GPS tips for biking & hiking

These notes are mainly for Garmin GPS devices and software.

Table of Contents

1. Summary

Common requirements:

- Create a route
- Save the route
- Transfer the route to a GPS device
- Follow the route on a GPS device
- Using a third party generated route

1.1 Create a route

This might be possible on your GPS device but if you're in the planning stage its more comfortable to do it on a software application. There are many possibilities but highlighting a few:

- Online applications:
  - Garmin Connect
  - RideWithGps, OutdoorActive, Komoot, AllTrails, WikiLoc, Strava
  - Walk the Lakes (https://www.walklakes.co.uk)
- PC application - Garmin BaseCamp

In my opinion the most flexible and controllable of these is BaseCamp but there are some very good online apps, such as Walk the Lakes for the UK. These online sites are free (register). Garmin Connect ought to be the ideal choice but it's become bloated and is flawed in some areas. The emphasis in GC and others like it seems to be more multimedia, sharing fitness etc.

In creating a route I like to do it on a suitable map. If your'e planning a walk or offroad cycle you'll probably want to see the footpaths and trails and this will help decide which application to use. Obviously if the route is overseas Ordnance Survey maps or any UK only maps are of no use.

BaseCamp is probably the best tool as it does everything you want including communication with a Garmin GPS device. After you've created a route or saved a track you can upload your GPX files to an online application for sharing etc. BaseCamp is a free download for installation on a PC (or Mac). However, the only map that BaseCamp comes with is a minimum detail worldwide map which is of no practical use. But as soon as BaseCamp sees another drive on the computer it looks for maps on that drive. If one plugs in a Garmin GPS device it looks for maps on that and they become available within BaseCamp. The chances are that you have OS maps or OpenCycleMaps on your GPS device. But it can be inconvenient to have to plug in your GPS device every time you want to plan a route so I have maps on a USB flash drive that when plugged in it can be seen by BaseCamp (see Detailed section for more). I've copied the OS maps from the device to the USB drive to enable use of the 1:50000 OsGb in parallel with other maps.

On the second row of tools on BaseCamp there are some function buttons with symbols. Float the mouse slowly over each in turn to get a word or two of description about each function. When you create a new route there are choices but basically it comes down to one of two types:

- Follow roads. It seems that all options except 'Direct' follow the roads but it can depend on the 'Routable' detail provided by the map.
- Direct

To create a route that involves off road travel then select the 'Direct' option. This has the same symbol as 'New Route'. To finish select the hand symbol 'Pan'. If you select anything other than

Direct the route will be limited to roads on the map (possibly some tracks). Also there will be many waypoints created in the route, more than are actually needed.

When I create a Direct route I click just after a decision point; e.g. say there's a fork ahead, that's a choice so I'd click just after the fork on the desired path, track or road.

If you've created a route by another application and you want to bring it into BaseCamp select 'My Collection' > File > Import into my collection. Selecting the route, map or waypoint will show it in the right hand panel on the map you've currently selected. Double clicking on it will bring up more detail such as all the point details and a graph of elevation if its in the route.

BaseCamp is widely used and is availabe free for download at http://www.garmin.com/en-GB/shop/downloads/basecamp There is button on that page to TUTORIALS and plenty of useful help in forums.

1.2 Saving the Route

To save the route as a GPX file select it on the left hand panel then do File > Export > Selection and choose where to save the file on your PC / Mac. Tip: ensure your PC / Mac shows file name extensions – the default on PCs is to hide the extensions (Microsoft knows best / you don't need to know – nonsense!).

1.3 Transferring the route to the device

I have a Garmin GPSMAP 62s (~ 5 years old) with bundled OSGB 1:50000 mapping. I can swap out the micro SD card to use other maps (see Detail section).

Routes and waypoints can be transferred to the device from BaseCamp and vice versa. BaseCamp shows the computer storage in the top left hand panel under the heading 'My Collection' and when the GPS device is plugged in it's shown under 'Devices'. By clicking on 'Internal Storage' within the device one can view the waypoints, routes and tracks on it. The waypoints, tracks and routes are then shown in the bottom left hand panel. You can copy waypoints, routes and tracks between the computer (My Collection) and the device. To transfer a route to a device select Device > Send to device > selected item (the route). You can also delete waypoints, tracks and routes from the device or local computer storage.

1.4 Following the route

This sub section discusses 'Direct' navigation (see Detail section for more).

Assuming the route is now on the GPS device, on the 62S press the 'Find' button > Select routes > select the route to follow. You can view the map but the compass view is more helpful. On the 62S you can have 4 data fields plus the compass (see Detail section for more).

Once you've instructed the GPS to follow the route it'll direct you to the nearest next point on the route. You don't have to start at the first point of the route, if you've approached the route part way in the nearest next point in the route will be found. Some ten metres or so before the point is reached, the device gives a couple of audible beeps. Once the device is heading away from that point it'll set itself to direct the user to the next point on the route.

1.5 Using a third party route

Garmin has come up with new concepts for training, fitness, laps, courses, social media, sharing etc. This seems to be a common feature of the online applications. Routes created from the online applications may be in the form of Tracks rather than Routes. The GPS Device may be able to navigate a Track just like a Route. Regardless, BaseCamp enables Track generation from a Route and vice-versa. Any Route in GPX format should load onto the device.

2. Detail

2.1 Terms

Point – a geographical point with the minimum attributes of latitude amd longitude

WayPoint – a point that has been created containing latitude, longitude and many other attributes such as name, display symbol, elevation.

TrackPoint – basically a WayPoint but identified in the GPX as a TrackPoint. It may have other attributes such as date+time, elevation, and Garmin extensions such as heart rate, temperature, cadence.

RoutePoint– basically a WayPoint but identified in the GPX as a RoutePoint

Track – a sequence of TrackPoints. Normally a track is recorded by the GPS device but tracks can be created

Route – a sequence of RoutePoints. Normally created by an application to be used for navigation

Heading – the direction in which you are travelling (think your head, which way it's pointing, usually in the direction of travel)

Bearing – the direction to waypoint. This could be a chosen waypoint or the next point in the route.

Raster Map – a map that consists of pixels (like a picture image). When you zoom right in it appears 'blocky' (pixelated)

Vector Map – data is stored differently, when you zoom right in it remains clear. However, there may not be as much detail as in a raster map, it depends on how much data the raster map is built with, ie the resolution

2.2 Route Creation Applications

There are many online applications but only a couple have been looked at in detail.

	Garmin BaseCamp	**Garmin Connect**	**Walk Lakes**
Maps	Whatever is available on GPS device or USB plugged in to PC	Bing, Google (with bike lanes and trails), OpenStreetMap	Ordnance Survey down to 1:25000, WayMaps (1), Bing, Esri, Satellite imagery
Driving route option	Yes	No	No
Follow roads option with instructions	Yes	Yes	No

Application	On the PC	Online	Online
Saved GPX details			
GPX files saved as	Route	Track (2)	Route
Name of route (3)	In the route	In the metadata	In the route
Track / route points named ?	The user created points Yes with the name of the nearest road	No	Yes sequential number suffixed with a colon
Elevation added	Yes	No	No
Time added (4)	Yes	Yes	No
Type of route – Direct or otherwise	Yes	No	No

1. 'WayMaps' are a good alternative to the OS at 1:25000
2. For some unknow reason Garmin Connect in 'Freehand' mode creates extra pseudo points alongside the user created points.
3. The name of the route: if its in the route in the GPX it'll show up in BaseCamp. If its only in the metadata it won't
4. The addition of a time to the route is academic, one can only guess its used to assist with time predictions.

2.3 Route Types

Garmin defines 'Activity'; cycling, driving, running etc. This is used in calculating routes. 'Direct' indicates point to point only.

2.3.1 Direct

This is the simplest form of navigation. The underlying map is used only as a canvas to display waypoints or routepoints. One can navigate on the GPS device visually on the map by seeing where you are and where you want to go to. The route will be drawn as a sequence of straight lines between the RoutePoints. Another way to navigate is to use the Compass View. The Compass circle shows the Heading. The large arrow in the centre shows the Bearing to the next WayPoint or RoutePoint. On the GPSMAP 62S there are four data fields, I have them set to:

- Distance to next point
- Name of next point
- Heading in degrees
- Bearing in degrees

One can swap between the Map View and the Compass View.

2.3.2 Following roads, trails, paths

For a GPS device or SatNav to navigate via roads, the Map in use must be 'Routable'. This means that the map contains data that either an application or the GPS device can access, to calculate a route following roads, trails etc. When a route is created that follows roads / trails many pseudo RoutePoints are created in order to draw that Route on a map such that it follows the curves of a road or trail. When the Route is transferred to the GPS device, the Route may be recalculated by the device if the Activity is not 'Direct'. The device can then show instructions for navigation.

2.4 WayPoint symbols

If you create a route in BaseCamp it'll show every waypoint on the route as a dot symbol. Garmin uses one of its own extensions ('sym') in the GPX format to determine what symbol to display and the dot symbol is named 'Waypoint'. If you've created a route on other software there probably won't be a 'sym' element and Garmin will default to a blue flag in BaseCamp and a pushpin on the 62S. This can be overpowering when displayed on a map, especially if you have a route that follows roads with hundreds of points. See here for the complete list of Garmin symbols: http://www.javawa.nl/symbolen.html .

2.5 WayPoints

Individual WayPoints can be created to define a Route. For example one could create a WayPoint at the top of a hill or at a significant feature. Navigating can then be simply to the next WayPoint. This allows the user to easily change their mind, e.g. miss out points. WayPoints can have unique symbols so they're quickly recognisable and quick to identify on lookup in the GPS device.

2.6 OpenMaps

There is a worlwide set of open source maps that are customised by many different interest groups. These are freely available and can be loaded onto Garmin GPS devices. See the separate document 'GpsResources' for more details. There are many flavours of OpenMaps with different emphasis such as OpenStreetMap, OpenCycleMap, OpenVeloMap, OpenMtbMap, http://hikebikemap.org.

2.7 OSGB vs OpenMaps

Ordnance survey maps are a great choice for use in the UK due to their rich detail especially for walking or off road routes. A negative point especially noticeable on the 1:50000 is that they are raster maps so that when you zoom in the view becomes pixelated and unclear. But if you wish to cycle or hike overseas then another type of map will be needed.

OpenMaps are free and usually vectorised, they don't have as much detail but when you zoom in they remain clear. They can be downloaded and copied onto a micro SD card for the GPS device or a USB flash drive to use in BaseCamp. See the separate document 'GpsResources' for more detail.

2.8 Loading maps onto a USB drive

To enable OSGB maps in BaseCamp without having to plug in your device every time copy the

complete contents of the bundled micro SD card to a USB flash drive. To add open maps to the USB drive see the separate document 'GpsResources'.

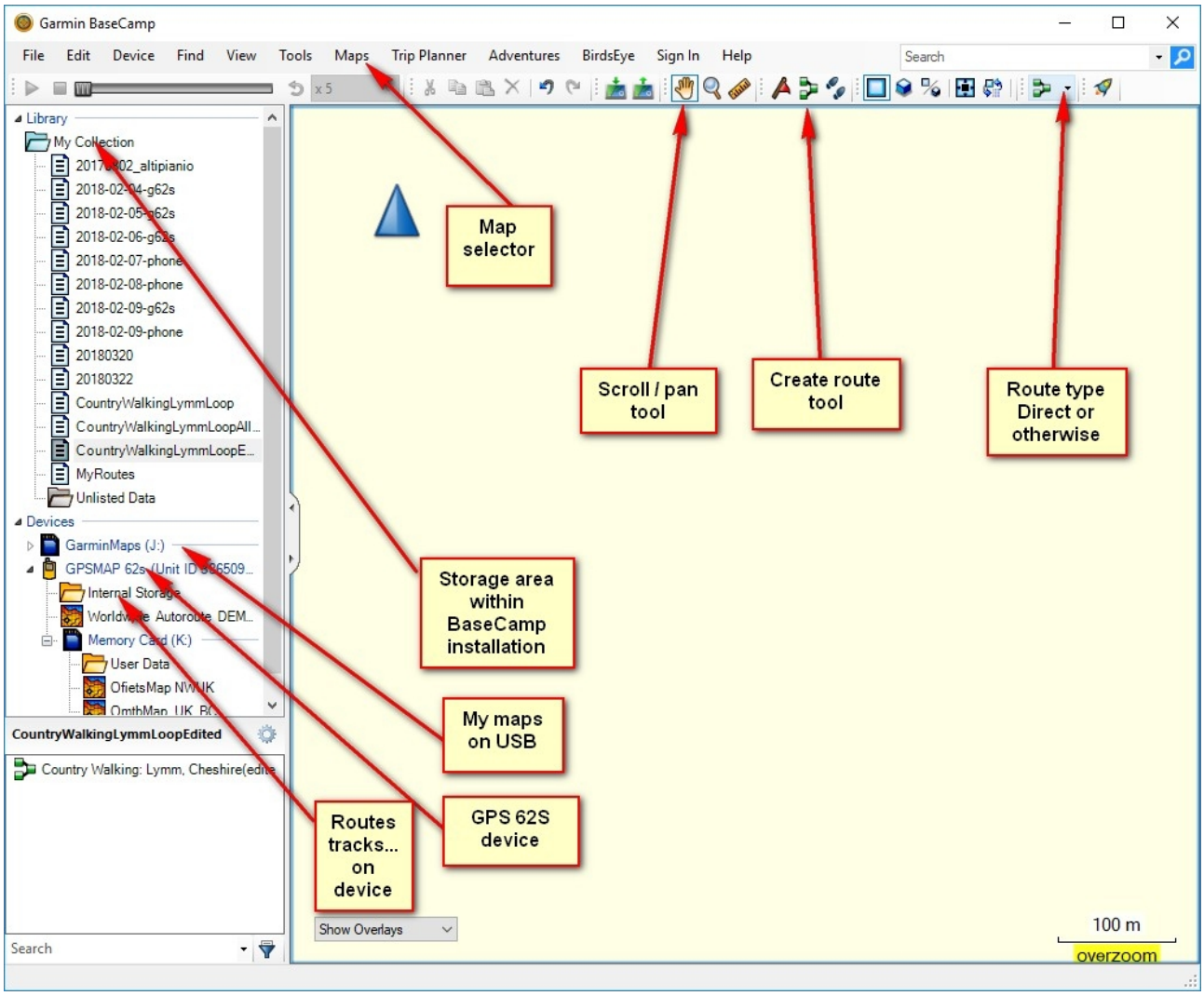
2.9 GPX files

A GPS works mainly with waypoints, tracks and routes. You can create any of these either by independent software or on a GPS device. When any of these are created they can be transferred via a file that's structured in a standard format by the name of GPX, ie the file will have an extension '.gpx'. So one can create a route in say Garmin BaseCamp, save it to a gpx file that can be transferred to one's GPS device or to friends for their GPS devices. Take a look inside a GPX file with a simple editor such as Notepad; its not gobbledygook, one can identify individual latitude and longitudes, elevations, waypoints, routes, dates & times etc.

The GPX format is a standard but Garmin have their own extensions to that format (see more in the Detailed section). A route in a GPX file is basically a list of waypoints but there is also information on how each waypoint should be displayed and how the navigation should occurr on the device (e.g. follow roads or go direct).

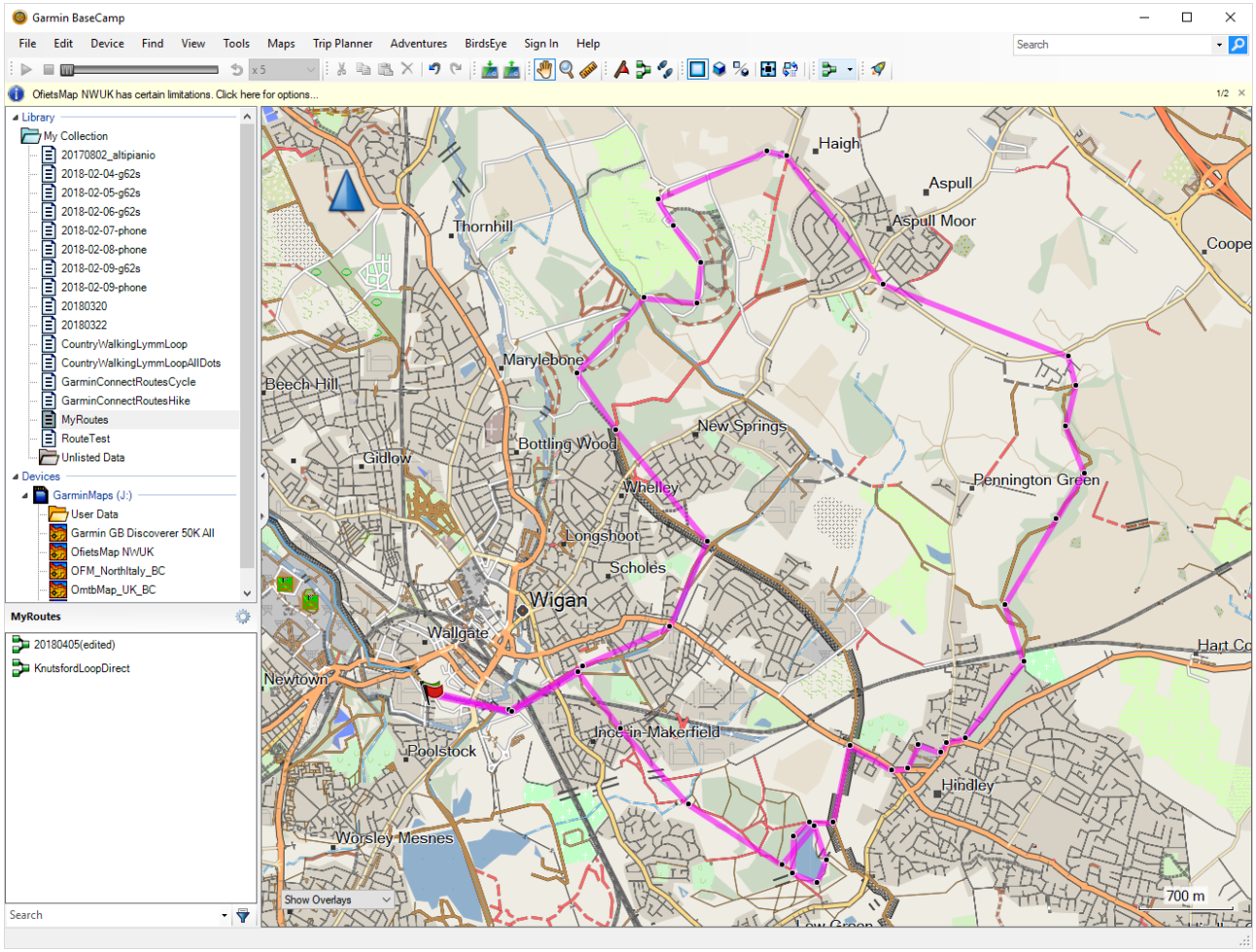
2.10 Screenshots

2.10.1 BaseCamp



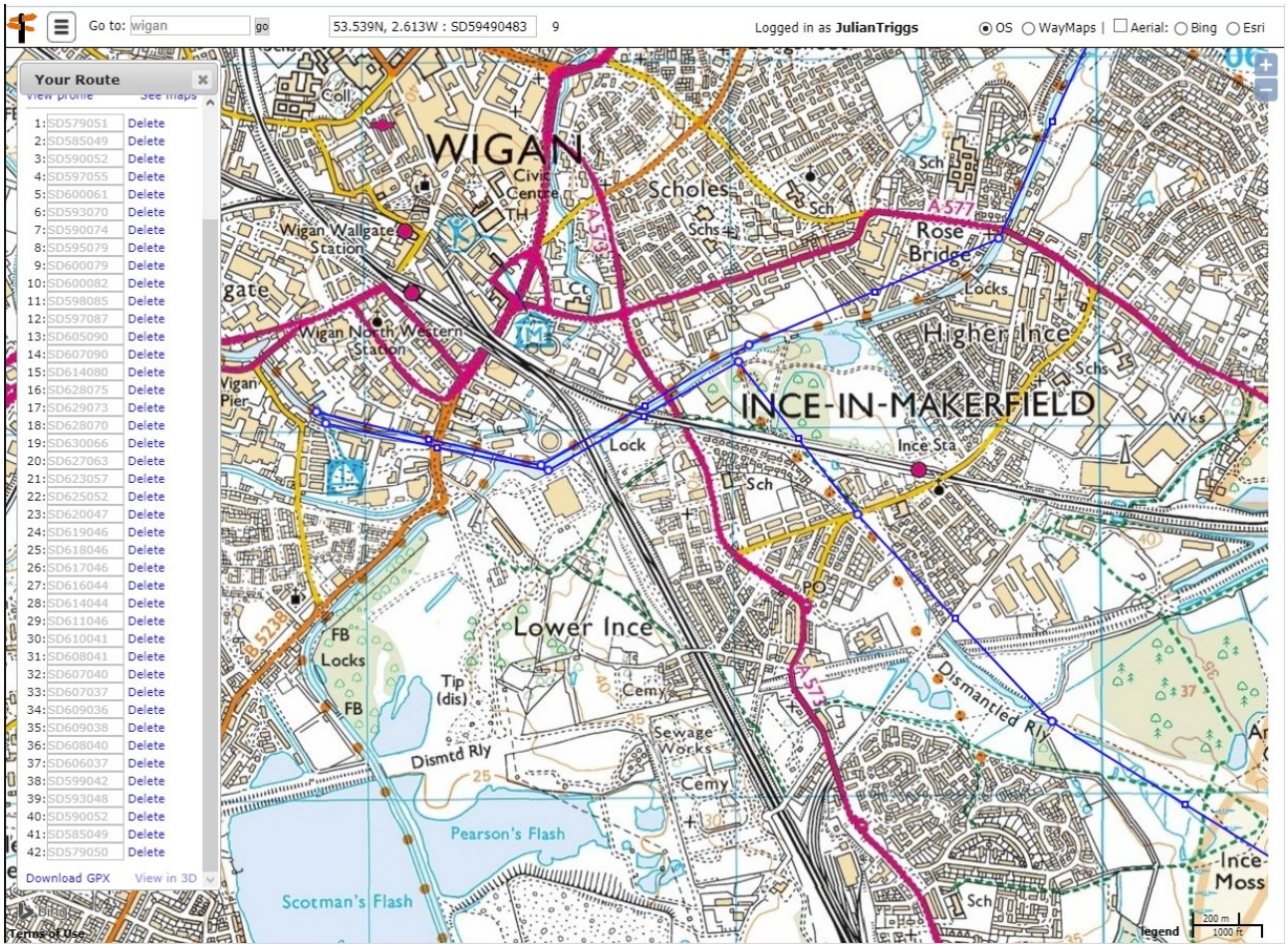
2.10.2 Route in BaseCamp

I copied the track from the ride on Thursday 5 April, made a Route and here it is displayed in BaseCamp. The map is OpenMtbMap but I also have OS 1:5000 available at a click. To get into the fine detail I actually used Walk Lakes to create the Route initially.



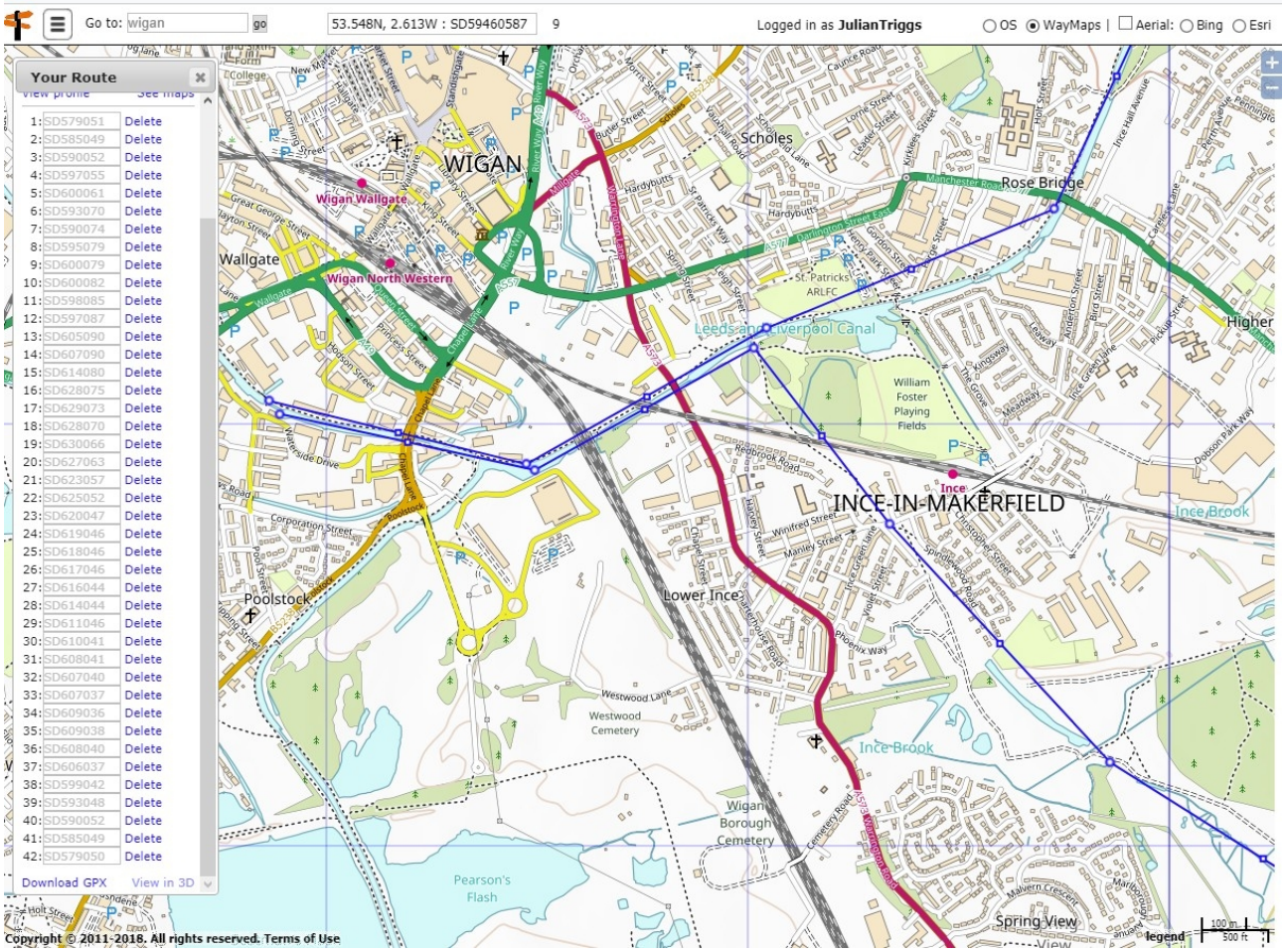
2.10.3 Route in Walk Lakes 1

Part of route displayed on OS 1:25000



2.10.4 Route in Walk Lakes 2

Part of route displayed on WayMaps 1:25000



GPSMAP 62S Compass Page (web image with default data fields)

2.11 GPS Devices

The **GPSMAP 62S** is a general purpose fully featured 'ruggedised' device with pushbuttons. It has a removable micro SD card and works with 2 AA batteries. These can be of the rechargable type. The address space for maps on the SD card is 4GB. The OSGB 1:50000 takes up most of this so there is no room for any other type of map on that card. OpenMaps tend to take up less space and seberal different maps can be readily loaded onto a separate SD card.

The **Garmin Edge Touring** is designed mainly for cycle touring and works much like a SatNav. However, according to the documentation it can do 'Direct' navigation – to be tried ! Its pre-loaded with Open Maps and doesn't have a removable SD Card.

2.12 Useful Links

https://ridewithgps.com/help/garmin-edge-touring

https://ridewithgps.com/help/planning-routes/

https://www.gpsies.com/

http://hikebikemap.org