

Satellite Imagery Interpretation Guide



Zaatari Camp
Photo Credit: UNHCR

Displaced Population Camps



Harvard
Humanitarian
Initiative

Signal Program on Human Security and Technology

Authors

All research, analysis, writing, editing and layout for *Satellite Imagery Interpretation Guide: Displaced Population Camps* was completed by the Signal Program on Human Security and Technology at the Harvard Humanitarian Initiative (HHI).

Isaac L. Baker, Imagery Analysis Manager

Brittany L. Card, Program Coordinator

Nathaniel A. Raymond, Director

Study Review

Overall supervision of this study for HHI was provided by Vincenzo Bollettino, PhD, and Michael Van-Rooyen, MD, MPH, of HHI.

This publication was reviewed by:

Carolina Jorda Alvarez, United Nations Institute for Training and Research-Operational Satellite Applications Programme (UNITAR-UNOSAT)

Sebastian Ancavil, International Organization for Migration (IOM)

Lars Bromley, UNITAR-UNOSAT

Joshua Lyons, Human Rights Watch

Patrick Meier, Qatar Computing Research Institute

Claudia Pereira, IOM

Amin Salameh, IOM

Susan Wolfenbarger, American Association for the Advancement of Science

Acknowledgments

The authors are grateful for the time each of the expert reviewers took to review and comment on this guide. The authors especially thank John Clark of Google's Skybox Imaging and Amin Salameh of the International Organization for Migration for their invaluable contributions to the development of this guide.

This report was made possible due to the generous donation of satellite imagery to the Signal Program on Human Security and Technology at the Harvard Humanitarian Initiative. Donations were made by Google's Skybox Imaging and SpaceUnited. The authors are grateful for the support provided by both these organizations.

About The Signal Program on Human Security and Technology

The Signal Program on Human Security and Technology (Signal Program) was founded by the Harvard Humanitarian Initiative in 2012. Signal Program staff, fellows, and partners work to advance the safe, ethical, and effective use of information technologies by communities of practice during humanitarian and human rights emergencies.

The program addresses critical gaps in research and practice HHI encountered while designing and managing the pilot phase of the Satellite Sentinel Project (SSP) from December 2010 to the summer of 2012. Through the analysis of satellite imagery and open source reports from Sudan, SSP was a watershed moment in the use of remote sensing to monitor the human security of civilians during and armed conflict.

The program's ongoing research and scholarship focuses on the following three areas:

Tools and Methods

Design and scientifically test tools and methods that remotely collect and analyze data about humanitarian emergencies;

Standards and Ethics

Help lead the development of technical standards and professional ethics for the responsible use of technology to assist disaster-affected populations;

Mass Atrocity Remote Sensing

And conduct retrospective analysis of satellite imagery and other related data to identify remotely observable forensic evidence of alleged mass atrocities.

About the Harvard Humanitarian Initiative

The Harvard Humanitarian Initiative is a university-wide center involving multiple entities within the Harvard community that provide expertise in public health, medicine, social science, management, and other disciplines to promote evidence-based approaches to humanitarian assistance. The mission of HHI is to relieve human suffering in war and disaster by advancing the science and practice of humanitarian response worldwide.

HHI fosters interdisciplinary collaboration in order to:

- Improve the effectiveness of humanitarian strategies for relief, protection and prevention;
- Instill human rights principles and practices in these strategies; and
- Educate and train the next generation of humanitarian leaders.

Table of Contents

	Preface . . .	i
	Acronym List . . .	ii
	How to Access Imagery Featured in this Guide . . .	iv
	Chapter 1: Uses and Methodology . . .	1
Chapter 2: Interpreting Imagery of Displaced Population Camps . . .		4
	Chapter 3: Camp Overviews . . .	11
Chapter 4: Shelter and Civilian-Use Structures . . .		19
	Chapter 5: Education . . .	30
	Chapter 6: Food Security . . .	35
	Chapter 7: Health . . .	38
	Chapter 8: Logistics . . .	42
Chapter 9: Water, Sanitation, and Hygiene (WASH) . . .		44
	Chapter 10: Agency-Use Structures . . .	47
	Chapter 11: Security . . .	54
	Appendix I: Expanded Methodology . . .	58
	Appendix II: Camp Structure Data . . .	61
	Appendix III: Maps Used for Analysis . . .	67

Preface

Remote sensing analysis by humanitarian organizations to detect and document changes related to displaced population camps has been employed, in various iterations, by the field for as long as two decades. The use of remote sensing to support responses to civilian displacement can prove valuable for site planning, identifying patterns of population change, and capturing key data for program planning and evaluation purposes.

Recent advances in the amount of satellite imagery that is commercially accessible, as well as the adoption of technologies such as Google Earth, has enabled this form of analysis to become more prevalent among humanitarians. The rise of voluntary technical organizations (VTO) as part of the crisis mapping movement is a crucial factor in remote sensing's more central role in supporting operations that assist displaced populations.

What was once only the domain of UN or government-based experts supporting humanitarian operations at the headquarters level is now considered a standard tool in the humanitarian toolbox. However, basic reference guides and publicly available training materials that can equip humanitarian practitioners attempting to apply remote sensing to the analysis of displaced population centers have, until now, not been available.

The Signal Program on Human Security and Technology has, with this study, begun to address this critical gap in practice and pedagogy. *Satellite Imagery Interpretation Guide: Displaced Population Camps* provides the first set of case studies of displaced persons camps in East Africa and the Middle East specifically intended to teach and guide those analyzing satellite imagery of refugee and IDP camps.

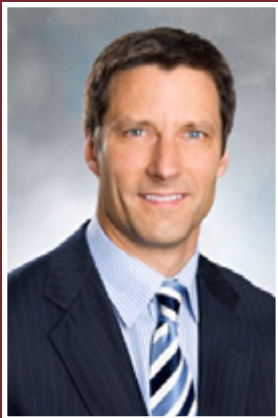
This guide makes two core contributions to the broader humanitarian sector: 1) It presents an approach for organizing observable objects in satellite imagery in relationship to the categories of the UN's humanitarian cluster system; and 2) the guide identifies both situation specific and commonly found types of critical humanitarian infrastructure in imagery.

While only a first step in a larger, long-term process of building best practices and technical standards, this reference guide is a milestone in the professionalization of remote sensing analysis for humanitarian purposes. The guide is especially relevant at a time when ongoing armed conflicts in Syria, Central African Republic, Sudan, Nigeria, and elsewhere have recently displaced millions of civilians from their homes. The individuals and organizations that assist those populations will very likely be benefiting from the integral support of geospatial analysts and VTOs as they do their work.

Products such as *Satellite Imagery Interpretation Guide* will be key components of the evolving architecture of training and resources available to these practitioners. It is HHI's intent that this guide and other products like it will support these emerging digital humanitarians as they play an increasingly crucial role in humanitarian response.



Michael VanRooyen, MD, MPH, FACEP
Director, Harvard Humanitarian Initiative



Michael VanRooyen
MD, MPH, FACEP

Director, Harvard
Humanitarian Initiative

Acronym List

ACTED	Agency for Technical Cooperation and Development
AVSI	Association of Volunteers in International Service
CARE	Cooperative for Assistance and Relief Everywhere
DRC	Danish Refugee Council
DWS	Department for World Service - Lutheran World Federation
FAO	Food and Agriculture Organization of the United Nations
FCA	Finn Church Aid
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HAD	Humanitarian Aid & Development
HHI	Harvard Humanitarian Initiative
HI	Handicap International/Atlas Logistics
IDP	Internally Displaced Persons
IFRC	International Federation of the Red Cross and Red Crescent Societies
IOM	International Organization for Migration
IMC	International Medical Corps
IRC	International Rescue Committee
IRD	International Relief and Development
JEN	Japan Emergency NGO
JHAS	Jordan Health Aid Society
LWF	Lutheran World Federation
MdM	Médecins du Monde
MoE Jordan	Ministry of Education - Jordan
MoH Jordan	Ministry of Health - Jordan
MSF	Médecins Sans Frontières
NCCK	National Council of Churches of Kenya
NHF	Noor Al Hussein Foundation
NP	Nonviolent Peaceforce

RCK	Refugee Consortium of Kenya
RI	Relief International
SC	Save the Children
SCUK	Save the Children UK
SMoH	State Ministry of Health
SP	Samaritan's Purse
SPHO	Sudan Peace Humanitarian Organization
SRCS	Sudanese Red Crescent Society
UN OCHA	United Nations Office for the Coordination of Humanitarian Affairs
UNFPA	United Nations Population Fund
UNHCR	United Nations High Commissioner for Refugees
UNHCR-LCU	United Nations High Commissioner for Refugees Logistics Coordination Unit
UNICEF	United Nations International Children's Emergency Fund
UNITAR- UNOSAT	United Nations Institute for Training and Research-Operational Satellite Applications Programme
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
UNOPS	United Nations Office for Project Services
UNV	United Nations Volunteers
UNWOMEN	United Nations Women
VTO	Voluntary Technical Organization
WASH	Water, Sanitation, and Hygiene
WES	Water, Environmental, and Sanitation
WFP	World Food Programme
WHO	World Health Organization
WTK	Windle Trust Kenya

How to Access Imagery Features in this Guide

Satellite Imagery Interpretation Guide: Displaced Population Camps was produced in collaboration with Google's Skybox Imaging. In this project, the Signal Program used six images collected by Skybox; two of Yida and Zam Zam and one of Zaatari and Dagahaley. SpaceUnited also donated an image of Zaatari that was collected by Astrium.

The six Skybox images used to create this guide are publicly available online for viewing and interpretation at the following link: www.skybox.com/hhi-displaced-population-camps. This imagery is published by Google under Creative Commons by Attribution ([CC BY 4.0](https://creativecommons.org/licenses/by/4.0/))

Each camp location covered in the guide is marked with a pin on the map. To view the imagery on the Google Earth Engine website, click "Zoom to area" under the location name and the date you wish you explore. Once zoomed to the corresponding location, use your mouse or the "+" or "-" box in the lower left hand corner of your screen to zoom in or out.

Clicking on the pin for each location will show a box that contains the camp name, a brief description, and map coordinates. This box also contains links to download GeoTIFF imagery for offline use.

Users who have advanced skills in using geospatial software can also download a KML file for use in Google Earth and other mapping tools. To do so, click "Download KML" under "HHI - Satellite Imagery Interpretation Guide- Camps." Once opened in Google Earth, this file will show a pin for each camp. Clicking on a pin will show a description of the camp and the links to download the high resolution satellite imagery for offline use by experienced users in advanced geospatial software.

Chapter 1: Uses and Methodology

1A. Need for an Interpretation Guide

According to the United Nations High Commissioner for Refugees (UNHCR), 51.2 million individuals were forcibly displaced due to persecution, conflict, generalized violence, and human rights violations in 2013. This figure is comprised of 16.7 million refugees, 33.3 million internally displaced persons (IDPs), and 1.2 million asylum-seekers.¹ The number of refugees and IDPs globally continued to rise throughout 2014. This was due, in large part, to the continuation of both protracted crises and more recent conflicts, such as Syria.

Voluntary technical organizations (VTOs), imagery analysts, and researchers often interpret remote sensing data of planned and self-settled displaced population camps that host IDPs and/ or refugees. This work is increasingly done to support humanitarian agencies working to assist these populations. The interpretation of satellite imagery can provide critical situational awareness to responders in the field.

A key source of remote sensing data for this diverse community of practitioners is high resolution commercial satellite imagery. The potential uses of satellite imagery for assisting displaced populations have been explored over the past two decades,² including the following applications:

- Map shelters and other buildings present at camps, including changes to the number and type of these structures that are visible over time.³
- Aid in the remote detection of displaced populations, often in non-permissive environments and/or over extremely large physical areas.⁴
- Support site selection, monitor camp construction, and conduct environmental assessments.⁵
- Conduct rapid assessments during or immediately after a mass displacement of civilians.⁶
- Document the impact of a natural disaster, man-made disaster (such as a fire), or violent incident that has occurred at a camp.⁷

One implication of the increasing adoption of remote sensing by humanitarian organizations is that little formal sector-specific research and pedagogy exists. The earliest adopters of remote sensing were governments and their militaries beginning in the 1950's. By comparison, the application of remote sensing to humanitarian operations, like IDP/refugee assistance, emerged in the 1980's and 1990's.⁸ This technology was initially used exclusively by large agencies, particularly UN and governmental organizations.

However, recent advances in the commercial collection and access to satellite imagery has resulted in the expanding use of this data by humanitarian and human rights organizations, VTOs, and researchers. Thus, there is a critical gap in accepted methodologies, examples of observable objects, and general best practices to train and guide volunteers and humanitarian analysts as they remotely analyze displaced population camps.

1B. Addressing Gaps in Practice

This guide is intended to fill two specific, interconnected gaps in the current use of high resolution satellite imagery in support of refugee/IDP assistance operations. The first gap is the absence of public and standardized references for commonly observed objects visible in high resolution satellite imagery that are often present in certain refugee and IDP camp contexts (hereafter, "displaced population camps").

To address this gap, the guide aims to assist in the identification of certain individual objects and/or groups of objects. This identification may also help analysts identify operational contexts in which objects may be present. This guide lists the dimensions, colors, shape, and, when possible, unique identifying features about objects visible in high resolution imagery of displaced population camps.

These objects may include temporary shelters (e.g. tents), locally built shelters constructed from organic matter and/or other materials (e.g. tarps), and prefabricated structures (e.g. caravans). Additional objects covered by this guide include, but are not limited to, water and sanitation infrastructure, warehouses, markets, and mosques.

It is important to note that, in most cases, the identity and function of objects present in camp settings cannot be identified based on the imagery alone.

The second gap addressed by this guide is a framework for integrating these objects, and the observations made about them, with the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) humanitarian cluster system. The cluster system is the architecture by which humanitarian agencies, both UN organizations and NGOs, share information, coordinate response to specific crises, and manage the provision of services at specific locations, such as displaced population centers.⁹

While objects may relate to several different clusters at once, this guide sorts objects present at each camp by the cluster with which it has its primary relationship. The pre-existing cluster areas utilized for this method are Education, Food Security, Health, Logistics, Shelter, and Water, Sanitation, and Hygiene (WASH). For example, an object present in satellite imagery of a displaced population center consistent with a latrine facility would be placed under “WASH”. The corresponding OCHA humanitarian icon for each of these clusters can be found on a chapter’s first page.

Objects that either do not fit into a specific pre-existing cluster are placed into categories created by the authors. These categories are Agency-Use, Civilian-Use, and Security.

1C. Potential Users of the Guide

The guide is primarily intended as a reference and training resource for students studying humanitarian response and technology; volunteers supporting humanitarian operations; and general audiences interested in the application of these skills and technologies to humanitarian assistance. While the guide may be of some utility to professional geospatial analysts regularly engaged in humanitarian work, it is mainly designed to serve as an introduction to this work for those new to the field.

The guide presents information, suggested interpretation guidelines and techniques, and aggregated data resulting from case studies with the goal of supporting skill development in the following areas:

- Basic object identification of structures that may often be found at planned displaced population camps;
- Practical and operational considerations related to imagery interpretation of displaced population camps;
- Familiarity with the phenomena, activities, and issues that can affect the visual profile of a camp in satellite imagery;
- General understanding of how certain objects may be used by civilians and agencies in a camp context; and
- Initial approaches for integrating data derived from imagery interpretation with other forms of available humanitarian data about camp contexts.

1D. Data and Methods

Camp Selection

The reference guide includes case studies of four camps in East Africa and the Middle East. The camps are Yida Camp in South Sudan; Zaatari Camp in Jordan; Zam Zam Camp in the Darfur Region of Sudan; and Dagahaley Camp in Kenya. These camps and regions were chosen for two reasons. First, these camps provide examples of geographic regions where civilian displacement is an ongoing problem. Second, these camps present observable objects that may be found across a relatively diverse set of camp environments in multiple regions and operational contexts.

Sources of Imagery Data

The Signal Program at HHI’s research staff analyzed high resolution satellite images of the camps over the

course of six months. For each camp, two high resolution images collected in 2014 were interpreted. A total of seven images were analyzed over the course of the guide's development. SpaceUnited provided one image collected by Astrium to the Signal Program for this project. The other six images interpreted as part of the research were provided by Skybox Imaging.

Analysis Methodology

Observable objects present in these images were cross-referenced with data from publicly available maps produced by UN agencies and other humanitarian organizations operating in these camps. Additional open source data, including situation reports, news articles, and ground photographs, were used to help identify, document, and describe objects present in the satellite imagery of the camps.

Signal Program researchers captured several standard fields of information about each object included within the report. These fields are an object's shape, color, and measurement in meters. Additional properties, when relevant, are noted. The researchers note, when possible, whether similar objects occur in other camps analyzed in the reference guide.

Limitations

The Signal Program's identification of objects present at displaced population camps based on the interpretation of satellite imagery has three major limitations. First, any observable objects that could not be identified and cross-corroborated with open source data or contextual analysis are not included. Secondly, objects that are smaller than the resolution available for the satellite images received by the Signal Program are not included in the guide. Lastly, only objects present at the camps on the dates that the satellite images were captured are included in the guide.

Additionally, the intended functionality and/or current use of an apparent structure present in satellite imagery cannot be conclusively determined by imagery interpretation alone. While some structures, such as apparent civilian shelters like tents, may be more readily identifiable than other structures, such as a school or a hospital, analysts must always seek corroborating information from non-imagery sources whenever possible.

[For an expanded methodology, please see Appendix I]

Chapter 2: Interpreting Imagery of Displaced Population Camps

2A. Defining and Identifying “Planned” Camps

This resource focuses explicitly on “planned” refugee or IDP camps. A planned camp, as defined in the context of this guide, is a displaced population camp of refugees and/or IDPs being serviced by international and non-governmental aid agencies in a specific location. Planned camps can develop from initially self-settled camps in some cases.

While planned camps are one type of displaced population camp, self-settled IDP and refugee settlements are often of interest to humanitarian and human rights groups as well. These camps occur spontaneously when civilian populations flee a natural disaster or violence to self-selected locations. Self-settled camps can occur organically when displaced populations cluster near a specific location in an often uncoordinated way. In later guides, the Signal Program and others may address some of the specific, often highly complex visual profiles encountered when interpreting self-settled camps.

Planned camps often have repeating visual properties and phenomena that reflect the ongoing presence of aid agencies and the sustained provision of humanitarian assistance to a specific population over time. Though these properties and phenomena vary across regions, these characteristics may sometimes even vary within the same region.

Some of these visual properties and phenomena often present in planned camps may include the following:

- Common types and/or models of civilian shelter structures;
- Established camp perimeter, such as a fence, trench, or official boundary line;
- Agency compounds for staff living quarters, program support structures, warehouses, and administrative buildings;
- Logistics infrastructure such as airstrips, motor pools, and ground transport operations; and
- Repeating arrangements of buildings, which may sometimes include Sphere-standard derived placements of certain infrastructure, such as washing facilities, kitchens, and other civilian-use facilities.¹⁰

In all cases, analysts must seek non-imagery data corroborating of the camp’s location and the presence of specific agencies through reliable, often public sources. These sources may include maps, situation reports, news articles, and/or information acquired directly from humanitarian agencies.

2B. Practical and Operational Considerations When Interpreting Camp Imagery

There are several key practical and operational considerations that an analyst should be aware of when interpreting satellite imagery of displaced population camps. Issues an analyst might encounter will likely vary from camp to camp. However, some critical cross-cutting questions should always be discussed and answered prior to interpreting imagery of camps:

- What information do potential end-users need?
- What is the camp’s history and context?
- What are the limitations of available imagery data?
- How will change be measured over time?
- What objects will be identified?
- What is the plan for data recording and storage?

What information do potential end-users need?

In most cases, the interpretation of satellite imagery of a displaced population camp occurs in response to a request from a humanitarian agency directed to a VTO and/or institution-based analysts. Generally, these requests are highly time sensitive and occur under significant operational pressures to obtain information. Analysts should

be sensitive to the time and resource constraints of operational agencies on the ground, and seek to pre-agree the objectives, key data, and potential outcomes as early in the process as possible.

The majority of the time these requests usually focus on counting the number or changes in the number of civilian shelters present at a particular camp. Counting shelter structures provides important data for humanitarian agencies that they either might not be able to collect themselves, or may not be able to collect as accurately, regularly, easily, and as quickly.

Information gained from imagery interpretation, in some cases, can help inform population estimates, corroborate current population counts, and support the completion of needs assessments. Specific data about shelters often of interest to humanitarian agencies can include the following:

- Number of certain structures present in an image and/or images;
- Types of structures (e.g. manufactured tents, locally-built shelters, etc.);
- Disposition of the shelters (e.g. where are the shelters located, how they are spaced, and what services and/or other structures are nearby);
- Status of the shelters (e.g. are shelters damaged by fire, knocked over by wind, etc.); and,
- Capacity of the shelters (e.g. how many people are estimated to fit inside a specific shelter type or model).

What is the camp's history and context?

All analysts involved in imagery interpretation should have a common, well-informed knowledge of the history and context of each camp of interest. Understanding the unique characteristics of a camp are crucial for effectively interpreting imagery of the camp as each camp can present a distinct visual profile.

As discussed in detail in the following sections of this chapter, there are several key questions and dynamics analysts should consider before beginning interpretation of imagery (See Sections 2E and 2D). It may be helpful to create a camp profile that provides an overview of each camp of interest for all members of a team interpreting an image (See Chapter 3 for examples).

Camp profiles often prove extremely helpful in ensuring both the coherent interpretation of images by multiple analysts and providing end-users important contextual background on the camp. Key information that a camp profile or overview should contain may include the following information:

- Summary of climate and geography, including key features (e.g. elevation, topography, etc.) and weather activity (e.g. rainy seasons, flooding patterns, etc.);
- Available population estimates of the number of civilians at the camp, brief ethnographic information about them, and a breakdown of gender and age;
- Information about when the camp was created, how it came into being (e.g. planned camp, initially self-settled camp, etc.), and its evolution over time; and an
- Updated list of operational agencies and their responsibilities by humanitarian cluster.

What are the limitations of available imagery data?

Discussions about the potential value of imagery interpretation for supporting humanitarian response often center on questions of what imagery can and cannot be expected to show. To identify the limitations of imagery interpretation in a specific scenario, two separate but related lines of inquiry are required. First, general constraints of imagery interpretation must be addressed. Some questions that may help identify these constraints include, though are not limited to, the following:

- Are the objects of interest visible at the available resolution?
- What characteristics of these objects can be reasonably and reliably seen and scientifically measured throughout the image?

- What inferences about these objects can be drawn from this data?
- Are these inferences based on identifying characteristics unique to these objects and their function, or can they also be drawn about different objects for the same reasons?

Second, key questions should be asked about the quality, volume, and temporality (e.g. how recently the imagery was collected) of the imagery data. These questions may include the following:

- How recently was the imagery collected?
- Are there large amounts of clouds, sun glare, or other atmospheric phenomena that may corrupt the quality of the available imagery?
- How many images are available and over what time frame?
- What type of imagery was collected (e.g. panchromatic, high resolution, low resolution, near-infrared, etc.) and how does this imagery type affect completing the assigned task?

Analysts should discuss these issues both as a team and with the potential end-users of the resulting product, as well as any other key stakeholders. Having shared and informed expectations amongst all stakeholders about what can and cannot reasonably be determined from imagery interpretation of available data is essential to a successful project. Without these common expectations, the resulting products may not fulfill the objectives of all stakeholders and may not have the impact that was intended by the exercise.

How will change be measured over time?

Multi-temporal change detection is the process of comparing two or more images of the same location from different times against one another to make probabilistic inferences about changes at that location over a specific timeframe.¹¹ While how to perform change detection is not the focus of this edition of the guide, it is likely that information gained from imagery interpretation of camps may be used either immediately or at a later date to detect change over time.

To engage in change detection, a change metric needs to be identified (e.g. number of shelters visible in an image). Once the change metric is identified, additional imagery of that location needs to be accessed through archival imagery or the collection of fresh imagery of that location, depending on the time frame of interest to the analyst. It is important to ensure accuracy and consistency between how objects are identified between each image and over time to detect change to a scientifically reproducible standard.

What objects will be identified?

All stakeholders should come to agreement before imagery interpretation begins about what objects are of value to the project and how they will be identified. Given the large number of objects often present in an image of a camp, having a clearly defined scope of what objects are of value is crucial for guiding imagery interpretation.

When working in large groups, which is often the case in VTO deployments, common imagery examples of the key objects should be identified and shared with the group, including descriptions of notable visual characteristics. As the interpretation goes forward, a system for reporting and recording any variances to these examples and descriptions should be established, including a process for agreeing changes to the basis for object identification.

What is the plan for data recording and storage?

Consistency and accuracy in how analysts record, categorize data, and note who collected what data is essential for all imagery interpretation. Analysts should decide before interpreting imagery what data will be recorded, how data will be entered into a database or logging system, with what specifications (e.g. to what precision will latitude and longitude be shown, etc.), and how activities performed by each analyst will be captured. For an example of an imagery data log, see Appendix II in this guide.

Also, a data storage plan should be developed and agreed before interpretation of imagery begins. While data security is always crucial, it is especially important to ensure that data is secure and uncorrupted when dealing with information about the location and status of vulnerable populations, such as refugees and IDPs. If the goal of imagery interpretation is to support accountability proceedings in a judicial venue, extra steps and precautions should be taken.¹²

2D. Visual Profiles of IDP/Refugee Camps

The four displaced population camps studied in this guide are located in East Africa and the Middle East. These camps - Yida, Zam Zam, Zaatari, and Dadaab - are distinct products of their historical, cultural, environmental, and operational contexts. Satellite images of the camps reflect these contexts.

Regardless of where they are located, displaced population camps are shaped by a complex interplay of both situationally specific and cross-cutting factors. These factors play crucial roles in giving each camp its own unique profile of visual characteristics. The camp's visual profile is influenced by both the natural environment and what observable objects, such as shelters and other humanitarian infrastructure, may be present there.

Some, though not all, of these visual characteristics can be visible in high resolution satellite imagery. A camp with a predominantly Muslim population, for example, can reasonably be expected to contain mosques, which may be identifiable in satellite imagery by their architecture and their orientation towards Mecca.

In another example, a camp located in a cold weather environment may include family tents with "a fly-sheet, a cotton lining, and hole for a stove pipe," according to UNOCHA guidelines, which can change the shape and visual properties of the structures. In humid climates, the tents' flysheet may be raised to improve ventilation, also creating a unique visual feature observable in satellite imagery of the camp.¹³

The visual characteristics of a displaced population camp can change either suddenly or gradually over time. Changes to the visual profile of a camp can be due to the activity pattern of the population residing at the camp, seasonal weather, and the actions of the governmental and non-governmental organizations that operate within the camp or in its vicinity.

The introduction of a different ethnic or religious group to a camp may cause new types of buildings and arrangements of structures to occur in certain parts of the camp. A fire, flood, or sandstorm may damage or destroy critical civilian use infrastructure. This infrastructure may later be repaired, rebuilt elsewhere, or simply abandoned - all factors that affect the layout of the camp and its overall visual profile.

New humanitarian agencies may arrive with different forms of infrastructure, vehicles, and equipment than the groups that preceded them, changing the visual profile of the camp in the process. Groups that were previously operational at a location may withdraw abruptly due to security events, changes in funding, or because their particular services are no longer required at that stage of the response. While some factors will repeat across camps, each context should be treated as unique and assumptions made based on previous analyses should always be challenged.

2E. Key Questions When Analyzing IDP/Refugee Camps

A camp's unique visual characteristics and the complex mix of factors that affect them are critical for helping make sense of the objects present at displaced population centers when employing remote sensing analysis. Analysts should have three fundamental goals in mind as they ask critical questions about the factors that shape a camp's visual profile:

1. Understand why certain infrastructure are present at a camp.
2. Identify what population-specific patterns of behavior may create, remove, or alter infrastructure visible at the camp.
3. Anticipate how the camp's environmental and operational context may affect its visual profile.

Some of the major factors affecting the visual profile of a camp, as well as examples of key questions an analyst should ask about them, may include the following:

1.) Climate and geographic region of both the displaced population and where the camp is located (if different than the population's home area).

- How does the climate and seasonal weather affect what building materials are used and how shelters are built at this camp?
- Is the camp's environment different from where the displaced population originally lived? Is it similar?
- What environmental hazards, such as flooding or extreme cold, may affect how structures are built and arranged?

2.) Cultural traditions and ethnic identity of a displaced population, including gender dynamics and religious affiliations.

- Are the shelters at the camp similar to traditional dwellings? How are they different?
- What religious affiliations are present within the displaced population and what visible infrastructure may be created by these groups?
- How might the status of women in this culture affect the construction, position, and arrangement of certain types of physical infrastructure, such as sanitation, hygiene, and medical facilities?

3) Type of disaster that resulted in the displacement and the tempo of its impact on the population (e.g. rapid onset, slow onset, or ongoing disaster).

- Is the camp continuing to grow due to new arrivals, or is the population size relatively static?
- If the population was displaced due to violence, are they still vulnerable to attacks at this location?
- Does the disaster permanently preclude the population from returning to their original homes, or is this displacement truly temporary?

4) History of the camp, including the duration that the current population has been living there and the past uses of the area before it became a displaced population center.

- How has this location been utilized in the past and what pre-existing infrastructure was present when the camp was created?
- How long has this location been a displaced population center and have other populations from different ethnic groups or nationalities previously lived there?
- How long has this specific population been present at this specific location? How may they have altered or adapted structures there over time?

5) Security situation in and around the camp, which may affect where and how the camp is built, as well as the ability of humanitarian agencies to access the camp.

- If the camp has come under attack, how has the camp been assaulted in the past (e.g. airstrikes, artillery, or raids by ground forces)? What evidence of the attacks, such as craters, damaged buildings, or vehicle tracking may be visible?
- What protection concerns are present within the displaced population, such as sexual assault, conscription, or forced disappearance, and who is responsible for managing them?
- Does the security situation allow humanitarian agencies to operate regularly at the camp, or are they working remotely?

6) Operational agencies present at the camp, including governmental, non-governmental, and international organizations.

- What agencies are present at the camp and from what governments? Why are those governmental actors there?
- What NGOs are present at the camp and what are their specific roles?
- What UN and other international agencies are present at the camp? How big are their operational footprints?

2F. Types of Shelter Structures

As the imagery interpreted in this guide shows, the majority of objects that make up the visual profile of a camp are structures used for shelter by displaced persons. Most projects tasked with interpreting imagery of displaced population camps focus on civilian shelters. This task is often initiated by agencies for the purposes of detecting change in the number of shelters visible at a one location or multiple locations over short or long periods of time.

Changes in the number of shelters, where and how they are positioned over time, and what materials they appear to be made of are all important pieces of information to the analyst. Additionally, observing changes to shelters, either to their visual characteristics and/or their numbers, is often a main reason analysts review imagery of a camp.

When documenting information about shelters, there are three broad categories of shelter structures an analyst should be familiar with:

1.) **Manufactured:** Manufactured structures can include factory-produced tents, caravan trailers, and other pre-fabricated living, storage, and administrative structures. These types of structures are often used as either shelters for displaced populations or as buildings for humanitarian personnel and operations. Logos (e.g. “UNHCR”), colors, and markings of these agencies on tents and other structures may be present in a satellite image.

2.) **Locally built:** Locally built structures are often constructed from naturally available materials such as branches and mud. In some cases, they may be the same size and shape as the populations’ regular dwellings in their home communities, or smaller but similar versions of these structures. Locally built structures may incorporate materials provided by humanitarian agencies at the camp, particularly plastic tarps. These tarps may often be visible in satellite imagery. In the cases of camps, such as Dadaab, where populations have been living for some time, temporary structures may evolve over time into permanent structures with metal roofs, gardens, added wings, and outbuildings.

3.) **Hybrid:** In some cases analysts may see manufactured structures combined with locally built elements, such as animal corrals around a standard UN tent. Displaced populations will adapt, customize, and add-on to manufactured structures they are given with items purchased or provided and other locally available raw materials. Facilities used by humanitarian agencies are often organized into compounds containing temporary and permanent structures. These compounds can include manufactured tents, prefabricated buildings, or pre-existing or locally built structures.

2G. Organizing Observable Objects by Humanitarian Sectors

The observable objects featured in this guide are primarily organized using the categories of the UN Cluster System. The Cluster System was created as part of the UN Humanitarian Reform of 2005 and consists of nine main categories of clusters.¹⁴

The objective of organizing observable objects by UN cluster, when possible, is to provide a framework for relating specific objects to the sector of humanitarian response activities with which they may have the most relevance. This approach may provide analysts a tool to draw connections between changes in the number, position, and properties of these objects in satellite imagery with accepted humanitarian indicators present in other sources of data.

Of the nine UN clusters, this guide identifies six clusters that have observable objects with a primary functional relationship to those clusters that may be visible in satellite imagery of displaced population centers. These cluster categories with observable objects identified within this guide are the following:

- *Education:* Schools and other educational facilities present in a camp environment

- *Food Security*: Warehouses, distribution points, and other infrastructure relevant to the provision of food aid to the camp's population.
- *Health*: Facilities such as hospitals and clinics.
- *Logistics*: Infrastructure relevant to the requisition, transportation, storage, and distribution of relief items and commodities.
- *Shelter*: Structures provided to or built by the displaced population as an interim dwelling while living at the camp.
- *WASH (Water, Sanitation, and Hygiene)*: Infrastructure for the storage, transportation, and distribution of water, toileting, waste management/disposal, and washing and bathing.

In addition to the six cluster-based categories above, this guide identifies three additional categories outside the UN cluster system. The three categories unique to the approach of this guide are Agency-Use Structures, Civilian-Use Structures, and Security.

The Civilian-Use category includes observable objects primarily managed and used by the camp's population. This may include markets, religious buildings, meeting areas, recreational facilities, and other infrastructure utilized primarily by the camp's occupants other than their shelters.

The Agency-Use category includes permanent structures, tents, and other structures that humanitarian agencies use to provide services to the displaced population. These structures can be used for housing, offices, and other administrative purposes. Types of Agency-Use structures may include manufactured dome, keyhole, tunnel, and other shapes of tents, as well as prefabricated and locally built permanent or semi-permanent structures.

The Security category includes structures and infrastructure such as checkpoints, barracks, watchtowers, and similar facilities used by governments, international agencies, NGOs, and non-state actors in reference to a camp. A government security force, a local police agency, a paramilitary or civil defense group, or international peacekeepers seeking to protect the camp's population may control these objects.

Chapter 3: Camp Overviews

Yida Camp

Background



Yida Camp is located in Yida, Unity State, South Sudan. The camp was established on 1 July 2011. The majority of the residents in the camp are IDPs from South Sudan and refugees from Sudan. As of 8 November 2014, the camp's population was 71,940.¹⁵ Yida has a tropical climate and experiences distinct rainy and dry seasons. The rainy season lasts from April/May to October/November, while the dry season lasts from November/December to March/April.

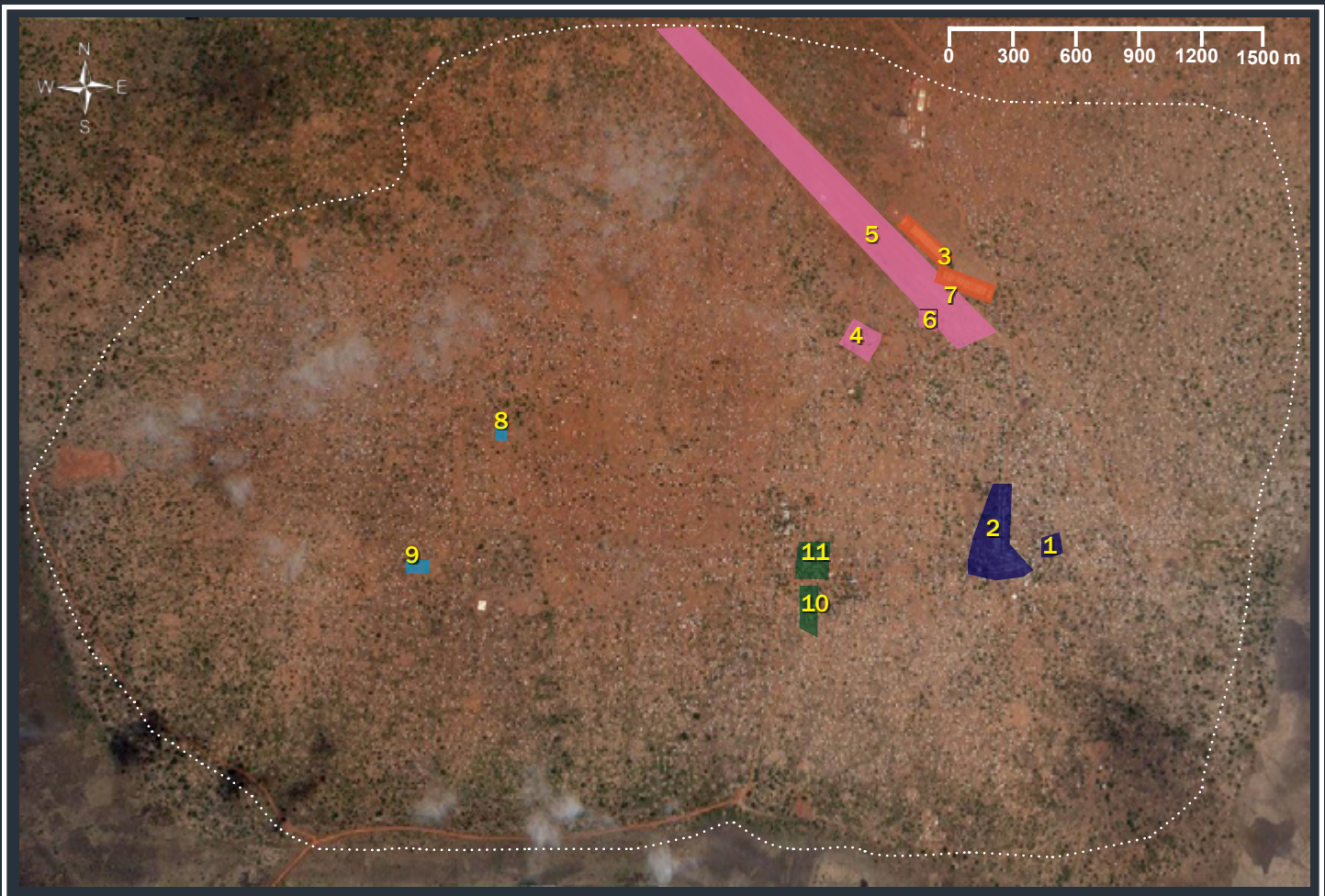
The table below outlines the agencies and organizations reported to be operational at Yida Camp.¹⁶ On the following page an overview image of Yida Camp is provided. The location of infrastructure analyzed in later chapters are mapped.

Before examining specific structures, creating an overview map of points of interest on a satellite image helps orient an analyst to the overall layout of the camp and how the location of structures may be related to each other. For example, in Yida Camp the WFP Food Distribution Center and Samaritan's Purse Warehouses are located near the airstrip. Additionally, creating an overview map is especially helpful when multiple analysts are interpreting the same image simultaneously. Shared maps can capture information from diverse sources of data and prevent inaccurate or redundant identifications by the team.

Agencies Operational at Yida Camp

<i>Lead Agency</i>	UNHCR
<i>Camp Management</i>	UNHCR
<i>Child Protection</i>	NP
<i>Core Relief Items</i>	SP, UNHCR
<i>Food</i>	SP, WFP
<i>Gender-Based Violence</i>	IRC
<i>Health</i>	CARE, IRC, Seo
<i>Nutrition</i>	SP
<i>Protection</i>	ICRC, IRC, NP, UNHCR
<i>Registration</i>	UNHCR
<i>Water and Sanitation</i>	Solidarités, SP

Yida Camp Overview



CIVILIAN	Dark Blue
EDUCATION	Light Grey
FOOD SECURITY	Orange
HEALTH	Red
LOGISTICS	Pink
WASH	Light Blue
AGENCY	Green
SECURITY	Black

Infrastructure interpreted in this guide:

- | | |
|---|---------------------------|
| 1) Mosque [p. 23] | 8) Latrine [p. 45] |
| 2) Market [p. 23] | 9) Borehole [p. 45] |
| 3) WFP Food Distribution Center [p. 36] | 10) IRC Compound [p. 48] |
| 4) Samaritan's Purse Warehouses [p. 43] | 11) UNHCR Compound [p.49] |
| 5) Airstrip [p. 43] | |
| 6) Antonov An-26 [p. 43] | |
| 7) Fokker F27 [p. 43] | |

Publicly available data from two maps was cross-referenced with satellite imagery data to aid in the identification of structures in Yida Camp. They are: (1) UNHCR, Refugee Crisis in Unity: Yida Camp Shelters, 28 November 2012; and (2) UNHCR, Refugee Crisis in Unity: Yida Camp Water Coverage, 12 February 2013. These maps can be found in Appendix III.

Zaatari Camp

Background



Zaatari Camp is located in Zaatari, Mafraq Governorate, Jordan. Established on 28 July 2012, the camp is populated by refugees from Syria. As of 11 November 2014, the camp's population was 81,321.¹⁷ Zaatari is located in a desert climate and experiences both rainy and dry seasons. The rainy season lasts from October/November to April, while the dry season lasts from May to September/October.

The table below outlines the agencies and organizations reported to be operational at Zaatari Camp.¹⁸ On the following page, an overview image of Zaatari Camp is provided. The location of infrastructure analyzed in later chapters are mapped. Before examining specific structures, creating an overview map of points of interest on a satellite image helps orient an analyst to the overall layout of the camp and how the location of structures may be related to each other. For example, New Arrivals Registration in Zaatari Camp is located along the perimeter near a camp entrance. Additionally, creating an overview map is especially helpful when multiple analysts are interpreting the same image simultaneously. Shared maps can capture information from diverse sources of data and prevent inaccurate or redundant identifications by the team.

Agencies Operational at Zaatari Camp

<i>Camp Management</i>	UNHCR	<i>Mental Health and Psychological Support</i>	IMC, NHF
<i>Child Protection</i>	FCA, IMC, IRC, Mercy Cops, NHF, UNFPA, UNHCR, UNICEF	<i>Nutrition</i>	UNHCR
<i>Community Services</i>	NHF, UNHCR	<i>Protection</i>	ACTED, IMC, IRC, IRD, LWF, MercyCorps, UNFPA, UNHCR, UNICEF, UNWOMEN
<i>Coordination</i>	UNHCR	<i>Registration</i>	UNHCR
<i>Core Relief Items</i>	ACTED, IRD, JEN, NRC, UNHCR	<i>Reproductive Health</i>	UNFPA
<i>Education</i>	Children without borders-KnK, FCA, IRD, Mercy Corps, MoE Jordan, NRC, RI, SC, UNHCR, UNICEF	<i>Shelter</i>	NRC, UNHCR, UNOPS
<i>Food Security</i>	SC, UNHCR, WFP	<i>Water and Sanitation</i>	ACTED, JEN, Oxfam, UNHCR, UNICEF
<i>Gender-Based Violence</i>	IRC, NHF, UNFPA, UNHCR, UNICEF		
<i>Health</i>	IMC, IRC, IRD, JHAS, MdM, MoH Jordan, NHF, SC, UNHCR, UNICEF		

Zaatari Camp Overview



CIVILIAN	Blue
EDUCATION	White
FOOD SECURITY	Orange
HEALTH	Red
LOGISTICS	Pink
WASH	Light Blue
AGENCY	Green
SECURITY	Black

Infrastructure interpreted in this guide:

- | | |
|------------------------------|---------------------------------------|
| 1) Mosque [p. 25] | 9) KSA Hospital [p. 39] |
| 2) Market [p. 25] | 10) WASH Facilities [p. 45] |
| 3) Bahraini School [p. 31] | 11) Pumping Station Facility [p. 45] |
| 4) Saudi School [p. 31] | 12) UNHCR Registration [p. 50] |
| 5) American School [p. 31] | 13) New Arrivals Registration [p. 50] |
| 6) WFP Compound [p. 36] | 14) IOM Compound [p. 50] |
| 7) Communal Kitchens [p. 37] | 15) NRC Distribution [p. 51] |
| 8) Moroccan Hospital [p. 39] | 16) Police [p. 55] |
| | 17) Civil Defense [p. 55] |

Publicly available data from two maps was cross-referenced with satellite imagery data to aid in the identification of structures in Zaatari Camp. They are: (1) UNICEF, Jordan - Al Za'atari Camp: Households possessing a source of wastewater, 6 January 2014; and (2) UNICEF, Al Zaatari Refugee Camp - General Infrastructure, 4 September 2013. These maps can be found in Appendix III.

Zam Zam Camp

Background



Zam Zam Camp was opened in El Fasher, North Darfur, Sudan in August 2004. A camp extension was later opened in February 2009. Residents of the camp are primarily IDPs from the Darfur Region of Sudan. The camp has hosted more than 100,000 people since it opened. The flow of displaced civilians to the camp continues, with more than 8,000 seeking refuge at the camp as of April 2014 due to violence that broke out two months earlier.¹⁹ Located in a semi-arid climate, the camp experiences a rainy season from June until September and a dry season from October until May.

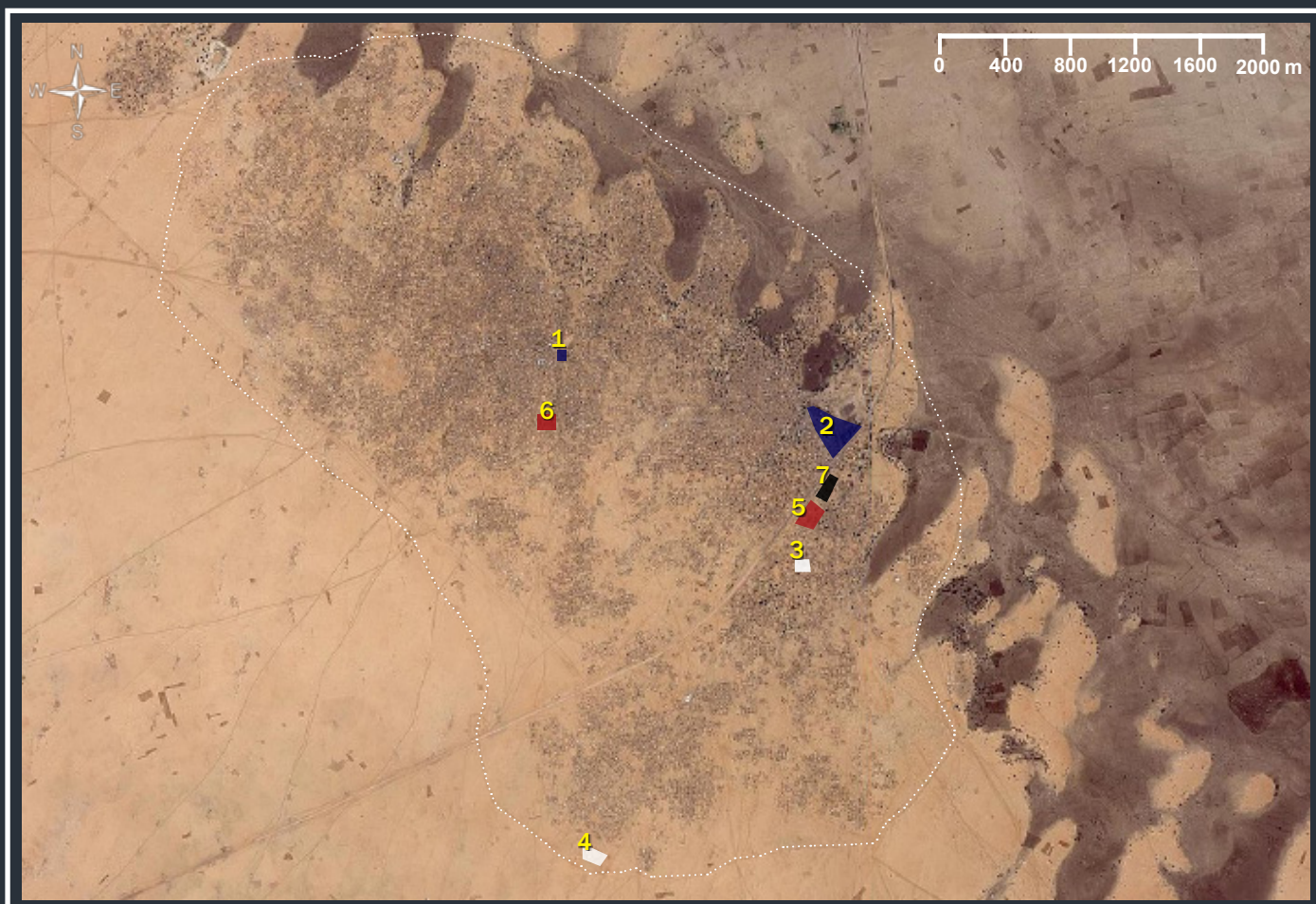
The table below outlines the agencies and organizations reported to be operational at Zam Zam Camp.²⁰ On the following page, an overview image of Zam Zam Camp is provided. The location of infrastructure analyzed in later chapters are mapped. Before examining specific structures, creating an overview map of points of interest on a satellite image helps orient an analyst to the overall layout of the camp and how the location of structures may be related to each other.

For example, in Zam Zam a security checkpoint is located along a main road which leads into the camp. Additionally, creating an overview map is especially helpful when multiple analysts are interpreting the same image simultaneously. Shared maps can capture information from diverse sources of data and prevent inaccurate or redundant identifications by the team.

Agencies Operational at Zam Zam Camp

<i>Camp Coordination</i>	UNHCR
<i>Education</i>	UNICEF, Plan Sudan, SPHO
<i>Emergency Shelter and Non-Food Items</i>	UNHCR-LCU, Plan Sudan
<i>Food</i>	WFP, SRCS, DNW, IODRA
<i>Health</i>	WHO, SMoH, RI, Mercy Malaysia, HAD
<i>Nutrition</i>	SMoH, WHO, UNICEF, WFP, RI
<i>Protection</i>	UNHCR, UNAMID, Plan Sudan, SPHO
<i>Registration</i>	UNHCR
<i>Water and Sanitation</i>	UNICEF, WES, Plan Sudan

Zam Zam Camp Overview



CIVILIAN	Blue
EDUCATION	White
FOOD SECURITY	Orange
HEALTH	Red
LOGISTICS	Pink
WASH	Cyan
AGENCY	Green
SECURITY	Black

Infrastructure interpreted in this guide:

- 1) Mosque [p. 27]
- 2) Market [p. 27]
- 3) School 1 [p. 32]
- 4) School 2 [p. 32]
- 5) Relief International Health Center 1 [p. 40]
- 6) Relief International Health Center 2 [p. 40]
- 7) Security Checkpoint [p. 55]

Publicly available data from two maps was cross-referenced with satellite imagery data to aid in the identification of structures in Zam Zam Camp. They are: (1) OCHA, Sudan: Zamzam IDP Camp Profile, 9 May 2013; and (2) OCHA, Zamzam IDP Camp - Health Centres Density per Squared Kilometer, 16 June 2011. These maps can be found in Appendix III.

Dadaab Camp

Background



Dadaab Camp, located in Dadaab, North Eastern Province, Kenya, is comprised of five smaller camps: Ifo, Dagahaley, Hagadera, Ifo 2 and Kambioos. Ifo, Dagahaley, and Hagadera were established in 1991 and 1992. Ifo 2 and Kambioos were established in 2011. These camps are primarily home to Somali refugees. The camp's population was 104,896 as of 31 October 2014.²¹ Located in a semi-arid climate, rainy seasons at this camp span from March until May and October to December. Dry seasons last from January to February and June to September.

This reference guide specifically examines Dagahaley Camp. The table below outlines the agencies and organizations reported to be operational at the camp.²² On the following page, an overview image of Dagahaley Camp is provided. The location of infrastructure analyzed in later chapters are mapped. Before examining specific structures, creating an overview map of points of interest on a satellite image helps orient an analyst to the overall layout of the camp and how the location of structures may be related to each other. For example, two identified boreholes in Dagahaley are located on opposite ends of the camp's exterior. Additionally, creating an overview map is especially helpful when multiple analysts are interpreting the same image simultaneously. Shared maps can capture information from diverse sources of data and prevent inaccurate or redundant identifications by the team.

Agencies Operational at Dagahaley Camp

<i>Lead Agency</i>	UNHCR
<i>Child Protection</i>	SCUK
<i>Community Services</i>	CARE, LWF, UNV
<i>Core Relief Items</i>	CARE, GIZ, UNHCR
<i>Education</i>	AVSI, DRC, FilmAid, LWF, NRC, UNHCR, WTK
<i>Food</i>	CARE, NRC, SCUK, WFP
<i>Gender-Based Violence</i>	IRC
<i>Health</i>	FilmAid, DRC, NCCCK, UNHCR, UNV
<i>HIV/AIDS</i>	CARE, FilmAid, HI, NCCCK, SCUK, UNHCR, WTK
<i>Logistics</i>	CARE, GIZ, UNHCR
<i>Nutrition</i>	UNHCR
<i>Protection</i>	DRC, FilmAid, LWF, NCCCK, RCK, SCUK, UNHCR
<i>Registration</i>	UNHCR
<i>Water and Sanitation</i>	CARE, NRC, UNHCR

Dagahaley Camp Overview Image



CIVILIAN	
EDUCATION	
FOOD SECURITY	
HEALTH	
LOGISTICS	
WASH	
AGENCY	
SECURITY	

Infrastructure Interpreted in this Guide:

- | | |
|-------------------------------------|---|
| 1) Mosque/Islamic School [p. 29] | 9) Borehole 1 [p. 46] |
| 2) Market [p. 29] | 10) Borehole 2 [p. 46] |
| 3) Illeys Primary School [p. 33] | 11) UNHCR Field Office and Transit Center [p. 49] |
| 4) Wathajir Primary School [p. 33] | 12) Administration Police [p. 56] |
| 5) Community School [p. 34] | 13) Police Base [p. 56] |
| 6) Food Distribution Center [p. 37] | 14) Police Post at Market [p. 56] |
| 7) Cholera Outbreak Center [p. 41] | 15) Tango IV Base [p. 57] |
| 8) Health Post 1 [p. 41] | 16) Windle Trust Compound [p. 52] |

Publicly available data from two maps was cross-referenced with satellite imagery data to aid in the identification of structures in Dadaab. They are: (1) UNHCR and LWF/DWS-Dadaab, Kenya - Dadaab District: Dagahaley Refugee Camp Overview, June 2013; and (2) UNHCR, LWF-Dadaab, and GeoVantage, Kenya - Lagdera District: Dagahaley Refugee Camp Overview, January 2012. These maps can be found in Appendix III.

Chapter 4: Shelter and Civilian-Use Structures



4A. Shelter

The Global Shelter Cluster provides shelters to displaced populations and strengthens preparedness and technical capacity to improve humanitarian response in this area. The International Federation of the Red Cross and Red Crescent Societies (IFRC) and UNHCR are co-leads for the cluster at the global level. IFRC leads the Global Shelter Cluster in disaster situations and UNHCR leads in conflict situations.²³

As previously mentioned, shelter structures are very often the primary focus of satellite imagery-based interpretation of displaced population camps. Changes to the number, position, and characteristics of shelters are often key metrics used by analysts to document and interpret macro-level changes to the status of people living in the camp.

In the following examples from each camp in the guide, repeating types of shelter structures, patterns of arrangement, repeating visual identifiers, and other phenomena associated with observable shelter structures are identified. Additionally, ground photographs used to help identify the shelters in the imagery are included. Analysts should be attuned to how climate, seasonal changes, and the ethnography of displaced populations affect how shelter structures are both initially built and adapted by displaced populations over time.

Yida

The primary shelter type present in Yida Camp is a locally built dwelling composed of branches and other materials naturally occurring in the area of the camp. Animal corrals and other outbuildings constructed from naturally occurring materials are visible as well.

Some shelter structures have a blue, white, or translucent tarp placed over or underneath the top layer of branches. The repeating presence of these tarps is a critical visual identifier for many of these shelters. Without a visible tarp, these shelters appear in imagery as mound shaped objects which are brownish in color.

Within Yida, civilians largely manage the social organization of the camp. As a result, the majority of the camp, particularly the shelters within the camp, is organized according to pre-existing tribal structures in place before the population was dislodged from their home communities. Most roads and paths cleared to connect the airstrip, water points, and other infrastructure were established “to accommodate the meandering boundaries of tribal territories and to facilitate travel between them.”²⁴

Zaatari

Two main types of shelter structures are present in Zaatari Camp: tents and caravan trailers. Tents were the primary shelter used by Syrian refugees when the camp was first established in July 2012, but officials began replacing tents with caravans in August 2012. At the time, refugees were living in “plastic triage tents,” which reportedly failed to keep out sand or cold winds. The caravans were to act as “more permanent structures.”²⁵

The caravans were initially established in a grid system with spacing to provide access to vehicles, protect against fire, and promote hygiene. However, camp residents have moved the caravans to create “‘little compounds’ - typically with a U-shape or a courtyard shape - so that they may live together with their extended families. Other rearrangements of the camp allow refugees to move closer to people from their village.”²⁶

The shelters in Zaatari, in other cases, are still arranged in certain sectors of the camp in a city block style format. WASH facilities, communal kitchens, and other common use facilities can, in some areas of the camp, be seen in regular intervals co-located with groups of shelters. Identifying how shelters relate to other nearby structures from other response clusters is key for analysts to understand the camp's layout.

Zam Zam

The primary structures in Zam Zam Camp are UN-issued family tents and locally built structures, known as "rakubas." Zam Zam is characterized by a mix of distributed manufactured shelter structures and locally built structures often occurring together in close proximity.

These locally built structures include rakubas, which are huts with a sloped roof and bamboo walls covered with mats.²⁷ Often, a sunshade is placed over the rakuba to help provide covered shelter.²⁸ Between 2013 and 2014, new arrivals to the camp have reportedly sought shelter under trees, in abandoned houses, or in huts made from cloth and wood.²⁹

Dagahaley, Dadaab Camp

The Dagahaley Camp at Dadaab is primarily comprised of two types of shelter structures. One type is a standard house shaped structure with mud walls and corrugated metal roofs. The other type is a domed shaped structure made of sticks with coverings comprised of cloth, paper, mud, or sticks.³⁰

Due to the presence of the displaced Somali population at the camp for more than two decades, in some cases, it is not uncommon for many of these structures to have become more formal and permanent over time. Groups of shelters, in many cases, appear surrounded by a perimeter fence, likely constructed from naturally occurring materials, such as branches.

Médecins Sans Frontières (MSF) reported in March 2014 that the poor quality of their shelters was a common complaint from residents of Dadaab throughout 2013. Of the refugees MSF interviewed as part of a study, 41% responded that their shelters did not provide sufficient protection from the rain and only 50% reported they had access to shelter material, like from UNHCR.³¹ According to Cooperative for Assistance and Relief Everywhere (CARE), tent shelters are regularly destroyed by severe weather and need to be replaced every six months.³²

4B. Civilian-Use Structures

Civilian-use structures are defined as structures constructed and utilized by the displaced population itself for economic, religious, and community purposes, including governance and recreation. Some examples of civilian-use structures identified by maps can include, though are not limited to, mosques, churches, markets and shops, community gathering areas, and athletic facilities, such as soccer pitches. For example, a soccer pitch is located at the American School (see Figure 5-2 in Chapter 5: Education).

These structures provide evidence about the activities of camp residents and how they adapt the physical environment of a camp through their activity patterns over time. Additionally, these structures can provide key indicators about the ethnographic composition of a camp population.

Of the many types of civilian-use structures marked on maps of the camps, markets and mosques are the structures that could often be identified through satellite imagery analysis. These identifications are possible based on imagery data alone because of the unique visual properties of these facilities. Markets are identified by this analysis at each of the four camps. Mosques can be seen at three of the camps - Yida, Zaatari, and Zam Zam.

Identifying Mosques

One critical object in camps with a primarily Muslim population, such as those featured in this guide, is the mosque. Unlike churches that may be present in camps, which can often be difficult to identify based on archi-

tectural features alone, mosques are often uniquely identifiable in satellite imagery.

Their comparatively easier identification is because of their orientation to the qibla, the direction to the Kabaa shrine located in Mecca, which all Muslims face during prayer.³³ Analysts should identify the vector of the apparent mosque towards Mecca and measure whether the apparent front end of the building is facing in that direction. Drawing a directional line using Google Earth or similar programs from the Kabaa in Mecca through the middle of the building at the camp in question can help determine if the structure is facing that direction.

Identifying Markets

Markets and shops are often locations where crowds of residents of the camp can sometimes be visible in satellite imagery. These areas are often collections of makeshift stalls, tarps, and locally built structures clustered tightly together in a small area. As a population remains at a camp over a period of years, it can be expected that these areas become more established and built-up by the residents of the camp.

Yida Camp

Figure 4-1



Displaced Persons Shelters

24 June 2014

Yida Camp, South Sudan

1) Tent

Shape: Rectangular

Color: Blue

Dimensions: 4.7 m x 3.9 m

2) Tent

Shape: Rectangular

Color: White

Dimensions: 4.7 m x 3.9 m

3) Tent

Shape: Rectangular

Color: White

Dimensions: 16.3 m x 7.6 m

Figure 4-2



Yida Camp, South Sudan

September 2012

Photo credit: UNHCR/ K. Mahoney

Figure 4-3



Yida Camp, South Sudan

February 2012

Photo credit: United to End Genocide/ Dan Sullivan

Yida Camp

Figure 4-4



Mosque

24 June 2014

Yida Camp, South Sudan

Mosque

1) Tent

Shape: Rectangular

Color: White

Dimensions: 15.2 m x 8.1 m

2) Tent

Shape: Rectangular

Color: White

Dimensions: 6.8 m x 4.4 m

Figure 4-5



Market

16 March 2014

Yida Camp, South Sudan

The main market in Yida is composed of individually roofed stalls. Located in the eastern side of the camp, the market is a main source of household items, clothing, and fuel for civilians. It is also a major source of livelihoods for residents. On 13 March 2014, a fire reportedly broke out at a restaurant in the market, causing the destruction of more than 100 shops and 30 houses.³⁴ This image, captured three days after the fire, indicates widespread destruction in a confined area as a result of burning. Burn scars, destroyed structures, and some still intact structures are visible.

Zaatari Camp

Figure 4-6



Displaced Persons Shelters
31 January 2014
Zaatari Camp, Jordan

1) Caravan
Shape: Rectangular
Color: White
Dimensions: 6.4 m x 3.2 m

2) Tent
Shape: Hexagonal
Color: White
Dimensions: 6.6 m x 3.8 m

Figure 4-7



Zaatari Camp, Jordan
June 2014
Photo credit: World Bank/ Dominic Chavez

Figure 4-8



Zaatari Camp, Jordan
November 2012
Photo credit: UNHCR/ Brian Sokol

Zaatari Camp

Figure 4-9



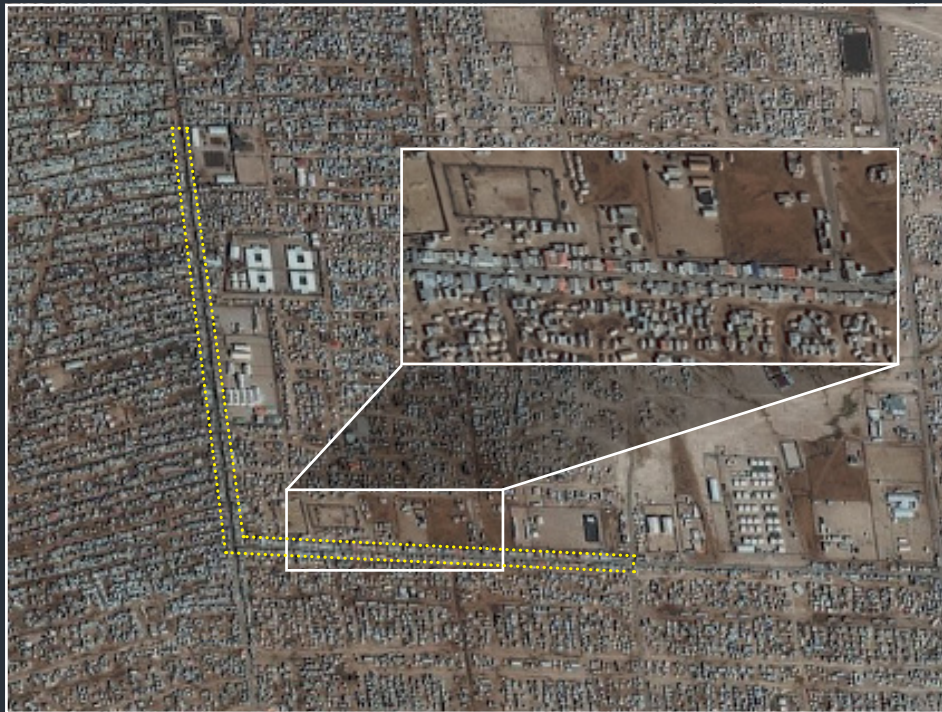
Mosque

31 January 2014
Zaatari Camp, Jordan

Mosque

- 1) Tent
- Shape: Rectangular
Color: White
Dimensions: 25.5 m x 10 m

Figure 4-10



Market

31 January 2014
Zaatari Camp, Jordan

The market area in Zaatari, known as Champs-Élysées, contains stalls that are run by refugees who are living in the camp. In many cases, merchants who operated businesses before fleeing Syria have re-established their business in the camp. Many types of stores can be found in this area, including vegetable stands, clothing and footwear stores, falafel restaurants, and pet shops.³⁵ With hundreds of shops and businesses operating in this area, UNHCR encourages trade and the provision of services to attempt to provide camp residents a sense of normalcy.³⁶

Zam Zam Camp

Figure 4-11



Displaced Persons Shelters

17 July 2014

Zam Zam Camp, Sudan

1) Tukul

Shape: Circular

Color: Brown

Dimensions: 4.6 m x 4.6 m

3) Tent

Shape: Rectangular

Color: White

Dimensions: 4.3 m x 2.5 m

5) Tent

Shape: Rectangular

Color: Blue

Dimensions: 4.2 m x 3.4 m

2) Tent

Shape: Square

Color: Brown

Dimensions: 3.9 m x 3.9 m

4) Tent

Shape: Rectangular

Color: Beige

Dimensions: 5.9 m x 3.5 m

Figure 4-12



Zam Zam Camp, Sudan

June 2014

Photo credit: UNAMID/ Albert Gonzalez Farran

Figure 4-13



Zam Zam Camp, Sudan

April 2014

Photo credit: UNAMID/ Albert Gonzalez Farran

Zam Zam Camp

Figure 4-14



Mosque
17 July 2014
Zam Zam Camp, Sudan

Mosque

- 1) Tent
Shape: Rectangular
Color: Brown
Dimensions: 10 m x 6.4 m
- 2) Tent
Shape: Rectangular
Color: Brown
Dimensions: 5.8 m x 4.4 m
- 3) Tent
Shape: Rectangular
Color: Brown
Dimensions: 4.2 m x 3.5 m

Figure 4-15

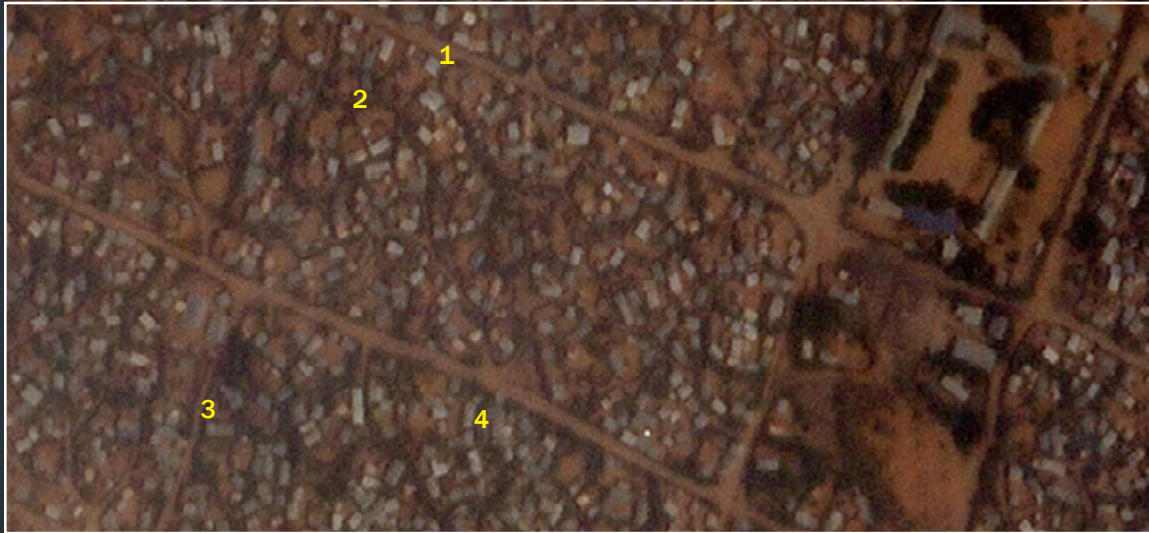


Market
17 July 2014
Zam Zam Camp, Sudan

In Zam Zam Camp, the market is comprised of more than a thousand shops and fifty sun shelters.³⁷ One example of the trade and commerce that exists as a result of the market, is the sale of fuel-efficient mud stoves built from local materials by women.³⁸ Unfortunately, the market, as in other camps, such as Yida, is at risk for incidental fires.³⁹ It has also been targeted as part of ongoing violence. For example, in October 2014, the market, along with other areas of the camp were reportedly attacked by the Central Reserve Police,⁴⁰ a paramilitary force active in Darfur and other parts of Sudan.

Dagahaley, Dadaab Camp

Figure 4-16



Displaced Persons Shelters

21 February 2014

Dagahaley, Dadaab Camp, Kenya

1) Tent

Shape: Rectangular

Color: White

Dimensions: 4.2 m x 3.2 m

2) Building

Shape: Rectangular

Color: Grey

Dimensions: 4.6 m x 4 m

3) Building

Shape: Rectangular

Color: Grey

Dimensions: 10 m x 4.9 m

4) Building

Shape: Rectangular

Color: Grey

Dimensions: 6.9 m x 4.8 m

Figure 4-17



Dadaab Camp, Kenya

May 2010

Photo credit: EC/ ECHO/ Daniel Dickinson

Figure 4-18



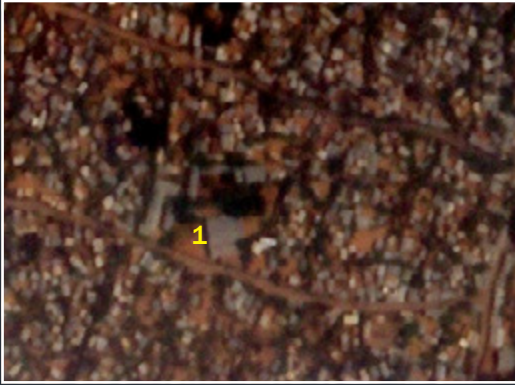
Dadaab Camp, Kenya

May 2010

Photo credit: EC/ ECHO/ Daniel Dickinson

Dagahaley, Dadaab Camp

Figure 4-19



Mosque / Islamic School

21 February 2014

Dagahaley, Dadaab Camp, Kenya

Mosque / Islamic School

1) Building

Shape: Rectangular

Color: Grey

Dimensions: 15.1 m x 22.7 m

Figure 4-20



Market

21 February 2014

Dagahaley, Dadaab Camp, Kenya

As a result of its development over the past twenty years, the market in Dadaab camp is reportedly “congested and disorganized.” Shops and stalls are located close together, and “unregulated electricity suppliers connecting shop owners to power lines” are reported. As a result, the market is at risk to large-scale fires. In July 2012, for example, an electrical fire destroyed 80% of the market.⁴¹

Chapter 5: Education



The goal of the Global Education Cluster is to “enable a predictable, well coordinated response that addresses the education concerns of populations affected by humanitarian crises.” At the global level, the cluster offers technical support and capacity development to country-level clusters. Led by the United Nation’s International Children’s Emergency Fund (UNICEF) and Save the Children, it is the only cluster co-led by a UN agency and a NGO.⁴²

The number and type of education facilities can vary greatly across camps. School facilities can be for early childhood, primary, or secondary education. While in school, children also require additional services, such as WASH and food/nutrition. Thus, infrastructure from multiple clusters may be present at one education facility.

These services may not always be delivered proportionately to the size of the population being served. For example, in Zam Zam’s basic schools one latrine is used by 103 students a day, 12 schools do not have a water facility, and 10 schools do not benefit from a school feeding program.⁴³

As well as traditional NGO and UN agency-run facilities, sometimes specific infrastructure in the Education Cluster is provided by government donors. For example, the Bahraini Royal Charity Organization funded the construction of an “education complex,” comprised of four schools, in Zaatari Camp.⁴⁴ This complex can be seen in Figure 4-1.

In two instances, education facilities with common shaped and sized infrastructure are seen in the analysis of the four camps. At Zam Zam, brown structures consistent with tents of a common shape and size are visible at each school facility at the locations designated as schools on the maps employed in the analysis. At Dagahaley, Dadaab Camp, commonly shaped, sized and colored tents are present at certain education centers. However, those tents were also visible at other locations throughout Dagahaley Camp corresponding to the activities of other clusters as well.

Zaatari Camp

Figure 5-1



Bahraini School
31 January 2014
Zaatari Camp, Jordan



Saudi School
31 January 2014
Zaatari Camp, Jordan

Bahraini School

1) Building
Shape: Rectangular
Color: White
Dimensions: 29.4 m x 14.1 m

2) Building
Shape: Rectangular
Color: White
Dimensions: 15 m x 11.2 m

3) Building
Shape: Rectangular
Color: White
Dimensions: 8.1 m x 11.2 m

4) Tent
Shape: Rectangular
Color: White
Dimensions: 20.4 m x 13.5 m

5) Tent
Shape: Rectangular
Color: White
Dimensions: 9.8 m x 8.3 m

Saudi School

1) Tent
Shape: Rectangular
Color: White
Dimensions: 9.8 m x 8.3 m

2) Tent
Shape: Rectangular
Color: White
Dimensions: 32.1 m x 10.9 m

Figure 5-2



American School
31 January 2014
Zaatari Camp, Jordan

American School

1) Tent
Shape: Rectangular
Color: White
Dimensions: 32.2 m x 9.5 m

2) WASH facility
Shape: Rectangular
Color: Grey
Dimensions: 9.2 m x 3.6 m

3) Soccer pitch
Shape: Rectangular
Dimensions: 107 m x 85 m

Zam Zam Camp

Figure 5-3



School 1
17 July 2014
Zam Zam Camp, Sudan

School 1

1) Tent
Shape: Rectangular
Color: Beige
Dimensions: 9.2 m x 5.5 m

2) Tent
Shape: Square
Color: White
Dimensions: 5.2 m x 5.2 m

3) Building
Shape: Rectangular
Color: Brown
Dimensions: 8.3 m x 5.3 m

Figure 5-4



School 2
17 July 2014
Zam Zam Camp, Sudan

School 2

1) Tent
Shape: Rectangular
Color: Brown
Dimensions: 9.2 m x 5.5 m

2) Building
Shape: Rectangular
Color: Beige
Dimensions: 20.1 m x 2.5 m

3) Tent
Shape: Rectangular
Color: Beige
Dimensions: 5.6 m x 2.8 m

4) Tent
Shape: Rectangular
Color: Beige
Dimensions: 8.3 m x 5.3 m

Dagahaley, Dadaab Camp

Figure 5-5



Illeys Primary School
21 February 2014
Dagahaley, Dadaab Camp, Kenya

Illeys Primary School

- 1) Tent
Shape: Rectangular
Color: White
Dimensions: 15.8 m x 6.2 m
- 2) Tent
Shape: Rectangular
Color: White
Dimensions: 22.6 m x 7 m
- 3) Building
Shape: Rectangular
Color: Grey
Dimensions: 45.4 m x 9.2 m

4) Building
Shape: Rectangular
Color: Grey
Dimensions: 60.4 m x 7 m

5) Building
Shape: Rectangular
Color: Grey
Dimensions: 40.2 m x 6.4 m

6) Building
Shape: Rectangular
Color: Grey
Dimensions: 10.8 m x 5.5 m

Figure 5-6



Wathajir Primary School
21 February 2014
Dagahaley, Dadaab Camp, Kenya

Wathajir Primary School

- 1) Building
Shape: Rectangular
Color: Blue
Dimensions: 36.8 m x 11.3 m
- 2) Building
Shape: Rectangular
Color: Blue
Dimensions: 15.3 m x 8 m
- 3) Building
Shape: Rectangular
Color: Grey
Dimensions: 16.4 m x 4.6 m

Figure 5-7



Community School
21 February 2014
Dagahaley, Dadaab Camp, Kenya

Community School

- 1) Tent
Shape: Rectangular
Color: Grey
Dimensions: 26.5 m x 7.7 m
- 2) Tent
Shape: Rectangular
Color: Grey
Dimensions: 17.4 m x 7.7 m
- 3) Tent
Shape: Rectangular
Color: Beige
Dimensions: 23.9 m x 10.6 m
- 4) Tent
Shape: Square
Color: Grey
Dimensions: 5.9 m x 5.9 m
- 5) Building
Shape: Rectangular
Color: Grey
Dimensions: 11.3 m x 9 m

Chapter 6: Food Security



The Global Food Security Cluster is co-led by the World Food Programme (WFP) and the Food and Agriculture Organization of the United Nations (FAO). The cluster coordinates food security response, including issues of food availability and access, during humanitarian crises. They additionally provide training, capacity development, and best practices for country-level response.⁴⁵

The Food Security Cluster requires designated infrastructure for food storage, preparation, and distribution. Some of the infrastructure identified across the four camps apparently employed for these purposes includes tents for storage, as well as prefabricated and/or locally built warehouses. In addition to distribution facilities, cooking areas for camp residents are also present. In Zaatari camp, communal kitchens allow residents to access shared areas where they can prepare food.

Tents with a consistent shape, size and colors at Food Security Cluster-related locations, according to UN and NGO maps, are visible at Yida and Dagahaley. In Yida, WFP and Samaritan's Purse co-lead Food Security operations. The WFP Food Distribution Center identified in this chapter (see Figure 6-1) is located next to the camp's airstrip. As noted earlier, it is important for analysts to understand the environment and climate that a camp is located within because seasonal changes can directly impact the operations of a camp. For example, during the rainy season, when roads become flooded, foodstuffs are air dropped to Yida camp by plane.⁴⁶

Analysis of an object's use as part of food security operations requires comparison with ground-sourced information, particularly agency generated maps. Many of the structures included in this guide as part of the Food Security Cluster section may be used by other clusters as well. Analysts should be aware of their uses across clusters when attempting to identify these structures and ascertain their functions.

Yida Camp

Figure 6-1



WFP Food Distribution Center

24 June 2014

Yida Camp, South Sudan

WFP Food Distribution Center

- 1) Tent
Shape: Rectangular
Color: Beige
Dimensions: 33 m x 12.4 m
- 2) Tent
Shape: Rectangular
Color: Beige
Dimensions: 25.4 m x 11.2 m

Zaatari Camp

WFP Compound

In Zaatari Camp, WFP works as part of the Food Security Cluster. The compound is enclosed by a perimeter wall or fence approximately 600 m long. Storage tents consistent with the WFP tents in Yida and Dagahaley Camps are present.

Figure 6-2



WFP Compound

31 January 2014

Zaatari Camp, Jordan

- 1) Tent
Shape: Rectangular
Color: Grey
Dimensions: 6.7 m x 4.8 m
- 2) Tent
Shape: Rectangular
Color: White
Dimensions: 25 m x 9.5 m
- 3) Tent
Shape: Rectangular
Color: White
Dimensions: 17 m x 8.6 m
- 4) Tent
Shape: Rectangular
Color: Beige
Dimensions: 25 m x 9.5 m

5) Building
Shape: Rectangular
Color: Grey
Dimensions: 13.9 m x 5.8 m

7) Building
Shape: Rectangular
Color: Grey
Dimensions: 15.7 m x 6.9 m

9) Building
Shape: Rectangular
Color: Grey
Dimensions: 8.9 m x 5.4 m

6) Tent
Shape: Rectangular
Color: Red
Dimensions: 13.5 m x 6.3 m

8) Building
Shape: Square
Color: Grey
Dimensions: 8.9 m x 8.9 m

Figure 6-3



Communal Kitchens
 31 January 2014
 Zaatari Camp, Jordan

Communal Kitchens

1) Building
 Shape: Rectangular
 Color: Grey
 Dimensions: 14.4 m x 4.8 m

Dagahaley, Dadaab Camp

Figure 6-4



Food Distribution Center
 21 February 2014
 Dagahaley, Dadaab Camp, Kenya

Food Distribution Center

1) Tent
 Shape: Rectangular
 Color: Beige
 Dimensions: 32.2 m x 11.4 m

2) Tent
 Shape: Rectangular
 Color: Beige
 Dimensions: 23.2 m x 8 m

3) Tent
 Shape: Rectangular
 Color: Blue
 Dimensions: 17.5 m x 7.1 m

4) Building
 Shape: Rectangular
 Color: Grey
 Dimensions: 10.2 m x 6.3 m

5) Tent
 Shape: Square
 Color: White
 Dimensions: 4.2 m x 4.2 m

7) Building
 Shape: Rectangular
 Color: Grey
 Dimensions: 17.6 m x 10.1 m

9) Tent
 Shape: Square
 Color: White
 Dimensions: 7.4 m x 5.3 m

6) Building
 Shape: Rectangular
 Color: Grey
 Dimensions: 29.5 m x 17 m

8) Building
 Shape: Rectangular
 Color: Grey
 Dimensions: 34.2 m x 10.1 m

10) Building
 Shape: Rectangular
 Color: Grey
 Dimensions: 21.9 m x 8.9 m

Chapter 7: Health



Lead by the World Health Organization (WHO), the Global Health Cluster works to enhance humanitarian health actions on both global and country levels. At the global level, health partners aim to improve response through capacity building. At the country level, responsibilities of partners include information assessments and analysis, the prioritization of response, and the mobilization of resources.⁴⁷

Hospitals, clinics, and health centers can take several forms in a displaced population camp. They can appear as multi-building compounds comprised of several large, manufactured tents that are easily identifiable. Additionally, they may be surrounded by demarcated walls or a fence-based perimeter surrounding several large, manufactured tents. These types of facilities can be found in Zaatari Camp (see Figures 7-1 and 7-2).

In other settings, smaller-scale facilities can be largely indistinguishable from other surrounding structures (see Figure 7-5). Disease-specific treatment centers may also be present. In Dagahaley, a Cholera Outbreak Center comprised of tents and buildings is present (see Figure 7-4). In the case of all health cluster facilities, a camp map or other non-imagery information source is required to clearly identify these structures.

Zaatari Camp

Figure 7-1



Moroccan Hospital
31 January 2014
Zaatari Camp, Jordan

Moroccan Hospital

- 1) Tent
Shape: Rectangular
Color: Brown
Dimensions: 6.5 m x 5.5 m
- 2) Tent
Shape: Rectangular
Color: Brown
Dimensions: 6.9 m x 6.3 m
- 3) Tent
Shape: Rectangular
Color: Brown
Dimensions: 12.7 m x 6.3 m

- 4) Tent
Shape: Rectangular
Color: White
Dimensions: 12.7 m x 5.6 m

- 5) Building
Shape: Rectangular
Color: White
Dimensions: 9.4 m x 3.8 m

- 6) Building
Shape: L-shape
Color: Beige
Dimensions: 9.2 m x 3.6 m

Figure 7-2



KSA Hospital
31 January 2014
Zaatari Camp, Jordan

KSA Hospital

- 1) Tent
Shape: Rectangular
Color: White
Dimensions: 47.8 m x 10.8 m
- 2) Tent
Shape: Rectangular
Color: White
Dimensions: 12.4 m x 11.3 m
- 3) Tent
Shape: Rectangular
Color: White
Dimensions: 31.4 m x 15.2 m

- 4) Tent
Shape: Rectangular
Color: Beige
Dimensions: 7.2 m x 5.9 m

- 5) Tent
Shape: Rectangular
Color: Beige
Dimensions: 12.2 m x 6.7 m

- 6) Tent
Shape: Rectangular
Color: Beige
Dimensions: 5 m x 3.4 m

Zam Zam Camp

Figure 7-3



Relief International Health Centers 1 and 2
17 July 2014
Zam Zam Camp, Sudan

Relief International Health Center 1

1) Tent
Shape: Rectangular
Color: White
Dimensions: 12.3 m x 5.8 m

2) Tent
Shape: Rectangular
Color: Beige
Dimensions: 10.1 m x 4.9 m

3) Tent
Shape: Rectangular
Color: White
Dimensions: 13 m x 6.1 m

4) Tent
Shape: Rectangular
Color: White
Dimensions: 11.9 m x 5.7 m

5) Tent
Shape: Rectangular
Color: White
Dimensions: 12.6 m x 4.9 m

6) Tent
Shape: Rectangular
Color: Beige
Dimensions: 6.2 m x 4.3 m

7) Tent
Shape: Square
Color: White
Dimensions: 4.5 m x 4.5 m

8) Tent
Shape: Octagonal
Color: White
Dimensions: 6.5 m x 6.5 m

9) Tent
Shape: Octagonal
Color: White
Dimensions: 5.3 m x 5.3 m

Relief International Health Center 2

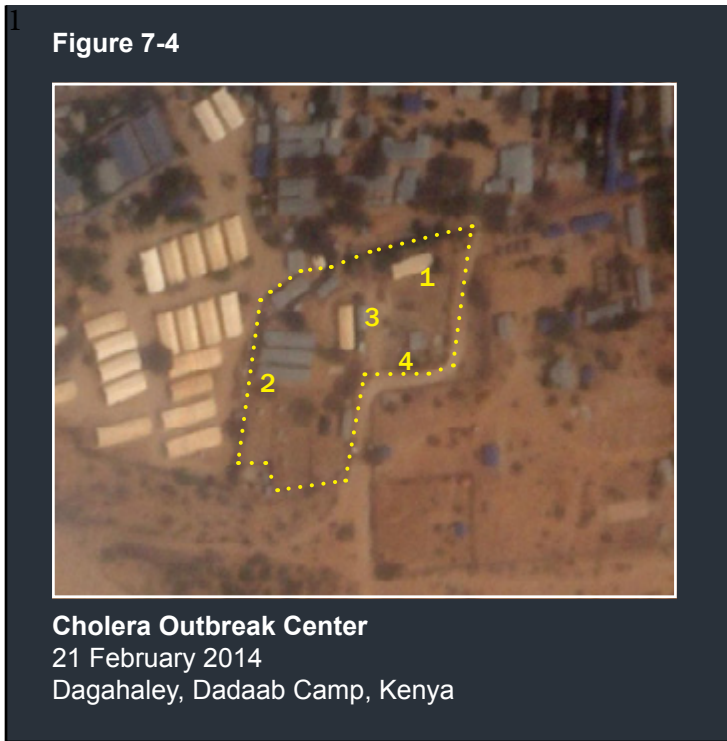
1) Tent
Shape: Rectangular
Color: White
Dimensions: 18.2 m x 8.9 m

2) Tent
Shape: Rectangular
Color: White
Dimensions: 12.9 m x 9.1 m

3) Tent
Shape: Rectangular
Color: White
Dimensions: 6.1 m x 4.7 m

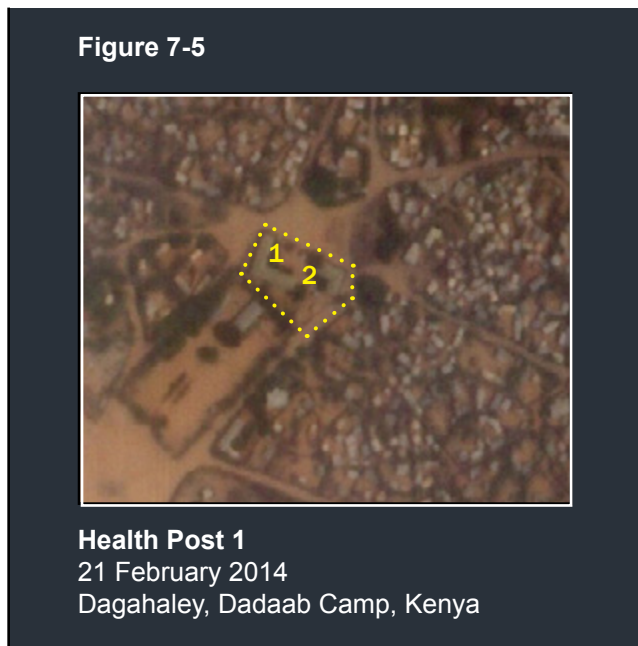
4) Tent
Shape: Rectangular
Color: White
Dimensions: 3.5 m x 2 m

Dagahaley, Dadaab Camp



Cholera Outbreak Center

- 1) Tent
Shape: Rectangular
Color: Beige
Dimensions: 25.2 m x 9.3 m
- 2) Building
Shape: Rectangular
Color: Grey
Dimensions: 29.6 m x 6.2 m
- 3) Building
Shape: Rectangular
Color: Grey
Dimensions: 13.6 m x 5.8 m
- 4) Building
Shape: Rectangular
Color: Grey
Dimensions: 11.8 m x 8.1 m



Health Post 1

- 1) Building
Shape: Rectangular
Color: Grey
Dimensions: 25.1 m x 6.1 m
- 2) Building
Shape: Rectangular
Color: Grey
Dimensions: 12.4 m x 6.2 m

Chapter 8: Logistics



The Global Logistics Cluster “provides coordination services to the logistics sector and, if needed, augments logistics infrastructure and provides common logistics services for the humanitarian community as a whole.” The Logistics Cluster is also responsible for information management related to logistics, development of tools, and provision of training.⁴⁸

Logistics operations are crucial for supplying camps with items such as food, water, building materials, and non-food items ranging from WASH kits to cooking utensils. Activities that can involve the Logistics Cluster include ground, air, maritime, and riverine transportation.

The visual profile of humanitarian logistics infrastructure observable in satellite imagery may vary between camps. Two critical factors affect what logistics infrastructure is visible in satellite imagery of a camp. These factors are 1) whether the camp is easy to access from the ground, and 2) whether it has a lack of natural resources on site, such as water aquifers and vegetation.

When humanitarians can't easily access and resupply a camp through ground transportation, agencies become more reliant on air assets. Impediments to cost-effectively and safely accessing the camp from the ground include insecurity due to ongoing hostilities in the area, poor or non-existent roads between the camp and regional supply hubs, and rainy seasons or other regional weather conditions regularly interrupting ground supply routes.

Yida Camp is an example of the visual profile created by logistics infrastructure at a camp in a moderately non-permissive environment. The dirt airstrip, clearly visible in the imagery of Yida, has a runway length of 1700 m and a width of 68 m. At the bottom left of the airstrip, near the Samaritan's Purse Warehouses, is a derelict Antonov An-26 aircraft. The WFP food distribution center, which is detailed in the Food Security chapter, and a derelict Fokker F27 aircraft are located at the bottom left of the airstrip. This airstrip is an important lifeline for Yida given the ongoing insecurity around the camp, as well as heavy seasonal rains and poor roads.

Yida Camp

Figure 8-1



Samaritan's Purse Warehouses
16 March 2014
Yida Camp, South Sudan

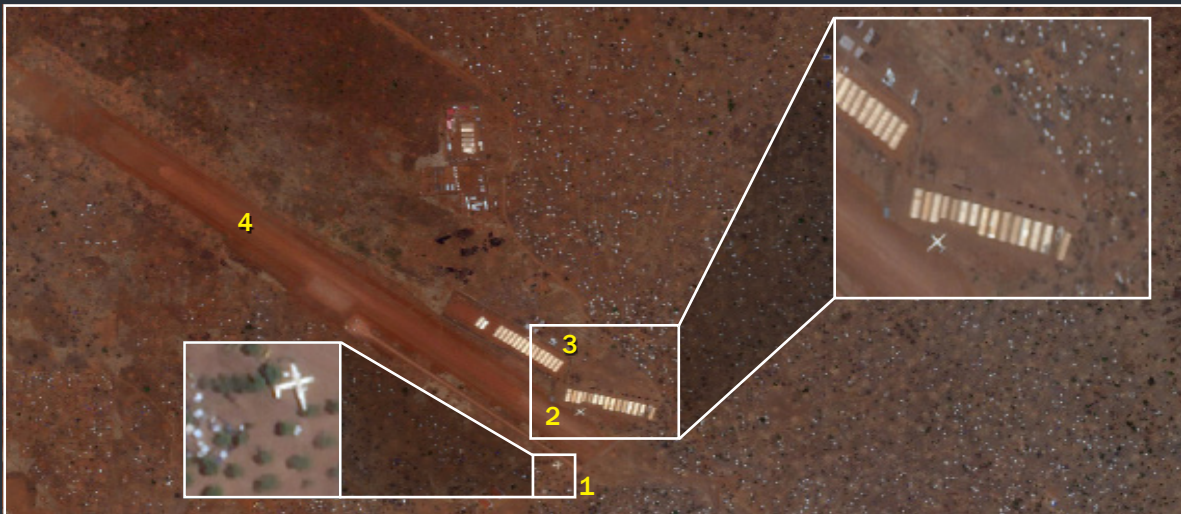
Samaritan's Purse Warehouses

- 1) Building
Shape: Rectangular
Color: White body, red roof
Dimensions: 20.6 m x 19 m x 5 m

- 2) Building
Shape: Rectangular
Color: White body, red roof
Dimensions: 26.5 m x 17.5 m x 5 m

Airstrip and Aircraft

Figure 8-2



Airstrip, Derelict Antonov An-26 and Fokker F27, and WFP Food Distribution Center
16 March 2014
Yida Camp, South Sudan

1) Derelict Antonov An-26

2) Derelict Fokker F27

3) WFP Food Distribution Center (see Food Security Chapter for structure details)

4) Airstrip
Length: 1700 m
Width: 68 m

Chapter 9: Water, Sanitation, and Hygiene (WASH)



The Global WASH Cluster delivers water, sanitation, and hygiene assistance during emergencies to affected populations. On a global scale, the Cluster works to enhance preparedness and technical capacity. UNICEF is the lead agency of the cluster.⁴⁹

Types of WASH Cluster infrastructure that may be seen in a displaced persons camp may include several specific types of structures. Some common WASH structures can include latrines, communal washing and hygiene facilities, water extraction (boreholes) and distribution points, pumping stations, storage tanks, and water bladders.

Key indicators to look for when attempting to identify WASH Cluster infrastructure include standard shapes and positions for latrines and washing centers across the camp. Analysts should also take note of repeating water distribution points, water storage containers, and extraction infrastructure, such as borehole pump houses that may be present throughout the camp. Counting the number of WASH Cluster facilities and noting the pattern of their distribution is useful to help determine what WASH services are available proportionate to a camp's population.

A reliable approach for analysts attempting to identify WASH Cluster infrastructure in satellite imagery begins with asking the following core questions:

- How is water obtained at the camp? Is it delivered by tanker, pumped from boreholes, or obtained through other local water sources?
- Where is water stored at the camp?
- What type of latrines and washing facilities are used at the camp? Are they co-located with shelters in each sector of the camp or are they positioned in centralized facilities?
- How do cultural, religious, and gender differences affect how latrines and washing facilities are constructed and positioned?

By answering these questions through cross-referencing non-imagery data with imagery data, analysts should be able to identify repeating infrastructure in characteristics that occur throughout the camp.

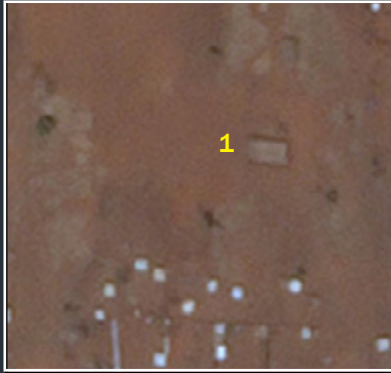
Water at Yida Camp, for example, is primarily obtained through boreholes drilled at the camp and maintained by agencies in the WASH Cluster. The structures present at boreholes in Yida have a common visual identifier: Either a brown colored tent or shed-like structure erected over the site of the borehole. This is likely where the pump used to extract water from the borehole is probably located.

In the case of Zaatari Camp, water is provided through local extraction via boreholes and through deliveries by tanker truck.⁵⁰ The presence of elevated platforms supporting water tanks is commonly observed throughout the camp. These elevated storage facilities can be seen near communal kitchens, washing facilities, and other structures.

Latrines and washing facilities are often highly identifiable in satellite imagery. In the case of Zaatari, for example, the WASH facilities are often visible every several blocks of clustered shelters, in some cases. At Zam Zam, the latrines are of standard size and shape, set apart from groups of shelters.

Yida Camp

Figure 9-1



Latrine

24 June 2014

Yida Camp, South Sudan



Borehole

24 June 2014

Yida Camp, South Sudan

Latrine

1) Excavated area
 Shape: Rectangular
 Color: N/A
 Dimensions: 14 m x 7.8 m

Borehole

2) Borehole
 Shape: Rectangular
 Color: Beige
 Dimensions: 8.8 m x 4.4 m
 Additional features: tent covering

Zaatari Camp

Figure 9-2



WASH Facilities

31 January 2014

Zaatari Camp, Jordan



Pumping Station Facility

31 January 2014

Zaatari Camp, Jordan

WASH Facilities- Male

1) Building
 Shape: Rectangular
 Color: Grey
 Dimensions: 9.2 m x 3.6 m

WASH Facilities- Female

2) Building
 Shape: Rectangular
 Color: Grey
 Dimensions: 9.2 m x 3.6 m

Pumping Station Facility

1) Water tank
 Shape: Circular
 Color: White
 Dimensions: 2.4 m x 2.4 m

2) Building
 Shape: Rectangular
 Color: Grey
 Dimensions: 5.6 m x 3.2 m

3) Building
 Shape: Rectangular
 Color: Grey
 Dimensions: 6.5 m x 3.6 m

4) Tent
 Shape: Rectangular
 Color: Grey
 Dimensions: 4.3 m x 3.2 m

Dagahaley, Dadaab Camp

Figure 9-3



Borehole 1
21 February 2014
Dagahaley, Dadaab Camp, Kenya



Borehole 2
21 February 2014
Dagahaley, Dadaab Camp, Kenya

Borehole 1

- 1) Tent
Shape: Rectangular
Color: Blue
Dimensions: 8.5 m x 5.1 m

- 2) Water Tank
Shape: Circular
Color: White
Dimensions: 5 m x 5 m

Borehole 2

- 1) Tent
Shape: Rectangular
Color: Blue
Dimensions: 8.5 m x 5.1 m

- 2) Water Tank
Shape: Circular
Color: White
Dimensions: 5 m x 5 m

Chapter 10: Agency-Use Structures

Agency-use structures, as defined within the context of this guide, are observable objects where humanitarian personnel work and often live. These structures are relevant to the administrative and programmatic activities of humanitarian organizations, including registration and transit centers.

Analysts should take note of changes to the number and type of these structures when interpreting imagery of a camp. Documenting changes to these compounds can be valuable data for corroborating reports of agencies beginning, suspending, resuming, or ending operations at a camp.

Agency-use structures are present across all four camps analyzed in this guide. While each humanitarian agency's footprint differs from camp to camp, as well as within camps, in some cases, there are some common characteristics to these facilities.

Agency housing and administrative areas tend to almost always have a compound lay-out, which includes a perimeter wall or fence in the camps studied in this guide. In most cases, the compounds contain an apparent mix of structure types. The structures can include locally built structures, small dome tents or keyhole shaped tents, prefabricated buildings, and large UNHCR-style hexagonal tents, in some cases.

Yida Camp shows aid groups employing dome and keyhole shaped tents alongside locally built structures at several agency compounds. At Zaatari, hexagonal UNHCR-style tents, caravans, tunnel tents, and prefabricated housing units are visible at various UN agency and NGO compounds.

White and beige tents and uniquely shaped white colored octagonal tents are visible at two Relief International compounds at Zam Zam Camp. UNHCR, CARE, Norwegian Refugee Council (NRC) have major compounds that are visible in imagery of Dagahaley Camp, Dadaab. These compounds contain apparent locally built structures with corrugated roofs and hexagonal tents consistent with UNHCR-style tents.

This analysis also identified registration centers for incoming displaced persons to a camp and transit centers for the transport of civilians. UNHCR registration centers are seen at Zaatari and Yida. Additionally, a crowd of people can be seen outside the New Arrivals Registration area in Zaatari Camp (see Figure 10-3). A UNHCR transit center is also identified at Dagahaley.

Yida Camp

IRC Compounds

The International Rescue Committee (IRC) area is composed of at least two neighboring, non-contiguous compounds comprised of approximately 70 tent-like structures and one building. The north compound is enclosed by a perimeter wall or fence approximately 305 meters in length. The south compound is enclosed by a perimeter wall or fence approximately 340 meters in length, with a large unenclosed area approximately 35 meters long visible. Within each compound there are additional fences or walls present. In Yida Camp, IRC works as part of the Gender-Based Violence, Health, and Protection Clusters.

Figure 10-1



IRC Compounds
24 June 2014
Yida Camp, South Sudan

1) Tent
Shape: Keyhole
Color: White
Dimensions: 6.9 m x 5.8 m

2) Tent
Shape: Square
Color: White
Dimensions: 5 m x 5 m

3) Tent
Shape: Square
Color: White
Dimensions: 3.8 m x 3.8 m

4) Tent
Shape: Rectangular
Color: Blue
Dimensions: 12 m x 6.5 m

5) Tent
Shape: Rectangular
Color: Blue
Dimensions: 9.5 m x 5.5 m

7) Tent
Shape: Rectangular
Color: Blue
Dimensions: 5.3 m x 6.3 m

9) Building
Shape: Rectangular
Color: Grey
Dimensions: 17.5 m x 6.1 m

6) Tent
Shape: Rectangular
Color: Blue
Dimensions: 8.3 m x 4.6 m

8) Tent
Shape: Rectangular
Color: White
Dimensions: 21.1 m x 8.8 m

UNHCR Compound

Approximately 90 structures enclosed by a 551 meter perimeter wall or fence are present in the UNHCR compound. The majority of the structures appear to be tents. UNHCR is the lead agency at Yida Camp and also works as part of the Camp Management, Core Relief Items, Protection, and Registration Clusters.

Figure 10-2



UNHCR Compound
24 June 2014
Yida Camp, South Sudan

1) Tent
Shape: Square
Color: Blue
Dimensions: 12.4 m x 12.4 m
Additional Features: Pyramid roof

2) Tent
Shape: Square
Color: Blue
Dimensions: 4.2 m x 4.2 m

3) Tent
Shape: Rectangular
Color: Grey
Dimensions: 13.8 x 4.9 m

4) Tent
Shape: Keyhole
Color: White
Dimensions: 6.9 m x 5.8 m

5) Tent
Shape: Rectangular
Color: Red
Dimensions: 24.3 m x 7.8 m

6) Tent
Shape: Square
Color: Blue
Dimensions: 5 m x 5 m

7) Tukul
Shape: Circular
Color: Brown
Dimensions: 8.4 m x 8.4 m

Zaatari Camp

UNHCR Registration, New Arrivals Registration, and IOM Compound

This enclosed multi-NGO compound contains three distinct areas: UNHCR Registration, New Arrivals Registration, and an International Organization for Migration (IOM) Compound. The compound is surrounded by a perimeter wall or fence approximately 720 m long. A crowd of people appears to be gathered outside the New Arrivals Registration area. UNHCR leads the Registration Cluster in Zaatari Camp.

Figure 10-3



UNHCR Registration, New Arrivals Registration, and IOM Compound
31 January 2014
Zaatari Camp, Jordan

UNHCR Registration

- 1) Building
Shape: Rectangular
Color: Grey
Dimensions: 8.3 m x 4.1 m
- 2) Building
Shape: Rectangular
Color: Grey
Dimensions: 25.7 m x 3.9 m
- 3) Building
Shape: Rectangular
Color: Grey
Dimensions: 12.4 m x 4.2 m
- 4) Building
Shape: Rectangular
Color: Grey
Dimensions: 5.5 m x 4.9 m

New Arrivals Registration

- 5) Tent
Shape: Rectangular
Color: Beige
Dimensions: 20 m x 8.8 m
- 6) Caravan
Shape: Rectangular
Color: White
Dimensions: 8.9 m x 3.2 m
- 7) Building
Shape: Rectangular
Color: White
Dimensions: 25.5 m x 10 m
- 8) Building
Shape: Rectangular
Color: White
Dimensions: 31.3 m x 10.6 m

IOM Compound

- 9) Tent
Shape: Rectangular
Color: Beige
Dimensions: 14 m x 8.8 m
- 10) Water tank
Shape: Rectangular
Color: Grey with white sides
Dimensions: 5.4 m x 3.1 m

NRC Distribution Center

An NRC Distribution Center is an enclosed compound surrounded by a perimeter wall or fence approximately 800 m long. NRC works as part of the Core Relief Items and Education Clusters.

Figure 10-4



NRC Distribution Center
31 January 2014
Zaatari Camp, Jordan

1) Tent
Shape: Rectangular
Color: White
Dimensions: 24.2 m x 11.6 m

2) Tent
Shape: Rectangular
Color: White
Dimensions: 27.1 m x 11.8 m

3) Tent
Shape: Rectangular
Color: White
Dimensions: 6.4 m x 3.2 m

4) Tent
Shape: Rectangular
Color: White
Dimensions: 12.1 m x 4.6 m

Dagahaley, Dadaab Camp

UNHCR Field Office and Transit Center

In Dadaab, UNHCR is the lead agency of the camp and works as part of multiple other clusters. The UNHCR Field Office and Transit Center are located in the same compound, which is surrounded by a perimeter wall or fence 600 m long.

Figure 10-5



UNHCR Field Office and Transit Center
21 February 2014
Dagahaley, Dadaab Camp, Kenya

UNHCR Field Office and Transit Center

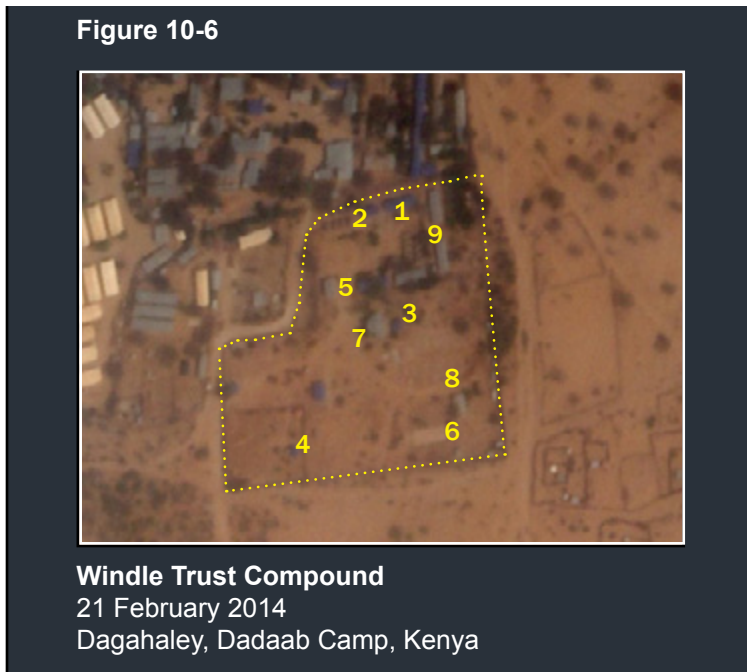
- 1) Caravan
Shape: Rectangular
Color: White
Dimensions: 6.7 m x 4.5 m
- 2) Building
Shape: Rectangular
Color: Grey
Dimensions: 15.2 m x 7.5 m
- 3) Tent
Shape: Rectangular
Color: Blue
Dimensions: 15.7 m x 8.1 m

- 4) Building
Shape: Rectangular
Color: Grey
Dimensions: 16.6 m x 5.7 m
- 5) Building
Shape: L-shaped
Color: Grey
Dimensions: 42.7 m x 8 m
- 6) Building
Shape: Rectangular
Color: Grey
Dimensions: 13.2 m x 6.3 m
- 7) Building
Shape: Rectangular
Color: Grey
Dimensions: 19.7 m x 5.8 m

- 8) Tent
Shape: Rectangular
Color: White
Dimensions: 9.7 m x 5.5 m
- 9) Tent
Shape: Rectangular
Color: Beige
Dimensions: 22.8 m x 9.1 m
- 10) Building
Shape: Square
Color: Grey
Dimensions: 7 m x 7 m

Windle Trust Compound

The compound of the Windle Trust, which works as part of the Education and HIV/AIDS Clusters, is located adjacent to the hospital in Dagahaley.



- 1) Building
Shape: Rectangular
Color: Blue
Dimensions: 22.7 m x 6.5 m
- 2) Building
Shape: Rectangular
Color: Blue
Dimensions: 11.5 m x 6.3 m
- 3) Building
Shape: Square
Color: Blue
Dimensions: 6.9 m x 6.9 m
- 4) Building
Shape: Square
Color: Blue
Dimensions: 4.9 m x 4.9 m

- 5) Building
Shape: Rectangular
Color: Grey
Dimensions: 13 m x 7.8 m

- 7) Building
Shape: Rectangular
Color: Grey
Dimensions: 17.9 m x 6.7 m

- 9) Building
Shape: Rectangular
Color: Grey
Dimensions: 22.6 m x 7.6 m

- 6) Building
Shape: Square
Color: Grey
Dimensions: 5.8 m x 5.8 m

- 8) Building
Shape: Square
Color: Grey
Dimensions: 11 m x 9.2 m

CARE Compound

The CARE compound, enclosed by a 700 m perimeter wall or fence, is comprised of both buildings and tents.

Figure 10-7



CARE Compound
21 February 2014
Dagahaley, Dadaab Camp, Kenya

CARE Compound

1) Tent
Shape: Rectangular
Color: Blue
Dimensions: 9.5 m x 8.5 m

2) Building
Shape: Rectangular
Color: Grey
Dimensions: 8.5 m x 7.5 m

3) Tent
Shape: Rectangular
Color: Blue
Dimensions: 39.2 m x 9.6 m

4) Tent
Shape: Rectangular
Color: Grey
Dimensions: 25.8 m x 7.5 m

5) Tent
Shape: Rectangular
Color: Beige
Dimensions: 25.6 m x 6.7 m

7) Tent
Shape: Rectangular
Color: Blue
Dimensions: 25.7 m x 10.5 m

9) Building
Shape: Rectangular
Color: Grey
Dimensions: 14.9 m x 5.3 m

6) Building
Shape: Rectangular
Color: Grey
Dimensions: 9.7 m x 6.6 m

8) Tent
Shape: Square
Color: Blue
Dimensions: 11.3 m x 11.3 m

10) Building
Shape: Rectangular
Color: Grey
Dimensions: 21.6 m x 6.7 m

Chapter 11: Security

Security infrastructure is defined in the context of this guide as checkpoints, camp perimeter fencing, troops barracks and police stations, and other infrastructure. These objects are often used by local law enforcement from the camp's host nation, internal camp security personnel, and international protection forces, such as UN peacekeepers.

While each camp has its own unique security context, it should be expected that more than one security-related agency will likely be operational at each camp in most cases. Security infrastructure, particularly perimeter trenches, fences, and checkpoints are often highly observable in satellite imagery.

At Zam Zam camp, for example, a security checkpoint is visible along a road. Also at Zaatari, a large perimeter trench is clearly visible on the north side of the camp. According to an interview by the Signal Program with a humanitarian responder who had worked at the camp, that trench is part of Zaatari's security perimeter.⁵¹ Imagery interpreted of Dagahaley shows the presence of several similar structures at installations marked as local police compounds.

Analysts should make note of changes to the position, apparent size of the deployment in terms of vehicles, and deployment patterns of security forces over time. This information, which can be derived in many cases through imagery interpretation, may be of value in cross-corroborating reports of troop deployments, insecurity, or other major security events that have allegedly occurred at the camp.

Zaatari Camp

Figure 11-1



Civil Defence and Police
31 January 2014
Zaatari Camp, Jordan

Civil Defence

1) Building
Shape: Rectangular
Color: Grey
Dimensions: 9.7 m x 5.2 m

2) Building
Shape: Rectangular
Color: Grey
Dimensions: 4.2 m x 3.2 m

Police

3) Building
Shape: Rectangular
Color: White
Dimensions: 21.1 m x 8.9 m

4) Building
Shape: Rectangular
Color: White
Dimensions: 10 m x 4.3 m

5) Building
Shape: Rectangular
Color: White
Dimensions: 18 m x 9.2 m

6) Building
Shape: Rectangular
Color: White
Dimensions: 4.1 m x 3.3 m

Zam Zam Camp

Figure 11-2



Security Checkpoint
17 July 2014
Zam Zam Camp, Sudan

Security Checkpoint

1) Building
Shape: Rectangular
Color: Brown
Dimensions: 10.9 m x 7.8 m

2) Building
Shape: Rectangular
Color: White
Dimensions: 24 m x 7 m

3) Booth
Shape: Square
Color: White
Dimensions: 2.9 m x 2.9 m

4) Tent
Shape: Rectangular
Color: Beige
Dimensions: 9.3 m x 5.3 m

Dagahaley, Dadaab Camp

Figure 11-3



Administration Police
21 February 2014
Dagahaley, Dadaab Camp, Kenya

Administration Police

- 1) Tent
Shape: Rectangular
Color: Blue
Dimensions: 25.6 m x 7.7 m
- 2) Tent
Shape: Rectangular
Color: Blue
Dimensions: 7.8 m x 6.6 m
- 3) Tent
Shape: Square
Color: White
Dimensions: 3.6 m x 3.6 m

Figure 11-4



Police Base
21 February 2014
Dagahaley, Dadaab Camp, Kenya



Police Post at Market
21 February 2014
Dagahaley, Dadaab Camp, Kenya

Police Base

- 1) Tent
Shape: Rectangular
Color: Blue
Dimensions: 37.7 m x 8.5 m
- 2) Building
Shape: Rectangular
Color: Grey
Dimensions: 16.6 m x 6.7 m

- 3) Building
Shape: Rectangular
Color: Grey
Dimensions: 13 m x 5 m
- 4) Building
Shape: Square
Color: Grey
Dimensions: 5.3 m x 5.3 m

Police Post at Market

- 1) Tent
Shape: Rectangular
Color: Grey
Dimensions: 24.4 m x 6.9 m

Figure 11-5



Tango IV Base
21 February 2014
Dagahaley, Dadaab Camp, Kenya

“Tango IV” Base

1) Building
Shape: Rectangular
Color: Grey
Dimensions: 24.4 m x 6.9 m

2) Tent
Shape: Rectangular
Color: Blue
Dimensions: 25.9 m x 8.3 m

3) Tent
Shape: Rectangular
Color: Blue
Dimensions: 10.2 m x 8.8 m

4) Building
Shape: Rectangular
Color: Grey
Dimensions: 12.2 m x 8.7 m

5) Building
Shape: Rectangular
Color: Grey
Dimensions: 6.8 m x 5.5 m

Appendix I: Expanded Methodology

Tent and Building Identification

This guide identifies structures as being consistent with one of three categories of objects: tent, building, or caravan. These determinations are made through a multi-step process. Ground photographs of tents and buildings in each camp were examined to identify the materials used in a structure's construction, along with its shape, color, and additional properties, like a pitched roof. These findings were then applied throughout a camp to identify additional structures because, regardless of a structure's size, the previously identified attributes remained consistent at that facility.

The term "tent" is used in this guide to represent two types of structures. First, this term describes manufactured tents, such as a UNHCR family tent or WFP storage tent. Additionally, the term "tent" is used to describe structures whose roofs are made of materials such as tarps or cloth. These structures are identified as tents because the materials used in the construction of their roofs are similar. In some cases the material may even be the same as the materials used in manufactured tents. For example, these structures can be found in Yida Camp as locally built structures.

The term "building" is used in this guide to represent structures constructed from materials such as stone, concrete, and metal. In particular, metal roofs can be identified in satellite imagery because of their reflective properties and coloring. These types of structures are commonly found in Dagahaley.

Caravan trailers are specifically identifiable because of their unique shape, uniform size, and color. Ground photographs were used to corroborate these properties. However, when identifying any object it's important to be aware of the visual changes that occur over time due to the environment and climate of a camp. For instance, in a desert region such as Zaatari, the analyst needs to consider how sand and dirt can change the appearance of an object over time. For example, an originally white tent in a desert can eventually become a brown one. If possible, it would be beneficial to view multiple images of the camps on different days throughout several different months and seasons.

Imagery Analysis Software Platforms Used

The imagery analysis of the four camps was conducted primarily in the remote sensing software ERDAS Imagine. The imagery acquired by Signal that is already geo-referenced (embedded with geographic referencing information such as longitude and latitude coordinates) has had their geographic data cross-referenced between Imagine and two other platforms: Google Earth Pro and ArcGIS' ArcMap. This step is to ensure accuracy and consistency of the geo-referenced information throughout all imagery. Additionally, in the case of all camps, the imagery loaded in Imagine is synced to Google Earth via Imagine's interface.

Imagery Data

A combination of both high resolution (HR) and very high resolution (VHR) imagery was analyzed by the Signal Program over the course of six months. HR imagery has a resolution of 1 to 5 meters per pixel, whereas VHR imagery has a resolution of less than 1 meter per pixel. All sets of imagery provided by Skybox for this guide are categorized as HR due to being approximately 1 meters per pixel in resolution. The one VHR image, which was collected by Astrium over the Zaatari camp on 31 January 2014, is approximately 0.6 meters in resolution. Due to the limitations of not being able to accurately identify structures and their measurements with imagery higher than 5 meters per pixel, it is not recommended to conduct this analysis with imagery that is not HR or VHR.

For each camp, two images collected in 2014 were used, with the exception of a single image for Dagahaley Camp in Dadaab. In total, seven images were interpreted over the course of the guide's development. The dates of the imagery collections, listed in the order they were interpreted, are as follows:

Camp	Date	Satellite
Yida	16 March 2014	SkySat-1
Yida	24 June 2014	SkySat-1
Zaatari	31 January 2014	Pléiades
Zaatari	16 March 2014	SkySat-1
Zam Zam	17 July 2014	SkySat-1
Zam Zam	10 October 2014	SkySat-1
Dagahaley, Dadaab	21 February 2014	SkySat-1

The image of Zaatari from 31 January was collected by Astrium and was provided to the Signal Program by SpaceUnited. The other six images employed as part of this research were provided to the Signal Program by Skybox Imaging.

Imagery Analysis Techniques

All imagery, with the exception of Zaatari from 31 January 2014, was acquired with embedded geo-referenced information. The 31 January image was geo-referenced in ArcMap and the coordinates were verified for accuracy with Imagine linked to Google Earth Pro. To ensure consistency, the coordinates of all imagery used in the guide has been verified across software platforms.

Imagery was primarily analyzed in Imagine and initially situated in a north-facing vector. Adjustments to the vector are often made to examine alternate angles of structures. The final presentation of the imagery for the report is pictured in a north-facing vector. All imagery data was projected in the WGS 84 Mercator coordinate system. The same coordinate system was used across images to ensure consistency in the recording of measurements and locations. Before any measurements of objects were made, the imagery was subjected to cubic convolution sampling to reduce initial pixelation of object edges. Using Imagine’s multispectral toolbar, a min-max automatic adjustment to the contrast and brightness was performed for accurate color and light representation of the natural color imagery.

Measurements of all observable objects presented in the guide were taken using the measuring function tool in Imagine. Each measurement was also cross-referenced with archived imagery in Google Earth Pro, if available, as well as appropriately overlaid image extractions on Google Earth Pro’s platform. The Google Earth Pro measurements were conducted with the path ruler function. Lengths and widths were taken for each object. When a high off-nadir angle allowed the height of an object to be measured, that data was recorded as well.

Colors of all objects were analyzed without any manipulation of the color layers. However, the objects were cross-referenced across multiple platforms for color accuracy. This was especially important in the case of Dagahaley, Dadaab Camp. In Dagahaley, color verification was critical for determining that the materials used for the roofs of objects were primarily consistent with corrugated metal.

Additionally, all images of the camps were topographically analyzed with Google Earth Pro to determine the topographic context in which the camp is situated. Particular attention was paid to the terrain and elevation level of the camp.

Integration of Non-imagery Data

Non-imagery data that was integrated into the analysis process conducted for this guide includes maps, ground photos, NGO situation reports, news reports, and similar products. One of the most critical steps in the imagery analysis process was the utilization of open source maps of the camps produced by UN agencies and other humanitarian organizations.

These maps provide a crucial guide to identifying specific objects in the camps. It is important to note that, in some cases, maps may not be available for certain camps. Signal analysts geo-referenced the maps used in the analysis process in ArcMap to ensure that the locations in the imagery matched with the locations presented in the maps.

Analysts also noted the surrounding context of an object to assist in its identification. Some of these contextual identification approaches include identifying other similar structures or patterns of recurring groups of different structures, such as a WASH facility present near shelters in a city block formation.

Additionally, NGO situation reports, news articles, and publicly available ground photographs, were used to help identify, document, and describe objects present in the satellite imagery of the camps. This data helped to provide another contextual approach by introducing evidence of cultural, geographic, and operational attributes that shape the visual profile of camps presented in this guide.

Recording Analysis Data

As previously mentioned, Signal Program researchers captured several standard fields of information about each object included within the report. These fields are an object's shape, color, and dimensions in meters. Additional notable patterns and properties of the object are presented when applicable.

The researchers note, when possible, whether similar objects occur in the other camps analyzed in this guide. In Google Earth Pro, linked with the imagery uploaded on the ERDAS Imagine platform and in conjunction with the geo-referenced maps, individual objects were counted and stored on KMZ files within folders labeled for the compounds and sectors in which they are found inside of the camps.

The object-specific fields collected and documented in the chapters of this guide are also presented in spreadsheet format in Appendix II. Though data logs will vary depending on what data is being captured and for what purposes, the log presented is meant to provide a general example of what imagery data logs should normally capture.

Appendix II: Camp Structure Data

Yida Camp, South Sudan

Chapter	Description	Observable Object	Latitude	Longitude	Shape	Color	Length	Width
Agency-Use Structures	Samaritan's Purse Compound	Tukul	10.0963	30.0847	Circular	Brown	8.4 m	8.4 m
Agency-Use Structures	Samaritan's Purse Compound	Tent	10.0962	30.0847	Rectangular	Beige	24.2 m	11.7 m
Agency-Use Structures	Samaritan's Purse Compound	Tent	10.0963	30.0847	Rectangular	Beige	5 m	2.8 m
Agency-Use Structures	Samaritan's Purse Compound	Tent	10.0961	30.0847	Rectangular	Brown	9.2 m	3.8 m
Agency-Use Structures	Samaritan's Purse Compound	Tent	10.0963	30.0845	Rectangular	Grey	17 m	11.5 m
Agency-Use Structures	Samaritan's Purse Compound	Tent	10.0962	30.0845	Rectangular	Grey	13.5 m	7.8 m
Agency-Use Structures	Samaritan's Purse Compound	Tent	10.0963	30.0847	Rectangular	Blue	8.3 m	4.8 m
Agency-Use Structures	Samaritan's Purse Compound	Tent	10.0963	30.0847	Rectangular	Grey	9.9 m	6.8 m
Agency-Use Structures	Samaritan's Purse Compound	Tent	10.0963	30.0847	Rectangular	Blue	9.6 m	7.7 m
Agency-Use Structures	Samaritan's Purse Compound	Tent	10.0962	30.0847	Square	Grey	5.5 m	5.5 m
Agency-Use Structures	IRC Compound	Tent	10.0969	30.0842	Keyhole	White	6.9 m	5.8 m
Agency-Use Structures	IRC Compound	Tent	10.0969	30.0842	Square	White	5 m	5 m
Agency-Use Structures	IRC Compound	Tent	10.0969	30.0842	Square	White	3.8 m	3.8 m
Agency-Use Structures	IRC Compound	Tent	10.0968	30.0842	Rectangular	Blue	12 m	6.5 m
Agency-Use Structures	IRC Compound	Tent	10.0969	30.0843	Rectangular	Blue	9.5 m	5.5 m
Agency-Use Structures	IRC Compound	Tent	10.0969	30.0841	Rectangular	Blue	8.3 m	4.6 m
Agency-Use Structures	IRC Compound	Tent	10.0971	30.0842	Rectangular	Blue	5.3 m	6.3 m
Agency-Use Structures	IRC Compound	Tent	10.0969	30.084	Rectangular	White	21.1 m	8.8 m
Agency-Use Structures	IRC Compound	Building	10.0969	30.0842	Rectangular	Grey	17.5 m	6.1 m
Agency-Use Structures	UNHCR Compound	Tent	10.0974	30.0833	Square	Blue	12.4 m	12.4 m
Agency-Use Structures	UNHCR Compound	Tent	10.0974	30.0834	Square	Blue	4.2 m	4.2 m
Agency-Use Structures	UNHCR Compound	Tent	10.0973	30.0835	Rectangular	Grey	13.8 m	4.9 m
Agency-Use Structures	UNHCR Compound	Tent	10.0974	30.0835	Keyhole	White	6.9 m	5.8 m
Agency-Use Structures	UNHCR Compound	Tent	10.0972	30.0835	Rectangular	Red	24.3 m	7.8 m
Agency-Use Structures	UNHCR Compound	Tent	10.0973	30.0833	Square	Blue	5 m	5 m
Agency-Use Structures	UNHCR Compound	Tukul	10.0973	30.0834	Circular	Brown	8.4 m	8.4 m
Food Security	WFP Food Distribution Centers	Tent	10.1068	30.0889	Rectangular	Beige	33 m	12.4 m
Food Security	WFP Food Distribution Centers	Tent	10.1067	30.0889	Rectangular	Beige	25.4 m	11.2 m
Logistics	Samaritan's Purse Warehouses	Building	10.1047	30.0865	Rectangular	White body, Red roof	20.6 m	19 m
Logistics	Airstrip	N/A	10.1068	30.0889	Rectangular	N/A	1700 m	68 m
Logistics	Antonov An-26	N/A	10.1068	30.0889	N/A	White	24 m	29 m
WASH	Latrine	Excavated area	10.1053	30.0774	Rectangular	N/A	14 m	7.8 m
WASH	Borehole	Structure on east side	10.0984	30.0809	Rectangular	Beige	8.8 m	4.4 m
Shelter	Displaced Persons Shelter	Tent	10.1011	30.0965	Rectangular	White	4.7 m	3.9 m
Shelter	Displaced Persons Shelter	Tent			Rectangular	Blue	4.7 m	3.9 m
Shelter	Displaced Persons Shelter	Tent	10.1011	30.0965	Rectangular	White	16.3 m	7.6 m
Civilian-Use Infrastructure	Mosque	Tent	10.0987	10.0948	Rectangular	White	15.2 m	8.1 m
Civilian-Use Infrastructure	Mosque	Tent	10.0987	10.0947	Rectangular	White	6.8 m	4.4 m

Zaatari Camp, Jordan

Cluster	Description	Observable Object	Latitude	Longitude	Shape	Color	Length (meters)	Width (meters)
Agency-Use Structures	ICRC building	Building	32.2993	36.3205	Rectangular	White	30.1	7.5
Agency-Use Structures	ICRC building	Caravan trailer	32.2993	36.3205	Rectangular	White	8.7	4.1
Agency-Use Structures	IOM Compound	Tent	32.3027	36.3254	Rectangular	Beige	14	8.8
Agency-Use Structures	IOM Compound	Water tank	32.3027	36.3254	Rectangular	Grey with white sides	5.4	3.1
Agency-Use Structures	New Arrivals Registration	Tent	32.3028	36.3251	Rectangular	Beige	20	8.8
Agency-Use Structures	New Arrivals Registration	Building	32.3031	36.3242	Rectangular	White	25.5	10
Agency-Use Structures	New Arrivals Registration	Building	32.3031	36.3242	Rectangular	White	31.3	10.6
Agency-Use Structures	New Arrivals Registration	Caravan trailer	32.3028	36.3251	Rectangular	White	8.9	3.2
Agency-Use Structures	NRC Distribution Center	Tent	32.2979	36.3379	Rectangular	White	24.2	11.6
Agency-Use Structures	NRC Distribution Center	Tent	32.2979	36.3379	Rectangular	White	27.1	11.8
Agency-Use Structures	NRC Distribution Center	Caravan trailer	32.2979	36.3379	Rectangular	White	6.4	3.2
Agency-Use Structures	NRC Distribution Center	Tent	32.2979	36.3379	Rectangular	White	12.1	4.6
Agency-Use Structures	UNFPA - Women's Center	Tent	32.2993	36.3201	Rectangular	White	9.8	4.8
Agency-Use Structures	UNFPA - Women's Center	Caravan trailer	32.2993	36.3201	Rectangular	White	8.7	4.1
Agency-Use Structures	UNHCR Registration	Building	32.3035	36.3232	Rectangular	Grey	8.3	4.1
Agency-Use Structures	UNHCR Registration	Building	32.3035	36.3232	Rectangular	Grey	25.7	3.9
Agency-Use Structures	UNHCR Registration	Building	32.3035	36.3232	Rectangular	Grey	12.4	4.2
Agency-Use Structures	UNHCR Registration	Building	32.3035	36.3232	Rectangular	Grey	5.5	4.9
Agency-Use Structures	UNICEF/UNHCR Offices and Stores	Tent	32.3041	36.3217	Rectangular	Beige	25	9.5
Agency-Use Structures	UNICEF/UNHCR Offices and Stores	Tent	32.3041	36.3217	Rectangular	White	24.2	8.8
Civilian-Use Infrastructure	Mosque	Tent	32.3017	36.3193	Rectangular	White	25.5	10
Education	American School	Tent	32.3008	36.3214	Rectangular	White	32.2	9.5
Education	American School	Wash facility	32.3008	36.3214	Rectangular	Grey	9.2	3.6
Education	Bahraini-Funded School	Building	32.2988	36.3215	Rectangular	White	29.4	14.1
Education	Bahraini-Funded School	Building	32.2988	36.3215	Rectangular	White	15	11.2
Education	Bahraini-Funded School	Building	32.2988	36.3215	Rectangular	White	8.1	11.2
Education	Bahraini-Funded School	Tent	32.2988	36.3215	Rectangular	White	25.4	13.5
Education	Bahraini-Funded School	Tent	32.2988	36.3215	Rectangular	White	10.3	11.4
Education	Saudi-Funded School	Tent	32.2931	36.3278	Rectangular	White	10.3	11.4
Education	Saudi-Funded School	Tent	32.2931	36.3278	Rectangular	White	32.1	10.9
Education	Save The Children's Rainbow Kindergarten	Tent	32.3001	36.3233	Rectangular	Red	11.7	6.5
Education	Save The Children's Rainbow Kindergarten	Tent	32.3001	36.3233	Rectangular	White	18.8	10.1
Education	Save The Children's Rainbow Kindergarten	Tent	32.3001	36.3233	Rectangular	White	10.3	9.8
Education	Save The Children's Rainbow Kindergarten	Tent	32.2983	36.3294	Rectangular	Grey	14.4	4.8
Food Security	Common Kitchens	Building	32.2981	36.3205	Rectangular	Beige	25	9.5
Food Security	WFP Compound	Tent	32.2981	36.3205	Rectangular	Grey	13.9	5.8
Food Security	WFP Compound	Building	32.2981	36.3205	Rectangular	Grey	15.7	6.9
Food Security	WFP Compound	Building	32.2981	36.3205	Rectangular	Grey	8.9	8.9
Food Security	WFP Compound	Building	32.2981	36.3205	Square	Grey	8.9	8.9
Food Security	WFP Compound	Building	32.2981	36.3205	Rectangular	Grey	8.9	5.4
Food Security	WFP Compound	Tent	32.2981	36.3205	Rectangular	Red	13.5	6.3
Food Security	WFP Compound	Tent	32.2981	36.3205	Rectangular	White	6.7	4.8
Food Security	WFP Compound	Tent	32.2981	36.3205	Rectangular	White	25	9.5

Zaatari Camp, Jordan

Cluster	Description	Observable Object	Latitude	Longitude	Shape	Color	Length (meters)	Width (meters)
Food Security	WFP Compound	Tent	32.2981	36.3205	Rectangular	White	17	8.6
Health	KSA Hospital	Tent	32.2924	36.3302	Rectangular	Beige	7.2	5.9
Health	KSA Hospital	Tent	32.2924	36.3302	Rectangular	Beige	12.2	6.7
Health	KSA Hospital	Tent	32.2924	36.3302	Rectangular	Beige	5	3.4
Health	KSA Hospital	Tent	32.2924	36.3302	Rectangular	White	47.8	10.8
Health	KSA Hospital	Tent	32.2924	36.3302	Rectangular	White	12.4	11.3
Health	KSA Hospital	Tent	32.2924	36.3302	Rectangular	White	31.4	15.2
Health	Moroccan Hospital	Building	36.3223	36.3223	L-shape	Beige	8.3	2.5
Health	Moroccan Hospital	Tent	32.3026	36.3223	Rectangular	Brown	6.5	5.5
Health	Moroccan Hospital	Tent	32.3026	36.3223	Rectangular	Brown	6.9	6.3
Health	Moroccan Hospital	Tent	32.3023	36.3223	Rectangular	Brown	12.7	6.3
Health	Moroccan Hospital	Tent	32.3023	36.3223	Rectangular	White	12.7	5.6
Health	Moroccan Hospital	Building	32.3023	36.3223	Rectangular	White	9.4	3.8
Security	Civil Defence	Building	32.3018	36.3286	Rectangular	Grey	9.7	5.2
Security	Civil Defence	Building	32.3018	36.3286	Rectangular	Grey	4.2	3.2
Security	Police	Building	32.3018	36.3286	Rectangular	White	21.1	8.9
Security	Police	Building	32.3018	36.3286	Rectangular	White	10	4.3
Security	Police	Building	32.3018	36.3286	Rectangular	White	18	9.2
Security	Police	Building	32.3018	36.3286	Rectangular	White	4.1	3.3
Shelter	Displaced Persons Shelter	Tent	32.2951	36.3296	Hexagonal	White	6.6	3.8
Shelter	Displaced Persons Shelter	Caravan trailer	32.2951	36.3304	Rectangular	White	6.4	3.2
WASH	Pumping Station Facility	Building	32.2868	36.3279	Rectangular	Grey	6.5	3.6
WASH	Pumping Station Facility	Tent	32.2868	36.3279	Rectangular	Grey	4.3	3.2
WASH	Pumping Station Facility	Water tank	32.2868	36.3279	Circular	White	2.4	2.4
WASH	Pumping Station Facility	Building	32.2868	36.3279	Rectangular	Grey	5.6	3.2
WASH	WASH - Female	Building	32.3028	37.3354	Rectangular	Grey	9.2	3.6
WASH	WASH - Male	Building	32.3028	37.3354	Rectangular	Grey	9.2	3.6

Zam Zam Camp, Sudan

Cluster	Description	Observable Object	Latitude	Longitude	Shape	Color	Length (meters)	Width (meters)
Civilian	Mosque	Tent	13.49457	25.30025	Rectangular	Brown	10	6.4
Civilian	Mosque	Tent	13.49456	25.30025	Rectangular	Brown	5.8	4.4
Civilian	Mosque	Tent	13.49456	25.30024	Rectangular	Brown	4.2	3.5
Shelter	Displaced Persons Shelter	Tukul	13.48625	25.30575	Circular	Brown	4.6	4.6
Shelter	Displaced Persons Shelter	Tent	13.48625	25.30565	Square	Brown	3.9	3.9
Shelter	Displaced Persons Shelter	Tent	13.48625	25.30566	Rectangular	White	4.3	2.5
Shelter	Displaced Persons Shelter	Tent	13.49216	25.30674	Rectangular	Beige	5.9	3.5
Shelter	Displaced Persons Shelter	Tent	13.49216	25.30674	Rectangular	Blue	4.2	3.4
Security	Security Checkpoint	Building	13.48427	25.31004	Rectangular	Brown	10.9	7.8
Security	Security Checkpoint	Building	13.48426	25.31003	Rectangular	White	24	7
Security	Security Checkpoint	Booth	13.48427	25.31004	Square	White	2.9	2.9
Security	Security Checkpoint	Tent	13.48427	25.31005	Rectangular	Beige	9.3	5.3
Education	School 1	Tent	13.48003	25.30767	Rectangular	Beige	9.2	5.5
Education	School 1	Tent	13.48003	25.30767	Square	White	5.2	5.2
Education	School 1	Building	13.48003	25.30767	Rectangular	Brown	8.3	5.3
Education	School 2	Tent	13.49299	25.30001	Rectangular	Brown	9.2	5.5
Education	School 2	Building	13.49299	25.30002	Rectangular	Beige	20.1	2.5
Education	School 2	Tent	13.49298	25.30001	Rectangular	Beige	5.6	2.8
Education	School 2	Tent	13.49299	25.30001	Rectangular	Beige	8.3	5.3
Health	Relief International Health Center 1	Tent	13.48332	25.30898	Rectangular	White	12.3	5.8
Health	Relief International Health Center 1	Tent	13.48333	25.30897	Rectangular	Beige	10.1	4.9
Health	Relief International Health Center 1	Tent	13.48332	25.30897	Rectangular	White	13	6.1
Health	Relief International Health Center 1	Tent	13.48331	25.30898	Rectangular	White	11.9	5.7
Health	Relief International Health Center 1	Tent	13.48332	25.30899	Rectangular	White	12.6	4.9
Health	Relief International Health Center 1	Tent	13.48334	25.30898	Rectangular	White	6.2	4.3
Health	Relief International Health Center 1	Tent	13.48333	25.30898	Square	White	4.5	4.5
Health	Relief International Health Center 1	Tent	13.48333	25.30897	Octogonal	White	6.5	6.5
Health	Relief International Health Center 1	Tent	13.48333	25.30898	Octogonal	White	5.3	5.3
Health	Relief International Health Center 2	Tent	13.49313	25.29467	Rectangular	White	18.2	8.9
Health	Relief International Health Center 2	Tent	13.49312	25.29466	Rectangular	White	12.9	9.1
Health	Relief International Health Center 2	Tent	13.49312	25.29467	Rectangular	White	6.1	4.7
Health	Relief International Health Center 2	Tent	13.49314	25.29467	Rectangular	White	3.5	2

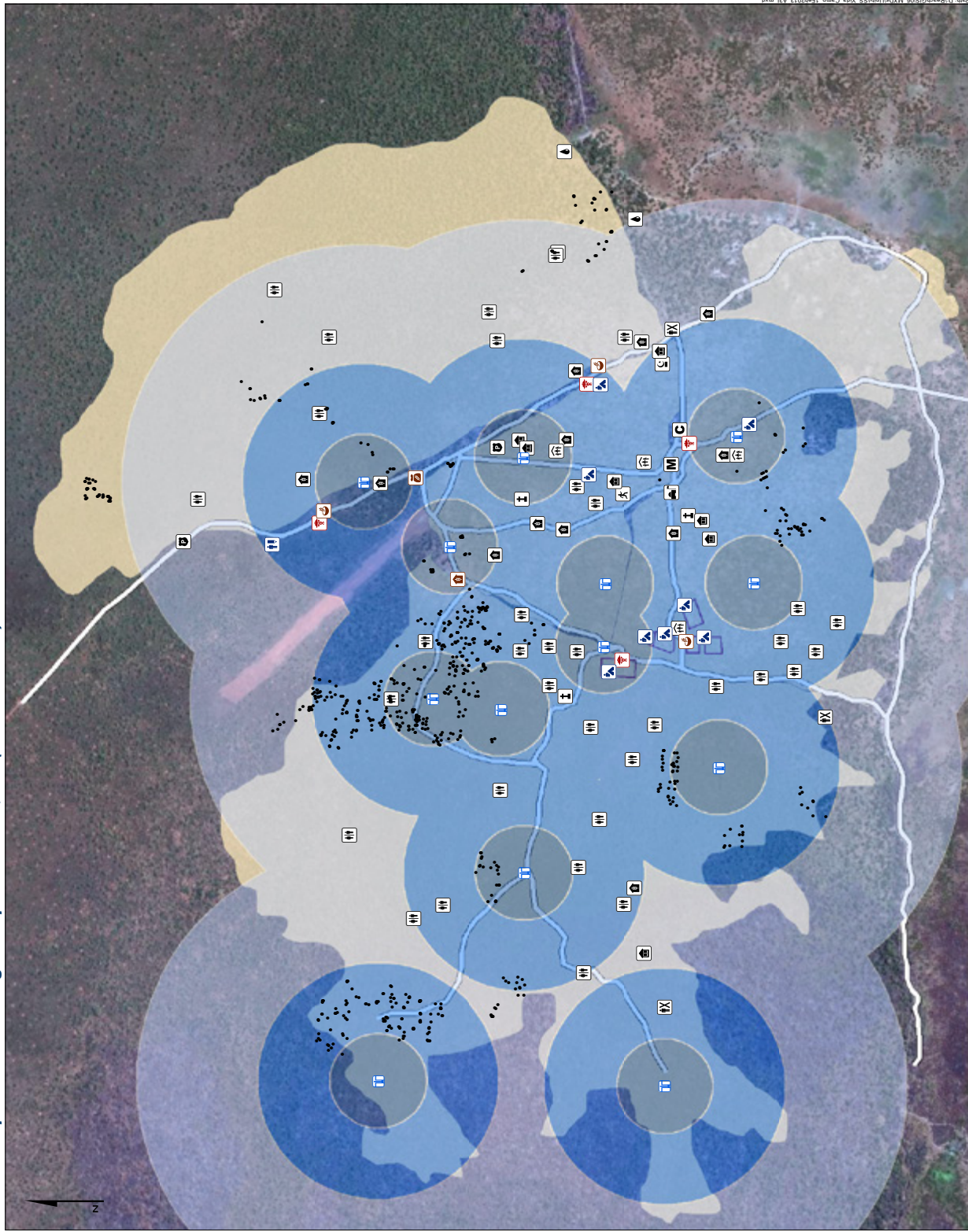
Dagahaley, Dadaab Camp, Kenya

Cluster	Description	Observable Object	Latitude	Longitude	Shape	Color	Length (meters)	Width (meters)
Agency-Use Structures	CARE Compound	Tent	0.1882	40.2981	Rectangular	Blue	9.5	8.5
Agency-Use Structures	CARE	Building	0.1883	40.2981	Rectangular	Grey	8.5	7.5
Agency-Use Structures	CARE	Tent	0.1883	40.2982	Rectangular	Blue	39.2	9.6
Agency-Use Structures	CARE	Tent	0.1881	40.2981	Rectangular	Grey	25.8	7.5
Agency-Use Structures	CARE	Tent	0.1883	40.2981	Rectangular	Beige	25.6	6.7
Agency-Use Structures	CARE	Building	0.1882	40.2981	Rectangular	Grey	9.7	6.6
Agency-Use Structures	CARE	Tent	0.1883	40.2981	Rectangular	Blue	25.7	10.5
Agency-Use Structures	CARE	Tent	0.1883	40.2982	Square	Blue	11.3	11.3
Agency-Use Structures	CARE	Building	0.1883	40.2981	Rectangular	Grey	14.9	5.3
Agency-Use Structures	CARE	Building	0.1881	40.2981	Rectangular	Grey	21.6	6.7
Agency-Use Structures	Windle Trust	Building	0.1861	40.2981	Rectangular	Grey	11	9.2
Agency-Use Structures	Windle Trust	Building	0.1861	40.2982	Rectangular	Grey	22.6	7.6
Agency-Use Structures	UNHCR Field Office	Caravan	0.1841	40.2942	Rectangular	White	6.7	4.5
Agency-Use Structures	UNHCR Field Office	Building	0.1842	40.2942	Rectangular	Grey	15.2	7.5
Agency-Use Structures	UNHCR Field Office	Tent	0.1841	40.2941	Rectangular	Blue	15.7	8.1
Agency-Use Structures	UNHCR Field Office	Building	0.1841	40.2943	Rectangular	Grey	16.6	5.7
Agency-Use Structures	UNHCR Field Office	Building	0.1843	40.2942	L-shaped	Grey	42.7	8
Agency-Use Structures	UNHCR Field Office	Building	0.1842	40.2941	Rectangular	Grey	13.2	6.3
Agency-Use Structures	UNHCR Transit Center	Building	0.1832	40.2942	Rectangular	Grey	19.7	5.8
Agency-Use Structures	UNHCR Transit Center	Tent	0.1832	40.2941	Rectangular	White	9.7	5.5
Agency-Use Structures	UNHCR Transit Center	Tent	0.1833	40.2942	Rectangular	Beige	22.8	9.1
Agency-Use Structures	UNHCR Transit Center	Building	0.1833	40.2941	Square	Grey	7	7
Shelter	Civilian Home	Building	0.1905	40.2909	Rectangular	Grey	4.6	4
Shelter	Civilian Home	Building	0.1905	40.2909	Rectangular	Grey	10	4.9
Shelter	Civilian Home	Building	0.1905	40.2909	Rectangular	Grey	6.9	4.8
Civilian	Mosque/Islamic School	Building	0.1882	40.2924	Rectangular	Grey	15.1	22.71
Civilian	Market	Buildings	0.1884	40.2955	Rectangular	Grey	n/a	n/a
Education	Illeys Primary School	Tent	0.1875	40.2831	Rectangular	White	15.8	6.2
Education	Illeys Primary School	Tent	0.1876	40.2831	Rectangular	White	22.6	7
Education	Illeys Primary School	Building	0.1874	40.2831	Rectangular	Grey	45.4	9.2
Education	Illeys Primary School	Building	0.1876	40.2831	Rectangular	Grey	60.4	7
Education	Illeys Primary School	Building	0.1876	40.2832	Rectangular	Grey	40.2	6.4
Education	Illeys Primary School	Building	0.1876	40.2831	Rectangular	Grey	10.8	5.5
Education	Community School	Tent	0.1816	40.2968	Rectangular	Grey	26.5	7.7
Education	Community School	Tent	0.1815	40.2967	Rectangular	Grey	17.4	7.7
Education	Community School	Tent	0.1814	40.2968	Rectangular	Beige	23.9	10.6
Education	Community School	Tent	0.1816	40.2966	Square	Grey	5.9	5.9
Education	Community School	Building	0.1815	40.2967	Rectangular	Grey	11.3	9
Education	Wathajir Primary School	Building	0.1811	40.2811	Rectangular	Blue	36.8	11.3
Education	Wathajir Primary School	Building	0.1812	40.2812	Rectangular	Blue	15.3	8

Dagahaley, Dadaab Camp, Kenya

Cluster	Description	Observable Object	Latitude	Longitude	Shape	Color	Length (meters)	Width (meters)
Education	Wathajir Primary School	Building	0.1812	40.2811	Rectangular	Grey	16.4	4.6
Food Security	Food Distribution Center	Tent	0.1864	40.2961	Rectangular	Beige	32.2	11.4
Food Security	Food Distribution Center	Tent	0.1863	40.2959	Rectangular	Beige	23.2	8
Food Security	Food Distribution Center	Tent	0.1865	40.2961	Rectangular	Blue	17.5	7.1
Food Security	Food Distribution Center	Building	0.1865	40.2959	Rectangular	Grey	10.2	6.3
Food Security	Food Distribution Center	Tent	0.1864	40.2961	Square	White	4.2	4.2
Food Security	Food Distribution Center	Building	0.1865	40.2962	Rectangular	Grey	29.5	17
Food Security	Food Distribution Center	Building	0.1865	40.2961	Rectangular	Grey	17.6	10.1
Food Security	Food Distribution Center	Building	0.1863	40.2962	Rectangular	Grey	34.2	10.1
Food Security	Food Distribution Center	Tent	0.1864	40.2962	Square	White	7.4	5.3
Food Security	Food Distribution Center	Building	0.1865	40.2962	Rectangular	Grey	21.9	8.9
Health	Cholera Outbreak Center	Tent	0.1861	40.2967	Rectangular	Beige	25.2	9.3
Health	Cholera Outbreak Center	Building	0.1859	40.2967	Rectangular	Grey	29.6	6.2
Health	Cholera Outbreak Center	Building	0.1861	40.2966	Rectangular	Grey	13.6	5.8
Health	Cholera Outbreak Center	Building	0.1862	40.2967	Rectangular	Grey	11.8	8.1
Health	Health Post (1)	Building	0.1866	40.2875	Rectangular	Grey	25.1	6.1
Health	Health Post (1)	Building	0.1861	40.2875	Rectangular	Grey	12.4	6.2

Appendix III: Maps Used For Analysis



Map Legend

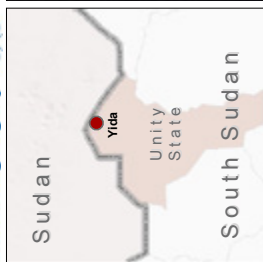
- Clinic
- MI
- Mosque
- Food Distribution
- Feeding Center
- Registration
- UNNGO Compound
- Warehouse
- Water Point
- Administration
- Cemetery
- Church
- Camp Council
- Latrine
- Market
- Community Meeting Area
- Stadium
- Camp Area
- Shelters - Jan. 2013
- Road

Data Sources: Vector Data - UNHCR / Samaritan's Purse
Satellite Imagery - Bing Maps
Contact: matthew.wence@unhcr.org

Map Scale for A3: 1:15,000
0 110 220 330 440 Meters

Note: Data, designations and boundaries contained on this map are not warranted to be error-free and do not imply acceptance by the REACH partners mentioned on this map.
This document has been produced with the financial assistance of UNHCR. The views expressed herein do not necessarily reflect those of UNHCR.

REACH *Joining more effective humanitarian action*



Map Legend

- Clinic
- Mill
- Food Distribution
- Mosque
- Feeding Center
- Hair/Wellend
- Police
- Registration
- School
- UNINGO Compound
- Stadium
- Warehouse
- Camp Area
- Water Point
- Administration
- Shelter
- Road
- Cemetery
- Church
- Community Meeting Area
- Camp Council
- Latrine
- Market

Data Sources: Water Points - UNHCR; Shelters, Police /
Subsistence ACTED; Satellite Imagery - Bing Maps
Coordinate System: GCS WGS 1984
Contact: mathew.werner@unhcr.org

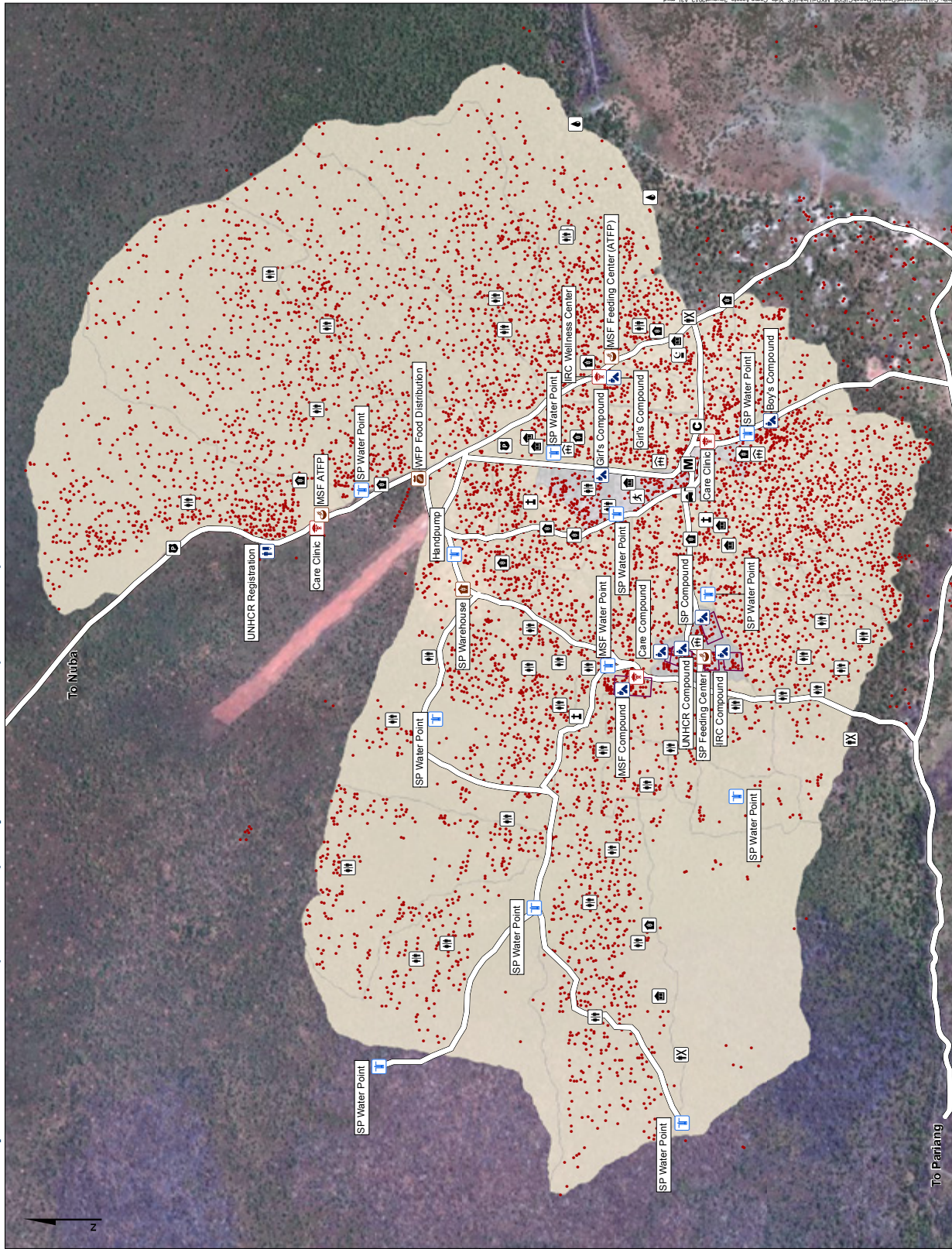
Map Scale for A3: 1:14,000



Note: Data, designations and boundaries combined on this map are not warranted to be error-free and do not imply responsibility by the UNHCR partners mentioned on this map.

This document has been produced with the financial assistance of UNHCR. The views expressed herein should not be taken, in any way, to reflect the official opinion of UNHCR.

REACH Reaching more effective humanitarian action



Path: C:\Users\werner\Documents\Map\Unity\Yida_Camp\Map\Map_28Nov12_A3.mxd

AI Zaatari Refugee Camp - General Infrastructure

Production Date: 09/04/2013
 Draft version - work in progress
 For Humanitarian Relief Purposes Only



Legend

Camp entrance

Roads

- Market road
- Asphalted road
- Main road
- Small road

WASH facilities

- WASH Centre: female
- WASH Centre: male
- Septic tank
- Elevated water tank
- Waterpoint
- Borehole or Pumping Station
- Mobile or Temporary Toilet

Garbage collection points

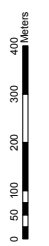
- Bin, 1m³
- Bin, 10m³

Camp facilities

- Shop
- Recreation Area
- Child Friendly Space or Play area
- Registration
- Offices
- Clinic / Health Facility
- Distribution Center
- Storage / Warehouse
- Common Space
- Mosque or Musallah
- Police
- School
- Kitchen

Facility status

- Under construction
- Damaged or unusable



Projection: WGS 1984 UTM Zone 37N
 Horizontal datum: WGS 1984
 Theme: Global ACTED/REACH - last update: March 2013
 Satellite imagery: ©2010-2013 by AeroMap Services / Spot Image
 Contact: reach.mpo@unicef.org
 Note: Data, designations and boundaries shown on the map are for informational purposes only. UNICEF is not responsible for the REACH partners, associates or donor information on the map.

A product of

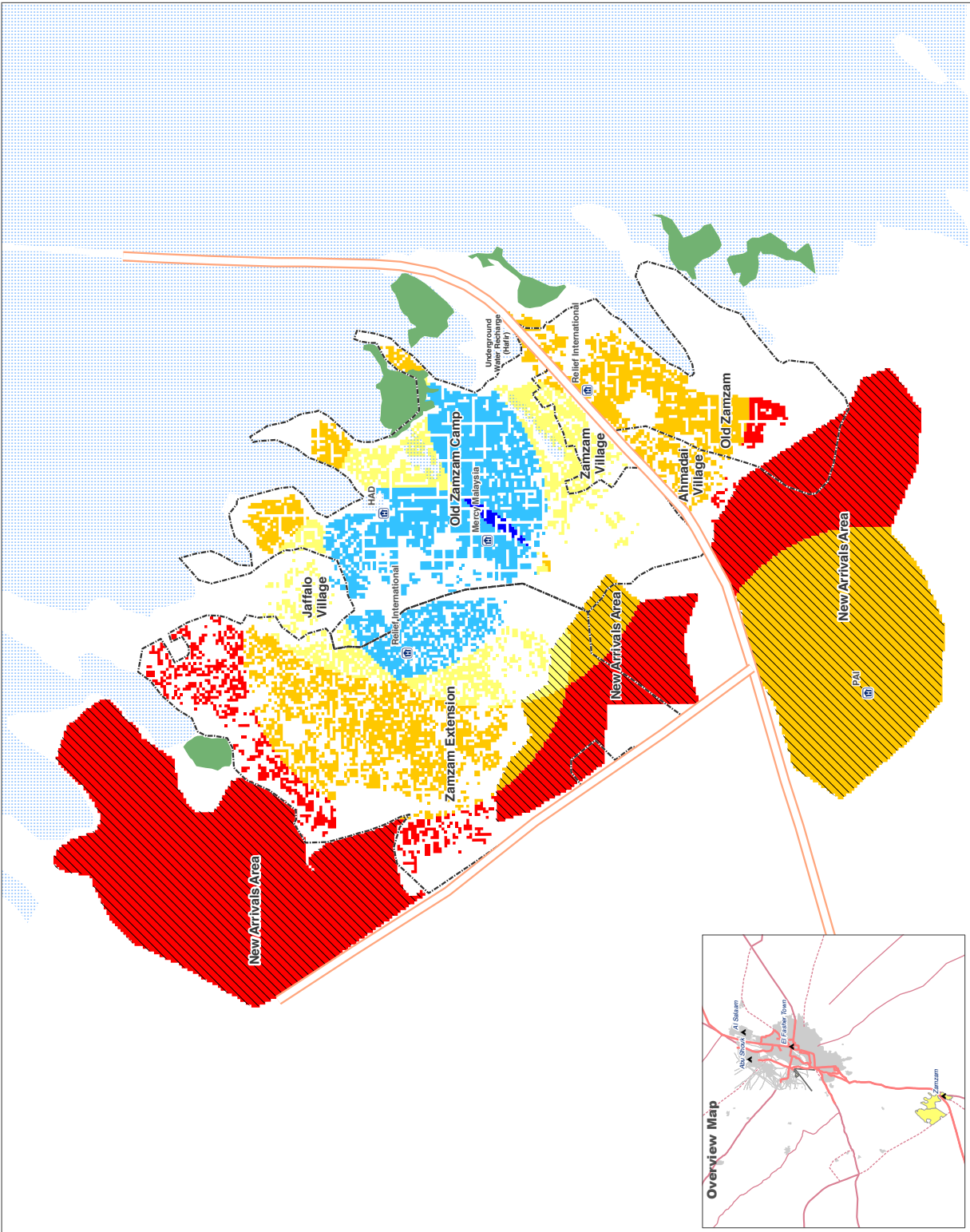
REACH REACHING EVERY CHILD

In partnership with

UNOSAT **IMPACT**



NORTH DARFUR, SUDAN: Zamzam IDP Camp - Health Centres Density per Squared Kilometer
16 June 2011



Legend

Health Centre

Health Centres Density per Squared Kilometer

0 (Red)
1 (Orange)
2 (Yellow)
3 (Light Blue)
4 (Dark Blue)

Land Use

New Arrivals Areas
Flood Prone Area
Wooded Area

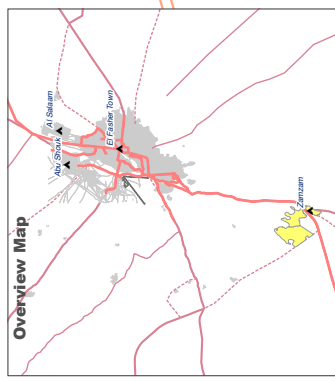
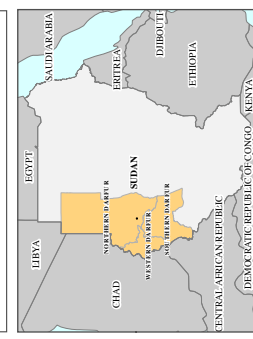
Camp Boundary
Main Roads

OCHA Sudan is funded by:
Common Humanitarian Fund (Denmark, Ireland, Netherlands, Norway, Spain, Sweden, DFID) Switzerland, ECHO, USAID/OFDA and Italy

Map Doc Name: SU-DAR-CAMP-02_AZ_110616_Northern_Darfur_Zamzam_Camp
Creation Date: 16 June 2011
Projection/Datum: Geographic / WGS 1984
Web Resources: <http://ochaonline.un.org/sudan>
Nominal Scale at A2 paper size: 1:22,000

Map jointly produced by CRMA/UNDP, OCHA and UNAMID GIS
Map data source(s): Camp data from UN agencies and INGOs. Land cover digitized from Quickbird image dated 16 Dec 10. Water points: UNICEF. Proposed extension layout - UNHCR

Disclaimer:
The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or its authorities, or concerning the delimitation of its frontiers or boundaries.



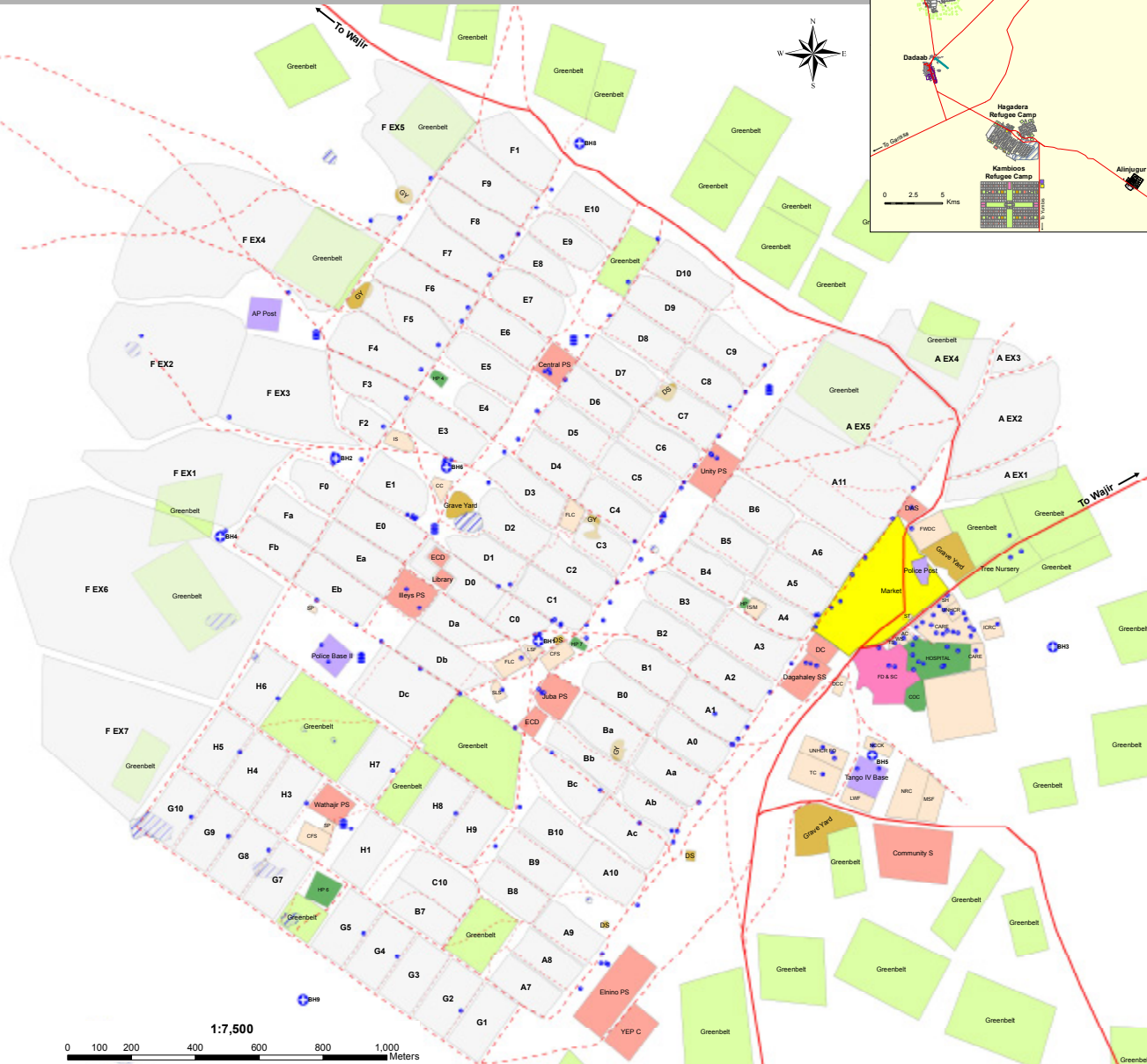
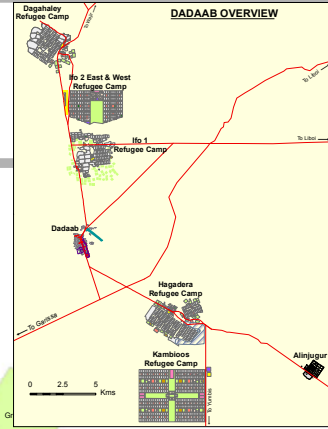
Kenya - Dadaab District

Dagahaley Refugee Camp Overview

As of June 2013



Geographic Information Systems unit
LWF/DWS-Dadaab
©2013
Sources: UNHCR, LWF/DWS-Dadaab
Datum: WGS 1984
Projection: UTM Zone 37
The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations



Services and Providers			
Core Relief Items 1. CARE 2. UNHCR	Education 1. AVSI 2. CARE 3. FilmAid 4. NRC 5. UNHCR 6. UNICEF 7. WTK	Community Services 1. LWF 2. CARE	Food 1. CARE 2. NRC 3. SCUK 4. WFP
HIV/AIDS 1. CARE 2. HI 3. NCKC 4. SCI 5. UNHCR 6. WTK	Livelihood 1. DRC	Gender Based Violence 1. CARE	Logistics 1. CARE 2. UNHCR
Registration 1. UNHCR	Shelter 1. NCKC 2. NRC	Nutrition 1. ADEO 2. UNHCR	Water & Sanitation 1. CARE 2. NRC 3. UNHCR
			Protection 1. CARE 2. DRC 3. LWF 4. NCKC 5. RCK 6. SCI 7. UNHCR

Key		
AC - Atlas Computers	FWDC - Fire Wood Distribution Centre	SLS - Slaughter Slab
CC - Community Centre	HP - Health Post	ST - Safaricom Tower
CFS - Child Friendly Space	GY - Grave Yard	SO - Satellite Office
COC - Cholera Outbreak Centre	IS/M - Islamic School/Mosque	SS - Secondary School
DAS - Dagahaley Adult School	LWF - Lutheran World Federation	TC - Transit Centre
DC - Disability Centre	NCKC - National Council of Churches in Kenya	TS - Tailoring School
DCC - Dagahaley Computer Centre	NRC - Norwegian Refugee Council	UNHCR - United Nations High Commissioner for Refugees
DS - Disposal Site	MSF - Medicines San Frontiers	WS - Welding Shed
FD & SC - Food Distribution & Centre	PS - Primary school	YEP C - Youth Education Pack Centre
FLC - Family Life Centre	SH - Social Hall	
FO - Field Office		

Population: 98,700 Persons
Camp size
1. Hectares - 820,9563
2. Kilometers Squared - 8.21

Legend	
Food	Main road
Blocks	Utility road
Health	Trails
Market	Water points
Security	Water Tanks
Boreholes	
Education	
Sanitation	
Environment	
Camp Facilities	
Flood Prone Areas	

Footnotes

- 1 “War’s Human Cost: UNHCR Global Trends 2013.” UNHCR, June 20, 2014, <http://www.unhcr.org/5399a14f9.html>, 2.
- 2 Einar Bjorgo, “Refugee Camp Mapping Using Very High Spatial Resolution Satellite Sensor Images.” *Geocarto International* 15:2 (2000), <http://www.geocarto.com.hk/cgi-bin/pages1/june00/refugee.pdf>.
- 3 “Update: IDP Camp Expansion in UNMISS Base, Juba Airport, South Sudan.” UNITAR, February 18, 2014, http://www.unitar.org/unosat/node/44/1939?utm_source=unosat-unitar&utm_medium=rss&utm_campaign=maps.
- 4 “Bossangoa IDP Camp Location, Ouham Province, Central African Republic.” UNITAR, December 14, 2013, http://www.unitar.org/unosat/node/44/1887?utm_source=unosat-unitar&utm_medium=rss&utm_campaign=maps.
- 5 “Al Azraq Refugee Camp, Az Zarqa Governorate, Jordan.” UNITAR, July 4, 2013, http://www.unitar.org/unosat/node/44/1770?utm_source=unosat-unitar&utm_medium=rss&utm_campaign=maps.
- 6 “Crowdsourcing Satellite Imagery Tagging to Support UNHCR in Somalia.” Standby Task Force, November 2, 2011, <http://blog.standbytaskforce.com/tag/analysis/>
- 7 “Janjaweed Torches South Darfur IDP Camp Next to UNAMID Base,” The Enough Project, March 28, 2014, <http://enoughproject.org/blogs/janjaweed-torches-south-darfur-idp-camp-next-unamid-base>
- 8 Ziad Al Achkar, Isaac L. Baker, and Brittany L. Card, “Sharing Space: Adapting Military Approaches to Geospatial Analysis for Humanitarian Response and the Documentation of Human Rights Abuses.” Program on Humanitarian Policy and Conflict Research, Harvard School of Public Health, June 2013, http://www.hpcrr-research.org/sites/default/files/publications/2%20Sharing%20Space_HHI_Final_a%20copy_0.pdf.
- 9 “Cluster Coordination.” OCHA, <http://www.unocha.org/what-we-do/coordination-tools/cluster-coordination>.
- 10 “The Sphere Project: Humanitarian Charter and Minimum Standards in Humanitarian Response.” <http://www.sphereproject.org/>
- 11 Ashbindu Singh (1989), “Digital change detection techniques using remotely-sensed data.” *International Journal of Remote Sensing*.” 10:6, <http://www.tandfonline.com/doi/pdf/10.1080/01431168908903939>
- 12 Dr. Patrick Kroker, “Emerging Issues Facing the Use of Remote Sensing Evidence for International Criminal Justice.” Harvard Humanitarian Initiative, December 2014, <http://hhi.harvard.edu/sites/default/files/publications/Emerging%20Issues%20RS%20and%20IJ%20Kroker.pdf>
- 13 “Tents: A guide to the use and logistics of family tents in humanitarian relief.” United Nations Office for the Coordination of Humanitarian Affairs, 2004, <http://www.humanitarianresponse.info/system/files/documents/files/A%20guide%20to%20the%20use%20and%20logistics%20of%20family%20tents.pdf>, 11-12.
- 14 “Cluster Coordination.”
- 15 “South Sudan Situation: Information Sharing Portal.” UNHCR, <http://data.unhcr.org/SouthSudan/settlement.php?id=34&country=251®ion=26>.
- 16 Ibid.

- 17 “Syria Regional Refugee Response: Inter-agency Information Sharing Portal.” UNHCR, <http://data.unhcr.org/syrianrefugees/settlement.php?id=176®ion=77&country=107>.
- 18 Ibid.
- 19 Ian Timberlake, “‘Insecurity’ prevents UN, EU mission to Darfur camp.” Agence France-Presse, April 10, 2014, <http://reliefweb.int/report/sudan/insecurity-prevents-un-eu-mission-darfur-camp>.
- 20 “Sudan: Zamzam IDP Camp Profile.” OCHA, May 9, 2013, http://reliefweb.int/sites/reliefweb.int/files/resources/sud13_North%20Darfur_Zamzam%20IDP%20Camp%20Profile_a3_09may13.pdf.
- 21 “Refugees in the Horn of Africa, Somali Displacement Crisis: Information Sharing Portal.” UNHCR, <http://data.unhcr.org/horn-of-africa/settlement.php?id=10&country=110®ion=3>.
- 22 Ibid.
- 23 “Global Shelter Cluster.” Global Shelter Cluster, <https://www.sheltercluster.org/Global/Pages/default.aspx>.
- 24 REACH, “Yida Refugee Camp Social Profile,” South Sudan Series, November 2012.
- 25 Taylor Luck, “Zaatari refugee camp set for upgrade from tents to trailers.” The Jordan Times, August 8, 2012, <http://jordantimes.com/zaatari-refugee-camp-set-for-upgrade-from-tents-to-trailers>.
- 26 Alison Ledwith, “Zaatari: The Instant City.” Affordable Housing Institute, 2014, <http://www.affordable-housinginstitute.org/wp-content/uploads/2014/08/AHI-Publication-Zaatari-The-Instant-City-PDF-140829.pdf>, 24.
- 27 Margie Buchanan-Smith and Dr Abduljabbar Abdulla Fadul, “Adaptation and Devastation: The Impact of the Conflict on Trade and Markets in Darfur.” Feinstein International Center, June 2008, <http://www.cmi.no/file/TradeandmarketsinDarfur.pdf>, 51.
- 28 “Building Opportunities and Livelihoods in Darfur.” CHF International, Inc., September 15, 2004, http://pdf.usaid.gov/pdf_docs/Pdacf518.pdf, 5.
- 29 “‘Insecurity’ prevents UN, EU mission to Darfur camp.”
- 30 Mitchell Sipus, “Housing and Displacement: An Evaluation of Sphere Minimum Standards for Shelter Planning Within a Protracted Refugee Settlement.” August 2008, <http://www.slideshare.net/msipus/sphere-housing-standards-in-dadaab-refugee-camp-2794380>
- 31 “Dadaab refugees: An uncertain tomorrow.” Medecins Sans Frontieres, March 2014, <http://www.msf.org/sites/msf.org/files/bp-dadaab-march-2014-low.pdf>.
- 32 “The Human Cost of the Funding Shortfalls for the Dadaab Refugee Camps.” CARE, September 20, 2012, <http://www.care.org/emergencies/dadaab-refugee-camp-kenya/human-costs-funding-shortfalls-dadaab-refugee-camps>.
- 33 “Qiblah.” <http://islam.about.com/od/prayer/g/qiblah.htm>.
- 34 “Fire Destroys Center of Yida Market.” Nuba Reports, March 14, 2014, <http://nubareports.org/fire-destroys-center-of-yida-market/>.
- 35 “Zaatari: The Instant City.”

- 36 Howard Johnson, "Syria crisis: Economy of Jordan's Za'atari refugee camp." BBC News, August 11, 2013, <http://www.bbc.com/news/business-23661065>.
- 37 "Shops destroyed in Zamzam camp market fire, North Darfur." Radio Dabanga, January 20, 2014, <https://www.radiodabanga.org/node/64725>.
- 38 "Inside an internally displaced persons camp: Focus on Darfur." Plan Canada, <http://plancanada.ca/inside-an-internally-displaced-persons-camp>.
- 39 "Shops destroyed in Zamzam camp market fire, North Darfur."
- 40 "'Abu Tira' ravage part of Zamzam camp in North Darfur." Radio Dabanga, October 21, 2014, <https://www.radiodabanga.org/node/82301>.
- 41 "KENYA: Dadaab fire highlights emergency preparedness gap." IRIN News, July 31, 2012, <http://www.irinnews.org/report/95989/kenya-dadaab-fire-highlights-emergency-preparedness-gap>.
- 42 "Who we are." Global Education Cluster, <http://educationcluster.net/who-we-are/>.
- 43 "Sudan: Zam Zam IDP Camp Profile."
- 44 Hashemite Kingdom of Jordan, UNHCR, UNICEF, et al., "Joint Jordan-UN Appeal." October 2012, <http://reliefweb.int/sites/reliefweb.int/files/resources/jounappeal2012.pdf>.
- 45 "About FSC." Food Security Cluster, <http://foodsecuritycluster.net/about>.
- 46 "Yida Refugee Camp Relief," Samaritan's Purse, <http://www.samaritanspurse.org/article/yida-refugee-camp-relief-update/>.
- 47 "About the Global Health Cluster." World Health Organization, http://www.who.int/hac/global_health_cluster/about/en/.
- 48 "Global Logistics Cluster." Logistics Cluster, <http://www.logcluster.org/ops/global-logistics-cluster>.
- 49 "WASH Cluster." WASH Cluster, <http://washcluster.net/>.
- 50 "Water Network studies for Zaatari Camp." Zaatari Water Network Technical Working Group, May 8, 2014, <https://data.unhcr.org/syrianrefugees/download.php?id=5536>.
- 51 Interview with Amin Salameh of IOM, July 2014