Bonneagar Iompair Éireann
Transport Infrastructure Ireland

# Red Light Camera
# Blackhall Place, Dublin
# Pilot Programme – Phase 3

## Closure Report *(DRAFT)*
## April 2016

**DOCUMENT HISTORY**

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INDEX

## 1. Executive Summary

On-going analysis of the LUAS collision data show the main contributory factor to the LUAS safety statistics are the high number of road traffic collisions. This analysis has identified that the main causation factor is red light infringements by road vehicles at signalised junctions where the LUAS interfaces with road traffic.

These red light infringements not only put motorists, LUAS personnel and passengers at risk, they also cause considerable disruption to the LUAS service. To try and tackle the issue of red light infringements at LUAS junctions, A Red Light Camera Project was established between the then RPA (now called TII), AGS, DCC and DTO (now called the NTA).

The aims of the Red Light Camera Project were: to source and install red light cameras, to test and commission the cameras, and to bring the red light cameras into operation and issue Fixed Charge Notices (FCNs). In December 2010 Red Light Cameras were successfully sourced, procured and installed on Blackhall Place and on Con Colbert Road with an outstation on Queen St.

It was agreed between TII, NTA, AGS and DCC that the Red Light Camera at the Blackhall Place/Queen St junction be brought into operation on a pilot basis to run for 12 months. At 8am on Thursday 4th June 2015 the red light camera was successfully commissioned and began issuing Fixed Charge Notices for accepted detections via the Garda Pulse system.

The data from the Red Light Camera Project, to the end of April, raises several items of serious concern:

- The high level of road vehicles breaking the red light at this LUAS junction, putting the LUAS drivers and passengers at risk.
- The number of cyclists who were detected violating the red light.
- The high number of violations which were detected in excess of 5 seconds after the display of the red signal.
- The comparative number of violations by taxi drivers who were detected by the Red Light Camera.

Research carried out by the Centre for Innovative Human Systems (CIHS), Trinity College Dublin on behalf of TII, found that the installation of enforcement cameras, increased fines or points and enhanced public awareness campaigns were viewed as the most effective means of deterring motorists from failing to stop at a red traffic signal. In addition, the research found that the introduction of the red light cameras at Blackhall Place has had a very positive influence on improving safety behaviour at this junction. Further details of this research are discussed later in this report.

The Red Light Camera (Pilot Programme) has achieved the Project Scope to install, operate and provide violation images and data to enable the prosecution via the Fixed Charge Notice process or a subsequent court appearance.

This technology may be applied to other junctions in Dublin, and in other parts of the country, where motorists breaking red lights is particularly problematic.

Subsequent to the project review, data analysis and associated research, the recommendations are:

**Recommendation No.1:**
It is recommended that the Red Light Camera Project forms part of the ongoing Road Safety Campaigns and utilises the data available from the detection history to inform the campaign.

**Recommendation No.2:**
It is recommended that the existing Pilot Project Red Light Camera installation on Blackhall Place is confirmed as a permanent installation.

**Recommendation No.3:**
It is recommended that the Pilot Project Red Light Camera outstation on Queen St is progressed to an operational and enforceable installation.

**Recommendation No.4:**
It is recommended that an ongoing campaign to enhance the awareness of the enforcement options available to the Gardaí for cyclists breaching red traffic signals is undertaken.

**Recommendation No.5:**
It is recommended to carry out a CCTV survey of other LUAS junctions to determine the suitable for the provision of additional Red Light Cameras.

## 2. Introduction

In 2015 the LUAS system carried 34.6 million passengers safely, reliably and efficiently. However, the ongoing success of the LUAS system has in part been hindered by Road Traffic Collisions (RTC) and Emergency Brake (EB) applications by tram drivers which has occurred at LUAS interface junctions, particularly at signalised intersections.

In relation to LUAS Operations, a Road Traffic Collision (RTC) involves the physical contact between a tram and a road vehicle.

An Emergency Brake (EB) application is a combination of the application of trams electrical, mechanical and the electromagnetic braking systems. It should be noted that the application of an emergency brake can also cause minor injuries to unsuspecting LUAS passengers and that a LUAS vehicle has an approximate carrying capacity of 285 passengers.

On-going analysis of the LUAS collision data show that the main contributory factor to the LUAS safety statistics are the high number of road traffic collisions. The analysis has identified that the main causation factor is red light infringements by road vehicles. Figure 1 outlines the annual accident statistics for the LUAS operations.

Note: 2016 P4; is the statistics Year to Date to the end of Period 4, LUAS Reporting Period (24th April 16).

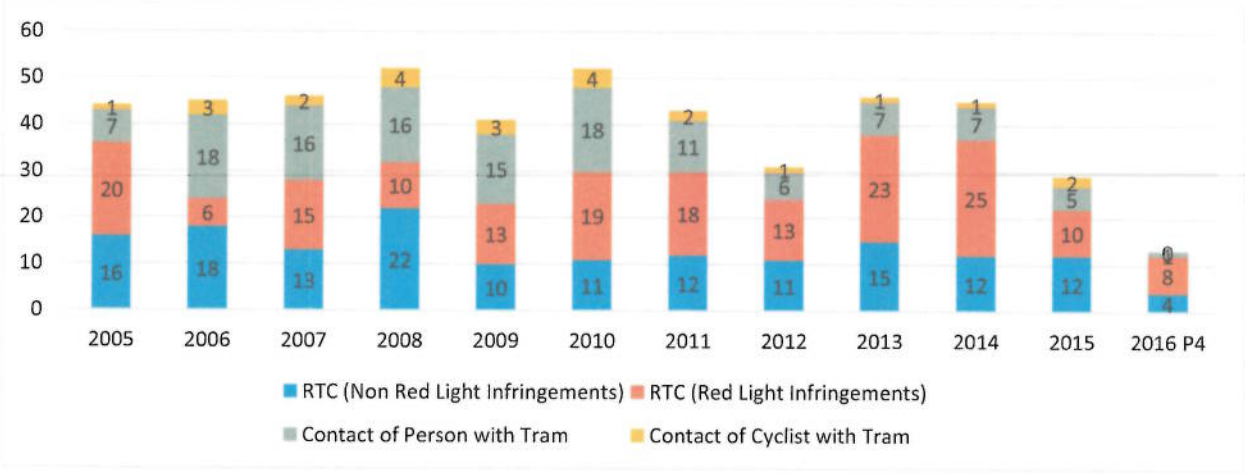


*Figure 1 - Annual LUAS Accident Statistics*

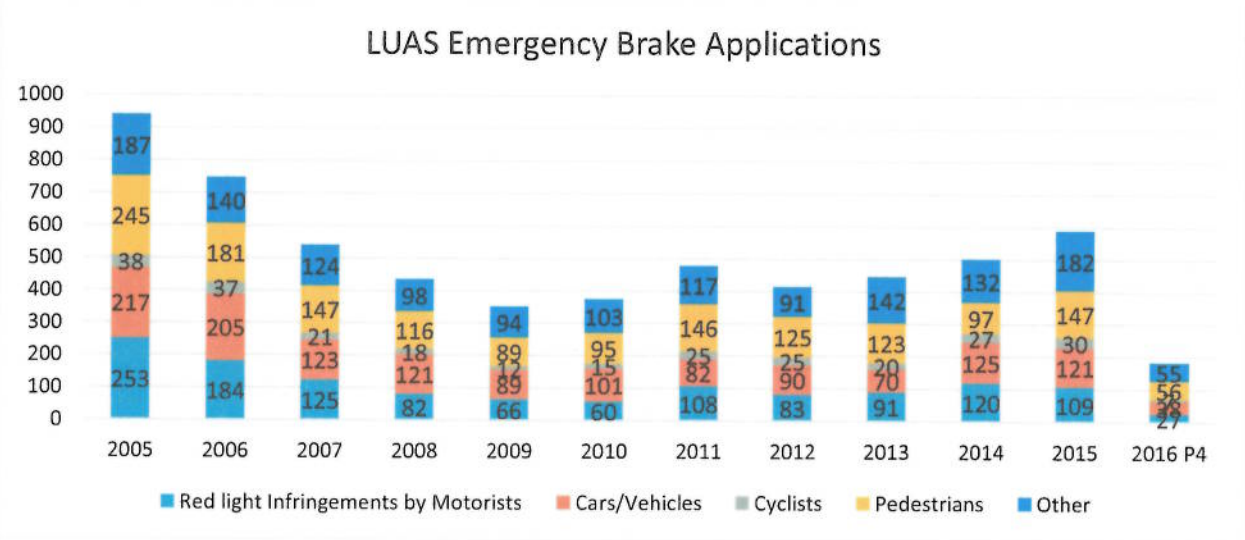


*Figure 2 - Annual Emergency Brakes per causation factor*

Motorists who drive through a red light at junctions that cross the LUAS tram tracks, are placing themselves, their passengers, LUAS staff and passengers on the LUAS trams at risk of serious injury or even death. Coupled with this is the inconvenience to passengers and the expense of getting the tram service back into operation after an incident. The continuing high level of red light infringements by motorists at LUAS junctions is a major concern for TII and the LUAS Operator. The Red Light Camera Project is designed to tackle this important safety issue.

The following are the aims of the Red Light Camera Project:

- To source and install two red light cameras and one outstation.
- To test and commission the cameras.
- To commission the red light cameras and issue Fixed Charge Notices (FCNs) for prosecution.

The Red Light Camera Project was split into the following three phases:

Phase 1 - Trial Phase
Phase 2 - Enforcement Phase
Phase 3 – Operational Phase.

It was agreed between the then Railway Procurement Agency (now called Transport Infrastructure Ireland), National Transport Agency (NTA), An Garda Siochana (AGS) and Dublin City Council (DCC) that the Red Light Camera on Blackhall Place at the junction with Benburb St would be brought into operation on a pilot basis to run for 12 months.

This Red Light Camera Project Closure Report will carry out an assessment of the Red Light Camera Project and evaluate its implementation.

## 3. LUAS Road Traffic Collisions

The following sections outline statistics in relation to the LUAS road traffic collisions and emergency brake applications. Both TII and the LUAS Operator carry out on-going analysis of the LUAS incident/collision data and these statistics are reported in the TII monthly and annual safety reports.

Analysis of the RTC statistics identified a pattern of road traffic collisions (RTC) at a number of LUAS junctions. Figures 3 and Figure 4 shown a profile of the LUAS Red Line and LUAS Green Line respectively, with the number of RTCs for each junction along the alignment.

The LUAS Red Line has a higher number of at grade road crossings (53) compared to the LUAS Green Line (22), the LUAS Red Line has therefore a higher risk of an RTC at junctions.

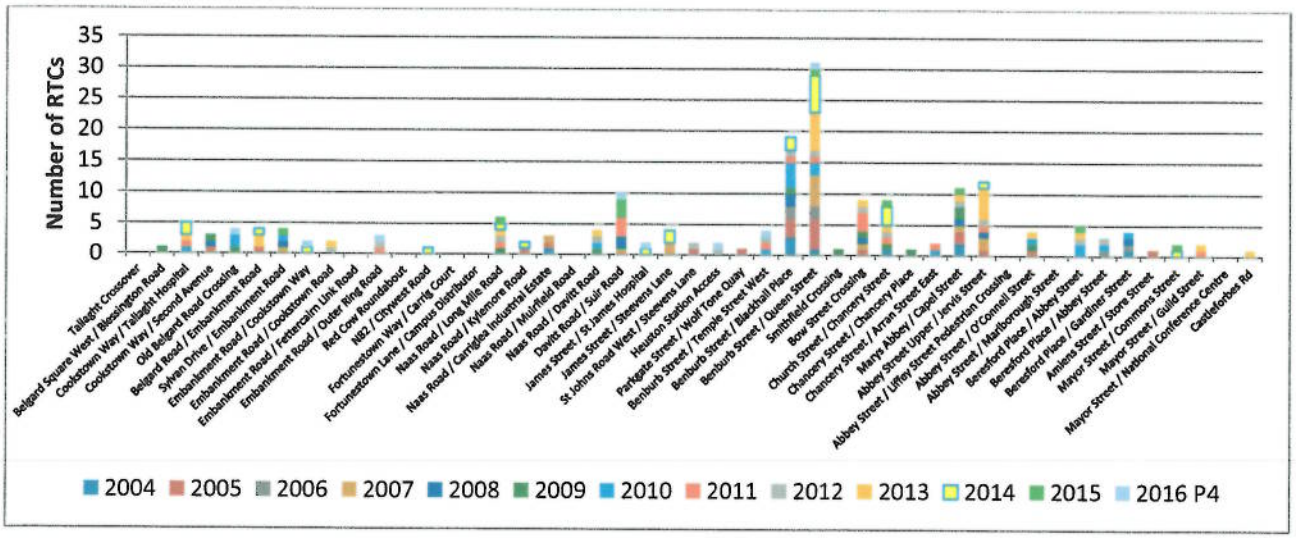


*Figure 3 - RTCs per LUAS Red Line Road Signalised Junction*

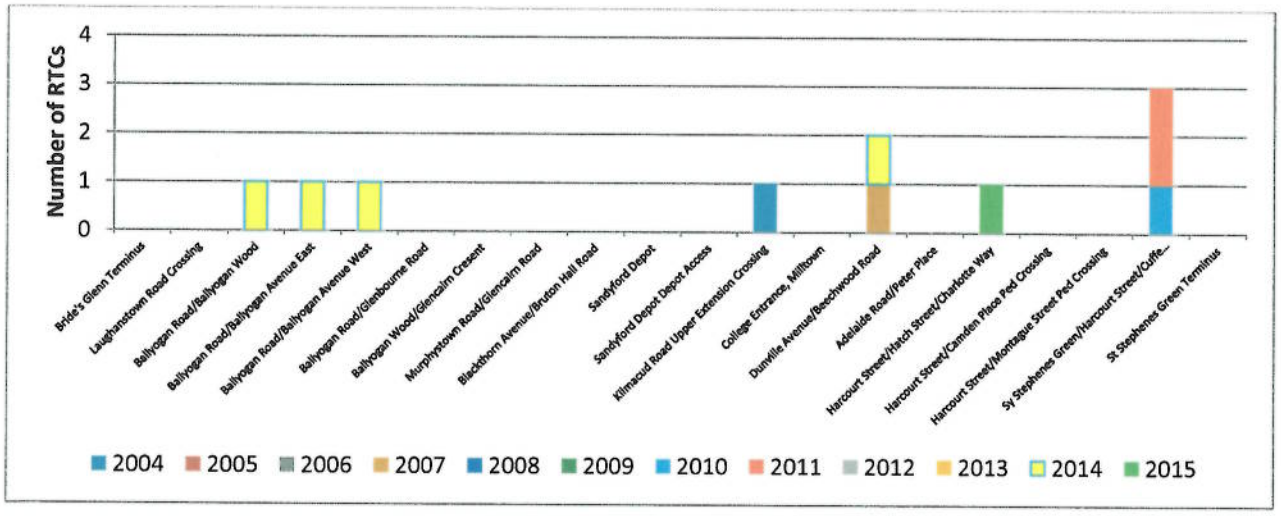


*Figure 4 - RTCs per LUAS Green Line Road Signalised Junction*

The statistics indicates that the following two junctions have the highest number of road traffic collisions on the LUAS network. (Refer to Figure 3)

- Benburb St (LUAS Red Line) junction with Blackhall Place.
- Benburb St (LUAS Red Line) junction with Queen St.

Analysis of the statistics identified that the main causation factor for RTCs and EBs at both these locations was road vehicles failing to stop at the red traffic signal.

This failure to stop at red traffic signals was perceived to be due in part to a 'see-through' problem at the Blackhall Place junction (e.g. the green signal at Blackhall Place / Ellis Quay junction was visible on approach to Blackhall Place / Benburb Street junction) possibly leading to driver confusion. A similar issue was perceived to exist at the Queen St junction.

To tackle these problems, the then Railway Procurement Agency (which was renamed 'Transport Infrastructure Ireland' - TII in August 2015) implemented a variety of measures at the two junctions to improve driver behaviour at the junctions, as part of the ongoing network wide safety initiatives programme.

The installation dates and a brief description of the measures installed at each junction were as follows:

Blackhall Place - junction with Benburb St (LUAS Red Line)

- 2004 – Q4 - Installation of oversize (900mm sides) advance tram warning signs on both sides of the northbound and southbound approaches.
- 2005 – Q2 - Disabling the demand tram detection loop – which consequently requires that all trams on both approaches to the junction have to stop completely on every occasion for an average of 11 seconds per tram.
- 2005 – Q3 - Installation of high friction carriageway surfacing (buff colour in the nearside bus lane and red colour in the offside traffic lane).
- 2006 - Q1 - Installation of flashing road studs in the carriageway surface (to display flashing red lights synchronised with the adjacent red traffic signals) on both northbound and southbound approaches.
- 2006 – Q2 - Installation of louvres on the traffic signals at the adjacent southbound junction on Ellis Quay, installation of additional secondary traffic signals on the southbound approach.
- 2006 – Q4 - Installation of high mounted secondary traffic signal.
- 2006 – Q4 - Remarking of all junction line marking including yellow box marking.
- 2011 – Q1 – Installation of red light camera unit
- 2011 – Q4 - Installation of LED traffic signals at the junction.
- 2011 –Q4- Installation of revised tram warning signs on both approaches (in conjunction with the installation of the northbound and southbound Quality Bus Corridors).

Queen St - junction with Benburb St (LUAS Red Line)

- 2004 – Q4 - Installation of oversize advance tram warning signs on both sides of the southbound approach.
- 2005 – Q1 - High mounted secondary traffic signal.
- 2006 – Q1 - Installation of an additional secondary traffic signal on the southbound approach.
- 2006 – Q2 - Remarking of all junction line marking including yellow box marking.
- 2006 – Q3 - Installation of louvres on the traffic signals at the adjacent southbound junction at Ellis Quay.
- 2008 – Q3 - Installation of flashing road studs in the carriageway surface (to display flashing red lights which are synchronised with the adjacent red traffic signals) on both northbound and southbound approaches .
- 2008 – Q3 - Installation of LED traffic signals.
- 2008 – Q4 - Installation of high friction carriageway surfacing.
- 2011 – Q1 – Installation of red light camera outstation

- 2014 – Q4 - The stop line and pedestrian crossing on Queen St was relocated 8 metres southwards and closer to the junction with Benburb St (LUAS Red Line). Similarly on approach to the Queen St junction, the tram signal priority on the 'to Connolly' approach has also been downgraded.

In tandem with these measures the LUAS Operator trained their tram drivers in defensive driving techniques.

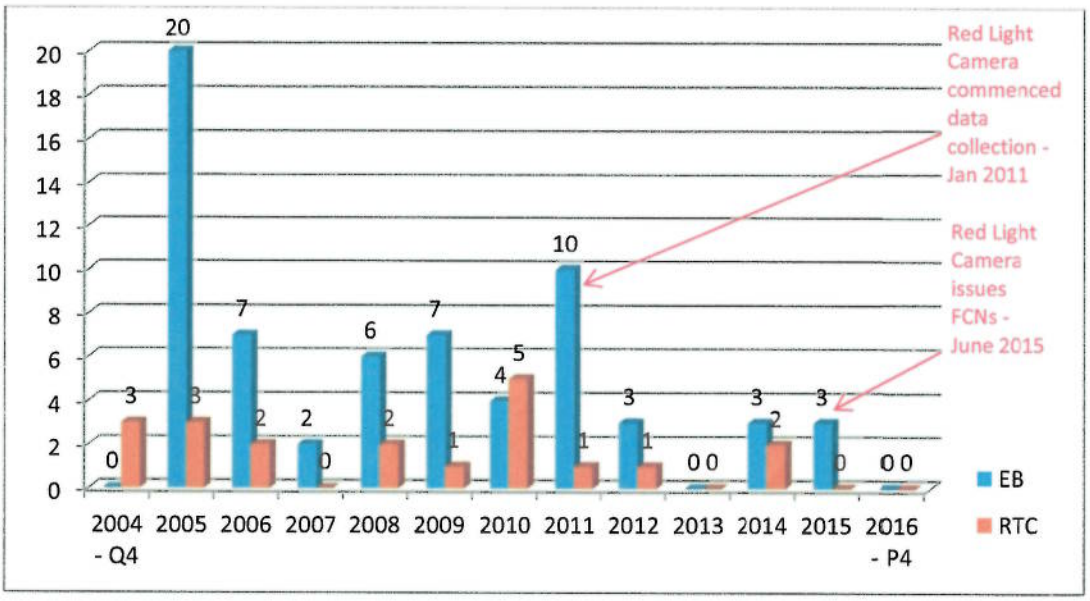


*Figure 5 - Blackhall Place - junction with Benburb St Summary of Road Traffic Collisions (start of Q4 -2004 to end of P4 -2016)*

Figure 5 indicates that there has been a reduction in RTCs and EBs since 2011 – this may be due to the combined effect of the mitigation measures, the Red Light Camera installation, the safety campaigns and the defensive LUAS driver training.

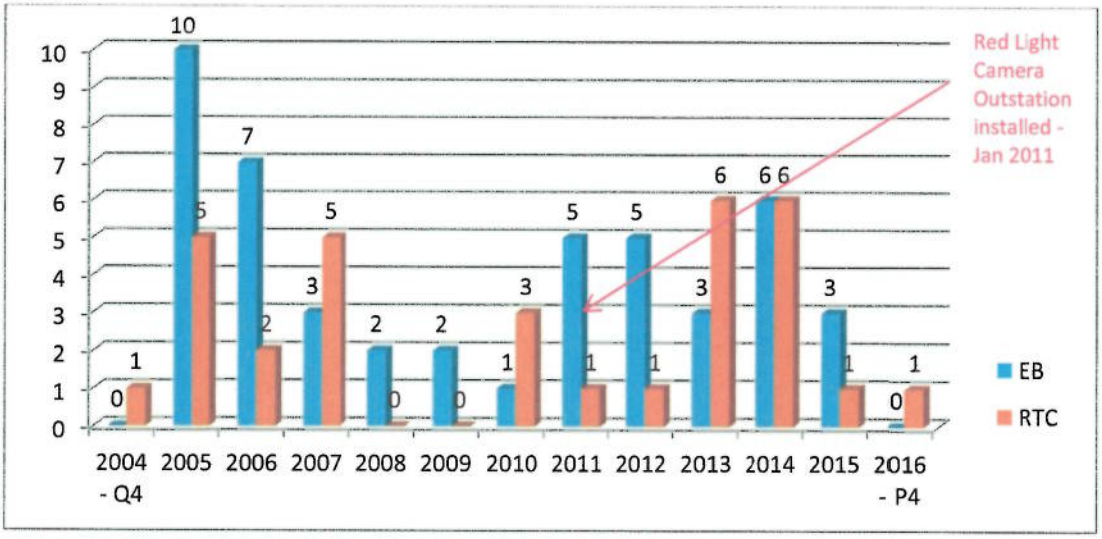


*Figure 6 - Queen St - junction with Benburb St Summary of Road Traffic Collisions (start of Q4 -2004 to end of P4 -2016)*

Figure 6 indicates that during the period 2011 to 2015 the number of RTCs and EBs remained high. However the reconfiguration of the Queen St junction in December 2014 and the downgrading of the tram priority on 'to Connolly' approach appears to be contributing to a reduction in incidents in 2015 and up to P4 in 2016.

As the long term aim is the safe and efficient provision of tram services at both junctions and the consequent improvement in passenger satisfaction, the ongoing operation of the existing Red Light Camera on Blackhall Place and the installation and operation of an Red Light Camera on Queen St is paramount.

The high number of RTCs (see Figure 1) due to red light infringements prompted investigations into the viability and feasibility of the installation of Red Light Camera infrastructure at LUAS signalised road junctions. Due to the high frequency of RTCs at these LUAS junctions, both the Blackhall Place and Queen St junctions were the selected LUAS locations for the installation of a pilot Red Light Camera System.

## 4. Red Light Camera Installations

In July 2010 the Elmore Group Limited was awarded a contract by DCC to install Red Light Cameras at Blackhall Place southbound- (north of junction with Benburb St) and on Con Colbert Road eastbound – (west of junction with South Circular Road). A Red Light Camera outstation (which is a housing only and hence capable of transferring a camera unit) was installed on Queen St (southbound) - north of junction with Benburb St.


*Figure 7 - Locations of Red Light Camera Installations*

It was agreed between TII, NTA, AGS and DCC that the Red Light Camera on Blackhall Place at the junction with Benburb St be brought into operation on a pilot basis to run for 12 months.

At 8am on Thursday 4th June 2015 the red light camera was commissioned and began issuing Fixed Charge Notices for accepted detections via the Garda Pulse system.


*Figure 8 - Red Light Camera on Blackhall Place*

*Figure 9 - Red Light Camera on Blackhall Place*

*Figure 10 - Red Light Camera on Queen St*


*Figure 11 - Red Light Camera on Con Colbert Rd*

Blackhall Place is a four lane main road with two lanes northbound and two lanes southbound, currently encompassing a kerbside 12 hour bus lane in each direction.

Blackhall Place provides southbound access from the north inner city to the south quays, leading to the N4 National Primary Route, whilst the northbound lanes are generally accessed from Ellis Quay and Usher's Island for northbound traffic accessing the north side of the city.

Benburb St contains the two-way LUAS Red Line running east and west at this junction with a single lane of westbound vehicular traffic.

Traffic count data received from DCC advised that on Tuesday 9th February 2016, 795 vehicles passed southbound through the junction in the AM peak period (07:00 – 09:00) whilst 813 vehicles passed through the junction in the PM peak period (16:30 – 18:30).

The RTCs which occurred at the Blackhall Place junction have been overwhelmingly in the southbound direction.

## 5. Red Light Camera

A red light camera is a traffic enforcement camera which captures images of a vehicle which has proceeded beyond the stop line on a single direction approach at an intersection when a red traffic signal aspect is displayed. By automatically photographing vehicles that proceed through a junction in violation of red traffic signal aspect, the camera produces evidence that assists An Garda Síochána (AGS) with the enforcement of road traffic signal violations.

Generally the camera is triggered by detection loops installed in the carriageway, though radar can also be utilised. This red light camera technology has been successfully installed and operated worldwide, in countries including Australia, Canada, the United Kingdom, Singapore and the United States.

Consequently, after several discussions with An Garda Siochana (AGS), the enforcement authority, and Dublin City Council (DCC), the road authority, a funding application for the installation of Red Light Cameras was submitted by the then RPA to the Dublin Transportation Office (renamed the National Transport Authority - NTA) in 2006 for approval.

## 6. Project Scope

In December 2008 AGS authorised a pilot programme to re-introduce Red Light Cameras onto Dublin streets for the monitoring of red light traffic violations. Subsequently in 2009 discussions were undertaken between AGS / DCC and the then RPA to ascertain the requirements of the Red Light Camera Pilot Project.

The following were the aims of the Red Light Camera Project:

1. To source and install two red light cameras and one outstation.
2. To test and commission the cameras.
3. To bring the cameras into operation and issue Fixed Charge Notices (FCNs).

The Red Light Camera Project was split into the following three phases:

- Phase 1 - Trial Phase - (commenced in Q1 of 2010)
- Phase 2 - Enforcement Phase - (commenced in Q4 of 2013)
- Phase 3 – Operational Phase. - (commenced in Q3 of 2015)

### 6.1 Phase 1 – Trial Phase

Phase 1 - Trial Phase required the installation of operational Red Light Cameras at two junctions in Dublin City to prove the required technology and associated processes for the installation and operation of Red Light Cameras. It was intended that the Red Light Cameras would be operated and maintained by a private contractor.

The necessary legislation for the outsourcing of the detection, identification and validation of road traffic offences by non-Garda personnel was enacted in 2004 and is detailed in the Road Traffic Act 2004 (No 44). The legislation was further expanded in the Road Traffic Act 2006 (No 23) and Road Traffic Act 2010 (No 25).

Notwithstanding the provision of legislation to permit the use of private contractors to assist with the collation of data for the enforcement of road traffic offences, no precedence for such a process existed. At the commencement of the Red Light Cameras Pilot Project, AGS were in the process of introducing the private contractor- operated 'Go-Safe' mobile speed camera vans which are used to detect and validate speeding violations for the subsequent issue of Fixed Charge Notices (FCNs). AGS advised that the completion of the procurement of a contractor to supply and operate mobile speed cameras prior to commencing the Red Light Cameras programme was crucial as this would highlight issues associated with the involvement of private contractors.

The successful introduction of the private contractor operated mobile speed camera vans subsequently prompted an arrangement whereby, between late 2009 and July 2010, DCC tendered for a contractor to install and maintain (for a period of 12 months) an Red Light Cameras at two junctions. The Red Light Camera infrastructure was required to apply internationally proven technology using carriageway detection loops which monitor violations in multiple lanes on a single approach to the selected junction and meet the requirements of UK Home Office Type Approval or European equivalent.

In July 2010 the Elmore Group Limited was awarded a contract by DCC to install an operational Red Light Cameras at the junctions of Blackhall Place and Benburb St, and on Con Colbert road. The contract also included installing an outstation at the junction of Queen St and Benburb St.

The Red Light Cameras outstation which was installed on Queen St, north of junction with Benburb St (LUAS Red Line) comprises a post, housing, ducting and chambers only but is capable of receiving a camera unit in the future.

This outstation was designed to facilitate the rotation of cameras between different sites as part of an enforcement regime.

The Red Light Camera on Con Colbert Road, which was installed to replace a defunct Red Light Camera unit, has a high volume of red light violations with minimal time into red incidents and would provide a very useful comparative data from a non-LUAS signal location.

In December 2010 Red Light Cameras were successfully sourced, procured and installed on Blackhall Place and on Con Colbert Road with an outstation on Queen St. The download and monitoring of violation data continued for approximately 12 months after the installation date.

The following statistics are a sample of the overall analysis undertaken during this Trial Phase in 2011.

a) 813 violations were recorded over 164 days
   - an average of 5 total (accepted and rejected) detections per day
     (Note: Rejected Detections - Detections may be rejected for the following reasons: image obstructed, bus blocking image, illegal movement, and vehicle registration not visible. Cyclists are also counted as a rejected detection.
     Accepted Detections – Detections processed for prosecution.
   - 33 detections occurred whilst a Luas was also in the junction

b) Time after red
   - 12 detections were in excess of 50 seconds after the display of the red signal
   - 410 detections were in excess of 5 seconds but less than 50 seconds after the display of the red signal
   - 391 detections were 5 seconds or less after the display of the red signal

c) Time of Day
   - 155 detections occurred during the AM off-peak (9.31am to 11.59am)
   - 139 detections occurred during the AM peak period (7.00am to 9.30am)

d) Vehicle class:
   - Cars / Vans 337 detections
   - Buses / Coaches 24 detections
   - Taxis 136 detections
   - Cyclists 254 detections

The graph presents the total number of detections by class of vehicle and the time of the violation after the red signal has been displayed on the Blackhall Place approach to the junction.

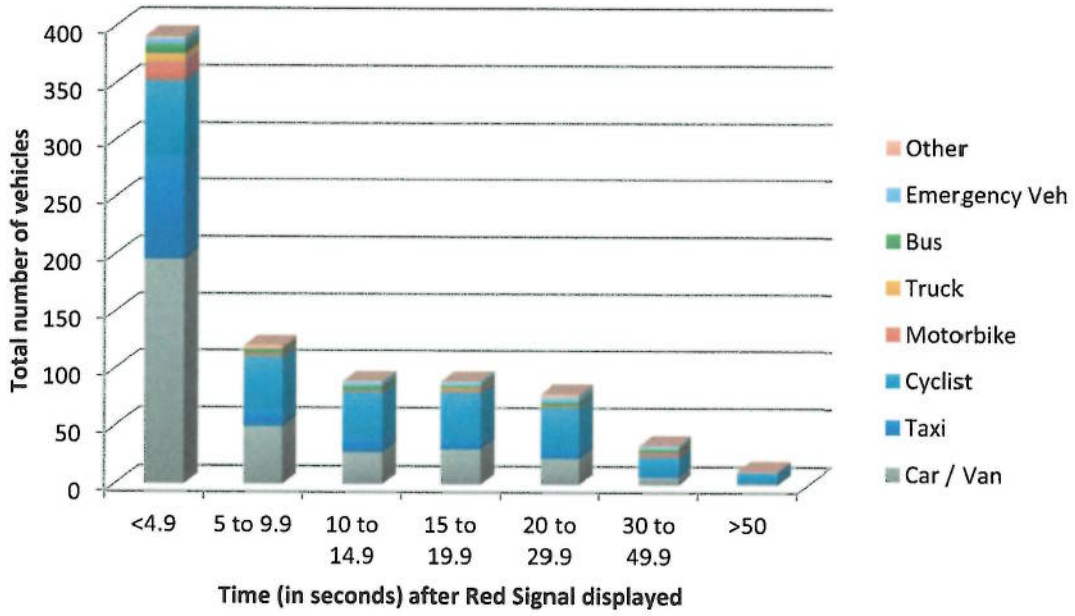


*Figure 12 - Red light detectionss by time into red and by vehicle type at Blackhall Place junction*

Figure 12 indicates the time into red and vehicle class for detections collated within Phase 1 – Trial Phase.

As the data gathered in Phase 1 - Trial Phase (Figure 12) was not gathered for enforcement purposes, the detections were not classified as accepted detections and rejected detections. It should therefore only be used to establish particular trends rather than a direct comparison with the data gathered during Phase 3 – Operational Phase

### 6.2 Phase 2 – Enforcement Phase

Phase 2 commenced in Quarter 4 of 2013 with meetings between AGS, the Elmore Group and the then RPA to discuss the various requirements of violation detection, recording, validation of violations and issuance of Fixed Charge Notices (FCNs).

The meetings and teleconference calls discussed and resolved the technical issues of violation detection, downloading of data to a secure storage facility, uploading of data onto the Garda 'Pulse' communication network and the subsequent issuance of Fixed Charge Notices to the identified vehicle user. At a later date, the enforcement model was agreed between AGS, NTA, TII and DCC and paved the way for Fixed Charge Notices to be issued.

An Garda Siochána's PULSE system is now linked to the new red light cameras at this junction, automating the process of issuing fixed charge notices for this particularly dangerous road traffic offence.

Breaking red lights incurs 3 penalty points and a fine of up to €120 on payment of the fixed charge.

Drivers who contest the Fixed Charge Notice are subsequently issued with a court summons.

### 6.3 Phase 3 – Operational Phase

Phase 3 – the Operational Phase commenced on Thursday 4th June 2015 with a 'Go-Live' start of the Red Light Camera and the issuance of Fixed Charge Notices to road users.

The commencement of this phase was accompanied by a major publicity campaign utilising social and public media.

A small number of Fixed Charge Notices were contested, however to date there have been no successful appeals against the FCN in court.

## 7. Red Light Camera Statistics

The following charts indicate the various aspects of the analysis of the collated data over the Review Period which commenced with the start of Phase 3 – Enforcement Phase on the Thursday 4th June 2015 and continued until 30th April 2016.

The following is a summary of detections from 4th June 2015 to 30th April 2016

| | Jun-15 | Jul-15 | Aug-15 | Sep-15 | Oct-15 | Nov-15 | Dec-15 | Jan-16 | Feb-16 | Mar-16 | Apr-16 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL NUMBER OF DETECTIONS | 58 | 91 | 70 | 75 | 85 | 63 | 52 | 52 | 73 | 74 | 75 | 768 |
| DAYS MONITORED | 27 | 31 | 31 | 30 | 31 | 30 | 31 | 31 | 29 | 31 | 30 | 332 |
| REJECTED DETECTIONS | 20 | 48 | 28 | 40 | 43 | 25 | 16 | 11 | 31 | 34 | 32 | 328 |
| ACCEPTED DETECTIONS | 38 | 43 | 42 | 35 | 42 | 38 | 36 | 41 | 42 | 40 | 43 | 440 |
| DETECTIONS PER DAY | 2.1 | 2.9 | 2.3 | 2.5 | 2.7 | 2.1 | 1.7 | 1.7 | 2.5 | 2.4 | 2.5 | |

*Table 1 - General summary of red light detections*

Note: Rejected Detections - Detections may be rejected for the following reasons: image obstructed, bus blocking image, illegal movement, and vehicle registration not visible. Cyclists are also counted as a rejected detection.

Accepted Detections – Detections processed for prosecution.

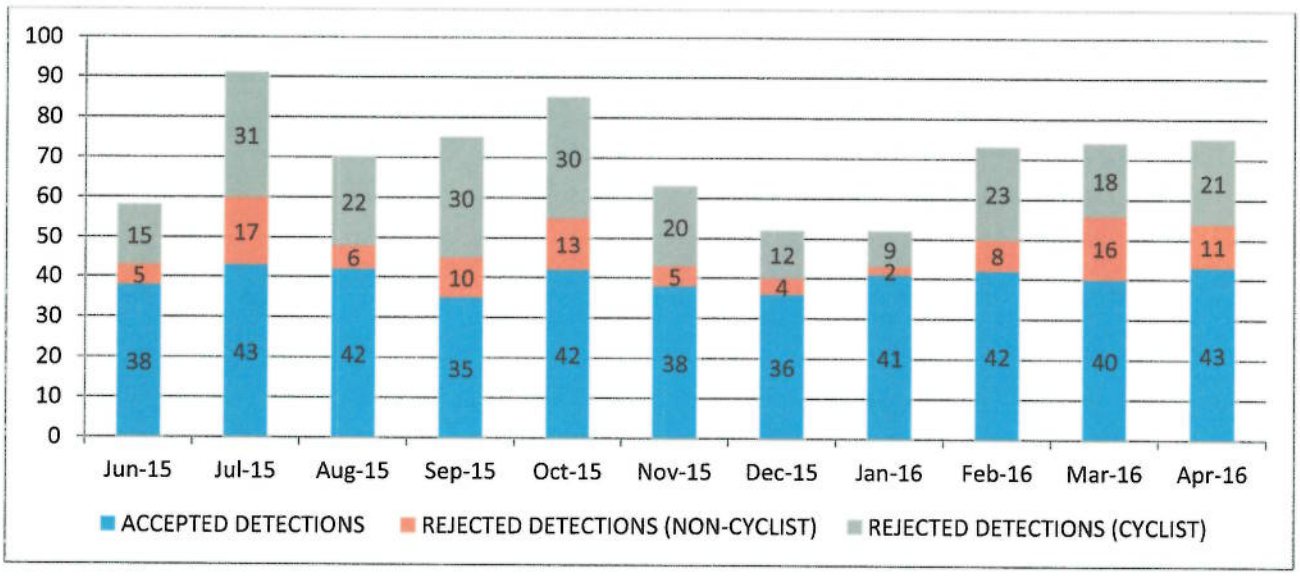


*Figure13 – Accepted and rejected detections*

As per Figure 13 it is of concern that almost a year after the start of the issuance of FCNs and enforcement procedures that the volume of detections from the Blackhall Place Red Light Camera has not declined significantly.

It is recommended that an enhanced level of public awareness of the volume of detections and the results of court convictions is promoted via ongoing road safety campaigns and cycling campaigns.

The ongoing issue of cyclists breaching red signals, whilst it has been tackled by the issuance of FCNs by AGS on site, will require an ongoing education and enforcement campaign to significantly reduce the rejected Red Light Cameras cyclist detections, which average 31% of all detections.

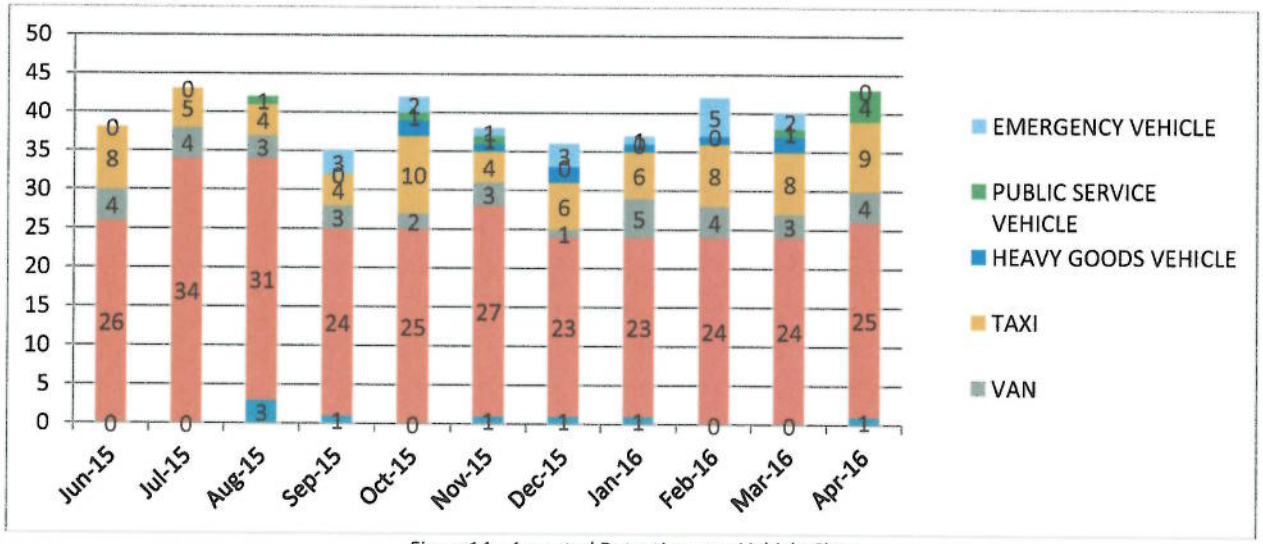


*Figure14 - Accepted Detections per Vehicle Class*

Figure 14 indicates a relatively high number of violations by taxis (16%) which are a major concern. It is suggested that an education awareness campaign be developed to focus on taxi drivers and the risks to drivers and passengers.

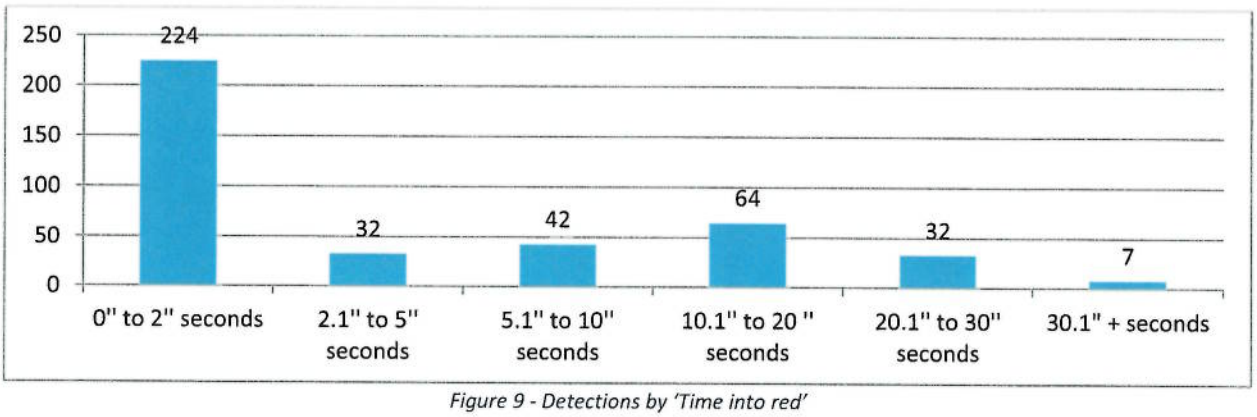


*Figure 9 - Detections by 'Time into red'*

Figure 15 indicates that 36 % of 'time into red' detections are in excess of 5 seconds; this is a cause of major concern.

The available CCTV footage from the mobile camera indicated that a majority of the motorists are travelling straight through the red lights without stopping. The outcome of this CCTV survey is discussed later in this report

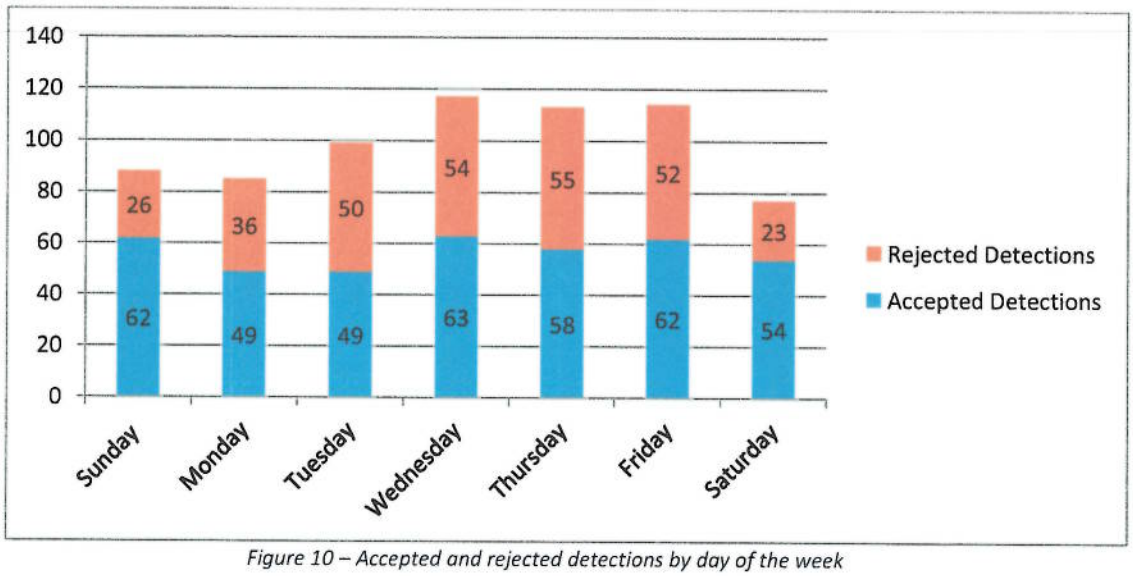


*Figure 10 – Accepted and rejected detections by day of the week*

Figure 16 indicates that there does not appear to be any significant statistical difference between detections when analysed by the day of the week.

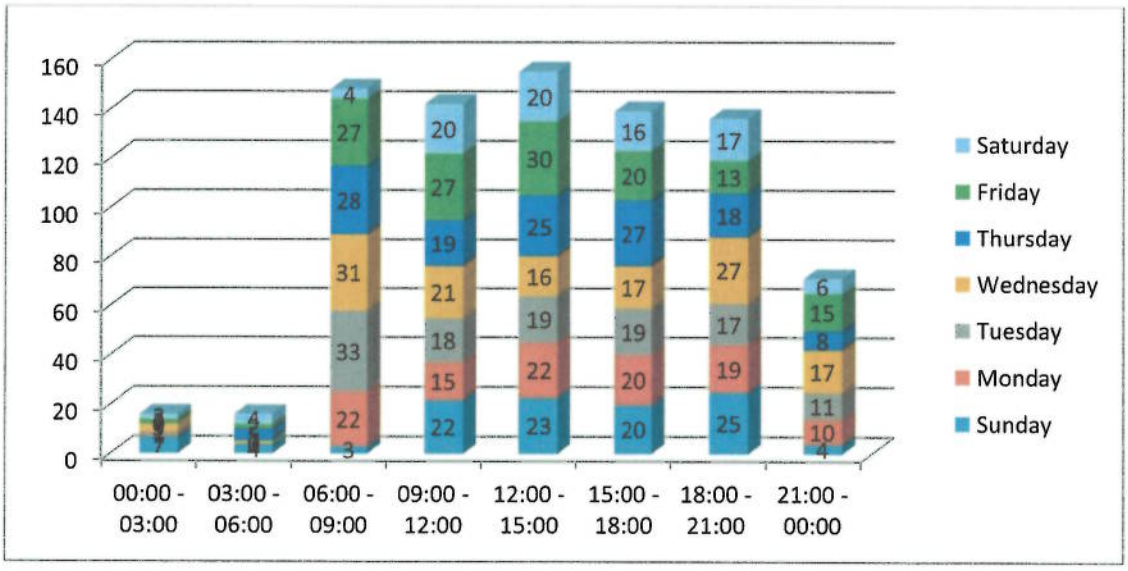


*Figure 11 – Detections by day of week and time period*

Figure 17 indicates that the relatively high number of detections during the time period 21:00 – 00:00 considering the minimal number of road users during this period is a cause for concern.

The data from the red light camera raises some items of serious concern:

- The high level of road vehicles breaking the red light at this LUAS junction, putting the LUAS drivers and passengers at risk.
- The number of cyclists who were detected violating the red light.
- The high number of violations which were detected in excess of 5 seconds after the display of the red signal.
- Ratio of taxis to other road users who are detected by the Red Light Camera

## 8. Road Safety Audit – November 2014

As part of the ongoing investigation of incidents at LUAS interface junctions TII commissioned a Road Safety Audit - Stage 4 for the junction of Blackhall Place with Benburb St and the LUAS Red Line. The Road Safety Audit Stage 4 was undertaken by certified Road Safety Auditors from AECOM in November 2014. (7).

One of the main recommendations of the audit report (item 4.1.1) was that the existing Red Light Camera be made operational.

## 9. Research Project – Road User Behaviour at LUAS Junctions

In 2015, TII engaged the Centre for Innovative Human Systems (CIHS), Trinity College Dublin, to research the motorist's behaviour when approaching LUAS junctions, particularly in relation to road violations such as failing to stop at red traffic signals.

The results of this research programme (5) will help TII develop future safety campaigns and actions to improve the interface between the LUAS and other road users.

The research program includes:

- Review of the Literature.
- Quantitative Analysis of Incidents and LUAS and non-LUAS junctions.
- Interviews with LUAS drivers.
- Public-Wide Survey focusing on road-user behaviour at LUAS junctions (surveyed 295 motorists).
- Focus Group with road users.

In relation to the use of red light cameras, the research found the following:

1. The survey participants were asked about their perception of the effectiveness of current deterrents (note: no information was provided to the participants on current deterrents). The results indicate that the participants judged that current deterrents are mainly ineffective suggesting potential support for an increase in the use of deterrents at LUAS junctions.

   However there was overwhelming agreement that the introduction of the red light cameras at Blackhall Place has had a very positive influence on improving safety behaviour at this junction. For example one of the focus group participants highlighted that that he ....."now treats this junction differently'. The results from the public wide survey also indicated very strong support for punitive measures, particularly red light cameras and increased penalties.

2. The results of the Public-Wide Survey and the Focus Group with road users found that the installation of enforcement cameras linked to automatic penalties, increased fines or points on the driver licence and enhanced public awareness campaigns were viewed as the most effective means of deterring motorists from failing to stop at a red traffic signal.

3. The study found that participants (both motorists and cyclists) would be less likely to break a red light if they knew cameras were present at a junction. Almost 49% of survey participants indicated that the introduction of red light cameras linked to automatic penalties and increase in other penalties (e.g., points on licence) was required to improve safety at LUAS junctions. This strong support for punitive measures would indicate that one of the key recommendations would be to roll out the introduction of the Red Light Cameras across all 'high risk' LUAS junctions as a matter of immediate priority.

4. It was also felt that the visible presence of Garda at high risk junctions would have a positive impact on safety behaviour and an increase in penalties for non-compliance.

## 10. TII Mobile Junction Monitoring CCTV System

During 2015, TII contracted a company called Kinesense, to develop a portable stand-alone junction CCTV camera to record red light infringements and monitor motorist's behaviour at LUAS junctions.

Kinesense specialises in Video Content Analytics (VCA) technology which enables the automatic detection of events in video. During 2015, a CCTV system was successfully tested and TII purchased the camera in February 2016. The system can identify when offences occur and gathers CCTV footage of driver behaviour. This information is recorded without the need for road loops or connections into the traffic signals.

The camera is portable and is easy to move to different locations. The data from this portable camera will identify red light infringements and assess junctions for possible future red light camera installations. The analyses of the CCTV footage will help TII formulate strategies to improve the safety at LUAS junctions.

The available CCTCV footage from the mobile camera indicated that a majority of the motorists are travelling straight through the red lights without stopping. It is recommended that additional surveys are carried out at LUAS junctions to confirm this behaviour. It is proposed to use the CCTV camera to investigate the 'see-through' issue from the second set of traffic lights at Ellis Quay and its possible contribution to the number of red light infringements at Benburb St.

## 11. Project Responsibility

The Red Light Camera Project is a project to source and install two red light cameras and one outstation, to test and commission the cameras and to bring the cameras into operation and issue Fixed Charge Notices (FCNs).

The National Transport Agency (NTA) has statutory responsibilities in relation to the provision of public transport infrastructure and services, the regulation of public service vehicles and the management of traffic.

Having regard to its functions, the NTA has entered into an Agreement with the Commissioner of An Garda Síochána and the Minster for Justice and Equality in relation to a camera based enforcement system to detect violations of red traffic signals at the junction of Blackhall Place with Benburb Street.

Under the provisions of that Agreement, the NTA is responsible for the performance of the Services (as defined in the Agreement) and has entered into a contract with Elmore Group for the carrying out of those services.

The Agreement commenced on the execution date of the Agreement and shall, subject to clause 9 continue for a period of one year from the Services Commencement Date. Services Commencement Date shall be one month from the date of certification of Services Testing by the Garda Commissioner in accordance with Clause 3.1 or as may otherwise be agreed in writing. The Agreement, made by the exchange of letters between the parties, maybe extended for a period not exceeding six (6) months on the terms and conditions set out in the Agreement.

## 12. Project Costs and Benefits

A red light infringement is already a breach of legislation, but prior to the introduction of a red light camera can only be enforced if a Garda officer is on site or witnesses the event. The new red light camera can prove very beneficial as they can be deployed safe in the knowledge that the evidence they produce can be used directly for prosecution purposes without additional and time consuming Garda intervention or investigation. The advantage is that the camera is unattended and fully automatic process undertaken 24 hours a day without the need for Garda presence at the junctions.

In considering the need for Red Light Camera it is worth noting the cost of road traffic collisions as set out in Appendix 1 of the Road Safety Strategy 2007 – 2012 (Road Safety Authority, 2007).

*"Goodbody Economic Consultants (in a Department of Transport-commissioned study) set the following values for costs per collision (CPC):*

| ***Table 1*** | |
|---|---|
| *Fatal* | *€2,280,000* |
| *Serious injury* | *€304,600* |
| *Slight injury* | *€30,000* |
| *Material Damage* | *€2,400* |

*Between the years 2000 and 2005, the total cost to the state of traffic collisions was €10.6 billion.*

| ***Table 2: Total cost of Road Collisions 2000 to 2005*** | | | |
|---|---|---|---|
| ***Type*** | ***Total number of collisions*** | ***CPC €000*** | ***Total Cost €Billion*** |
| *Fatal* | *2,063* | *2,280* | *4.704* |
| *Serious injury* | *15,295* | *305* | *4.659* |
| *Slight injury* | *32,234* | *30* | *0.967* |
| *Material Damage* | *119,631* | *2* | *0.287* |
| *Total* | *169,223* | *N/A* | *10.6* |

**Investing in Road Safety**

Economist Peter Bacon and Associates stated that *"...investing in a Road Safety Strategy will give rise to very significant net economic benefits relative to the costs incurred. In summary it was estimated that the benefit/cost ratio will be 4.5:1 rising to an annual benefit/cost ratio of 8.3:1 after the complete implementation of the Strategy."*

The total cost of RTCs on the LUAS network has a number of factors including both direct and indirect costs.

a) Cost of installation
b) Cost of ongoing maintenance
c) Cost of Garda and Contractor Resources
d) Reduction of ½ a Serious Injury incident will more than pay for the cost of the installation and maintenance system
e) Project Scope did not envisage that the Project would pay for itself (as per Go –Safe system) – the benefits of the Red Light Camera Project would improve road safety and driver behaviour.

Similarly there are a number of benefits accruing from red light cameras

a) Reduction in RTCs and EBs and improved road safety
b) Reduction in interruptions to LUAS services

c) Reduction in LUAS operational costs incurred by RTCs and EBs

d) Improved LUAS customer perception

e) Income from FCN

## 13. TII Strategy for Tackling Red Light Infringements

To tackle the issue of Red Light Infringements TII have adopted a strategy centred on the 4 Es of Road Safety

This Strategy is based on three key areas of intervention

1. Engineering
2. Education
3. Enforcement
4. Evaluation

### 1. Engineering

These include measures relating to the design of junctions, warning signs and the operation of the signalling system at LUAS junctions as detailed in this report.

### 2. Education

These include measures relating to raising awareness among motorists of the dangers of running red lights at LUAS junctions.

A number of safety campaigns have been carried out to try and address the issue of road traffic collisions, and in particular red light infringements.

#### May 2015 – Red Light Camera Launch

The Red Light Camera System at Blackhall Place / Benburb Street junction was launched on Thurs 4th June 2015 with Garda Síochána, the then RPA, the National Transport Authority (under the auspices of the Department of Transport, Tourism and Sport), the Department of Justice and Dublin City Council.

The Red Light Camera System and the automatic penalty pointsprocess launched by the Minister for Transport, Tourism and Sport really captured the media and public attention.

#### Sept 2015 – Red Light Camera Promotion

In September 2015 TII ran a Radio and Digital campaign aimed at reminding drivers about the Red Light Camera System. It also communicated the positive reduced RTC rate in 2015.

TII created and posted new content on www.luas.ie. TII launched a new Red Light Camera Video on You Tube. The Video and video ad on YouTube were viewed by over 50,000 people and the Social Media engagement was very high, very positive and very supportive.

The following are links to LUAS safety videos that were developed as part of these safety campaigns.

https://www.youtube.com/watch?v=hAJ7tqLvqXQ&feature=player_profilepage

https://www.youtube.com/watch?v=nsjpNNJ2UXg&feature=player_detailpage

https://www.youtube.com/watch?v=TYDA4k3w3lE&feature=player_detailpage

The aim of education is to change motorist attitudes and behaviour and to stimulate an awareness of the need for improvement in safety at LUAS junctions.

**3. Enforcement**

This includes measures for the prevention, policing and mitigation of the effect of collisions to ensure that road users behave in a safe manner. The primary responsibility for enforcement of road traffic legislation rests with An Garda Siochana. Maintaining a high level of enforcement is critical to further progress in reducing collisions (RSA Road Safety Strategy 2013 — 2020).

The implementation of the red light camera has added the critical element of enforcement to the safety of LUAS junctions.

**4. Evaluation**

Finally, evaluation can help to ensure a sustainable reduction in road traffic collisions by ongoing analysis of incident/collision data and review into the effectiveness of mitigation measures.

## 14. Recommendations

**Recommendation No.1:**

It is recommended that the Red Light Camera Project forms part of the ongoing Road Safety Campaigns and utilises the data available from the detection history to inform the campaign.

**Recommendation No.2:**

It is recommended that the existing Pilot Project Red Light Camera installation on Blackhall Place is confirmed as a permanent installation.

**Recommendation No.3:**

It is recommended that the Pilot Project Red Light Camera outstation on Queen St is progressed to an operational and enforceable installation.

**Recommendation No.4:**

It is recommended that an ongoing campaign to enhance the awareness of the enforcement options available to the Gardaí for cyclists breaching red traffic signals is undertaken.

**Recommendation No.5:**

It is recommended to carry out a CCTV survey of other LUAS junctions to determine the suitable for the provision of additional Red Light Cameras.

## 15. Conclusions and Summary

Ireland's first automated Red Light Camera System was launched on Thursday, the 4th June 2015 by the Minister for Transport, Tourism and Sport, Paschal Donohoe TD, at the Blackhall Place / Benburb Street junction in Dublin 7.

The Red Light Camera Project has been a collaborative approach between TII, NTA, AGS and DCC. The installation of this camera system and its ongoing operation and maintenance has been funded by the National Transport Authority.

Red Light Cameras can help to deter motorists from taking unnecessary risks such as jumping the red lights at LUAS junctions.

Summary of results:

The data from the red light camera raise some items of serious concern:

- The high level of road vehicles breaking the red light at this LUAS junction, putting the LUAS drivers and passengers at risk.
- The number of cyclists who were detected violating the red light.
- The high number of violations which were detected in excess of 5 seconds after the display of the red signal.
- Ratio of Taxis detected by the Red Light Camera

Although there was a reduction in the number of RTCs caused by red light infringements in 2015, the continued high level of red light infringements by motorists at LUAS junctions is a major concern.

The potential consequences of a tram collision are much higher due to the number of LUAS passengers who may be injured, the damage to the tram, and the delays to the tram network. Red light running has emerged as a particular danger.

TII have focused primarily on engineering and education measures. However, the implementation of the Red Light Camera has added the critical element of enforcement to the safety of LUAS operations.

As the long term aim is the safe and efficient provision of tram services at both junctions and the consequent improvement in passenger satisfaction, the ongoing operation of the existing Red Light Camera on Blackhall Place and the installation and operation of an Red Light Camera on Queen St is paramount.

The Red Light Camera Project has been a very positive development and it is hoped that additional Red Light Cameras can be installed at other LUAS signalised road junctions

The Red Light Camera (Pilot Programme) has fulfilled the Project Scope to install, operate and provide violation images and data to enable the prosecution via the Fixed Charge Notice process or a subsequent court appearance.

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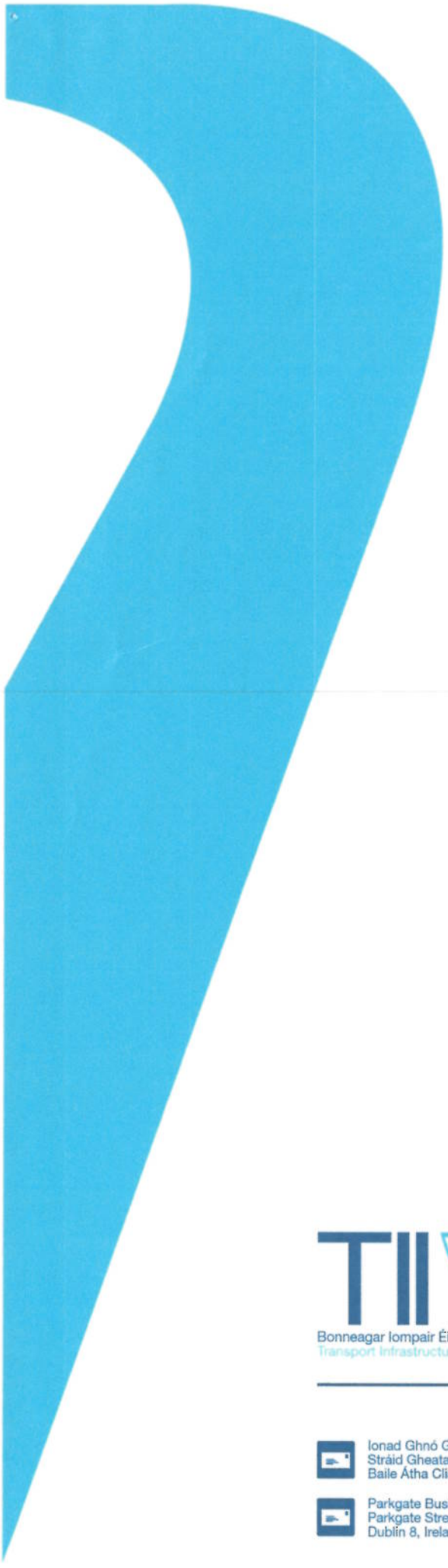

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