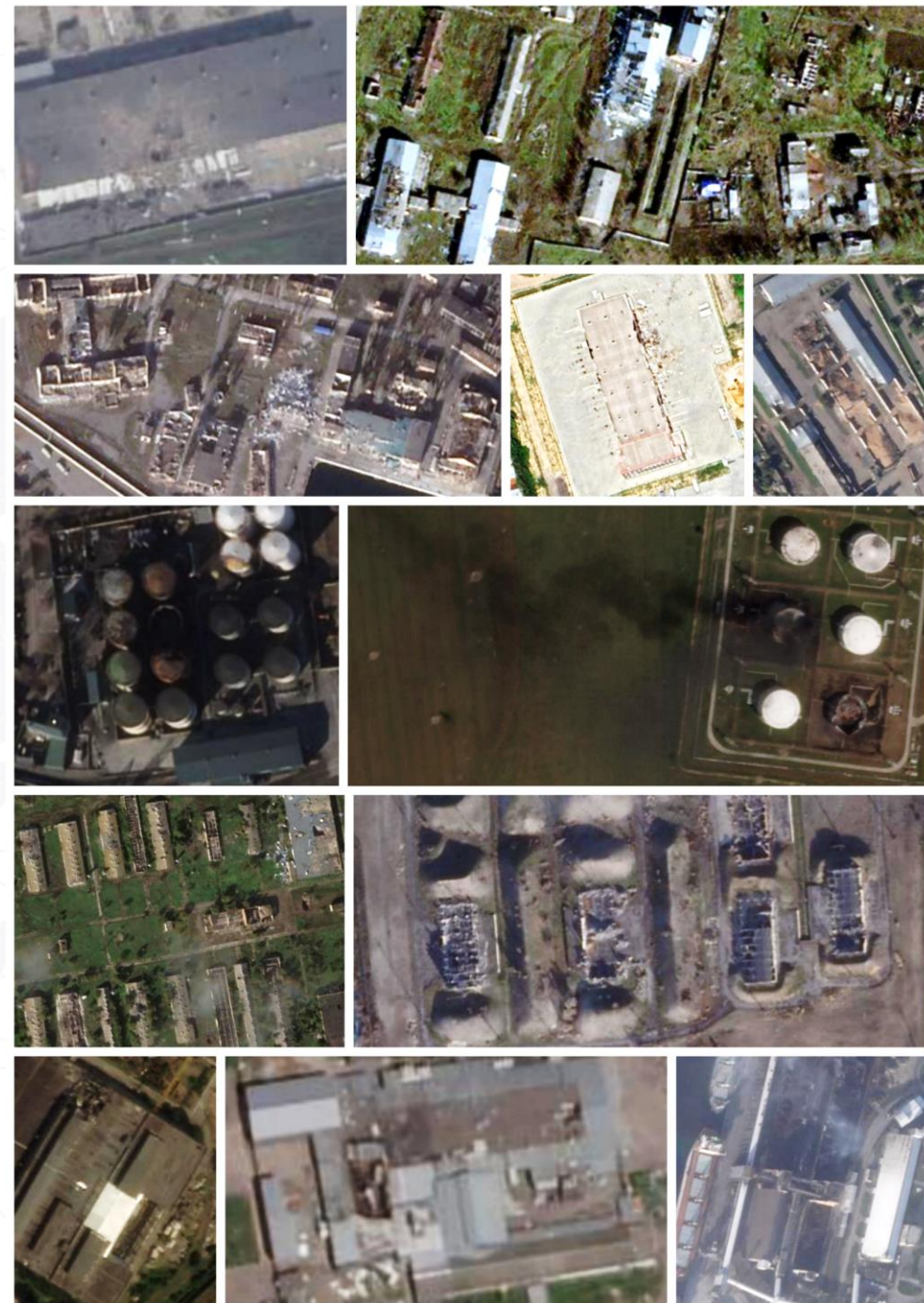


# Conflict-driven environmental and health risks in Mykolaivska Oblast

**Area-based assessment**

February 2022 - June 2023

**REACH** Informing  
more effective  
humanitarian action





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**01**

# **The Hazardous Events Monitoring Initiative**



# Rationale



**Ukraine is heavily industrialised** (metallurgy, mining, machinery, chemical and petro-chemical, energy generation, etc.)



**Many industrial facilities are directly impacted by hostilities** (damaged, destroyed, dismantled, etc.), leading to the release of hazardous substances into the environment, with negative consequences on human health, productive natural assets and ecosystems.



**Event- and facility-specific information is crucial** to address immediate and long-term environmental and health risks.



Infrastructure and transport facility in Kyivska oblast, damaged in March 2022 and containing kerosene.

# REACH's Hazardous Events Monitoring Initiative

## 4 facilities

affected by conflict in Volynska oblast



## Objective

Inform humanitarian and early recovery actions that address the impacts of conflict-related incidences to hazardous industrial infrastructure on the environment, human health and livelihoods.



## Methodology

- Media monitoring
- Secondary data review
- Primary data collection & analysis
- Remote sensing (satellite imagery)
- Environment modelling
- Flash Environmental Assessment Tool (FEAT)

# Data utilization

## Local authorities



Gain a localized understanding of hazardous events' impacts on people and the environment, to develop adapted impact mitigation and recovery measures.

## Operational actors (SESU)



Develop emergency response and evacuation plans adapted to identified risks to ensure rapid response to hazardous events.

## Environmental NGOs



Develop targeted interventions for environmental restoration, advocate for resources, support affected communities with nature-based livelihoods.

## International humanitarian community



Coordinate and prioritize interventions, focusing on the most urgent environmental, health, and livelihoods-related needs.

## Local humanitarian NGOs



Tailor localized response efforts addressing specific environmental, health, and livelihood challenges in affected communities.

## Donors



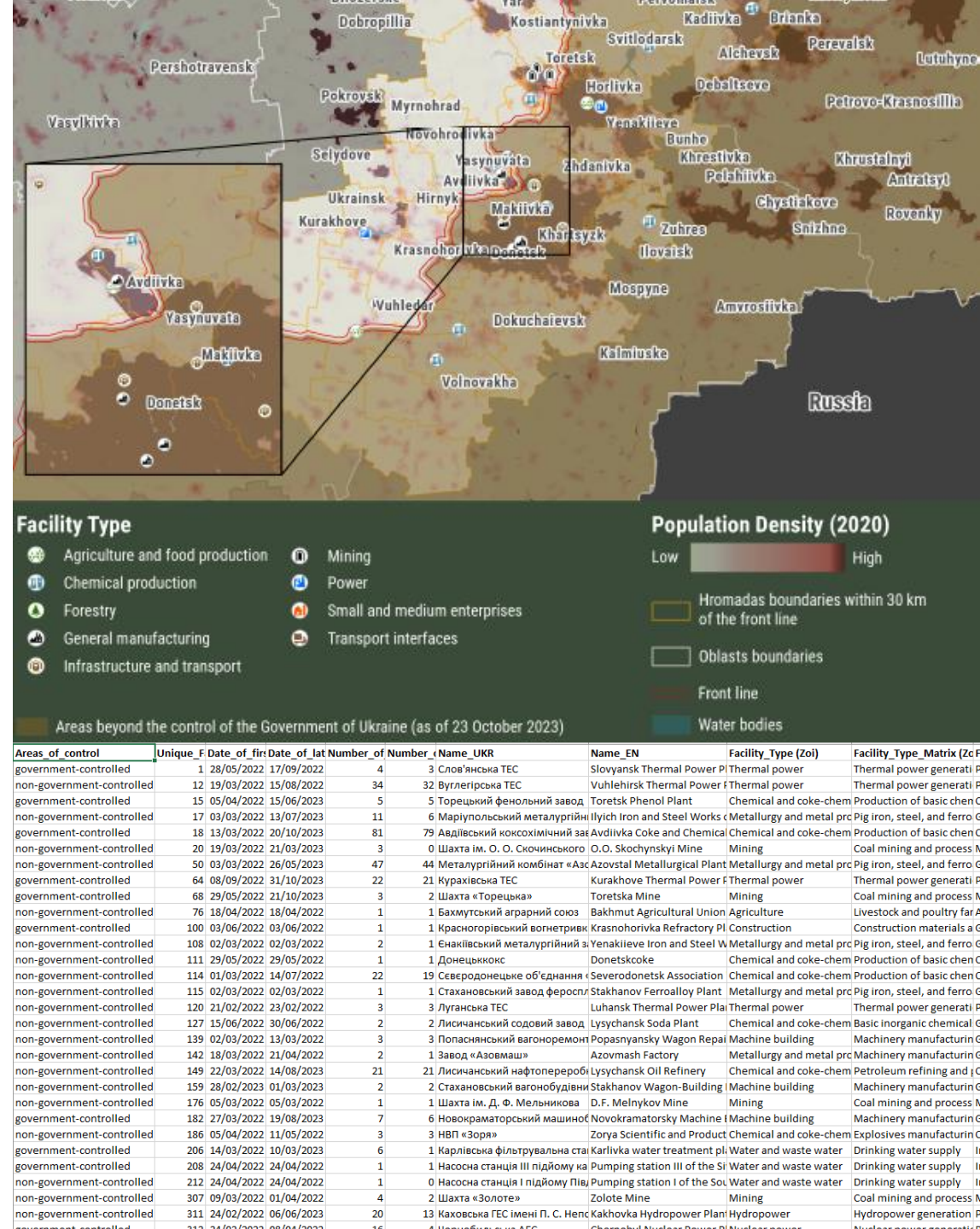
Strategic allocation of funds to key areas such as ecosystem restoration, healthcare, and sustainable economic recovery.



The data informing REACH's Hazardous Events Monitoring Initiative is considered sensitive, and therefore not publicly available.

**Upon request, REACH can bi-laterally share reports, datasets and customized maps with humanitarian and recovery actors.**

Please contact us at...  
[impact.ukraine@impact-initiatives.org](mailto:impact.ukraine@impact-initiatives.org)



A light gray world map is centered in the background. Overlaid on the map is a complex, light gray geometric pattern of interconnected lines forming various sized triangles and polygons. The number '02' is positioned in the upper center, over the European continent.

**02**

# **Background & key findings**



# Background



**Mykolaiv Oblast serves as a key industrial hub in Ukraine**, playing a crucial role in the country's industrial sector.



**The region experienced active conflict** from February to early April 2022, followed by **persistent shelling** until mid-November 2022.



The combination of long-standing industrial pollution and recent conflict-related damage to industrial facilities in Mykolaiv **poses significant risks to human health, local livelihoods, and the ecological balance** of the Dnipro River and the Black Sea.

This presentation is part of an in-depth assessment of environmental and public health impacts emanating from conflict-related hazardous incidents in Mykolaiv District since 24 February 2022



Conflict-related incident at a petroleum storage facility in Mykolaiv Oblast.

# Methodology

01

## Media monitoring

Baseline data derived from Zoï Environment Network's Ecodozor.org, which consolidates multiple sources to monitor Ukraine's war-induced environmental impact, cataloging disruptions to infrastructure and utilities from public and authority reports, with expert analysis and satellite verification, categorizing and geo-locating incidents in a continuously updated database since 24 February 2022.

02

## Remote sensing

When relevant, identified conflict-affected facilities were visually inspected using Planet Labs' high-resolution satellite imagery to confirm damage, assess its severity, and identify traces of environmental contamination. While facility damage can be used as a proxy to assess contamination, it is not always possible to confidently infer a causal relationship between damage and contamination.

03

## Primary data

16 key informant (KI) interviews with representatives of local authorities (4), local environmental experts (3), conflict-impacted enterprises (4) and residents (5). Insights from key informants were triangulated with secondary data, remote sensing and FEAT analysis to develop a holistic understanding of local impacts.

04

## Flash Environmental Assessment Tool

Helps to identify existing or potential acute environmental impacts that pose a threat to humans, human life-support functions and ecosystems, following sudden-onset natural disasters and conflicts.

# Key findings



From February 2022 to June 2023, **59 conflict-related events at hazardous industrial facilities were recorded across 27 settlements** of Mykolaivska oblast, with potential large-scale impacts on the environment, human health and livelihoods.



A third of incidents occurred at port infrastructure near the Dnipro River, suggesting **high levels of pollution to water resources and potential public health impacts** due to toxic chemicals.



The most common hazardous substances found in affected industrial facilities **are nitric acid, organophosphate, pesticide, isopropyl alcohol, ammonia, ammonium nitrate, oils and solvents, diesel, kerosene, and liquified petroleum gas (LPG)**. These substances can cause both immediate and long-term environmental and health consequences, highlighting the importance of local responders' awareness regarding substance-specific impacts and mitigation measures.



On 6 June 2023, the Kakhovka Dam breach resulted in the **flooding of an area including Novopetrivsky Plavni landscape reserves, the Pischany peninsula, and the Ivano-Kepine botanical reserve**, with potential long-lasting impacts on ecosystems.



# Key findings



Key informants highlighted complex and multifaceted impacts of conflict-driven environmental damage in Mykolaiv region, including:

- **Disruptions to water supply for households and businesses**
- **Disruptions to transportation networks**
- **Air and soil contamination**
- **Overall decrease in living standards and psychological stress**
- **Reduced access to productive natural assets due to mines and UXOs**
- **Displacement and relocation.**



Half of the KIs reported a **low awareness of contaminated areas and of their consequences**, mentioning the low availability of information enabling them to take appropriate protective measures.



Persisting **information gaps** hinder the ability of actors to build a comprehensive understanding of the potential long-term impacts of environmental damage in the Mykolaiv region, indicating a **need for ongoing monitoring of hazardous events** to mitigate impacts on human health and livelihoods.

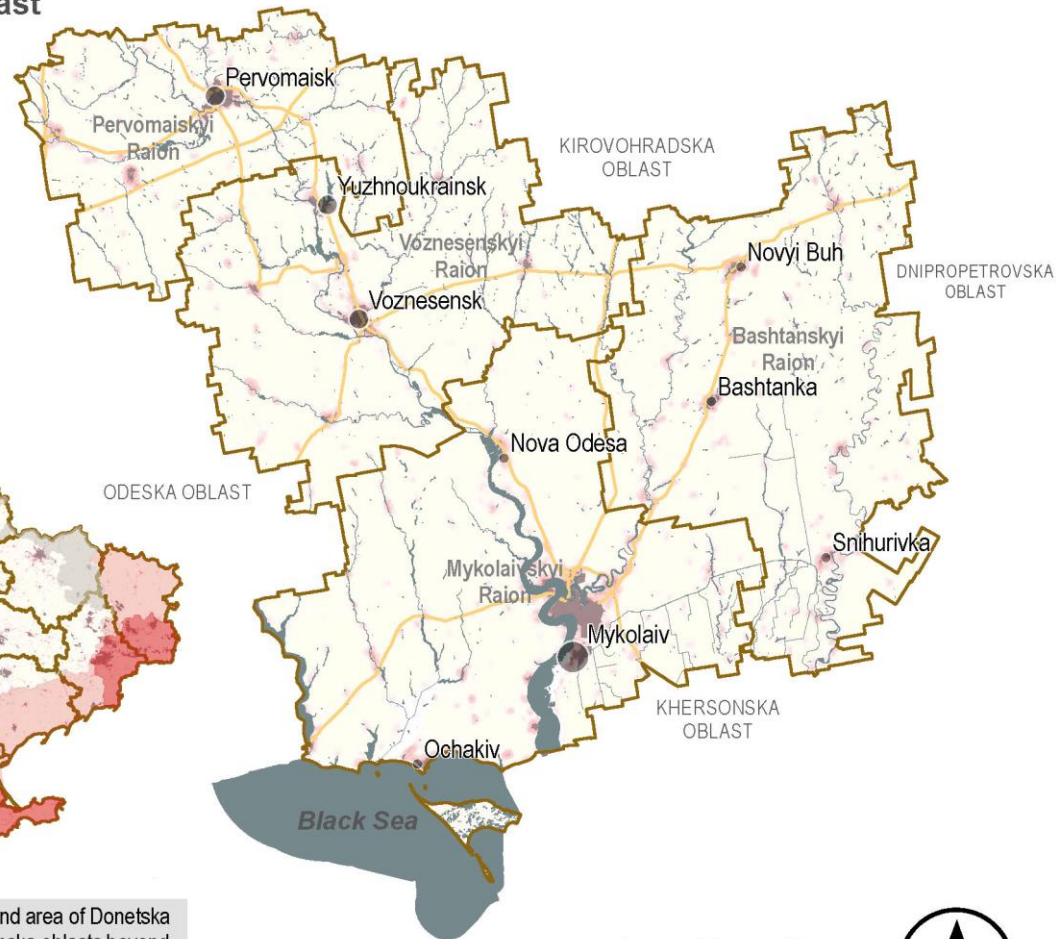
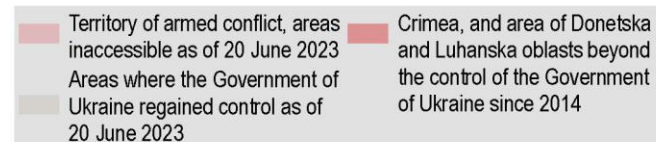
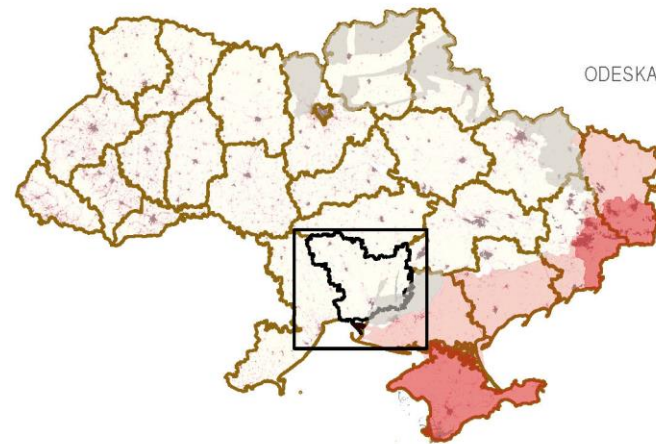
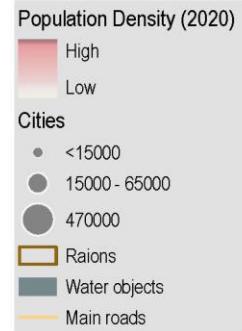


**03**

# **Conflict-related incidents at industrial facilities**

# Mykolaiv Oblast and District

Population of Mykolaivska Oblast in 2020 was 1,091,800 people



## Pre-war environmental challenges in Mykolaivska Oblast

Governmental environmental protection experts identified the following environmental concerns pre-dating February 2022:

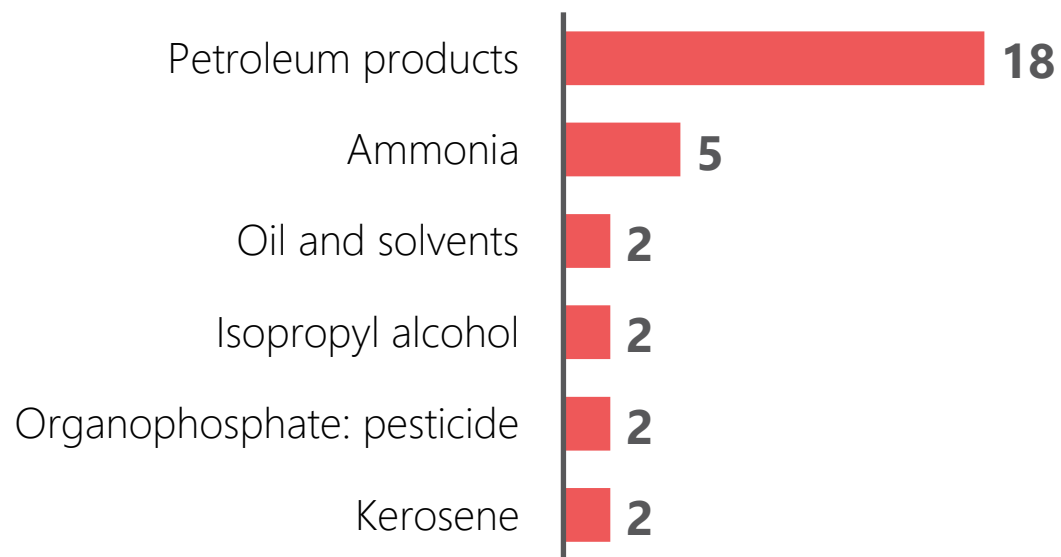
- 1 Soil pollution and corrosion** caused by extensive use of pesticides by farmers and breach of soil usage legislation.
- 2 Soil degradation** caused by water and wind erosion, excessive ploughing of natural sites, low quality of woodland belts.
- 3 Poor quality of drinking water:** large amounts of organic substances in the water, strong smell of chlorine, lack of fresh water; disturbed ecological balance due to increase water level and flooding in the Oleksandriv reservoir; poor condition of treatment facilities; pollution and siltation of water bodies.
- 4 Air pollution** due to large numbers of trucks and industrial facilities, sludge depositories, drought and frequent forest fires.
- 5 Waste disposal:** accumulation of hazardous wastes leading to the deterioration of the landfill condition in Korenykha.



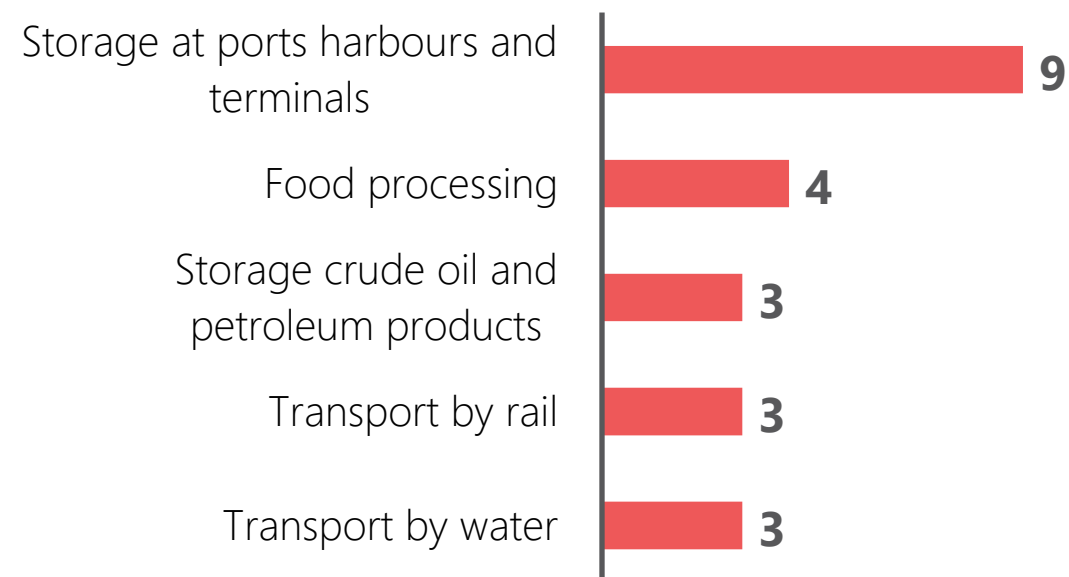
# Conflict-related incidents at industrial facilities

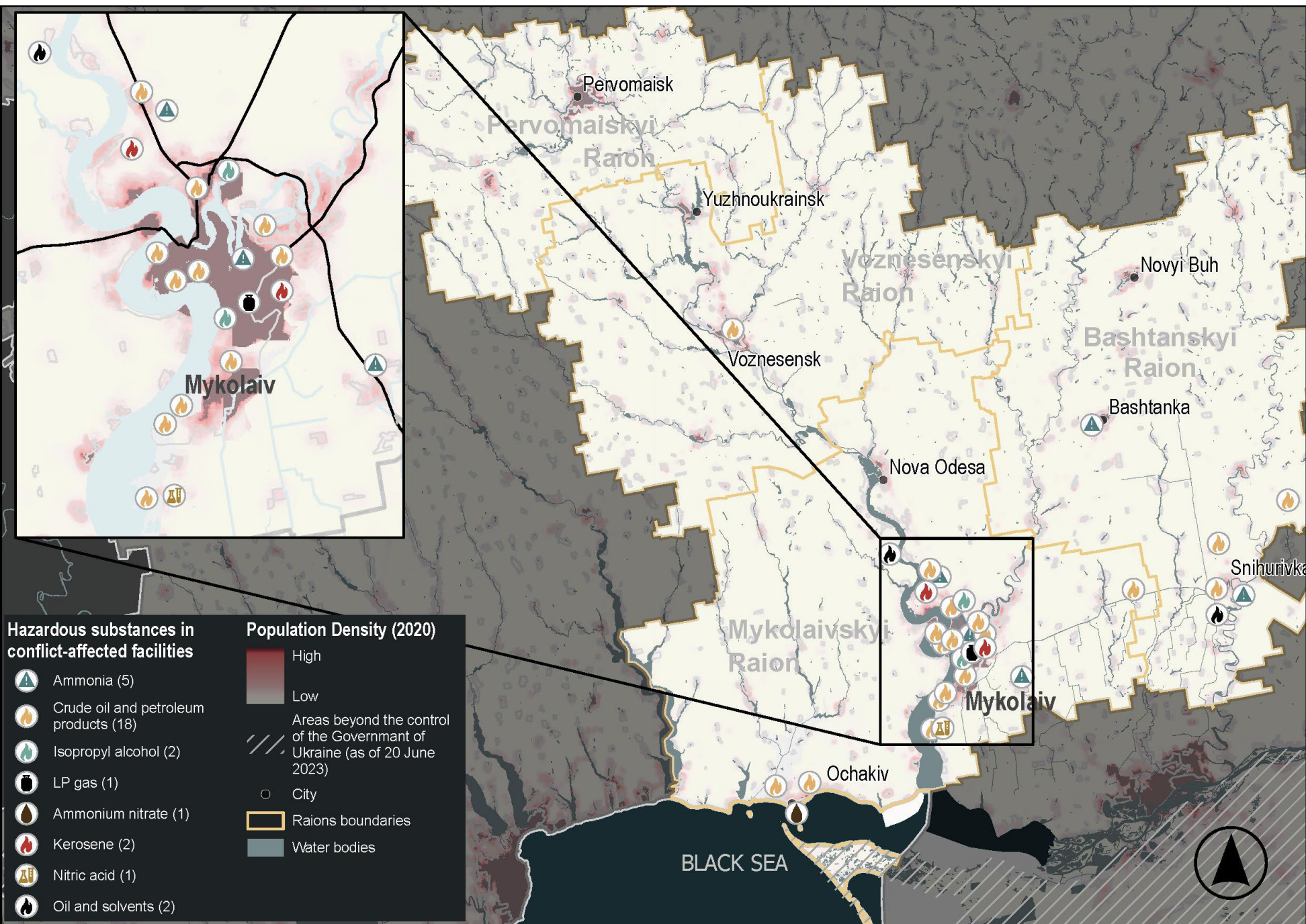
**59** conflict-related events at hazardous industrial facilities were recorded from February 2022 to June 2023

## Hazardous substances contained in conflict-affected industrial facilities in Mykolaivska Oblast (top 6)



## Operation types of conflict-affected industrial facilities (top 5)





## Conflict-affected industrial facilities in Mykolaivska District



**04**

# **Conflict-driven environmental impacts in Mykolaiv region**



# Impacts on the atmosphere (air)

## Fire at maritime port LLC Nika-tera

- Major fire that erupted on an area of 10,000 square meters on 4 June 2022.
- Assessed damage exceeds 171 million USD.

## Anthropogenic forest fires

- Forests of the Balabaniv and Galitsyn tracts and estuaries burned as a result of rocket attacks.
- The impact of resulting atmospheric pollution are estimated at more than 20.5 million USD.

This incident highlights **the severe impact on air quality and the urgent need for comprehensive measures** to mitigate resulting environmental and public health repercussions.



Fire at an industrial facility in Mykolaiv on 4 June 2022

”

*"I think that the substances, which were emitted into the air and that we breathed in, will have a significant impact on the health of the people who live in the neighborhood. We will see the consequences later."*

**- Community KI**

# Impact on water resources

Water resources were unanimously identified by KIs as the most crucial for communities, for:

- 1 Irrigation systems relying** on the Ingulets and Dniipro rivers
- 2 Transportation of grain on barges** across the Southern Bug River towards Mykolaiv
- 3 Supporting** the needs of the **machine-building industry**
- 4** Providing people with **drinking water**

”

*“Unfortunately, there is lack of potable water in Mykolaiv, and it is a huge problem which arose due to the war. We did not have any problems with water before.”*

**- Local Authorities KI**

## CASE STUDY: Environmental impact in the Bug estuary



Environmental contamination in the Bug estuary following shelling of the vegetable oil tank LCC “Every” on 16-17 October 2022



The Bug Estuary is an illustrative example of the conflict’s complex and potentially **long-lasting impact on fragile ecosystems**. In October 2022, a **drone attack damaged a vegetable oil tank**. As a result:

- Large quantities of **oil were released into the estuary**
- Contaminated area reaching **3,000 square meters**
- **Fat content** in the water was found to be **5.5-15 times higher than normal**, representing a significant threat to ecosystems, including ichthyofauna and birds



# Impacts on land and soils

The primary environmental impacts of the conflict on soils and land, as reported by all KIs:

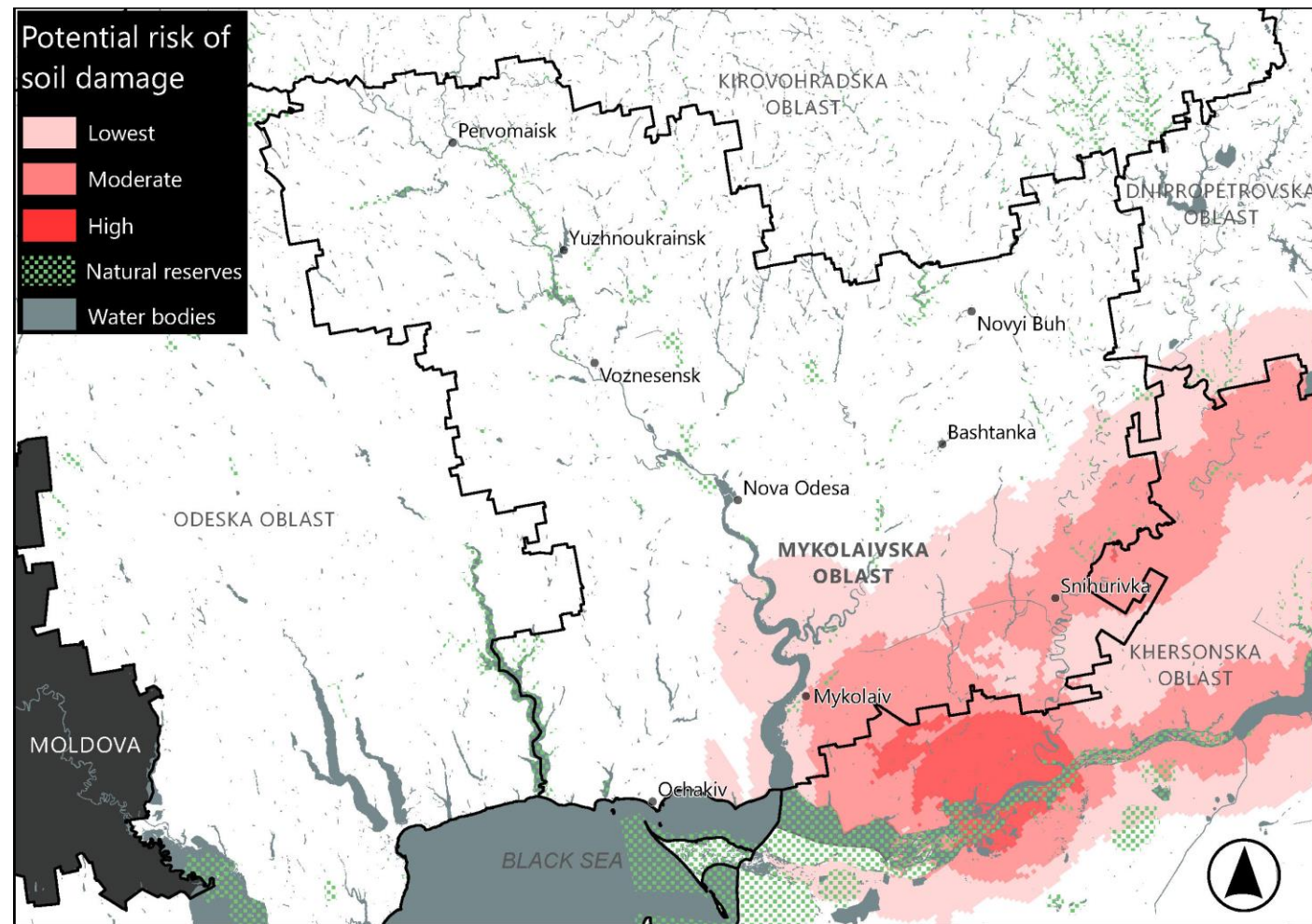
- **Mined zones** encompassing lands, agricultural areas, warehouses, and fields
- **Pollution** from fragments of reinforced concrete, glass, and plastic materials
- **Soil contamination** through the leakage of petroleum products and sunflower oil
- **Combustion-related damage** to fields
- Presence of **cattle carcasses**.

These factors collectively contribute to soil degradation, including compaction and erosion of upper layers, diminishing its quality and productivity.

”

*“We cannot use our black soils and fields due to mining. Most farmers do not work because of such restrictions. Access to forests are mined, as well as the river banks. There is no access to river banks.”*

**- Local Authorities KI**



## Potential risk of soil damage in Mykolaivska oblast

The severity of soil damage is determined using two indicators: **intensity of hostilities** and **proximity to the front line**.



# Impacts on ecosystems and biodiversity



Key informants reported the following impacts on ecosystems and biodiversity:

- 1 Mine and UXO contamination** in plantation forests **can cause harm to animals** like foxes and hares as well as **inhibit plant growth**
- 2 Fires and shelling** damage forests, leading to **increased plant debris**, while **movement of military equipment disturbs ground vegetation**
- 3 The accumulation of pollution in plants** impacts the overall **health of the ecosystem**
- 4 Damage to nature reserves limits their recreational potential**
- 5** Local authority representatives noted that a **ban on hunting** in forests has led to an **increase in the population of wild animals, contributing to rabies outbreaks**

A world map is centered in the background, rendered in a light gray color. Overlaid on the map is a complex, low-poly geometric pattern consisting of numerous thin, light gray lines that form a network of irregular triangles across the entire slide. The number '05' is displayed in a bold, red, sans-serif font, positioned centrally over the map.

**05**

# **Case studies**

# Environmental impacts of the Kakhovka dam breach in the Mykolaiv region

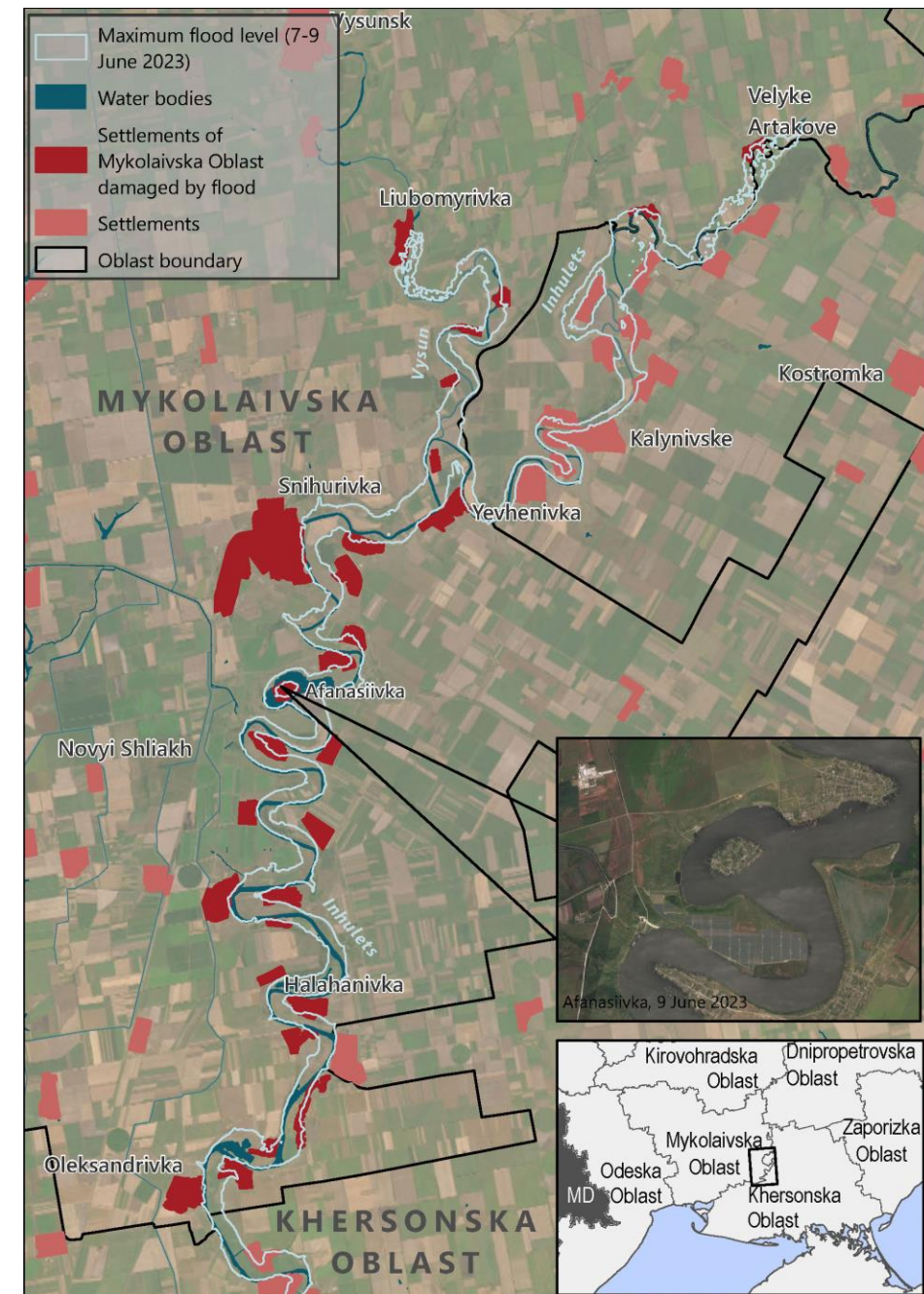
On 6 June 2023, the breach of the Kakhovka Dam resulted in the flooding of large areas, with significant environmental consequences, including:

- The washing out of the **plant cover** and **root systems**
- **Siltation** of some areas
- Alterations in the configuration of crystalline outcrops
- **Submergence of burrows** belonging to insects and birds, including the red-billed species; and
- Accumulation of debris, such as dry bushes, dry grass, and animal remains (including rabbits, crayfish, and fish entangled in tree branches).

Direct environmental losses caused by the flood in Mykolaiv region were estimated at **1.4 million USD** by the [State Environmental Inspection of South-Western District](#) on 14 July.

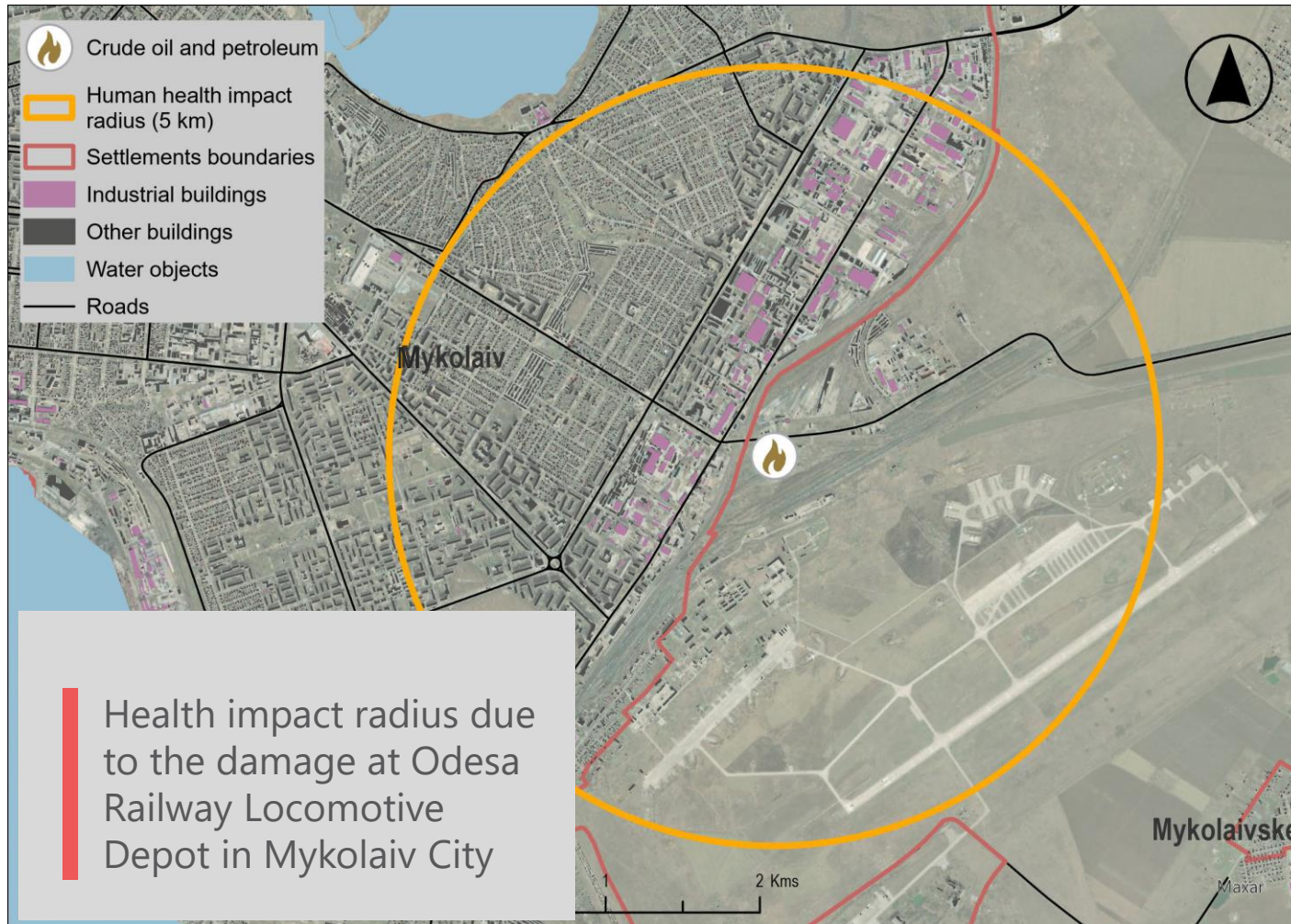
Several challenges prevent a comprehensive assessment of nature reserve fund's territory:

- Some areas are under the control of the Russian Federation
- Military activities are ongoing in certain areas
- Demining operations will be needed before inspections can be carried out safely.





## CASE STUDY: Destruction of the fuel and lubricants warehouse of the Odesa Railway Locomotive Depot in Mykolaiv City



It occurred on 25 February 2022 and resulted in the **combustion of about 1,200 tons of diesel fuel**. The combustion of diesel can produce irritating, corrosive, and/or toxic gases and have acute health effects, **posing a risk to human health within a 5 km radius**. Impacts on the aquatic environment are also possible 1.3-10km downstream of the incident.





A light gray world map is centered in the background. Overlaid on the map is a complex, light gray geometric pattern of interconnected lines forming various sized triangles and polygons. The number '06' is printed in a bold, red, sans-serif font, positioned centrally over the map's landmasses.

**06**

# **Impact on community and livelihoods**

# Impact on community and livelihoods



**Disruptions to water supply** for households and businesses



**Mines and UXOs** pose acute threats to the life and health of people



**Displacement and relocation**



**Disruptions to transportation networks**, for example, the destruction of railway bridges halted grain transportation on barges across the Pivdenny Bug River in the direction of Mykolaiv



**Reduced access to productive natural assets** due to mines and UXOs (agricultural lands and forests, drinking water, recreational areas, water bodies and beaches, river coasts, etc.)



Overall **decrease in living standards** and **increased psychological stress** due to military operations and safety concerns



Constant artillery shelling causes **air pollution** and **soil contamination** affecting agricultural lands

A light gray world map is centered in the background, overlaid with a network of thin, light gray lines forming a geometric, low-poly pattern. The map shows the continents of North America, South America, Europe, Africa, Asia, and Australia. The number '07' is positioned in the upper center, over the European continent.

**07**

# **Impact mitigation and recovery measures**

# Implemented response measures and public awareness

Measures so far implemented:

**Demining** to restore access to natural resources and industrial areas

**Monitoring** of atmospheric air quality

**Collection and removal** of demolition waste to prevent the accumulation of broken glass, plastic, and fragments of shells in the environment

When feasible, **collecting substances** released into the environment, e.g. sunflower oil in the Bug estuary.



The **most useful measures** mentioned by community member KIs included the **disposal of debris, fire extinguishing**, restoration of **water supply systems**, the **provision of information** on contaminated areas, and **household-level mitigation measures**. All KIs acknowledged the effective efforts of various state, community-based, and international actors to mitigate the consequences.



Half of the KIs reported a **low awareness** of contaminated areas and their consequences and mentioned a **low availability of information** allowing them to take appropriate protective measures. The main sources of information mentioned by respondents were mass and social media, followed by relatives, the State Emergency Services of Ukraine, and staff from agricultural enterprises.



# Additional recovery measures needed according to local key informants



Priority measures identified by local KIs are:

- **Continued demining** of land (from mines, fragments of shells, and unexploded ordinances) and water bodies (removal of ammunition).
- **Continued collection, transportation, and disposal services for debris** (fragments of broken glass, plastic material, reinforced concrete, and burnt trees).
- Restoration of potable water supply, sewage, and water treatment infrastructure.
- **Ongoing environmental monitoring** (i.e. water quality) and in-depth assessments, including the procurement of specialised equipment (i.e. mobile laboratories for water testing); engaging the services of specialists, and ecologists.
- Restoration of natural sites.
- Measures to revive local industries (delivery of raw materials and products).
- Simplify the procedure for damage compensation and create a commission to assess the extent of damage.

Despite the urgency of addressing environmental damage to prevent irreversible impacts, some obstacles prevent the implementation of identified measures. Among those, KIs mentioned:

- Ongoing military operations and further damage caused to industrial infrastructure.
- Mines and UXOs preventing access to impacted areas.
- Limited funding, workforce and expertise to carry out systemic environmental monitoring and assessment.
- Lack of detailed information to prioritise areas for recovery.

The full report is not publicly available due to the sensitive information it contains. **REACH can share the report bi-laterally upon request** with humanitarian actors to enable the inclusion of industrial risks in sectoral programming, support operational preparedness and response, and inform recovery activities.

REACH is also able to **share extracts of its hazardous events database**, and **produce customized maps** upon request.

To know more, please contact REACH at...

[impact.ukraine@impact-initiatives.org](mailto:impact.ukraine@impact-initiatives.org)

## Hazardous Events Monitoring Initiative



## Conflict-driven environmental and health risks in Mykolaivska Oblast

In-depth area-based assessment

(February 2022 - June 2023)

August 2023 | Ukraine

REACH

learning  
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# Thank you for your attention



Please contact IMPACT  
for the full report and data at  
[impact.ukraine@impact-initiatives.org](mailto:impact.ukraine@impact-initiatives.org)



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