DRAKEWELL
Analyse · Formulise · Strategise

Drakewell C2-Cloud
Journey Time Module User Guide
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Maylands, Bryne Lane, Padbury, Bucks MK18 2AL

Tel: +44 (0)1280 827042/308086 | **Fax:** +44 (0)1280 822118 | **Email:** info@drakewell.com | **drakewell.com**

VAT Registration No. 125947396. Company No: 07568366. Registered Office: 843 Finchley Road, London, NW11 8NA.

Contents

Overview

This document gives an overview of the Drakewell Journey Time module. The software can calculate journey times from any data in timestamp / vehicle id form. For example, ANPR or Bluetooth.

The software provides two approaches to analysis of journey time data:

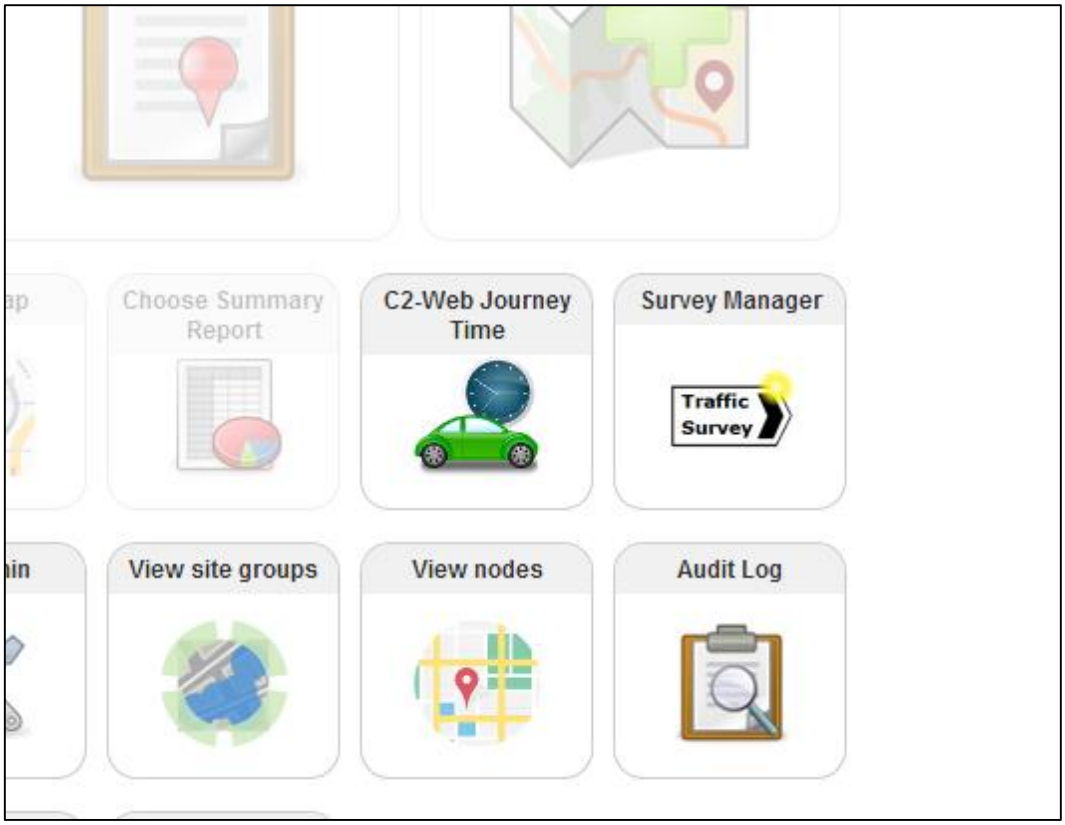
1. Analysis from raw vehicle data. This is useful for reporting over short time scales and allows for quick configuration and fine tuning of parameters.
2. Pre-computed journey times on user-defined routes. This is useful for reporting over long time scales but doesn't allow for quick parameter variation.

The document will outline both types of analysis, as well as the creation and configuration of routes.

Accessing the module

Before you can use the module, you must be logged in to your C2 user account.

The module can be accessed from the C2 home page by clicking the **C2-Web Journey Time** link.



If this link isn't available then the account you're logged in to doesn't have permission to view C2 Journey Time. You should speak to the administrator in charge of your C2 user group, or contact Drakewell for assistance.

Navigation

Home Pages

The **Home Page** for the C2 Journey Time module is a list of the Nodes and Site Groups that have been flagged as having journey time data. This page can be reached from anywhere else either by clicking the Drakewell icon in the top left corner, or by selecting C2 Journey Time from the Home dropdown in the navigation bar.

A **Group Home Page** shows links to various parts of the C2 Journey Time module for that group. This page can be reached from anywhere else by selecting the group from the Groups dropdown. When on a group-specific page, the links on the Group Home Page are also available from the Group dropdown.

Navigation Bar

At the top of every page is a grey navigation bar.

On the left hand side are dropdown menus.

The **Home** dropdown has links to get back to the home pages for the C2 Journey Time module and C2-Cloud.

The **Groups** dropdown lists all Nodes and Site Groups that have been flagged as having journey time data. Clicking one will take you to the Group Home Page for that group.

The **Group** dropdown has links to group-specific pages for the current group. E.g., the Route List and Route Map. These are the same links that show on the Group Home Page. This will only show if looking at a group-specific page.

The **Route** dropdown has links to some route-specific pages for the current route. This will only show if looking at a route-specific page (e.g. a report for a route).

On the right hand side are links to log out, change password, and alter settings like preferred units and date/time formats.

Sites

A **site** in C2 corresponds to a data recorder. A site must belong to exactly one **Node** in C2. A site can also belong to zero or more site groups.

Journey Time Sites

Not all sites in C2 appear in C2 Journey Time. This is because not all sites have data suitable for journey time calculation. The software treats a site as a journey time site if any of the following conditions are met:

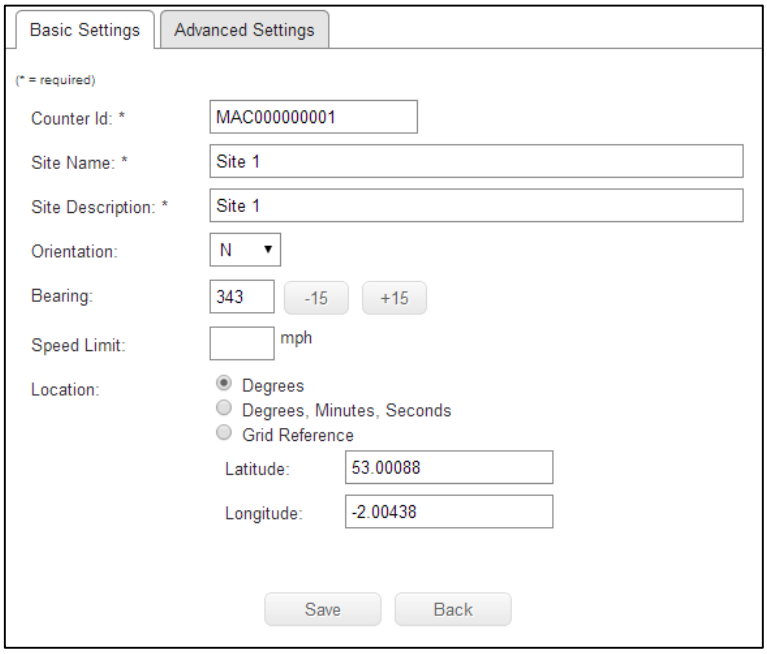
- The **Counter Id** (or **Cosit**) begins with the letters **MAC.**
- The **Counter Id** (or **Cosit**) begins with the letters **ANPR.**
- The site has **hasjt=1** in its parameters.

Creating a Journey Time Site

This can be done by users with admin access to the node the site will be a member of.

This is identical to creating an ordinary site in C2 with a few details specific to Journey Time.

From the **Node Admin** page for the node you wish the site to be a member of, click **New Site**.



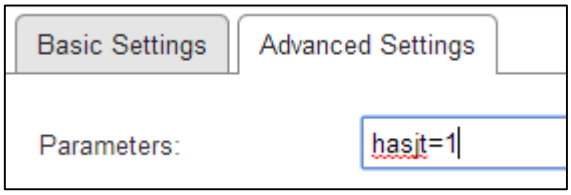
The **Counter Id** for a Bluetooth recorder should begin with the letters **MAC.**

The **Counter Id** for an ANPR camera should begin with the letters **ANPR.**

The recorder will have an id. This must appear at the end of the **Counter Id.** Between the MAC/ANPR and the recorder id should be enough zeroes to make the **Counter Id** 12 characters in length.

It's strongly recommended that a location be set. Without this, it's difficult to use the recorder for route based analysis, though it can still be used for ad hoc analysis from raw data.

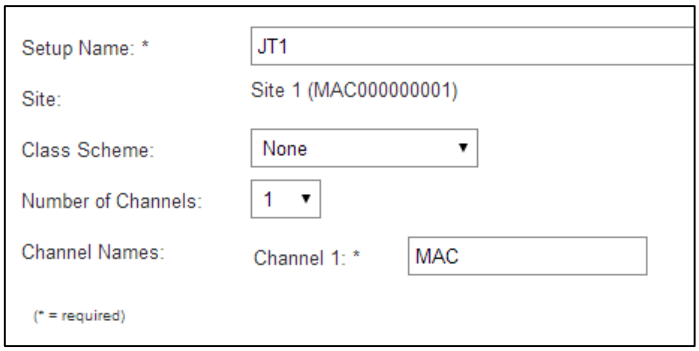
If the **hasjt=1** parameter is required, this can be added to the **Parameters** under the **Advanced Settings** tab. The parameters field is a comma-separated list of key-value pairs.



You can also tell C2 how often the recorder sends data by specifying the **Collection Interval.** This allows C2 to distinguish between a lack of recent data due to a fault and lack of recent data due to the data not being sent very often.

Once the required details have been entered, click the **Save** button. You'll be asked if you want to **create a new PVR setup**. Click **Yes**.

A **setup** contains meta-data about the traffic data. For example, channel names, class scheme, etc. In this case, we only need a setup with a single channel. First enter a name for the setup. Then select 1 from the **Number of Channels** dropdown and enter a name for the channel in the text box that appears.



Click the **Save** button to finish.

The system will now know about the site and any data that comes in will be processed to it by the Drakewell Instation.

Routes

It's possible to define routes in C2 for use in the calculation of live and historic journey times, long-term reporting, DATEX II export, etc.

A route is a chain of sites. There are two types of route:

- **Normal routes**. These are made from two sites for performing simple "A to B" matching.
- **Compound routes**. These are routes made by joining normal routes end to end. This allows for the more complex "A to B to C to … to Z" matching.

In C2, normal routes that are used as part of a compound route are referred to as **Link Routes**.

Compound routes are useful for journey times over a long distance. The delay on the live calculation of journey times is at least the journey time along the route. This is because a vehicle must complete the route before journey times can be calculated. By breaking the route up, the software can calculate journey times over shorter segments and sum them up to produce an overall journey time. The delay on live journey times is then reduced.

We recommend that normal routes have journey times somewhere in the ballpark of 2 to 15 minutes. If recorders are placed too close together, the natural variance in traffic plus the error in the detection time at each recorder can sum up to be comparable to the journey time being measured. The result is an inaccurate journey time. If the route is too long then the match rate is likely to be reduced resulting in an inaccurate journey time. Also the calculated journey times will be delayed.

Routes and Site Groups

A route must be made of sites and links from the same node. Routes can always be created in a node but they can only be created in a site group if that group only contains sites from a single node.

A route will only be visible from a site group if all sites on the route are in the site group. For example. Suppose a node contains four sites A, B, C and D, and two routes A->B and B->C. Suppose a site group is created containing sites B, C and D. The B->C route will be visible from the site group because both sites B and C belong to the site group. The A->B route won't be visible from the site group because site A doesn't belong to the site group.

Route Anatomy

A route is made up of three parts.

1. **Details**. This includes the name, description, and any journey time calculation parameters.
2. **Schematic**. This is the list of sites that define the route, as well as the list of link routes connecting those sites in the case of a compound route.

3. **Waypoints**. These are a list of latitudes and longitudes that define the path taken by vehicles travelling along the route.

Each part has an editor screen. The schematic is required for all routes. The waypoints don't have to be defined but without them it's impossible to calculate the route length (and hence speed along the route) or display the route on a map. Every route requires a name but otherwise the basic details can be left at their default values.

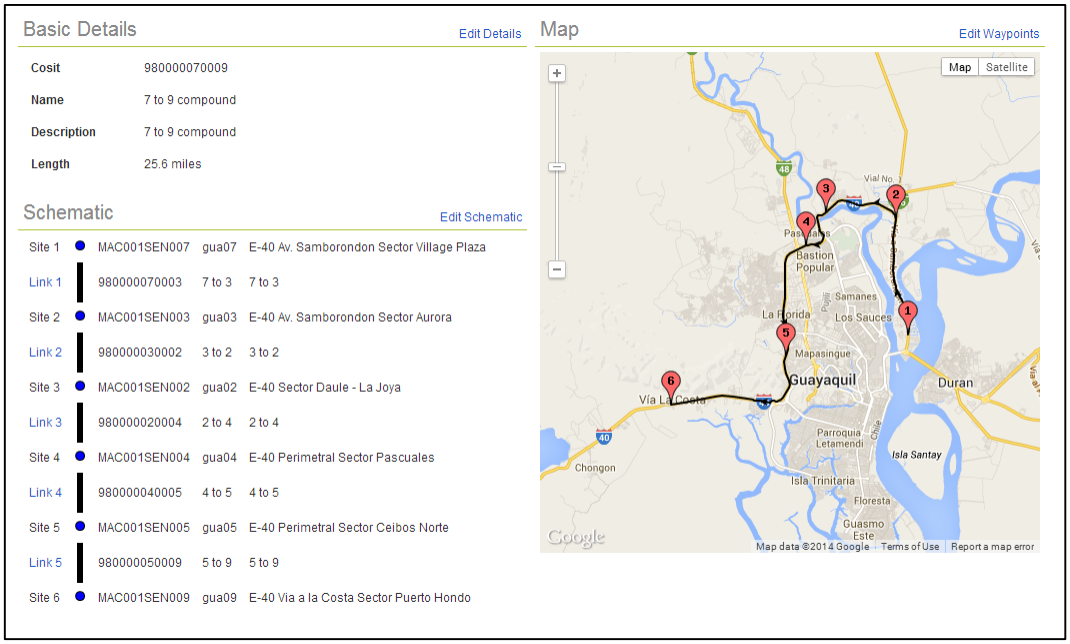
Route List and Route Overview

To view a list of all routes in a group, navigate to the group home page and click **Route List** in the **Lists** section. Alternatively, select Route List from the Group dropdown menu.

This gives you a list of all routes in that group displayed so that compound routes and their link routes appear together. Note that a link route can belong to several compound routes so link routes may appear more than once on this list.

Routes can be disabled by clicking the checkbox in the "Disabled" column. This will exclude the route from reports and maps.

From this screen, click the blue hyperlinked "Cosit" to go to the **Route Overview**.



The overview screen shows some basic details, the schematic, a map of the route, and a list of "parent" routes (compound routes the route is part of) in the case of link routes. Also on this screen are links to the editors for the basic details, the schematic and the waypoints.

Creating a Route

To create a route in a group, navigate to the group home page and click **Create Route** in the **Admin** section. Alternatively, select Create Route from the Group dropdown menu. Note that if the group is a site group containing sites from different nodes, you can't create a route from it.

Enter a name for the route in the text box on the right hand side.

Click sites on the map to define the route you want. As you click sites, they'll be replaced with a numbered icon indicating that they're part of the route and their order on the route. To remove a site from the route, click the numbered icon. To break a segment up with another site, click and drag the segment onto the site.

On the right, you'll see the sites you've clicked listed from top to bottom. If there's already a route in C2 passing through the selected sites, it'll be shown in the bottom right of the screen.

If you're defining a compound route (more than two sites) then you must also choose which link routes to use on each segment. On the right, next to each segment is a drop down menu. This allows you to choose whether to reuse an existing link/normal route, or whether to create a new one. The links shown are those joining the sites at the start and end of the segment. If you create a new link you must also give it a name.

For example, suppose a route from site A to site B with the name "A to B" is already defined in C2. Suppose a route is drawn from site A to B to C on the map. Next to the A->B segment, "New Route" and "A to B" will appear in the drop down. Assuming no other link routes are already defined, only "New Route" will appear in the drop down next to the B->C segment.

In most cases, an existing link should be reused instead of creating a new one. A new link is only potentially useful in the rare case when there are two distinct sets of journey times between two recorders that can be separated by appropriate journey time filtering. For example, vehicles may follow two distinct routes that have different journey times, or a road may have fast/slow lanes with different journey times.

A link route is a route in its own right. It will appear in reports and on the map. It can be reused when creating compound routes.

Once you're happy with the route, click the **Save** button in the bottom right of the screen. To start again, click the **Clear All** button.

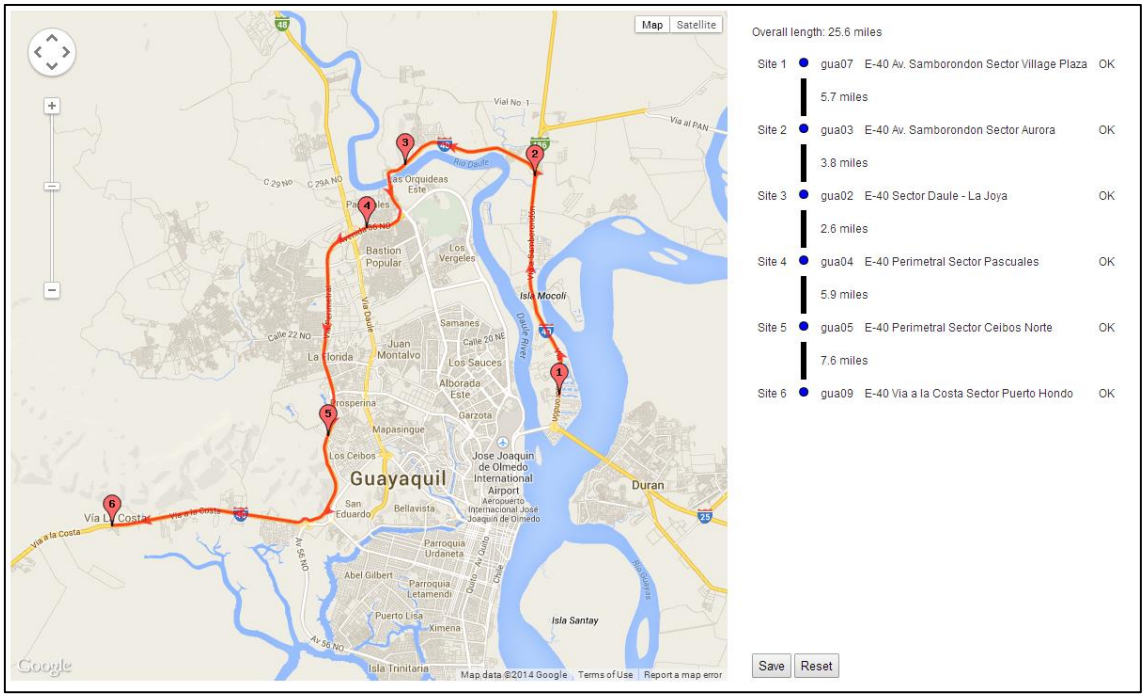
Once a new route has been created, a link will appear in the bottom right taking you to the **Route Overview**. It is recommended that you define the route waypoints at this point.

Route Waypoints Editor

The waypoints for a route are a list of latitudes and longitudes that correspond to the path taken by vehicles travelling along the route. Note that the software doesn't (and can't) use the waypoints as a restriction on matching. Waypoints are used for mapping and for calculating route length and hence speed.

Waypoints can be defined for any route (compound, link or normal) but setting the waypoints for a compound route will also automatically set the waypoints for each constituent link route so it's only necessary to edit the waypoints on compound routes and normal routes.

To edit the waypoints for a route, click **Edit Waypoints** on the **Route Overview** screen.



The editor shows the sites along the route with numbered icons specifying their order. If waypoints are already defined, they will appear as a red line. On the right is a diagram showing the route with the lengths of each segment.

Waypoints are calculated by using the Google directions service. This ensures that the waypoints follow the road. The only user input required is a start marker, an end marker, and up to eight intermediate markers to shape the waypoints line. To place a marker, left click on the map. To place a marker part way along the line, left click near the line at the point you want the marker to appear. The start of the line will be green, the end of the line will be red, and intermediate markers will be grey. The line also has arrows indicating direction. Markers can be dragged and dropped to shape the line.

It's not required that the markers be placed on or near sites, but it is required that the waypoints line pass through all of the sites in the correct order. Next to each site in the list on the right is a status text indicating whether the route is near enough to the

waypoints line. If the line doesn't pass through the sites in the correct order, this will be indicated at the bottom right of the screen.

Note that the directions service cares about which side of the road the marker appears on. If the marker is on the wrong side of the road then the waypoints line may have to make a detour to get back on to the desired line. Therefore, it's important to place the marker on the side of the road the traffic is travelling on.

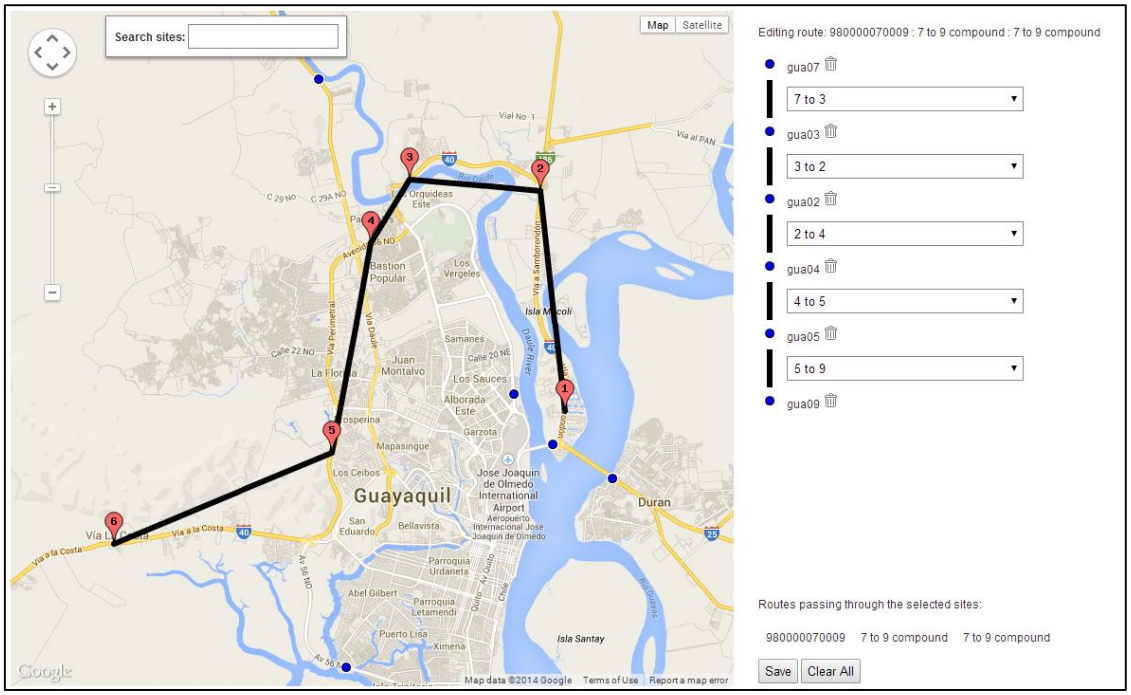
The software will truncate the route at the start and end to ensure that it starts and ends as close to the recorder location as possible. It's recommended that the line start and end a few metres before/after the start/end site to ensure the full length of the route is covered by the waypoints line.

When you're happy with the waypoints line, click the **Save** button in the bottom right corner of the screen. The line will turn red indicating that this is the line now saved to the database. To clear the line you've drawn and start again, click the **Reset** button.

Route Schematic Editor

The schematic is the list of sites that define the route, as well as the list of link routes connecting those sites in the case of a compound route.

To edit the schematic for a route, click **Edit Schematic** on the **Route Overview** screen.



The editor is very similar to the screen as used for creating a new route. Refer to that section for instructions on editing the schematic.

Note that it's not possible to edit the schematic for a link route. This is because a link route is part of a compound route and editing the link route would imply editing the compound route too.

Route Details Editor

The Route Editor allows configuration of the route name and description, various journey time calculation parameters, and the alerts raised by the route.

To edit the details for a route, click **Edit Details** on the **Route Overview** screen.

System Defaults

By default, most parameters are the system defaults. If the **Use system defaults** checkbox is ticked, the defaults will be displayed but not editable. To override the system defaults and enable editing, uncheck the checkbox.

Apply to Link Routes

When editing a compound route, some parameters can be passed to all constituent link routes when saving. For example, if the free-flow speed along a compound route is 30mph then it would be reasonable to set the free-flow speed to 30mph on all constituent link routes as well. To quickly do this:

1. Open the Route Editor for the compound route.
2. Set the free-flow speed to 30mph.
3. Check the **Apply to link routes** checkbox.
4. Click the Save button.

Note on Compound Routes

Some settings can only apply to non-compound routes. For example, since the journey time for a compound route is the sum of the link route journey times, the Journey Time Statistic setting can't directly apply to the compound route. The list of settings that don't directly apply to a compound route are:

- Journey Time Statistic
- Journey Time Filtering
- Live Journey Time Lookback
- Live Journey Time Weighting

Instead, these are used when calculating the journey time while skipping a site. For example, if A->B->C->D is a compound route, links A->B, B->C, and C->D will use the parameters set on their Route Editor screens. If site B stops working, the compound route journey time will be calculated from links A->C and C->D. The parameters used for A->C will be those set on the Route Editor screen for the compound route.

Parameter Exceptions

Some parameters can be made to vary by time of day and/or day of week. The configuration for these is split into two parts: **Default** and **Exceptions**.

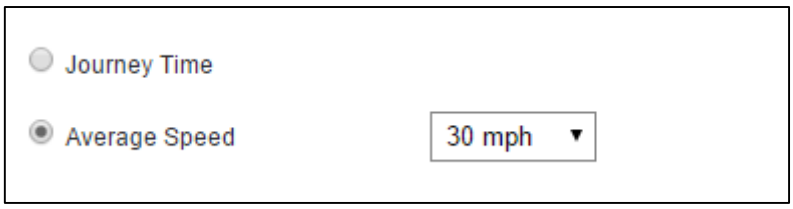
The Default parameters apply at all times not specified in the Exceptions.

The Exceptions can apply to one or more time ranges (e.g. 07:00 to 10:00 and 16:00 to 19:00) and any combinations of days of the week.

Multiple exceptions can be defined. For example, you may have one set of parameters for weekday peak hours and another for 7am to 7pm at weekends.

Note that if two exceptions clash (e.g. if one exception is Mon-Fri all day and another is Mon-Fri 7am to 7pm) then the one appearing first in the list takes priority.

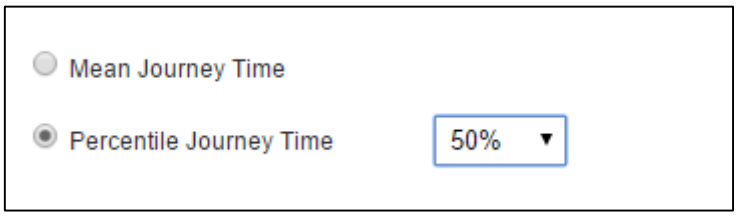
Free-Flow



This defines the typical free-flow conditions on the route. This can either be set to a fixed speed (e.g. the speed limit on an uninterrupted stretch of road), or a fixed journey time (useful if there are obstacles like roundabouts or traffic lights along the route causing the speed to vary).

The main use of this parameter is when defining Alert Levels for the "Journey Time Deviation from Fixed Bounds" alert. By default, these are set as percentages of free-flow.

Journey Time Statistic

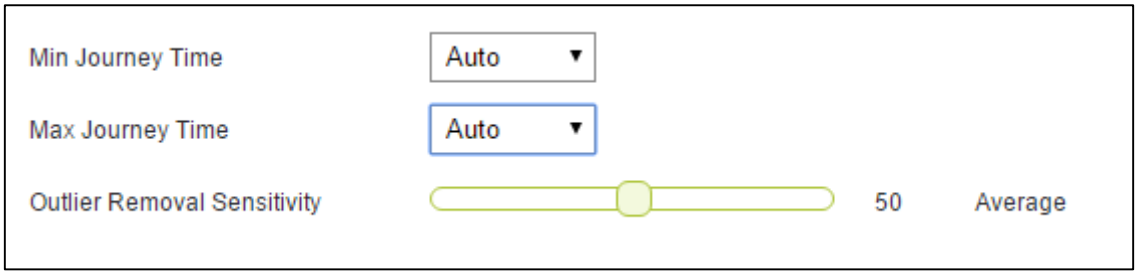


This is the statistic used when calculating journey times. It can either be the mean, or a percentile.

In most cases, a percentile is the best statistic to use as it's not affected much by the presence of outliers in the data.

Note that if weighting is used when calculating live journey times, the statistic used is a weighted mean or percentile.

Journey Time Filtering



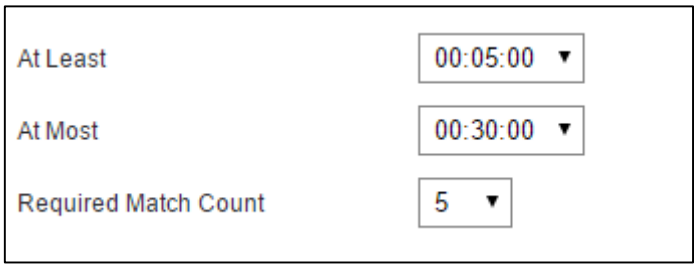
This defines limits on the allowed journey times, and the strength of the outlier removal filter.

The options for journey time bounds are:

- **Auto**. Min Journey time is 0:00. Max journey time is 4 * 25%ile Journey time of unfiltered matches.
- **No Limit**. No min/max filtering takes place.
- **Specific time**. Set an exact permitted time limit.

Outlier filtering ranges from 0 (none applied) to 100 (anything below 25%ile or above 75%ile is removed). Use the **Preview** tab to see the effect this setting has on the data.

Live Journey Time Lookback

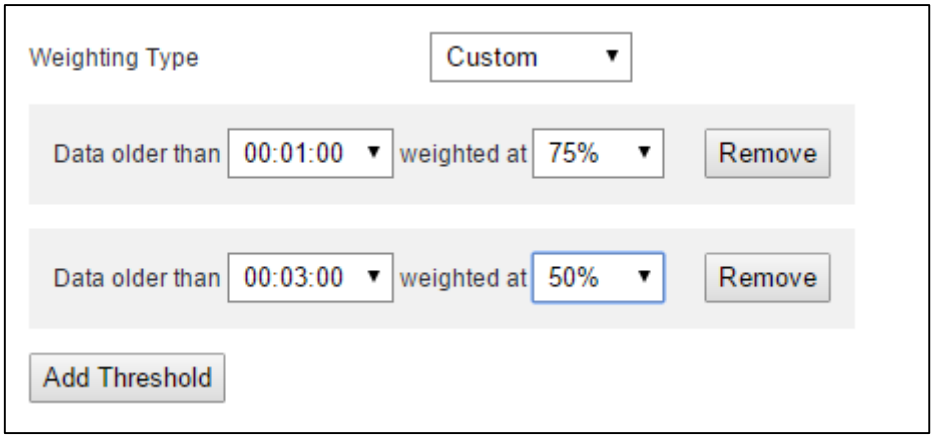


This defines the data used when calculating live journey times.

All matches up to the minimum lookback time are used. If this doesn't meet the match count requirement, older matches are included until either we meet the match count requirement, or we reach the maximum lookback time. If the match count requirement can't be satisfied, no journey time is reported.

For example, suppose **At least** is set to 5 minutes, **At most** is set to 30 minutes, and **Required Match Count** is set to 10. In this case, all matches ending their journey in the last 5 minutes will be used. If this gives us 10 or more matches, we're done. Otherwise, older matches will be added until either we have 10 matches, or until we're looking back at matches from 30 minutes ago. If we still don't have 10 matches then no journey time is reported.

Live Journey Time Weighting

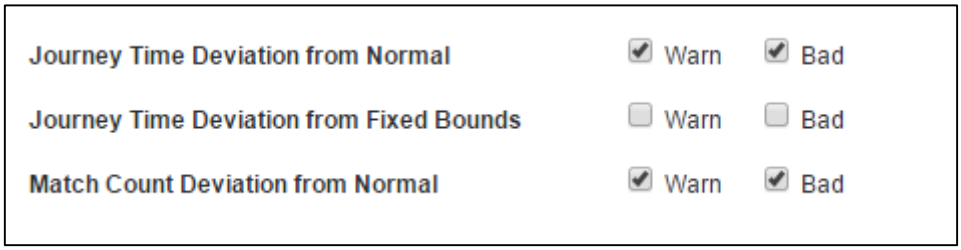


Matches can be weighted so that more recent ones contribute more to the calculated journey time than older ones. In this case, a weighted version of the Journey Time Statistic is used.

Exponential Weighting uses an exponential decay curve with a configurable half-life. For example, if 50% weighting is set at 5:00 then a match from 0:00 ago will be weighted at 100%, a match from 5:00 ago will be weighted at 50%, a match from 10:00 ago will be weighted at 25%, and so on.

Custom Weighting allows for configuration of up to 10 weighting thresholds. Data up to the first threshold is weighted at 100%. For example, a single threshold saying "Data older than 00:05:00 weighted at 70%" means data up to 5:00 will be weighted at 100% and data older than 5:00 will be weighted at 70%.

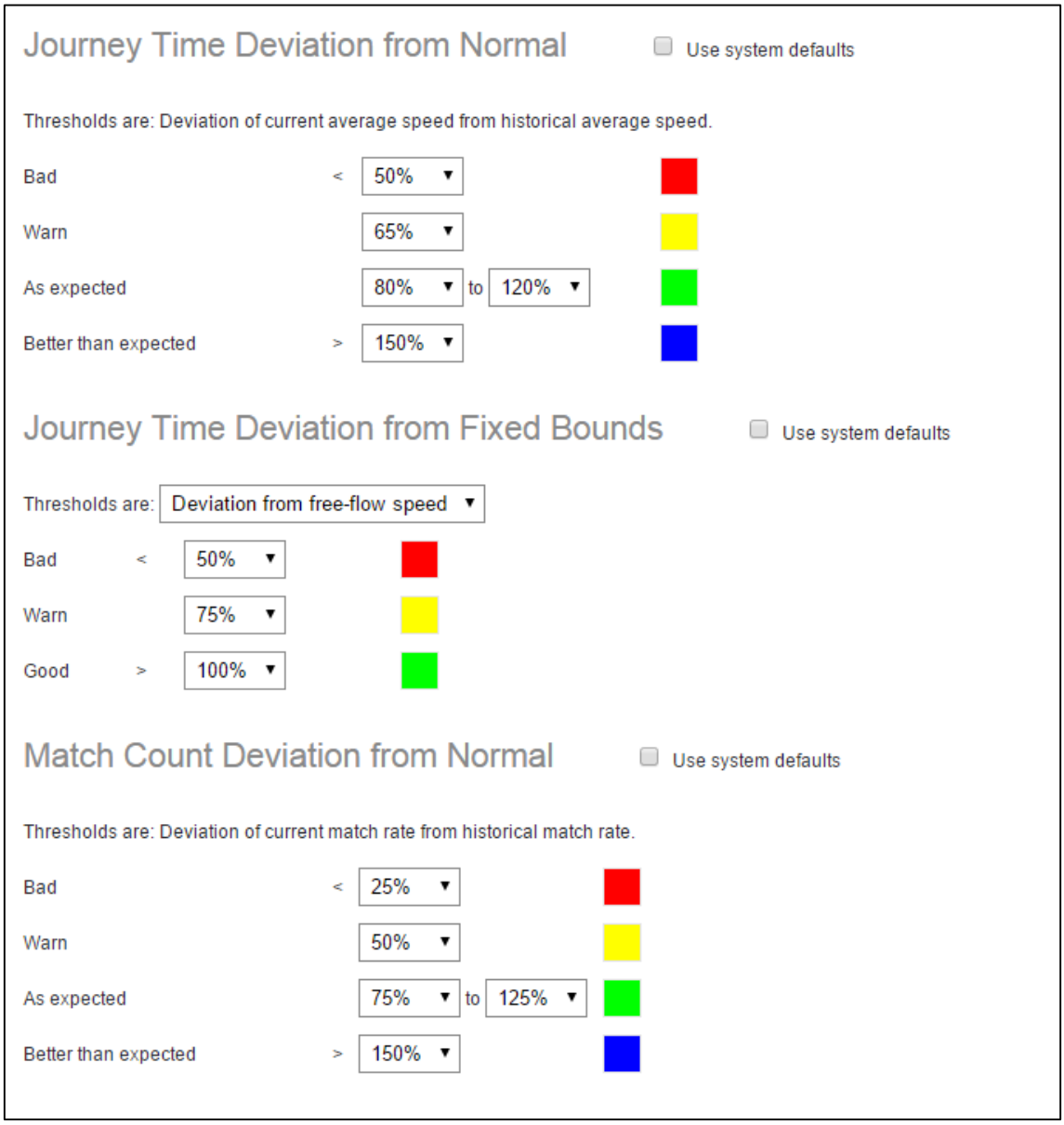
Active Alerts



The alerts and alert levels raised by this route can be switched on or off. For example, you may decide that a route should never raise an alert of a particular type, or it should only ever raise alerts at the highest severity level.

This applies to alerts that are emailed out to alert recipients. This doesn't affect the colours shown on the map which will always reflect alert levels whether or not they're sent to alert recipients.

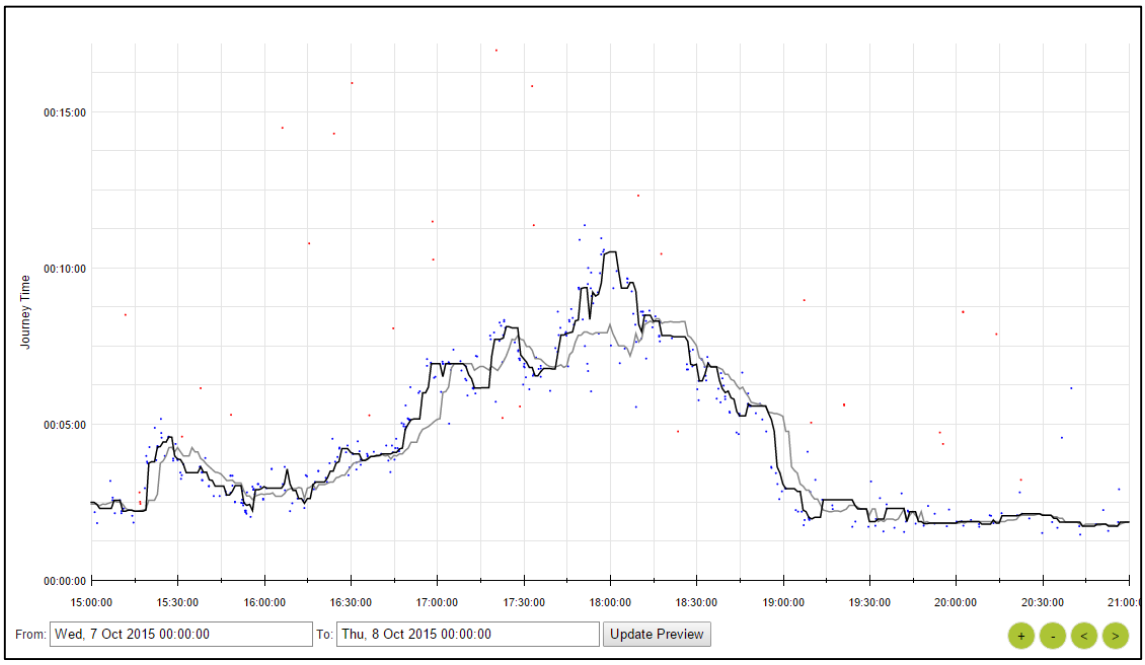
Alert Levels



The thresholds on this screen define the boundaries between alert levels for each of the alert types appropriate for the route.

Also shown are the colours used on the map for each alert level.

Preview



This tab allows previewing of up to three days of simulated live journey time data. This is useful for checking how new settings will affect journey times before clicking the Save button.

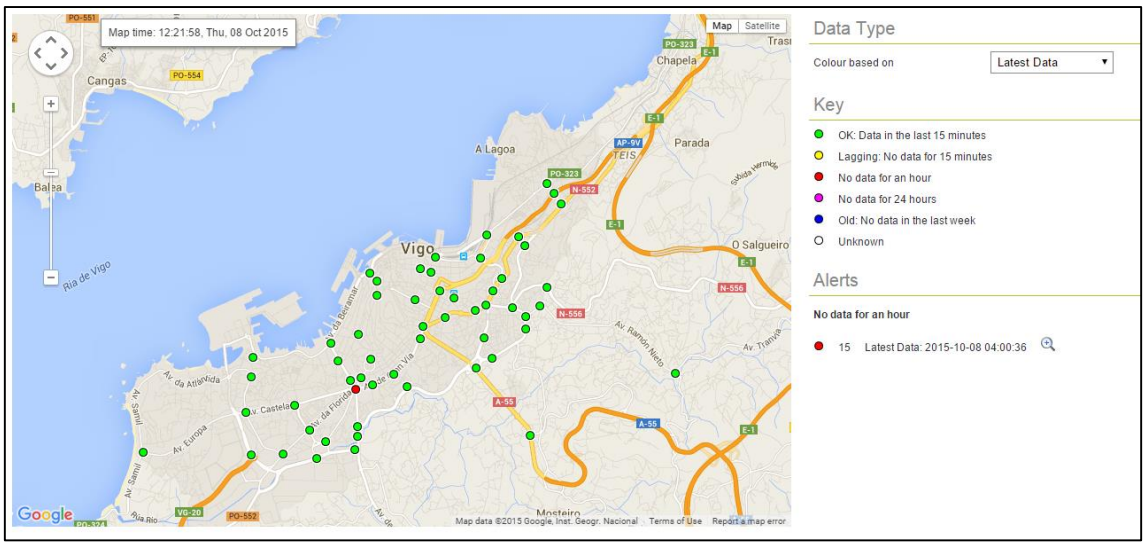
Data is loaded between the times specified by the **From** and **To** time selectors below the graph. To change the data, alter the times (no more than three days) and click **Update Preview**.

The graph shows scatter data for valid matches and outliers, a grey line showing journey times using the currently saved settings, and a black line showing journey times using the proposed new settings.

The graph can be zoomed and panned using the green buttons below the graph.

Note that this tab isn't available for compound routes. This is because compound route journey times are summed from link route journey times, and not derived from raw data.

Site Status Map



The site status map displays all journey time sites and colour codes them according to when the latest data was received. This is useful for determining if any sites are failing to send data.

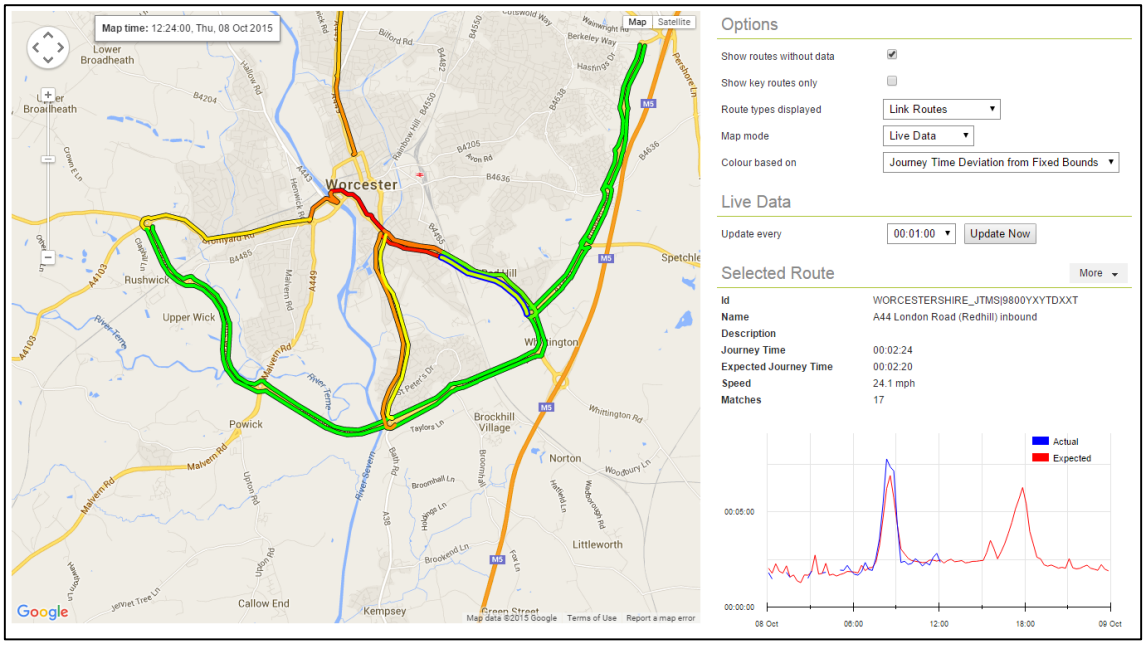
To access the map for a group, click the **Site Status Map** link in the **Maps** section on the home page for the group in the Journey Time module. Alternatively, select Site Status Map from the group dropdown menu while viewing the group.

Each dot on the map is a site. The sites are coloured according to the key on the right hand side. Also on the right is a list of the sites in the status categories requiring the most attention.

Clicking a site on the map will bring up an info box stating when the latest connection and latest data were recorded.

Route Map

To access the map for a group, click the **Route Map** link in the **Maps** section on the home page for the group in the Journey Time module. Alternatively, select Route Map from the group dropdown menu while viewing the group.

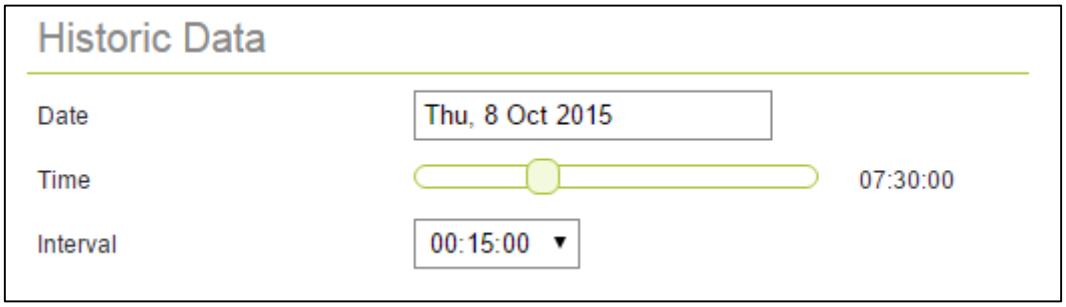


Live and Historic Modes

The map can display either current data or historic data. To switch modes, select from the **Map Mode** drop down.

In Live mode, the map displays live data and updates according to the interval set in the options on the right of the screen.

In Historic mode, the map displays historic data. Data can be viewed for all routes one day at a time. The day can be changed using the date selector to the right of the map. The time of day can be changed by dragging the time slider. As the slider is dragged, the route colours change.



Journey times are averaged out according to the selected interval allowing for fine or coarse time selection.

Route Colours

The routes are coloured based on one of the following alert types:

- Journey Time Deviation from Normal
- Journey Time Deviation from Fixed Bounds
- Match Count Deviation from Normal

To change the alert type, select from the **Colour based on** drop down.

Broadly speaking, the colours are as follows:

- Red: Bad
- Yellow: Warn
- Green: Good / As Expected
- Blue: Better than Expected

The thresholds used for switching from one colour to another vary from route to route and are configurable under the **Alert Levels** tab on the Route Editor.

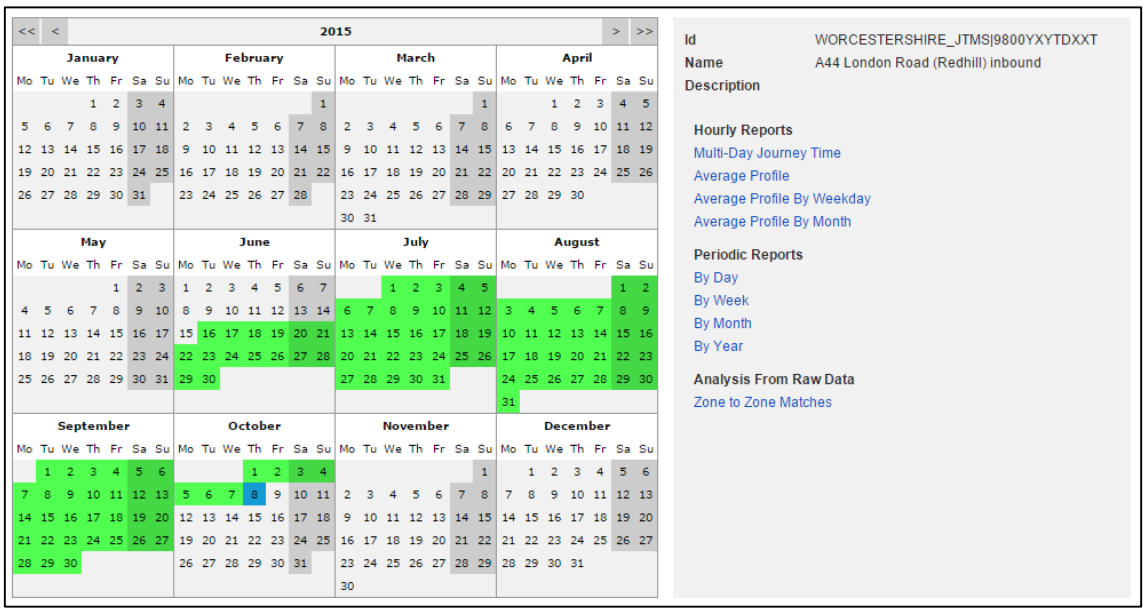
Route Details

To view details for a specific route, click it on the map. On the right will appear some information about the route and a graph showing the journey times for the day of interest. In live mode, the day will be today. In historic mode, the day will be the one selected in the date selector.

Clicking the **More** drop down will give links to the **Route Overview** screen, the **Calendar** giving access to more reports, and **Zone to Zone Matches** for the selected route allowing for more detailed data analysis.

Reports

Calendar



The calendar shows available data for a route and gives access to reports.

To access the calendar, go to any route-specific screen (e.g. **Route Overview**), hover over the route name in the navigation bar at the top of the screen, and select **Calendar** from the drop down.

On the calendar, days with data are shown in green. Days with zero matches are shown in grey. The selected date range is shown in blue.

To change the year, use the arrows at the top of the calendar.

To select a date range, click and drag on the calendar. To select across multiple years, click and drag to start the selection, then (without releasing the mouse click) hover over the arrows that appear when you select into January or December.

Available reports are displayed to the right of the calendar.

Note that **Zone to Zone Matches** performs calculations from raw data so it's not recommended that you select more than a week or two if running this report.

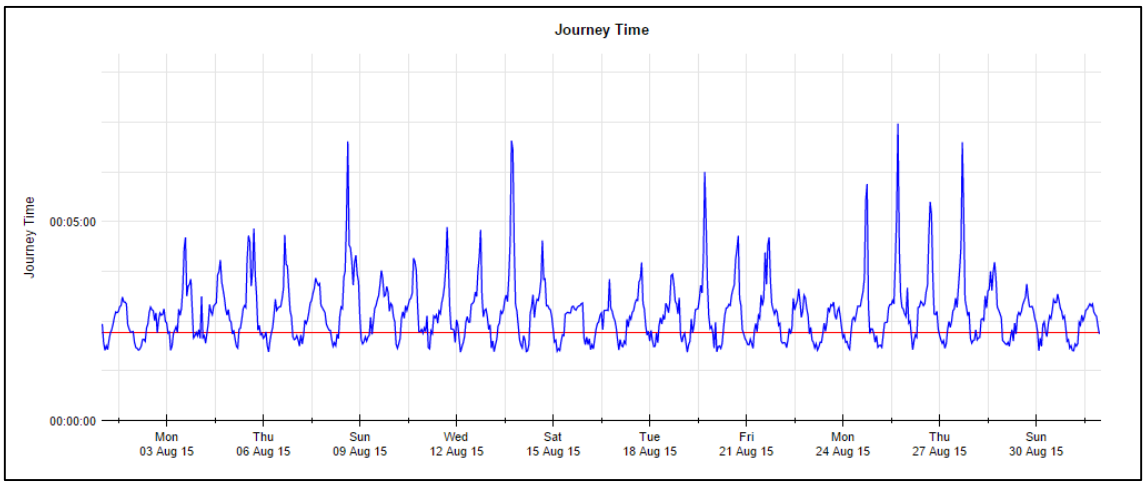
Hourly Reports

These are route-specific reports and can be loaded from the **Calendar**.

Broadly speaking, they show hourly data (and in fact can show data down to 15 minute intervals) with possible long term averaging to show "typical" conditions.

Each of the reports have options for the date range, time interval, and data type (Journey Time, Speed, and Match Count for non-compound routes) and can be exported to excel by clicking the **To Excel** button.

Multi-Day Journey Time

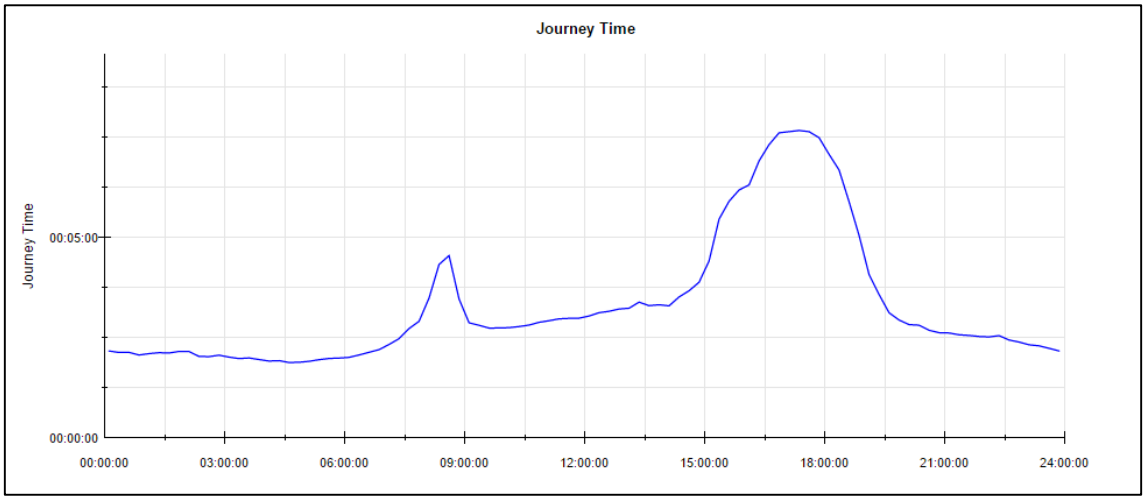


This shows data with no long term averaging.

The interval of the report can be set down to 15 minutes.

The **Overlay Days** checkbox will change the graph so that the days are overlaid and the x axis spans a single day. Weekdays will show in blue while weekends will be grey.

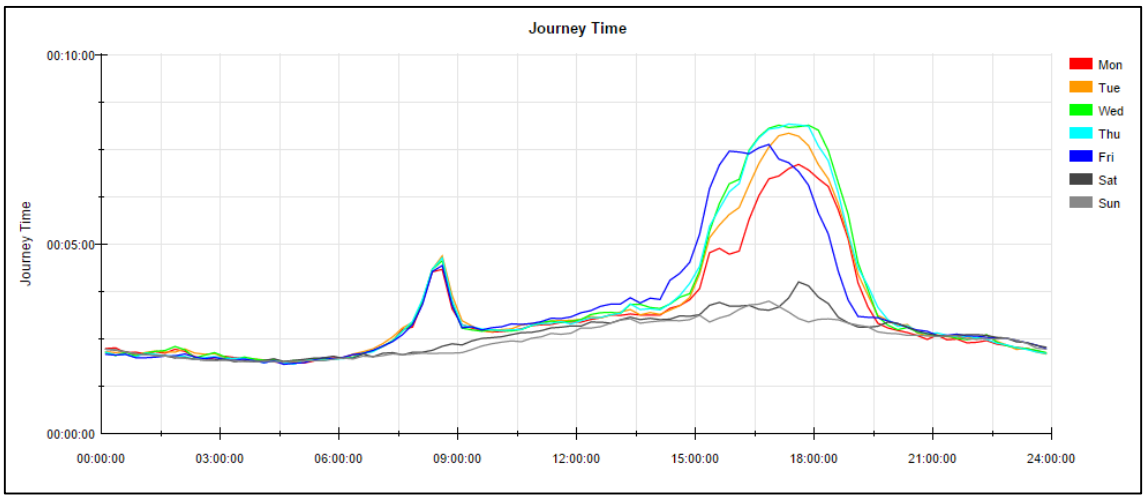
Average Profile



This shows an average daily profile gotten by averaging out all days in the range of the report.

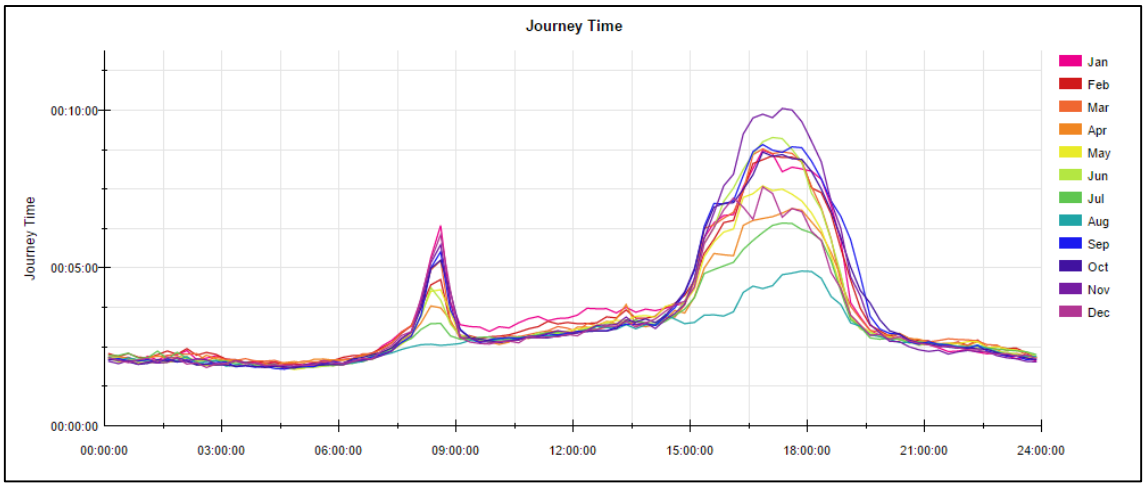
This report can be restricted to specific days of the week.

Average Profile by Weekday



This shows average daily profiles for each day of the week over the range of the report. For example, you can compare a typical Monday to a typical Friday.

Average Profile by Month



This shows average daily profiles for each month over the range of the report. For example, you can compare a typical July day to a typical August day.

This report can be restricted to specific days of the week. For example, you can compare typical Saturday in July to a typical Saturday in August.

Periodic Reports

Month	Journey Time	Speed (mph)	Match Count	Coverage
May 2014	00:03:23	19.7	6617	95.5%
Jun 2014	00:03:13	20.7	6769	100%
Jul 2014	00:02:52	23.3	7166	100%
Aug 2014	00:02:38	25.3	6323	100%
Sep 2014	00:03:35	18.6	7318	100%
Oct 2014	00:03:40	18.2	6994	100%
Nov 2014	00:03:45	17.8	6555	100%
Dec 2014	00:03:51	17.3	6172	100%
Jan 2015	00:04:04	16.4	6191	100%
Feb 2015	00:03:28	19.3	6067	100%
Mar 2015	00:03:35	18.6	6899	100%
Apr 2015	00:03:10	21.1	6305	100%
May 2015	00:03:21	19.9	5945	100%
Jun 2015	00:03:21	19.9	6282	100%
Jul 2015	00:03:02	22	6541	100%
Aug 2015	00:02:37	25.5	5108	100%
Sep 2015	00:03:45	17.8	5778	100%
Oct 2015	00:03:57	16.9	1518	27.3%

These are route-specific reports and can be loaded from the **Calendar**.

They show long term trends in journey time, speed, and match count in daily, weekly, monthly, or yearly intervals.

These reports can be restricted to specific times of day and/or days of the week. For example, you can look at long term trends of morning weekday peak hours on a weekly basis.

Each of the reports can be exported to excel by clicking the **To Excel** button.

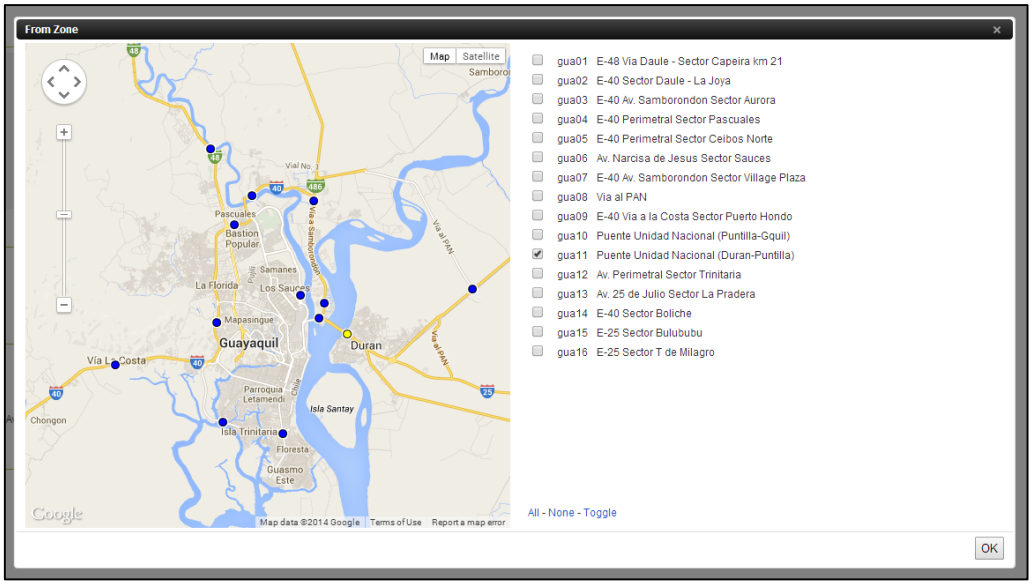
Zone to Zone Matches

This allows matching from one site or collection of sites (a "zone") to another. It can either be loaded for a route, or in an ad hoc manner for an arbitrary set of origin and destination sites. In either case, the report is generated on the fly from raw vehicle data.

This report can be loaded for a route from the **Calendar**. It can be loaded for ad hoc analysis by clicking **Zone to Zone Matches** in the **Reports** section on a group home page.

From Zone and To Zone

Start and End zones are defined by clicking **Pick Sites** and selecting sites from a site list or a map. Multiple sites can be selected in each zone.



Zones must either be identical or disjoint:

From Zone = A, B, C	To Zone = A, B, C	OK. Zones are identical.
From Zone = A, B, C	To Zone = X, Y, Z	OK. Zones are disjoint.
From Zone = A, B, C	To Zone = C, D, E	Not OK. Zones overlap.

Filtering Parameters

Data can be filtered by specifying min/max permitted journey times, and by specifying an outlier removal sensitivity. The min/max match time filters are applied first, followed by outlier removal. If the outlier removal sensitivity is set to 0, no outlier removal is performed. If set to 100, strong outlier removal is performed. The "Auto" min match time is 0:00. The "Auto" max match time is 4 * 25%ile journey time.

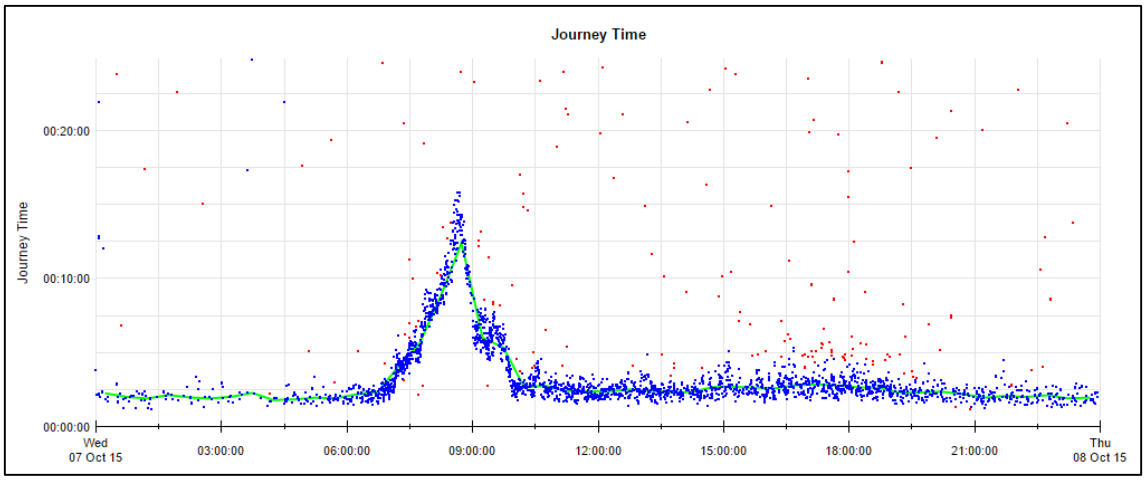
Report Options

The reporting interval and percentile journey time can be changed.

If parameters are changed, click **Get Data** to refresh the report.

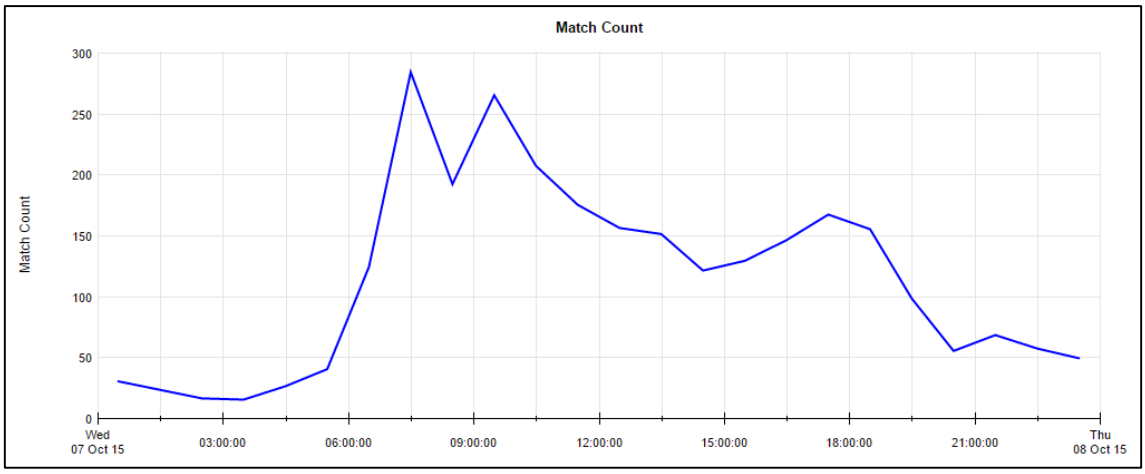
The report has 3 parts.

Journey Time Graph



The x axis is date/time and the y axis is journey time. Several components can be toggled on/off using the checkboxes to the left of the graph. **Scatter** is the scatter data of the matched vehicles. **Outliers** is scatter data of vehicles that were matched but then excluded by the outlier removal. **%ile Journey Time** and **Mean Journey Time** are line graphs.

Match Count Graph



This shows match count reported at the interval specified by the **Report Interval** option.

Tabular Data

Wednesday, 07 Oct 2015

	Match Count	50 %ile Journey Time	Mean Journey Time
00:00	31	00:02:07	00:03:48
01:00	24	00:02:03	00:02:00
02:00	17	00:02:00	00:02:07
03:00	16	00:02:13	00:04:35
04:00	27	00:01:52	00:02:40
05:00	41	00:01:57	00:02:00
06:00	125	00:02:19	00:02:18
07:00	285	00:04:35	00:04:48
08:00	193	00:10:24	00:10:43
09:00	266	00:05:51	00:05:47
10:00	208	00:02:44	00:02:47
11:00	176	00:02:25	00:02:26
12:00	157	00:02:28	00:02:28
13:00	152	00:02:26	00:02:29
14:00	122	00:02:31	00:02:34
15:00	130	00:02:41	00:02:47
16:00	147	00:02:43	00:02:49
17:00	168	00:02:49	00:02:51
18:00	156	00:02:40	00:02:45
19:00	99	00:02:20	00:02:21
20:00	56	00:02:16	00:02:19
21:00	69	00:02:03	00:02:11
22:00	58	00:02:04	00:02:06
23:00	50	00:01:56	00:02:01

This gives tabular data reported at the interval specified by the **Report Interval** option. Various columns are available and they can be toggled on/off using the checkboxes to the left of the table.

Origin-Destination Matrix

This allows matching from a large number of origin sites to a large number of destination sites. The data is displayed in a matrix. This report doesn't depend on or use routes in any way. It is generated on the fly from the raw vehicle data.

This report can be loaded for a group by clicking **Origin/Destination Matrix** in the **Reports** section on a group home page.

Origins and Destinations

Origin and Destination sites are defined by picking sites from a site list.

Filtering Parameters

Data can be filtered by specifying min/max permitted journey times, and by specifying an outlier removal sensitivity. The min/max match time filters are applied first, followed by outlier removal. If the outlier removal sensitivity is set to 0, no outlier removal is performed. If set to 100, strong outlier removal is performed. The "Auto" min match time is 0:00. The "Auto" max match time is 4 * 25%ile journey time. These parameters apply to each cell in the matrix.

Network Parameters

By default, the matrix is calculated in the context of all sites in the group, even those that aren't selected as an origin or destination. This allows for consistency across matrices with different origin/destination sites. The analysis can be run in the context of just the selected sites by choosing **Selected Sites** from the **Included Sites** dropdown. The report will load faster in this case as the matching engine is looking at fewer sites so this option is especially recommended if the group contains many sites (more than ~30 sites) but only a few sites are required in the matrix.

The **Absence** parameter specifies how long a vehicle must be absent from a site before its next visit is considered to be a new one.

Max Step Time is the maximum time permitted for a vehicle to travel from one site to the next as it makes a journey through the network. If this time is exceeded, the journey is and the vehicle is assumed to have made two separate journeys. This is useful for breaking up morning and evening commutes.

Max Journey Time is the maximum time permitted for the overall journey from the start to the end. If this is exceeded, the vehicle is ignored.

Report Options

The reporting interval and percentile journey time can be changed.

There are 5 matrix types. These specify how cell counts are determined. Suppose a vehicle travels along a journey A->B->C->D.

In **All Matches** mode, we add 1 to each of A->B, A->C, A->D, B->C, B->D, and C->D. Each cell (almost) mirrors the results of the Zone to Zone Matches report for that pair of sites. This also mirrors the Origin-Destination Matrix (v1) report.

In **Next Site** mode, we add 1 to each of A->B, B->C, and C->D. Each row of the matrix tells you where vehicles dispersed to immediately after visiting that site.

In **First Seen, Last Seen** mode, we add 1 to the A->D cell only. Each row of the matrix tells you the destination of vehicles entering the network at that site.

In **First Seen** mode, we add 1 to each of A->A, A->B, A->C and A->D. Each column of the matrix tells you the origin of vehicles at that site.

In **Last Seen** mode we add 1 to each of A->D, B->D, C->D, and D->D. Each row of the matrix tells you the destination of vehicles at that site.

Vehicles only seen at a single site are ignored.

The report can either be displayed on the screen or exported straight to csv. The latter option is useful if the matrix is big. Even modern browsers (Chrome, Firefox, and IE9+) may struggle to display a 20x20 matrix of hourly data over a week.

If parameters are changed, click **Get Data** to refresh the report.

The Matrix

	gua01	gua02	gua03	gua04	gua05
gua01	gua01 to gua01 Details Match Count - 50%ile Time -	gua01 to gua02 Details Match Count 193 50%ile Time 00:17:57	gua01 to gua03 Details Match Count 99 50%ile Time 00:25:30	gua01 to gua04 Details Match Count 1826 50%ile Time 00:10:45	gua01 to gua05 Details Match Count 50%ile Time
gua02	gua02 to gua01 Details Match Count 229 50%ile Time 00:13:10	gua02 to gua02 Details Match Count - 50%ile Time -	gua02 to gua03 Details Match Count 2139 50%ile Time 00:06:11	gua02 to gua04 Details Match Count 2264 50%ile Time 00:04:53	gua02 to gua05 Details Match Count 50%ile Time
gua03	gua03 to gua01 Details Match Count 99 50%ile Time 00:22:19	gua03 to gua02 Details Match Count 2138 50%ile Time 00:07:43	gua03 to gua03 Details Match Count - 50%ile Time -	gua03 to gua04 Details Match Count 675 50%ile Time 00:13:16	gua03 to gua05 Details Match Count 50%ile Time
gua04	gua04 to gua01 Details Match Count 1813 50%ile Time 00:09:31	gua04 to gua02 Details Match Count 2057 50%ile Time 00:05:38	gua04 to gua03 Details Match Count 819 50%ile Time 00:12:52	gua04 to gua04 Details Match Count - 50%ile Time -	gua04 to gua05 Details Match Count 50%ile Time
gua05	gua05 to gua01 Details Match Count 808 50%ile Time 00:21:28	gua05 to gua02 Details Match Count 692 50%ile Time 00:17:07	gua05 to gua03 Details Match Count 299 50%ile Time 00:29:34	gua05 to gua04 Details Match Count 1446 50%ile Time 00:11:12	gua05 to gua05 Details Match Count 50%ile Time
gua06	gua06 to gua01 Details Match Count 1176	gua06 to gua02 Details Match Count 797	gua06 to gua03 Details Match Count 506	gua06 to gua04 Details Match Count 2748	gua06 to gua05 Details Match Count

Each cell contains an overall match count, percentile journey time, and a **Details** link to the Zone to Zone Matches report for that pair of sites.

By clicking **Bin into Time Intervals,** each cell's contents is changed to show tabular data for that pair of sites. The data is binned according to the **Report Interval** option. This is not recommended for large matrices on older browsers.

gua01 to gua04

Details

Wed 08 May 2013

	Match Count	50 %ile Time
00:00	5	00:06:46
01:00	5	00:06:33
02:00	10	00:07:32
03:00	5	00:08:33
04:00	17	00:07:58
05:00	50	00:09:31
06:00	143	00:11:26
07:00	122	00:12:48
08:00	139	00:12:12
09:00	113	00:11:36
10:00	100	00:10:37
11:00	113	00:10:38
12:00	93	00:11:10
13:00	88	00:10:46
14:00	90	00:09:45
15:00	121	00:12:06
16:00	119	00:12:20
17:00	170	00:11:51
18:00	131	00:09:18
19:00	91	00:08:47
20:00	48	00:08:07
21:00	31	00:09:50
22:00	15	00:08:24
23:00	7	00:08:19

By clicking **Heat Map,** the cells are coloured according to their volume. Blue indicates low volume while red indicates high volume.

Below the matrix is a **To Excel** button which exports the matrix as currently shown on the screen to excel.

Live Journey Times

This report shows the current live journey times for all routes in a group.

To access this report, click the **Live Journey Times** link in the **Reports** section on the home page for the group in the Journey Time module. Alternatively, select Live Journey Times from the group dropdown menu while viewing the group.

Historic Journey Times

This report shows historic data for all routes in a group over a short period of time (a day or two).

To access this report, click the **Today's Journey Times** or **Yesterday's Journey Times** link in the **Reports** section on the home page for the group in the Journey Time module. Alternatively, select **Historic Journey Times** from the group dropdown menu while viewing the group. The date range can be altered on the report.

Initially, data is shown hourly but can also be shown down to 15 minute intervals.

By default, journey time data is shown, but the data type can be switched between Journey Time, Speed, and Match Count for non-compound routes.

The report can be exported to excel by clicking the **To Excel** button.

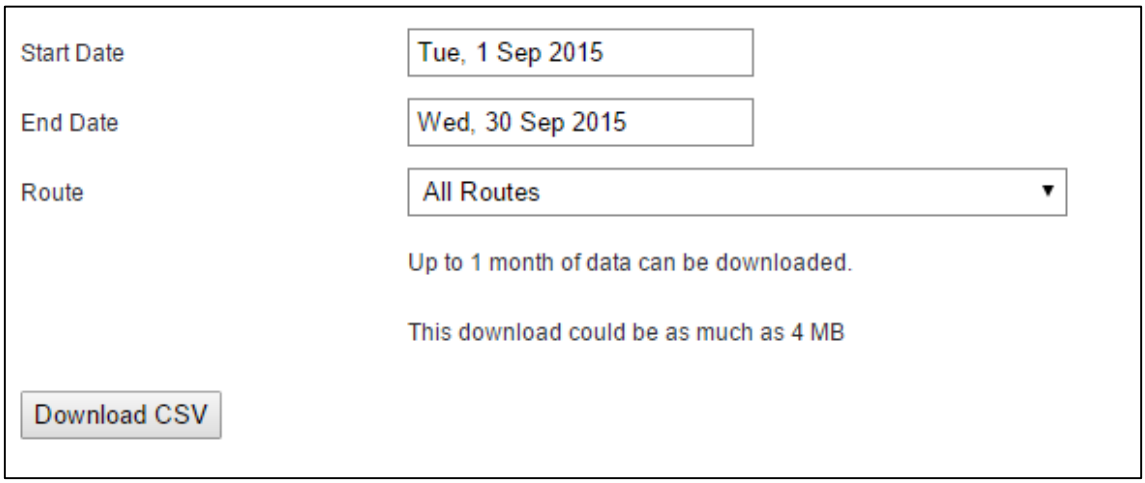
Note that because of the potentially large amount of data being displayed, this is not suitable for getting data for all routes over time ranges longer than about two days. To do this, use the **Journey Time Export** facility.

Exports

Exports allow downloading of large quantities of data in csv format.

These are found in the **Exports** section on the home page for the group in the Journey Time module. Alternatively, they can be accessed from the group dropdown menu while viewing the group.

Journey Time Export



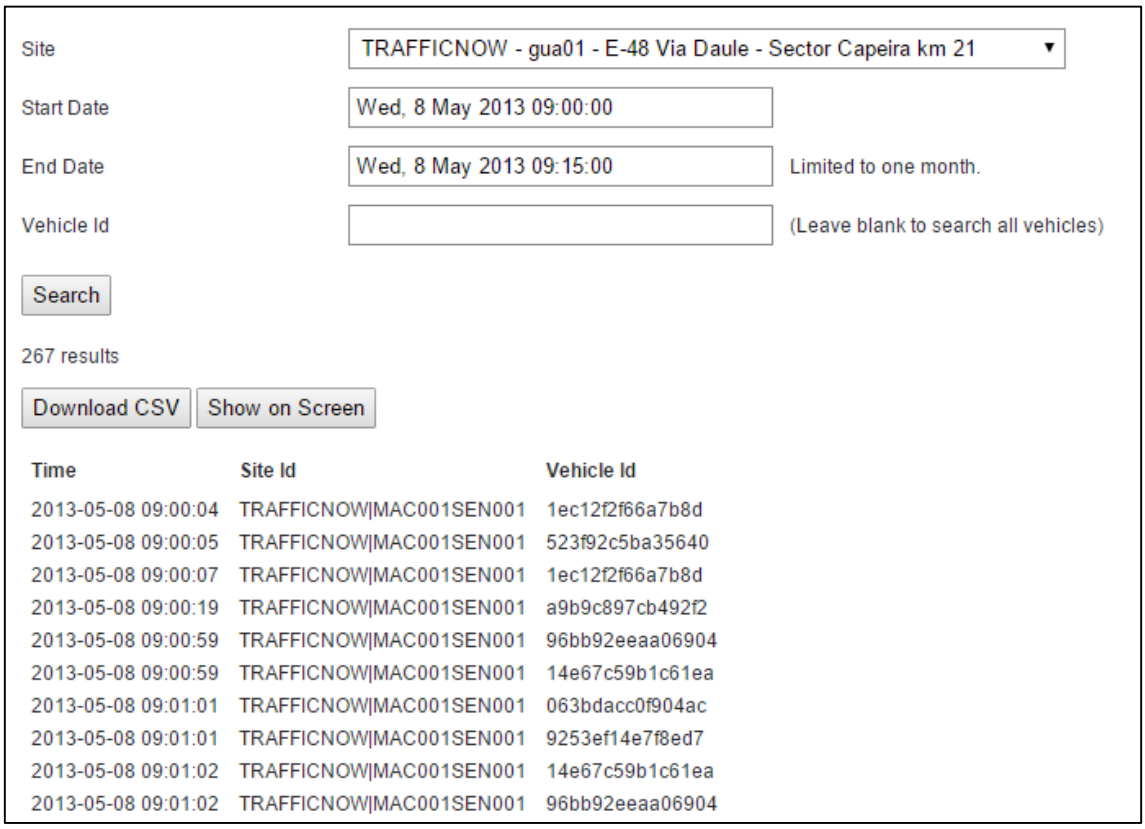
This allows exporting historic journey times over a customizable time period for either a specific route or all routes in a group.

The time range of the export is limited (limit shown in the options). The downloaded data will be limited if the selected time range is too large.

The format of the export is a csv file.

Note that compound routes don't have a match count so this won't appear in the export.

PVR Export



This allows searching and exporting of raw vehicle records for either a specific site or all sites in a group.

The time range of the export is limited (limit shown in the options).

The search can be restricted to a specific vehicle id. Note that this will usually be encrypted in some form so you need to know the encrypted id which you can probably get from the recorder manufacturer.

The results can be exported to csv or displayed on the screen. Whether the option is available depends on the number of results. Appropriate options will be displayed after you click the Search button.

Note that if the underlying data is Bluetooth, you may get several records for each Bluetooth device as it passes by a recorder. The number of records in the export is not the same as the number of vehicles passing the recorder!

Alerts

The Journey Time system can raise the following alerts:

- **Journey Time Deviation from Normal**. Compares the current journey time to the historical average journey time for the same time of day and day of week.
- **Journey Time Deviation from Fixed Bounds**. Compares the current journey time to fixed bounds configured in the Route Editor.
- **Match Count Deviation from Normal**. Compares the current match count to the historical average match count for the same time of day and day of week.

Alerts are conveyed to the user in one of the following ways:

- Through route colours on the Route Map.
- Via email.

Alerts are raised at two levels:

- Warn
- Bad

The alerts raised and the thresholds for the alert levels are configurable for each route in the Route Editor.

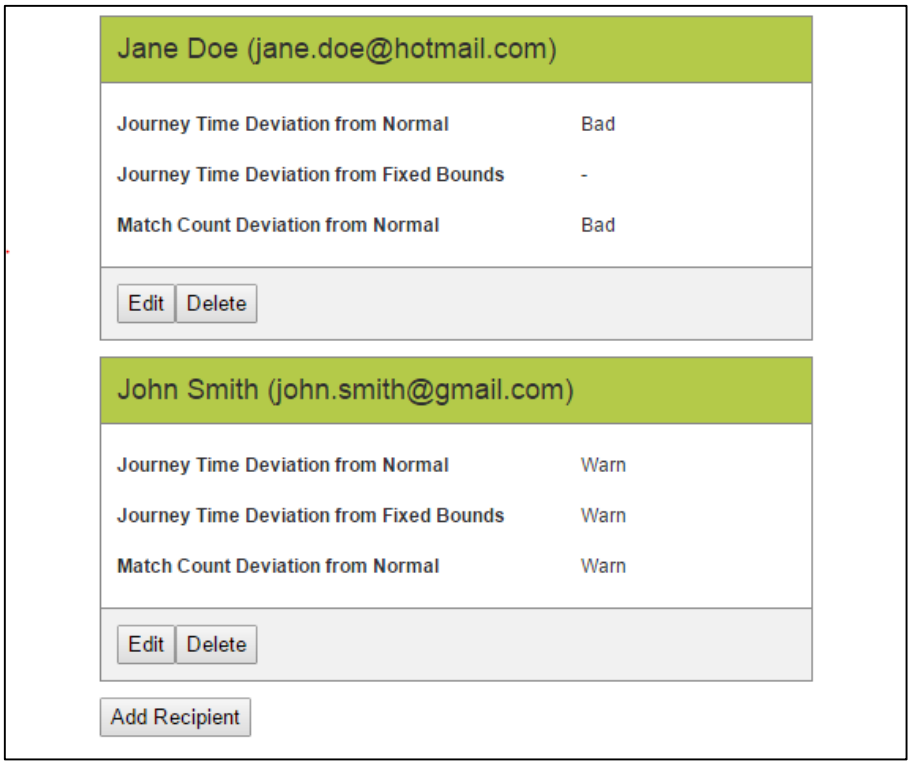
Note that Journey Time Deviation from Normal and Match Count Deviation from Normal will only be raised if the route has historic profile data computed. See **Historic Profiles** for more information.

Alert Recipients and Subscriptions

A group administrator can subscribe email addresses to receive alerts raised by the routes in a node. Each recipient can be configured to only receive alerts of a specific type or level. For example, john.smith@gmail.com could be set up to receive "Match Count Deviation from Normal" alerts at the "Bad" level.

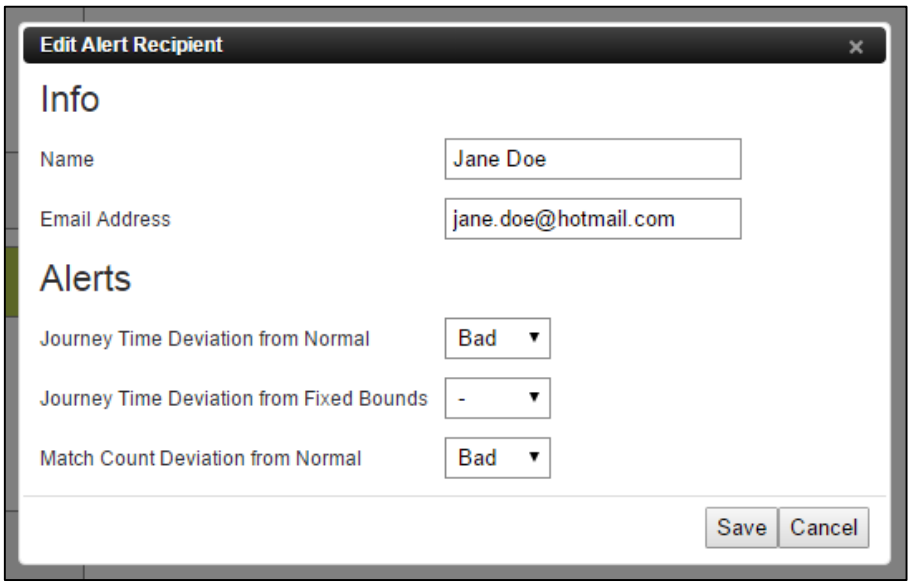
Note that alert subscriptions are node-specific. If you want to subscribe the same email address to multiple nodes you have to set up multiple recipients in each node.

To access the Alert Subscriptions editor for a node, click the **Alert Subscriptions** link under the **Admin** section on the home page for the node in the Journey Time module. Alternatively, select Alert Subscriptions from the group dropdown menu while viewing the node.



The Alert Subscriptions editor allows a group administrator to create, edit, and delete alert recipients, and to alter the alerts a recipient is subscribed to.

When editing or creating a recipient, a form is displayed allowing input of a name and email address, and setting of alert levels for each alert type.



Note that the alert level set is the minimum that the recipient will receive. For example, if the alert level is set to Warn, the recipient will receive any alerts at the "Warn" or "Bad" levels.

Historic Profiles

It's often useful to know what the "normal" or "expected" journey time is at a given time. To do this, the system stores long term averaged data for each route. The following profiles are stored by default:

- Each weekday
- National holidays / Bank holidays
- School holidays

All profiles are stored in 15 minute bins.

The appropriate profile is automatically used when calculating an expected journey time.

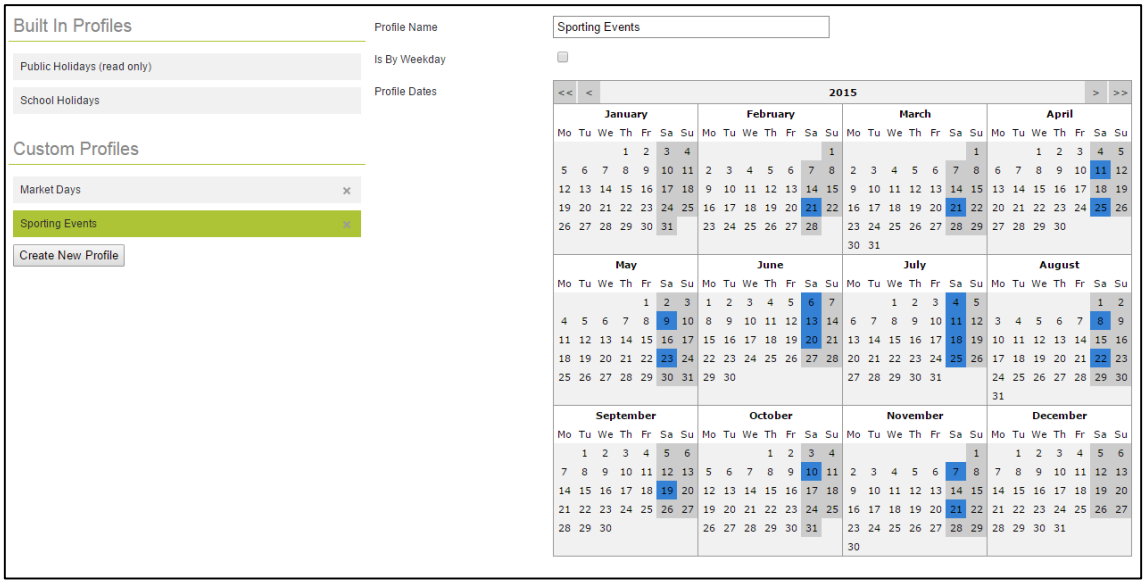
If a day is both a national holiday and a school holiday, the national holiday profile is used.

Note that the dates used for the school holiday profile must be manually entered by a group administrator. This is because school holidays vary from place to place and the system can't know when they are without some manual intervention. By default, no dates will be specified which means the profile will be empty and unused.

Profile Admin

As well as the default profiles, a group administrator can create new profiles that will apply to all routes in a node. For example, a custom profile may be created to cover special market days or sporting events. Note that the user only sets the dates that apply to the profile. The expected journey times are automatically calculated from existing data.

To create and edit profiles for a node, click the **Profiles** link under the **Admin** section on the home page for the node in the Journey Time module. Alternatively, select Profiles from the group dropdown menu while viewing the node.



On the Profile Admin screen, the profiles are listed on the left. Click a profile to select it and view/edit the profile name and dates. Note that some profiles are read-only so can be viewed but not edited.

Click the **Create New Profile** button to create a new profile and select it for editing.

To delete a custom profile, click the X on the profile in the profile list. A confirmation dialog will ask you if you're sure before the profile is deleted. All dates and calculated journey times will be removed. This cannot be undone.

When a (non-read-only) profile is selected, you can edit its name, whether a separate profile should be stored for each weekday, and the dates used by the profile. Changes are saved automatically.

The dates serve two purposes:

- They specify which data is averaged out to produce the profile.
- They specify which dates the profile is applied to.

Note. If two profiles use the same dates, the first profile on the list takes priority.

For example, if "Profile A" has all of Feb 2015 selected as its dates (and if it's not superseded by another profile) then the average journey times for Profile A will be computed from the data in Feb 2015 and any expected journey time for Feb 2015 will use Profile A.

If **Is By Weekday** is checked, separate 24 hour profiles will be calculated for each weekday and the appropriate one will be used when calculating an expected journey time. If unchecked, a single 24 hour profile will be calculated and applied to all selected dates regardless of weekday.