

Annotated User Guide

This PDF marks the parts of the Hydro Lab interface that a new user should look at first. The boxes are teaching aids only: they point to controls, evidence panels and report outputs.

- Start by confirming the active data pack has loaded.
- Read the scenario and ground condition before interpreting the map.
- Use map layers one at a time so the explanation does not become noise.
- Use the official-data and model-honesty panels before writing a report sentence.

Golden rule

The site should never pretend a screening footprint is a calculated flood depth, velocity or arrival time. Any report must say what is observed, what is modelled, and what is still uncertain.

Start Here: Data Pack, Status and Rainfall Scenario

Use this screen first. Confirm the pack has loaded, then read the active dataset and rainfall scenario before trusting any map or chart.

LTV Hydro Lab

Separate rainfall, runoff, floodwater and scenario workspace

1. Loaded status t starter loaded

Data Pack

Active dataset

2. Active dataset ter

3. Pack metadata iver Kent starter

AREA	Cumbria / Lake District starter pack
MODE	analytical screening
CRS	EPSG:27700

61 mm
RAINFALL TOTAL

24.1 mm
MAX 24H RAINFALL

1.556 m
PEAK RIVER STAGE

0.337 m
STAGE RANGE

6.0 h
INDICATIVE LAG

20 mm/hr

Heavy local rain · realistic but locally significant · adjusted stress 20.0 mm/hr

Z2 mean slope 8.9%

LTV LIDAR evidence layer is visible; HAND and flow accumulation are still pending.

2 action receptors

Runoff begins · 15-30 min

Scenario Runoff Lens

S2: Heavy local rain · 20 mm/hr for 1 hour. Surface flow likely begins in steep or poorly drained areas.

OverviewTerrainActionsAll Packsscreening

Run Pulse Sequence

Sequence idle. Visual briefing cue only; not calculated flood depth, velocity or arrival time.

The map displays the Lake District region in Cumbria, England, with various towns and geographical features labeled. A red box highlights a specific area in the central part of the map, near the town of Penrith and the Lake District National Park. The map includes a scale bar and a north arrow.

Scenario

4. Rainfall intensity buttons

Normal heavy rain

S2 · 20 mm/hr
Heavy local rain

S3 · 40 mm/hr
Severe rainfall

S4 · 60 mm/hr
Extreme cloudburst

S5 · 100 mm/hr
Exceptional stress-test

Antecedent condition

5. Ground wetness setting

Scenario Basis

PROVISIONAL STRESS LADDER

S2 · 20 mm/hr · serious local rainfall

Good working trigger for visible surface runoff and first receptor watch states.

PLANNER	Review plant routes, low storage, temporary works and upstream water arriving at the site.
CREW	Keep loose material, fuel, tools

Guided Run and Layer Switches

Use the Guided Run panel when explaining the site to a new person, then use the layer switches to reveal one evidence type at a time.

Guided Run

1. Pick the briefing step

W1 - Storm stress
Pick a rain rate and ground wetness.

W2 - Storm stress
Pick a rain rate and ground wetness.

W3 - Terrain route
Show why water is expected to move this way.

W4 - Site action
Translate the model into construction decisions.

W5 - Report caveat
State the decision and the uncertainty together.

2. Say this in plain English

pick has and sampled LTV LIDAR evidence. The risk zones and rainfall ladder are still screening tools until FEH rainfall and formal hydraulic layers are added.

Map Layers

3. Turn evidence layers on/off

LIDAR terrain zones

Flow direction + high/low points

Construction receptors

Rain / river gauges

EA statutory main rivers

Official EA flood context

EA surface-water hazard

Show all datasets together

DATASETS IN OVERVIEW All Active

Kendal / River Kent star... ACTIVE

24-Month Rainfall History

Met Office · 1km · 2024-05 to 2026-04

TOTAL
3331.4 mm
sum of loaded monthly values

MEAN MONTH
138.8 mm
simple mean across loaded months

WETTEST MONTH
Nov 25 · 287.7 mm
highest value in this 24-month window

COVERAGE
24/24
gauge 584772; nearest HadUK grid cell

May 24	<div style="width: 45%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	150.6 mm	Jun 24	<div style="width: 35%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	79.5 mm
Jul 24	<div style="width: 55%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	126.9 mm	Aug 24	<div style="width: 75%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	201.2 mm
Sept 24	<div style="width: 60%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	145.5 mm	Oct 24	<div style="width: 70%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	151.9 mm
Nov 24	<div style="width: 50%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	100.5 mm	Dec 24	<div style="width: 75%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	189.5 mm
Jan 25	<div style="width: 40%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	97.1 mm	Feb 25	<div style="width: 30%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	65.1 mm
Mar 25	<div style="width: 20%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	39.1 mm	Apr 25	<div style="width: 10%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	25.4 mm
May 25	<div style="width: 45%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	94.8 mm	Jun 25	<div style="width: 70%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	195.8 mm
Jul 25	<div style="width: 55%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	134.1 mm	Aug 25	<div style="width: 65%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	107.3 mm
Sept 25	<div style="width: 80%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	279.4 mm	Oct 25	<div style="width: 60%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	128.5 mm
Nov 25	<div style="width: 85%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	287.7 mm	Dec 25	<div style="width: 80%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	212.2 mm
Jan 26	<div style="width: 50%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	103.0 mm	Feb 26	<div style="width: 70%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	164.2 mm
Mar 26	<div style="width: 60%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	175.9 mm	Apr 26	<div style="width: 40%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	76.2 mm

No fake data: nearest HadUK-Grid cell to pack rainfall gauge using EPSG:27700 [source](#)

B - official gridded monthly rainfall; nearest grid cell to rainfall gauge; not sub-hourly intensity or catchment-average design rainfall No fake gap filling: unavailable months are shown as unavailable.

NRFA Daily Flow History

73005 · Kent at Sedgwick · 2022-10-01 to 2024-09-30

STATION MATCH
same river downstream proxy
Kent at Sedgwick

MEAN DAILY FLOW
12.85 m3/s
mean across loaded archive days

PEAK DAY
2024-01-21 · 108.10 m3/s
highest daily mean in this window

COVERAGE
731/731
official archive days loaded

Oct 22	<div style="width: 70%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	17.20 m3/s	Nov 22	<div style="width: 80%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	17.28 m3/s
Dec 22	<div style="width: 60%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	13.34 m3/s	Jan 23	<div style="width: 90%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	25.89 m3/s
Feb 23	<div style="width: 30%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	7.25 m3/s	Mar 23	<div style="width: 85%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	19.10 m3/s
Apr 23	<div style="width: 40%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	7.07 m3/s	May 23	<div style="width: 15%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	2.89 m3/s
Jun 23	<div style="width: 10%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	1.47 m3/s	Jul 23	<div style="width: 50%; height: 10px; background: linear-gradient(to right, #008000, #000000);"></div>	8.32 m3/s

Scenario Runoff Lens: Map Focus and Legend

This is the map-reading screen. Use focus shortcuts, then read the map and legend together so colours and lines are explained correctly.

starter pack

MODE **analytical screening**

CRS **EPSG:27700**

Scenario

S1 · 10 mm/hr
Normal heavy rain

S2 · 20 mm/hr
Heavy local rain

S3 · 40 mm/hr
Severe rainfall

S4 · 60 mm/hr
Extreme cloudburst

S5 · 100 mm/hr
Exceptional stress-test

Antecedent condition
Normal

Scenario Basis

PROVISIONAL STRESS LADDER
S2 · 20 mm/hr · serious local rainfall
Good working trigger for visible surface runoff and first receptor watch states.

PLANNER Review plant routes, low storage, temporary works and upstream water arriving at the site.

CREW Keep loose material, fuel, tools and welfare kit out of hollows and downhill lines.

CALIBRATION Use as screening / stress-test rainfall until local FEH DDF values are ingested.

Guided Run

W1 · Data check
Confirm what is real, provisional and missing.

W2 · Storm stress
Pick a rain rate and ground wetness.

Scenario Runoff Lens
S2: Heavy local rain · 20 mm/hr for 1 hour. Surface flow likely begins in steep or poorly drained areas.

1. Map focus shortcuts | All Packs | screening

Run Pulse Sequence | Sequence idle. Visual briefing cue only; not calculated flood depth, velocity or arrival time.

2. Map evidence surface

3. Read colours here

- water corridor
- active scenario zones
- watch zones / near threshold
- LiDAR slope evidence zones
- LiDAR slope direction samples
- sampled low / collection point
- sampled high ground
- construction receptors
- receptor above scenario threshold
- EA statutory main rivers

24-Month Rainfall History

Met Office · 1km · 2024-05 to 2026-04

TOTAL 3331.4 mm sum of loaded monthly values	MEAN MONTH 138.8 mm simple mean across loaded months	WETTEST MONTH Nov 25 · 287.7 mm highest value in this 24-month window	COVERAGE 24/24 gauge 584772; nearest HadUK grid cell
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May 24 | 150.6 mm | Jun 24 | 79.5 mm

Official Context: Flood, Surface Water and Channels

These panels keep the work honest. They separate official data layers from local screening footprints and make the limitations visible.

O5 - 2 hr+ / post-event
Extreme review

Runoff begins - 15-30 min
Steeper or already-wet ground begins producing visible surface runoff.
Planner: Upstream inflow routes and temporary works near crossings become the first watch items.
Ground crew: Keep tools, fuel, spoil and welfare kit out of hollows and obvious downhill lines.
Within selected rainfall stress

Data Integrity

TELEMETRY
B
B - direct telemetry, point rainfall gauge, not catchment-average rainfall

TERRAIN
B
B - direct 1m DTM sampling for terrain evidence; not yet HAND/flow-accumulation calibrated routing

RAIN HISTORY
24/24 months
B - official gridded monthly rainfall; nearest grid cell to rainfall gauge; not sub-hourly intensity or catchment-average design rainfall

SURFACE WATER
WMS registered
B - official RoFSW hazard WMS context; probabilistic national/LLFA modelling; not a Hydro Lab depth, velocity, timing or drainage calculation

CHANNELS
7230 lines
B - official statutory main river extract; does not include ordinary watercourses, culverts, drains or blockage assumptions

SCENARIOS
Screening
Rainfall ladder pending FEH DDF calibration and catchment rainfall checks.

GAPS
0 pending
0 caution / caveat checks in this pack.

LOADED Real Time Flood Monitoring API...

1. EA flood map context Environment Agency / Defra - Flood Zones published November 2023; Flood Storage Areas published May 2024

FLOOD STORAGE AREAS 2 <small>May 2024</small>	FLOOD ZONE 3 6,840 <small>November 2023</small>	FLOOD ZONE 2 13,992 <small>November 2023</small>
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[Show Overlay](#) 20834 official features; loaded lazily so the default map stays quick. [source](#)

Official EA planning context only. The service is designed to indicate flood risk to areas of land and is not sufficiently detailed to decide whether an individual property is at risk. It does not include groundwater, direct field runoff or sewer overflow. Hydro Lab uses it as a cross-check overlay, not as a calculated depth, velocity or arrival-time model.

RoFSW surface-water hazard is controlled in the separate panel below because it is a live official WMS hazard layer, not a local feature-count overlay.

2. Surface-water hazard layer Environment Agency / Defra - revision 2025-09-17

ACTIVE WMS LAYER Hazard rating 0+ <small>modelled surface-water extent</small>	DATA TYPE official context <small>Live WMS tiles; no local feature count or invented values.</small>	HAZARD MEANING depth + speed <small>Higher hazard rating means more dangerous floodwater conditions.</small>
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[Show Overlay](#) LAYER Hazard rating 0+ - modelled surface-water extent [dataset](#) [WMS](#)

Annual chance bands behind RoFSW are high: 3.3%+; medium: 1% to 3.3%; low: 0.1% to 1%; very low: below 0.1%. The hazard layers show areas with the selected hazard rating or higher.

RoFSW is an official surface-water flood hazard context layer. It is produced from national scale modelling and compatible local LLFA modelling. It shows the likelihood of flooding with a given hazard rating or higher. Hazard ratings combine flood depth and speed; higher ratings are more dangerous. Use as context only: it is not a Hydro Lab runoff calculation, not a site drainage model, and not an arrival-time or depth forecast.

3. Statutory main river network Environment Agency / Defra - updated 2025-10-24

MAIN RIVER FEATURES 7,230 <small>official line features intersecting the pack bbox</small>	OFFICIAL LENGTH 1200.3 km <small>segment length reported by source properties</small>	MISSING BY DESIGN ordinary drains <small>culverts, ditches, sewer capacity and blockages still need separate data</small>
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[Hide Layer](#) B - official statutory main river extract; does not include ordinary watercourses, culverts, drains or blockage assumptions [source](#)

Official statutory main river context only. This layer identifies watercourses designated as Main River in England. It does not include every ordinary watercourse, field drain, culvert, sewer, ditch or blockage. Hydro Lab uses it as an official channel cross-check and future burn-in input, not as a calculated flow-depth or drainage-capacity model.

Model Honesty: What Is Proven and What Is Not Yet Proven

This is the anti-garbage section. It tells the reader what can be reported now, what remains a screening assumption, and what data is needed for the next modelling step.

CAUTION - NRFA_DAILY_FLOW_HISTORY
NRFA Gauged Daily Flow is archived daily mean flow live 15-minute stage and not a site drainage model

PASS - EA_FLOOD_MAP_FOR_PLANNING
20834 official Flood Map for Planning features load storage areas 2; Flood Zone 3 6840; Flood Zone 2

CAUTION - EA_FLOOD_MAP_FOR_PLANNING
Official EA planning context only. The service is designed to indicate flood risk to areas of land and is not sufficient detailed to decide whether an individual property is at risk. Hydro Lab uses it as a cross-check over a calculated depth, velocity or arrival-time model.

PASS - RISK_OF_FLOODING_FROM_SURFACE_WATER_HAZARD
Official RoFSW Hazard WMS overlay registered with hazard-rating layers from Environment Agency / DfE

CAUTION - RISK_OF_FLOODING_FROM_SURFACE_WATER_HAZARD
RoFSW is an official surface-water flood hazard context. It is produced from national scale modelling and local LLFA modelling. It shows the likelihood of flood a given hazard rating or higher. Hazard ratings can vary in depth and speed; higher ratings are more dangerous context only; it is not a Hydro Lab runoff calculation site drainage model, and not an arrival-time or depth forecast.

PASS - EA_STATUTORY_MAIN_RIVERS
7230 statutory main river features loaded; total of segment length 1200.256 km inside pack bbox.

CAUTION - EA_STATUTORY_MAIN_RIVERS
Official statutory main river context only. This layer watercourses designated as Main River in England, not include every ordinary watercourse, field drain, sewer, ditch or blockage. Hydro Lab uses it as a cross-check and future burn-in input, not calculated flow-depth or drainage-capacity model.

LIDAR Terrain Evidence

Z1 - Burneside upstream runoff convergence
48.5 m-123.9 m elev · mean slope 8.6% · 358 samples

Z2 - Kendal river corridor
36.7 m-115.6 m elev · mean slope 8.9% · 249 samples

Z3 - South Kendal downstream pulse
31.0 m-90.6 m elev · mean slope 6.9% · 284 samples

R1 43.0 m · slope 11.0% · bearing 223 deg

R2 40.1 m · slope 8.6% · bearing 265 deg

1. Model readiness score

what the current output can safely claim

Screening ready

5 ready / 2 partial or screening / 2 pending

Current claim limit

Safe claim: terrain-derived route and receptor ranking.

Do not claim yet

Not yet: flood depth, velocity, formal arrival time or regulatory model result.

Observed telemetry

Can show measured recent rainfall / river response.

READY

Recent EA rainfall and water-level observations are loaded for the active pack.

LTV 1m terrain samples

Can rank likely source / fall / collection clues.

PARTIAL

3 terrain zones and 4 construction receptors have sampled elevation / slope evidence.

Scenario ladder

Can compare relative escalation, not return-period rainfall yet.

SCREENING

S1-S5 rainfall levels are useful stress tests, but still need FEH local calibration.

24-month rainfall context

Needed for month-by-month report context.

READY

Monthly rainfall context is registered as loaded.

River-flow history

Needed for stronger historical comparison.

READY

Longer river-flow context is registered as loaded.

HAND / flow accumulation

Needed before depth / accumulation claims.

PENDING

Requires hydrologically conditioned LIDAR, flow direction, flow accumulation and HAND rasters.

Official flood overlays

Needed for regulatory context and cross-checking.

READY

Official flood-risk context is registered as loaded.

Surface-water hazard

Needed to cross-check pluvial hazard alongside the terrain route story.

READY

EA RoFSW hazard WMS is registered as a live official context overlay.

Built drainage / blockage

Needed before strong site-specific routing claims.

PENDING

Culverts, drains, walls, roads, bridges and blockage assumptions are not modelled yet.

NEXT DATA TARGETS

EA LIDAR-derived HAND / flow accumulation / slope rasters / RoFSW local extract / PMTiles for reportable feature counts and offline screenshots / Ordinary watercourses, culverts, drainage assets and blockage assumptions

2. Data contract for real runoff modelling

data gates before stronger routing claims

Hydro Lab runoff-engine data contract

Defines the minimum data evidence needed before a Hydro Lab pack can move from screening polygons to routed runoff animation and then to quantified reporting.

7 ready / 2 partial / 4 blocked

Screening brief

Measured recent telemetry plus terrain-derived receptor ranking.

OPEN

No missing blocker for this claim gate.

Routed animation

Step-through likely water movement from high ground through accumulation routes to receptors.

BLOCKED

3 blockers: Hydrologically conditioned DTM; Flow direction / accumulation / HAND; Land cover / impermeability

Quantified report

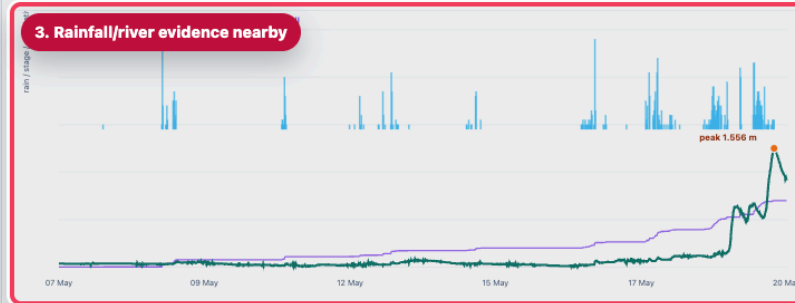
Reportable rainfall context, official flood comparison and caveated model outputs.

BLOCKED

2 blockers: FEH rainfall calibration; Flow direction / accumulation / HAND

Report Snapshot: The Copyable Output

This is the section that can be turned into a client note or site briefing. It should stay factual, sourced and clear about uncertainty.



- 1. Rain observed**
61.0 mm total rainfall in the sampled window; 24.1 mm maximum 24h rainfall.
- 2. River responded**
Victoria Bridge, River Kent, Kendal stage ranged 1.219 m to 1.556 m.
- 3. Terrain routes water**
LTV 1m LiDAR sampled for 3 zones and 4 receptors; 891 zone samples, 3 likely collection points and local slope/bearing checks.
- 4. Scenario stress-test**
20 mm/hr, realistic but locally significant; Use as screening / stress-test rainfall until local FEH DDF values are ingested.
- 5. Uncertainty declared**
Point rainfall gauge; not a catchment-average rainfall model yet.

Current Brief Copy

ACTION THRESHOLD

Kendal / River Kent starter · S2 · 15-30 min
2 receptors within the selected rainfall and outcome window.

PLANNER
Upstream inflow routes and temporary works near crossings become the first watch items.

GROUND CREW
Keep tools, fuel, spoil and welfare kit out of hollows and obvious downhill lines.

TERRAIN
Z2 has the strongest sampled LiDAR slope signal at 8.9% mean slope, 36.7 m to 115.6 m elevation range.

EVIDENCE
61.0 mm observed rainfall total, 24.1 mm max 24h rainfall, 0.337 m observed water-level range; rainfall gauge approx 3.1 km from the water gauge.

RAINFALL HISTORY
Met Office HadUK-Grid monthly rainfall 2024-05 to 2026-04: 3331.4 mm total, 138.8 mm mean month, wettest November 2025 (287.7 mm); 24/24 months loaded.

FLOW HISTORY
NRFA Gauged Daily Flow 73005 Kent at Sedgwick, 2022-10-01 to 2024-09-30: mean 12.85 m³/s, peak 108.10 m³/s on 2024-01-21; 731/731 days loaded; same river downstream proxy.

OFFICIAL FLOOD CONTEXT
EA Flood Map for Planning (Rivers and Sea) loaded as official context for Kendal / River Kent starter: Flood storage areas: 2; Flood Zone 3: 6840; Flood Zone 2: 13992. Official EA planning context only. The service is designed to indicate flood risk to areas of land and is not sufficiently detailed to decide whether an individual property is at risk. It does not include groundwater, direct field runoff or sewer overflow. Hydro Lab uses it as a cross-check overlay, not as a calculated depth, velocity or arrival-time model.

SURFACE-WATER HAZARD

Report Snapshot Print

2. Copy for report drafting

1. Report-ready summary

Kendal / River Kent starter / S2 / Heavy local rain / 20 mm/hr for 1 hr

OUTCOME
O2 / Runoff begins / 15-30 min / adjusted stress 20.0 mm/hr

TELEMETRY
61.0 mm observed rainfall total; 24.1 mm max 24h rainfall; 0.337 m observed water-level range.

RAINFALL HISTORY
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FLOW HISTORY
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