Research Terms of Reference

Damage Impact Analysis UKR2310 Ukraine

1 August 2023 Version 1.0

REACH Informing more effective humanitarian action

1. Executive Summary

Country of	Ukraine									
intervention										
Type of Emergency		Natural disaster	X (Conflict		Other (specify)				
Type of Crisis	Х	Sudden onset		Slow onset	Х	Protracted				
Mandating Body/	BHA									
Agency										
IMPACT Project	ACTE	ED code 64FNU								
Code	IMPA	.CT code TBD								
Overall Research										
Timeframe (from	1/9/2	023 – 1/1/2025								
research design to final										
outputs / M&E)										
Research	1. Pil	ot/ training: 1/9/2023		6. Preliminary pres	senta	ation: 1/12/2023				
Timeframe	2. Sta	art collect data: 15/09/2023		7. Outputs sent fo	r vali	dation: 1/1/2024				
These dates align with	3. Da	ta collected: 21/10/2023		8. Outputs publish	ied: 1	5/1/2024				
the delivery of the first	4. Da	ta analysed: 21/11/2023		Final presentati	9. Final presentation: 30/1/2024					
round of outputs.	5. Da	ta sent for validation: 21/11/2	023							
Number of	Х	Single assessment (one cy	cle) –	Nine outputs across m	ultiple	e geographies				
	Multi assessment (more than one cycle)									
assessments		Multi assessment (more that	an one	e cycle)						
assessments Humanitarian	Miles	Multi assessment (more that is the second se	an one	e cycle) Deadline						
assessments Humanitarian milestones	Miles	Multi assessment (more tha stone Donor plan/strategy	an one	e cycle)						
assessments Humanitarian milestones Specify what will the	Miles	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy	an one	Deadline // //						
assessments Humanitarian milestones Specify what will the assessment inform and	Miles	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy:	an one	cycle) Deadline // // REACH will regula	arly li	aise with relevant				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: • Shelter Cluster	an one	cycle) Deadline // // REACH will regula clusters to inform	arly lia	aise with relevant ramming in these areas.				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: • Shelter Cluster • Food Security and Live	an one	cycle) Deadline // // REACH will regula clusters to inform ds Cluster input will a	arly lia progr	aise with relevant ramming in these areas. selection of assessment				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: • Shelter Cluster • Food Security and Live • WASH	an one	Deadline // // // REACH will regula clusters to inform Cluster input will a areas and the type	arly lia progr allow es of	aise with relevant ramming in these areas. selection of assessment information presented.				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: Shelter Cluster Food Security and Live WASH Health	an one	Deadline // // // REACH will regula clusters to inform ds Cluster input will a areas and the type	arly lia progr allow es of	aise with relevant ramming in these areas. selection of assessment information presented.				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles X	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: • Shelter Cluster • Food Security and Live • WASH • Health NGO platform plan/strategy	an one	Deadline // // // REACH will regula clusters to inform Cluster input will a areas and the type //	arly lia progr allow es of	aise with relevant ramming in these areas. selection of assessment information presented.				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: Shelter Cluster Food Security and Live WASH Health NGO platform plan/strategy Other (Specify):		Deadline // // // REACH will regula clusters to inform ds Cluster input will a areas and the type // Ongoing	arly lia progr allow es of	aise with relevant ramming in these areas. selection of assessment information presented.				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles X X	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: Shelter Cluster Food Security and Live WASH Health NGO platform plan/strategy Other (Specify): Local Governments	elihood	Deadline // // // REACH will regula clusters to inform Cluster input will a areas and the type // Ongoing	arly lianger and the second se	aise with relevant ramming in these areas. selection of assessment information presented.				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles X X	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: Shelter Cluster Food Security and Live WASH Health NGO platform plan/strategy Other (Specify): Local Governments Oblast Governments		Deadline // // // REACH will regula clusters to inform ds Cluster input will a areas and the type // Ongoing	arly lianger and the second se	aise with relevant ramming in these areas. selection of assessment information presented.				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles X X X	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: Shelter Cluster Food Security and Live WASH Health NGO platform plan/strategy Other (Specify): Local Governments Oblast Governments Institutional reconstruct actors (LNDD, World 5	an one	Deadline // // // REACH will regula clusters to inform Cluster input will a areas and the type // Ongoing	arly li progr illow es of	aise with relevant ramming in these areas. selection of assessment information presented.				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: Shelter Cluster Food Security and Live WASH Health NGO platform plan/strategy Other (Specify): Local Governments Oblast Governments Institutional reconstruct actors (UNDP, World E	elihood	Deadline // // // REACH will regula clusters to inform ds Cluster input will a areas and the type // Ongoing	arly lianger and the second se	aise with relevant ramming in these areas. selection of assessment information presented.				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: Shelter Cluster Food Security and Live WASH Health NGO platform plan/strategy Other (Specify): Local Governments Oblast Governments Institutional reconstruct actors (UNDP, World E	tion Bank)	Deadline // // // REACH will regula clusters to inform ds Cluster input will a areas and the type // Ongoing	arly li progr llow es of	aise with relevant ramming in these areas. selection of assessment information presented.				
assessments Humanitarian milestones Specify what will the assessment inform and when	Miles X X	Multi assessment (more that tone Donor plan/strategy Inter-cluster plan/strategy Cluster plan/strategy: Shelter Cluster Food Security and Live WASH Health NGO platform plan/strategy Other (Specify): Local Governments Oblast Governments Institutional reconstruc actors (UNDP, World E	an one	Deadline // // // REACH will regula clusters to inform Cluster input will a areas and the type // Ongoing	arly li progr illow es of	aise with relevant ramming in these areas. selection of assessment information presented.				

Audience Type &	Audience type			Dissemination				
Dissemination	X Stra	tegic	X General Product Mailing (e.g. mail to NGO					
Specify who will the	X Prog	grammatic	consortium; HCT participants; Donors)					
assessment inform and	⊓ One	rational	X Cluster Mailing (Education, Shelter and WASH)					
how you will			and presentation of findings at next cluster meeting					
disseminate to inform			ΧF	Presentation of findings (e.g. at HCT meeting;				
the audience			Clu	ister meeting)				
			ΧE	Bilateral dissemination to local authorities.				
Detailed	Х	Yes (upcoming)		No				
dissemination plan								
required								
General Objective	Inform	the prioritisation of humanitarian respons	e, ea	arly recovery and reconstruction actors through a				
	refined	l understanding of the extent, severity of c	confli	ct-related damage to the built environment				
	(reside	ential and public service infrastructure) in o	confli	ict-affected settlements and insight into the				
	impact	of this damage through an accountability	to at	ffected population lens.				
Specific	1.	Assess the extent and severity of conflict	-relat	ted damage to the built environment				
Objective(s)		(including residential and public service in (damage assessment)	ntrasi	tructure) in conflict-affected settlements				
		(uamage assessment).						
	2.	Facilitate a detailed understanding of the	local	lised impacts of damage on the short-term				
		(humanitarian response and early recove	ry) a	nd long-term (reconstruction), including:				
		a. Availability and accessibility of a	esse	ntial public services: education, healthcare,				
		administrative services etc	icity,	communication, transponation,				
		b. Livelihoods, employment oppor	tuniti	ies and economic productivity.				
		c. Displacement and conditions of	retu	rn.				
		d. Social cohesion and social capi	tal.					
	2	Identify and amplify community's priorities	for	recovery and reconstruction to facilitate their				
	Э.	inclusion into recovery planning.	5 101					
	4.	Identify contextual and systemic factors (enab	lers or barriers) likely to facilitate or hinder				
		measures to address damage impacts, or	impacts, on the short- and long-term.					
Research								
Questions	1) W	/hat is the extent, severity and density of	dama	age to the built environment in conflict-				
	af	fected settlements?						
	aj	 Residential damage: i) How many private bouses are dated and the second se	maa	ed?				
		ii) How many apartment buildings a	re da	amaged?				
		iii) What is the estimated population	impa	acted by residential damage?				
		iv) Where is damage density the hig	hesť	?				
	D)	 Public and service infrastructure dama i) How many essential public service 	ige:	silities (education, healthcare				
		communication, transportation, a	dmin	istrative, community services) are				
		damaged?		······································				
		ii) How many utility services (water,	elec	tricity) are damaged?				
		III) How many social/symbolic/culture	al ob	Jects are damaged?				
			ic all	น ระเพษ แกลรถนบในเป็นกับ กายกายรูโ?				
	2) W	/hat are the impacts of damage to the buil	t env	vironment with regards to:				
	a)	Residential damage						
		i) What are the immediate needs re	elated	d to residential damage?				
	۲.	ii) vviiai are the expected long-term	nee	us related to residential damage?				
	U)	i) What are the immediate needs re	lated	d to damage to healthcare infrastructure?				

	 ii) What are the immediate needs related to damage to education facilities? iii) What are the immediate needs related to damage to transportation services? iv) What are the immediate needs related to damage related to water and utilities? v) In what way have employment opportunities and livelihoods been impacted by the damage to the build environment? vi) What strategies have community members adopted to respond to the infrastructure and residential damage? 3) Based on identified damage impacts, what are the communities' priorities / highest needs in relation to the impact of damage, early-recovery and reconstruction? a) Immediate needs from residential damage (Shelter) i) What type of repairs should be prioritised? ii) What areas should be prioritised? b) Immediate needs from public service infrastructure damage. i) What sectors should be prioritised? ii) How can cultural heritage and community identity best be preserved? iv) How, if at all, are populations in vulnerable positions affected differently? 4) What are the contextual and systemic factors (enablers or barriers) likely to facilitate or hinder effective response to identified damage impacts? a) What is the local capacity to meet early-recovery and reconstruction needs? b) What does best practice and successful early-recovery and reconstruction look like? c) What factors are important in early recovery as expressed by the local population and 								
Geographic	Confli	ct affected urban settlements in	East	, North	n and	I South of Ukraine	Э.		
Coverage									
Secondary data	Open	Street Map, OCHA for neighbo	urhoo	d bou	ndar	ies, ESA Sentinel	l-1 ai	nd Sentinel-2 imagery,	
sources	ESA V	VorldCover (2020), MAXAR (Ge	eo-Ey	e, Wo	rldVi	ew), UNOSAT (da	ama	ge data), LUN, REACH	
Demoletter (a)	MSNA	A data, reputable media sources	6.				-1 - 1		
Population(s)		IDPs in camp							
Select all that apply	Х	IDPs in host communities				IDPs [Other, Specify]			
		Refugees in camp				Refugees in informal sites			
		Refugees in host communi	ties			Refugees [Other, Specify]			
	Х	Host communities			Х	Returnees			
Stratification		Geographical #:		Grou	Jb #:			[Other Specify] #:	
Select type(s) and	N/A	Population size per		Ρορι	ulatio	on size per		Population size per	
enter number of strata		strata is known?		strat	ata is known?			strata is known?	
		Yes X No		□ Ye	es X	No		Yes X No	
Data collection		Structured (Quantitative)			Х	Semi-structure	ed (C	(ualitative)	
tool(s)	_							-	
	Sam	oling method			Dat	ta collection m	etho	od	
Semi-structured	X Pu	rposive			X۲	Key informant inte	erviev	v (Target #): 10 per	
data collection tool	X Sno	owballing			loca	ation			
(s) # 1		her Speciful							
Select sampling and									
and specify target #									
interviews									

Semi-structured	X Pu	rnosive			X Focus group discussion (Target #): 1-3 per				
data collection tool					location				
(s) # 2	X Sh	owbailing							
Select sampling and	□ [Ot	her, Specify]							
data collection method									
and specify target #									
interviews									
Semi-structured	X Pu	rposive			X	Mapping focus gr	oup	discussion (Target #): 1-2	
data collection tool	X Sno	owballing			per	location			
(s) # 3									
Select sampling and	□ [Ot	her, Specify]							
data collection method									
interviews									
Interviewe									
Data management	Х	IMPACT				UNHCR			
platform(s)									
F(-)		[Other, Specify]							
Expected output	Х	Situation overview #: 9_	Х	Rep	ort #	#:		Profile #:	
type(s)									
		Presentation (Preliminary	Х	Pres	sent	ation (Final)		Factsheet #: 3	
		findings) #: 0		#: 9					
		Interactive dashboard	Х	Web	oma	omaps #: 3		Map #: 24	
		#:							
		[Other, Specify] #:						I	
Access	Х	Public (available on REAC	H re	sourc	e ce	nter and other h	numa	initarian platforms)	
	Х	Restricted (bilateral dissem	ninat	ion or	nly u	pon agreed diss	semi	nation list, no	
		publication on REACH or c	other	platfo	orms	;)		·	
		* Note: Outputs access wil	l be	deter	mine	ed on a case-by-	case	e basis based on the	
		locations of assessed settle	eme	nts (i.	e. pr	oximity to frontli	ine),	level of granularity, and	
		sensitivity of the data prese	ente	1.					
Visibility Specify	REA	CH, BHA (USAID), ECHO							
which logos should be	Dono	or: BHA, ECHO							
on outputs	Coor	dination Framework: NA							
Partners: UADamage, UNOSAT, LiveEO									

2. Rationale

2.1 Background

Since the onset of the full-scale invasion of Ukraine by the Russian Federation in February 2022, numerous settlements, including large cities with dense built-up cover and rural, more sparsely populated areas, reported severe damage to both residential buildings and public service infrastructure. Areas of concern are primarily located in the frontline oblasts, particularly Donestka, Kharkivska, Khersonska, Luhanska, Mykolaisvka, Sumshchyna and Zaporizhzhia oblasts. According to a joint assessment released by the Government of Ukraine, the World Bank Group, the European

Commission, and the United Nations, the estimated cost of direct damage has reached \$135 billion as of March 2023.¹ This extensive damage has both direct and indirect impacts on the population. Direct impacts include disruptions to essential services such as healthcare and education, utility network disruptions, and environmental or public health risks due to contamination. Indirect impacts may manifest as displacements, fractures in the social fabric, and a reduced capacity to recover due to a decline in social capital.

REACH has conducted residential and infrastructure damage assessments since March 2022 to inform immediate humanitarian response. As of July 2023, the availability of data and information concerning the location and severity of conflict-related damage to residential and public service infrastructure has significantly improved, thanks to the efforts of international non-government organizations (INGOs), private sector initiatives, and various levels of the Ukrainian government. However, while information on the location, extent, and severity of damage is becoming more accessible and comprehensive the situation remains highly dynamic due to continued frequent shelling. This study will provide local authorities and implementing stakeholders with current data at a critical time when they are commencing their early-recovery and reconstruction planning. In addition, unlike most damage assessments currently conducted in Ukraine, the non-sensitive data will be shared publicly.

In addition, whilst the importance of damage assessment is receiving increased acknowledgement, comprehensive and localised analyses of the *impacts* of damage on communities is still lacking. The second objective of this research cycle is therefore to frame damage impact analysis from an Accountability to Affected Population (AAP) lens, enabling humanitarian and local government actors to incorporate the perspectives, perceptions and needs of local communities into early-recovery and reconstruction planning.

2.2 Intended impact

Overall, the project's intended impact is to empower both the affected communities and the stakeholders involved in response, recovery and reconstruction efforts. By amplifying the voices of those affected and providing data-driven insights, the project strives to facilitate informed decision-making, improved resource allocation, and ultimately contribute to the sustainable and effective recovery of conflict-affected areas.

By collecting and analysing data the project will enable evidenced-based decision-making and prioritization. Firstly, by analysing remote imagery and qualitative data, the project seeks to identify the extent and severity of damage and capture the lived experiences of impacted people. This holistic approach allows for an in-depth insight into the challenges faced by the affected communities.

¹ The World Bank. (2023). Ukraine Rapid Damage and Needs Assessment. <u>https://documents1.worldbank.org/curated/en/099184503212328877/pdf/P1801740d1177f03c0ab180057556615497.pdf</u>

Secondly, the project intends to provide evidence-based data that can inform the prioritisation of response, recovery and reconstruction programming. This data-driven approach ensures that actors involved in such efforts have a clear understanding of the most pressing needs and can allocate resources accordingly.

Furthermore, the translation of outputs to Ukrainian serves as a crucial step towards informing local policy makers and authorities. By providing them with comprehensive and highly contextualised information, the project aims to support more robust planning and management of recovery and reconstruction processes. This localised knowledge can contribute to more effective decision-making, enabling policymakers to implement targeted strategies that address the specific needs of the communities.

3 Methodology

3.1 Population of interest

The population of interest includes host community members, IDPs and returnees in the settlements impacted by damage caused by hostilities in the East, North and South of Ukraine. Based on consultations with relevant stakeholders, settlements in Kharkivska, Izyum and Mykolaivska oblasts have been selected as the initial sites of study. As the military situation remains dynamic, additional locations will be determined on an ongoing basis, with site selection based on levels of conflict impacts, accessibility and identified information gaps. Consultations with external stakeholders such as the shelter cluster, UNDP, MedAir, and ACTED have been conducted to avoid duplication and ensure that the research targets areas that are of interest to external stakeholders and implementing partners.

3.2 Research methods

This workstream uses a mixed-methodology approach. By combining geo-spatial analysis, remote sensing, secondary data review and qualitative primary data collection, the research aims to gain a comprehensive and multifaceted understanding of the extend and impact of conflict-related damage.

3.2.1 Geo-spatial analysis through remote sensing of satellite imagery

Several methodological approaches are currently available to IMPACT in Ukraine to assess the extent and severity of damage to residential and public service infrastructure using remote sensing. Relevant approaches will be selected on a case-by-case basis based on the features of assessed areas (i.e.: size, estimated levels of damage, proximity to frontline, etc.), the specific objectives of each assessment, and the availability of satellite imagery.

Overall, assessment of conflict impact on residential and public service infrastructure will be performed through processing of high-resolution optical satellite images through established and developing partnerships with UNOSAT, UADamage and LiveEO.

UNOSAT uses images provided by MAXAR company (World-View and Geo-Eye satellites with 50 cm spatial resolution) acquired during and after the conflict in several locations of Ukraine. Visual inspection of such scenes allows to detect most of the severe damage to buildings in urban settlements (see details below).

UADamage is a Ukrainian organisation leveraging artificial intelligence (AI) technologies to assess various types of conflictrelated infrastructure damage. At the moment of developing this TOR (July 2023), IMPACT Ukraine is piloting a partnership with this organisation to increase the timeliness and efficiency of satellite imagery processing. Data processed by UADamage will be embedded into this research cycle's products when relevant.

LiveEO is a Germany-based earth observation company specialised in the monitoring of linear infrastructure and other objects, including industrial, education, healthcare, according to OSM data. Al-based observation is performed at a monthly frequency to detect "change" (i.e. damage) and notify users for further analysis. At the moment of developing this TOR, IMPACT is finalising a contractual arrangement with LiveEO.

The below section describes the overall methodology used to assess damage across these various approaches.

Public service infrastructure damage: Damaged buildings will be matched with previously known objects on a georeferenced database, developed using open-source information such as layers from OpenStreetMap (OSM). This dataset will be expanded with data from Google Maps and media sources. Validation will be conducted to avoid duplication of facilities and structures. Objects in the georeferenced database will be categorised as 1) infrastructure and service providers and 2) business facilities. Data for the first category will be mainly extracted from the layers prepared by OSM contributors and will include: healthcare, education, social and administrative facilities. As well, it will include important transport hubs (such as railway stations), bridges, and locations of utility network objects (such as power substations). The second category of business facilities will rely also on a specific knowledge of local retail and food shop networks. Alongside with mapping the large industrial objects in conflict-affected areas, there will be an imputation of different shops (food, medicine, veterinary, clothes, etc.) and supermarkets as an important element of local economies. These objects will be assigned to one of four categories: 'possible damage' (visible debris near building or indirect signs of damage on roofs or walls), 'moderate damage' (visible damage of walls and roofs), 'severe damage' (substantially damaged walls, destroyed roof), and 'destroyed' (only a few remnants of walls with no roof). Shops and other small facilities located on the ground floor of multiapartment living houses will be assigned to the "visible damage" or "severe visible damage" categories according to the visual damage type of the whole building. Although remote sensing satellite data cannot fully capture the damage caused by conflict hostilities, it illustrates general trends while field (ground or drone) surveys are restricted or impossible.

Absolute and relative estimates of damaged key infrastructure and facilities will be examined and reported in sharable form suitable for humanitarian actors, area-based assessments, and local authorities. Additionally, settlement-level (in form of summarized hexagonal grids, without direct mapping of damaged infrastructure due to security reasons) damage density hotspots will be mapped and presented to better inform spatial patterns of conflict impact and areas to prioritize the response.

Residential damage: To estimate conflict impact on the residential buildings in urban settlements directly affected by ongoing hostilities, IMPACT will assess the visually detected damage using high-resolution optical satellite images. These objects will be assigned to the one of four categories: 'possible damage' (visible debris near building or indirect signs of damage on roofs or walls), 'moderate damage' (visible damage of walls and roofs), 'severe damage' (substantially damaged

walls, destroyed roof), and 'destroyed' (only a few remnants of walls with no roof). Additionally, type of building (single-family home or apartment building, old or recently built), number of floors and entrances (for apartment buildings) will be assigned as necessary inputs to calculate number of apartments in specific building. This data will come from visual inspection from Google Maps, and data available for recently built houses on commercial website LUN. Building footprints will be a base data source to estimate the total number of populations who used to live in damaged or destroyed buildings. This population estimation will be based on the average number of people living in single apartments or private house specified for the given area of interest (average number of household members for oblast based on data from State Statistics Service). Hotspots of detected damage will be reported using GIS tools at neighbourhood level. Neighbourhood boundaries will be drawn with usage of official city plans rather than using historical urban zoning which precise boundaries are rather unavailable.

Overall, to connect revealed findings of damage with humanitarian needs and humanitarian actors' capacity, IMPACT will communicate with humanitarian actors and local authorities through cluster platforms. Settlement-level maps with estimated damage to infrastructure will be shared bilaterally and agglomeration-level factsheets (for specific areas) will be shared publicly. Sharing of revealed damage data in geospatial (both SHP and KML extensions for users with different GIS capacity) and table formats by request will allow to incorporate findings into humanitarian actors' workflows. Revealed findings are intended to be presented at humanitarian cluster meetings to better understand the gaps between the actual needs and response capacity.

3.2.2 Ground truthing

Ground truthing refers to the process of collecting on-site or "ground truth" data to validate or confirm the accuracy of remotely sensed or modelled data. It involves comparing the information obtained from satellite imagery, aerial photographs, or computer-generated models with actual data collected directly from the field. Ground truthing significantly increases the reliability and accuracy of remote sensing data interpretation, as it provides a means of verifying the identified features, land cover classes, or other characteristics derived from remote sensing sources. The data will be collected by enumerators with the use of a checklist developed by the research team. By collecting ground truth data, the study will be able to assess the accuracy, validate classifications, and make necessary adjustments or corrections to improve the quality of remote sensing data analysis. The feasibility and relevance of ground truthing activities will be assessed on a case-by-case basis based on analysis of the security situation and accessibility.

3.2.3 Secondary data review

Secondary data review will involve a comprehensive analysis of available data from humanitarian actors and damage assessment data from relevant partners. Additionally, relevant literature from humanitarian actors addressing humanitarian needs related to infrastructure and residential damage will be analysed. REACH will examine protection-related data, trends from Arrival and Transit Monitoring, Multi-Sector Needs Assessment and other relevant internal products to contextualise damage impact analysis and reduce risks of duplication and consultation fatigue among respondents. This data will also be utilised to identify protection risks and the needs of groups in vulnerable positions such as older people, women, children and people with disabilities and IDPs. With the use of secondary data, REACH will develop an understanding of the primary drivers and resulting needs stemming from vulnerabilities resulting from conflict-related damage to the built environment.

3.2.4 Primary qualitative data collection

By combining in-depth interviews with key informants, focus group discussions and participatory mapping, this research seeks to gather data that sheds light on the experiences, perceptions, and challenges faced by actors and communities affected by residential and infrastructure damage, as well as the broader implications for community resilience and post-conflict recovery and reconstruction efforts.

- Key informant interviews will be conducted with local government officials, representatives of local civil society
 organisations (CSO), and relevant sectoral actors (Shelter, Health, Education, WASH, etc.). Interviews will focus
 on assessing damage and identifying needs at the settlement level, as well as gather information on existing
 response and repair efforts and local implementation capacities and resources. A total of 12 to 15 KI interviews will
 be conducted per location, KIs will be selected based on background and occupation related to residential and
 infrastructure damage.
- Focus groups will be organised with community members representing various populations of interest. These
 sessions will aim to gather information on needs and impact of the damage and identify preferences for prioritisation
 in the context of recovery and reconstruction work as expressed by community members. Participant selection will
 be based on a cross section of the local community, with the aim to include diverse representation based on gender,
 age, and socioeconomic background. Focus groups will exist of 6 to 8 participants. The sessions will be recorded
 and verbatim transcribed in order to be able to include quotes in the research outputs.
- Participatory mapping is a collaborative approach that engages local communities and stakeholders in the process of creating maps. Participatory mapping will allow respondents to actively participate in mapping their environment, resources, and knowledge in relation to infrastructural damage impacts in their settlement, ensuring their voices are heard and their expertise is recognised. By involving community members in data collection and representation, participatory mapping promotes community ownership, supports decision-making processes, and facilitates communication and collaboration among different stakeholders. To conduct this research methods the research team will develop laminated large print out maps of the area that will allow focus groups participants and key informants to use white board markers to indicate what areas they believe should be prioritised in relation to residential and infrastructure damage recovery and reconstruction.

Sampling: Key informants and discussion group members will be purposively (via snowballing technique) selected via two parallel strategies:

- 1. Local authorities will provide contacts of key informants.
- 2. A contact list of key informants will be established based on existing REACH networks.

Tools: Semi-structured questionnaires. Discussions will be recorded, and notes will be taken by enumerators during the discussion. After every KI interview and FGD, debriefs will be held with enumerators. In these debriefs, enumerators will be

asked to share their thoughts and experience on the data collection activity, as neutrally as possible. These debriefs will be recorded and shared with HQ using the IMPACT debrief template.

Triangulation: The responses of the various KI groups (residents, local government representatives, CSOs representative, service providers, etc.) will be compared to give an indication of the various types of infrastructural damage impacts.

Data source	Short description	Area	Available data and comment
Sentinel-1	Remote sensing	Global	Radar imagery (10 m)
Sentinel-2	Remote sensing	Global	Multispectral imagery (10 m)
World-View and Geo-Eye	Remote sensing	Specific locations of interest	RGB-composites of visible bands (50 cm)
FIRMS	Remote sensing	Global	Thermal anomaly detection (500 m)
OCHA Settlement Boundaries	Administrative boundaries	Ukraine	Admin boundaries
OSM buildings network	Vector layer	Global	raw OSM
OSM road, electricity network	Vector layer	Global	raw OSM
Google Maps	Locations of facilities and structures	Global	Locations to impute into the main database
UNOSAT damage data	Vector layer	Ukraine	Locations of damaged structures

3.3 Open data sources to be utilised

3.4 Limitations

This study is based on two research methodologies, GIS and qualitative research which have their own distinct limitations. GIS (Geographic Information Systems) research is subject to several limitations.

The accuracy of GIS analysis relies heavily on the quality of the available satellite imagery. Shelling that occurred postprocurement of imagery, clouds and low-resolution imagery may lead to challenges in spatial analysis and interpretation, Whilst major damage may still be detected with lower accuracy imagery, these factors may impact the ability to detect minor damage, such as broken windows.

Qualitative research provides invaluable insight into complex human behaviors and motivation. However, the subjective nature of qualitative data collection and analysis can introduce bias, making it challenging to ensure objectivity and reproducibility. These limitations will be mitigated with the use of the data saturation grid.

Data Processing & Analysis

For geo-spatial data processing and analysis, see section 3.4.1 above (*Geo-spatial analysis through remote sensing of satellite imagery*).

Qualitative data: The accuracy, consistency, and reliability of the data will be ensured with the use of the data saturation grid. The data will firstly be systematically organised and coded, with similar themes and concepts grouped together. Next,

any irrelevant or duplicate data is removed, and any missing or incomplete information is addressed through careful data augmentation or contacting participants for clarification. The research team will additionally critically examine the data for potential biases, inconsistencies, or errors. Finally, the cleaned data is documented and stored in a secure manner, and subsequently analysed to develop a narrative.

Overall, the fact sheets and situational overviews produced under this research cycles will include:

- Damage assessment mappings (geo-spatial analyses)
- Damage impact analysis (based on primary qualitative data)
- Presentations for external stakeholders
- When relevant, web-based public-facing outputs (such as story maps)

These different components will be used independently and jointly according to the specific objectives of assessments in each assessed area.

3. Key ethical considerations and related risks

The proposed research design meets / does not meet the following criteria:

The proposed research design	Yes/ No	Details if no (including mitigation)
Has been coordinated with relevant stakeholders to avoid unnecessary duplication of data collection efforts?	Yes	
Respects respondents, their rights and dignity (specifically by: seeking informed consent, designing length of survey/ discussion while being considerate of participants' time, ensuring accurate reporting of information provided)?	Yes	
Does not expose data collectors to any risks as a direct result of participation in data collection?	Yes	
Does not expose respondents / their communities to any risks as a direct result of participation in data collection?	Yes	
Does not involve collecting information on specific topics which may be stressful and/ or re-traumatising for research participants (both respondents and data collectors)?	Yes	
Does not involve data collection with minors i.e. anyone less than 18 years old?	Yes	
Does not involve data collection with other vulnerable groups e.g. persons with disabilities, victims/ survivors of protection incidents, etc.?	Yes	

				-				
	Follows	IMPACT	SOPs	for	management	of	personally	Yes
Ide	identifiable information?							

5. Roles and responsibilities

Table 3: Description of roles and responsibilities

Task Description	Responsible	Accountable	Consulted	Informed
Research design	SAO	RM	GISO, IMPACT Research Design and Data Unit (RDD)	Shelter Cluster and implementing partners; Remote sensing partners.
Supervising data collection	Field Officer	Field Coordinator	Impact CC	Operational partners (ACTED)
Data processing (checking, cleaning)	AO/DBO/GISO	SAO	HQ RDD	RM
Data analysis	AO/SAO/GIS	SAO	HQ RDD	RM
Output production	AO/SAO/GIS	RM	RM	RM, DCC
Dissemination	SAO/RM	RM	RM	(See dissemination plan)
Monitoring & Evaluation	AO/SAO	RM	RM	CC
Lessons learned	AO/SAO	RM	RM	CC

4. Data Analysis Plan

Please see the attached Data Analysis Plan.

5. Data Management Plan

Data management plan available upon request.

7. Monitoring & Evaluation Plan

IMPACT Objective	External M&E Indicator	Internal M&E Indicator	Focal point	Tool	Will indicator be tracked?
	Number of	# of downloads of x product from Resource Center	Country request to HQ		X Yes
Humanitaria	humanitarian organisations	# of downloads of x product from Relief Web	Country request to HQ		X Yes
n stakeholders	IMPACT services/products	# of downloads of x product from Country level platforms	Country team	llser lo	X Yes
are accessing IMPACT	Number of	# of page clicks on x product from REACH global newsletter	Country request to HQ	g	X Yes (when applicable)
products	accessing IMPACT	# of page clicks on x product from country newsletter, sendingBlue, bit.ly	Country team		X Yes
	services/products	# of visits to x webmap/x dashboard	Country request to HQ		X Yes (when applicable)
IMPACT activities contribute to better program	Number of humanitarian	# references in HPC documents (HNO, SRP, Flash appeals, Cluster/sector strategies)	Country	Referen	Cluster strategies, Assessment and Analysis Working Group, Shelter, Health, Education.
implementati on and coordination of the humanitaria	organisations utilizing IMPACT services/products	# references in single agency documents	team	ce_log	TBD
Humanitaria n stakeholders are using IMPACT products	Humanitarian actors use IMPACT evidence/product s as a basis for decision making, aid planning and delivery Number of humanitarian documents (HNO, HRP, cluster/agency strategic plans, etc.) directly informed by IMPACT products	Perceived relevance of IMPACT country-programs Perceived usefulness and influence of IMPACT outputs Recommendations to strengthen IMPACT programs Perceived capacity of IMPACT staff Perceived quality of outputs/programs Recommendations to strengthen IMPACT programs	Country team	Usage_ Feedba ck <i>and</i> Usage_ Survey templat e	Usage survey to be distributed to local authorities, local actors, international actors 6 months after publication
Humanitaria n stakeholders are engaged	Number and/or percentage of humanitarian organizations	# of organisations providing resources (i.e.staff, vehicles, meeting space, budget, etc.) for activity implementation	Country team	Engage ment_lo g	□ Yes

Damage Impact Assessment Research Cycle – 1 September 2023

in IMPACT programs throughout	directly contributing to IMPACT	# of organisations/clusters inputting in research design and joint analysis	X Yes
the research cycle	programs (providing resources, participating to presentations, etc.)	# of organisations/clusters attending briefings on findings;	X Yes