InshoreWatersLite

Net-Trekking Limited

Version 0.1 Rev A

http://www.Net-Trekking.co.uk

"Every Geek should have one!"

Simple, easy build kits following a brutalist style that every geek should have.



InshoreWatersLite

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InshoreWatersLite

1. Introduction

The UK Inshore Waters Forecast is a specialised marine weather service produced by the Met Office that focuses on the coastal region extending up to 12 nautical miles offshore around the British Isles. While the main UK Shipping Forecast covers broad offshore sea areas—such as Dogger, Fisher, Thames, and Biscay—the Inshore Waters Forecast zooms in on 19 distinct coastal segments defined by prominent headlands and landmarks, such as Cape Wrath to Rattray Head or Selsey Bill to Lyme Regis. Tailored specifically for small craft, coastal mariners, and leisure activities, it shares the Shipping Forecast's standardized terminology for wind force, sea state, weather, and visibility, but provides far more localized detail on microclimates, near-shore tidal races, wind acceleration around headlands, and immediate 24-hour coastal conditions.

InshoreWatersLite brings the forecast to life. Contained within the map are 19 multi colour LEDs. These LEDs are painted with a colour to reflect the current wind conditions. The actual area forecasts are scrolled, in turn, on the display along with the forecast date and general situation.

Every attempt has been made to ensure the documentation is up to date and error free. If you spot any errors or find something unclear and possibly confusing, then please email your thoughts to: Support@Net-Trekking.co.uk.

2. Warnings

2.1. Running Temperature

The ESP32-S3 SuperMini may feel warm to the touch. A temperature between 50°C and 60°C is usual and to be expected.

2.2. Data Quality

The code scrapes the inshore waters forecast from the Met Office website, on particular the printable forecasts page found here:

https://weather.metoffice.gov.uk/specialist-forecasts/coast-and-sea/print/inshore-waters-forecast

This page is published by the Met Office and may be subject to change by the Met Office. If this occurs it may impact the functionality of InshoreWatersLite. If this happens then every attempt will be made to publish new software as soon as possible.

2.3. Power

The ESP32-S3 does like a decent amount of power. Some USB ports, especially those on a PC or laptop may not provide sufficient. It is recommended to use a phone charger or similar. If Strange behaviour is noticed, then trying a different power source is recommended.

3. Assembly

Assembly is relatively easy and will probably take no more than an hour.

Please follow the instructions carefully. Perform each suggested test and, if the test fails, stop. Check your work. Make sure the components have the correct orientation. Check for shorts between pins. Check for missing solder joints. Check for dry joints. If it still fails stop and please contact Support@Net-Trekking.co.uk.

3.4. Required Tools

To assemble the kit, you will require the following tools:

Tool	Comment
Small soldering iron	
Solder	See safety notes above.
Wire cutters	
Small cross head screwdriver	

3.5. Parts List

Part	Quantity	Comment
Bolt M3 12mm (for the two stands)	4	
Capacitor 0.1uf 100nf 104 - C1	1	
DIL 14 Pin Socket	1	
Double Row Socket 8+8 Way	1	
ESP32 S3 SuperMini – Ready Programmed – U2	1	
IC 74LS14 – U3	1	This may be wrapped in tin foil. If so, then it may be damaged by static electricity. Please keep touching the pins to a minimum.
LED Insertion Tool	1	
LED WS2812B APA-106	19	
Nut M3 (for the two stands)	4	
Nylon Bolt M3 8mm	4	
Nylon Nut M3	4	
Nylon PCB Spacer M3 12mm	4	
OLED Display 256x64 3.12” – U1	1	

PCB InshoreWatersLite V0.1	1	
Single Row Socket 9 Way	2	
Switch – Tactile – SW1	1	
Stand – Left hand side	1	
Stand – Right hand side	1	
USB Cable	1	

3.6. Assembly Steps

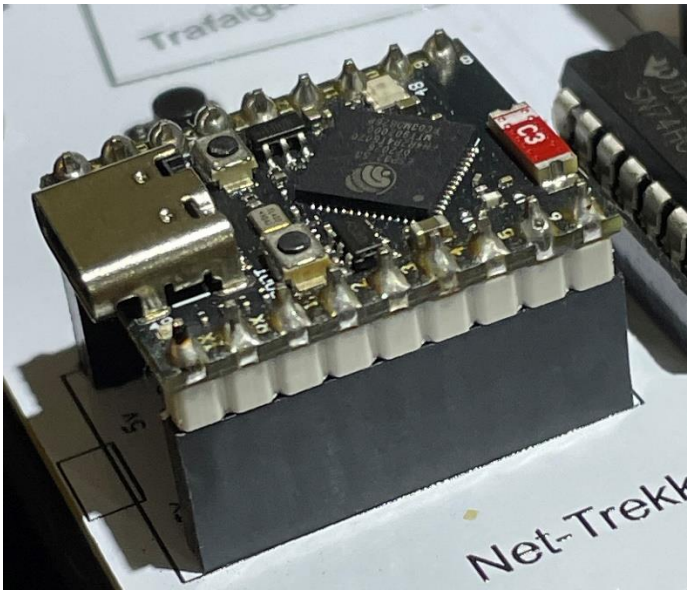
Assembly is sometimes easier working from the lowest profile components to the highest. With that in mind the suggested order of assembly is given below.

3.6.1. ESP32-S3, Header Pins, and Single Row Sockets – U2

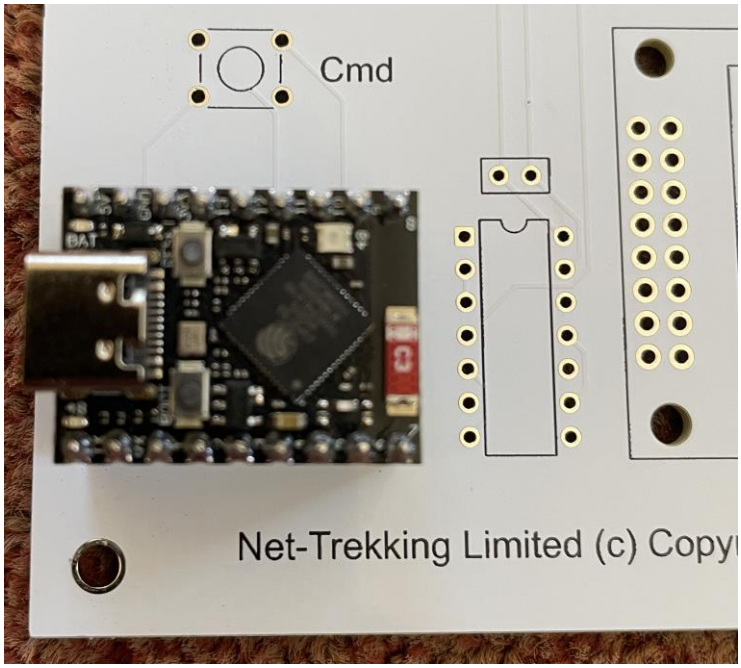
Note: There is a small blue LED on the ESP32-S3 labelled “BAT”. This can be seen just above the USB-C socket in the picture below. This is there to support the charging on external batteries. There is no software control over this LED, and, on occasions, it may flash. One solution to this problem is to mark over the LED lens with a black marker pen or black acrylic paint. Depending on your soldering skills you may chose to remove it completely.

Note: In some kits the two rows of header pins mentioned below may already be soldered into the ESP32 board. If so, then this has been part of the testing process to ensure the kit works as expected.

Note: When complete the ESP32-S3 should look like this:



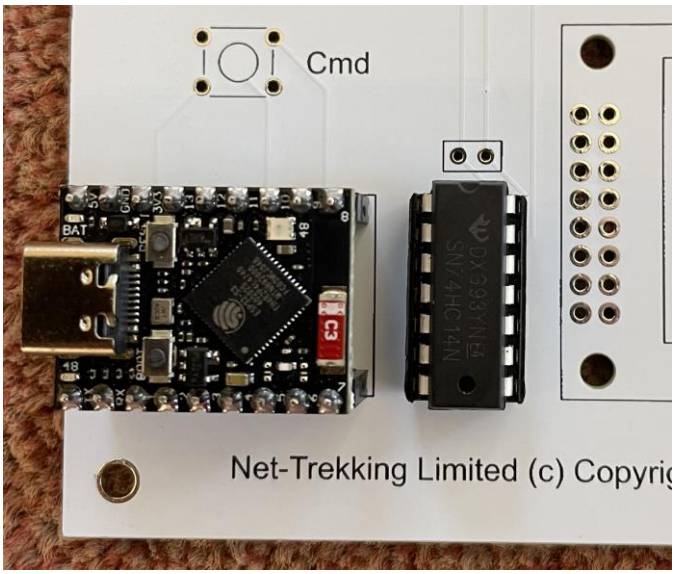
Start by inserting the two header row pins into the ESP32-S3 SuperMini. Solder one pin of each strip and make sure the pins are flat against the PCB before completing all the soldering. Insert the header pins into the two 9-way single row sockets and insert them into the main PCB. The USB socket of the ESP32-S3 SuperMini should be on the left-hand side aligned with the outline on the PCB. Again, solder one pin of each strip and make sure the pins are flat and the ESP32-S3 SuperMini looks correctly placed before completing the soldering of all the pins. Once complete the PCB will look like:



3.6.2. DIL Socket a & IC 74LS14 – U3

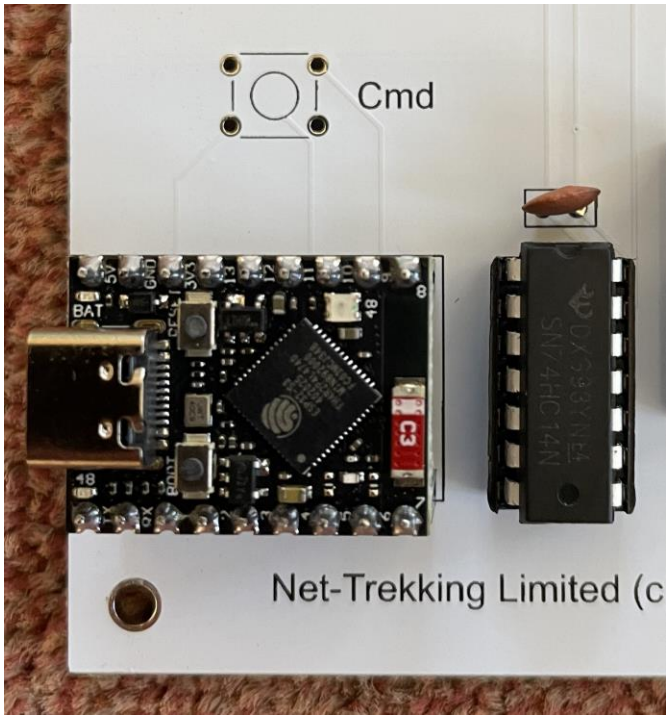
See the comment in the parts list above.

Insert the DIL 14 pin socket in the PCB. Ensure that the small notch is at the top. Solder one pin and then ensure that the socket is aligned nicely with the outline on the PCB. When happy solder the remaining pins. Take the 74LS14 IC and insert it into the socket. Ensure that the notch on the IC is at the top. You may need to straighten the pins of the IC. This is best done by holding the IC at either end, align it so the length of the pins is against a hard surface and push the against the hard surface. Repeat for the other side of the IC. Once complete the PCB will look like:



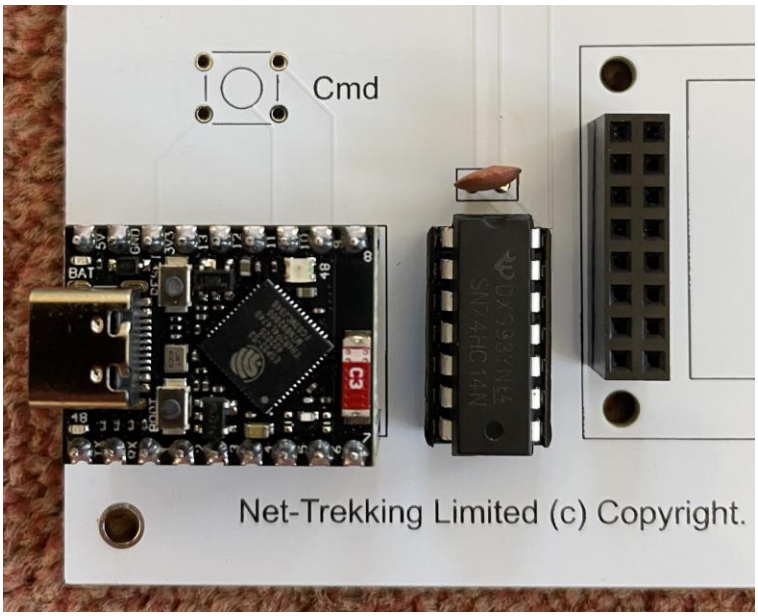
3.6.3. Capacitors - C1

Next insert the capacitor C1 – marked 104. Mount it flush to the PCB with the label on the top side. Once complete the PCB will look like:



3.6.4. Double Row Socket 8+8 Way

Next insert the double row socket. Solder one pin and ensure that the socket is aligned with the outline on the PCB and sitting parallel with the outline of the display. When happy solder the remaining pins. Once complete the PCB will look like:



3.6.5. Mount the Display – U1

The display is held in place by four Nylon 12mm M3 PCB Spacers. Start by pushing the threaded end of each spacer through the PCB and add an M4 nut on the bottom side of the PCB. Insert the header pins of the display into the double row socket. Ensure that the header pins are correctly aligned with the socket. The holes in the four corners of the display should align with the four nylon spacers. Screw one nylon bolt into each of the four holes to secure the display to the PCB. Once complete the PCB will look like:



At this point progress may be tested. Apply power to the ESP32-S3 SuperMini through the supplied USB Cable. Only apply 5 volts. There may be a small delay and then the display should show a splash screen containing the text “ShippingForecastLite”.

If this fails check the orientation of the IC, if this is correct and it still fails email the support desk at Support@Net-Trekking.co.uk.

3.6.6. Tactile Switch – SW1

Next insert the tactile switch and apply solder. Once complete the PCB will look like:



3.6.7. LED Array

There are 19 LEDs to be inserted. Care needs to be taken to ensure that all LEDs are at the same height and vertical. To assist with this the kit contains a small tool. Start by inserting an LED into the tool as shown below. Note that the tool may feel a little “stiff” to start with. Try inserting an LED in a few times until the “stiffness” goes away.



Note the flat side of the LED (and the long legs) are at the top. All LEDs need to be inserted with the flat side to the left. The flat side aligns with the square solder mask hole.



Turn the PCB over, solder the pins, and remove the excess.

At this point power may be applied to the board and the LED should run through a test sequence changing colour from Bright Blue, Red, Green, and then Blue. The initial Bright Blue may look white. **If it does not, then check for shorts between pins. Do not proceed until any problems are resolved.**

Remove the power and proceed with the remaining LEDs. It may be necessary to spin the LED on the tool where LEDs are physically close together. It is recommended to install the LEDs in the following order:

Cape Wrath to Rattray Head including Orkney
Rattray Head to Berwick upon Tweed
Berwick upon Tweed to Whitby
Whitby to Gibraltar Point
Gibraltar Point to North Foreland
North Foreland to Selsey Bill
Selsey Bill to Lyme Regis
Lyme Regis to Lands End including the Isles of Scilly
Lands End to St Davids Head including the Bristol Channel
St Davids Head to Great Orme Head, including St Georges Channel
Great Orme Head to the Mull of Galloway
Isle of Man
Lough Foyle to Carlingford Lough
Mull of Galloway to Mull of Kintyre including the Firth of Clyde and North Channel
Mull of Kintyre to Ardnamurchan Point
The Minch
Ardnamurchan Point to Cape Wrath
Shetland Isles
Channel Islands

Not all inshore water names are visible on the PCB, if in doubt please check here:

https://weather.metoffice.gov.uk/specialist-forecasts/coast-and-sea/inshore-waters-forecast

After inserting each LED apply power to ensure that the LED follows the test sequence. If it does not, then check for shorts between pins. Do not proceed until any problems are resolved.

The LEDs may also be orientated by the length of the legs. Please ensure that the long legs are inserted in the hole with the square solder mask.

3.6.8. Attach the Stand

Each side of the stand is attached with two 12mm bolts. Before attaching to the PCB put each bolt in a hole, apply the nut, and tighten up. This should pull the nut into the leg so that it sits flush with the leg surface. The right-hand side has the cutout / cable restraint in the lower limb.

Once complete the PCB will look like:

InshoreWatersLite



4. Settings

4.7. Basic Settings

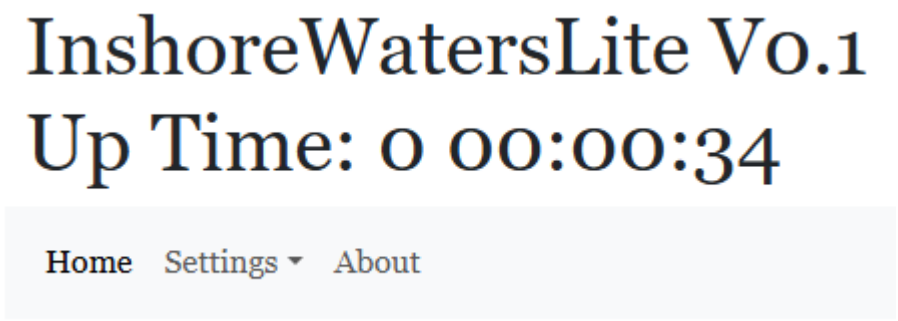
Settings are changed via a simple webpage served up by the ESP32 S3. Insert the USB cable and plug the device into a power source. The LEDs will cycle through a power up sequence, and the display will scroll the message:

"Please connect to the access point InshoreWatersLite browse to http://192.168.4.1, select Wi-Fi Settings from the menu to provide Wi-Fi credentials."

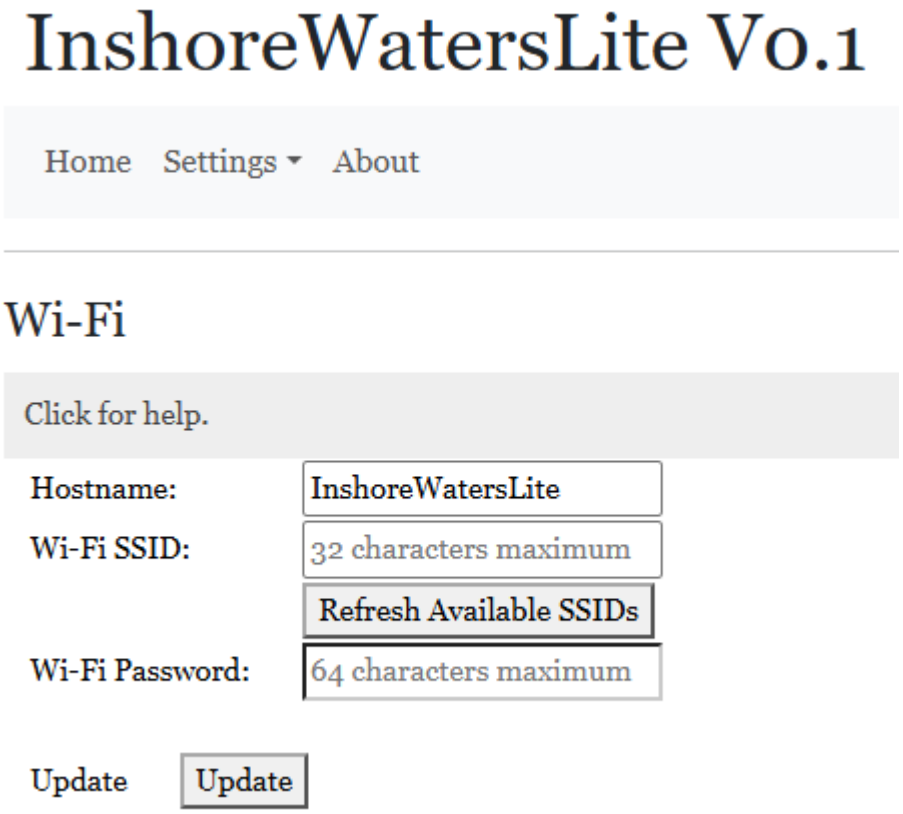
At this point, an access point called InshoreWatersLite should be visible to a phone or Wi-Fi enabled personal computer. Connect to the access point and browse to:

http://192.168.4.1

You will see the following page:



Select the Menu option Settings | Wi-Fi Settings, this will take you to the page:



The main fields of interest here are the Wi-Fi SSID and Wi-Fi Passwords fields. These must be populated to allow the device to connect to a Wi-Fi connected to the Internet.

When complete, hit the update button located at the bottom of the screen.

There may be a short delay after which the device will fetch the latest shipping forecast, illuminate the LEDs, and start cycling though the forecasts.

InshoreWatersLite makes use of mDNS (Multicast Domain Name System). It is a network protocol that lets devices on a local network find each other and resolve hostnames to IP addresses without needing a central DNS server. Once your Wi-Fi connection has been configured you should be able to browse to:

http://InshoreWatersLite.local

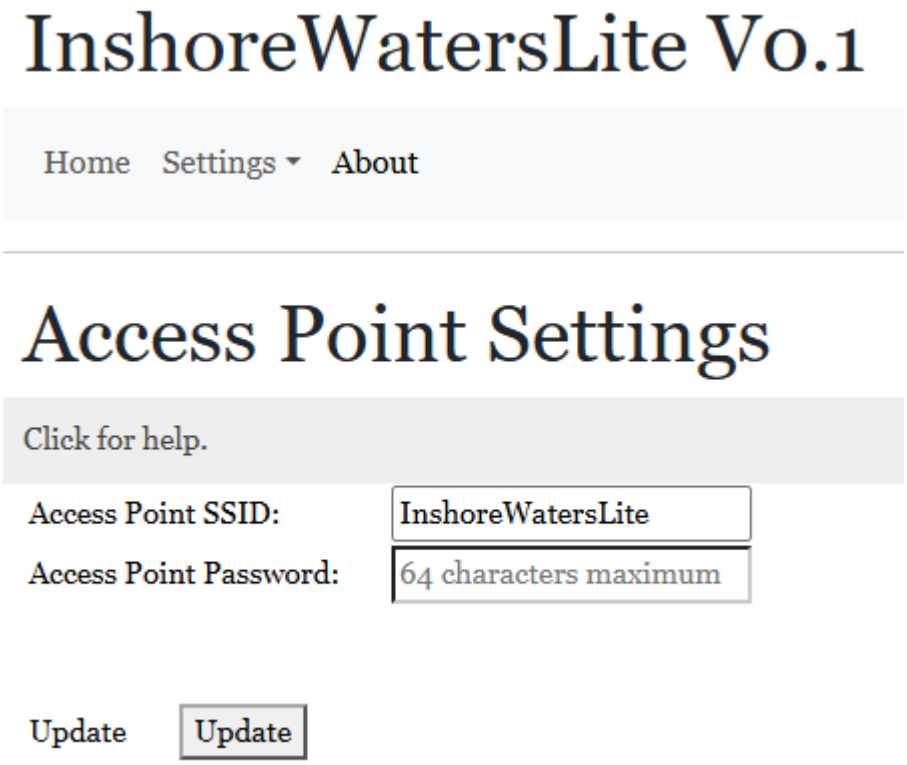
without having to connect to the InshoreWatersLite access point.

4.8. Advanced Settings

Further settings can be found below the Settings | Access Point menu option and Settings | Inshore Waters Settings menu option.

4.8.1. Access Point

By default, the Access Point settings are set to:



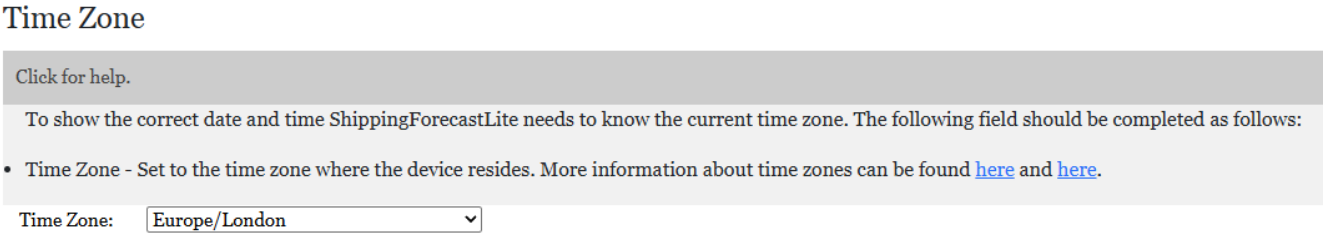
The access point related controls can be used to control the following:

- Access Point SSID - The SSID associated with this device. If multiple InshoreWatersLite devices exists on the same network, then it may be necessary to give each device a unique name.
- Access Point Password - The password associated with the device SSID. The field can be left blank if password access is not required.

Once changes have been made the Update button must be pressed.

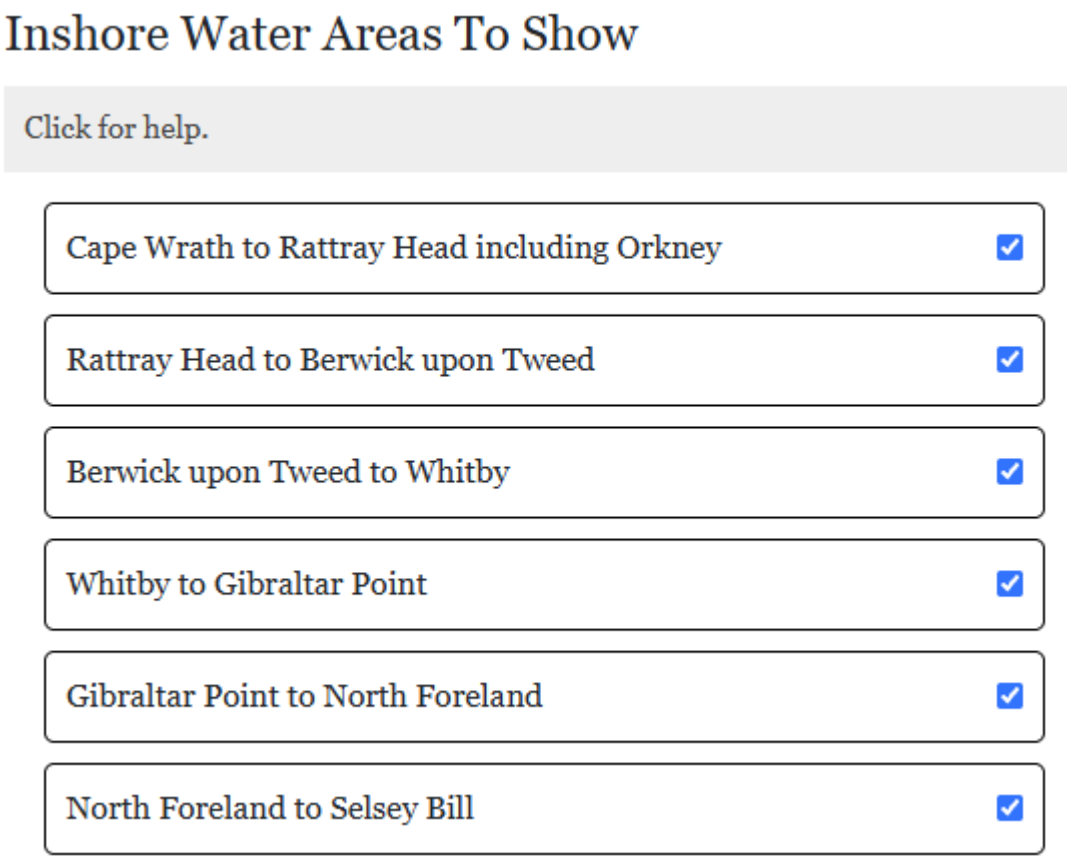
4.8.2. Inshore Waters Settings

By default, the Shipping Forecast Settings are:



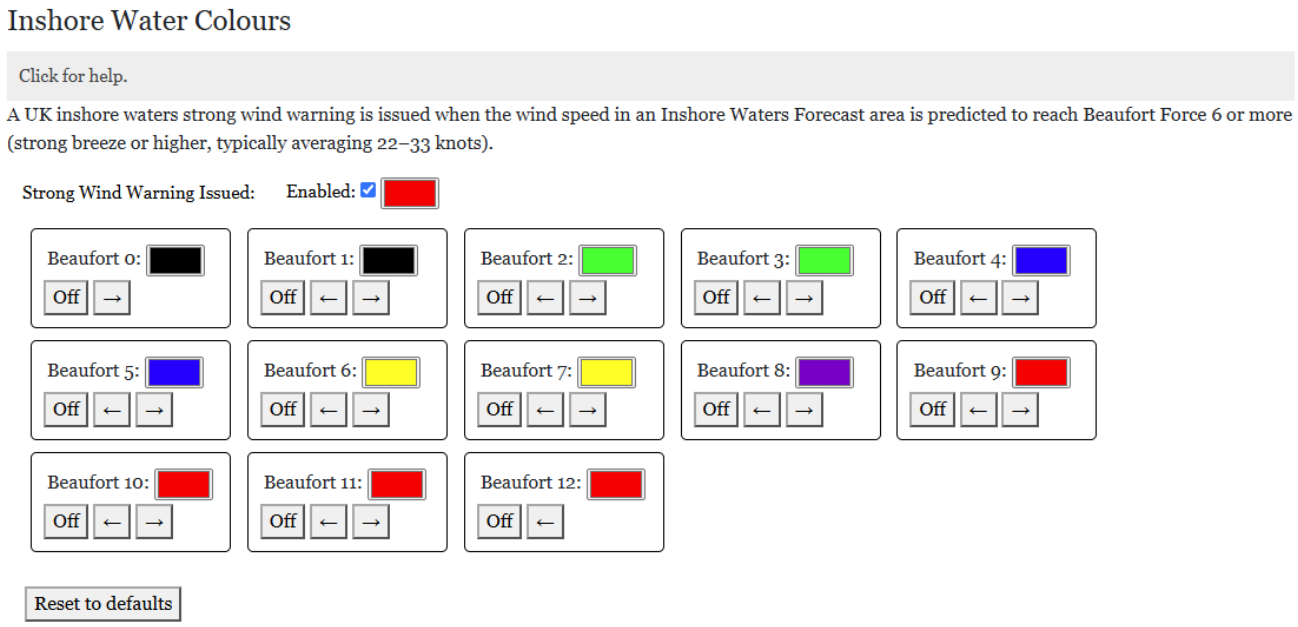
InshoreWatersLite

InshoreWatersLite displays the time, to ensure this is correct, select the time zone that represents your location. This defaults to Europe/London.



When cycling through the forecasts only the selected forecasts are shown. If all forecast areas are deselected, then it will default to all.

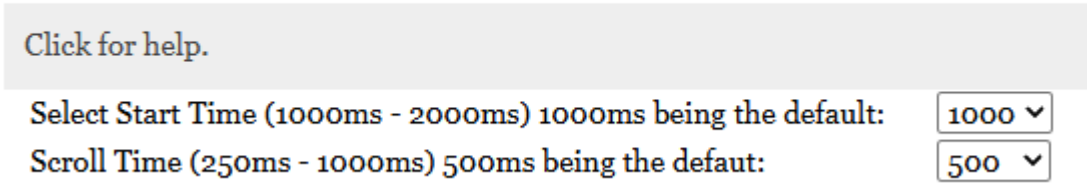
InshoreWatersLite



The colours used to paint the LEDs are controlled by the above.

- Strong Wind Warnings Issued - This controls whether LEDs are painted a specific colour when a strong wind warning for the area has been issued. The default is enabled and the default colour is red.
- Beaufort Colours: - These control the colour an LED is painted to reflect the maximum wind speed. The setting Strong Wind Warnings Issued overrides these colours.
- Reset to Defaults - This control resets all colours to their default values.

Inshore Waters Select



- Select Start Time - This controls the time, in milliseconds, before the select starts. It ranges from 1000ms to 2000ms with 1000ms being the default.
- Scroll Time - This controls the time, in milliseconds, before the select scrolls. It ranges from 250ms to 1000ms with 500ms being the default.

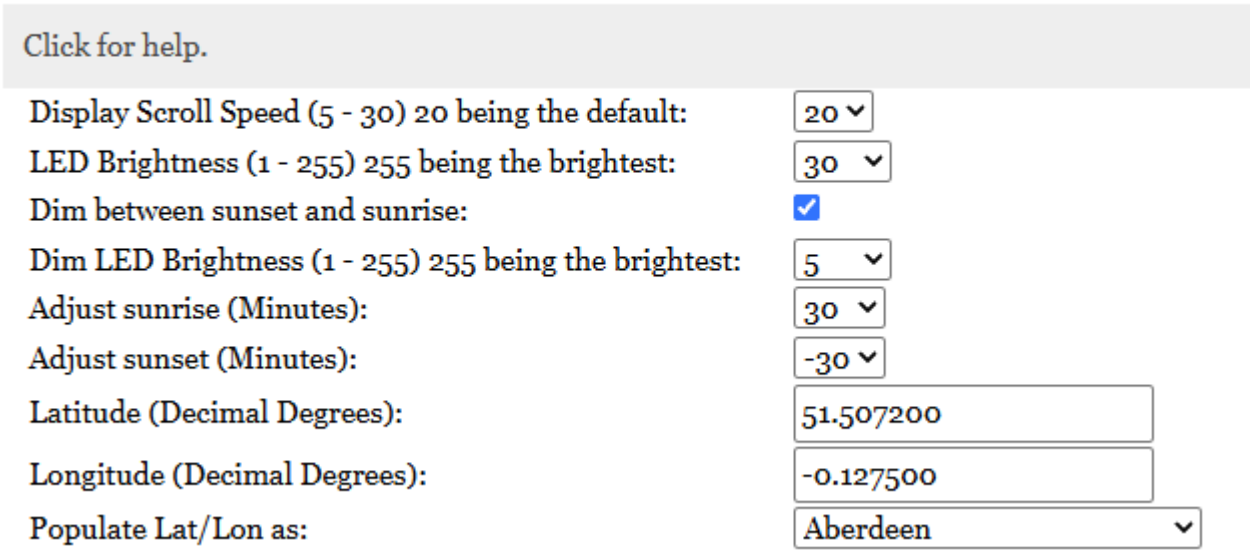
InshoreWatersLite

Inshore Waters Outlook



- Include outlook for following 24 hours - This controls whether the outlook for the following 24 hours is included. If true, then outlook will be added to the scrolling text and the LED display will reflect the maximum wind speed during the 24 hour forecast and the outlook. The default is true.

Display



- Display Scroll Speed - This controls the display scroll speed. This ranges from 1 to 30 with 20 being the default.
- LED Brightness - This controls the brightness of the LED display. This ranges from 1 to 255 with 255 being the brightest. The default is 30.
- Dim between sunset and sunrise - This controls whether the LED display is dimmed during the hours of darkness. The default is off.
- Dim LED Brightness - This controls the brightness of the LED display during the hours of darkness. This ranges from 1 to 255 with 255 being the brightest. The default is 5.
- Adjust sunrise / sunset - The times of sunset and sunrise are calculated from the current time and the latitude / longitude value. These extra controls allow the time to be brought forward or pushed back as required. The values range from +60 minutes to -60 minutes. The default values are 30 minutes and -30 minutes.
- Latitude / Longitude - These are used to provide the latitude and longitude of the device. The values are specified as decimal values with negative latitudes being south of

the equator and negative latitudes being west of the primary meridian. The default values are for London.
- Populate Lat/Lon as - This control is used to populate the latitude and longitude values defined above from a list of well-known cities.

Once changes have been made the Update button must be pressed.

5. Command Button (Cmd)

The command button can be used to gain access to extra functionality. It responds to single clicks, double clicks, and long clicks. The displays accessed via these clicks do not timeout. To move the display on simply click again as required.

5.9. Single Click

A single click will step the display into the next screen. The order is:

Inshore Waters – Inshore water LEDs are flashed and the corresponding forecast scrolled in the display. Once the scrolling is complete it will move on to the next sea area. The sea area order is that used by the official shipping forecast.

Forecast Details – the date and time information associated with the forecast will be scrolled in the display.

General Synopsis – The forecast general synopsis will be scrolled in the display.

Gale Warnings – All the areas for which gales have been forecast will be scrolled in the display.

Sunrise / Sunset Times – Displays the sunrise and sunset times for today and tomorrow.

5.10. Double Click

This provides access to the software version and uptime of InshoreWatersLite.

5.11. Triple Click

This performs a factory reset and subsequent reboot of InshoreWatersLite. All configuration values will be reset to their default values.

5.12. Long Click

A long click advances the active sea area. If the display is currently showing Thames and you want to see Biscay, then press and hold the command button. The LEDs will clear and Thames

will be displayed as white. Continue holding and the LED will cycle round the sea areas. Release the command button when the sea area of interest is on.

6. LED Colours

The LED colours reflect the maximum predicted windspeed for the given inshore waters area. If the forecast is:

“3 becoming 5 later”

Then the LED is coloured against the 5.

The colours used are:

Description	Colour
Strong wind warning issued	Red
Beaufort scale possibly 8	Purple
Beaufort scale 6 to 8	Yellow
Beaufort scale 4 to 6	Blue
Beaufort scale 2 to 4	Green
Beaufort scale 2 or less	LED is turned off

These colours where chosen based on text found within the document:

https://www.hse.gov.uk/pubns/priced/l64.pdf

7. iPhone Personal Hotspot

The iPhone supports a personal hotspot where the iPhone provides an access point that allows users to connect to and then provides internet access via 4G / 5G etc. InshoreWatersLite can make use of these hotspots, but some iPhone configuration is required.

By default, the hotspot name associated with an iPhone will typically look like:

Martin’s iPhone

The apostrophe causes an issue, and it is recommended to remove it. This can be done by navigating to:

Settings | General | About | Name

There you can simply either remove the single quote or give the device a whole new name.

Next navigate to:

Settings | Personal Hotspot

Where you will need to “Allow Others to Join”, provide a “Wi-Fi Password”, and “Maximise Compatability”.

Once done InshoreWatersLite should be able to connect to the internet via your phone.

8. Software Updates

Software updates are made available via the website http://www.Net-Trekking.co.uk