

# AIS Watchkeeper — Operator Manual

Version 1.1 · Covers AIS Watchkeeper 0.46 · Audience: shoreside operators / watchkeepers.

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## 1. Overview

AIS Watchkeeper turns QGIS into a live maritime traffic console. It listens to an AIS receiver — either a USB/serial dongle or a network (TCP) feed — decodes the vessel broadcasts, and plots every ship on the map in real time, with heading, speed vector, track trail and a name learned from the traffic itself.

On top of the live picture it gives you four watchkeeping tools:

- **The Guardian** — draw guard zones on the map and get an alarm when a vessel enters, sits inside, or leaves one; optionally only for vessels you care about (guard groups).
- **Coverage mapping** — a running map of where your receiver actually hears Class A and Class B traffic, so you know your blind spots.
- **Vessels** — a live nearby list with bearing, range and fairway binding, plus a register of every ship seen.
- **Routes** — vessels are matched to the official Dutch fairway network, so you can watch a fairway as a strip (inbound/outbound), see its bridges and locks, and get a ship's ETA to any of them. Where the bundled network doesn't reach — anywhere outside the Netherlands — you can **draw your own custom routes** and bind traffic to them too.

Everything runs inside QGIS as a dockable panel. There's no separate application and no cloud service — the feed comes straight off your receiver to your machine. (The one exception is the live bridge/lock lookup in Section 9, which is best-effort and optional.)

**The panel at a glance.** One dock, six tabs, in the order you'll normally use them:

1. **AIS stream** — pick your source, connect, watch the raw feed, set how vessels are drawn.
2. **AIS Guardian** — arm the alarms and manage guard groups.
3. **Vessels** — the nearby list, the full register and your own fleet.
4. **Routes** — a table of fairways with traffic on them; open one as a strip.
5. **Event log** — every alarm and coverage event, exportable to CSV.
6. **History** — browse the recorded voyage archive (when voyage history is switched on).

A ? button in the top-right corner of the panel opens this manual at any time.

## 2. Installation

AIS Watchkeeper installs like any QGIS plugin from a ZIP, and it carries its own dependencies — you do **not** need to pip-install anything. The AIS decoder (pyais) and the serial driver (pyserial) are bundled inside the plugin.

### Requirements

- QGIS **3.22 or newer**. The plugin is Qt6/QGIS 4 compatible, so it runs on both current and next-generation QGIS.
- An AIS source: a serial/USB AIS receiver, **or** access to a TCP AIS feed (host and port).

### Steps

1. In QGIS, open **Plugins** → **Manage and Install Plugins...**
2. Choose **Install from ZIP**.
3. Browse to the AIS Watchkeeper ZIP and click **Install Plugin**.
4. Confirm any "install untrusted plugin" prompt — this is normal for a plugin that isn't on the official repository.

Once installed you'll see an **AIS Watchkeeper** button on the toolbar and an entry under **Plugins** → **AIS Watchkeeper**. Either one **toggles the dock** open and closed — a single click opens the panel, builds its map layers and leaves it ready for a source.

**First-run notice.** The first time you open AIS Watchkeeper in a QGIS session, a short **usage notice** appears. It states that the tool receives, portrays and stores AIS messages, and that you — the operator — are solely responsible for complying with the privacy legislation that applies where you use it. Click **I do** to accept and the

responsibility for complying with the privacy regulations that apply where you see an alert as to accept and the panel opens; **Decline** (or closing the notice) keeps it closed, and no AIS data is received or handled until you accept. The notice appears once per session.

### 3. Getting around QGIS

AIS Watchkeeper lives inside QGIS, so a few native QGIS habits make everything else easier. If you're already comfortable in QGIS, skim this and skip ahead.

#### 3.1 Showing the Layers panel

The **Layers** panel is the list down the side of QGIS that shows every map layer — the basemap, your live vessels (`liveFeedAIS`), guard zones (`guardZones`), coverage, route markers, and so on. You'll need it to turn layers on and off and to edit guard zones and markers.

If it isn't visible: **View** → **Panels** → **Layers** (tick the box). The same menu lists every other panel, including AIS Watchkeeper itself, so you can re-open the plugin from here if you ever close it.

While you're there, also make sure the editing buttons are available: **View** → **Toolbars** → **Digitizing Toolbar**. That's where the pencil and the *Add Feature* buttons live.

#### 3.2 Floating the panel onto a second screen





In a watchkeeping setup you often want the map filling one monitor and the AIS Watchkeeper panel on another. The panel is a standard QGIS dock, so:

- **To undock it:** grab the panel's title bar (where it says *AIS Watchkeeper*) and drag it out of the QGIS window — it becomes a free-floating window you can drop on a second monitor and resize. A double-click on the title bar does the same in one move.
- **To re-dock it:** drag it back to the left or right edge of the QGIS window until a highlighted strip appears, then release. Double-clicking the title bar again also snaps it home.

The same trick works on the Layers panel — handy if you want the map, the layer list, and the plugin spread across two screens.

#### 3.3 The native editing pattern (add a guard zone or a marker)

Three features — **guard zones**, **route reference markers** and **custom routes** — are things *you* draw on the map using QGIS's own editing tools. They all follow the same five-step pattern, so learn it once:

1. In the **Layers** panel, click the layer you want to draw on to select it (`guardZones` for a zone, `Route reference markers` for a marker, `Custom routes` for a route).
2. Click  **Toggle Editing** — the pencil button on the Digitizing toolbar. The layer is now editable (a pencil appears beside it in the Layers panel).
3. Click the matching **Add Feature** button:  **Add Polygon Feature** for a guard zone,  **Add Point Feature** for a marker,  **Add Line Feature** for a custom route.
4. Draw on the map:
  - *Guard zone (polygon)*: left-click to drop each corner, then **right-click to finish** the shape.
  - *Marker (point)*: a single left-click where you want it.
  - *Custom route (line)*: left-click each vertex along the route, then **right-click to finish** the line. The direction you draw it matters — see Section 9.8.

1. Click  **Save Layer Edits** (the floppy-disk button), then click the pencil again to **Toggle Editing off**.


#### What happens after you finish drawing:





- **Guard zone** → AIS Watchkeeper's own zone form opens automatically. Give the zone a name, choose whether it's armed, whether it alarms on entry and/or exit, and whether it watches *all* vessels or only chosen guard groups, then click OK. (Section 7 covers what those settings do. To change a zone later, select it on the map and reopen its form from the **AIS Guardian** tab.)
- **Marker** → QGIS's standard attribute form asks for a **name** (a buoy, a VTS sector boundary, a berth). Type it and click OK. The marker snaps to the nearest fairway automatically and appears on that route's strip as a teal diamond at the correct distance along the route (Section 9).

- **Custom route** → QGIS's attribute form asks for a **name**. Type it and click OK. The route becomes a fairway you can bind traffic to, listed in the Routes tab in blue (Section 9.8).

Markers and zones are saved to disk in your profile, so they survive QGIS restarts and plugin upgrades.

### 3.4 Moving, reshaping and deleting a feature

Once a guard zone or a marker is drawn, you can change or remove it — same tools for both layers. First select the layer in the **Layers** panel and  **Toggle Editing** on, then:

- **Move or reshape it:** pick the  **Vertex Tool** on the Digitizing toolbar. Hover over the feature and its vertices light up. Drag a vertex to move it; for a guard-zone polygon, double-click an edge to add a new corner, or click a vertex and press **Delete** to remove that corner. To slide a whole feature without reshaping it, use the  **Move Feature(s)** tool instead.
- **Delete it:** with the  **Select Features** tool, click the marker or zone on the map so it highlights, then press the **Delete** key (or the  **Delete Selected** button on the toolbar). Deleting a guard zone stops it alarming; deleting a marker removes it from the route strip.

Either way, finish with  **Save Layer Edits** and toggle editing off. Nothing is permanent until you save.

**Tip — placing a route marker accurately.** A marker binds to whichever fairway is *nearest* to where you drop it, so put it where there's no doubt. Zoom in until the thin fairway lines appear on the chart (around **1:12500 or closer**), then drop the marker in the **middle of the fairway, right on a routeline**. That way it snaps to the route you intended, at the correct distance along it, and lands exactly where you expect on the strip. Drop it loosely between two parallel fairways and it may bind to the wrong one.

## 4. Connecting a source

This is the first real step: pointing AIS Watchkeeper at your receiver. Open the dock and go to the **AIS stream** tab — the leftmost one. At the top you choose between three kinds of source:

- **USB / Serial** — a physical AIS receiver plugged into your machine (or a serial-to-USB adapter).
- **Network (TCP)** — an AIS feed delivered over the network from another host: a base-station, an aggregator, a multiplexer, or a shore server.
- **Internet** — a free or open online AIS service, for trying the plugin out before you have a receiver of your own (see §4.7).

Pick the radio button that matches what you have. The panel below swaps to show the right fields.

### 4.1 A USB / serial receiver

1. Plug the receiver in.
2. Select **USB / Serial**.
3. Open the **Port** dropdown and pick your device. Each entry shows the port, a description and a hardware tag (e.g. the USB vendor/product), so you can tell a real AIS receiver from, say, a Bluetooth COM port. If you plugged in after opening the panel, click **Refresh** to re-scan.
4. Set **Baud** to **38400** — the AIS standard. (Some receivers present their data at 4800; if 38400 gives you nothing, try that.)
5. Click **Connect**.

If you're not sure which port or baud is right, don't guess — use Auto-detect (next).

**A note on Bluetooth receivers.** Most Bluetooth AIS receivers pair with your computer as a *virtual serial port*. Once they're paired at the operating-system level, they appear in the **Port** dropdown just like a plugged-in USB device, and you connect to them exactly as above — pick the port, set the baud, **Connect**.

The exception is receivers that talk over **Bluetooth Low Energy (a GATT connection)** instead of a serial profile. These never present as a serial port, so they **won't appear in the dropdown and aren't supported** by AIS Watchkeeper, which speaks only serial and TCP. If your Bluetooth receiver pairs fine but never shows up as a port, it's most likely one of these — contact the plugin developer for support.

### 4.2 Auto-detect — let the plugin find it

## 4.2 Auto-detect — get the plugin into it

The **Auto-detect** button does the port-and-baud hunt for you. It listens on each serial port in turn, trying the AIS standard 38400 first and then 4800, 9600 and 115200. A port producing valid AIS sentences is the winner; a port spitting garbage is rejected within a second or so, so the scan is quick.

1. Make sure the receiver is plugged in.
2. Click **Auto-detect**.
3. Watch the status line — it reports each port it tries and what it found (how many valid sentences, how many were AIS, how many GPS).
4. When it finds an AIS feed it **selects that port and baud and connects automatically**. If it finishes without finding AIS, nothing is connected and you'll see the per-port findings in the log to help you diagnose (e.g. a port that's all GPS and no AIS).

This is the fastest way to get going with unfamiliar hardware.

## 4.3 A network (TCP) feed

1. Select **Network (TCP)**.
2. Enter the **Host** (an IP address or hostname) and **Port** of the feed.
3. Click **Connect**.

The plugin connects straight to the TCP NMEA stream and starts decoding. It also tolerates feeds that wrap each sentence in a NMEA TAG block (the `\...\` prefix many aggregators and multiplexers add) — those are stripped automatically before decoding, so a feed that used to show nothing now works.

## 4.4 Secured feeds and logins

Before it connects a TCP source, AIS Watchkeeper quietly probes the endpoint to see whether it's plain, encrypted, or expecting a login. A normal open feed just connects as above and you'll notice nothing. But if the endpoint looks **secured** — it offers TLS, or it greets you with a login prompt and sends no data until you authenticate — a **login dialog** opens, pre-filled from what the probe found:

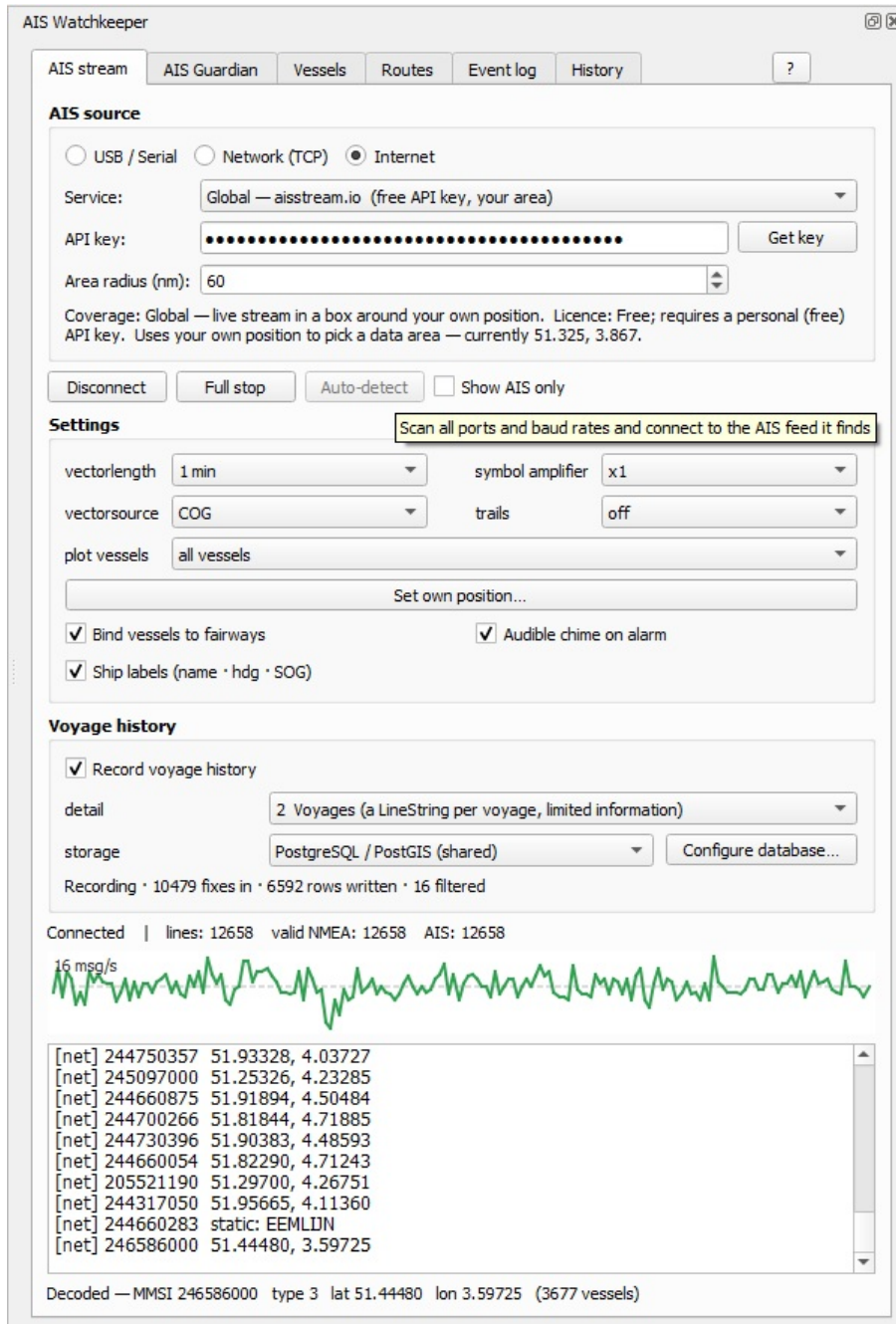
- A **TLS** toggle (with an option to accept a self-signed certificate), set on if the server offered encryption.
- An **authentication method**: none, username + password, or token.
- A **login line template** with `{user}`, `{pass}` and `{token}` placeholders — because there's no single standard AIS login, the exact line your server expects is configurable here.

Fill in your credentials and connect. You can store them safely: the dialog uses **QGIS's own encrypted credential store**, so the secret is held in QGIS's master-password-protected database, decrypted only at the moment of connecting, and never written into the plugin's own files. The plugin remembers the *non-secret* bits per host (the TLS flags, the login template, which stored credential to use) so the next connect pre-fills — but the password itself stays in QGIS's vault.

## 4.5 Knowing you're connected

Once a source is live:

- The **Connect** button changes to **Disconnect**.
- The **feed-live** indicator lights green (you'll see it here and on the **AIS Guardian** tab).
- The **status line** shows a state word plus running counts — sentences per second on the line, how many validated, and how many were AIS — so you can confirm real traffic is flowing, not just noise.
- Vessels begin appearing on the map within a sentence or two, and the map pans once to your first contact.



The AIS stream tab, connected to the aisstream.io internet feed: the source panel, the Settings box (speed vector, symbol amplifier, trails, plot-vessels, own position and the toggles), the Voyage-history box, the live "msg/s" rate graph, and the decoded sentence log with running counts.

## 4.6 Pausing and disconnecting

- **Disconnect** stops the feed but leaves the plugin and your map layers in place.
- **Full stop** is the bigger hammer: it halts *everything* the plugin is doing — the feed, the auto-detect scan, every timer and layer update — so you can freeze the session cleanly (for example before unplugging hardware). The same button resumes. On Windows this is also the safe way to stop a serial receiver before pulling it out, avoiding the rare disconnect-mid-read crash.

## 4.7 Internet sources — trying it without a receiver

If you don't have a receiver yet and just want to see AIS Watchkeeper working, choose **Internet**. A dropdown offers a few free or open online AIS services:

- **Norway — Kystverket** — the Norwegian Coastal Administration's public feed. It needs no signup at all: pick it, click **Connect**, and you'll see live traffic along the Norwegian coast within seconds. Coverage is Norway only, but it's the fastest way to prove the plugin works.

- **Global — aisstream.io** — a free, worldwide service that streams the vessels in a box around **your own position**, so you see ships in your *own* waters. It needs a free API key: click **Get key** to open the sign-up page, paste the key into the **API key** field, and — because it's a location-based feed — set your own position on the map first (see §6). Then **Connect**.
- **Global — VesselAPI** — a second worldwide option, also free with a key (**Get key** opens its dashboard). It polls the vessels in the same own-position box every half-minute.

For the two global services the **Area radius (nm)** box sets how large a box around your position is requested. If you choose a location-based service without a position set, the plugin reminds you to set one first. Your key is stored safely in QGIS's settings, per service, so you paste it only once.

A word of perspective: these internet feeds are for **testing, and for coverage where you have no receiver of your own**. In your local waters a real antenna hears far more, far sooner. Among free worldwide feeds, aisstream.io and VesselAPI are the genuine options — most other "global" services are paid, or require you to run and share your own receiver.

**Attribution.** The Norway / Kystverket feed is open data under **NLOD 2.0**. If you use, store or share it you must credit the source: "*Contains data under the Norwegian Licence for Open Government Data (NLOD) distributed by the Norwegian Coastal Administration (Kystverket)*" (<https://data.norge.no/nlod/en/2.0>). The open feed already excludes small fishing (<15 m) and recreational (<45 m) craft, so those vessels are never received or stored. aisstream.io and VesselAPI are used under their own free-tier terms with your personal API key.

The Kystverket licence was **reviewed for possible infringement and found to be in compliance**: because the restricted small-craft data is excluded from the open feed it is never stored or redistributed, and NLOD 2.0 permits the plugin's storage, sharing and commercial use provided the attribution above is given. This finding is also shown in the app when you select the Kystverket source.










## 5. Reading the map












Once a source is live, decoded vessels are written to a map layer called **liveFeedAIS** and updated continuously. Everything in this section is about that live picture — what the symbols mean and how to tune them. All the tuning controls live in the **Settings** box on the **AIS stream** tab, and your choices are saved with the QGIS project, so they come back next time you open it.

### 5.1 Vessel symbols

Each vessel is drawn as a **ship-shaped symbol coloured by type**, scaled to the vessel's *real* length and beam (from its AIS dimensions) and **rotated to point the way it's heading** — true heading if the vessel reports it, otherwise course over ground. So a 300 m tanker looks like a 300 m tanker, pointing the right way; a small craft looks small. Where a vessel hasn't reported its dimensions yet, a sensible default size is used until it does.

The type comes from the vessel's AIS *ship-and-cargo type* code. The legend:

Symbol	Type	AIS code
	Cargo	70–79
	Tanker	80–89
	Passenger	60–69
	High-speed craft	40–49
	WIG (wing-in-ground)	20–29
	Fishing	30
	Towing	31, 32
	Dredger	33
	Diving ops	34

	Military	35, 59
	Sailing	36
	Pleasure craft	37
	Pilot	50
	SAR	51
	Tug	52, 53
	Anti-pollution	54
	Law enforcement	55
	Medical transport	58
	Other	90–99
	Other identified	remaining codes
▲ (triangle)	<b>Unidentified</b> — no type reported yet	none

A vessel shows as a small **triangle** until it broadcasts a type; once it does, it switches to the matching ship symbol. The triangle still rotates to the vessel's heading, so even unidentified contacts show which way they're pointing.

## 5.2 Speed vectors

A **speed vector** is a line projected ahead of each moving vessel showing where it will be in the next few minutes — the standard way to read who's going where at a glance. Two dropdowns in **Settings** control it:

- **vectorlength** — how far ahead to project: **none, 1, 3 or 6 minutes**. The line length scales with the vessel's speed, so faster ships draw longer vectors.
- **vectorsource** — which bearing the vector follows: **COG** (course over ground, drawn **green**) or **heading** (the way the bow points, drawn **blue**). The colour change makes it obvious which you're looking at — useful when a vessel is being set by current or wind and its heading and course differ.

Stopped vessels (zero speed) draw no vector.

## 5.3 Trails

**trails** draws a faint dotted line through each vessel's recent positions, so you can see where it has been. The dropdown sets how many past fixes to join: **off, 5, 10 or 20**. Longer trails give more history but more clutter — 5–10 is a good watchkeeping default.

## 5.4 Symbol amplifier

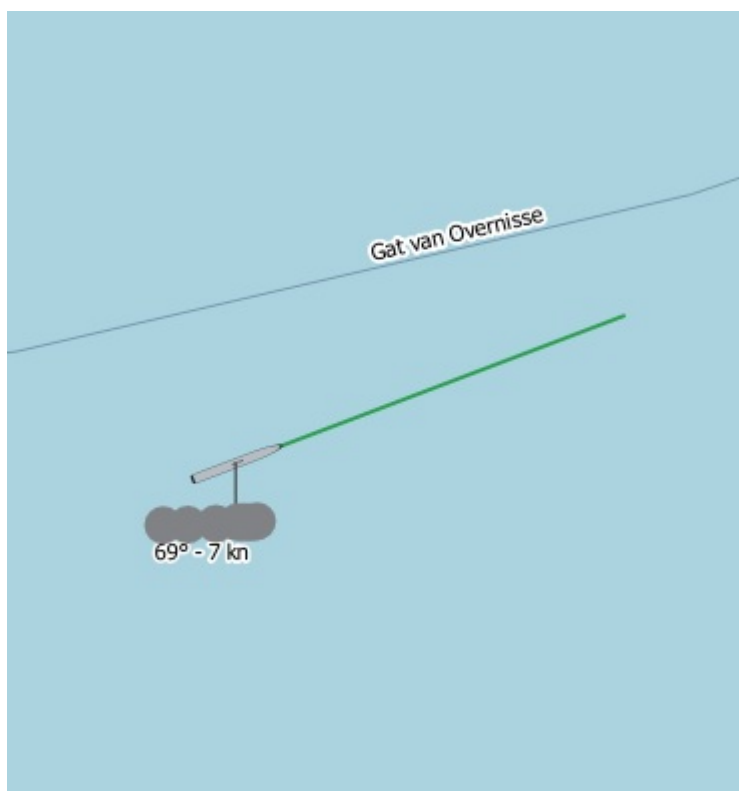
At a wide zoom, true-to-scale ship symbols can become specks. The **symbol amplifier** multiplies symbol size — **×1, ×2, ×5, ×10** — without changing anything else, so you can keep small craft visible when zoomed out. It's purely a visual aid; the underlying positions are unchanged. (Drop it back to ×1 when you zoom in close.)

## 5.5 Vessel names and labels

As vessels broadcast their static data (name, callsign, IMO, dimensions), AIS Watchkeeper quietly **learns and remembers them per MMSI** in a small on-disk register. That's why a vessel that arrived as a bare number gradually gains a name — and why it's already named the next time it appears, even before it re-broadcasts. You read this register in the **Vessels** tab (Section 8).

Each vessel also carries a **label**: its name (up to ten characters) on the first line and, on a second line, its heading and speed — for example **351° - 20 kn**. The label sits a fixed distance off the vessel on its starboard quarter,

joined to the symbol by a short leader line so it's clear which ship it belongs to even in a crowd. Vessels reporting a **static status** — moored or at anchor — show the name only, since heading and speed carry no meaning there. The **Ship labels** toggle in the Settings box turns the labels on and off.



A vessel's label, set off on the starboard quarter and joined to the symbol by a short leader line — here the heading-and-speed line reads  $69^\circ - 7 \text{ kn}$  (the name sits on the line above once it has been learned). The green line is the vessel's COG speed vector.

## 5.6 Plotting, and the display switches

The Settings box has a **plot vessels** dropdown that decides which vessels are drawn on the map:

- **all vessels** (default) — every decoded vessel is drawn on the `liveFeedAIS` layer.
- **my fleet** — only the vessels on your **My fleet** watchlist are drawn (Section 8.3), so the map shows just the ships you care about while the feed still decodes everything.
- **off** — nothing is plotted; the plugin keeps decoding and counting traffic without drawing it.

Near the connect controls, above the Settings box, is a **Show AIS only** checkbox — it filters the live *sentence log* on the tab down to AIS messages, hiding any other NMEA traffic (e.g. GPS sentences) sharing the feed. This affects the on-screen log only, not the map.

Two more switches sit in the Settings box: **Bind vessels to fairways** connects each vessel to the Dutch fairway network and is the foundation of the Routes features (Section 9), and **Audible chime on alarm** governs the Guardian's alarms (Section 7).

## 5.7 Losing contact — stale targets

A vessel that stops transmitting doesn't linger forever. If **no position is heard from a target for 20 minutes**, AIS Watchkeeper removes it from the map, from its trail and from any route binding, keeping the picture current. Whether the removal is *noted* depends on coverage: if the feed was still live at the time — you were hearing *other* vessels — the target counts as a genuine **lost target** and a line is written to the event log; if the whole feed had gone quiet (an outage), the removal is silent, since the vessel simply went out of coverage. A target that starts transmitting again reappears normally.

# 6. Receiver position & coverage mapping

## 6.1 Why set your receiver position

Telling AIS Watchkeeper where your antenna is does two things:

1. **It anchors coverage mapping** — every cell of received traffic is stamped with this position (Section 6.4).
2. **It's the reference point for the Vessels list** — the **Bearing** and **Distance** to each nearby vessel are measured from here (Section 8).

You can run without it — vessels still plot, the Guardian still alarms, and traffic still binds to routes — but coverage and the nearby bearing/distance need it.

## 6.2 Setting your position

On the **AIS stream** tab, click **Set own position...** You have two ways to give it:

- **Pick on the map** — after clicking the button, click your antenna's location on the map. The point is reprojected automatically, so it doesn't matter what coordinate system the map is in.
- **Type it** — enter `lat, lon` in decimal degrees (EPSG:4326), e.g. `51.333, 3.833`.

Your position then shows on the map as a single **home marker** (a house symbol, or a bold star as a fallback). To move it, just set it again.

## 6.3 It's remembered

Your receiver position is saved, so it's restored the next time you open the project and coverage **resumes accumulating under it** automatically — you don't re-enter it each session.

## 6.4 Coverage mapping

As traffic comes in, AIS Watchkeeper records **where it actually hears vessels**, building a live picture of your real-world reception — and, just as usefully, your blind spots. It does this on a grid: each small cell counts how many receptions it has collected, split by transponder class.

- **Class A** (the 12.5 W transponders carried by commercial vessels) is drawn in **blue**.
- **Class B** (the 2 W transponders on smaller craft) is drawn in **orange**.
- Each cell's dot **grows with reception density** — the more hits in a cell, the bigger the dot — so strong, reliable coverage stands out from the fringes where you only occasionally hear a vessel. Because Class A transmits at far higher power, you'll typically see its blue reaching much further out than the orange Class B.

The coverage layer is added to your project but switched **off by default**, so it doesn't clutter the live picture. To see it, open the **Layers** panel (Section 3.1) and tick the coverage layer. Turn it off again the same way.

Coverage is **kept separately per source**, so different sources never blur together. For a local receiver it is stamped with the antenna position you set, so moving to a new position starts a fresh survey while the old one is kept — you can compare reception from different sites. An internet source is tracked under its own identity instead: a fixed-footprint feed such as Kystverket keeps its own coverage map, and a position-based feed such as aisstream.io is tracked around the position you set. Switching source therefore switches to that source's own coverage picture, rather than overwriting your antenna's.

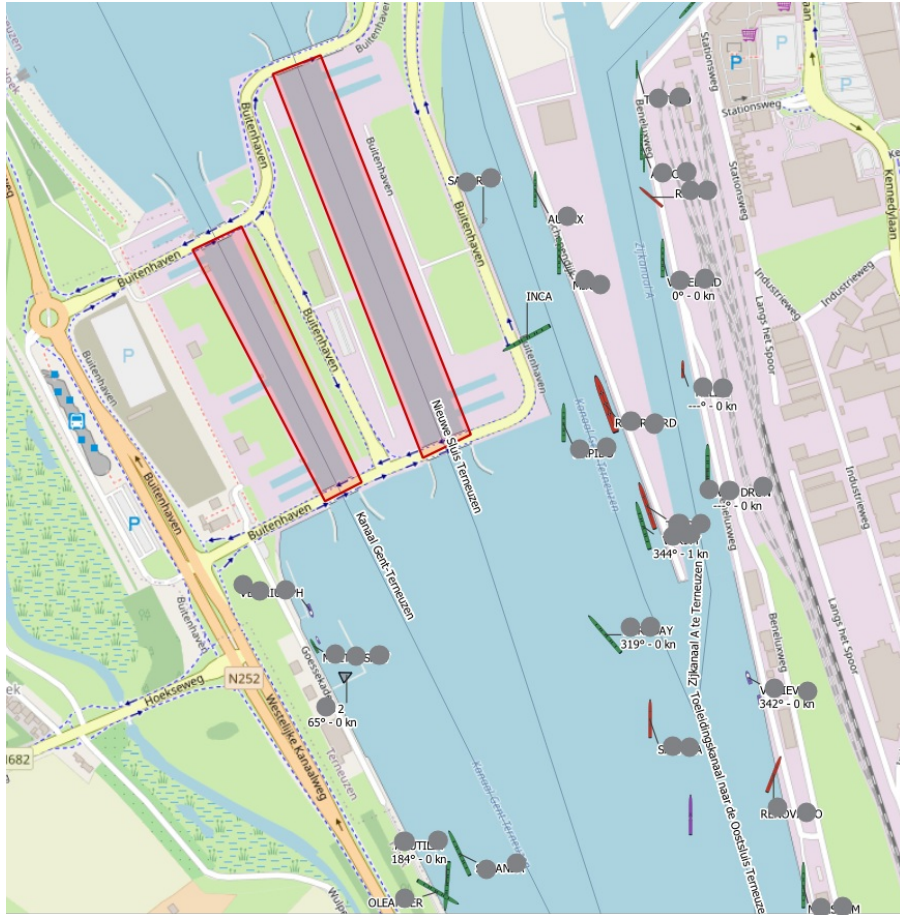
## 6.5 Watching coverage build

The **Event log** tab shows a coverage-status caption, and — when event logging is on — logs each time a vessel first comes into or drops out of coverage. So beyond the map picture, you get a running record of coverage changes over time. The logging side of this is covered next.

# 7. The Guardian

The AIS Guardian watches guard zones you draw on the map and raises an alarm when a vessel crosses them — the core watchkeeping function. It also keeps a log of vessel events. Everything here lives on the **AIS Guardian** tab.

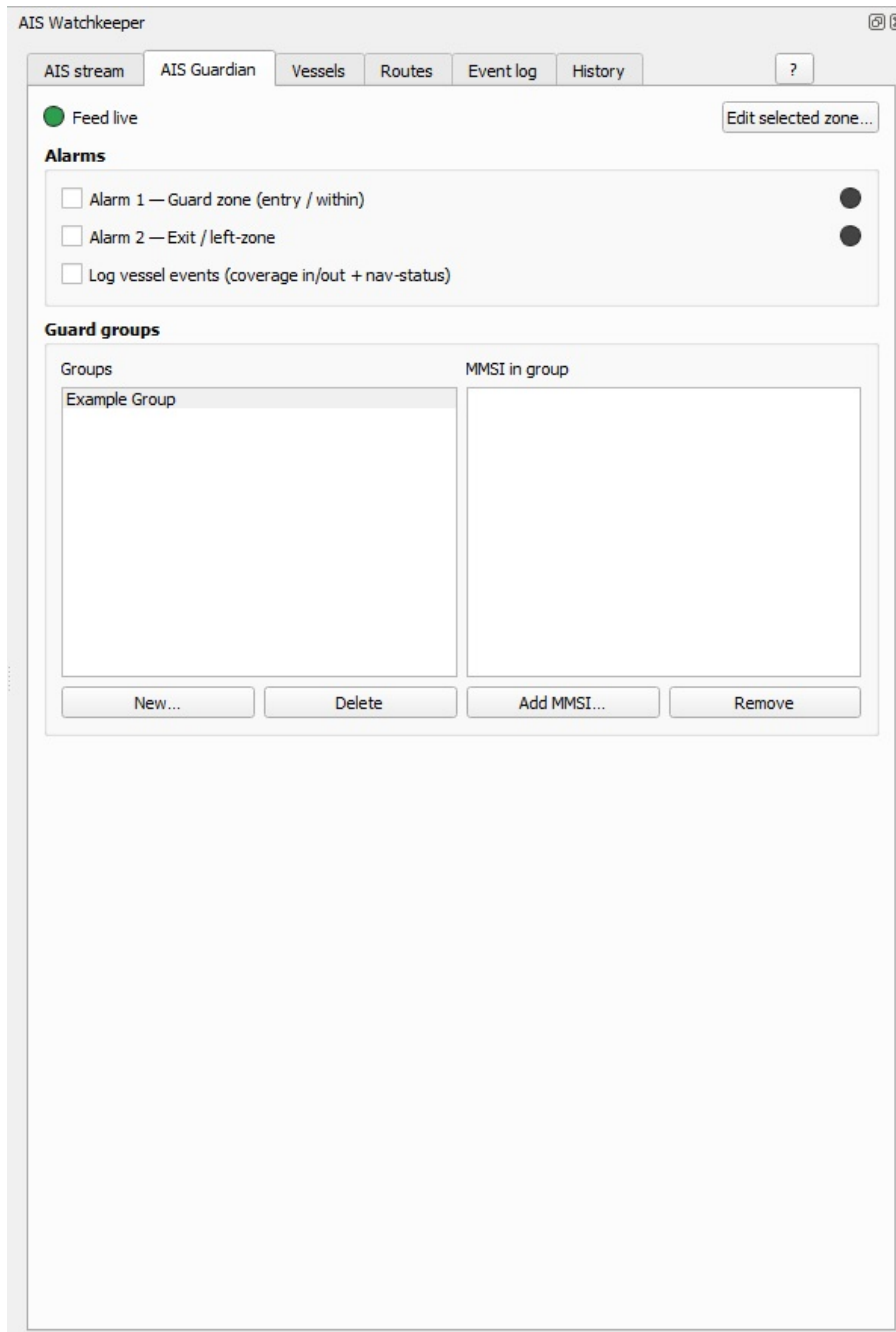
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Guard zones (red) drawn around the lock chambers at Terneuzen, watching live traffic; a vessel entering an armed zone raises an alarm and an Event-log entry.

## 7.1 The tab at a glance

Top to bottom: a green **Feed live** light, an **Edit selected zone...** button, the **Alarms** box (two alarms plus an event-logging switch), and the **guard-groups** editor.



The AIS Guardian tab — the Feed-live light, the three alarm switches (Alarm 1/2 plus the log-only event switch), and the guard-groups editor with New / Delete / Add MMSI / Remove.

## 7.2 Drawing a guard zone

A guard zone is a polygon you draw with QGIS's native editing tools, exactly as described in Section 3.3: select the `guardZones` layer, **Toggle Editing**, **Add Polygon Feature**, click out the shape, right-click to finish, then **Save Layer Edits**.

The moment you finish the polygon, the Guardian's **zone form** opens:

- **Name** — a label for the zone (shown in alarms and the log).
- **Armed** — the zone's own on/off switch (on by default). An unarmed zone is kept but never alarms.
- **Alarm on entry (Alarm 1)** — alarm when a vessel enters or sits inside (on by default).
- **Alarm on exit (Alarm 2)** — alarm when a vessel leaves (off by default).
- **Target** — **All vessels**, or **Guard groups** with a checklist of your groups (Section 7.5). Pick one or more groups to watch only those vessels.

Two save-time failsafes stop you from creating a zone that can never fire: you can't save a group-targeted zone with **no group selected**, and you can't save a zone with **neither entry nor exit** ticked.

To change a zone later, select it on the map ( Select Features) and click **Edit selected zone...** on this tab.

## 7.3 The three switches

The **Alarms** box holds the master switches. A zone only acts when the relevant master switch here is on:

- **Alarm 1 — Guard zone (entry / within)** — fires when a targeted vessel enters or is inside any armed zone. Its red light glows while any entry incident is open.
- **Alarm 2 — Exit / left-zone** — fires when a targeted vessel leaves. Its red light glows while any exit incident is open.
- **Log vessel events (coverage in/out + nav-status)** — *log-only, no chime, no light*. Records when vessels first enter or drop out of your reception coverage, and when a vessel changes navigation status (e.g. moored → under way). These go to the Event log only.

While a vessel is triggering an alarm, its name also turns **red** in the Vessels → Nearby list (Section 8), so you can spot the offending contact in the list at a glance, not just on the map.

Think of alarming as **two-level gating**: a zone fires only when the master switch is on **and** the zone is armed **and** the vessel is a target. That lets you arm a whole set of zones but silence them all with one master switch, or leave the master on and disarm a single zone.

## 7.4 How detection behaves

A few deliberate behaviours make the alarms trustworthy:

- **Segment-based** — the Guardian tests the track *between* two consecutive fixes, not just the dots. A fast vessel reporting infrequently can't skip across a thin zone unseen.
- **One incident per visit** — a 60-second exit grace absorbs tide and GPS jitter, so a vessel loitering on a boundary registers as a *single* incident, not a flurry. Entry is reported immediately; an exit is confirmed once the grace expires. A genuine leave-and-return after the grace counts as two incidents.
- **Self-clearing light** — the red light simply reflects whether any incident is currently open. There's no acknowledge step and nothing to reset.

## 7.5 Guard groups (watching specific vessels)

A **guard group** is a named set of MMSIs — a watchlist. The editor at the bottom of the tab lets you create and name groups, and add or remove MMSIs in each. Once a group exists, you can target a zone at it (Section 7.2) so the zone alarms only on those vessels.

The fastest way to populate a group is from the **Vessels** tab: right-click a vessel and choose **Copy to group** (Section 8). Use groups for a watchlist of vessels of interest; use **All vessels** on a zone when you want any intrusion to alarm.

## 7.6 What happens when an alarm fires

On a real alarm (Alarm 1 or 2), three things happen together:

1. **An audible chime** — if **Audible chime on alarm** is ticked. That toggle sits in the **Settings** box on the AIS stream tab (on by default) and governs the Guardian's alarms.
2. **A message-bar line** across the top of QGIS, naming the alarm kind, the vessel's MMSI, the zone, and what happened.
3. **An entry in the Event log** (Section 8 covers the Event log tab).

The log-only events from the third switch (coverage in/out, nav-status) are **silent** — no chime, no message bar — and appear only in the Event log.

# 8. Vessels

The **Vessels** tab is a live table of traffic, with three views you switch between using the **Nearby / Register / My fleet** radio buttons at the top.

## 8.1 Nearby

**Nearby** lists every vessel currently being received, measured against your receiver position (Section 6) and sorted **nearest first**. Columns:

- **MMSI** — the vessel's identity number.
- **Vessel name** — its learned name (blank until it broadcasts one). A vessel currently triggering a Guardian alarm shows its name in **red** here, matching the map.
- **Bearing** — the compass bearing from your position to the vessel, in degrees.
- **Distance** — straight-line range from your position, in nautical miles.
- **Fairway** — the name of the fairway the vessel is bound to, or — if it isn't on one.
- **Flow** — its direction of travel along that fairway. A vessel that's moored, at anchor or aground shows **idle** instead of a direction (so a ship sitting beside a fairway doesn't read as "moving").
- **Route km** — how far along the fairway it is, in kilometres (the fairway's linear-referencing measure).

Because it's sorted by distance and refreshes live, the top of the list is always your closest traffic. **Click any row** to pan and zoom the map to that vessel.

MMSI	Vessel name	Bearing	Distance	Fairway	Flow	Route km
2460026	VIRATA	8°	1.38 nm	Westerschel...	inbound	61.2
2460030	LIPATA	234°	1.43 nm	—	idle	
2473009	DIPATA	255°	1.44 nm	—	idle	
2460087	IRATA	257°	1.47 nm	—	—	0.2
2460075	YIRATA	250°	1.48 nm	—	—	0.3
2460066	GOSSATA	260°	1.50 nm	—	idle	
2460000	HENDRIK	260°	1.51 nm	Route via de Oostsluis na...	idle	0.3
2460003	RUMY	242°	1.51 nm	—	idle	
2460005	MUSDA	263°	1.51 nm	—	—	
2460006	ITATA	234°	1.51 nm	—	idle	
2460005	REVA	266°	1.52 nm	Route via de Oostsluis na...	idle	0.5
2460000	TERNEL	268°	1.53 nm	—	—	0.0
2460000	LUEN GEVAIT	268°	1.54 nm	—	—	0.6
2460000	WIMELD	268°	1.54 nm	—	idle	
2460000	SUSINS	270°	1.56 nm	Zijkanaal A naar ...	outbound	0.2
2460000	RIPATE	274°	1.57 nm	—	—	
2460000	IPANIN	271°	1.57 nm	—	idle	
2460000	YLDOS	265°	1.58 nm	—	idle	
2460091	NATA	276°	1.59 nm	—	—	
2460000	VEIT	241°	1.60 nm	Kanaal van Gent naar ...	outbound	28.4
2460000	ATA	287°	1.60 nm	—	—	
2460043	SIFA	267°	1.61 nm	—	idle	
2060000	TRAGER	273°	1.61 nm	—	idle	
2460000	WILLA	279°	1.61 nm	Zijkanaal A naar ...	inbound	0.6
2460000	RATA	280°	1.63 nm	—	idle	

*Nearby: traffic sorted nearest-first, each row showing bearing and distance from your position, plus the fairway, flow and route-km from binding (idle vessels show no flow).*

If no receiver position is set, Nearby stays empty — Bearing and Distance have nothing to measure from. Set your position (Section 6.2) to populate it.

## 8.2 Register

**Register** switches the table to the **learned vessel database** — every vessel AIS Watchkeeper has ever seen and remembered, not just those in range right now. It's backed by `vessel_names.xml` in your profile, so it persists across sessions and grows over time. Columns:

- **MMSI, Vessel name, Vessel callsign, Vessel ID, Vessel Length, Vessel Beam, Vessel Type.**

A **search box** (active in this view) filters the table as you type, matching across the fields — handy for finding a particular ship in a long history.

MMSI	Vessel name	Vessel callsign	Vessel ID	Vessel Length	Vessel Beam	Vessel Type
				13	5	Sailing
				12	4	PleasureCraft
				19	10	OtherType_N...
				12	4	Sailing
				13	4	PleasureCraft
				15	5	Sailing
				2	2	
				12	4	OtherType_N...
				73	9	Cargo_NoAdd...
				85	9	Cargo_NoAdd...
9423633				166	28	Cargo
				73	8	Cargo_NoAdd...
				86	10	Cargo_NoAdd...
				96	13	WIG
9223435				88	12	Cargo
				110	12	OtherType
				110	12	Cargo_NoAdd...
				80	9	Cargo_NoAdd...
				80	8	OtherType_N...
				86	10	OtherType_N...
				86	11	Cargo_NoAdd...
				85	10	OtherType_N...
9778002				102	16	Tanker_NoAd...
9823792				106	16	DredgingDel...

*Register: the learned ship database — MMSI, name, callsign, vessel ID, length, beam and type — for every vessel ever seen, filtered live by the search box.*

## 8.3 My fleet

**My fleet** is your own watchlist — the ships you want to keep an eye on regardless of the rest of the traffic. Switch to it with the **My fleet** radio button; the view lists the vessels you've added, with the same columns as the Register, and its search box filters as you type.

**Adding and removing.** In *any* Vessels view (Nearby, Register or My fleet), right-click a vessel and choose **Add to my fleet**; to drop one, right-click it and choose **Remove from my fleet**. Your fleet is saved in your profile (`my_fleet.json`, Section 11.1), so it persists across sessions.

**Plotting just your fleet.** Set the **plot vessels** dropdown (Section 5.6) to **my fleet** and the map draws only these vessels — a clean picture of just your ships, while the feed keeps decoding everything else.

### 8.4 Copy a vessel into a guard group

Right-click any vessel row and choose **Copy to group** → **[group]** to add that vessel's MMSI to one of your guard groups (Section 7.5). It's the quickest way to build a watchlist: spot a vessel of interest in the list, right-click, done — no typing MMSIs by hand.

### 8.5 The Event log

The fifth tab, **Event log**, is the running record. Every alarm (zone entry/exit) and every logged event (coverage in/out, nav-status changes, stream-health summaries) lands here with a timestamp, newest first. **Refresh** reloads it, and **Export** writes the whole log to a CSV file for reporting or archiving. A coverage-status caption sits beside the export control.

	Time (UTC)	Kind	Zone	MMSI	Lat	Lon	Detail
1	2026-07-08...	LOST TARGET		2114011	52.0865	4.649088333...	no position for 20 min (...)
2	2026-07-08...	LOST TARGET		1170114	51.739025	3.825885	no position for 20 min (...)
3	2026-07-08...	LOST TARGET		2115110	51.871695	4.31258	no position for 20 min (...)
4	2026-07-08...	LOST TARGET		1140195	51.652636...	4.29869	no position for 20 min (...)
5	2026-07-08...	LOST TARGET		2113211	51.698330...	4.421643333...	no position for 20 min (...)
6	2026-07-08...	LOST TARGET		1147011	51.624866...	3.914415	no position for 20 min (...)
7	2026-07-08...	LOST TARGET		1111115	51.830216...	4.966596666...	no position for 20 min (...)
8	2026-07-08...	LOST TARGET		1111115	51.920584...	4.50639	no position for 20 min (...)
9	2026-07-08...	LOST TARGET		1111110	51.811643...	4.654681666...	no position for 20 min (...)
10	2026-07-08...	LOST TARGET		2110115	51.461941...	3.685035	no position for 20 min (...)
11	2026-07-08...	LOST TARGET		1111111	51.786515	5.088398333...	no position for 20 min (...)
12	2026-07-08...	LOST TARGET		1111110	52.287304...	3.873118333...	no position for 20 min (...)
13	2026-07-08...	LOST TARGET		1111110	51.687425	4.508891666...	no position for 20 min (...)
14	2026-07-08...	LOST TARGET		2112111	51.843976...	4.424388333...	no position for 20 min (...)
15	2026-07-08...	LOST TARGET		2111110	52.013798...	5.109576666...	no position for 20 min (...)
16	2026-07-08...	LOST TARGET		1111110	52.098903...	4.265478333...	no position for 20 min (...)
17	2026-07-08...	LOST TARGET		1111110	51.757391...	4.278663333...	no position for 20 min (...)
18	2026-07-08...	LOST TARGET		1111110	51.970496...	5.42586	no position for 20 min (...)
19	2026-07-08...	LOST TARGET		1111110	51.961789...	4.413928	no position for 20 min (...)
20	2026-07-08...	LOST TARGET		1111110	51.233726...	2.922088333...	no position for 20 min (...)
21	2026-07-08...	LOST TARGET		1111115	51.942693...	4.177351666...	no position for 20 min (...)
22	2026-07-08...	LOST TARGET		1111110	51.1411	2.744355	no position for 20 min (...)
23	2026-07-08...	LOST TARGET		1111113	51.951105	4.075026666...	no position for 20 min (...)
24	2026-07-08...	LOST TARGET		2111111	51.299229...	4.273796666...	no position for 20 min (...)
25	2026-07-08...	LOST TARGET		1111110	51.805366...	4.612881666...	no position for 20 min (...)

Refresh    Export CSV...    Coverage: A=2267 cells (15691 hits), B=762 cells (2666 hits)

The Event log: timestamped rows — here a run of **LOST TARGET** events (a target unheard for 20 minutes while the feed stayed live) with time, MMSI and last position. The coverage caption (bottom) tracks Class A/B cell counts; Refresh reloads and Export CSV saves the log.

## 9. Routes & fairway binding

This is what sets AIS Watchkeeper apart from a plain plotter: it ties each vessel to the Dutch fairway network, so you can think in terms of *fairways and traffic flow* rather than just dots on water. Everything in this section depends on **Bind vessels to fairways** being on (the switch in the AIS stream tab's Settings box, on by default).

### 9.1 What fairway binding is

As vessels move, AIS Watchkeeper matches each one to the fairway it's actually travelling on, and works out **how far along** that fairway it is (a kilometre measure) and **which way** it's heading. Those three facts — fairway name, route-km, flow direction — are what fill the Vessels tab (Section 8) and drive the route strip (Section 9.4).

The matching is deliberately careful, so vessels don't flicker between nearby fairways:

- It binds on the vessel's **track**, not a single position — it watches the course made good over at least **three** fixes and picks the fairway that best matches both *proximity* and the *direction the vessel is actually travelling*. So where several fairways run close together, a vessel binds to the one it's moving along, not merely the nearest line.
- A vessel that drops below about **2 knots for several fixes is detached** from its fairway — a moored or anchored ship stops being glued to whatever fairway it happens to sit beside. It re-binds once it's making way again. (This is why such vessels read **idle** in the Vessels list.)

### 9.2 The fairway chart layers

Two related datasets sit behind this, and they show up differently on the map:

- The **routes** used for binding are full-length, properly-named fairways (the Westerschelde, for instance, is one ~105 km line). These carry the kilometre referencing. They're bundled with the plugin, so binding works fully **offline**.
- A separate "**vaarwegen**" **passages** layer is a *display-only* chart layer — the individual named stretches (Honte, Pas van Terneuzen, Vlissingen Rede, and so on), drawn as thin reference lines. To keep the map clean, it only appears when you're **zoomed in past about 1:12500**. Zoom in and the fairway detail fills in; zoom out and it tidies away. You can toggle it like any layer from the Layers panel (Section 3.1).

### 9.3 The Routes tab

The **Routes** tab is a live table of every fairway that currently has traffic on it, **sorted by fairway name** so the list stays stable and doesn't jump around as vessel counts change. Columns:

- **Fairway** — the route's name.
- **Inbound / Outbound** — how many vessels are moving each way along it.
- **Idle** — how many bound-but-stationary vessels sit on it.
- **Bind width (m)** — the per-route binding tolerance: how far, as a **perpendicular distance from the centreline** (to either side), a vessel can be and still bind. Editable.

**Custom routes you've drawn appear here in blue**, tagged (*custom*), mixed in with the bundled fairways and behaving the same way — counts, bind width, and a leg you can open (Section 9.8).

AIS Watchkeeper

Fairways with vessels in coverage — click a row to open its leg. 'Bind width' is how far off the centreline a vessel still binds (m); widen it for broad tidal fairways.

Fairway	Inbound	Outbound	Idle	Bind width (m)
1e Eemhaven	1	1	0	150
3e Petroleumhaven	1	0	0	150
6e Petroleumhaven (Beerkanaal)	1	0	0	150
Aanloop West (A1)	1	1	0	150
Aanloop West (DW)	1	0	0	150
Albertkanaal	1	5	0	150
Amazonehaven	1	0	0	150
Amertak en Wilhelminakanaal	0	1	0	150
Amstel-Gouwevaart (Amstel en Aarkanaal)	1	1	0	150
Amsterdam-Rijnkanaal	20	20	0	150
Beneden-Zeeschelde	0	0	7	150
Berendrechtsluis, vaarweg door	1	0	0	150
Berghaven te Hoek van Holland	1	1	0	150
Bijleveldhaven	0	1	0	150
Binnenhaven te Noordland	0	0	1	150
Boerengat en aanliggende havens	0	2	0	150
Botlek en aanliggende havens	0	1	0	150
Boven-Rijn, Waal, Boven-Merwede, Beneden-Merwede en Noord	20	17	0	150
Brabantsche Vaarwater - Oosterschelde	1	3	0	150
Breeddiep	0	0	1	150
Buitenhaven te Vlissingen	2	1	0	150
Calandkanaal met aanliggende havens	2	3	0	150
Delwaidedok	0	0	1	150
Deurganckdok	0	0	2	150
Diepwaterroute van Rotterdam	0	1	0	150

The Routes tab — every fairway carrying traffic, sorted by name, with Inbound / Outbound / Idle counts and an editable Bind width (m). The default 150 m suits canals; widen a broad tidal fairway so ships sailing off the centreline still bind.

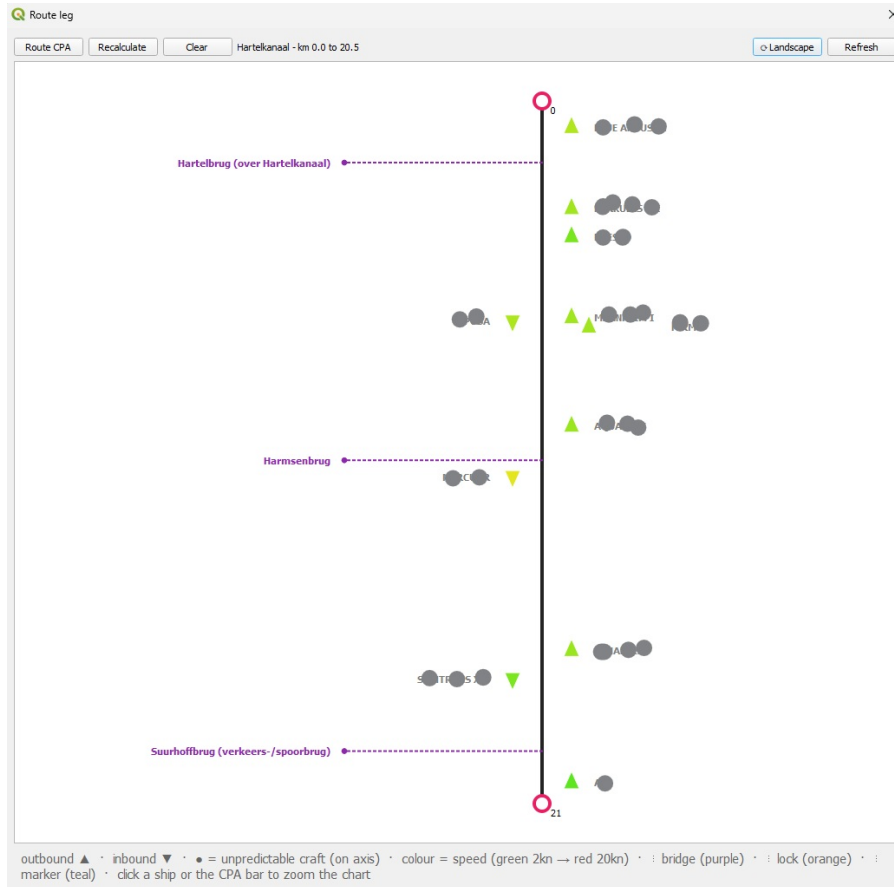
Click any row (except the Bind-width cell) to open that fairway's leg in the route-strip monitor (Section 9.4). The table refreshes every couple of seconds and keeps your selected route highlighted across refreshes.

**Tuning bind width.** A single fixed tolerance doesn't suit every fairway. The value is the **perpendicular distance measured outward from the fairway centreline** — not the total corridor width — so the fairway effectively spans that distance on *each* side of its centreline. A tidal fairway like the Westerschelde mouth is nearly a kilometre wide and ships legally sail well off the centreline, so a tight tolerance would drop them as "off-fairway." Double-click the **Bind width (m)** cell and widen it — for a fairway where ships run up to ~650 m off the centreline, set roughly **650**, which reaches ~650 m to either side. Narrow canals and closely-spaced parallel routes keep the tight default so they don't mis-bind. Widening never *steals* a vessel that's genuinely closer to another route — the nearest-plus-alignment rule still decides — it just lets an off-centre vessel bind to the fairway it's really on (reading as a slightly lower-confidence bind). Values are saved per route and reload next time.

## 9.4 The route-strip monitor

Click a fairway in the **Routes** tab and its **leg** opens in a separate window — the strip monitor. It lays the whole

Click a fairway in the **Routes** tab and its leg opens in a separate window — the strip member it lays the whole fairway out as a straight axis marked in kilometres, and places every vessel on it at its route-km, so you read a winding 100 km fairway as one clean line.



The Hartelkanaal leg as a strip (km 0–20.5). Outbound ▲ to one side, inbound ▼ to the other; bridges branch off by route-km (Hartelbrug, Harmsenbrug, Suurhoffbrug). Where symbols crowd they fan out perpendicular from the axis — slowest nearest the line, fastest furthest out.

How to read it:

- **Outbound vessels sit above the axis, inbound below** — so the two traffic streams separate at a glance.
- **Each vessel is coloured by speed** — a heat ramp from green at ~2 knots through to red at 20 knots and above (grey if the vessel isn't reporting speed). Fast movers jump out.
- **Stationary vessels are hidden** — anything slower than ~2 knots is dropped from the strip so it doesn't clutter, leaving only the traffic that's actually moving. Ship names are automatically nudged apart so they stay readable even in a busy cluster.

Controls on the strip's toolbar:

- **Portrait** toggles the layout between horizontal and vertical — a real re-layout, so labels read normally either way. Use whichever fits your screen or second monitor.
- **Refresh** re-fits the view to the whole leg. The strip also refreshes itself every couple of seconds.
- You can **wheel-zoom** about the cursor and **drag to pan**; your zoom and pan are kept across the live refreshes, and only an explicit action (open, Refresh, rotate, resize) snaps back to the full-leg fit.
- **← Overview** steps back out of the leg.

The strip is wired to the main map: **click a ship on the strip** and the QGIS map recentres, zooms and flashes that vessel — so you can go from "who's that on the strip" to "show me on the chart" in one click.

## 9.5 Bridges and locks (live from the RWS service)

When you open a leg, AIS Watchkeeper fetches that fairway's **bridges and locks** from the Rijkswaterstaat FIS-VNDS service and draws them on the strip as labelled markers rising from the axis: **purple for a bridge, orange for a lock**, named, positioned by their own route-km.

This is the one place the plugin reaches the internet. The fetch is per-route, cached, time-limited and entirely **best-**

**effort:** if you're offline or the service hiccups, the strip simply opens without the bridge/lock markers and the live AIS feed is never affected. So bridges and locks need a connection; binding, the strip and everything else work fully offline.

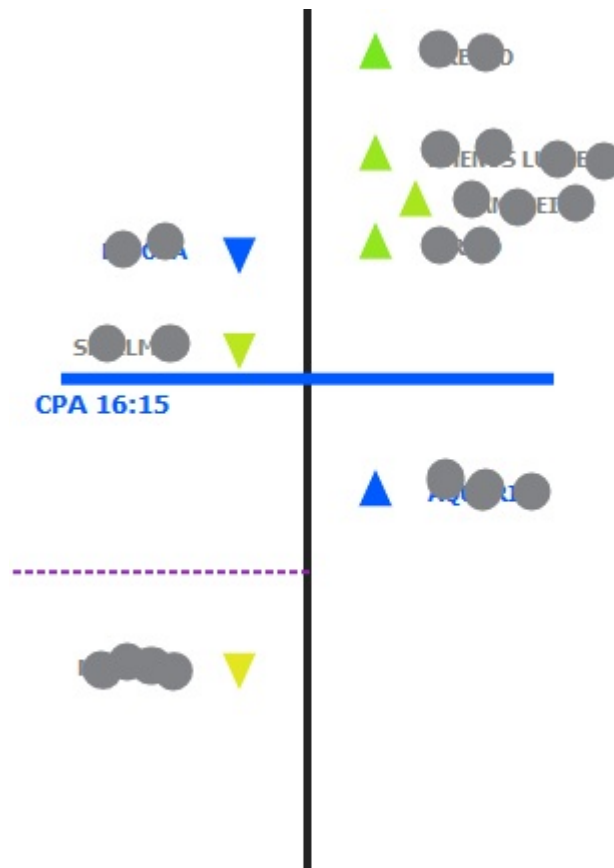
## 9.6 Your own reference markers

Bridges and locks come from the service, but you can add your **own** points to the strip — buoys, VTS sector boundaries, berths, anything you want as a landmark along the fairway. You place these with QGIS's native editing as described in **Section 3.4** (the `Route reference markers` layer), and they appear on the strip as **teal diamonds**, snapped to the nearest fairway and positioned by route-km exactly like the bridges and locks. They also feed the ETA tool below.

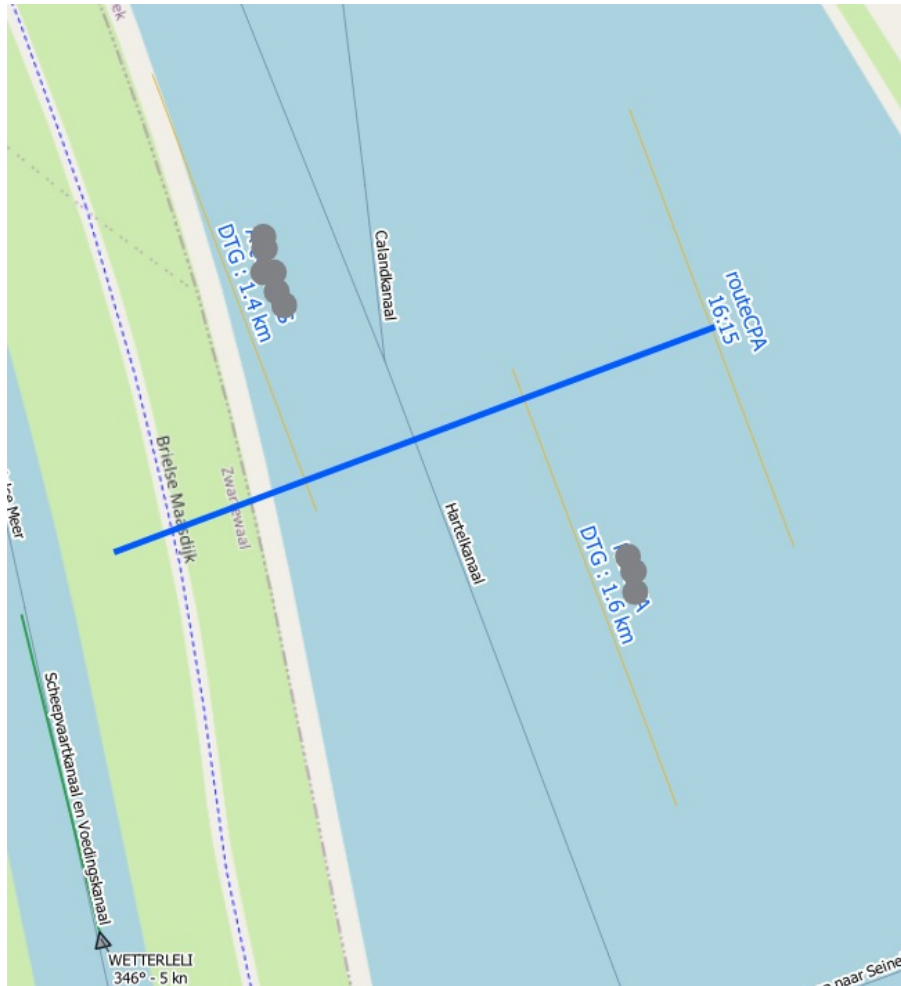
## 9.7 Route CPA and ETA

The **Route CPA** button predicts encounters *along the fairway* — which is what matters on a fairway, where two ships' paths are constrained to the same line.

- **Two vessels:** click **Route CPA**, then click two vessels on the same fairway. The strip predicts their meeting point and draws it — **blue for a head-on meeting, green for an overtaking** (one catching the other) — with each vessel's distance-to-go to that point.
- **A vessel and a fixed object:** click a vessel, then a bridge, lock or one of your markers, and you get that vessel's **ETA and distance-to-go** to the structure — useful for "when does this ship reach the lock."

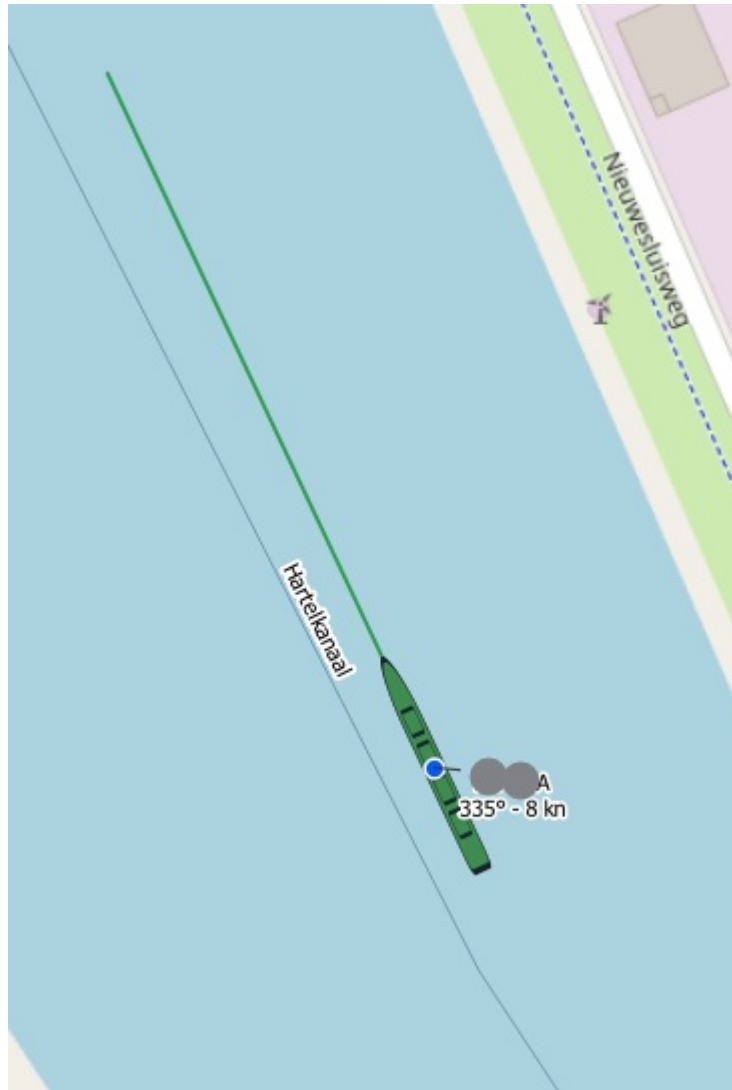


A head-on route-CPA on the strip — the blue bar marks the predicted meeting point and time (here CPA 16:15), with the two closing vessels either side of it.



The same prediction on the main chart: the meeting bar (routeCPA 16:15) drawn at its real position across the Hartelkanaal, each vessel labelled with its distance-to-go (DTG).

**Recalculate** re-runs the prediction with the latest positions; **Clear** removes it. Each picked vessel is also marked with a **blue dot** on the main chart, so you can pick the two ships out of the traffic and tie the on-strip prediction to the real vessels on the map.



A vessel coupled to the active route-CPA, marked with a blue dot at its position so you can find it among the traffic on the chart. Its green line is the COG speed vector.

## 9.8 Custom routes (drawing your own)

The bundled fairway network is the Dutch one. **Outside the Netherlands there's no bundled fairway to bind to** — so AIS Watchkeeper lets you draw your own. A custom route is just a line you draw down the middle of a waterway and give a name; from then on it behaves like any other fairway — traffic binds to it, it appears in the Routes tab, and it gets its own leg strip with route-km, inbound/outbound, CPA and ETA.

**Drawing one.** Custom routes live on the `Custom routes` layer, and you draw them with QGIS's native editing exactly as in **Section 3.3**: select the layer, **Toggle Editing**, **Add Line Feature**, left-click each vertex down the waterway, **right-click to finish**, type a name, then **Save Layer Edits** and toggle editing off. Draw it down the centre of the channel, the way you'd draw a fairway centreline; vessels bind to it within the same perpendicular tolerance as any route (and you can widen that per route from the Routes tab, Section 9.3).

**The direction you draw it sets inbound vs outbound.** A custom route has no sea to orient itself by, so it takes its direction from how you draw it: travel in the **same direction you drew the line (first vertex → last vertex) counts as inbound**, the reverse as outbound. If the counts come out backwards for your waterway, just redraw the line the other way (or reverse its geometry with the Vertex tool).

**Custom routes win ties.** Where a custom route overlaps or runs close to a bundled fairway, a vessel within tolerance of both **binds to your custom route**, not the native one — so your own routes take precedence wherever you've drawn them. Everywhere you *haven't* drawn a custom route, native binding is completely unchanged.

**They persist.** Custom routes are saved in your profile (`custom_routes.gpkg`, Section 11.1) and reload every session, and edits take effect live — add, reshape or rename a route, save, and the binding picks it up within a couple of seconds. In the Routes tab they're shown in **blue** and tagged (*custom*) so you can always tell your

routes from the bundled ones.

## 10. Voyage history

AIS Watchkeeper can keep a **history of where vessels have been**, segmented into voyages, so you can look back at a track later. It is **off by default** and entirely optional; you turn it on in the **Voyage history** box on the AIS stream tab.

### 10.1 Recording

Tick **Record voyage history** to start. Two choices shape what is kept:

- **Detail** — how much is stored, in three cumulative levels:

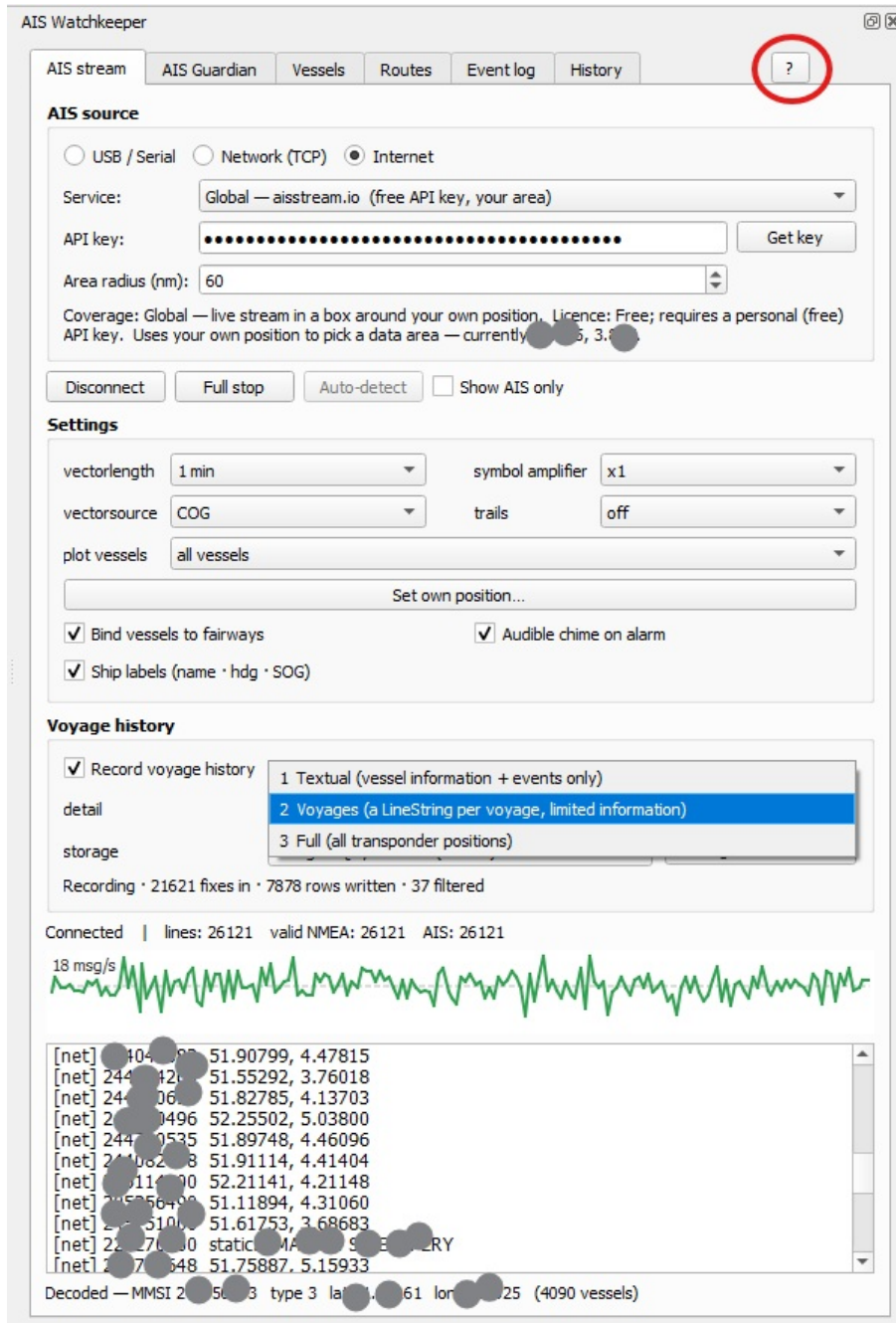
1. **Textual** — each vessel's identity plus a log of events (entering and leaving coverage, navigation-status changes). No geometry.
2. **Voyages** — the above, plus one line geometry per voyage.
3. **Full** — the above, plus every individual transponder position as a point (the fullest record).

- **Storage** — where it goes:

- **GeoPackage** — a single local file in your profile, created automatically. The status line shows how much disk it is using.
- **PostgreSQL / PostGIS** — a shared database, chosen from a connection you have saved in the QGIS Data Source Manager (click **Configure database...** to pick the connection and the target schema). The first time you record, the plugin offers to create the tables for you. Credentials come from QGIS's own connection, so nothing sensitive is stored by the plugin.

A **voyage** begins when a vessel is under way and ends when it moors or anchors, or when it drops out of coverage for more than an hour. Only real ships are recorded — shore stations, aids-to-navigation and obvious decode glitches (impossible position jumps) are filtered out — so the history stays clean. The status line reports fixes received, rows written and any that were filtered.

---



The Voyage-history box on the AIS stream tab with the **Detail** dropdown open — the three cumulative levels: 1 Textual, 2 Voyages, 3 Full. The ? button (top-right, circled) opens this manual.

## 10.2 Looking back

AIS Watchkeeper 🔍 🗖

AIS stream | AIS Guardian | Vessels | Routes | Event log | **History** | ?

Stored: 4729 voyages · 6507 vessels · 0 fixes (2026-07-07 22:03 – 2026-07-08 14:13 UTC) — Refresh

showing 4729

Search:

Time window: 2026-07-07 22:03 to 2026-07-08 13:52 last: hour day week

Only voyages crossing the current map view Apply filters

	Vessel	MMSI	start (UTC)	End (UTC)	Duration	Reason	Destination
2017	H...M...	01...03	2026-07-08 11:54	2026-07-08 12:26	32m	coverage_t...	—
2018	M...N S	414...03	2026-07-08 11:54	2026-07-08 13:18	1h 24m	stopped	—
2019	...A	18...15	2026-07-08 11:52	2026-07-08 12:49	56m	moored	—
2020	...AN GENT	2...7...08	2026-07-08 11:52	2026-07-08 12:09	16m	coverage_t...	—
2021	...K	2...690...	2026-07-08 11:52	2026-07-08 12:04	12m	coverage_t...	—
2022	S...URE II	...770...	2026-07-08 11:51	2026-07-08 12:11	19m	stopped	—
2023	V...K...HT	2......	2026-07-08 11:51	2026-07-08 12:15	24m	moored	—
2024	V...L...	2...029...	2026-07-08 11:50	2026-07-08 13:28	1h 37m	stopped	—
2025	...Y	2...37...	2026-07-08 11:50	2026-07-08 13:15	1h 25m	moored	—
2026	...57	...	2026-07-08 11:49	2026-07-08 12:36	46m	coverage_t...	—
2027	...STIUS	24...02...	2026-07-08 11:49	2026-07-08 12:44	54m	moored	—
2028	P...LUS	...3...	2026-07-08 11:49	2026-07-08 11:50	0m	coverage_t...	—
2029	M...TR...	...4...1...	2026-07-08 11:49	2026-07-08 12:21	31m	moored	—
2030	...	...50...0	2026-07-08 11:49	2026-07-08 12:32	43m	stopped	—
2031	A...A	2...26...0	2026-07-08 11:48	2026-07-08 12:28	40m	coverage_t...	—
2032	...P...S	2...41...6	2026-07-08 11:46	2026-07-08 12:06	19m	coverage_t...	—
2033	...ROUCH HAN	2...70...	2026-07-08 11:46	2026-07-08 13:40	1h 53m	stopped	—
2034	W...LA	3...5...0	2026-07-08 11:45	2026-07-08 11:49	4m	coverage_t...	—
2035	...NEST	...620...7	2026-07-08 11:45	2026-07-08 12:31	45m	stopped	—
2036	A...E	2...03...	2026-07-08 11:45	2026-07-08 12:01	15m	coverage_t...	—
2037	A...A	2...6...24	2026-07-08 11:44	2026-07-08 12:48	1h 04m	stopped	—
			2026-07-08	2026-07-08			

Show track | Show all tracks for vessel | Clear tracks | Export CSV... | Delete history...

The History tab: the stored-voyages table (vessel, MMSI, start / end UTC, duration, end reason, destination) with the search box, the time window and its last-hour / day / week presets, the map-view area filter, and the Show track / Show all tracks / Clear tracks / Export CSV / Delete history controls. The header shows how much is stored and how many rows are shown.

The **History tab** is the main way to browse what you have recorded: a sortable table of every voyage (vessel, MMSI, start / end in UTC, duration, end reason, destination), newest first. Three filters narrow it down: a **name or MMSI search**, an optional **time window**, and an optional **"only voyages crossing the current map view"** area filter. Then:

- **Double-click a voyage** (or select it and press **Show track**) to draw that voyage's track on the map and zoom to it.
- **Show all tracks for vessel** draws every voyage of the selected ship at once.
- **Export CSV...** saves the currently shown rows to a spreadsheet.
- **Delete history...** permanently clears the archive (see §10.3).

The header shows how much is stored (voyages, vessels, fixes) and the time span.

Two quicker shortcuts also pull a single track straight onto the map without opening the tab:

- **From the event log** — right-click an event and choose **Show track (±5 min)** to draw that vessel's track

from five minutes before to five minutes after the event.

- **From the register** — in the **Vessels** tab (Register view), right-click a vessel and choose **Past voyages...** to list its voyages; pick one and its track is drawn and zoomed to.

Retrieved tracks land in an **AIS history** layer group. If there is no history stored yet, the tab and the shortcuts tell you so rather than drawing an empty map.

## 10.3 Clearing history

**Delete history...** (in the Voyage history box) permanently clears all recorded history from the active backend — it empties the PostgreSQL tables, or deletes the GeoPackage file — after a confirmation. If recording was on, it resumes into a fresh, empty store.

# 11. Reference & troubleshooting

## 11.1 Where your data is kept

Everything you create lives in one folder inside your QGIS **profile**, not in the plugin folder — so it **survives plugin upgrades**:

```
<your QGIS profile>/ais_nmea_source/
```

What's in it:

- **Guard zones** — the polygons you draw (`ais_guardian_zones.gpkg`).
- **The Guardian store** — your guard groups, the event log, and your saved receiver position (`ais_guardian_store.gpkg`).
- **Coverage** — the Class A/B reception cells (`ais_guardian_coverage.gpkg`, kept separate to avoid write contention).
- **Vessel register** — the learned ship database (`vessel_names.xml`).
- **My fleet** — your vessel watchlist (`my_fleet.json`, Section 8.3).
- **Bind widths** — your per-route tolerances (`route_tol.json`).
- **Reference markers** — your strip landmarks (`markers.gpkg`).
- **Custom routes** — the routes you've drawn (`custom_routes.gpkg`, Section 9.8).
- **Voyage history** — when you record to the local GeoPackage, the voyage archive lives in a `history/` subfolder (`history/ais_history.gpkg`); recording to PostgreSQL/PostGIS keeps it in that database instead.
- A **backups** subfolder for the store.

To back up your whole setup, or move it to another machine, copy that one folder. (The fairway network itself — `data/routes.gpkg` and `data/fairways.gpkg` — ships *inside* the plugin and isn't something you edit.)

## 11.2 Troubleshooting

**A Bluetooth/USB receiver doesn't appear in the Port dropdown.** Most Bluetooth AIS units pair as a serial port and show up normally — click **Refresh** after pairing. If it still doesn't appear, it's most likely a Bluetooth Low Energy (GATT) device, which isn't supported (Section 4.1); contact the plugin developer.

**Connected, but no vessels appear.** Check the status counts on the AIS stream tab. If sentences are flowing but the **AIS** count stays zero, the baud rate is probably wrong (try **Auto-detect**, or 38400 vs 4800) or the feed isn't AIS (e.g. GPS-only). If AIS is being counted but nothing plots, make sure **Plot vessels on map** is ticked.

**A TCP feed won't connect or asks to log in.** The endpoint is secured — fill in the login dialog that appears (TLS, method, credentials) as described in Section 4.4.

**Vessels show but don't bind to a fairway.** Confirm **Bind vessels to fairways** is on. A vessel under ~2 knots is treated as idle and detached on purpose. If a moving vessel still won't bind, it may be sailing too far off the centreline — widen that route's **Bind width** in the Routes tab (Section 9.3).

**The Vessels → Nearby list is empty.** No receiver position is set; bearing and distance have nothing to measure from. Set it (Section 6.2).

**The coverage map isn't visible.** It's added switched off — tick the coverage layer in the **Layers** panel (Sections 3.1 and 6.4).

**A route's strip has no bridges or locks.** Those come live from the RWS service, so you're offline or it hiccupped. Everything else (binding, the strip, your markers) still works offline (Section 9.5).

**QGIS crashes when you unplug a serial receiver (Windows).** Hit **Full stop** before unplugging — it stops the reader cleanly first (Section 4.6).

**A guard zone never alarms.** Check the chain: the master switch (Alarm 1/2) must be on, the zone must be **Armed**, it must have **entry and/or exit** ticked, and if it's targeted at a guard group, that group must contain the vessel (Section 7).

## 12. Appendix

### 12.1 Licensing

AIS Watchkeeper (`ais_nmea_source`) is free software under the **GNU General Public License v3.0 or later** — the full text is in the bundled `LICENSE` file. Copyright © 2026 W.D. de Pooter; published under the byline **Captain Ahab & Cosmo**.

It bundles three pure-Python libraries (in `libs/`, so no `pip` or internet is needed to install them), each under its own permissive, GPL-compatible licence:

Library	Version	Licence	Purpose
<code>pyserial</code>	3.5	BSD-3-Clause	Serial port discovery and reading
<code>pyais</code>	3.1.0	MIT	AIS sentence decoding
<code>attrs</code>	26.1.0	MIT	<code>pyais</code> 's runtime dependency

One further library, **networkx** (BSD-3-Clause), is used for the routable fairway graph but is *not* bundled — it's provided by QGIS's own Python. Route matching degrades gracefully if it's absent.

**Data.** The bundled fairway network (`data/routes.gpkg`, `data/fairways.gpkg`) is derived from **Rijkswaterstaat FIS-VNDS** open `vaarweg/route` data, and the live bridges and locks are fetched from the same service.

### 12.2 AIS messages decoded

AIS Watchkeeper reads both `!AIVDM` (other vessels) and `!AIVDO` (own vessel) sentences, reassembling multi-sentence messages automatically. The message types it uses:

- **Position reports** — **types 1, 2, 3** (Class A) and **18, 19** (Class B): give each vessel's position, speed over ground, course, heading and navigation status. These decode immediately, one sentence each.
- **Static and voyage data** — **type 5** (Class A) and **type 24** (Class B, parts A/B): give the name, callsign, IMO/vessel ID, dimensions and ship-and-cargo type. These span two sentences, tied together on reassembly, and are what fill the vessel register and drive the ship-type symbology.