# JCT Symposium September 2026

# Journey Time Monitoring in Derbyshire

Dr Adrian Withill (Derbyshire County Council)

Hugo Barnes (AECOM)

## Background

Derbyshire, located in the centre of England, has an extremely varied topography, especially in the Peak District National Park. There are no cities in Derbyshire, with the largest town being Chesterfield. However, several important busy highway routes cross the County, including the M1, the A6 and A57.

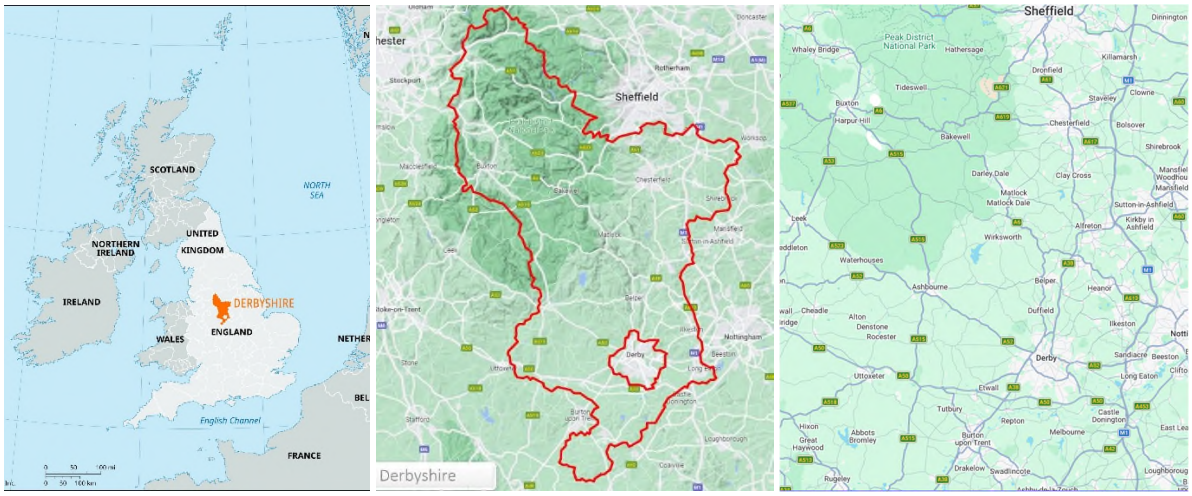



**Figure 1 – Location of Derbyshire – Sources :Encyclopaedia Brittanica and the Council's Common Database**

Other details regarding Derbyshire's topography are contained in the JCT paper entitled "Connected Roadworks", presented on 16th September 2026 so will not be repeated here.

The Council, thanks to a Department for Transport (DfT) grant in 2019 (National Productivity investment Fund for the local Road network) has been gradually developing the PTMS (Pre-Emptive Traffic Management System), originally intended to monitor traffic conditions in real time around the County and also to communicate alerts and driver information to roadside message signs and in-vehicle via mobile apps. A description of the PTMS is given later in this paper and also, to a fuller extent, within the "Connected Roadworks" paper referred to above.

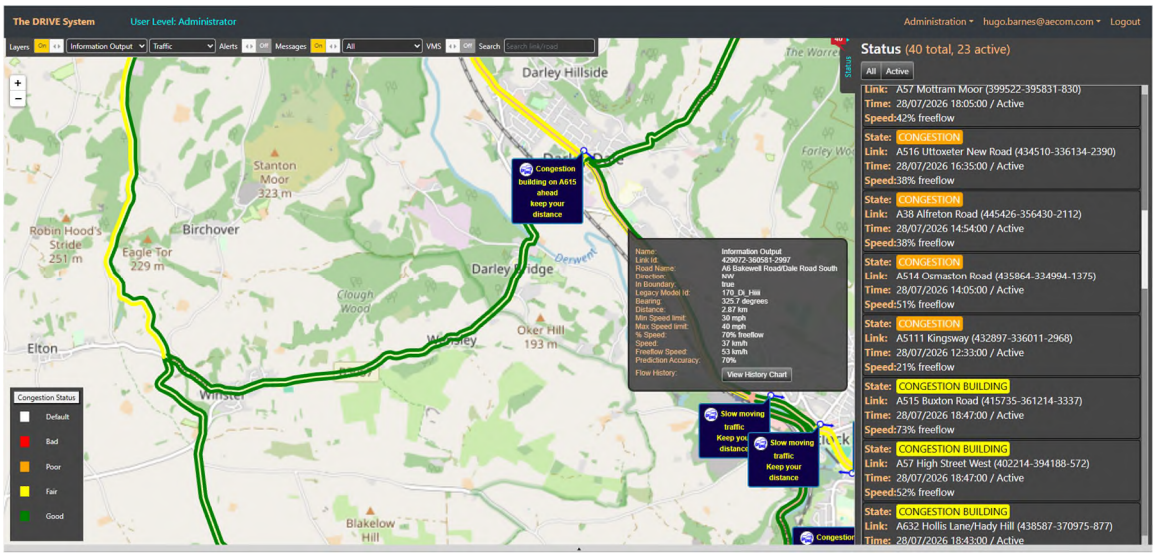



**Figure 2 – Screen Shot of the Pre-emptive Traffic Management System (PTMS) Displaying Congestion Alerts**

## Green Light Fund

In December 2023, Derbyshire County Council was fortunate enough to win a substantial grant from the DfT within the Green Light Fun (GLF) initiative. A core part of the Council's proposal was to use objective data for assessing the effect of the various measures that were included within the grant submission, and which have been subsequently delivered.

The projects funded from the GLF have ranged from the "tightening up" of intergreen settings where appropriate, a selective vehicle detection (buses and HGVs) scheme using image analysis (VivaCity), the implementation of SCOOT in Glossop and Ashbourne and, to, the real-time modification of signal settings in response to poor air quality conditions (eg $NO_2$ and $PM_{10}$).

As traffic signal specialists will appreciate, when small changes are made to signal timings, it is often difficult to isolate the benefits (or occasional disbenefits) in an objective manner. This means that reliable data to refine signal settings, SCOOT's operation or even intergreen changes etc, are not always available and therefore, inevitably the assessment may have to rely on subjective observations. Also, data may not be present to allow a benefit : cost model to be built with confidence to help justify similar expenditure in the future. There is the additional consideration that

large-scale data collection exercises are expensive as these usually require substantial staff time and, may not provide information on ”out of hours” operation.

Using the GLF, the opportunity was taken to adapt the PTMS to provide a new function, the Journey Time Monitoring (JTM) module, to collect average journey time data in 15-minute increments for 30,000 highway links, and then to store this data to enable, by means of setting geo fences (user defined polygons), detailed analysis of journey times for the whole of Derbyshire along corridors, areas and/or junctions.

The development of the JTM was a complex exercise but was completed over the course of 2025/26, with a successful Site Acceptance Test (SAT) in June 2026. Since that time, the system is being actively used to assess the effect of various traffic management changes (including roadworks) and is currently in use by the Council and its Consultants to assess -

- The relative merits of 24 hour operation of SCOOT and MOVA on a busy corridor in Chesterfield, this also includes the assessment of the most appropriate times for SCOOT to be active on weekdays and also Saturday and Sunday (the exercise will be repeated in September when the network is under maximum stress);
- The effect of a modification to signal timings at Derbyshire’s most congested junction (Horns Bridge);
- The effect of the Selective Vehicle Detection project (Buses and HGVs) and real time responses to specific pollution thresholds being reached (the A57 Air Quality Management area in Dinting); and,
- A “one off” monitoring of the effect of a vehicle breakdown at the busy Horns Bridge junction in Chesterfield.

**Pre-Emptive Traffic Management System (PTMS)**

As noted above, a fuller description of the PTMS can be found in the 2026 JCT Symposium paper regarding Connected Roadworks and hence, the full details will not be repeated within this paper.  However, the basics are as follows.

***PTMS Basics***

The PTMS is a tool developed to manage traffic on complex road networks while reducing reliance on supporting roadside infrastructure. This is achieved through combining traffic data from a variety of sources, including real-time floating vehicle data, and processing that data to responding automatically to complex scenarios that would otherwise be difficult for a human operator to resolve.  The PTMS displays and data is available to anybody in the Council who has the appropriate credentials. Also, access has been granted to Consultants whilst working on the Council's projects.




**Figure 3 – Network Intelligence Centre in Derbyshire (the PTMS is Usually Shown)**

The system generates interventions in response to changing traffic conditions in real time to optimise the road network. These interventions include the provision of automated driver information delivered in-vehicle via mobile apps and also to roadside variable message signs where available.

***Handling pollution***

Additional functionality includes the ability to monitor vehicle emissions. To achieve this a traffic volume model has been developed to determine traffic density in real-

time anywhere on the network. By combining the traffic volume model and road emissions model, vehicle-borne emissions are generated for the road network across the county. This will provide the capability to generate traffic management interventions in response to changing emissions levels and target quotas using a specific rule set.

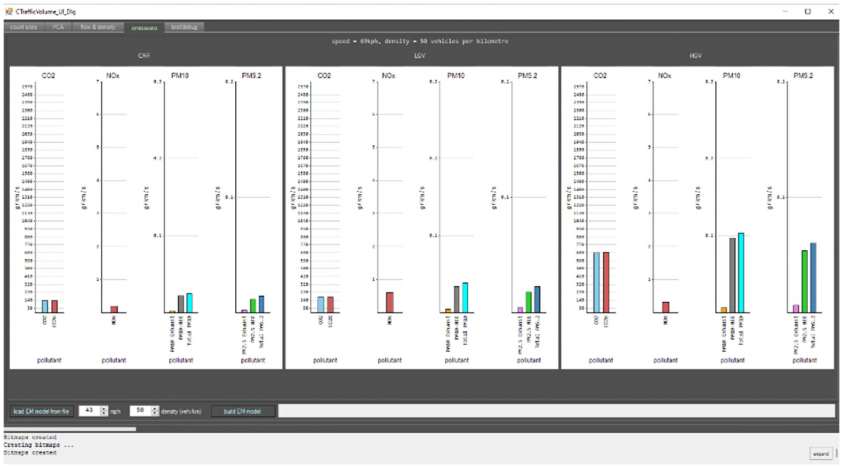


**Figure 4 – The PTMS Emissions Module Providing Real-Time and Historic Reporting for all Key Road Vehicle Generated Contaminants**

### *Traffic signal control*

Through a “Connected Roadworks” initiative, as reported in another paper at the JCT Symposium, the PTMS has been enhanced to allow the minimisation of delays to buses at temporary roadworks.

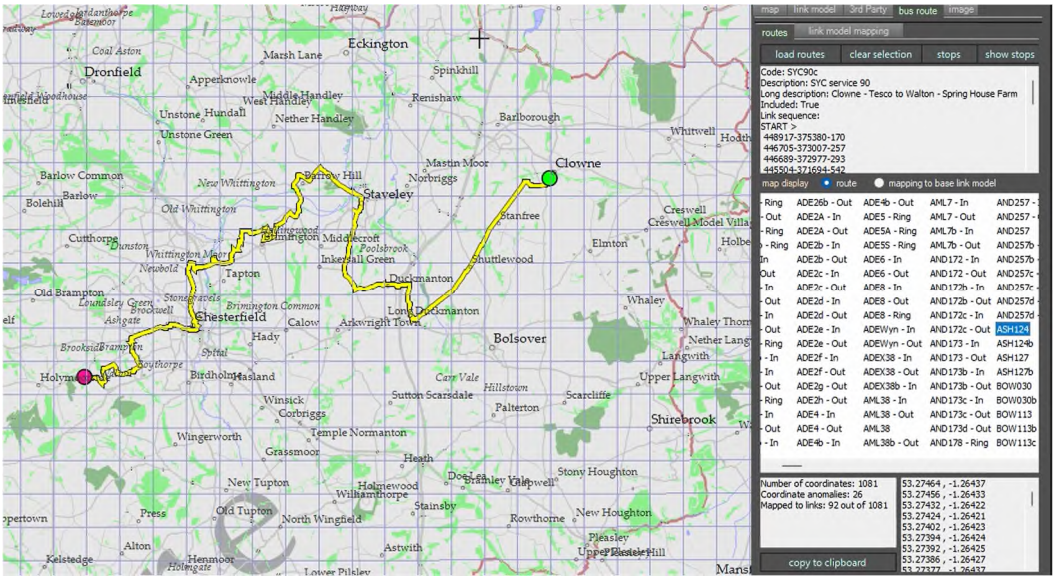



**Figure 5 – Bus Route Data from the Bus Open Data Service (BODS) Imported into the PTMS**

The likely traffic conditions on the Derbyshire highway network are predicted for the “next” 30 minutes, generated from an AI prediction algorithm. The resultant data is used to provide early warning alerts to the Council’s MyCity common database which, in turn can then modify automatically traffic signal timings to reduce actual and predicted delays to buses.

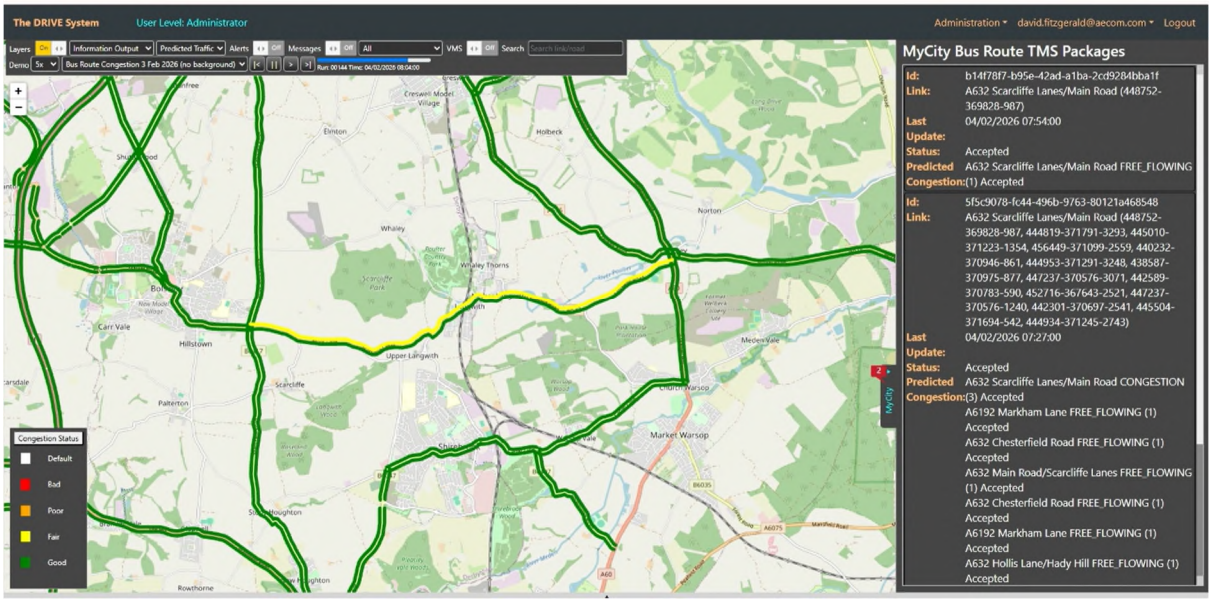



**Figure 6 – Traffic Signal Intervention ‘Packages’ Sent to the Council’s MyCity TMS to Modify Traffic Signal Timings**

Notwithstanding the multiple use of the PTMS for a variety of purposes, the case studies below relate to the collection of data, its analysis and use for assessing the effect of interventions on the highways network using the JTM tool.

## Case Studies

As the SAT for the JTM has only just been successfully completed, there has been a limited time to utilise the tool for the assessment of signal operations. Nevertheless, some work is being undertaken and updates will be presented to the Symposium on 17th September.

### Case Study 1 - Assessment of SCOOT and MOVA’s Operation

The A61 corridor in Chesterfield is one of Derbyshire’s most congested routes which connects Sheffield to/from the A38, and thence to/from the West Midlands. The A61 is a parallel north/south route to the M1 in Derbyshire, but also serves local communities and provides a route to/from parts of the Peak District National Park. Thus, congestion can occur, occasionally at times that would not normally be

expected such as when it rains on a summer afternoon and people in the Peak District all decide to go home at the same time.

At the request of the Council's Bus Service Improvement Plan (BSIP) team which initially enabled the introduction of SCOOT on parts of the A61, an assessment of the most appropriate method of signal control, mainly SCOOT vs MOVA was required. Some data is already available, but the GLF funded JTM system gives the opportunity for a comprehensive assessment of performance of each mode on all days of the week, using a very large sample size providing objective journey time data (hence delays).

The SCOOT Region under analysis is not large, but consists of two "T" junctions, one of which is congested for much of the working day and also at weekends, with several signalled pedestrian crossings. The image below, taken from the Urban Traffic Control (UTC) system shows the extent of the Region.

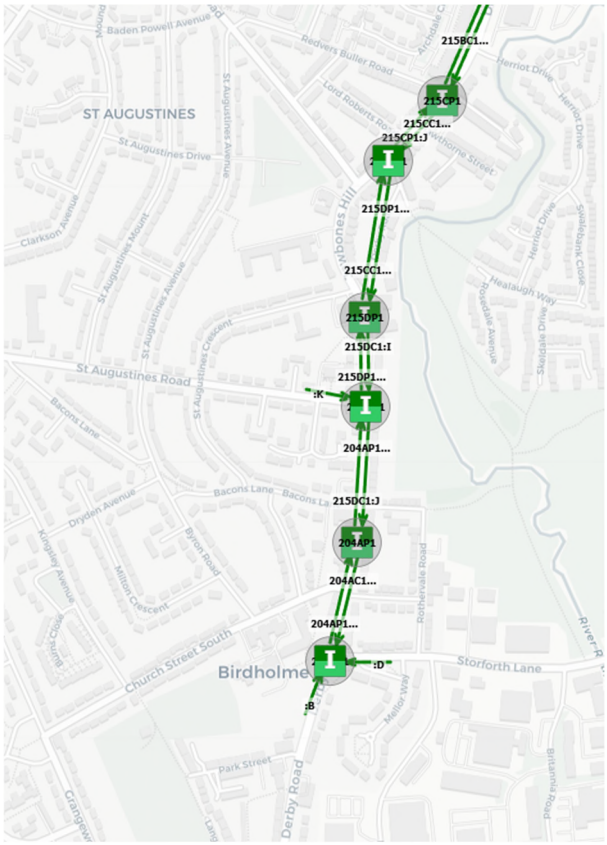



**Figure 7 – St Augustines SCOOT Region, Chesterfield**

The analysis of timings between SCOOT and the next mode in the control hierarchy (MOVA) has been achieved by the modification of the UTC timetable to have, for 14 alternating between day type 1 and day type 2 where is SCOOT operational for the entire day “type 1” and then the background timings for day “type 2”. This results in there being one instance of SCOOT each day of the week and the background timings also for each day of the week. This is to strip out, as far as is possible, any seasonal based traffic pattern changes in the area. As necessary for the conclusion of the study, journey time data for “control” sites in the vicinity can be used to increase the robustness of the work and confidence in the results, but as budgets for analysis are not limitless, the initial work will suffice for the time being.

The images below show the parts of the SCOOT Region and also some historical data that has been collected for the St Augustines and Derby Road junction along with examples of the exported data from the JTM, culminating in the ability to analyse patterns in a spreadsheet.

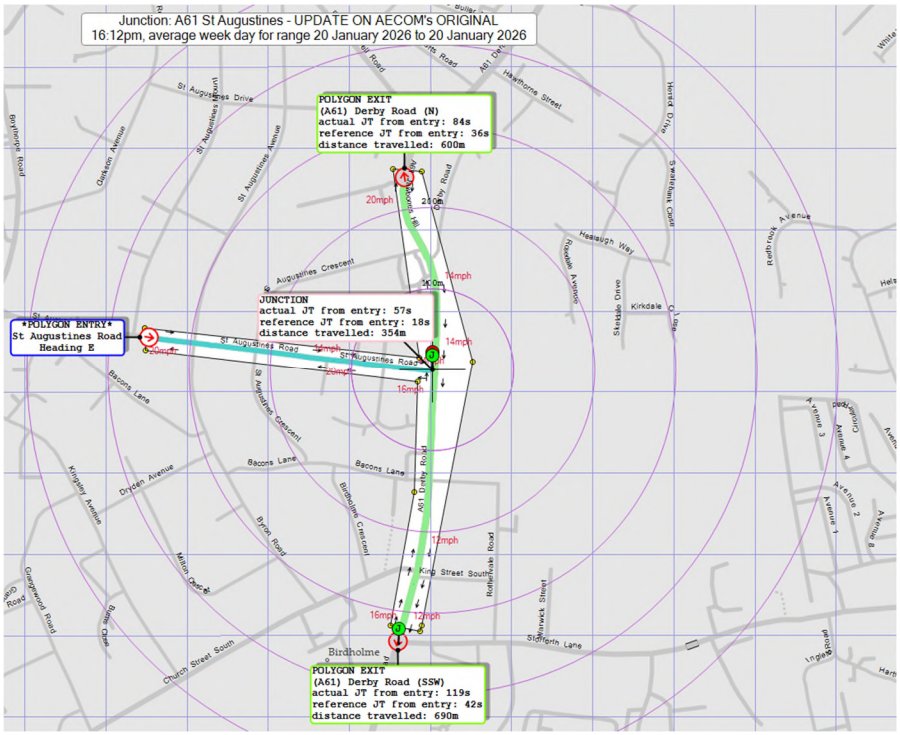



**Figure 8 – St Augustines/Derby Road, Chesterfield “Polygon” 20/1/26**

JUNCTION: A61 St Augustines - UPDATE ON AECOM's ORIGINAL
LOCATION: 53.223181,-1.426594
JUNCTION NOTE: (none)
AVERAGE_DAY_PROFILE_START_DATE: 20/01/2026
AVERAGE_DAY_PROFILE_END_DATE: 20/01/2026
INTERVAL_DURATION: 15 minutes
JOURNEY_TIME_UNIT:Seconds

| interval | polygon entry | to junction JT | ref JT | distance | to polygon exit | JT | ref JT | distance |
|---|---|---|---|---|---|---|---|---|
| 0:0-0:15 | (St Augustines Road) St Augustines Road (heading:E) | 39 | 18 | 354m | - | - | - | - |
| 0:0-0:15 | (A61) Derby Road (heading:NNE) | 30 | 24 | 336m | - | - | - | - |
| 0:0-0:15 | (A61) Derby Road (heading:S) | 19 | 18 | 246m | - | - | - | - |
| 0:0-0:15 | (St Augustines Road) St Augustines Road (heading:E) | - | - | - | (A61) Derby Road (heading:SSW) | 64 | 42 | 690m |
| 0:0-0:15 | (St Augustines Road) St Augustines Road (heading:E) | - | - | - | (A61) Derby Road (heading:N) | 63 | 36 | 600m |
| 0:0-0:15 | (A61) Derby Road (heading:NNE) | - | - | - | (A61) Derby Road (heading:N) | 54 | 42 | 582m |
| 0:0-0:15 | (A61) Derby Road (heading:NNE) | - | - | - | (St Augustines Road) St Augustines Road (heading:W) | 59 | 42 | 690m |
| 0:0-0:15 | (A61) Derby Road (heading:S) | - | - | - | (A61) Derby Road (heading:SSW) | 44 | 42 | 582m |
| 0:0-0:15 | (A61) Derby Road (heading:S) | - | - | - | (St Augustines Road) St Augustines Road (heading:W) | 48 | 36 | 600m |

| interval | polygon entry | to junction JT | ref JT | distance | to polygon exit | JT | ref JT | distance |
|---|---|---|---|---|---|---|---|---|
| 0:15-0:30 | (St Augustines Road) St Augustines Road (heading:E) | 39 | 18 | 354m | - | - | - | - |
| 0:15-0:30 | (A61) Derby Road (heading:NNE) | 29 | 24 | 336m | - | - | - | - |
| 0:15-0:30 | (A61) Derby Road (heading:S) | 24 | 18 | 246m | - | - | - | - |
| 0:15-0:30 | (St Augustines Road) St Augustines Road (heading:E) | - | - | - | (A61) Derby Road (heading:SSW) | 68 | 42 | 690m |
| 0:15-0:30 | (St Augustines Road) St Augustines Road (heading:E) | - | - | - | (A61) Derby Road (heading:N) | 66 | 36 | 600m |
| 0:15-0:30 | (A61) Derby Road (heading:NNE) | - | - | - | (A61) Derby Road (heading:N) | 56 | 42 | 582m |
| 0:15-0:30 | (A61) Derby Road (heading:NNE) | - | - | - | (St Augustines Road) St Augustines Road (heading:W) | 58 | 42 | 690m |
| 0:15-0:30 | (A61) Derby Road (heading:S) | - | - | - | (A61) Derby Road (heading:SSW) | 53 | 42 | 582m |
| 0:15-0:30 | (A61) Derby Road (heading:S) | - | - | - | (St Augustines Road) St Augustines Road (heading:W) | 53 | 36 | 600m |

| interval | polygon entry | to junction JT | ref JT | distance | to polygon exit | JT | ref JT | distance |
|---|---|---|---|---|---|---|---|---|
| 0:30-0:45 | (St Augustines Road) St Augustines Road (heading:E) | 37 | 18 | 354m | - | - | - | - |
| 0:30-0:45 | (A61) Derby Road (heading:NNE) | 29 | 24 | 336m | - | - | - | - |
| 0:30-0:45 | (A61) Derby Road (heading:S) | 23 | 18 | 246m | - | - | - | - |
| 0:30-0:45 | (St Augustines Road) St Augustines Road (heading:E) | - | - | - | (A61) Derby Road (heading:SSW) | 66 | 42 | 690m |
| 0:30-0:45 | (St Augustines Road) St Augustines Road (heading:E) | - | - | - | (A61) Derby Road (heading:N) | 63 | 36 | 600m |
| 0:30-0:45 | (A61) Derby Road (heading:NNE) | - | - | - | (A61) Derby Road (heading:N) | 55 | 42 | 582m |
| 0:30-0:45 | (A61) Derby Road (heading:NNE) | - | - | - | (St Augustines Road) St Augustines Road (heading:W) | 58 | 42 | 690m |
| 0:30-0:45 | (A61) Derby Road (heading:S) | - | - | - | (A61) Derby Road (heading:SSW) | 52 | 42 | 582m |
| 0:30-0:45 | (A61) Derby Road (heading:S) | - | - | - | (St Augustines Road) St Augustines Road (heading:W) | 52 | 36 | 600m |

| interval | polygon entry | to junction JT | ref JT | distance | to polygon exit | JT | ref JT | distance |
|---|---|---|---|---|---|---|---|---|
| 0:45-1:0 | (St Augustines Road) St Augustines Road (heading:E) | 29 | 18 | 354m | - | - | - | - |
| 0:45-1:0 | (A61) Derby Road (heading:NNE) | 29 | 24 | 336m | - | - | - | - |
| 0:45-1:0 | (A61) Derby Road (heading:S) | 23 | 18 | 246m | - | - | - | - |
| 0:45-1:0 | (St Augustines Road) St Augustines Road (heading:E) | - | - | - | (A61) Derby Road (heading:SSW) | 58 | 42 | 690m |

**Figure 9 – Screenshot of a Sample of Journey Time Data**

| | interval | polygon entry | to polygon exit | JT |
|---|---|---|---|---|
| 7 | 0:0-0:15 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 54 |
| 16 | 0:15-0:30 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 56 |
| 25 | 0:30-0:45 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 55 |
| 34 | 0:45-1:0 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 50 |
| 43 | 1:0-1:15 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 50 |
| 52 | 1:15-1:30 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 50 |
| 61 | 1:30-1:45 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 56 |
| 70 | 1:45-2:0 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 56 |
| 79 | 2:0-2:15 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 56 |
| 88 | 2:15-2:30 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 56 |
| 97 | 2:30-2:45 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 55 |
| 106 | 2:45-3:0 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 53 |
| 115 | 3:0-3:15 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 50 |
| 124 | 3:15-3:30 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 56 |
| 133 | 3:30-3:45 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 56 |
| 142 | 3:45-4:0 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 56 |
| 151 | 4:0-4:15 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 56 |
| 160 | 4:15-4:30 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 56 |
| 169 | 4:30-4:45 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 53 |
| 178 | 4:45-5:0 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 52 |
| 187 | 5:0-5:15 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 51 |
| 196 | 5:15-5:30 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 50 |
| 205 | 5:30-5:45 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 49 |
| 214 | 5:45-6:0 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 58 |
| 223 | 6:0-6:15 | (A61) Derby Road (heading:NNE) | (A61) Derby Road (heading:N) | 55 |

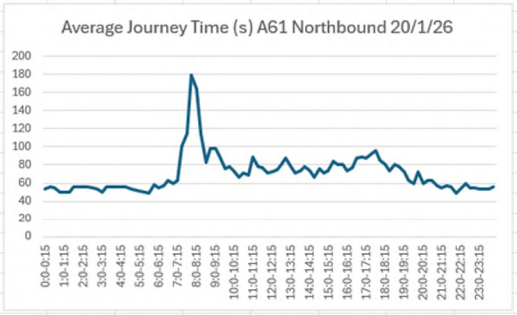



**Figure 10 – Screenshot of Excel Export (Data Manipulated and Filtered)**

Elements to note from this small example is that the ability to use data from a significant time ago means that analyses of seasonal effects on traffic can be established, perhaps informing the Council's specialists of when it is and is not appropriate to conduct maintenance works etc.

Initial work on the comparison of SCOOT and MOVA on the above Region has been conducted. It must be noted that the findings thus far are very much provisional as

the study will also be considering traffic delays in September when the school holidays have ended.

When setting up the journey time analysis, it is possible to select snapshot times for a day to show the average 15 minute journey time from one polygon “border” to all others, which are displayed automatically. In the image below, an example of this is shown for traffic close to Hope in the Peak District for 1st August 2026.

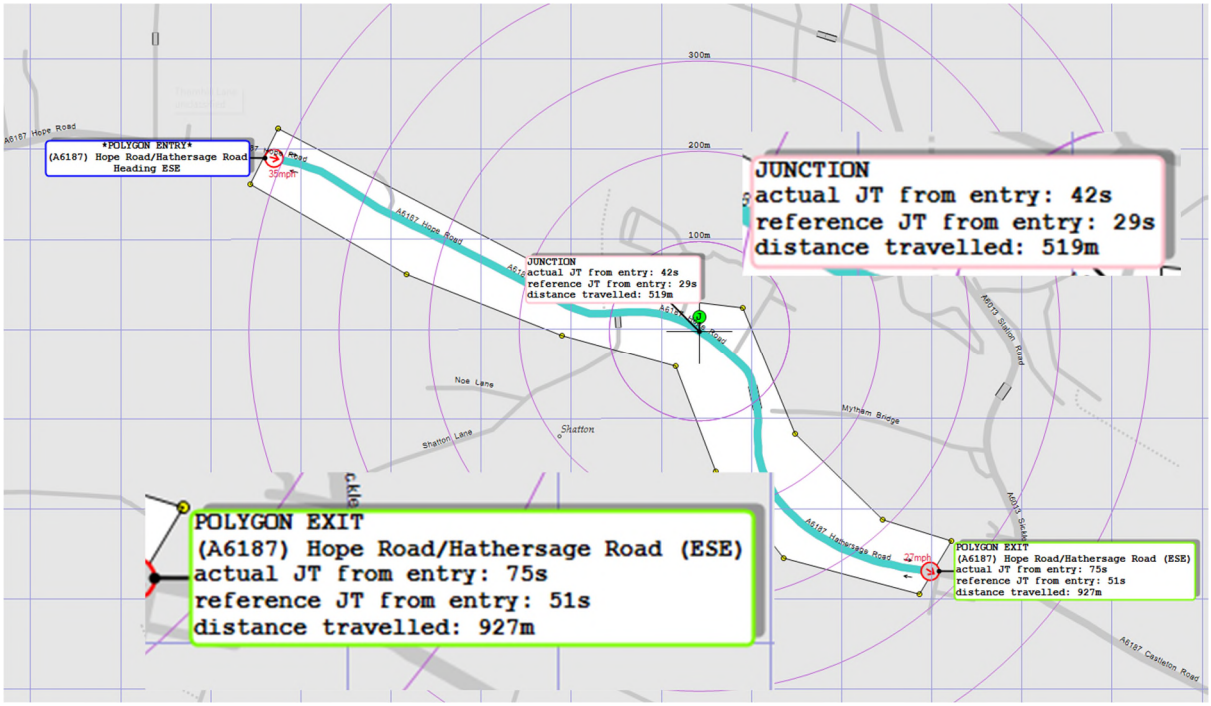



**Figure 11 – Polygon Showing Journey Times to Polygon Exits (the West to East Boxes have been Superimposed at a Larger Scale to Show the Information More Clearly)**

Those who have been involved in the analysis of traffic conditions where changes are relatively small, over a wide area, will be aware of the challenges of gathering objective data. In the past, stopwatches and limited ANPR (Automatic Number Plate Recognition) would usually have been utilised to record delays. In addition, any data from “out of hours” such as at weekends or the very early morning or late evening, would be especially difficult and/or expensive to gather. It is possible to use SCOOT messages as a partial surrogate for measuring delays, but as these come from the SCOOT model, it was assessed that these were of predicted rather than actual conditions and therefore it would be appropriate to use this as a prime data source.

The data gathering from the JTM has taken place as per that described above, with the (very) provisional results showing that SCOOT seems to be most appropriate in the working day and MOVA at other times. Results for the weekends are not yet available but are expected to be presented within the Symposium. However, this case study is designed to show the power and applicability of the JTM rather than the analysis of SCOOT/MOVA being the objective.

Notwithstanding the foregoing, the figures below show the detailed and high level results of the SCOOT/MOVA comparison thus far.

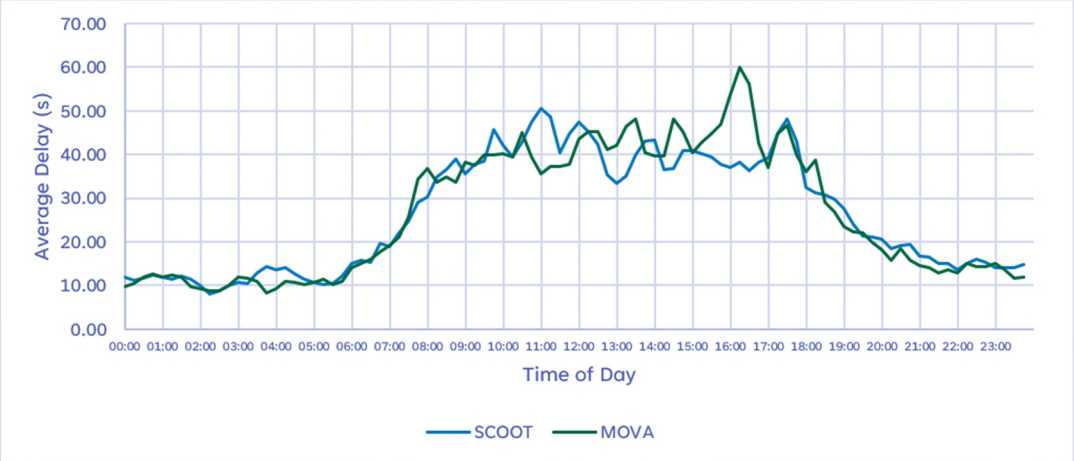



**Figure 12 - SCOOT vs MOVA on the A61 SCOOT Region Using PTMS Data – PROVISIONAL RESULTS**

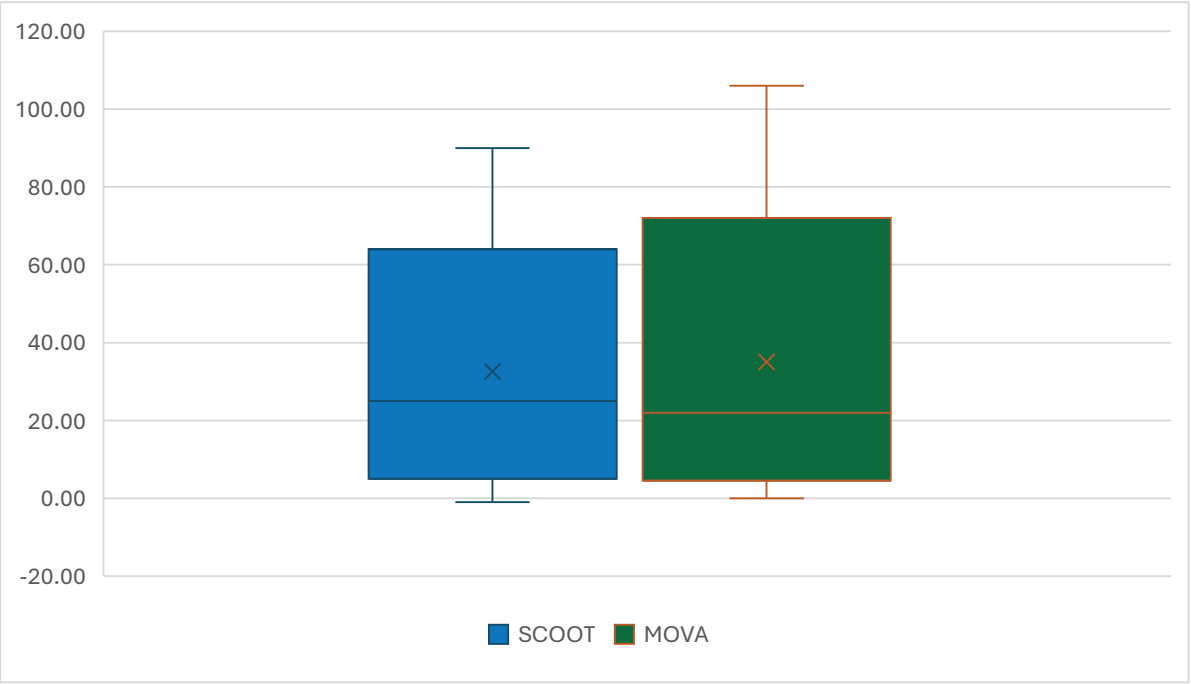



**Figure 13 – Overall Assessment of SCOOT/MOVA Comparison on the A61 Corridor - PROVISIONAL**

As well as noting caution regarding the above analysis, due to the study being incomplete at the time of the submission of this paper, the delays on each Link are yet to be weighted by traffic volumes (see later for potential developments to the JTM). Nevertheless, the data provided through the JTM does show the extent of analyses which is now possible which may not have been contemplated by other means.

**Case Study 2 – Vehicle Breakdown**

The Horns Bridge junction, a signalled roundabout, is Derbyshire's busiest and most congested intersection, where the A61 meets the A617 (a direct link from the M1 Motorway). In the early afternoon of 6th July 2026, it was noticed from traffic cameras and also the PTMS live display that a vehicle had broken down on the stopline on the A61's northbound approach to the signalled roundabout as shown by the red "x" on the image below. The police had coned off the traffic lane behind it, thus reducing the capacity of the stop line by approximately 33%.

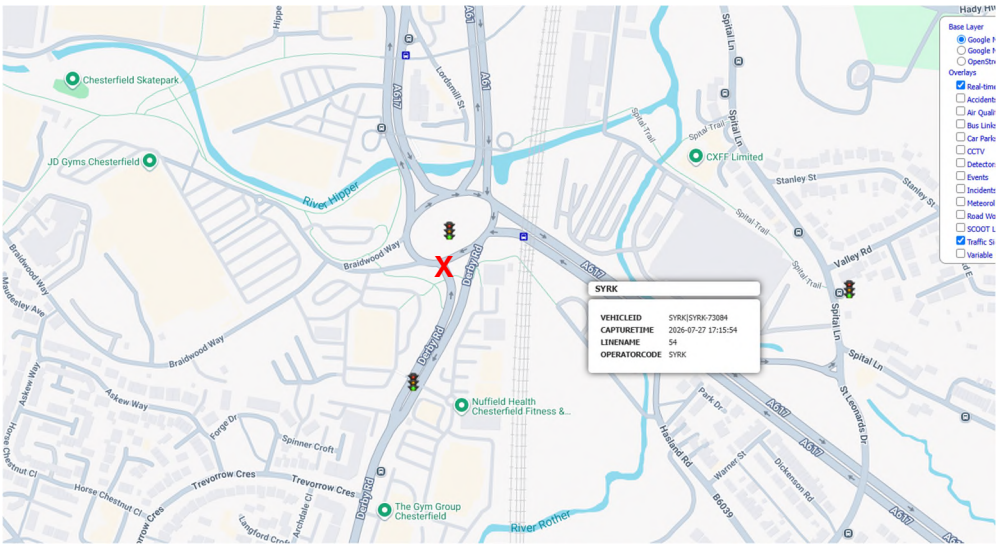



**Figure 14 – Location of Breakdown – Horns Bridge, Chesterfield 6/7/26**

In normal circumstances, the delays caused by such an incident would not be analysed. However, as the JTM tool had just become available, it was decided to compare delays during the period of the breakdown and immediate aftermath with atypical Monday a week later. It must be emphasised that comparison of one day against another is not normally a sensible thing to do, but as congestion was severe, a comparison, with this caveat is a valid exercise.

Unfortunately, a screenshot of the commencement of the incident was not captured immediately, but the following images show the situation a few minutes into the aftermath of the breakdown and coning off of the right hand lane (used mainly for the A61 S to A617 SE manoeuvre).



**Figures 15 & 16 – Vehicle Breakdown at Horns Bridge (6/7/26) and Resultant Queues on the A61 Northbound (Obscured Purposely)**

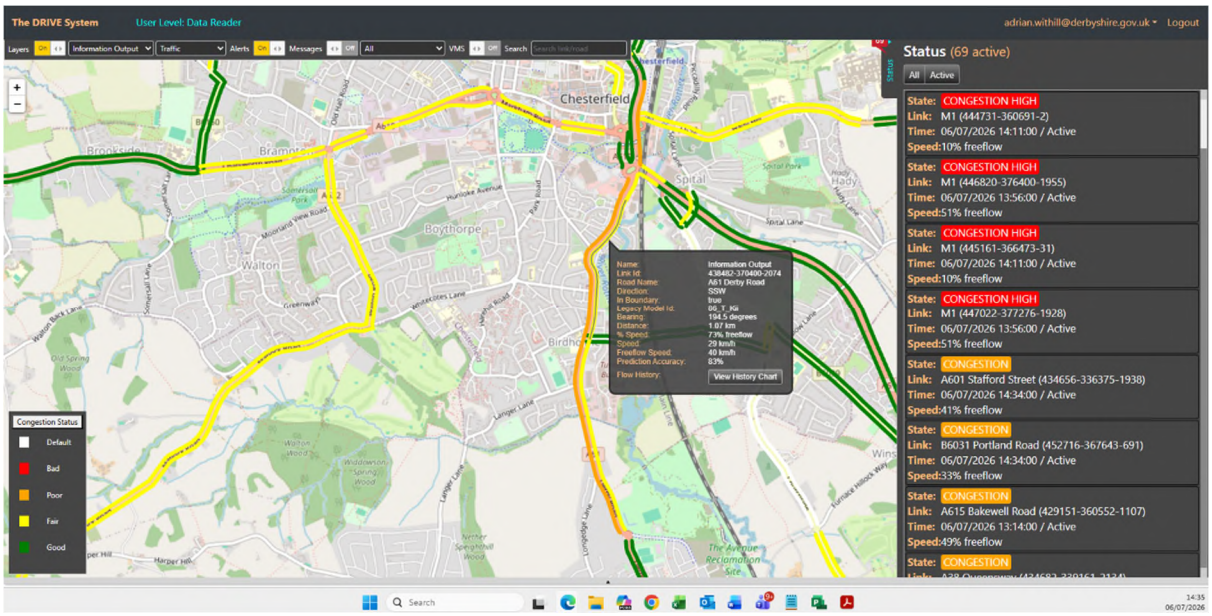



**Figure 17 – PTMS Display for 6th July 2026 – A61 at Horns Bridge**

To analyse the journey time data on the northbound A61 towards Horns Bridge, a new polygon (a geofence) was created by Council staff for the A61 from approximately 3 Km south of the Horns Bridge junction. In this instance, the journey times measured are the continuation of journeys from the A61 south to the A617 in the south-easterly direction. Delays are calculated for each 15 minute average by taking away the free flow journey time from that measured from the polygon entry to the polygon exit. Delays to other exits from the Horns Bridge roundabout are available as are other exits from the polygon but are not being considered for this case study. Rerouting of other facets of an incident are not taken into account in this exercise as the case study is intended to demonstrate the JTM only.

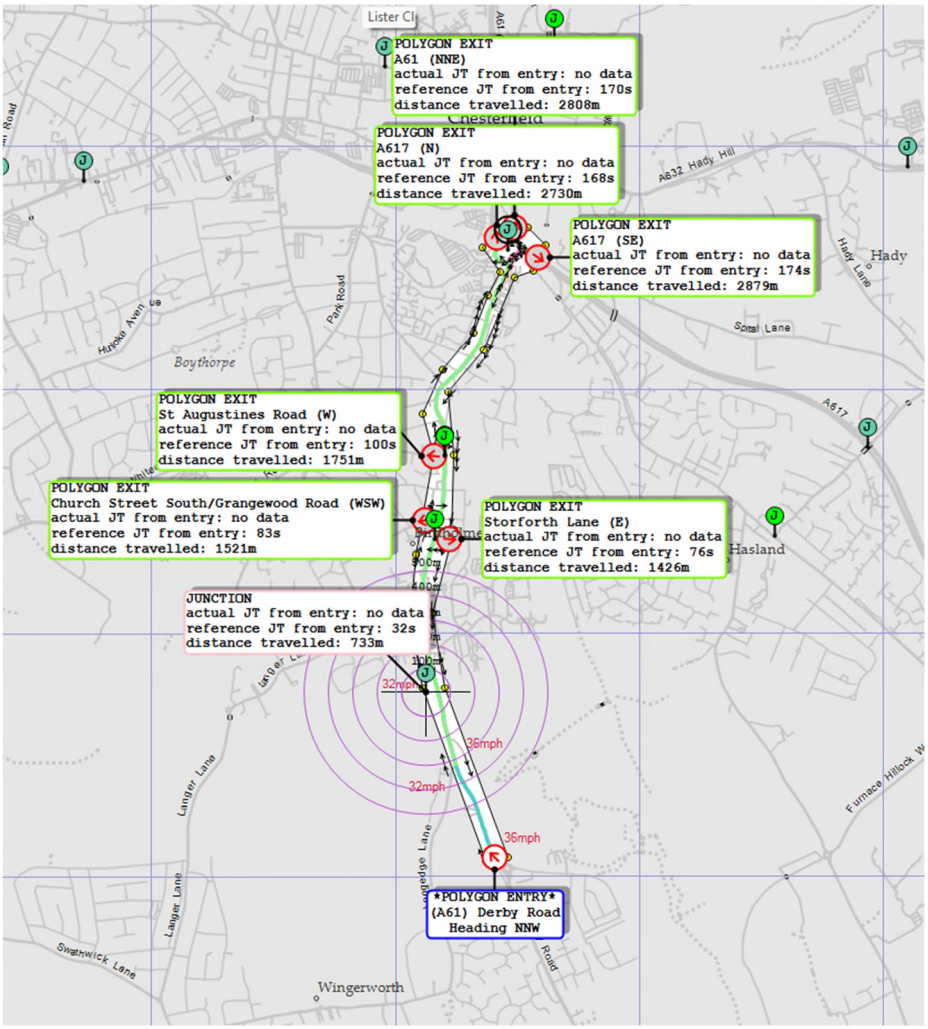



**Figure 18 – A61 Corridor Geofence (Live JT Data not Shown)**

Journey time data, already stored in the PTMS was exported to Excel for the 6th July 2026 and also the 13th of July. It is known that the breakdown occurred at approximately 13:00 and the site was cleared by the police at approximately 16:15, albeit with an appreciable backlog of traffic. The graphic below shows delays in 15-minute increments for the origin to destination chosen.

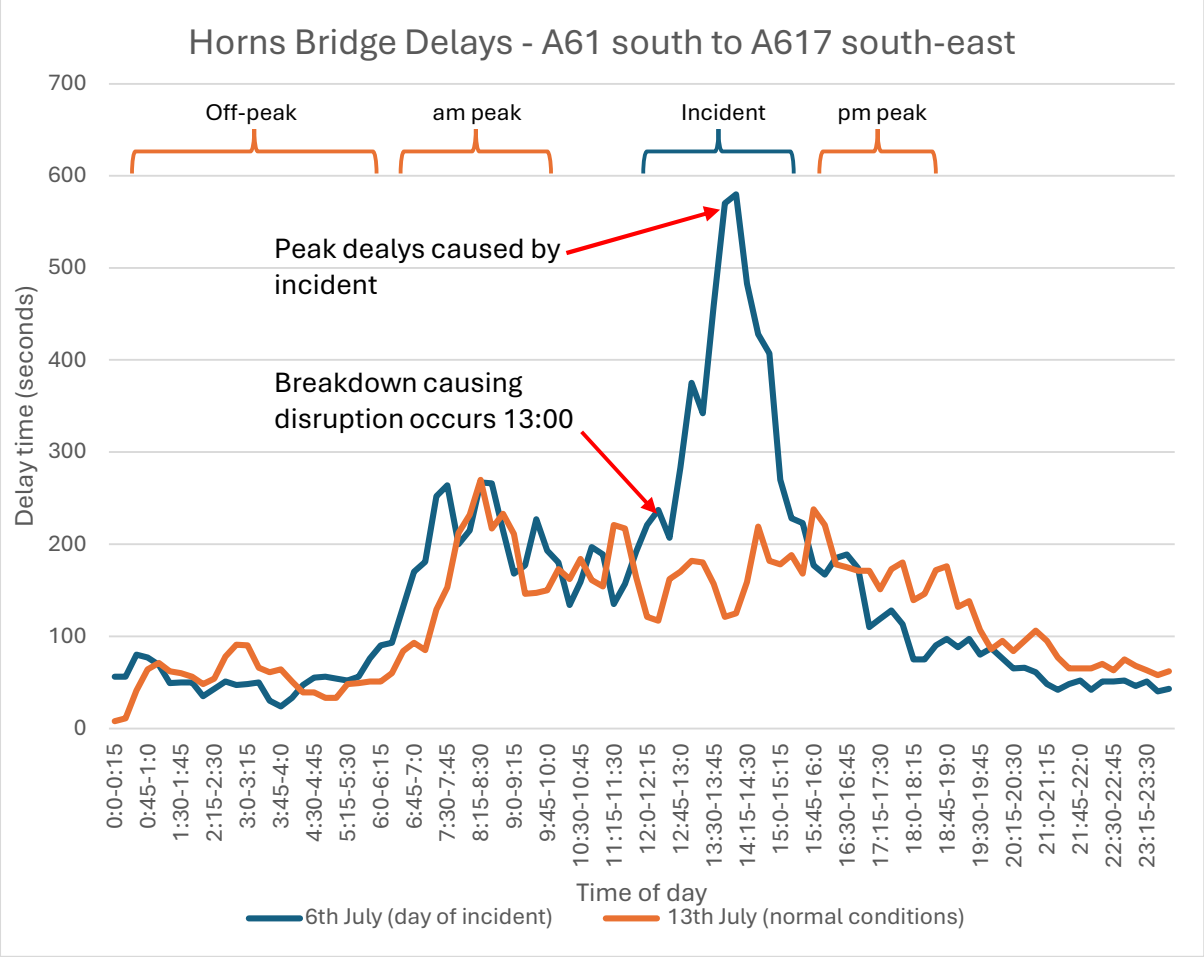



**Figure 19 – Illustration of the Delays Caused by a Vehicle Breakdown at Horns Bridge Roundabout on 6th July 2026 Compared to Monday 13th July**

From the data collected and analysed, which took approximately 20 minutes to undertake, the negative consequences of such a significant incident can be appreciated.

**Next Steps**

The JTM tool in the PTMS is in its early phases of use, but within the active project work where is it being used, County Council staff and the Council's Consultants are compiling a "wish list" of potential developments as project work commences.

A particular enhancement that was identified before SAT is the inclusion of traffic flow data to allow actual total delay to be calculated in terms of vehicle-hour delays. Also, the consequential economic cost of that delay could be included with the addition of

“time” and vehicle operating costs, albeit that these can be easily included in any spreadsheet analysis of the data.

Data exported into a single spreadsheet for chosen days would be preferable to multiple downloads of data as it would save the user significant time when assessing the effects of particular changes to signal timings or traffic management arrangements.

Some enhancements to the user interface would also be beneficial to make the gathering of data simpler and quicker.

Fortunately for the GLF project, some funds have been committed to enable some enhancements to be made to the JTM, but it is unlikely that these will be realised in time for the JCT Symposium.

**Lessons Learnt**

The project has been a success as the deliverable has met the terms of reference exactly. In actuality, some of the functionality exceeds what was thought possible which makes its use potentially far more widespread than initially anticipated.

Some relatively minor roads are not included within the PTMS. This has not proved to be a problem thus far, but it is known that in Glossop, where the tool will be used to assess the benefits of SCOOT’s introduction (another GLF project), a side road from a supermarket is not included which may mean the full analysis of effect has to exclude this SCOOT Link.

A calibration exercise is due to take place at a site where VivaCity detectors are operable for comparative purposes. However, the Council’s team is aware that the only true way of establishing the accuracy of all data (PTMS and VivaCity) is to conduct some manual observations, but as is usually the case, budgets are not available for a comprehensive exercise. Nevertheless, on a subjective basis, results, thus far, from the JTM, have matched what can be seen via the Council’s traffic cameras and by local knowledge of the County highway network.

**Summary**

The provision of a JTM to analyse journey times on 30,000 highway links in Derbyshire, with data being available on a historic bases for comparison purposes was proposed and delivered due to the DfT's Green Light Fund. This now enables the effects of various Green Light Fund projects, as well as other initiatives, to be assessed objectively with confidence. Additionally, whilst the system was being developed, it became clear that the usage of it for monitoring and assessment of traffic management projects (in the very widest sense) was significantly superior in terms of accuracy and cost, to other technique due to its extensive geographical and temporal coverage. As originally anticipated, the data from the tool will be extremely beneficial in fine tuning traffic signal timings at isolated junctions as well as within co-ordinated networks.

Relatively minor "tweaks" to signal timings can be assessed over long periods to be confident that the improvements were beneficial and to what extent to inform the traffic signal specialists of the likely success elsewhere. Indeed, some peripheral work for the purposes of other projects has indicated that some VA (Vehicle Actuated) maximum phase timers would benefit from a modification during off-peak operations to reduce delays during the "rush" to the Peak District on a Sunday, something that would not be immediately apparent without the beneficial use of the JTM tool.

The case studies of the use of the JMT in this paper have been chosen to exemplify what the system can be used for. Traffic signal and traffic engineering specialists will no doubt be able to consider other suitable applications, as will Derbyshire County Council, as the experience of this comprehensive tool develops.

The JTM project in Derbyshire has been extremely successful, and as the potential for objective data analysis is becoming clear to project managers, its use will be expanded for strategic as well as tactical purposes. Should the PTMS be applied elsewhere in the UK, then the JTM can be utilised immediately (assuming commercial arrangements incorporate its use).

Any opinions contained herein are not necessarily those of Derbyshire County Council.