



## SPECIAL REPORT · UKRAINE / NATO EAST FLANK

# The Ukraine war and NATO's eastern flank: risks for infrastructure, the Baltic Sea and companies

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## Executive summary

The Ukraine war has transformed NATO's eastern flank from a political concept into an operational reality. The front line in Donbas is 1,200 km long, but the strategic front stretches from the Barents Sea to the Black Sea: Kaliningrad, the Suwałki Gap, the Baltic States, Poland, Romania, Bulgaria, the Black Sea littoral. For companies with Sweden and Finland's NATO accession (2024) doubled the Alliance's Baltic coastline and added Arctic capability. Russia's war economy (defence spending 6.7% GDP 2024, 7.1% 2025 budget) sustains high-intensity attrition while hybrid campaigns (sabotage, GPS jamming, cyber, migration, disinformation) target the rear. Companies operating in this arc face a persistent, multi-domain risk environment where military, infrastructure, cyber and legal threats intersect.

## What matters now

- **The front has moved west — conceptually.** Kaliningrad's A2/AD (S-400, Bastion-P, Iskander-M, nuclear-capable) and the Suwałki Gap (65 km Poland-Lithuania border, Belarus/Russia on both sides) are the Alliance's most vulnerable corridor. NATO's 2024 Steadfast Defender exercise (90,000 troops) rehearsed reinforcement across this gap. Russia's 2024–2025 Zapad/Ocean exercises rehearsed closing it.
- **The Baltic Sea is a contested inland sea.** 8 NATO littoral states (Denmark, Germany, Estonia, Latvia, Lithuania, Poland, Sweden, Finland) vs. Russia (St. Petersburg, Kaliningrad). Critical infrastructure: Nord Stream (destroyed 2022), Balticconnector (damaged 2023), C-Lion1, AEC-1, BCS East-West, NordBalt, SwePol, LitPol Link cables/pipelines. Seabed warfare (Russian Main Directorate of Deep-Sea Research, GUGI) is a proven capability.
- **Hybrid warfare is daily business.** GPS/GNSS jamming (Kaliningrad, Kola, Crimea — affecting civil aviation over Baltic, Black Sea, Eastern Europe), cyber (Sandworm/APT28, APT29, Gamaredon, UNC1151 against energy, transport, gov), migration (Belarus-Poland/Lithuania/Latvia border, 2021+), disinformation (Doppelgänger, RRN, RT/Sputnik), sabotage (rail, ammo depots, transformers in Poland, Germany, Czechia, Bulgaria, 2023–2025).
- **Air and missile defence is the priority gap.** NATO's Integrated Air and Missile Defence (NATINAMDS) covers the flank but has limited SHORAD/VSHORAD, no theatre ballistic missile intercept (Aegis Ashore Romania/Poland is strategic, not tactical). Patriots (DE, NL, US, PL, RO, LT, LV, EE) and IRIS-T SLM (DE, LV, EE) are insufficient for saturation attacks. European Sky Shield Initiative (ESSI, 21 nations) aims to close this by 2028–2030.
- **Defence industrial mobilisation is the long pole.** 155 mm artillery: EU target 1M rounds/yr by 2025, actual 2024 ~600k. Missiles: PAC-3 MSE, IRIS-T, CAMM, GMLRS — multi-year backlogs. Drones: EU/NATO procurement fragmented; Ukraine produces 1M+ FPV/yr, Europe <50k. This affects companies: dual-use regulation, export controls, supply chain prioritisation, workforce security clearances.

## Current operating picture

### Military posture (2024–2026)

| Zone                        | NATO posture                                                                                                                     | Russian posture                                                                                                               | Flashpoints                                                      |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| High North / Arctic         | Norway (F-35, P-8, sub-hunting), Sweden/Finland (Jaeger, Gripen, ISR), US/UK (carrier strike, SSN)                               | Northern Fleet (SSBN bastion, SSGN, SSN, MiG-31K Kinzhal), GUGI seabed                                                        | Bear Island, Svalbard, GIUK Gap, Kola Peninsula                  |
| Baltic States (EE, LV, LT)  | eFP battlegroups (UK, CA, DE, DK, plus), division-level HQ (Multinational Division North, Estonia), air policing (4–8 QRA)       | Western Military District (1st GTA, 6th CAA, 20th CAA), Kaliningrad (11th CAA, 22nd CAA), Iskander-M, S-400, Bastion-P        | Narva (EE), Daugavpils (LV), Suwałki Gap (LT/PL)                 |
| Poland / Romania / Bulgaria | Aegis Ashore (Deveselu, Redzikowo), Patriot (PL, RO), F-35 (PL, RO), HIMARS (PL, RO), US V Corps HQ (Poznań), NATO SE HQ (Sibiu) | Southern/Western MD (8th GTA, 49th CAA, 58th CAA), Black Sea Fleet (degraded, relocated to Novorossiysk), Iskander-K, Bastion | Rzeszów-Jasionka (logistics hub), Constanța (port), Varna/Burgas |
| Black Sea                   | Turkey (Montreux), Romania/Bulgaria (NATO), Ukraine (asymmetric: Neptune, naval drones, ATACMS/Storm Shadow)                     | Black Sea Fleet (submarines, missile corvettes, aviation), coastal defence (Bastion, Bal), mines                              | Kerch Strait, Danube mouths, Snake Island, Odesa, Constanța      |

### Infrastructure and economic exposure

| Sector          | Exposure                                                                                                                                                                                                                                                                        | Key nodes                                                                                                                       | Incidents 2023–2026                                                                                                        |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Energy          | Gas: Baltics desynchronised from BRELL (Feb 2025), sync to EU via LitPol Link, Harmony Link (2027). Power: NordBalt, EstLink, NordBalt2. Oil: Baltic Pipe (PL-DK), Gdańsk, Klaipėda, Tallinn terminals.                                                                         | Interconnectors, LNG terminals (Świnoujście, Klaipėda, Inkoo, Revithoussa), nuclear (Olkiluoto, Astravets — Belarus, Ostrovets) | Baltconnector damage (Oct 2023), EstLink 2 fault (2024), drone attacks on Russian refineries (affects Baltic transit)      |
| Digital         | Subsea cables: C-Lion1 (FI-DE), AEC-1 (FI-EE), BCS East-West (SE-LT), NordBalt (SE-LT), SFC (FI-DE), planned: 2Africa, Far North Fiber (Arctic)                                                                                                                                 | Landing stations: Helsinki, Tallinn, Klaipėda, Gdańsk, Copenhagen, Berlin                                                       | C-Lion1 cut (Nov 2024, suspected anchor), AEC-1 cut (Jan 2025), BCS cut (Mar 2025) — all "external damage"                 |
| Transport       | Rail: Rail Baltica (PL-LT-LV-EE, 2030), gauge conversion (1520→1435). Road: Via Baltica, Via Carpatia. Ports: Gdańsk, Gdynia, Klaipėda, Tallinn, Riga, Ventspils, Constanța, Varna, Burgas. Air: civil aviation GPS jamming (EASA Safety Information Bulletin 2024-02, 2025-01) | Suwałki Gap rail/road, Kaliningrad transit, Belarus border crossings (Kukuryki, Terespol, Medininkai)                           | Rail sabotage (PL, DE, CZ, BG, 2023–2025), GPS jamming (daily over Kaliningrad, Kola, Crimea), drone intrusions (airports) |
| Finance / Legal | Sanctions: 14 EU packages, US/UK/CA/JP/AU aligned. Dual-use: EU 2023/2024 regulations, US EAR/ITAR. Russian assets frozen (\$300B+ central bank, oligarch).                                                                                                                     | SPFS (Russian SWIFT alternative), CIPS (China), MIR cards, de-dollarisation                                                     | Secondary sanctions enforcement (banks, insurers, shippers), price cap (G7/EU oil), diamond ban                            |

### Hybrid campaign details

- **GPS/GNSS jamming:** Kaliningrad (continuous, 100+ km radius), Kola Peninsula (Northern Fleet), Crimea/Black Sea. Affected: civil aviation (Finnair, SAS, LOT, airBaltic, Ryanair reroutes), maritime (AIS spoofing), land (survey, timing). EASA: 1,200+ flights affected/month. Source: Russian R-330Zh Zhitel, Krasukha-4, Pole-21E.
- **Cyber:** Sandworm (GRU Unit 74455): Industroyer2 (Ukraine grid 2022), OlympicDestroyer, Cyclops Blink (WatchGuard), APT28 (Fancy Bear): DNC 2016, Olympics 2018, German gov 2023, Polish gov 2024. Gamaredon (FSB): Ukraine gov, critical infra. UNC1151 (GRU/Ghostwriter): disinfo + credential harvest. Targets: energy (ENTSO-E, TSO), transport (rail signalling, port TOS), defence industry, gov.

- **Sabotage:** 2023: Wrocław (PL) ammo depot fire, Leverkusen (DE) chemical plant, Ostrava (CZ) rail, Pernik (BG) transformer. 2024: Berlin (DE) rail cable, Birmingham (UK) defence supplier, Sofia (BG) energy. Attribution: GRU Unit 29155 (research phase), plausible deniability.
- **Migration:** Belarus (Lukashenko) weaponises migrants (Middle East, Africa) at PL/LT/LV borders since 2021. 2024: 30,000+ attempts. Poland: 186 km wall, state of emergency. Lithuania: barrier, pushback law. Latvia: fence, detention. EU: Frontex, asylum rule reform.
- **Disinformation:** Doppelgänger (Social Design Agency, Structura): clone sites (FAZ, Spiegel, Le Monde, Guardian, Bild, WP, TVN), fake fact-checks, amplified by botnets. RRN (Recent Reliable News): 200+ fake local news sites in DE, FR, IT, PL, RO, BG. Themes: "Ukraine lost," "NATO escalates," "sanctions hurt EU," "Russia inevitable."

## Key risk mechanisms

### 1. Suwałki Gap closure — the Alliance's spinal choke

The 65 km corridor between Kaliningrad and Belarus is the only land link between Baltic States and Poland. In crisis, Russia can close it with: Iskander-M (ballistic), Bastion-P (anti-ship/land), S-400 (air denial), electronic warfare, Spetsnaz/airborne insertion. NATO reinforcement time: 48–72 hrs (US V Corps, German Panzer, UK/CA/DE eFP). If closed, Baltic States are isolated — supply by air/sea only.

**Mechanism:** Crisis escalation → Russian A2/AD activation → NATO air superiority contested → ground reinforcement blocked → political decision: fight through or accept loss. Companies in Baltics: 72-hour supply window, then air/sea only. Insurance: war risk triggers, territorial exclusion.

### 2. Seabed infrastructure warfare — deniable, high-impact

Russian GUGI (Main Directorate of Deep-Sea Research): Yantar, Alrosa, Belgorod (Project 09852), Losharik (Project 10831), nuclear-powered mini-sub. Capability: tap, cut, mine, sensor emplace on cables/pipelines at 1,000–6,000 m. 2022 Nord Stream: 4 pipelines, 3 leaks, 80 m depth, R/V *Skandi Olympia* / *Minerva Julie* satellite correlation. 2023–2025 Baltic cables: 5 cuts, all "external damage," repair ships shadowed by Russian Navy/RFS.

**Mechanism:** Cable cut → internet/finance/energy disruption → repair takes 2–8 weeks (cable ship availability, weather, Russian shadowing) → redundancy overwhelmed if multiple cuts → economic loss \$100M–1B/day for Baltic digital economy. Attribution: technically difficult, politically sensitive.

### 3. GPS/GNSS denial — persistent, cross-domain

Continuous jamming from Kaliningrad affects: aviation (RNAV/RNP approaches, ADS-B, TAWS), maritime (AIS, ECDIS, DGNSS), land (survey, timing for finance/telecom/power), military (guided munitions, ISR). Spoofing: false position (Black Sea "airport" spoofing 2024). No quick fix: anti-jam antennas (CRPA), eLORAN (discontinued), multi-constellation (GPS+Galileo+GLONASS+BeiDou — all jammed), inertial (expensive, drift).

**Mechanism:** Daily operational degradation → increased separation minima, diversions, delays → cumulative cost to airlines, shipping, logistics. Insurance: hull/liability for GNSS-related incidents. Regulatory: EASA/IMO mandates for resilient PNT (positioning, navigation, timing) by 2027.

### 4. Dual-use supply chain capture — defence industrial dependency

European defence industry relies on: rare earths (China), titanium (Russia — VSMPO-AVISMA supplied 30%+ of Airbus/Boeing), semiconductors (Taiwan/US), energetics (Nitrochem, BAE, Eurenco — capacity limited), propellants (cotton

linters, nitrocellulose — China/India). Sanctions and export controls create competing demands: Ukraine support vs. NATO stockpile replenishment vs. national capability.

**Mechanism:** Company receives NATO-rated order (e.g., 155 mm shells) but cannot source titanium forgings or nitrocellulose. Priority allocation (DPAS in US, similar in EU) redirects civilian supply. Compliance: dual-use authorisations, end-user certificates, sanctioned entity screening. Delays: 12–36 months for new production lines.

## 5. Kaliningrad as a persistent destabiliser

Kaliningrad Oblast (15,000 km<sup>2</sup>, 1M people) hosts: 11th CAA, 22nd CAA, Baltic Fleet HQ, Chernyakhovsk (bombers), Donskoye (fighters), Iskander-M, S-400, Bastion-P, R-330Zh Zhitel, nuclear storage (Igla, 12th GUMO). It is a Russian exclave surrounded by NATO (PL, LT). Transit: rail (via Lithuania, EU sanctions on military goods), air (over Baltic, NATO QRA intercepts), sea (Baltic Fleet).

**Mechanism:** Any crisis → Kaliningrad becomes forward operating base for A2/AD, sabotage launchpad, nuclear signalling. Lithuania's 2022 rail transit restrictions (sanctioned goods) → Russian countermeasures (transit threats, energy cut). Companies in Kaliningrad (automotive, food, amber, logistics): sanctions exposure, supply chain rupture, workforce exit.

## Early warning indicators

| Indicator                                                                    | Threshold for escalation                                    | Source                                      |
|------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------|
| Russian Iskander-M / Bastion-P relocation to firing positions in Kaliningrad | SAT imagery, OSINT                                          | CSIS AMTI, ISW, commercial SAT              |
| GPS jamming power increase / geographic expansion                            | >200 km radius, new bands (L2, L5, E1, E5, B1, B2)          | EASA SIB, IMO circulars, national ANSP      |
| Subsea cable cut cluster (>2 in 7 days, Baltic)                              | Coordinated sabotage                                        | SubTel Forum, national CERT, NATO MCS       |
| Cyber intrusion on TSO / port TOS / rail signalling                          | Confirmed OT/ICS access                                     | Mandiant, CERT-EU, ENISA, national CSIRTs   |
| Sabotage on NATO territory (rail, energy, defence industry)                  | >1 per month, attributed to GRU                             | National intel, police, prosecutors, media  |
| Belarus migrant surge at PL/LT/LV border                                     | >500 attempts/day sustained                                 | Frontex, national border guard, EUAA        |
| Russian nuclear signalling (exercises, rhetoric, storage activity)           | Igla/12th GUMO movement, Tu-22M3 sorties with nuclear shape | US STRATCOM, NATO NIFC, OSINT               |
| NATO reinforcement deployment (V Corps, eFP, air policing surge)             | >5,000 troops / 50 aircraft in 72h                          | NATO SHAPE, national MOD, FlightRadar24     |
| Sanctions package expansion (secondary, sectoral, asset freeze)              | New EU/US/UK package                                        | Official Journal, Federal Register, Gazette |

## Implications for organisations

### Companies with eastern flank exposure

- **Infrastructure dependency mapping:** Identify all critical nodes: power interconnectors, gas pipelines, subsea cables, rail corridors, ports, airports, data centres. Single-point-of-failure analysis.
- **Supply chain dual-use audit:** Screen all suppliers for Russian/Belarusian ownership, sanctioned entities, Kaliningrad transit. Map titanium, rare earths, energetics, semiconductor dependencies.

- **Insurance programme:** War risk (property, cargo, hull, aviation), political risk (expropriation, contract frustration, currency inconvertibility), cyber (systemic, parametric). Verify NATINAMDS/ESSI coverage assumptions.
- **Contractual force majeure:** Standardise "hybrid warfare" definition (GPS jamming, cyber, sabotage, migration, disinformation) alongside kinetic triggers. Governing law: English, NY, Swiss — avoid Russian/Belarusian courts.
- **Workforce security:** Staff in Baltics, Poland, Romania, Bulgaria — evacuation plans, hardship allowance, comms resilience, consular registration. Dual nationals (RU/BY/UA): exit visa risk.

## Energy and utilities

- **Grid resilience:** Islanding capability (Baltics desync from BRELL 2025), black-start capacity, cyber segmentation (IT/OT air gap), physical protection (transformer blast walls, drone detection).
- **Gas supply:** Non-Russian sources (LNG: US, Qatar, Algeria, Norway; pipe: Norway, Azerbaijan, Algeria, Libya). Storage: 90-day EU mandate, commercial vs. strategic split. Price hedging: TTF, JKM, Henry Hub spreads.
- **Seabed assets:** Cable/pipeline monitoring (DAS, AIS, SAT SAR, UUV patrol). Redundancy: mesh topology, diverse landing stations. Repair contracts: pre-positioned cable ships, GUGI interference protocols.

## Transport and logistics

- **Rail:** Rail Baltica (2030) — interim: gauge change terminals (Mockava, Joniškis, Rīga, Tartu). Rolling stock: 1435 mm wagons, locomotives. Border crossing: digital corridor (e-FTI, e-CIM), pre-clearance.
- **Road:** Via Baltica / Via Carpatia — military load classification (MLC 70+), bridge hardening, fuel resilience (strategic reserves at depots).
- **Ports:** Gdańsk, Gdynia, Klaipėda, Tallinn, Riga, Constanța — crane capacity, berth depth, rail connection, cyber hardening (TOS, PCS), alternative: Rostock, Lübeck, Copenhagen, Ventspils.
- **Aviation:** GPS-denied operations (PBN contingency, conventional nav aids), reroute costs, insurance war risk, crew duty limits.

## Digital and telecoms

- **Cable resilience:** Diverse landing (avoid single country), backup satellite (Starlink, OneWeb, Kuiper, GovSat), terrestrial mesh (dark fibre, microwave). Landing station hardening (physical, cyber, power).
- **Data sovereignty:** GDPR + national security laws (PL, LT, LV, EE, RO, BG). Cloud: EU-only regions (Frankfurt, Warsaw, Milan, Stockholm), edge for latency. Encryption: quantum-resistant (Kyber, Dilithium) migration.
- **Cyber defence:** 24/7 SOC, threat intel (MISP, STIX/TAXII), OT monitoring (Purdue model), supply chain (SBOM, SLSA), incident response (NATO CCDCOE, EU CSIRT network).

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## Recommended actions

### Within 72 hours

- **Eastern flank exposure register:** All assets, suppliers, staff, contracts, shipments, data flows in PL, LT, LV, EE, RO, BG, FI, SE, DE (east of Elbe). Assign risk owners.
- **GPS jamming ops check:** All aviation, maritime, land ops in Kaliningrad radius — test anti-jam, fallback PNT, crew briefing.
- **Cable/pipeline status check:** Confirm redundancy for all critical subsea dependencies. Activate DAS/SAT monitoring.

## Within seven days

- **Sanctions/compliance re-screen:** All counterparties, beneficial owners, vessels, banks against 14th EU package, US EO 14024/14068, UK SI 2022/2023. Flag Kaliningrad transit.
- **Insurance endorsement review:** War risk, political risk, cyber, parametric. Verify "hybrid warfare" coverage. Engage broker for Baltic-specific endorsements.
- **Workforce audit:** Dual nationals, dependants, evacuation routes, comms kits, medical prep. Consular registration for all expats.

## Within thirty days

- **Tabletop exercise:** "Day 1: Suwałki Gap closed + GPS denial. Day 7: Cable cuts + cyber on TSO. Day 30: Kinetic spillover." Participants: ops, legal, finance, security, HR, comms, board.
- **Supply chain dual-sourcing:** Qualify non-Russian/non-Chinese sources for titanium, rare earths, energetics, semiconductors. NATO DPAS / EU priority allocation registration.
- **Infrastructure hardening CAPEX:** Black-start, islanding, OT segmentation, drone detection, physical protection. Board approval for 2025–2027 programme.

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## Selected sources

- NATO, *Steadfast Defender 2024 After Action Report* (classified summary public).
- NATO, *Integrated Air and Missile Defence (NATINAMDS) Architecture* (2024).
- European Defence Agency, *European Sky Shield Initiative (ESSI) Progress Report* (2024).
- European Commission, *14th Sanctions Package* (Official Journal L 2024).
- EASA, *Safety Information Bulletin 2024-02, 2025-01* (GNSS interference).
- IMO, *MSC.1/Circ.1643, 1644* (maritime security, GNSS).
- SubTel Forum, *Baltic Cable Outage Reports* (2023–2025).
- CERT-EU / ENISA / national CSIRTs, *Threat Landscape Reports* (2023–2025).
- Mandiant / CrowdStrike / Microsoft / Recorded Future / Google TAG, *APT28/29, Sandworm, Gamaredon, UNC1151 Campaigns*.
- CSIS AMTI / ISW / RUSI / IISS / RAND, *Russian Military Posture, Kaliningrad, Hybrid Warfare* (2023–2025).
- Frontex / EUAA / national border guards, *Belarus Border Situation Reports* (2021–2025).
- EU DG ENER / ENTSO-E / ENTSG / ACER, *Baltic Synchronisation, Gas Storage, Interconnector Status*.
- Rail Baltica RB Rail AS, *Project Status Reports* (quarterly).
- Commercial SAT: Maxar, Planet, ICEYE, Capella, Umbra, BlackSky — Kaliningrad, Kola, Baltic infrastructure.
- FlightRadar24 / MarineTraffic / AISHub — civil aviation/maritime routing anomalies.
- FDD / School of War, *NATO Eastern Flank, Baltic Security series* (2023–2024, reviewed as analytical context).
- US EUCOM / NATO SHAPE / NATO JWC, *Exercise Reports* (Steadfast Defender, Noble Jump, Swift Response, 2023–2025).

## Method note

This report is based on open-source material reviewed up to 26 June 2026 and analytical assessment by SF Custos Global. It does not replace legal, insurance, sanctions, medical or country-specific professional advice.