

## Tutorial: Use OsmAnd for Off-track Hiking

I used Android 16 in Samsung A15, and OsmAnd~ 5.2.13 (expect slight variations in other set-ups). It also works on iPhones, though some menus differ. OsmAnd is very powerful (but still buggy in places). There are many options not mentioned here (back-up, lock screen, storage space *etc*). For some people, lack of custom waypoint icons and confusing bearing/distance to next route point in direct navigation may be deal-breakers for serious off-track use. But they can be fixed in future versions if enough people ask. You can also get around the bearing problem and save battery as described below.

### Installation

Download and install OsmAnd (OsmAnd~ is available from [FDroid](#)). If you decide to keep it, remember to give a donation to help development. It is a near-professional quality app, provided by a big team of semi-volunteers. The extensive online [documentation](#) is sometimes outdated or obscure, but there is usually a response (often helpful) to issues posted on [github](#). It is excellent as an offline road navigator. There are limitations, but even now it offers unmatched versatility for those who want a single navigation helper app. Although OsmAnd does not follow the traditional <wpt>, <trk>, <rte> paradigm, I find it much more intuitive than OruxMaps, which sometimes reminds me of my wife: I love it but even after many years I do not always understand it.

Android Auto integration for OsmAnd works [only](#) in a version purchased or subscribed through Google's Play Store (earlier workarounds fail in recent AA versions). Not needed for hiking.

For smooth operation, *eg* track logging in the background, turn off "Manage app if unused" and set "Battery - Unrestricted" under *Phone Settings > Apps > OsmAnd~*. The methods needed [vary](#) between phones and Android (or iPhone) versions.

Don't forget to turn on the phone location service if you want to navigate. The app may not warn you, and even some route planning seems to work strangely if the app does not have your position. Check by pressing  on the map screen.

### Set-up for hiking

Under  (Menu) > Maps & Resources, download "Offline vector maps" of your region, and probably "Terrain" and "Contours" (from OSM and SRTM). You probably want to enable "Topography" and "Trip Recording" (under Menu > Plugins). I disabled the "Weather" Plugin to simplify things.

Choose a Profile (probably "Waking" for hikers). There are lots of options to "Configure map" there. I used "Contour lines", "Terrain" (hillshading), "Coordinate grid" (UTM) of selected colour, and "Map style" Topo. Use "2D" for a map-like display (plan view). Pressing the "3D" button then changes to a tilted view, more useful for car navigation; and displays "2D" in the button on screen. (The displayed button is opposite to the current view: confusing until you get used to it. Changing the tilt angle seems buggy). "3D Relief" (raised elevations, which I turned off) is different from "3D" (tilted map). Don't touch "Overlay / Underlay map ..." (buggy in this version, requiring a profile reset, -- start again).

Throughout the app, most settings apply only to the Profile in use when they are applied. If you are used to (compass) circles of 360°, it will avoid confusion later if you now set Menu > Configure profile > General settings > Angular unit > Degrees 360 > Apply to all profiles. Also set units here. I have not been able to understand Menu > Configure profile > General settings > Remove animations.

There are more options under Menu > Configure screen. I added "Radius ruler", "Magnetic bearing", and "Trip recording - Distance" widgets to the right panel, used "Transparent widgets", and changed "Display position" to Centre (to get a cross-hair there). Under trip recording settings, I used "Prevent standalone logging" (which does not seem to work - check the notification and relaunch the app to "Finish / Close" via the widget if necessary). I also disabled the notification to start trip recording.

You may like “Elevation” and “GPS info” widgets. There is an option (Menu >Configure profile >General settings >Fullscreen mode) to click the screen for widget display on/off; for a clean map. “Elevation” and “Distance” relate to the map centre (cross-hair) but “Bearing” is not to the cross-hair. It is typically active only while navigating (maybe to a selected point, but see below). Other widgets, information bars and notifications report other “Distances”. Confusing, but you can turn some of them off.

You can [import](#) collections of waypoints, routes and tracks as separate gpx files (to show as sub-folders under Menu >My Places >My Favourites or >Tracks). *eg* Use Menu >My Places >Tracks >: >Import. Managing waypoints (favourites) can be tricky (not as simple as dropping in a gpx file). There is [no easy capacity](#) to make or show [custom waypoint icons](#). There is a huge range of built-in (OSM-like) icons, though they are monochrome, and maybe a bit boring. These built-in [icons](#) are grouped under [POI categories](#) (which keep changing), and are more suited for road-based tourism than for hiking. For example, there is no symbol for a track Y junction, let alone a river junction. The current list can be expanded on screen by a click on “All icons” and recently used icons are displayed first in the list. [Maybe](#) others can be added from POIs displayed on the map. As with any mapping app, it takes some time to exploit and understand limits of the app-specific <extensions> that OsmAnd uses in [GPX](#) files, stored under sub-folders of `Android\data\net.osmand.plus\files`.

Be warned that different icons may appear at different zoom levels depending on the [rendertheme](#) / [style settings](#) (`Android\data\net.osmand.plus\files\rendering`). Sometimes even nearby icons of the same type appear at different zooms. Renderthemes said to be designed for hiking are in the app (Menu >Configure map >Map rendering >Map style and Menu >Plugins) and [online](#).

Android restricts access; so to see, add, or modify app data files you will need to (i) use something like Cx File Explorer in the phone, or (ii) enable phone “developer options” and use a connected PC with adb (which is easier in the long run). There are lots of other sites with instructions on this, as it is a widely bewailed but tightening security measure in recent Android versions.

## Obtain WMTS maps

OSM maps are improving but in Australia at least the state government topo maps are much better, especially for contours. Fortunately they are available from WMTS web servers that OsmAnd can access (despite all claims to the contrary). First check Menu >Configure map >Map source >Add more... . Then either use >>Add manually ..., or create sub-folders under `Android\data\net.osmand.plus\files\tiles` (I made NSW-wmts and QLD-wmts), and place a correctly formatted `.metainfo` file in each. I used:

### QLD-wmts .metainfo

```
[url_template]
https://spatial-gis.information.qld.gov.au/arcgis/rest/services/Basemaps/QldMap_Topo/MapServer/WMTS/
tile/1.0.0/Basemaps_QldMap_Topo/default/GoogleMapsCompatible/{Z}/{Y}/{X}.png
[ext]
.png
[min_zoom]
5
[max_zoom]
16
[tile_size]
256
[img_density]
16
[avg_img_size]
18000
```

### NSW-wmts .metainfo

```
[url_template]
https://maps.six.nsw.gov.au/arcgis/rest/services/public/NSW_Topo_Map/MapServer/WMTS?Layer=public_NSW_
Topo_Map&Style=default&Timestamp=&TileMatrixSet=GoogleMapsCompatible&SERVICE=WMTS&REQUEST=GetTile&Ver
sion=1.0.0&FORMAT=image/jpeg&TileMatrix={Z}&TileCol={X}&TileRow={Y}
```

*Other settings as for QLD above.*

The URLs above come from the [Australia-Topo Maps.zip](#) file by TKK, who provided URLs for Australian State Topo WMTS servers. OsmAnd can also display tiles of satellite view, [SQLite](#) etc.

The WMTS tiles are periodically updated, and much better than those on the older WMS servers. If you choose to use them as the primary maps in OsmAnd (under Menu >Configure Map >Map source) you may want to turn off OSM Contour line, Coordinate grid and/or Terrain layers (also under Menu >Configure Map), if already built into the WMTS Topo maps. The OsmAnd grid has labels (that respond to “Text size”) and it zooms (not always 1 km, so use the scale / ruler near the screen base). OsmAnd saves accessed WMTS tiles for later use offline (`Android\data\net.osmand.plus\files\tiles\~`).

You do not need to do all the [file conversions](#) and work-arounds described on some web sites, unless you want maps from a format such as geopdf that OsmAnd really does not support. If possible, just use downloaded WMTS tiles. There probably is no need to worry about adding <bbox> settings, unless you want only a specific region within the WMTS server coverage (maybe to reduce download bandwidth and saved file space). But sometimes (as in NSW) the pdf topo mapsheets get improvements (like better contours) that come later or never to WMTS topo tiles.

### **Faster changes on-the-fly**

Menu >Configure screen >Custom buttons >Quick action can speed up (some) things you do a lot that otherwise require protracted clicking through menus (eg you can change maps, hide contours, remove hillshading or mute voice prompts). Put it somewhere you will not click by mistake. Another approach is to set up ([new](#)) [profiles](#) just how you like them for specific purposes (Menu >Settings >App / New profiles). OsmAnd [code](#) is (in theory) open source, but even [experts](#) struggle to add ideas.

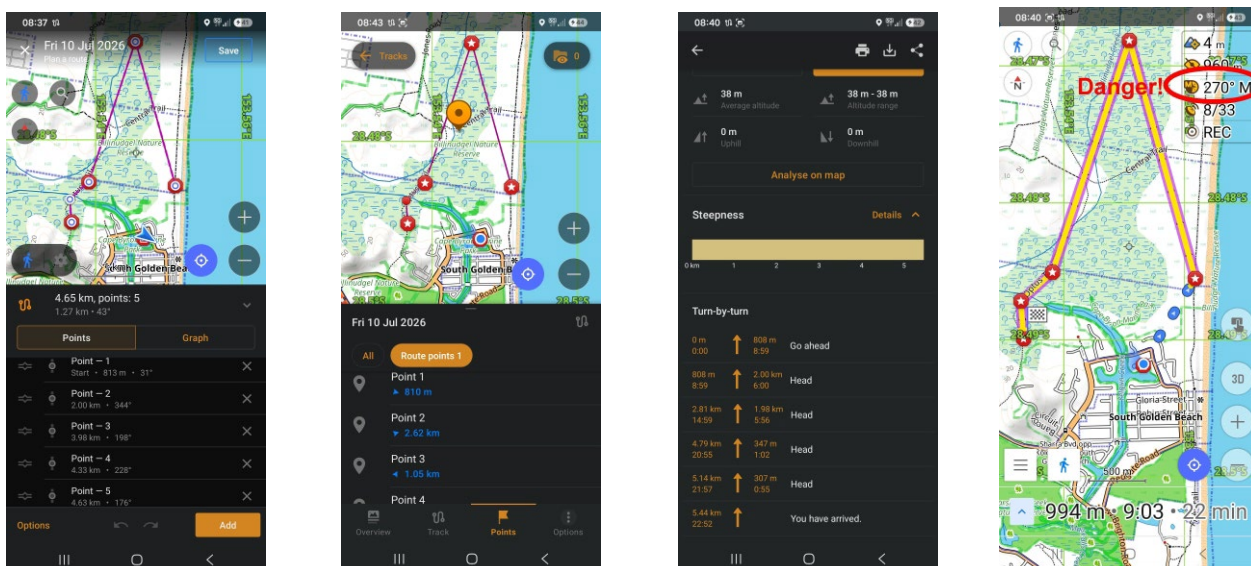
### **Plan routes**

Under Menu >Configure Maps >Routes, OsmAnd has many optional routes (along beaten paths) from various sources that can be displayed over those already in the default map from OSM (Menu >Configure map >Routes). Maybe look there before you plan a new route for off-track use.

Routes can be planned in the app via Menu >Plan a route >Create new route (and add the desired locations), on a PC in [OsmAnd Web](#), or using any software that can export GPX or KML files (which OsmAnd will convert to its own flavour of [GPX](#)). Be wary of imported GPX rtepts vs wpts (only the latter work for some OsmAnd navigation functions). Icons are optional, but anything other than the default waypoint/ favourite icon will have to be selected in OsmAnd (or by editing the GPX file, for experts).

If you access a route planned in OsmAnd through Menu >Plan a route >Open existing track, ‘Points’ will list distance and bearing between points. If you set Angular unit >Degrees 360 as advised above, the bearings will be in degrees from True North (even if you selected the Magnetic bearing widget). ‘Point 1’ shows distance and bearing to this point from your current location. But if you access the same route through Menu >My Places >Tracks, ‘Points’ will show only distances. If you Navigate the same route and view “Details”, you will be shown distances, estimated travel times and “turn” instructions (not bearings) as if you were driving on roads. If your route is looped (round-trip) it will tend to jump to the end (same as the start) and “finish” without reference to the intermediate points. Sometimes even the “turn” instructions are strange (eg all “Head” ... but where?). Imported routes may not behave like those planned in OsmAnd (eg they may show long point names and no bearings). Very confusing.

You must manually choose the start point (Menu >Navigation >From >Select on map) or the default will be “My Position” (good when navigating, but hopeless when route planning). Clicking a route point in the list makes other details available. Once, I stumbled on an option to customize some elements of the track points list (but I can’t find it again). There is an elevation graphic, but quality (ability to use terrain data) seems to depend on how the track is accessed.



OsmAnd is currently tailored for route-planning and navigation (in a vehicle) on the beaten track. It has great potential through simple corrections to its direct / straight-line navigation methods to become a versatile app useful to diverse off-track hikers. The [corrections](#) are more likely to be made if they are requested by many users.

## Navigate

There are several different ways to do many things in OsmAnd, sometimes with slightly different effect. For example, one can navigate a saved route (or is it a track?) by: Menu > My Places > Tracks (select track) > Navigate (↩); or Menu > Navigation > Settings > Follow track (select track). Or click a route (track) shown on screen, and select Navigate (↩) in the pop-up “context menu”.

While navigating off the beaten track, you will probably want to set Menu > Navigation > Settings > Navigation settings > Navigation type > Straight line. (This is the default in the aircraft profile available under Menu > Settings. It differs from “Direct-to-point” navigation which does not recalculate as you move.) I also turn “Voice prompts” and “Screen alerts” off there to save battery. Notifications from OsmAnd can be blocked in *Android Settings* > *Apps* > to save a little battery, at the cost of useful notifications. To stop OsmAnd from sending you ‘the long way round’ via the nearest roads, inactivate “Snap to road” under Menu > Navigation > Settings > Navigation settings > Map during navigation. This seems to apply to the current profile as a whole rather than a particular route or navigation instance. As mentioned above, be cautious of the “Bearing” available in a widget. In the current version, it is unclear what this bearing targets: maybe the final destination (over that cliff) when you want the next route point (along that ridge). Maybe it is the bearing to the point marked by a chequered flag? The [documentation](#) is very confusing: “*To display the bearing, a target point must be selected. If a destination point (or the first intermediate point, if there is one) is selected for navigation, it will be used as the target point. Otherwise, the topmost selected marker will be used.*” What?

Unfortunately, each program seems to have its own meanings (sometimes multiple or changing) for “track”, “route”, types of “waypoints” and “profiles”. Some users say that OsmAnd navigation works best with “[Map markers](#)” made from waypoints in an imported route (which in current OsmAnd-speak is a “track” until user-chosen navigation settings generate a “route”). But only route points also marked as gpx <wpt> (not just <rpt>) are listed, alpha-numerically. Even these must be resorted in order, which seems to defeat the purpose of importing the route. An undocumented method: Menu > My Places > Tracks (select a track) > Route Points (not “All” or “User”) > (not “Options:”) > Add to Navigation; uses all route points in correct sequence to create “Intermediate destinations” on screen with numbered flags. Bearing (widget) is to the start flag. Distances in the bottom panel (Route information) are route leg one and total route. Unfortunately, “Start” initially navigates from your current location to the 2nd route point (flag 1). Bearing (widget) is to flag 1. Distances in the bottom panel are ?? and your distance from finish. Worse, OsmAnd may flash up “Intermediate destination reached” and change the flags, even when you are far away. Confused yet? Maybe something to do with “[Route parameters](#)” but I can not work it out. OsmAnd may be more [problematic](#) for complex imported routes. Promising, but currently unreliable.

What off-track hikers (and off-road drivers and boaters and flyers) really need in straight-line navigation is: (i) distance and magnetic bearing to the next route point, and (ii) a clear indication of which point the app is targeting.

***For off-track hiking, it is better not to use OsmAnd continuous navigation, but rather get bearing and distance when required, by clicking on the next route point then “Navigation” or “Marker” (detailed below \*\*).*** It is still useful to plan and save a route, to display the route line on screen.

### **Extend battery life off-track**

Any app will use battery power while it uses the screen, checks GPS location, navigates a route or records a track. This does not matter much when using power from a car, but it can be a big problem off track. OsmAnd tries to find your current location (checks location services and uses battery) whenever it is in the foreground. You cannot adjust this in the app. Happily, it uses almost no power in the background without navigation or track recording (if these are active, you should see an icon in the notification area); and there are ways to [maximize phone battery life](#) while tracking.

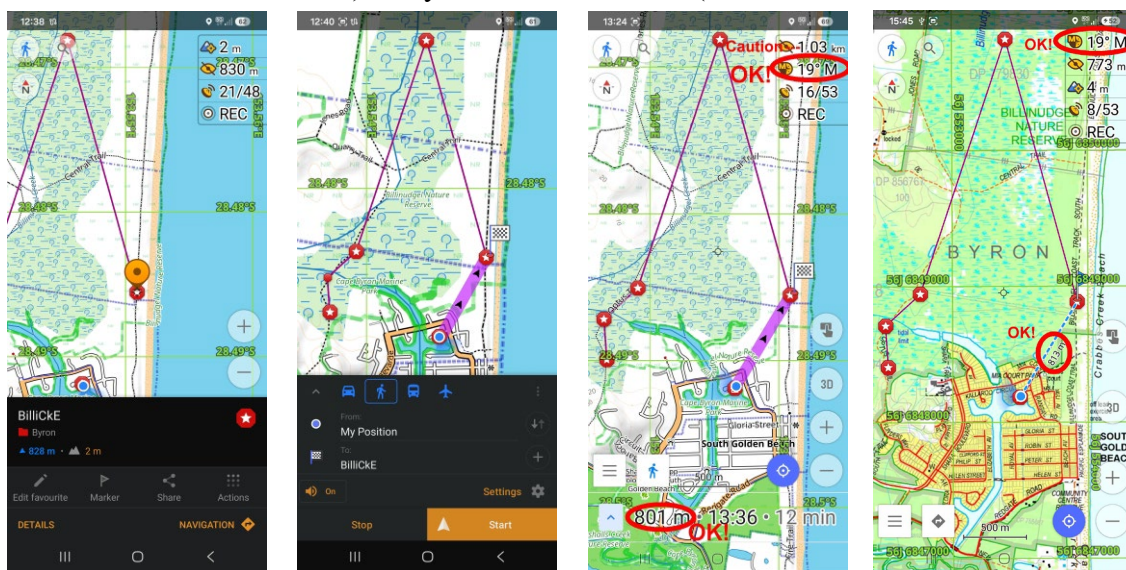
It is best to check OsmAnd run time, and any method to improve it, in a specific device before use. OsmAnd functions such as background track recording may either fail or reduce power use with altered battery-saver settings. If you have disabled battery-saver for OsmAnd:

1. Install and use as few apps as possible. Do not install any apps that try to trick the OS into background behaviour like keeping GPS on, killing apps, or cleaning the RAM.
2. Use offline maps in OsmAnd.
3. Some OsmAnd widgets are heavy CPU (power) users. Turn off widgets that are not needed.
4. Deactivate unnecessary map features (Menu >Configure map). POIs, 3D relief, hillshades, contour lines and grid all use more power and cause more screen redraws.
5. At the trailhead:
  - Start OsmAnd, and get a GPX fix. Select your hiking profile in OsmAnd.
  - Put the phone into airplane mode if you do not need calls. “Tower-hunting” is a huge battery user, especially in areas with weak or gappy phone coverage.
  - Set phone location service to GPS only (even if Android labels this as low accuracy or high battery use).
  - Go back to the phone home screen, then turn off that screen (sleep the phone).
  - In cold weather, keep the phone somewhere warm.
6. Use the screen as little as possible: it is the biggest power user in a mobile phone. (Screen illumination uses roughly 10 times more than the GPS chip in modern smartphones.) Use of a dark theme may help, as may auto-brightness mode in dim conditions.
7. Turn on the phone screen and bring OsmAnd to the foreground only when you need to check the map. OsmAnd should only use GPS while in the foreground (or while navigating or track recording); but something else (like weather or system/tracking apps) may keep the GPS running. Remember to go back to the home screen and sleep the phone, or OsmAnd may keep the screen on, with GPS on even if you are not recording a track.
8. If you want to record a track, use Menu >Trip recording >Logging accuracy >General logging interval (30 sec) >Minimum displacement (5 m) >Minimum accuracy (20 m). May not affect [GPS poll rate](#) (Google / Android intervenes). Pause recording (eg in the notification menu) while stopped for long breaks (just in case). See the warning above about “standalone logging”. Expect about 20 h run time from a full charge.
9. If you want OsmAnd to navigate, turn off the screen- or voice-prompts (Menu >Navigation >Settings >Sound). Preferably use direct navigation between route points (Menu >Navigation >Settings >Navigation Settings >Navigation Type >Straight line). To reduce redraws, turn off the screen and/or adjust (Menu >Navigation > Settings >Navigation Settings >Screen alerts & Route parameters; >>Maps during navigation > Auto-centre & Auto zoom). You cannot reduce the GPS poll rate during navigation. Expect less than 10 h run time from a full charge (more time with less screen use).

\*\* Rather than attempting to use OsmAnd (off-track) for continuous navigation, it is probably better to just get bearings when you need them. Click on (select) your next route point, then get a bearing (in the widget) to that point by clicking Navigation > Replace the destination. **To see the correct bearing, you must have a GPS fix and you must click “Navigation”** but you do not need to click “Start” (continuous navigation, which creates a notification). Then click the map for display. When you are ready it may be best to click ^ then “Stop” navigation to ensure minimal GPS usage. The bearing widget sometimes lingers on screen after navigation stops, or even after an app relaunch. This is probably a bug (goodness knows what it targets then).

**Alternatively:** if (i) Menu > Configure map > Map markers is on, and (ii) Menu > Map markers > More > Appearance on the map > Show directional lines is also on; click on (select) your next route point, then click “Marker” to get a flag (not numbered) at the point, a line with distance to the flag, and bearing (widget) to the flag! There are other functions of “Map markers” that I have not grasped. I removed the “Map markers bar” (it confuses me) using Menu > Configure screen > Widgets Top panel > Edit.

**Cautions:** “Radius ruler” and “Elevation” widgets relate to screen-centre, not a selected destination (so they will give a false elevation and distance unless the screen-centre cross-hair is over your next route point). If confused, turn them off. In contrast the “Route information” widget in the “Bottom panel” shows distance to the route destination, not the screen-centre (it offers no bearing). Do not create any “Intermediate destinations” or you may be confused - eg the “Bottom panel” sometimes only shows the final destination, even if you set “Display priority > Intermediate first”. It is wise to check all this and be familiar with it before departure. Oh, and don’t sit on your phone (it is probably less robust than a dedicated GPSr) or try to use it in the rain (most touchscreens won’t work when wet)!



It might be easier if OsmAnd offered a “Magnetic bearing to screen centre” widget. Then we could see an on-screen display of distance and magnetic bearing from current location to any point placed under the cross-hair (probably disabling map auto-centre & -zoom during navigation; via Menu > Navigation > Settings > Navigation settings > Map during navigation). Maybe not for gloves or rain. If your fingers are steady enough you can use Menu > Configure screen > Distance by tap (I leave it off).

A GPS track can be a great way to review a hike, but you may find that you enjoy the hike more, and develop other navigation skills faster, with less screen and GPS use. Roger Caffin has been an advocate of such skills. On a multi-day trip you may still need a solar charger and/or [powerbank](#).

It may help to run OsmAnd occasionally while your device is connected to the Internet. This may update the GPS almanac and speed up GPS fixes. Repeat after about a week, or position changes of more than 500 km.

This app space is [crowded](#), and changing. Comparisons rarely cover all features that may be important to you (eg cost; privacy; offline use; saving WMTS and geoPDF; overall paradigm; and handling of various “waypoint” types, such as imported GPX “wpt” vs “rtept”). You may have to test many to find one that you find acceptable; or you may need several (eg I use Google online on road, Orux for off-track hiking - both good, neither perfect).