



Global Heritage Network



Satellite Imagery Briefing: Monitoring Endangered Cultural Heritage Sites

Early Warning and Threat Monitoring System for
Cultural Heritage Sites in the Developing World



Endangered Global Heritage Sites: 2011 Examples

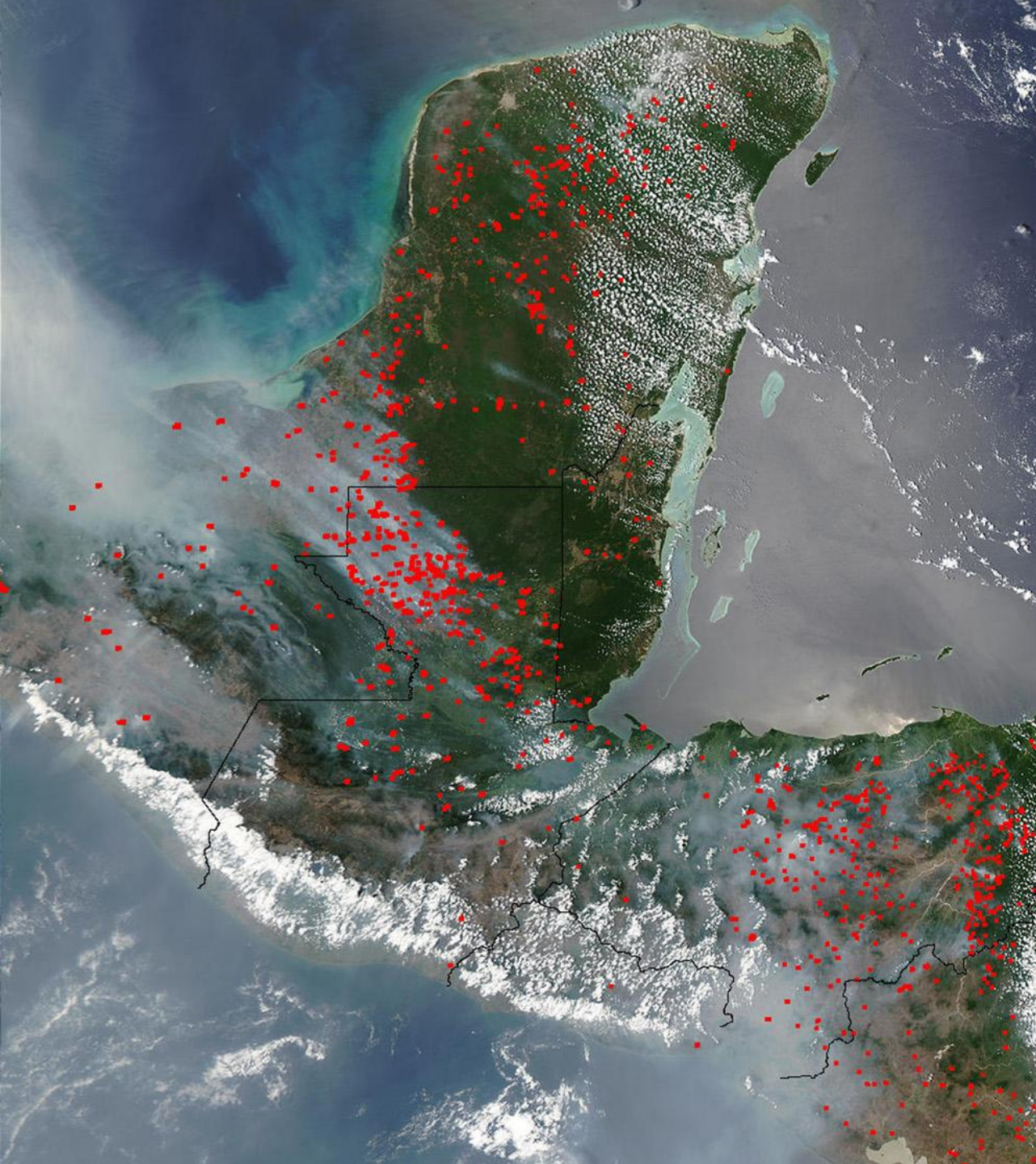


- A. **Mirador, Guatemala** – Development Pressures
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- C. **Nineveh, Iraq** – Development Pressures
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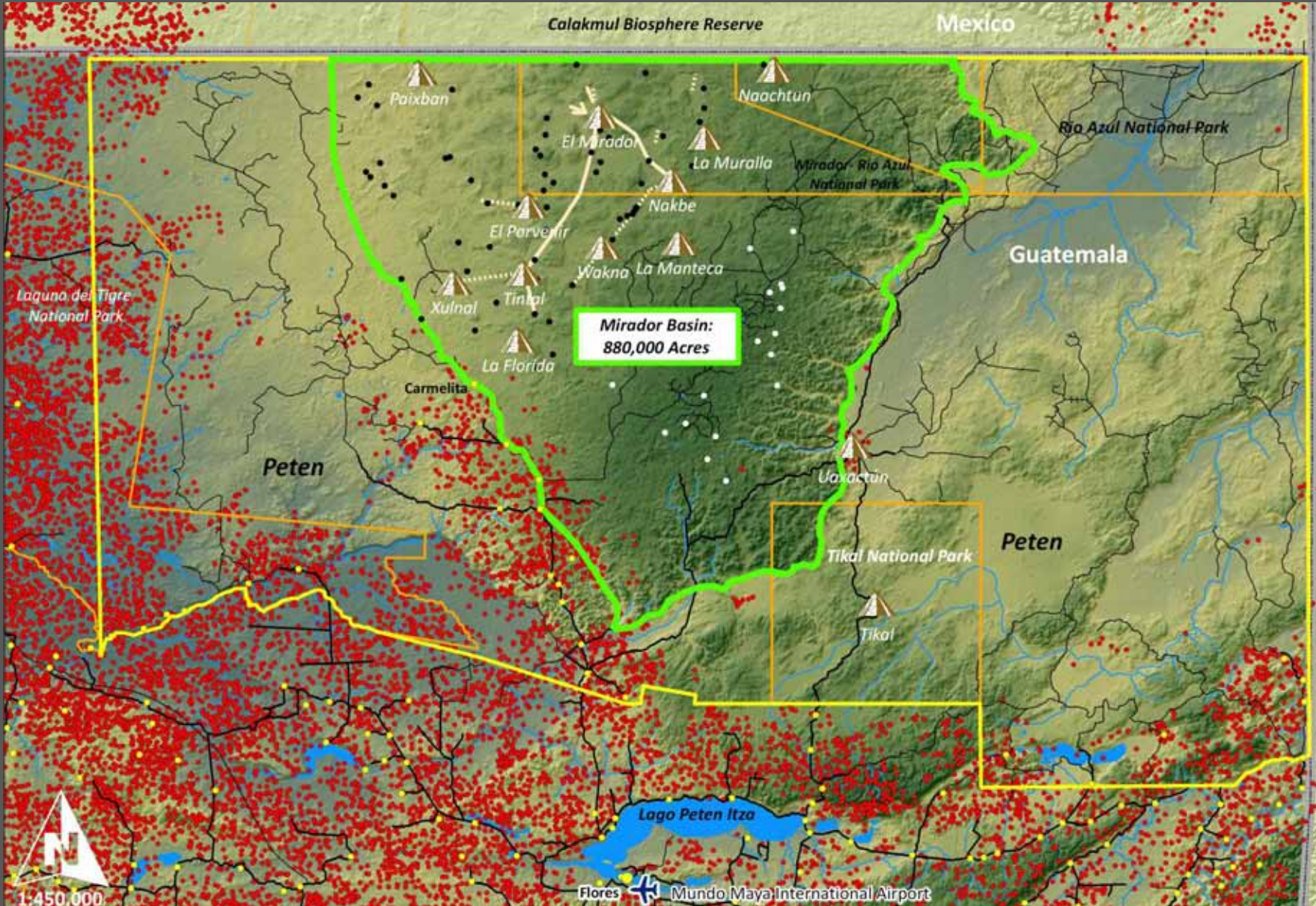
Mirador, Guatemala – Development Pressures

As seen in this satellite image, destructive fires are a major threat to the Mirador Basin. Drug trafficking profits are fueling a massive ranching industry which requires large areas of jungle to be cleared and has virtually destroyed the Maya Biosphere (Natural & Cultural Heritage) within the past five years in northern Guatemala.



Mirador, Guatemala – Development Pressures

Forest is also cleared for agricultural purposes, generally in a slash-and-burn practice that employs fire to clear the land. This practice has been so extensive, though, that the intensity of the fires and the resulting smoke has closed down schools as far north as Houston, Texas, in 2003 and 2004.



Mirador, Guatemala – Development Pressures

Below, a helicopter view of a forest frontier being burned via the technique of slash and burn agriculture.



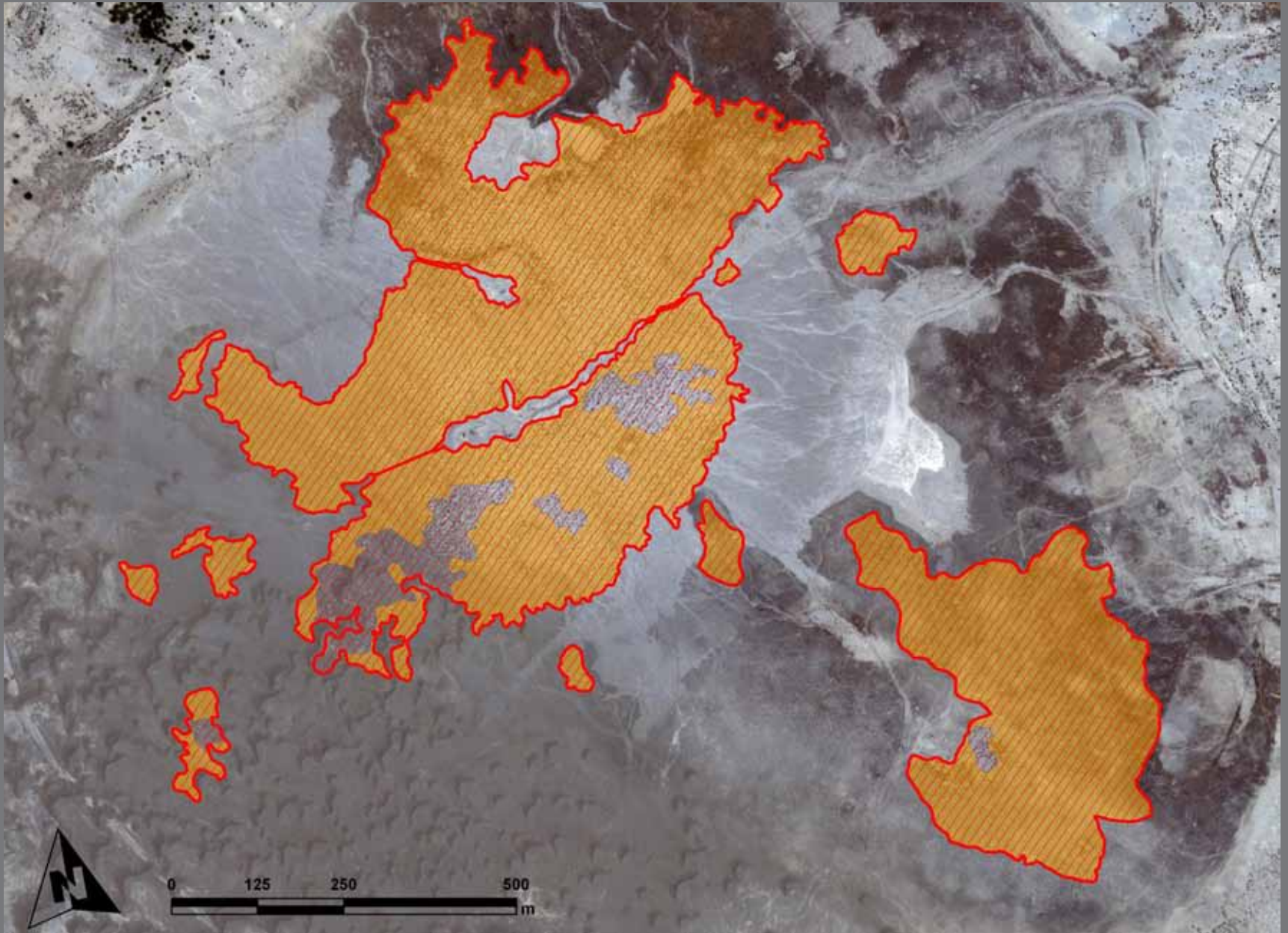
Umma (Tell Jokha), Iraq – Looting

High-resolution DigitalGlobe satellite imagery from February 2003 of the ancient archaeological site of Umma, before the Iraq War started (at left). Only scattered looting is evident. The same view from 2010 (at right), devastated by massive looting.



Umma (Tell Jokha), Iraq – Looting

All looting at Umma was mapped and it was found that the total calculated looted area = 1.12 sq km. Orange areas are those areas that were looted between 2003 and 2010, while the red hashed areas are total areas looted (+ looted areas before 2003).



Umma (Tell Jokha), Iraq – Looting

A vast expanse of crater-like looters trenches is visible in this oblique aerial photograph.



Nineveh, Iraq

— Development Pressures

Residential development has covered a huge swath of the ancient city of Nineveh, whose walls are visible in orange to the left. Red polygons are areas of new urban development between 2005 and 2010.



Nineveh, Iraq

– Development Pressures

Expansion of new residential areas threatens to cover the southern portion of the city (now used for agriculture) unless action is taken.

Cultivation occurs on over 60% of land inside ancient walls of Nineveh (shown here in green)

Data derived from the high-resolution satellite images is immensely helpful for understanding the threats to cultural heritage sites such as Nineveh as well as to their effective and long term management.

Legend

-  Core Area
-  Ancient Features
-  Modern Features
-  Agriculture
-  Water



Nineveh, Iraq – Development Pressures

Cultivation occurs on over 60% of the land inside the ancient walls of Nineveh. Below, an inappropriately reconstructed gate during the Saddam Hussein era.



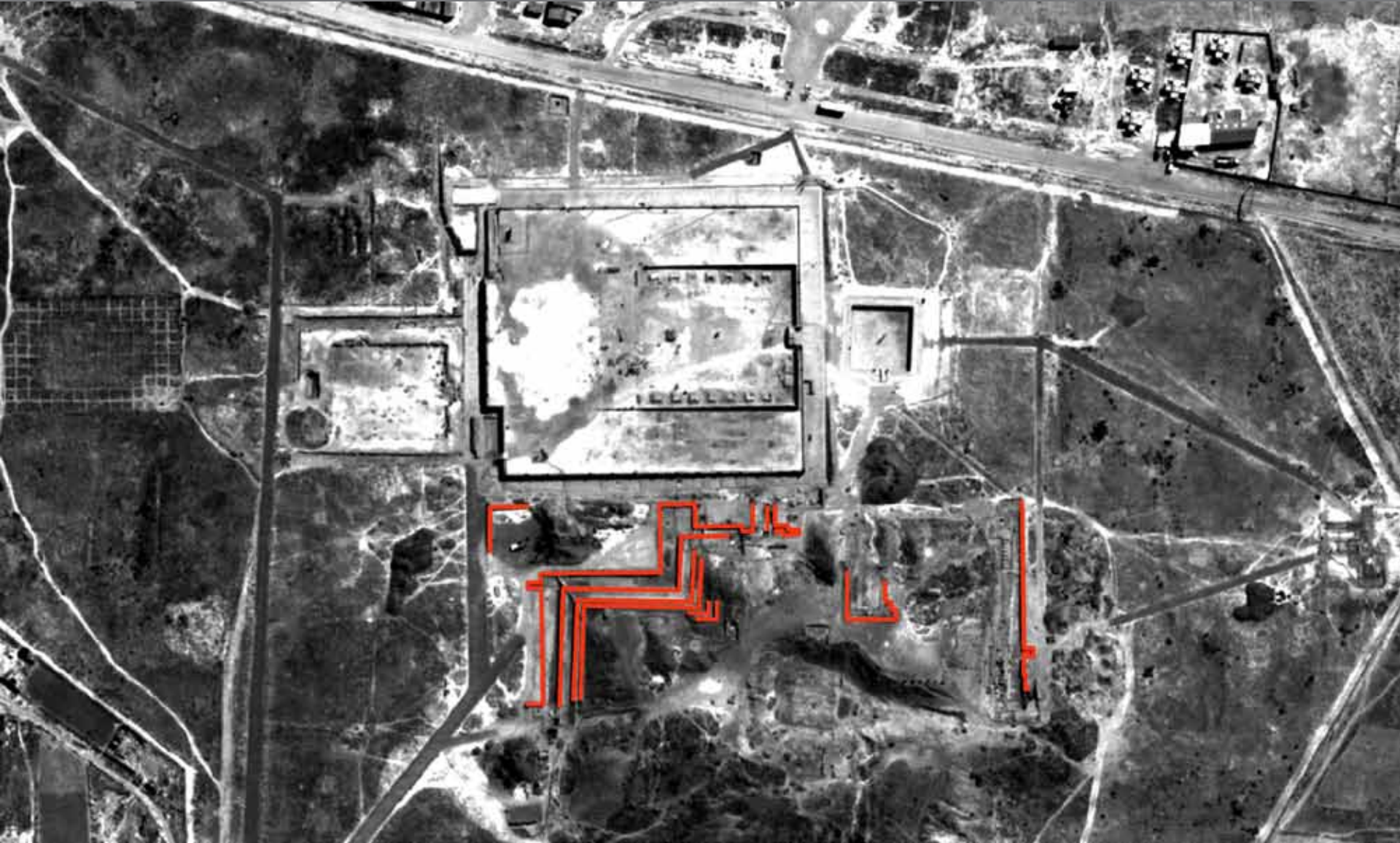
Tiwanaku, Bolivia – Inappropriate Restoration

Inauthentic restoration techniques have threatened the World Heritage status of this significant heritage site. Below, the site in 2003 **BEFORE** the reconstruction of ancient pyramid walls.



Tiwanaku, Bolivia – Inappropriate Restoration

Inauthentic restoration techniques have marred the World Heritage status of this world-class heritage site. Below, the site in 2008 **AFTER** inappropriate reconstruction of walls.



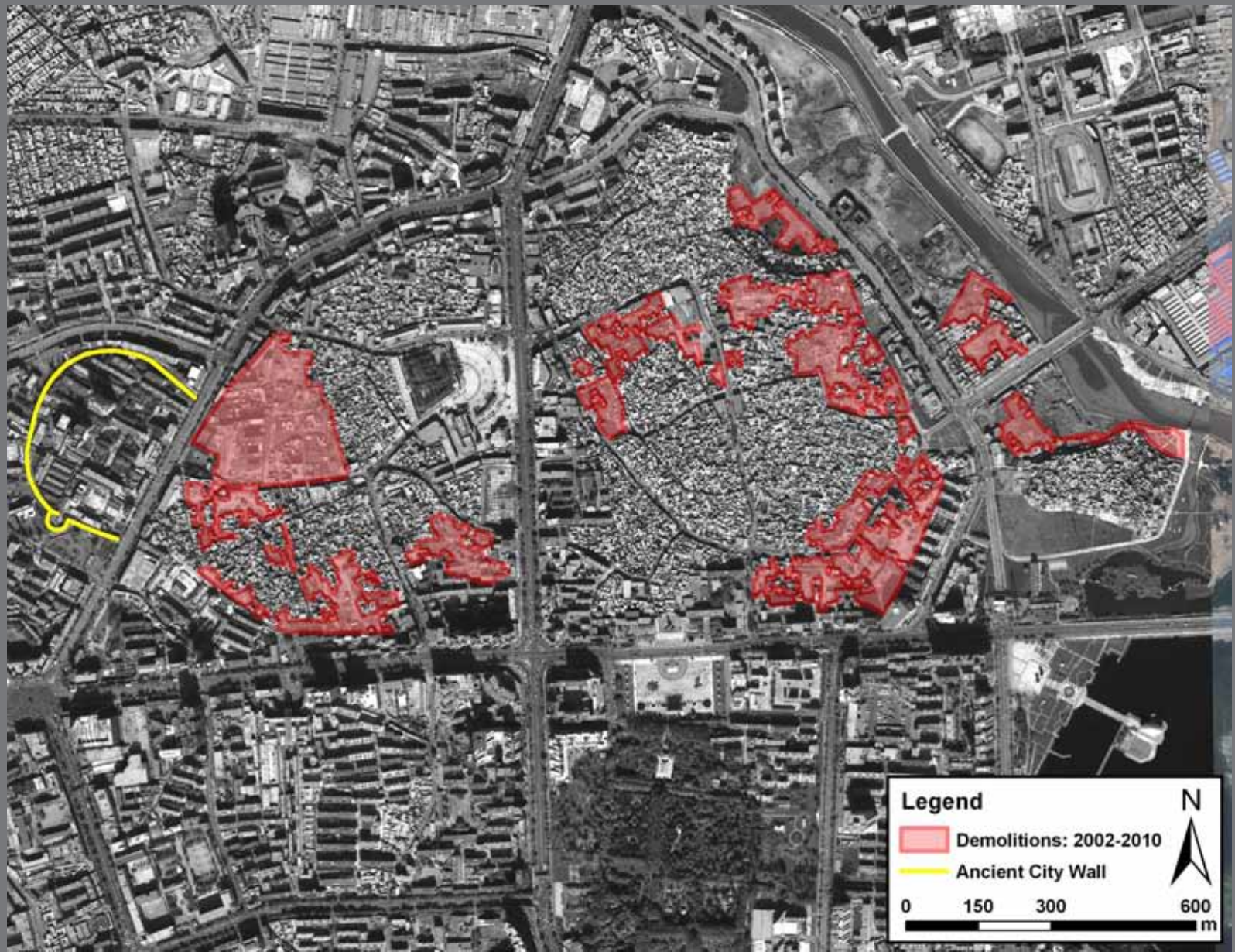
Tiwanaku, Bolivia – Inappropriate Restoration

Below, the reconstructed walls. The Bolivian government was responsible for the reconstruction, and UNESCO has threatened to remove Tiwanaku's World Heritage status as a result. To date, this has not occurred.



Kashgar Old Town, China – Development Pressures

As viewed in this high-resolution DigitalGlobe image from October 2010, significant portions of the old town of Kashgar have been demolished to make way for modern development.



Kashgar Old Town, China – Development Pressures

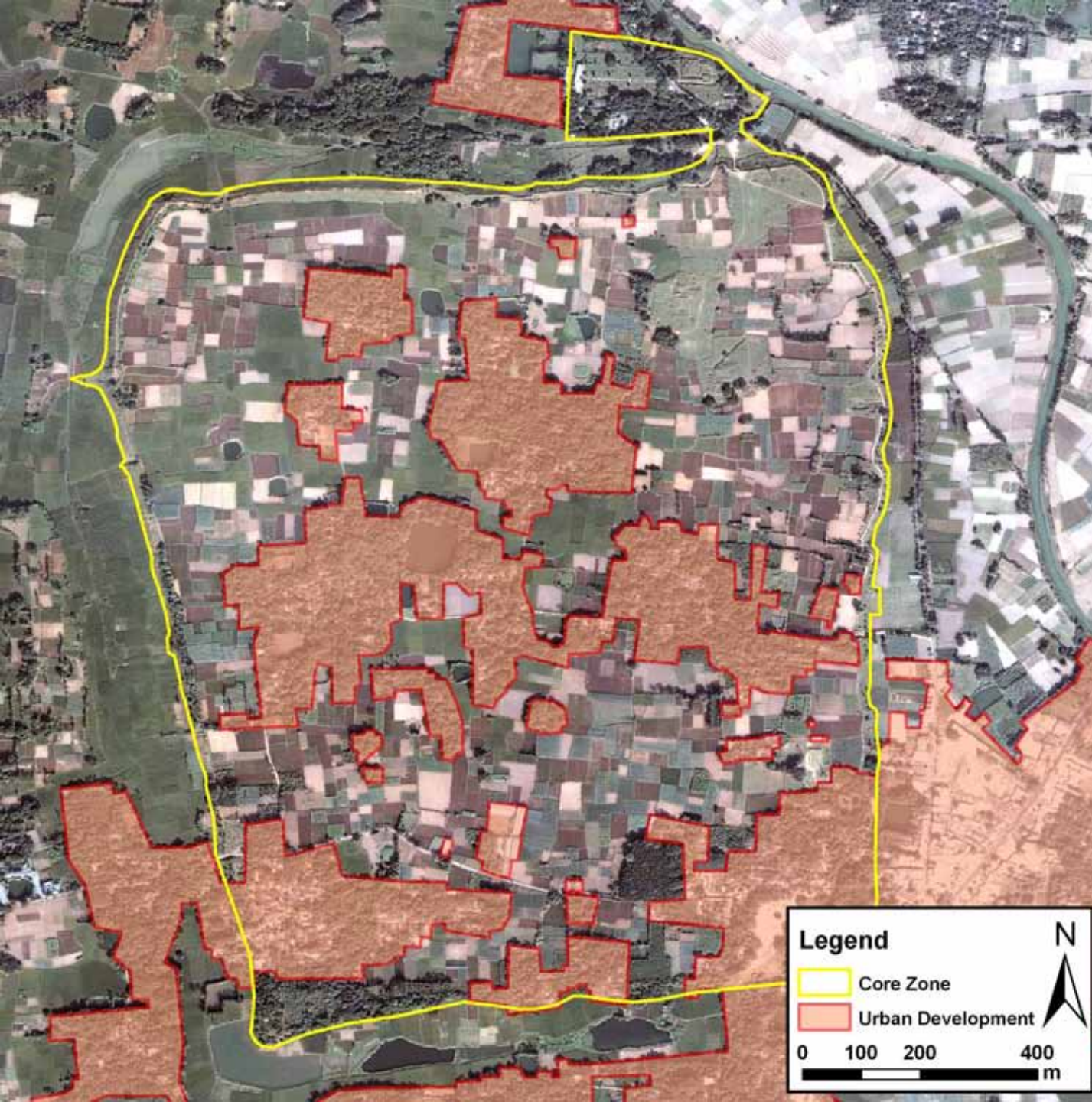
The dramatic ongoing demolitions of Kashgar's Old Town, seen close up below. *(Preston Rhea, Creative Commons)*




Mahansthangarh, Bangladesh – Development Pressures

As viewed in this 2009 DigitalGlobe image, interior portions of the ancient city of Mahansthangarh, Bangladesh, have been significantly covered by modern urban development. In addition, agriculture has expanded to every other available area within the Core Zone of the archaeological site. Insufficient management and widespread development pressures are the most significant threats facing Mahansthangarh.

If nothing is done to control this rampant urban encroachment, the entire site will soon be covered by modern buildings.



Legend

 Core Zone

 Urban Development

0 100 200 400

m



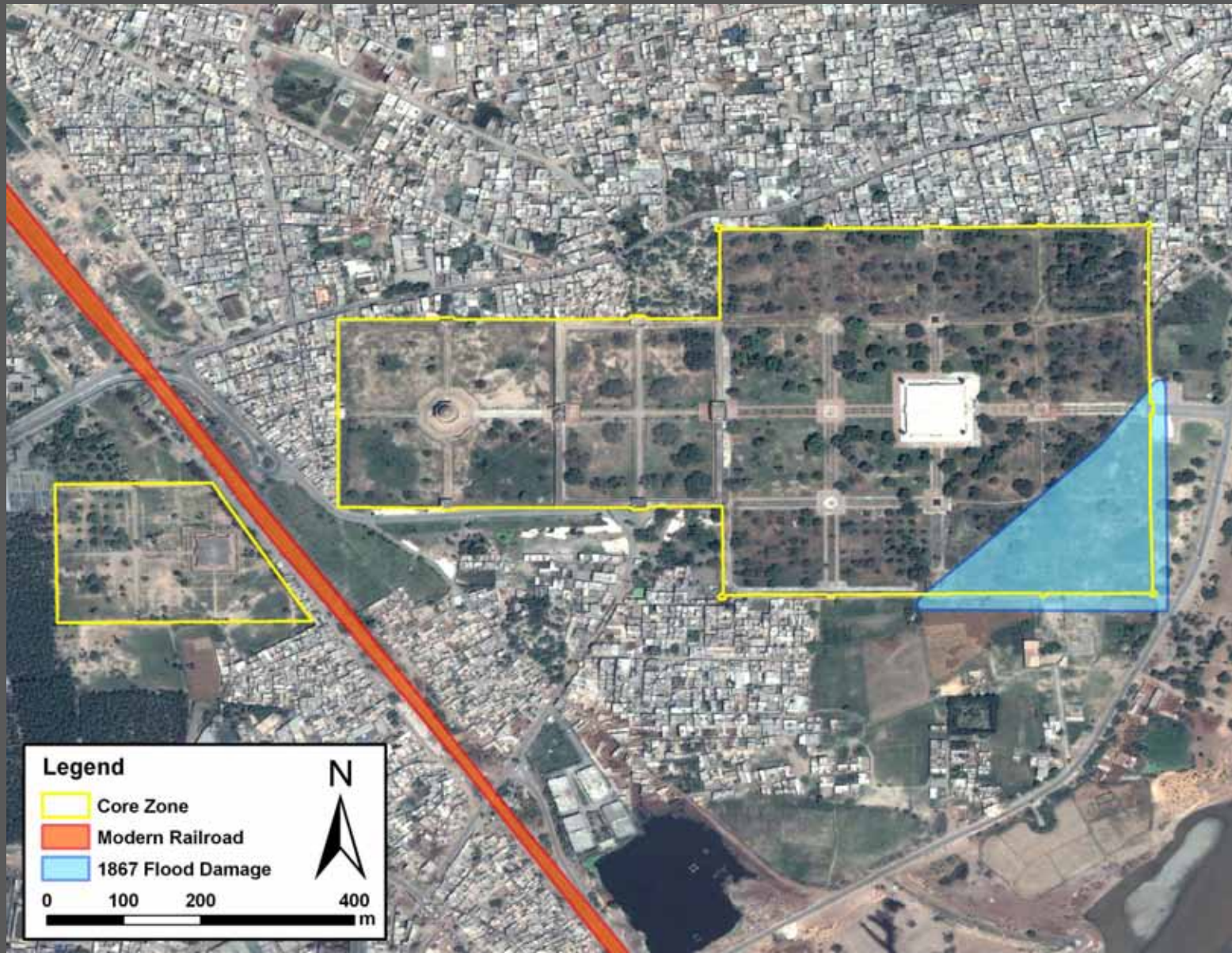
Mahansthangarh, Bangladesh – Development Pressures

A clear example of ancient city walls being used for agricultural purposes (here, banana cultivation). The site lacks sufficient management to prevent damaging practices such as these.



Jahangir Tombs, Pakistan – Insufficient Management

The main threats facing this ancient site are Insufficient Management, Neglect, and Development Pressures. A modern railroad bisects the main Core Zones of the site and the daily passing trains gradually destabilize the ancient structures.



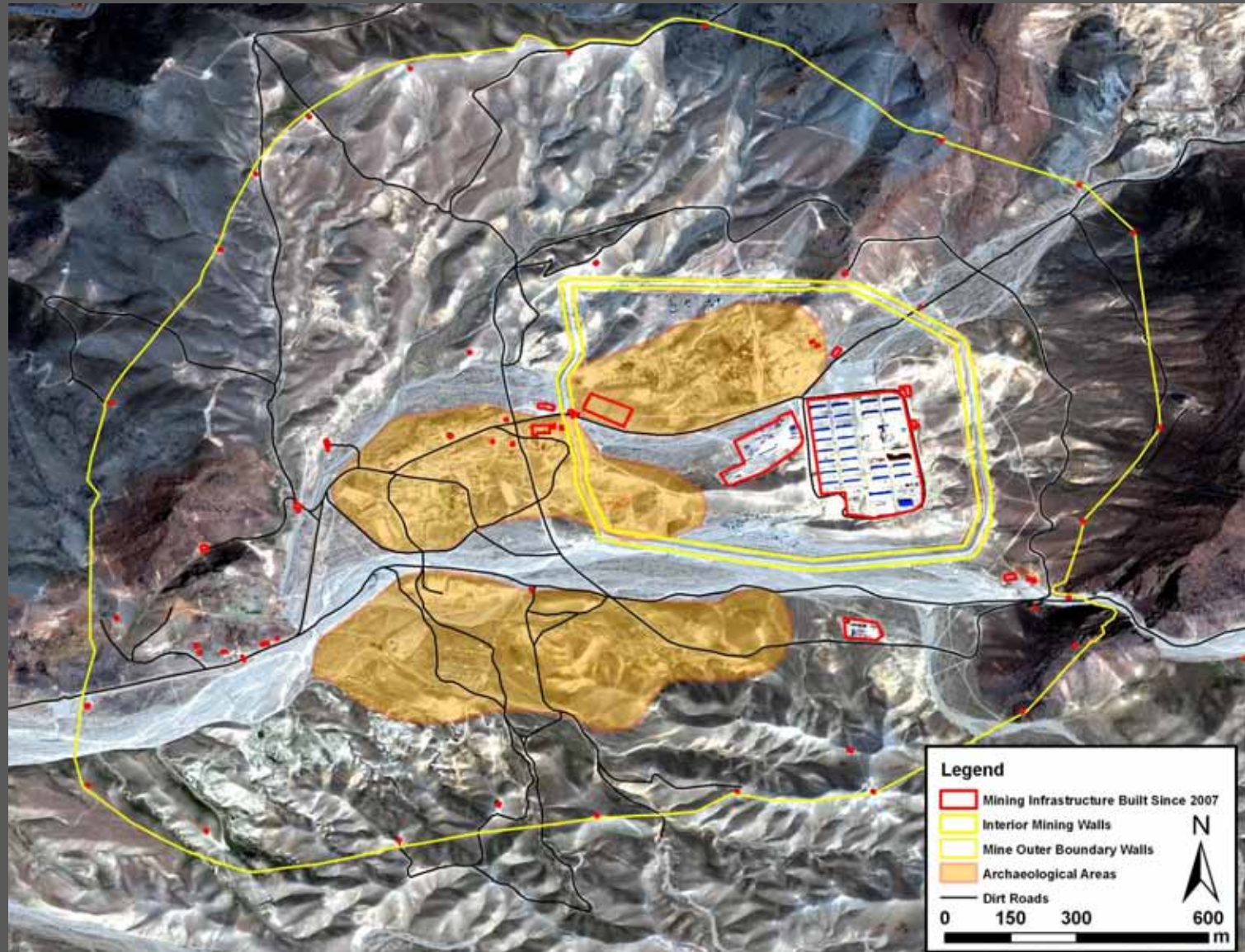
Jahangir Tombs, Pakistan –Insufficient Management

Many of the structures of the Jahangir complex, such as this entryway to Asif Khan Tomb seen below, have suffered extensively from a lack of adequate conservation, close proximity to streets and railroads, and urban encroachment.



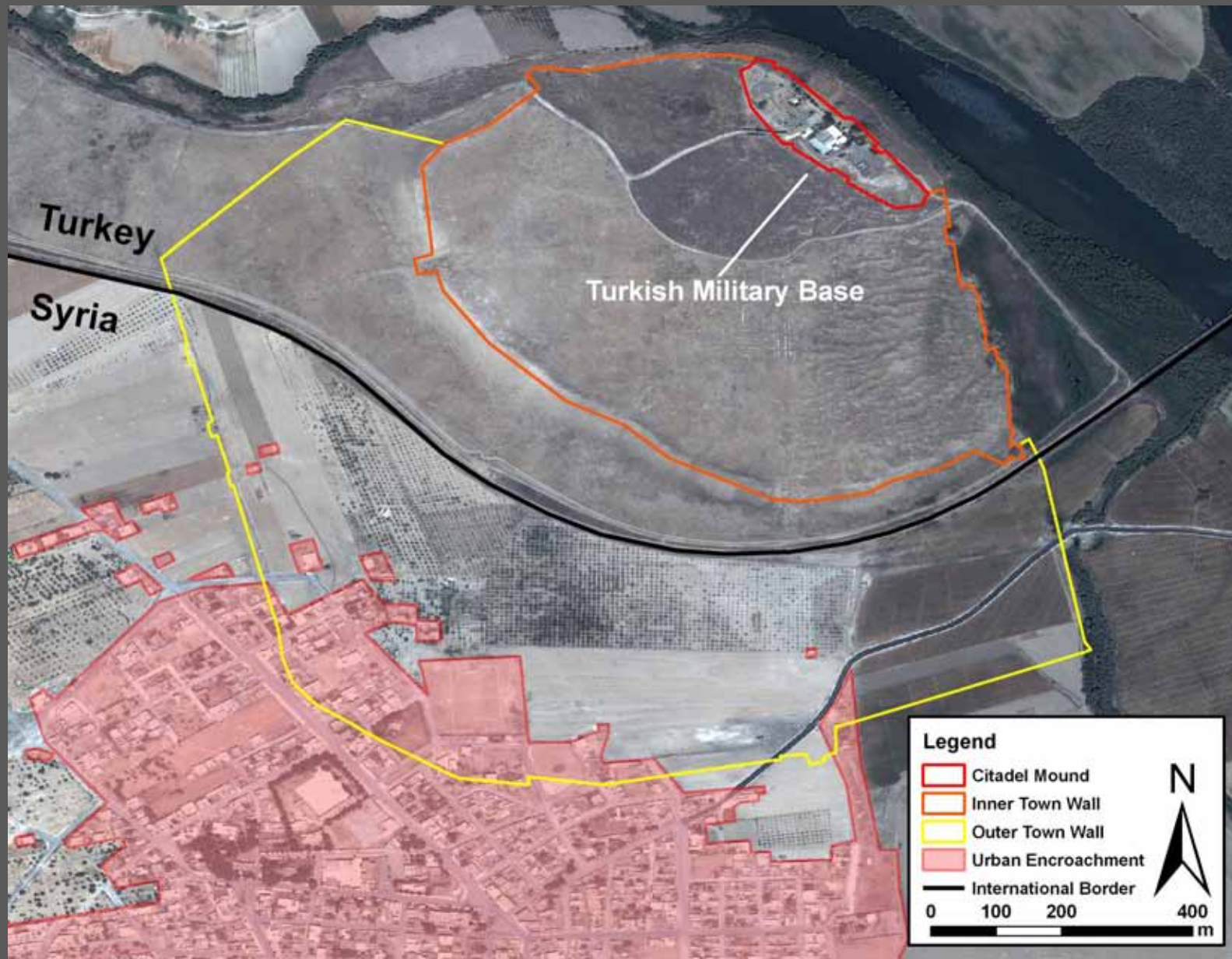
Mes Aynak, Afghanistan – Development Pressures

Mes Aynak (Tepe Kafiriat), an ancient Buddhist site located south of Kabul in Afghanistan, is in imminent danger of being lost forever due to a new Chinese copper mining project that will completely develop the area within three years, including all archaeological areas. As seen in the detailed map below, a huge mining complex that envelops much of the archaeological remains (estimated) has been constructed since 2007, shown here in transparent orange.



Carchemish, Turkey / Syria – Development Pressures

As seen in this DigitalGlobe image from June 1st, 2008, the modern Syrian town of Jarablus is fast encroaching upon the ancient outer town of Carchemish. However, the ancient citadel mound (Turkish side) has been built upon by the Turkish government by establishing a military base there.



Carchemish, Turkey / Syria – Development Pressures

The urban encroachment on this site is starkly portrayed in the image below. New homes have been constructed directly on top of the ancient settlement.



Kilwa Kisiwani, Tanzania – Natural Threats

The ancient fortress of Gereza, one of the main structures of the archaeological site of Kilwa Kisiwani, is at risk of collapsing into the Indian Ocean should projected rises in sea levels occur. It is currently threatened by the negative impacts of erosion.



Kilwa Kisiwani, Tanzania – Natural Threats

An historical aerial view of the Gereza fortress, which has had nearly one third of its original structure collapse into the Indian Ocean. (Photo: aluka.org)

