Satellite Imagery Interpretation Guide

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 Wolfinbarger, American Association for the Advancement of Science

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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.
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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.
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACTED</td>
<td>Agency for Technical Cooperation and Development</td>
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<td>AVSI</td>
<td>Association of Volunteers in International Service</td>
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<td>CARE</td>
<td>Cooperative for Assistance and Relief Everywhere</td>
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<td>DRC</td>
<td>Danish Refugee Council</td>
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<td>DWS</td>
<td>Department for World Service - Lutheran World Federation</td>
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<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<td>FCA</td>
<td>Finn Church Aid</td>
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<td>GIZ</td>
<td>Deutsche Gesellschaft fur Internationale Zusammenarbeit</td>
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<td>HAD</td>
<td>Humanitarian Aid &amp; Development</td>
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<td>HHI</td>
<td>Harvard Humanitarian Initiative</td>
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<td>HI</td>
<td>Handicap International/Atlas Logistics</td>
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<td>IDP</td>
<td>Internally Displaced Persons</td>
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<td>IFRC</td>
<td>International Federation of the Red Cross and Red Crescent Societies</td>
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<td>IOM</td>
<td>International Organization for Migration</td>
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<td>International Medical Corps</td>
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<td>International Rescue Committee</td>
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<td>IRD</td>
<td>Internaitonal Relief and Development</td>
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<td>JEN</td>
<td>Japan Emergency NGO</td>
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<td>Jordan Health Aid Society</td>
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<td>LWF</td>
<td>Lutheran World Federation</td>
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<td>MSF</td>
<td>Médecins Sans Frontières</td>
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<td>National Council of Churches of Kenya</td>
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<td>NHF</td>
<td>Noor Al Hussein Foundation</td>
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<td>NP</td>
<td>Nonviolent Peaceforce</td>
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<td>RCK</td>
<td>Refugee Consortium of Kenya</td>
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<td>RI</td>
<td>Relief International</td>
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<td>SC</td>
<td>Save the Children</td>
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<td>SMoH</td>
<td>State Ministry of Health</td>
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<td>SP</td>
<td>Samaritan’s Purse</td>
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<td>SPHO</td>
<td>Sudan Peace Humanitarian Organization</td>
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<td>SRCS</td>
<td>Sudanese Red Crescent Society</td>
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<td>UNOCHA</td>
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<td>United Nations Population Fund</td>
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<td>UNHCR</td>
<td>United Nations High Commissioner for Refugees</td>
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<td>United Nations High Commissioner for Refugees Logistics Coordination Unit</td>
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<td>UNOCHA</td>
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<td>United Nations Office for Project Services</td>
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<td>United Nations Volunteers</td>
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<td>UNWOMEN</td>
<td>United Nations Women</td>
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<td>VTO</td>
<td>Voluntary Technical Organization</td>
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<td>WASH</td>
<td>Water, Sanitation, and Hygiene</td>
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<tr>
<td>WES</td>
<td>Water, Environmental, and Sanitation</td>
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<td>WFP</td>
<td>World Food Programme</td>
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<td>World Health Organization</td>
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<td>Windle Trust Kenya</td>
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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](http://www.skybox.com/hhi-displaced-population-camps). This imagery is published by Google under Creative Commons by Attribution (CC 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 are 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. 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.\textsuperscript{12}

\textbf{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.\textsuperscript{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.

\textbf{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 prefabricated 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. 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

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.\(^\text{15}\) 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.\(^\text{16}\) 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

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

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

**Agencies Operational at Zam Zam Camp**

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

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.
Zam Zam Camp Overview

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, 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. 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. 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**

<table>
<thead>
<tr>
<th>Lead Agency</th>
<th>UNHCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Protection</td>
<td>SCUK</td>
</tr>
<tr>
<td>Community Services</td>
<td>CARE, LWF, UNV</td>
</tr>
<tr>
<td>Core Relief Items</td>
<td>CARE, GIZ, UNHCR</td>
</tr>
<tr>
<td>Education</td>
<td>AVSI, DRC, FilmAid, LWF, NRC, UNHCR, WTK</td>
</tr>
<tr>
<td>Food</td>
<td>CARE, NRC, SCUK, WFP</td>
</tr>
<tr>
<td>Gender-Based Violence</td>
<td>IRC</td>
</tr>
<tr>
<td>Health</td>
<td>FilmAid, DRC, NCCK, UNHCR, UNV</td>
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<tr>
<td>HIV/AIDS</td>
<td>CARE, FilmAid, HI, NCCK, SCUK, UNHCR, WTK</td>
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<tr>
<td>Logistics</td>
<td>CARE, GIZ, UNHCR</td>
</tr>
<tr>
<td>Nutrition</td>
<td>UNHCR</td>
</tr>
<tr>
<td>Protection</td>
<td>DRC, FilmAid, LWF, NCCK, RCK, SCUK, UNHCR</td>
</tr>
<tr>
<td>Registration</td>
<td>UNHCR</td>
</tr>
<tr>
<td>Water and Sanitation</td>
<td>CARE, NRC, UNHCR</td>
</tr>
</tbody>
</table>
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. Often, a sunshade is placed over the rakuba to help provide covered shelter. 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.

**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.

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. 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.

**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, Zaataari, 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. 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

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 4-4

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. 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.

Figure 4-5

Market

16 March 2014
Yida Camp, South Sudan
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
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.\textsuperscript{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.\textsuperscript{36}
Zam Zam Camp

Displaced Persons Shelters
17 July 2014
Zam Zam Camp, Sudan

1) Tukul
Shape: Circular
Color: Brown
Dimensions: 4.6 m x 4.6 m

2) Tent
Shape: Square
Color: Brown
Dimensions: 3.9 m x 3.9 m

3) Tent
Shape: Rectangular
Color: White
Dimensions: 4.3 m x 2.5 m

4) Tent
Shape: Rectangular
Color: Beige
Dimensions: 5.9 m x 3.5 m

5) Tent
Shape: Rectangular
Color: Blue
Dimensions: 4.2 m x 3.4 m

Figure 4-11
Zam Zam Camp, Sudan
June 2014
Photo credit: UNAMID/ Albert Gonzalez Farran

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
In Zam Zam Camp, the market is comprised of more than a thousand shops and fifty sun shelters. 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. Unfortunately, the market, as in other camps, such as Yida, is at risk for incidental fires. 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, a paramilitary force active in Darfur and other parts of Sudan.
Dagahaley, Dadaab Camp

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

Dadaab Camp, Kenya
May 2010
Photo credit: EC/ ECHO/ Daniel Dickinson

Figure 4-16

Figure 4-17

Figure 4-18
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.
Bahraini School
31 January 2014
Zaatari Camp, Jordan

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

Saudi School
31 January 2014
Zaatari Camp, Jordan

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

American School
31 January 2014
Zaatari Camp, Jordan

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

School 1
17 July 2014
Zam Zam Camp, Sudan

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

School 2
17 July 2014
Zam Zam Camp, Sudan

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

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

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

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
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 Zaatar 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

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

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

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

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

9) Building  
Shape: Rectangular  
Color: Grey  
Dimensions: 8.9 m x 5.4 m
**Dagahaley, Dadaab Camp**

**Figure 6-4**

**Food Distribution Center**

21 February 2014
Dagahaley, Dadaab Camp, Kenya

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

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

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

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

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

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

---

**Communal Kitchens**

31 January 2014
Zaatari Camp, Jordan

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

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

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

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
**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

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

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

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 Za’atari 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 Za’atari, 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

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

- **Borehole**
  - 24 June 2014
  - Yida Camp, South Sudan

  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
Figure 9-3

Borehole 1
21 February 2014
Dagahaley, Dadaab Camp, Kenya

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
21 February 2014
Dagahaley, Dadaab Camp, Kenya

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 Zaatar 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

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

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

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

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

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.

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.
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

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.

Windle Trust Compound
21 February 2014
Dagahaley, Dadaab Camp, Kenya

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

6) Building
Shape: Square
Color: Grey
Dimensions: 5.8 m x 5.8 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
The CARE compound, enclosed by a 700 m perimeter wall or fence, is comprised of both and buildings and tents.

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

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

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

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

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

**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**

**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**

**Administration Police**
21 February 2014
Dagahaley, Dadaab Camp, Kenya

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

**Police Base**
21 February 2014
Dagahaley, Dadaab Camp, Kenya

1) Tent
Shape: Rectangular
Color: Blue
Dimensions: 37.7 m x 8.5 m

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

3) Building
Shape: Square
Color: Grey
Dimensions: 5.3 m x 5.3 m

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

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

2) Building
Shape: Rectangular
Color: Grey
Dimensions: 16.6 m x 6.7 m

3) Building
Shape: Rectangular
Color: Grey
Dimensions: 16.6 m x 6.7 m

4) Building
Shape: Square
Color: Grey
Dimensions: 5.3 m x 5.3 m
"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 were 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:
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.

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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.
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Appendix III: Maps Used For Analysis
Zamzam IDP camp is located about 14 km south of El Fasher town. The camp was opened in August 2004 and since then it has been receiving new IDPs from different locations even from other Darfur states. It currently has an estimated population of 164,000. This figure is based on information from UN agencies and NGOs working in Zamzam. This figure is subject to change as more information becomes available.

**Who is Doing What in Zamzam?**

**WASH**
Presently, in the camp 4 water sources are available. As per the rapid assessment presently 19 liters water is provided to per capita in a day and one latrine is used by 18 persons.

**Water sources in the camp**

- Camp A: 1
- Camp B: 3
- Camp C: 7
- Camp D: 10

**Food**
GPD take place every 2 months with two months food provided to the IDPs. Simultaneously 17 basic schools are supported with food for education.

**NFI&ES**
Jerri cans, plastic sheets, cooking sets and plastic mats have been provided to new arrivals (10,025 people) and households affected by disaster and fire (235 people), since January 2013.

**Tribes living in the camp**

- Fur: 10%
- Dar: 10%

**Education**
In basic schools one teacher is used by 105 students per day. 12 schools are without water facility. 10 schools do not benefit from school feeding program.

**Number of schools and enrolment**

- Secondary: 1
  - 1,100
- Primary: 41
  - Child Friendly Space: 1
  - Classroom: 7,923
- Vocational: 26
  - No. of schools = 18,562

**Health**
There are 5 clinics operating in the camp and one ambulance for emergency referral to El-Fasher hospital.

**No. of clinics and daily consultations range**

- Camp B: 265
- Camp C: 20
- Camp D: 80

*Source*: Camp data UN agencies, NGOs working in the camp. Land cover [digitized from Quickbird image dated 16 Dec 10].

*Feedback*: ocha-feedback@un.org www.unocha.org/sudan www.reliefweb.int

*Disclaimer*: This map does not classify or provide information on the status of displaced persons' movements or return. This map is not official or recognized as acceptable by the United Nations.
Footnotes


14 “Cluster Coordination.”


16 Ibid.

18 Ibid.


22 Ibid.


29 “‘Insecurity’ prevents UN, EU mission to Darfur camp.”


35 “Zaatari: The Instant City.”


39 “Shops destroyed in Zamzam camp market fire, North Darfur.”


42 “Who we are.” Global Education Cluster, http://educationcluster.net/who-we-are/.

43 “Sudan: Zam Zam IDP Camp Profile.”


51 Interview with Amin Salameh of IOM, July 2014