Performance + Consultation Unit

Street Lighting and Levels of Crime in Surrey

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Introduction

Since December 2016, Surrey County Council has begun rolling out a program of part-night Street Lighting across the county with all areas having this implemented by July 2017. Concerns have raised in relation to the impact on crime levels across as a result. The purpose of this paper is to explore this issue on behalf Police and Crime Commissioner and to assist in providing an official response to this issue. Specifically this work has been commissioned to provide a response to the following:

- Overall crime trends for Surrey and the borough of Tandridge, specifically referencing changes in crime committed between 00:00 and 05:00.
- The types of crimes which have experienced change over the previous 12 months.
- An official view from Surrey Police on crime levels since street lighting was switched off in Surrey and whether there is a relationship.

In providing a response to these, crime data between 1st Jan 2015 and 30th September 2017 has been extracted from the Force's Data Warehouse and analysed using the statistical package R. A Negative Binomial Regression Analysis has been completed to determine if a significant relationship exists between levels of crime reported between 00:00 and 05:00 and part-night street lighting as the dataset considered here does not display equidispersion.

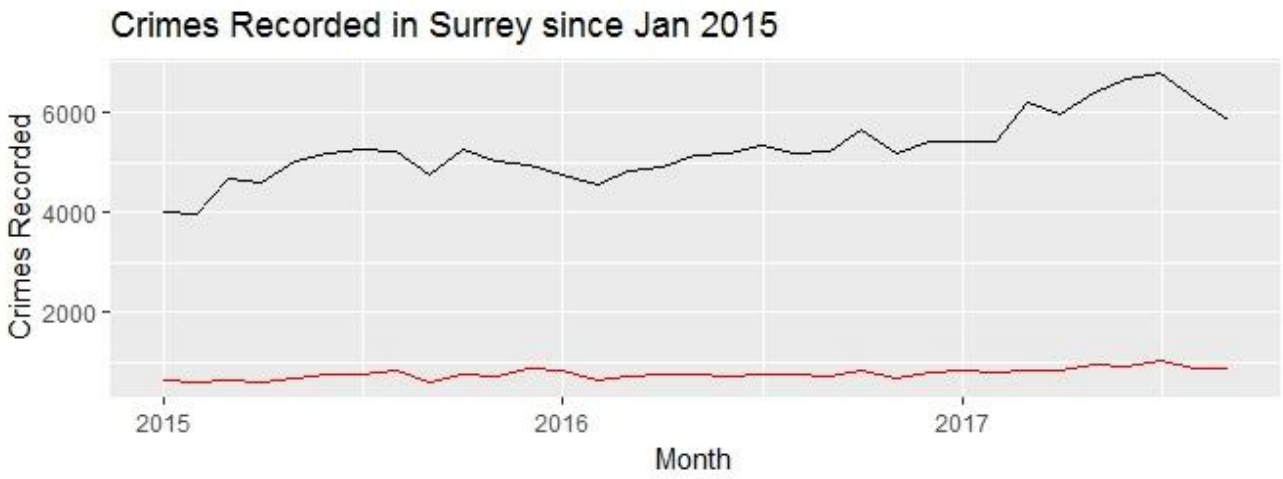
Overall Crime Trends

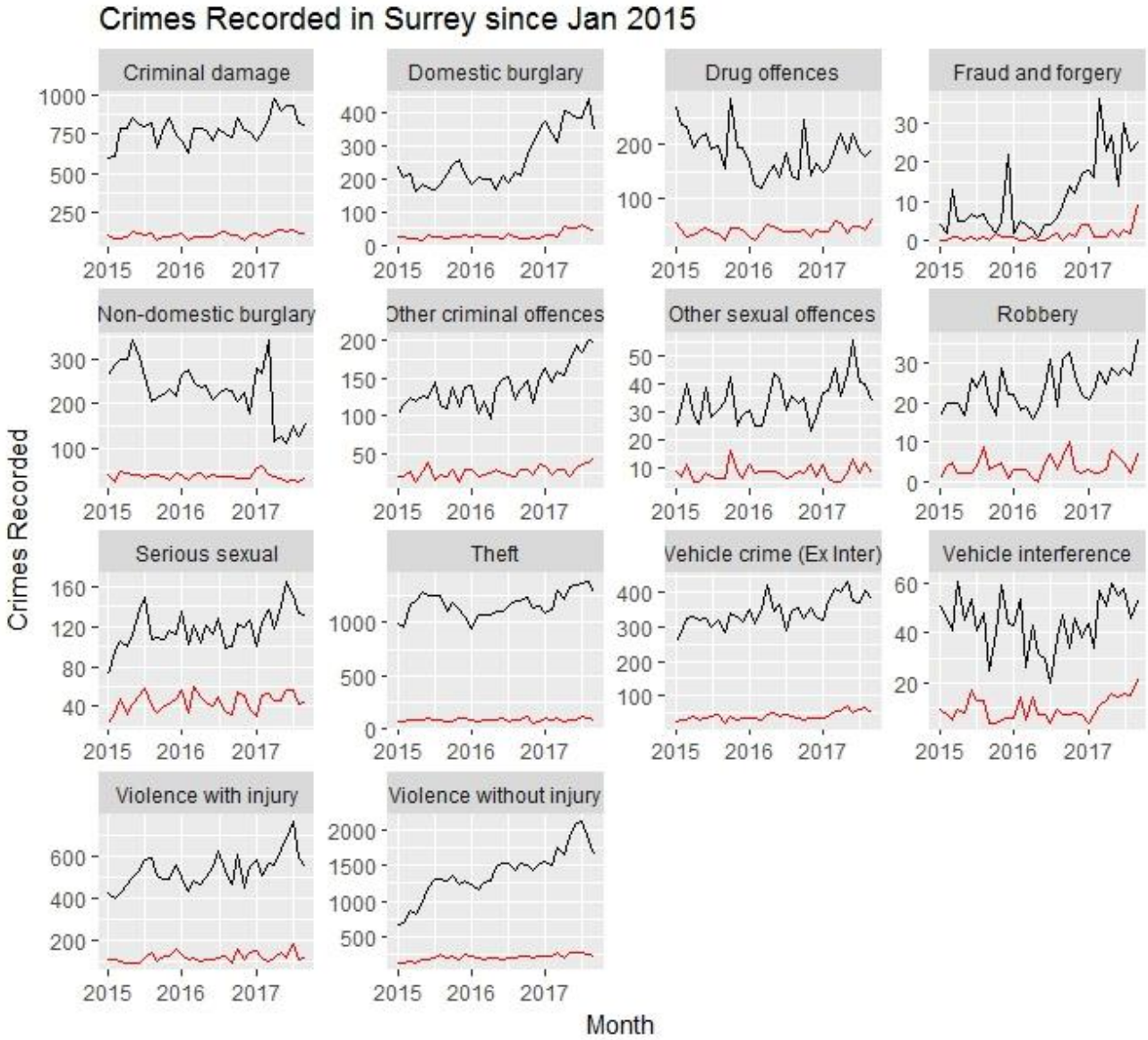
The chart below provides a breakdown of crimes recorded over between 1st January 2015 and 30th September 2017 firstly at Force level and secondly for the borough of Tandridge. Overall crime levels are denoted by the black line whilst those committed between the hours of 00:00 and 05:00 are shown in red.

Crime in Surrey

In the 12 months to 30th September 2017, reported crime in Surrey increased by 22.9% compared to the 12 months to 31st December 2015 (+13,280 additional offences). By contrast, crime committed between the hours of 00:00 and 05:00 increased by 20.9% during this period (+1763 additional offences).

The charts below provide an overview of monthly trends across the county as well as a breakdown of specific crime types. Of note, these offences committed between these hours appear to increase proportionally with the total number of offences recorded in the county (approx 14.5% since Jan 2015)



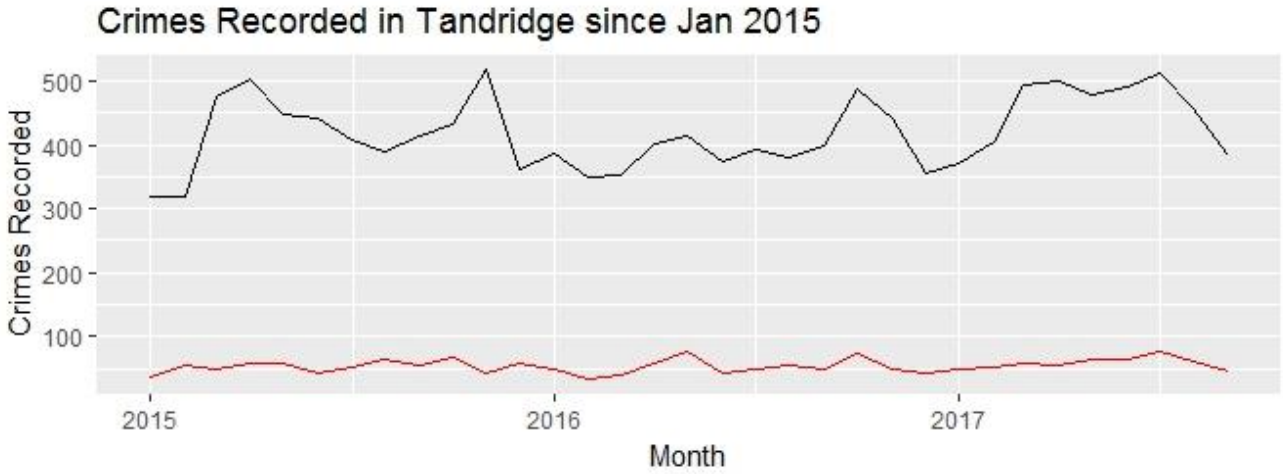


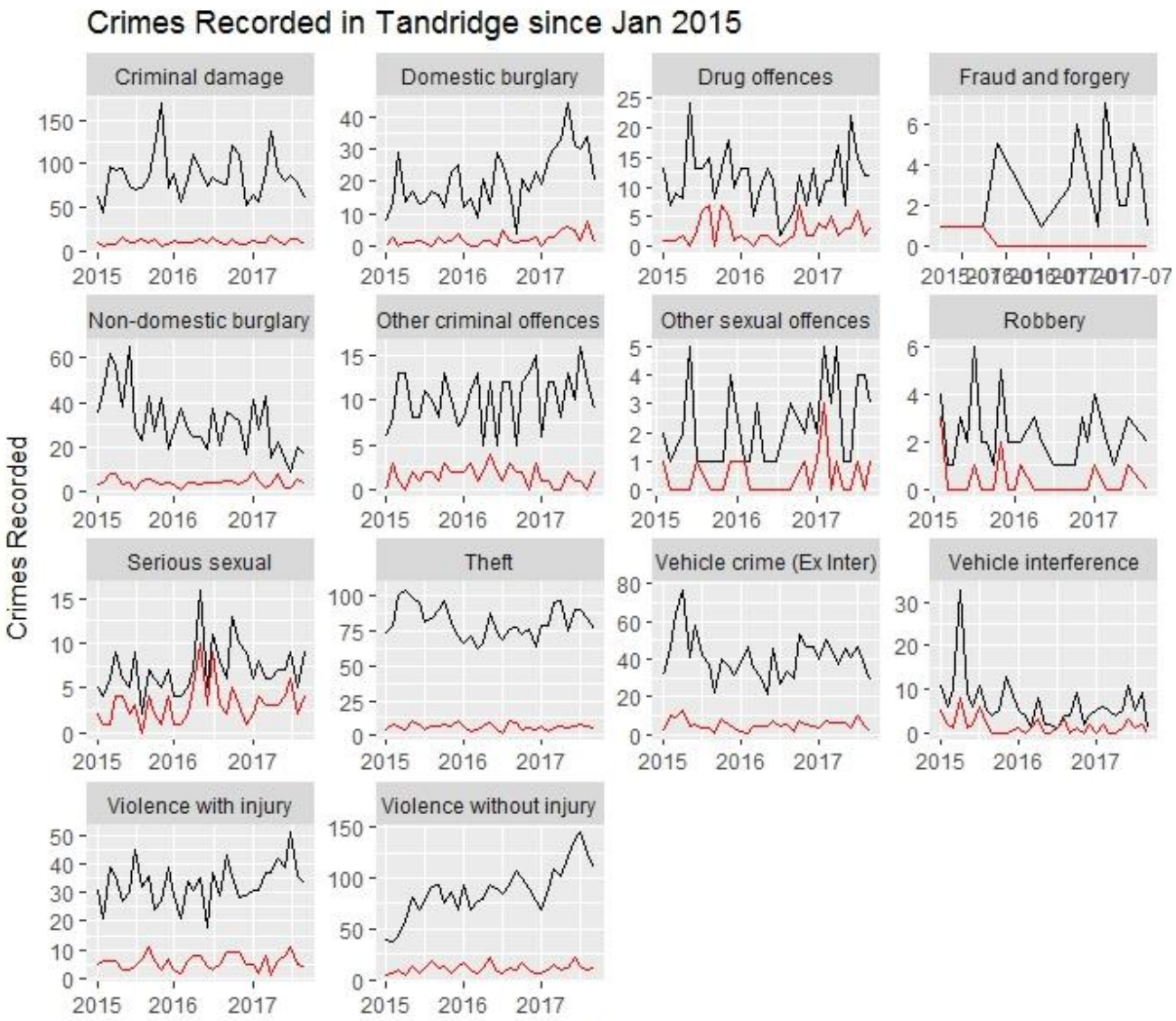
Crime in Tandridge

In the 12 months to 30th September 2017, reported crime in Tandridge increased by 6.7% compared to the 12 months to 31st December 2015 (+349 additional offences). By contrast, crime committed

between the hours of 00:00 and 05:00 increased by 6.9% during this period (+43 additional offences).

The charts below provide an overview of monthly trends across the county as well as a breakdown of specific crime types. The Force level trends highlighted above have also been noted in the borough of Tandridge. Of note, these offences committed between these hours appear to increase proportionally with the total number of offences recorded in the borough (approx 13% since Jan 2015)





Street Lighting and Crime Levels

A Negative Binominal Regression analysis was completed to determine the association between the numbers of crimes committed between 00:00 and 05:00 each month in the borough of Tandridge given the implementation of part-night lighting (STREET_LIGHTS) in that borough. The model was adjusted to take into account the total number of crimes recorded in the borough each month (FORCE). The full results are shown in Appendix A.

The results of this analysis highlight that the number of recorded crimes committed between the hours of 00:00 and 05:00 increased by around 2.7%. It is important to note however that the 95% confidence intervals for the results show us to be compatible with -12.5% reduction and a 20.6% increase (CI -12.5%, 20.6%) having adjusted for the total number of crimes recorded in the borough in that month suggesting that an absence of street lighting in the borough is not a significant predictor of the number of reported crimes committed between 00:00 and 05:00 each month (p=0.74035). Of note however is that the total number of crimes recorded in the borough each month does have a significant associate with the number of reported crimes committed between 00:00 and 05:00 with 0.16 times more offences recorded during this period for every TNO recorded overall.

A similar model was applied at Force level to determine the association between the numbers of crimes committed between 00:00 and 05:00 each month given the implementation of part-night lighting (STREET_LIGHTS) across the county. The model was adjusted to take into account the total number of crimes recorded in the each month (FORCE). The full results are shown in Appendix B.

The results of this analysis highlight that the number of recorded crimes committed between the hours of 00:00 and 05:00 by increased by around 0.08%. It is important to note however that the 95% confidence intervals for the results show us to be compatible with -7.5% reduction and a 8.3% increase having adjusted for the total number of crimes recorded in the county in that month suggesting that an absence of street lighting is not a significant predictor of the number of reported crimes committed between 00:00 and 05:00 each month (p=0.74035). Of note however is that the total number of crimes recorded in the borough each month does have a significant associate with the number of reported crimes committed between 00:00 and 05:00 with 0.00173 times more offences recorded during this period for every TNO recorded overall.

From a statistical perspective, there appears to no association between part night lighting scheme and increases in crime levels. The number of offences reported as having been committed between the hours of 00:00 and 05:00 have increased proportionally with overall crime levels since 2015. The main contributors to this have the introduction of new offences, improvements in crime data integrity, increased reporting of non-recent offences.

Appendix A – Negative Binomial Regression Analysis for Tandridge

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Deviance Residuals:
     Min        1Q    Median        3Q       Max
-2.09175  -0.77261  -0.06235   0.67439   2.43182

Coefficients:
               Estimate Std. Error z value Pr(>|z|)
(Intercept)   3.2933782  0.2487668  13.239  < 2e-16
STREET_LIGHTS 0.0270156  0.0815236   0.331  0.74035
FORCE         0.0016308  0.0006036   2.702  0.00689

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Signif. codes:
0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for Negative Binomial(96.5089) family taken to be 1)

    Null deviance: 43.974  on 32  degrees of freedom
Residual deviance: 33.037  on 30  degrees of freedom
AIC: 247.39

Number of Fisher Scoring iterations: 1


              Theta:  96.5
          Std. Err.:  66.3

 2 x log-likelihood:  -239.388
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Appendix B – Negative Binomial Regression Analysis for Surrey

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Deviance Residuals:
     Min        1Q    Median        3Q       Max
-1.72952  -0.61662  -0.07379   0.35510   2.66340

Coefficients:
               Estimate Std. Error z value Pr(>|z|)
(Intercept)   5.720e+00  1.411e-01  40.526  < 2e-16 ***
STREET_LIGHTS 8.048e-04  4.017e-02   0.020    0.984
FORCE         1.730e-04  2.835e-05   6.102 1.05e-09 ***
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Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for Negative Binomial (299.6015) family taken to be 1)

    Null deviance: 125.608 on 32  degrees of freedom
Residual deviance:  33.196  on 30  degrees of freedom
AIC: 362.35

Number of Fisher Scoring iterations: 1


              Theta:  300
          Std. Err.:  103

 2 x log-likelihood:  -354.354
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