

# Utilizing UAV Techniques to Investigate the Dynamics of Encroachment on The Right-Of-Way for The N8 Highway in Peri-Urban Ghana

Andy Kodua Boafo, Samuel Boamah Asiedu and Edward Matthew Osei Jnr (Ghana)

**Key words:** Access to land; Informal settlements; Land management; Photogrammetry; Spatial planning; Right of Way; Encroachment; UAV; Orthophotomosaic; DPSIR Framework

## SUMMARY

Encroachment on highway reserves is a major problem in Ghana as it hinders the efforts to develop and expand highways in Ghana. This paper draws on Asef Bayat's theory of "quiet encroachment" and uses UAV (drone) imagery to detect and analyze the development of informal settlements along the N8 highway reserves in Ghana.

Aerial images of the corridor were acquired and processed using Agisoft Metashape software and finally, an orthophoto was produced. The buildings and road features were extracted using a computer vision algorithm add-on in QGIS; Orfeo Toolbox. A GIS buffering operation was performed on the Right of Way (ROW) using 35m and 45m distances according to the standards of the Ghana Highway Authority and the physical planning committee. It was identified that thousand and eighty-six (1,086) buildings were identified in the buffered region. Using google earth historic data, these structures within the buffer were tracked (object detection) to determine the trend of encroachment within the reservation. A structured questionnaire was designed and administered to the affected people in the encroachment zone.

The results obtained from the datasets were analyzed by overlay operation and computing the areas of encroachment of adjacent structures with emphasis on evaluating the potential of the high-resolution drone images in the determination of encroachment into the ROW and as well determining the positional accuracy obtainable based on the spatial resolution of the input drone image used for this study.

---

Utilizing UAV Techniques to Investigate the Dynamics of Encroachment  
on The Right-Of-Way for The N8 Highway in Peri-Urban Ghana  
(12327)

Andy Kodua Boafo, Samuel Boamah Asiedu and Edward Matthew Osei Jnr (Ghana)

FIG Commission 7 & 2 Annual Meeting 2023  
Digital Transformation for Responsible Land Administration  
Deventer, the Netherlands, 2–4 October 2023