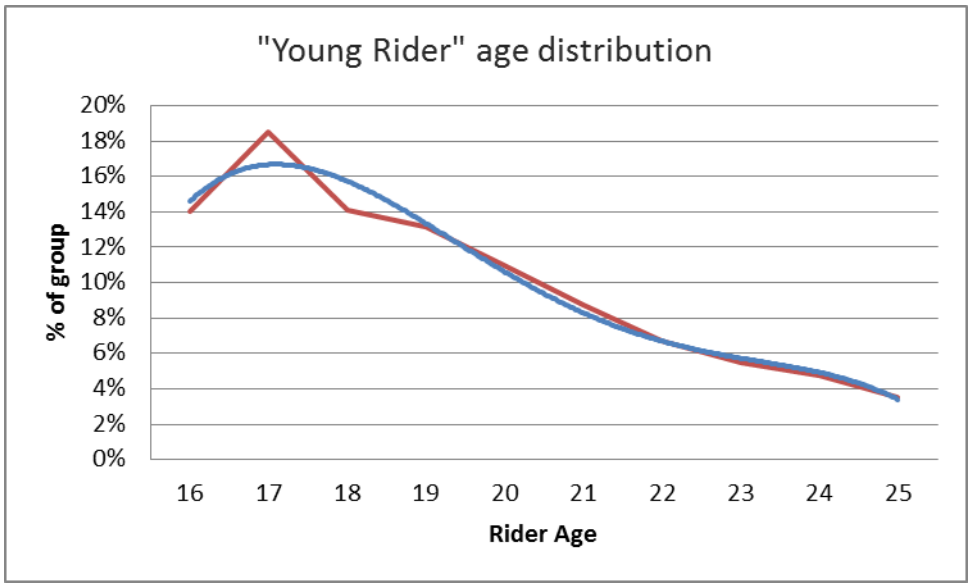


Figure 52: Young Rider age distribution

This shows that riders are concentrated towards the younger end of the age group, particularly 16-19 year olds, with a drop in rider involvements between the ages of 19 and 21. This is consistent with some riders moving to other modes of transport or bigger bikes as they become more affluent, and others becoming better at avoiding collisions with more experience.

- The most common Mosaic profiles for this group are:
  - **Type G:** Householders living in inexpensive homes in village communities (17.8% of group)
  - **Type M:** Families with limited resources who have to budget to make ends meet (15.8%)
  - **Type H:** Younger households settling down in housing priced within their means (12.9%)

  A table showing a breakdown of all Mosaic groups, and communications strategies for the groups highlighted above, can be found in the appendix.
- Average distance: Home address > KSI Collision location = **3.7 miles**. *This is compared to 10.2 miles for the commuters group and 16.1 miles for the leisure riders group.*
- Peak time analysis shows three peak times for the group:
  - Weekdays 3pm to 7pm (26% of KSI collisions)
  - Weekdays 7am to 9am (12%)
  - Saturdays Noon to 10pm (12%)

- The maps below compare home address hotspots with collision hotspots for young riders.

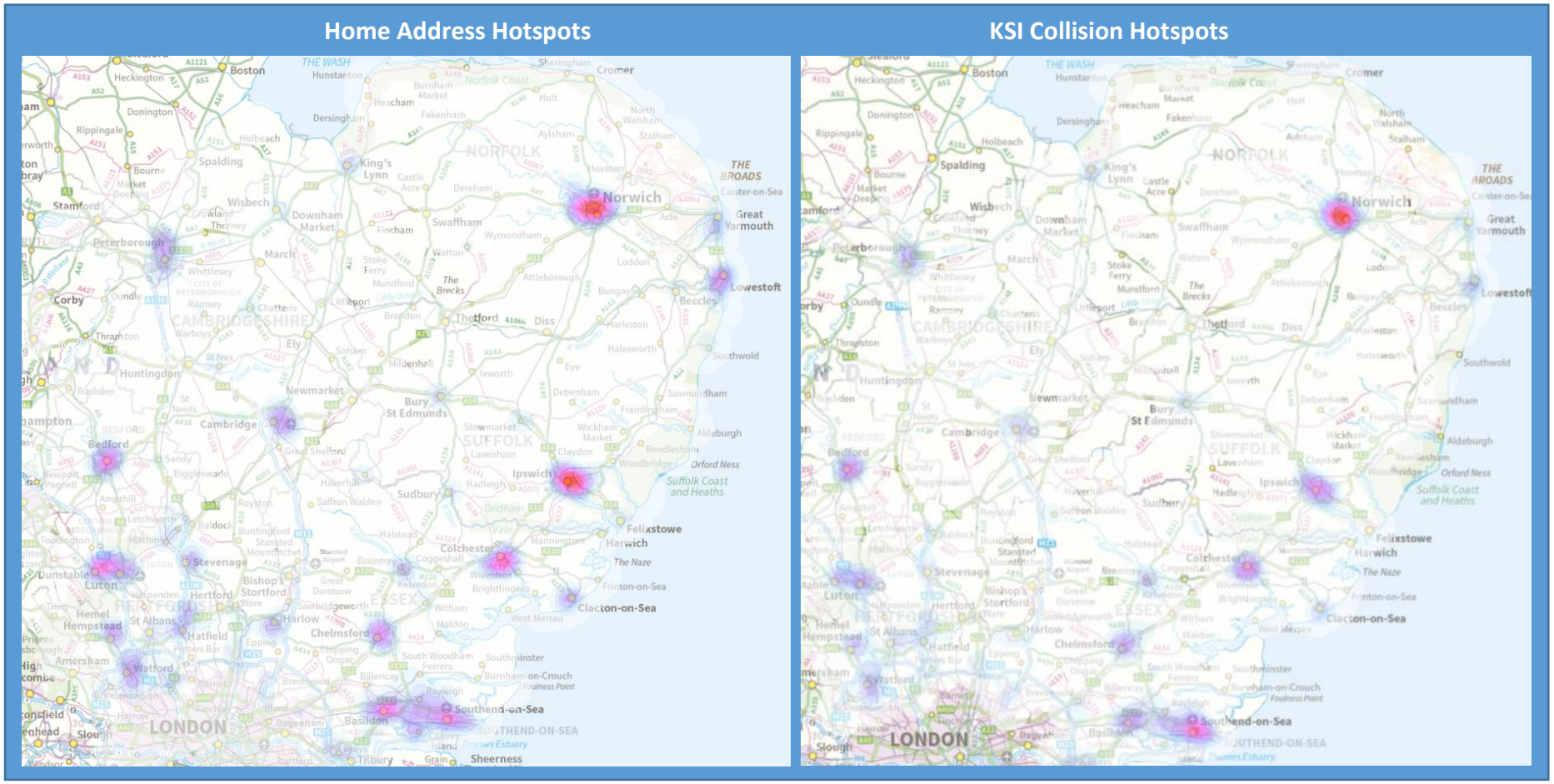


Figure 53: Home address and KSI collision hotspots for riders in the "Young Riders" group

The hotspot maps show very little difference between home address hotspots and KSI collision hotspots, reflecting the short average distance between rider home and collision location. As with other groups, hotspots are located in centres of population, with Norwich, Ipswich, Colchester, Luton and the Southend/Basildon conurbation being the most concentrated hotspots.

- Road type: The charts below show this group has the vast majority of their collisions on urban roads, both on weekdays and at weekends. This suggests similar types of journey for this group throughout the week, although the purpose may be different[25], and with the low average distance from home to collision, it suggests most journeys and collisions are within the town where the rider lives.

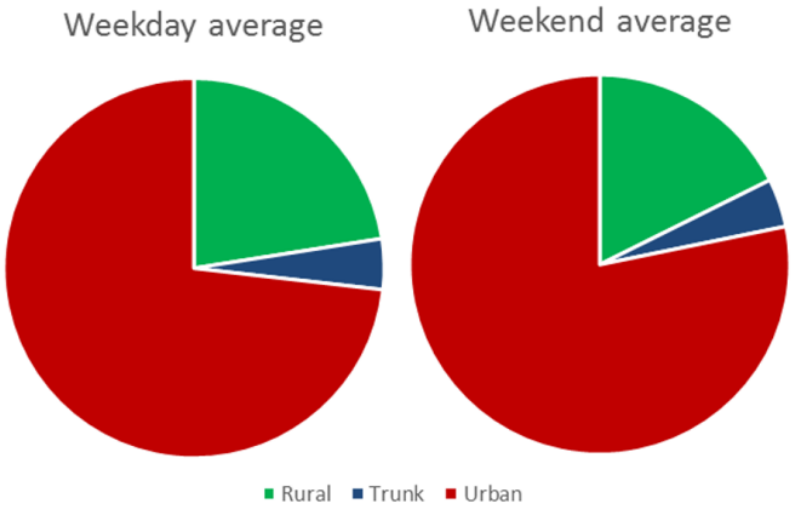


Figure 54: Road type - Young Rider KSI collisions

- Deprivation data shows this group is slightly over represented in deciles 0 to 50, being most over represented in the most income deprived decile of 0-10. This suggests many may ride a P2W out of financial necessity, rather than a specific desire to ride a motorcycle.

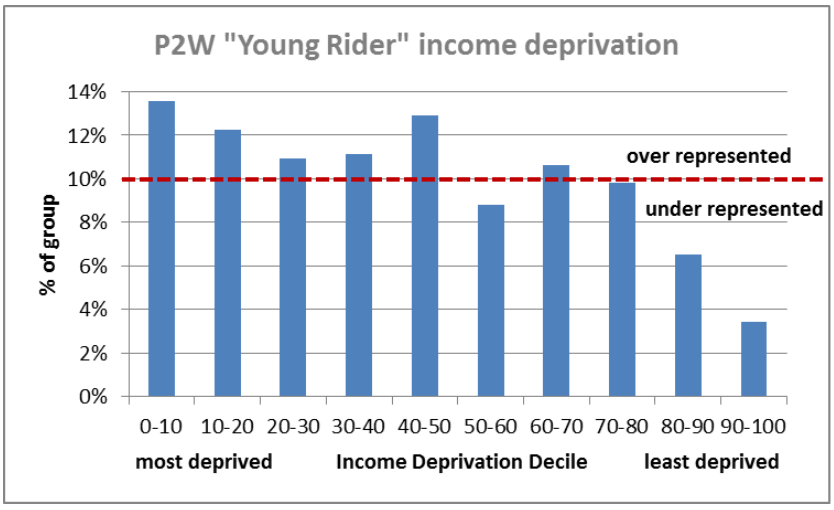


Figure 55: Income deprivation deciles - "Young riders"

[25] "Journey purpose" is a STATS19 field but it is populated too infrequently to allow any useful analysis.

Comparison with young drivers

The charts below compare demographic and behavioural factors associated with young P2W riders and young car drivers involved in KSI collisions in the Eastern Region.

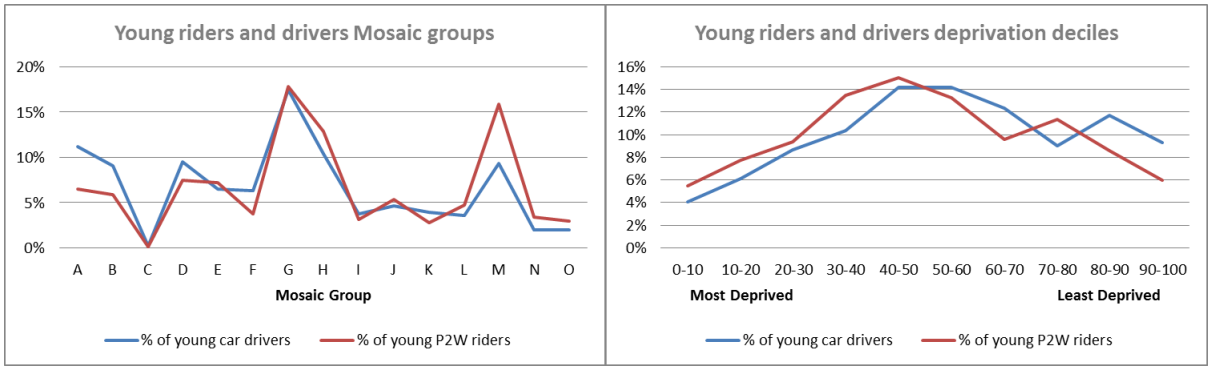


Figure 56: Socio-demographic comparison of young drivers and young riders

	Young Drivers	Young P2W Riders
Manoeuvre		
% Going ahead	69%	73%
% Overtaking	4%	11%
% Turning	12%	6%
Road Type		
Urban	47%	75%
Rural	41%	22%
Trunk	12%	3%
Gender		
Female	33%	6%
Male	67%	94%
At a junction	41%	65%

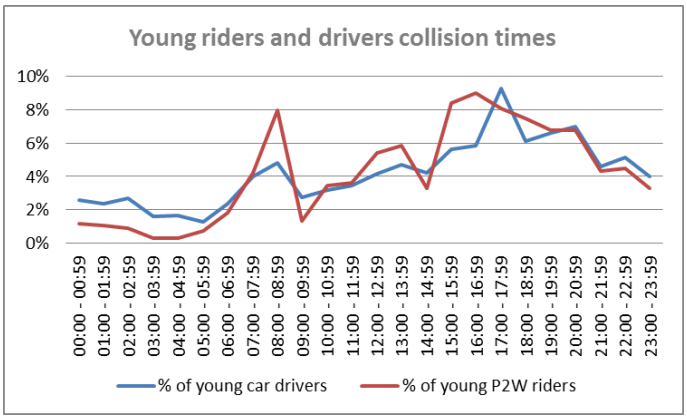


Figure 57: Peak time comparison of young drivers and young riders

These comparisons show the following:

- Young drivers and young riders have many similar demographic traits, but the main difference between the two groups is that young riders tend to be from more deprived areas, especially Mosaic Group M areas (Families with limited resources who have to budget to make ends meet).
- While young drivers and riders all have more collisions on urban roads than rural or trunk roads, young rider collisions are much more concentrated in urban areas, and also more likely to be at a junction.
- The majority of both groups are male, but young riders are much more overwhelmingly male than young drivers.
- Peak times are similar for both groups, but the morning peak is more pronounced for young riders and the afternoon peak begins sooner.

This suggests that some young P2W engagement could “piggy back” on more general young driver initiatives, but it is important to include specific engagement to address the issues most pertinent to young P2W riders.

Key Findings:
Mosaic, deprivation and age distribution data suggests many individuals in the "Young Riders" group may be influenced by financial or transport availability related factors, more than a specific desire to ride a motorcycle.

The fact that the vast majority of collisions occur on urban roads throughout the week and weekend, combined with the average distance from home to collision of 3.6 miles, indicates Young Riders do not usually travel long distances.

A combination of inexperience, low quality CBT training, and greater numbers on the road may be a reason for the greater number of riders at the younger end of this age group being involved in KSI collisions. As riders reach their early to mid-20s, they may avoid collisions due to experience and maturity, and be fewer in number as other options such as car ownership become viable.

Comparison of young drivers with young P2W riders suggests that some young P2W engagement could "piggy back" on more general young driver initiatives, but it is important to include specific engagement for young P2W riders to address the issues most pertinent to this group.

Appendices

Registered P2Ws by Eastern Region Police Force

Registered P2Ws	2011	2012	2013	2014
Bedfordshire	12,036	11,805	11,890	12,018
Cambridgeshire	18,844	18,387	18,398	18,468
Essex	38,938	38,476	38,284	38,687
Hertfordshire	22,578	21,738	21,646	21,606
Norfolk	25,624	25,163	24,753	25,153
Suffolk	21,782	21,432	21,215	21,331
Eastern Region	***139,802***	***137,001***	***136,186***	***137,263***

Involved rider local authority import and export rates

District	% of local riders having collisions elsewhere (export rate)
Stevenage	73%
Cambridge	67%
Forest Heath	65%
Castle Point	58%
South Cambridgeshire	54%
Rochford	52%
Watford	52%
Harlow	52%
Broadland	49%
Maldon	47%
North Hertfordshire	47%
Great Yarmouth	46%
St. Edmundsbury	45%
Babergh	44%
East Hertfordshire	44%
Three Rivers	43%
Central Bedfordshire	42%
Luton	41%
Braintree	40%
Colchester	40%
Norwich	39%
Brentwood	39%
Fenland	39%
Mid Suffolk	39%
Uttlesford	38%
Chelmsford	38%
Ipswich	37%
Huntingdonshire	37%
Breckland	36%
Basildon	35%
Epping Forest	34%
South Norfolk	34%
Dacorum	33%
Welwyn Hatfield	33%
Tendring	33%
King's Lynn and West Norfolk	32%
North Norfolk	32%
Suffolk Coastal	30%
East Cambridgeshire	28%
Waveney	27%
Southend-on-Sea	27%
Bedford	24%
St. Albans	23%
Hertsmere	23%
Broxbourne	20%
Thurrock	17%
Peterborough	13%

District	% of local collisions involving non-local riders (import rate)
Cambridge	76%
Epping Forest	73%
South Cambridgeshire	70%
Three Rivers	67%
Stevenage	65%
East Hertfordshire	65%
Forest Heath	65%
Hertsmere	62%
North Hertfordshire	61%
Brentwood	60%
Broxbourne	57%
Breckland	56%
Uttlesford	56%
Watford	56%
Maldon	55%
St. Edmundsbury	54%
South Norfolk	54%
Central Bedfordshire	53%
Braintree	53%
Norwich	52%
St. Albans	51%
Rochford	50%
Thurrock	49%
East Cambridgeshire	49%
Babergh	49%
Welwyn Hatfield	48%
Harlow	47%
Huntingdonshire	47%
Mid Suffolk	46%
Broadland	45%
Chelmsford	43%
Basildon	43%
Dacorum	43%
King's Lynn and West Norfolk	43%
Bedford	43%
Tendring	41%
Suffolk Coastal	40%
Colchester	39%
Castle Point	39%
Southend-on-Sea	39%
Great Yarmouth	38%
Fenland	36%
Luton	34%
North Norfolk	32%
Peterborough	29%
Ipswich	29%
Waveney	19%

P2W rider KSI collision involvements by local authority area of collision

Local Authority Area	Population (2014 estimate)	P2W riders involved in KSI 2011-15	KSI involvements per 10k population
Epping Forest	128,777	100	7.77
East Cambridgeshire	86,685	61	7.04
Breckland	133,986	94	7.02
Braintree	149,985	104	6.93
Mid Suffolk	99,121	65	6.56
South Norfolk	129,226	84	6.50
Norwich	137,472	89	6.47
St. Edmundsbury	112,073	72	6.42
Maldon	62,767	40	6.37
Chelmsford	171,633	102	5.94
South Cambridgeshire	153,281	91	5.94
Uttlesford	84,042	48	5.71
King's Lynn and West Norfolk	150,026	82	5.47
Rochford	84,776	46	5.43
Three Rivers	90,423	49	5.42
Forest Heath	62,812	34	5.41
Bedford	163,924	87	5.31
Colchester	180,420	95	5.27
Southend-on-Sea	177,931	93	5.23
Broadland	125,961	65	5.16
Ipswich	134,966	69	5.11
Hertsmere	102,427	52	5.08
Tendring	139,916	70	5.00
Waveney	115,919	57	4.92
Central Bedfordshire	269,076	132	4.91
Thurrock	163,270	79	4.84
Suffolk Coastal	124,776	58	4.65
Brentwood	75,645	35	4.63
St. Albans	144,834	67	4.63
Peterborough	190,461	86	4.52
North Hertfordshire	131,046	59	4.50
Fenland	97,732	44	4.50
Basildon	180,521	79	4.38
Dacorum	149,741	63	4.21
Huntingdonshire	173,605	73	4.20
Welwyn Hatfield	116,024	46	3.96
Babergh	88,845	35	3.94
Cambridge	128,515	50	3.89
North Norfolk	102,867	38	3.69
East Hertfordshire	143,021	51	3.57
Watford	95,505	34	3.56
Harlow	84,564	30	3.55
Castle Point	88,907	31	3.49
Great Yarmouth	98,172	34	3.46
Stevenage	85,997	26	3.02
Broxbourne	95,748	28	2.92
Luton	210,962	56	2.65
Eastern Region	***6,018,383***	***2,983***	***4.96***

Roads included in route analysis

Top 22 classified roads by total KSI collisions:

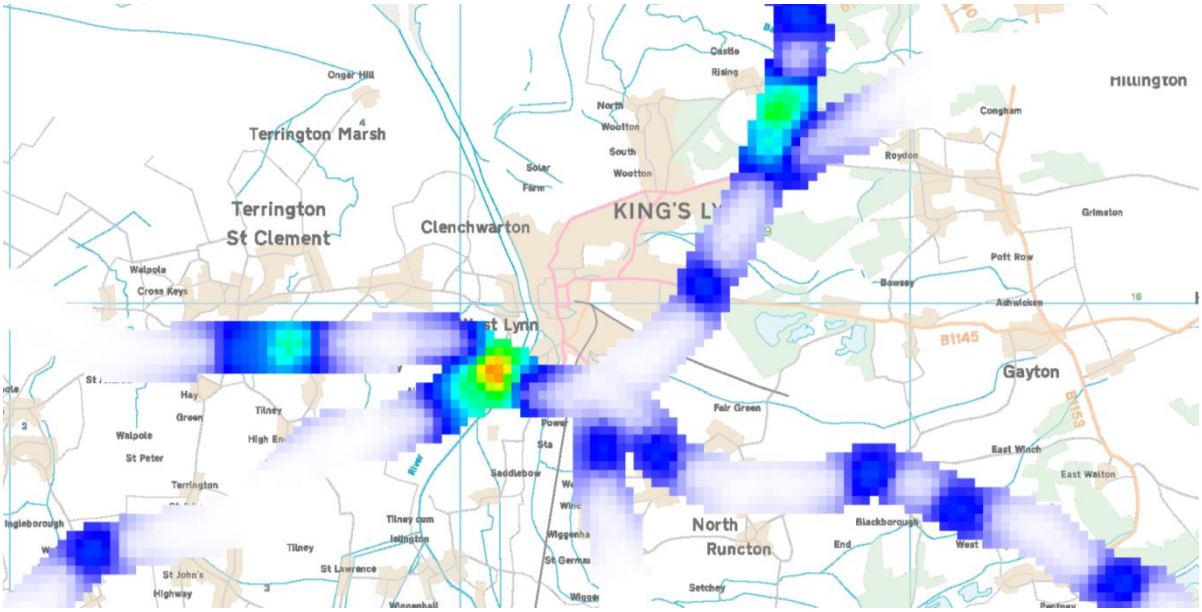
A1	A13	A143	A47	M11
A10	A131	A149	A5	M25
A12	A14	A41	A505	
A120	A140	A414	A507	
A127	A142	A428	M1	

Other major roads also included:

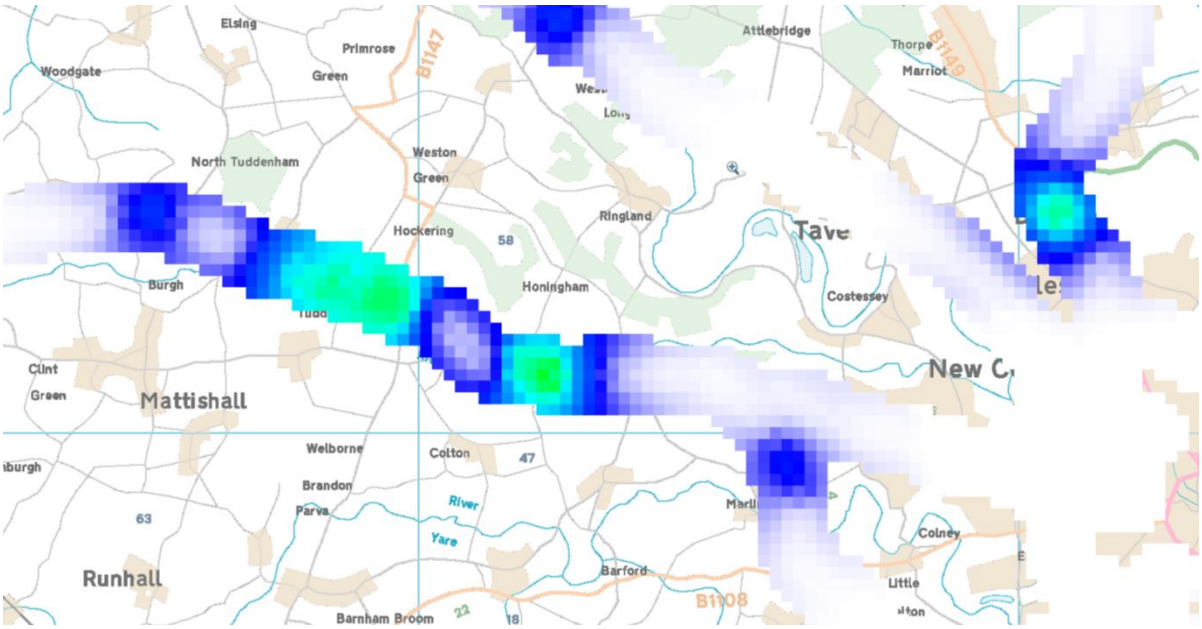
A1012	A1074	A1122	A133	A17	A605
A1017	A1075	A1123	A134	A412	
A1065	A11	A1151	A141	A421	
A1066	A1101	A130	A146	A6	
A1067	A1120	A1307	A148	A602	

Route Analysis close-ups

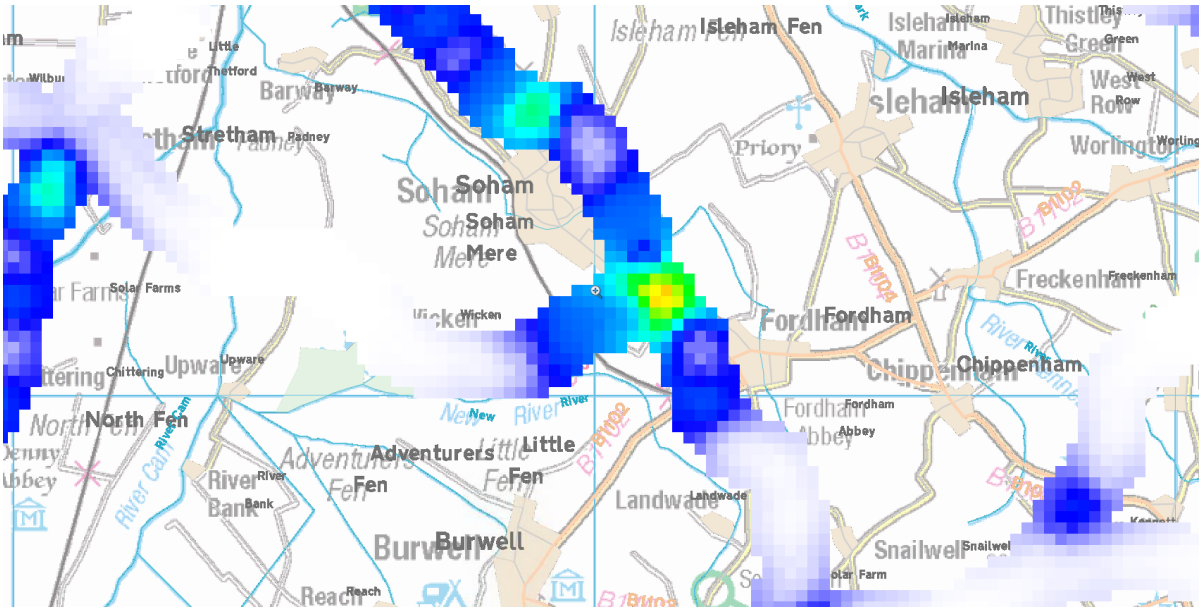
1. A17 / A47 junction west of Kings Lynn and A149 north of Kings Lynn.



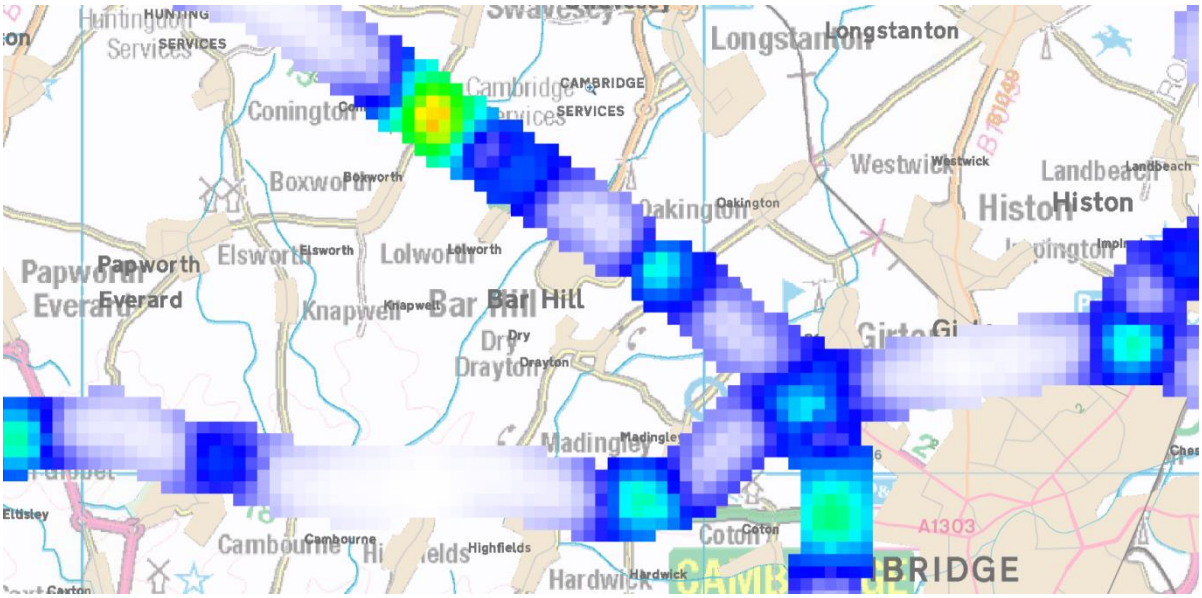
2. A47 west of Norwich



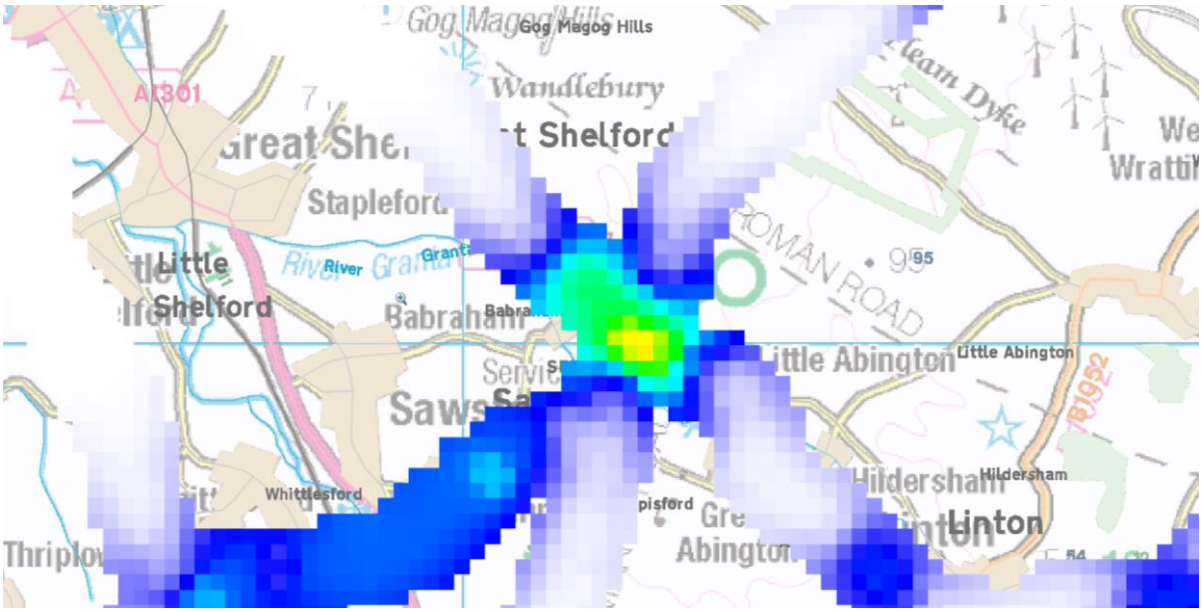
3. A142 south of Mildenhall



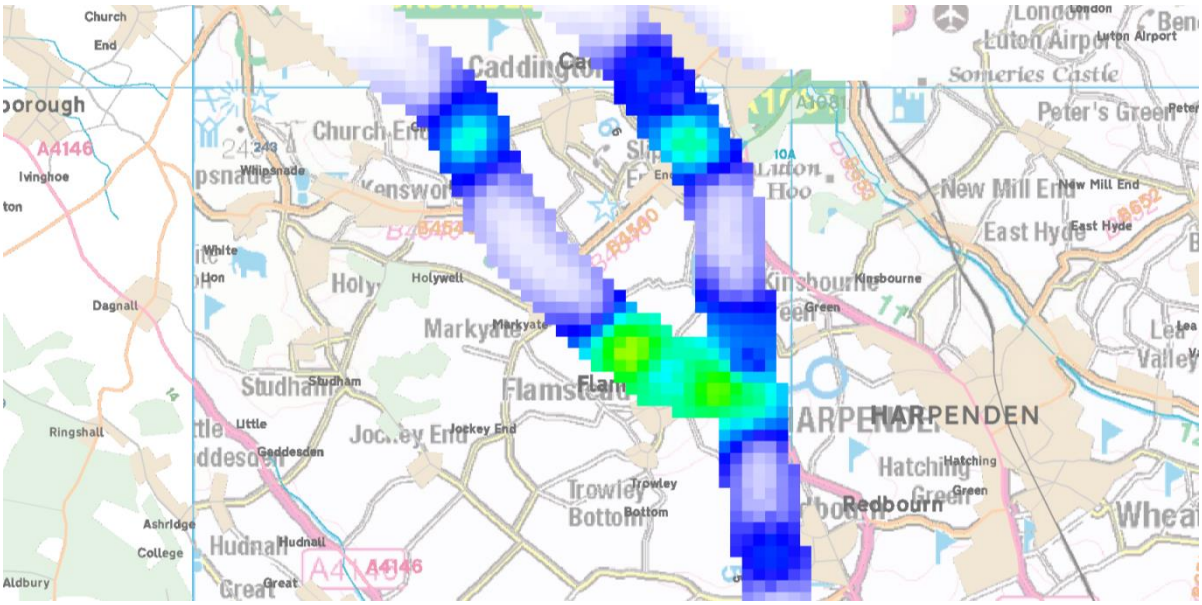
4. A14 north-west of Cambridge



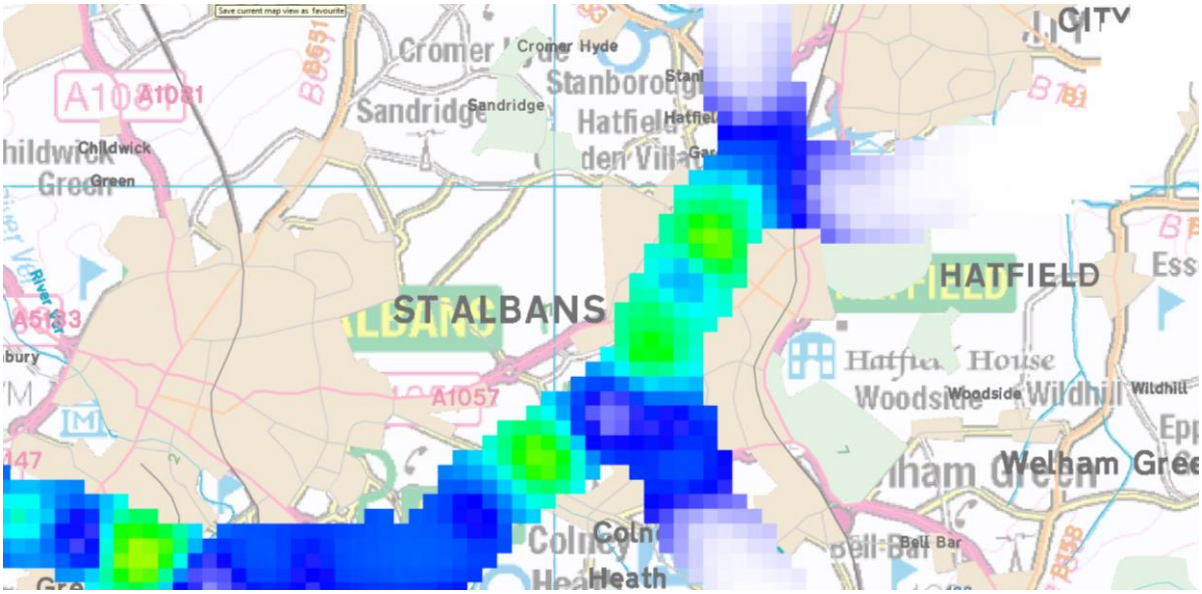
5. A11 junction with A505



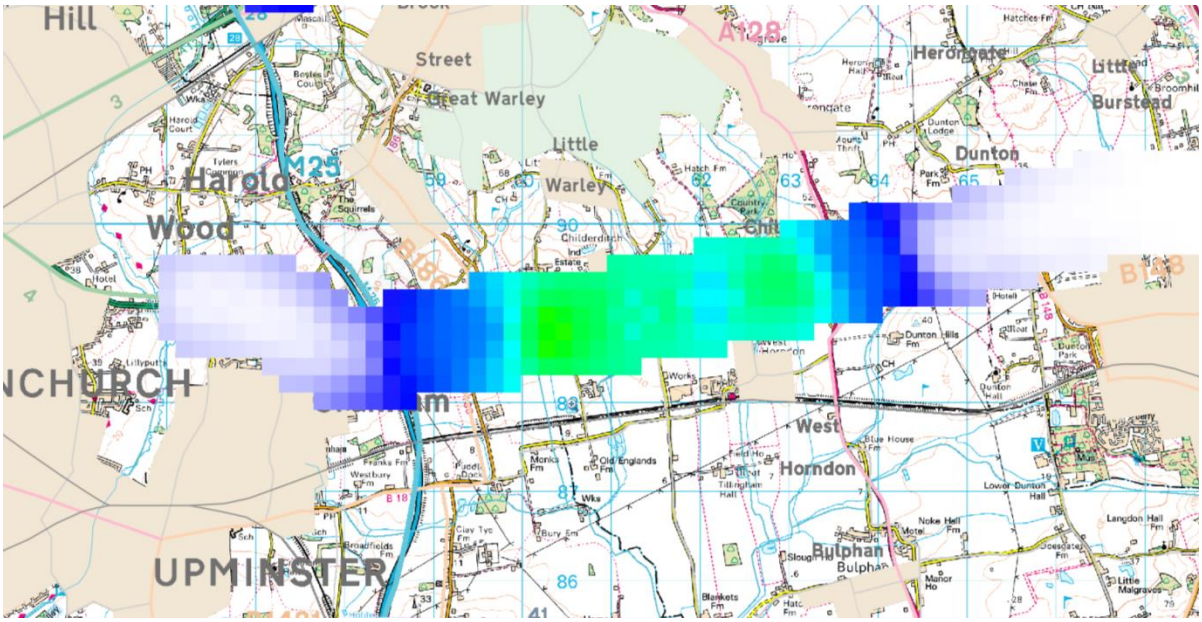
6. A5 south of Dunstable



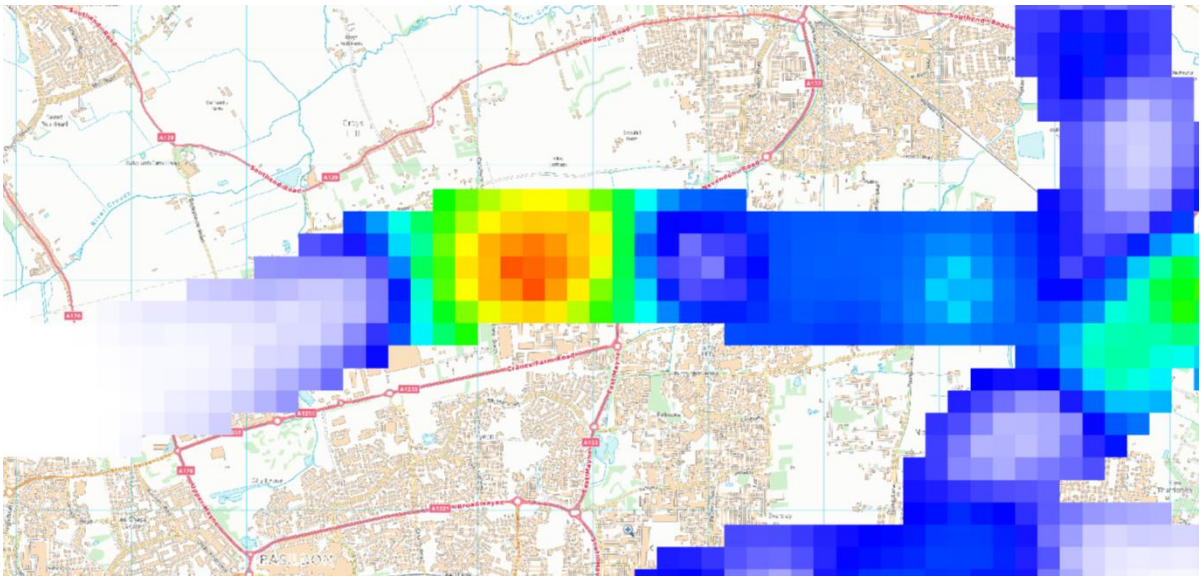
7. A1 Hatfield



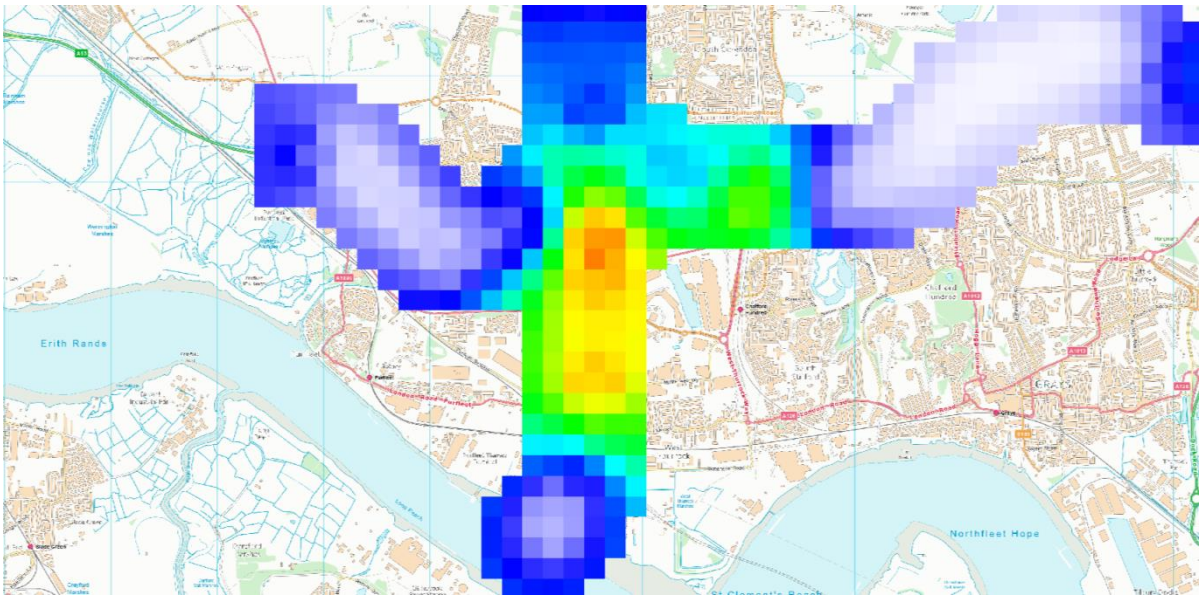
8. A127 east of M25



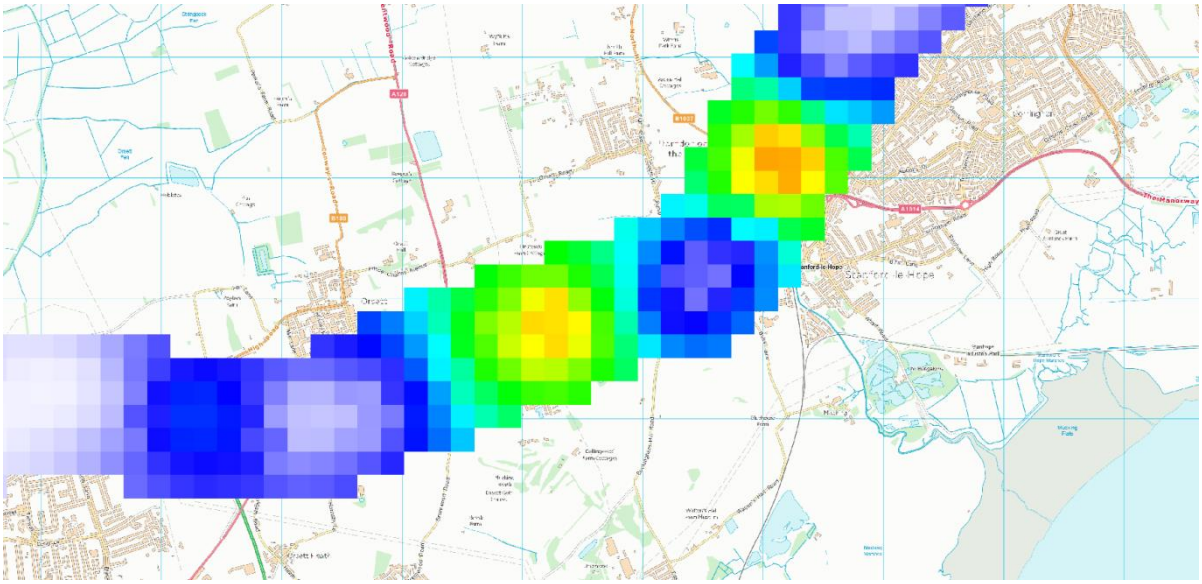
9. A127 Basildon



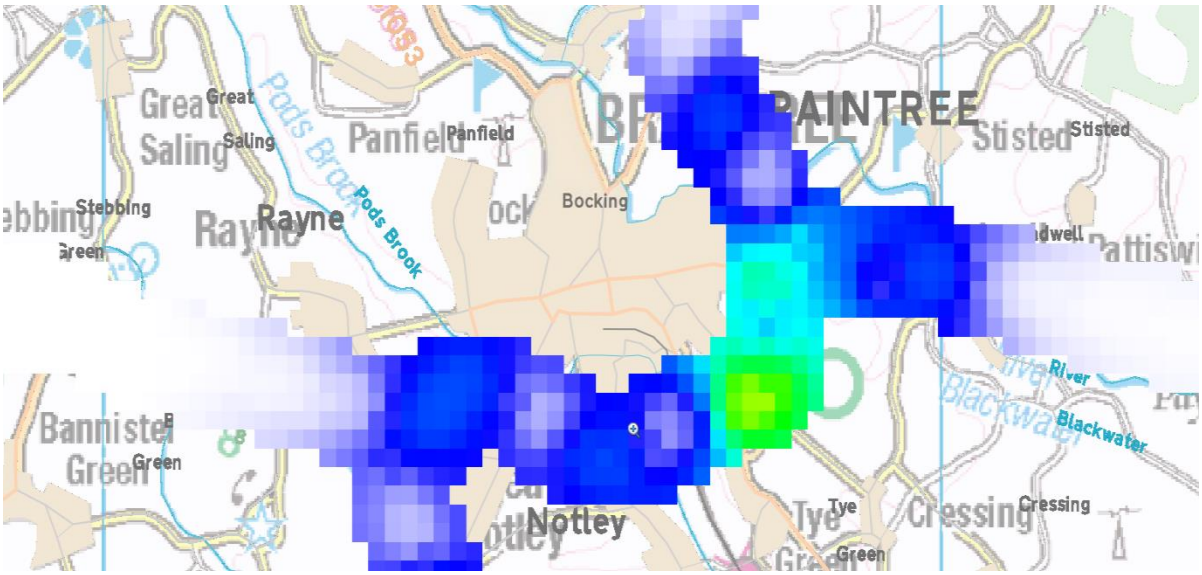
10. A13 and M25 DRC approach



11. A13 Stanford-le-Hope



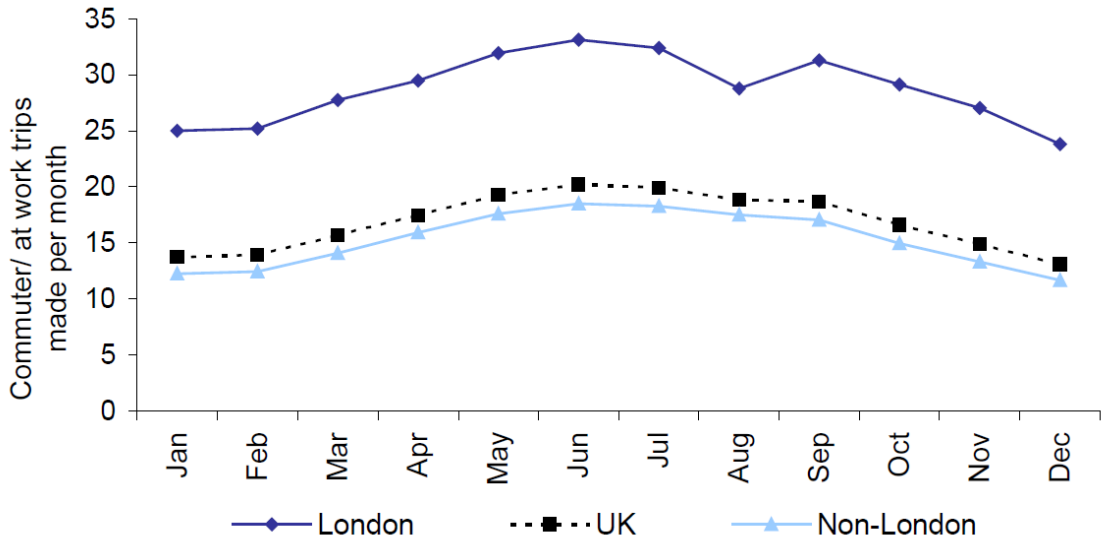
12. A120 Braintree



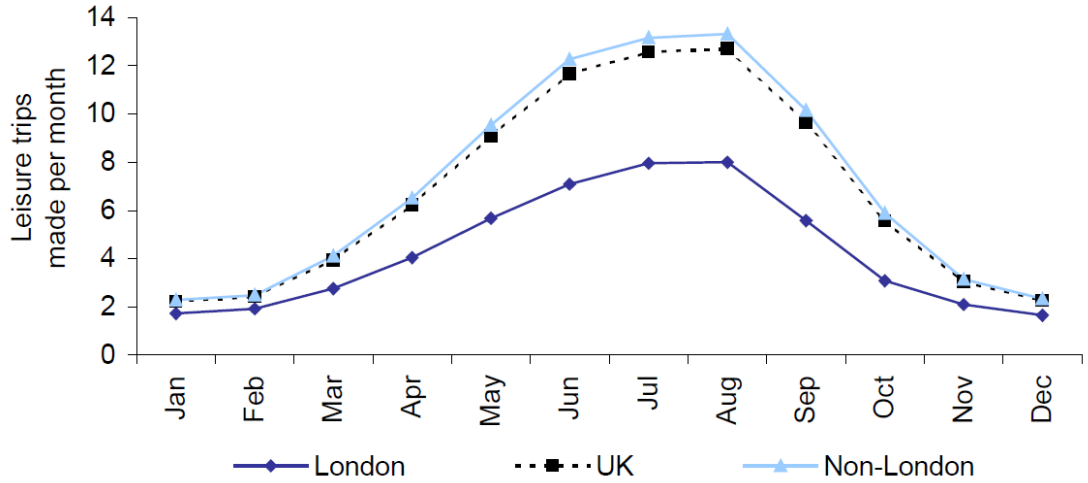
P2W rider seasonal trends

Both the graphs below show the seasonal nature of P2W traffic. These were taken from the document: ***London Road Safety Unit Research Summary No. 4: Differences between London motorcyclists and those from the rest of the UK.*** *TfL January 2004. Accessed 8th November 2016 from http://content.tfl.gov.uk/summary-no4-london-p2w-differences.pdf.*

Commuter/ at work trips



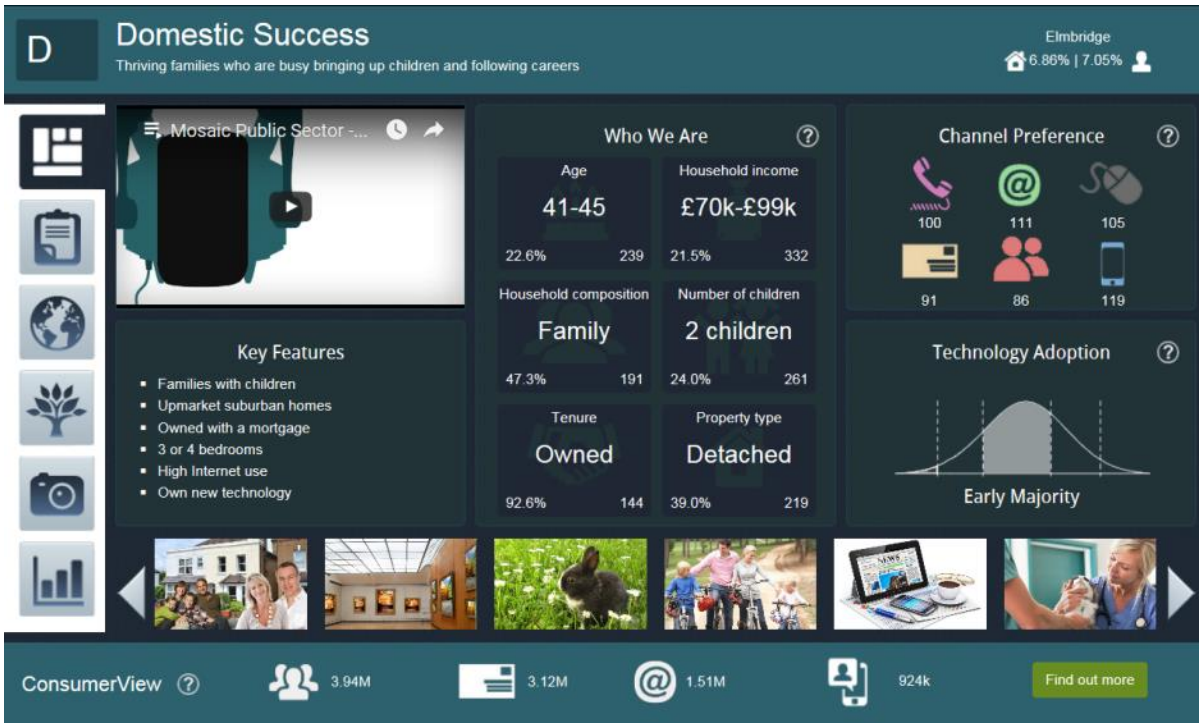
Leisure trips



Mosaic Group Summaries

A: Well-off owners in rural locations enjoying the benefits of country life

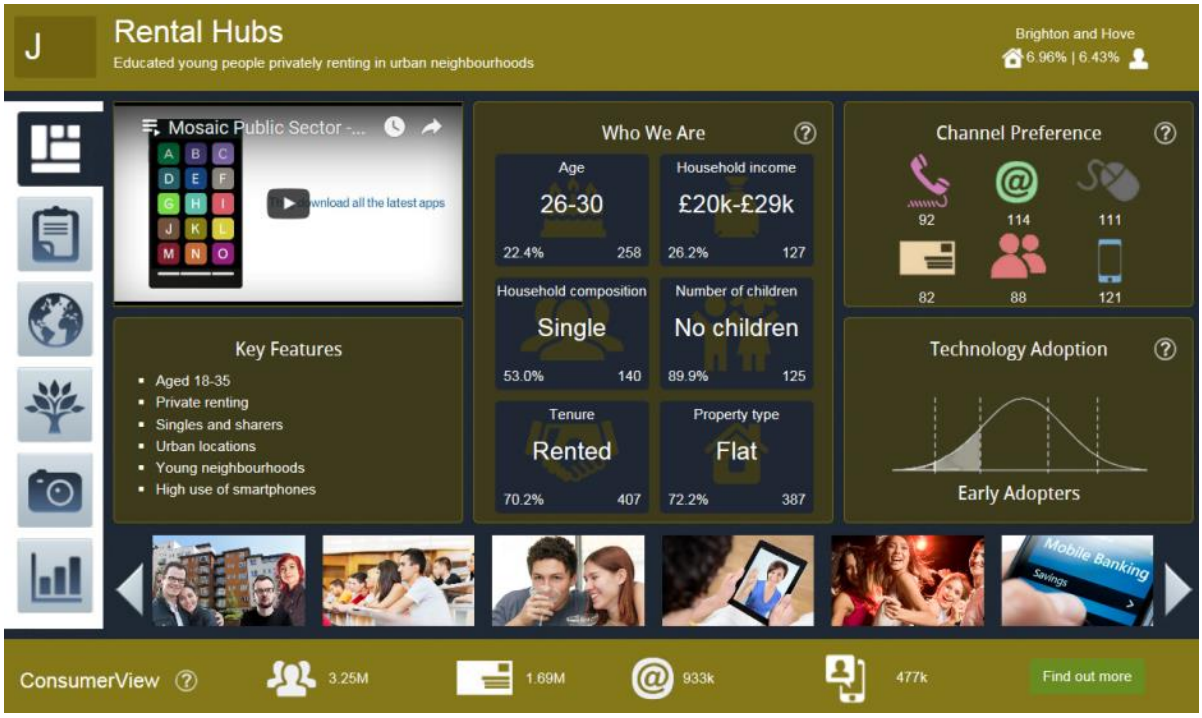
D: Thriving families who are busy bringing up children and following careers



G: Householders living in inexpensive homes in village communities

H: Younger households settling down in housing priced within their means

J: Educated young people privately renting in urban neighbourhoods



M: Families with limited resources who have to budget to make ends meet

Mosaic summary for profiled rider groups

Mosaic Group	Description	% of commuters	% of leisure riders	% of young riders
A	Well-off owners in rural locations enjoying the benefits of country life	8.1%	8.1%	6.5%
B	Established families in large detached homes living upmarket lifestyles	5.6%	6.1%	5.9%
C	High status city dwellers living in central locations and pursuing careers with high rewards	1.5%	1.6%	0.2%
D	Thriving families who are busy bringing up children and following careers	10.1%	11.6%	7.5%
E	Mature suburban owners living settled lives in mid-range housing	6.7%	9.0%	7.2%
F	Elderly people with assets who are enjoying a comfortable retirement	6.6%	7.1%	3.8%
G	Householders living in inexpensive homes in village communities	11.9%	12.9%	17.8%
H	Younger households settling down in housing priced within their means	12.5%	11.6%	12.9%
I	Residents of settled urban communities with a strong sense of identity	2.9%	2.3%	3.1%
J	Educated young people privately renting in urban neighbourhoods	6.9%	3.5%	5.4%
K	Mature homeowners of value homes enjoying stable lifestyles	4.6%	3.5%	2.8%
L	Single people privately renting low cost homes for the short term	5.8%	7.4%	4.7%
M	Families with limited resources who have to budget to make ends meet	10.2%	10.0%	15.8%
N	Elderly people reliant on support to meet financial or practical needs	3.7%	2.3%	3.4%
O	Urban renters of social housing facing an array of challenges	3.0%	2.9%	2.9%