

# Release Statement

## Spatio-temporally harmonised datasets for Nigeria. Version 1.0

20 January 2024

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### CITATION

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\* Building metrics are calculated based on the pixel in which their respective centroids are located (BCB method), or the pixel(s) that their geometries intersect (Pixel intersected Based – PIB method). In-depth explanations of each method follow in the methods overview below.

\*\* gl - google Open Buildings V3, ms – Microsoft Building Footprints 2023

\*\*\* XXX - year

\*\*\*\*YYY - class

## FILE DESCRIPTIONS

The spatially referenced geotiff grid layers introduced in this description all have a resolution of 3-arc seconds (~100m at the equator) and have a geographic spatial reference (WGS84). All geotiffs have a NoData value of -99999 (pixels that do not contain any buildings).

### NGA\_mastergrid\_L0.tif

Mastergrid for Nigeria. GRID3 NGA - Operational States v1.0. Nigeria country-wide operational state boundaries (administrative level 1). Released in September 2020. <https://data.grid3.org/search?q=boundary%20NGA>

### NGA\_count\_{PIB|BCB}\_{gl|ms}\_bf\_GL2\_v1.tif

Each grid cell of this dataset represents the counts of buildings within the grids'/pixels' bounds based on the 2 methods employed.

### NGA\_density\_{PIB|BCB}\_{gl|ms}\_bf\_GL2\_v1.tif

Each grid cell of this dataset represents the count of buildings within respective grid cells, divided the grid cell's area.

### NGA\_total\_area\_{PIB|BCB}\_{gl|ms}\_bf\_GL2\_v1.tif

Grid cells in this dataset represent the total building footprint area within respective grid cells. For buildings that straddle multiple grid cells, the grid cell in which the buildings' centroids are located will be allocated the area value. Note: For the BCB method, total building area may exceed the area of a grid cell if the centroid of a large building falls within the grid cell.

### NGA\_mean\_length\_{PIB|BCB}\_{gl|ms}\_bf\_GL2\_v1.tif

Grid cells in this dataset represent the mean area of all buildings whose buildings are within the respective grid cells.

### NGA\_cv\_area\_{PIB|BCB}\_{gl|ms}\_bf\_GL2\_v1.tif

Grid cells in this dataset represent a grid cell level coefficient of variation of building areas for all buildings inside a grid cell. Coefficient of variation is the standard deviation divided by the mean.

### NGA\_total\_length\_{PIB|BCB}\_{gl|ms}\_bf\_GL2\_v1.tif

Total length per grid cell is therefore a sum of the perimeters of all the buildings inside a grid cell.

### NGA\_mean\_length\_{PIB|BCB}\_{gl|ms}\_bf\_GL2\_v1.tif

Mean perimeter length of all the buildings inside a grid cell.

### NGA\_cv\_length\_{PIB|BCB}\_{gl|ms}\_bf\_GL2\_v1.tif

Grid cells in this dataset represent the coefficient of variation of building lengths (perimeter) for all buildings inside a grid cell.

### NGA\_C3S-LC-L4-LCCS-\*\*\*XXX\_\*\*\*\*YYY\_100m\_dist.tif

Distance to edges of reclassified ESA-CCI-LC classes 2015-2020. The values of the raster are the from the cell centres to the nearest feature.

Classes:

- 11 - Cropland, Natural Vegetation
- 40 - Tree Cover
- 130 - Shrubland
- 140 - Herbaceous Cover, Grassland, Mosses
- 150 - Sparse Vegetation
- 160 - Tree/Herbaceous Cover, Flooded, Fresh/Saline/Brackish Water
- 190 - Urban Areas
- 200 - Bare Areas
- 210 - Water Bodies, Permanent Snow And Ice

**NGA\_waterbodies\_dist\_osm\_GL2\_v1.tif**

Distance to OSM major waterways. OSM data up to 2023-01-17T21:21:52Z

**NGA\_intersections\_dist\_osm\_GL2\_v1.tif**

Distance to OSM major road intersections. OSM data up to 2023-01-17T21:21:52Z

**NGA\_highway\_dist\_osm\_GL2\_v1.tif**

Distance to OSM major roads. OSM data up to 2023-01-17T21:21:52Z

**NGA\_WDPA\_dist-\*\*\*XXX\_cat1\_100m.tif**

Distance to IUCN strict nature reserve and wilderness area edges 2015-2022

**NGA\_VNL\_\*\*\*XXX\_100m\_{fvf | nvf }.tif**

Night lights 2015-2022 VIIRS NTL 2.1.

- **fvf**: "Flares Volcanoes Filtered"
- **nvf**: "not Flares Volcanoes Filtered"

"[Global Gas Flaring Data Database](#)" from WorldBank and location of volcanoes "[Global GIS : volcanoes of the world](#)" were used to filter the abnormal values of the nightlights. We adapted the outlier removal algorithm developed for DMSP-OLS night-time lights (Baugh et al. 2010). The algorithm works by iteratively removing the largest visible band observation, recomputing the standard deviation of the remaining observations, and then comparing the new standard deviation to that of the previous iteration. This process stops when the standard deviations converge, which is defined as a difference of less than 0.2.

**NGA\_count\_ms\_roads\_GL2\_v1.tif**

Each grid cell of this dataset represents the counts of roads within the grids'/pixels'.

<https://github.com/microsoft/RoadDetections>

**NGA\_binary\_ms\_roads\_GL2\_v1.tif**

Grid cells in this dataset with value 1 indicate the presence of a road. <https://github.com/microsoft/RoadDetections>

**NGA\_dist\_ms\_roads\_GL2\_v1.tif**

Distance to roads. <https://github.com/microsoft/RoadDetections>

**NGA\_water\_mask\_0\_1\_gl2\_v1.tif**

Each grid cell of this dataset represents the water within the grids'/pixels'. (Source: WorldCover 2021 v200 10m)

<https://esa-worldcover.org/en/data-access>)

**NGA\_1st\_\*\*\*XXX\_tavg\_100m.tif**

Temperature

**NGA\_TerraClimate\_ppt\_\*\*\*XXX\_yravg\_100m.tif**

Precipitation

**NGA\_merit\_elevation\_gl2\_v1.tif**

Elevation

**NGA\_merit\_slope\_gl2\_v1.tif**

Slope

**NGA\_dist\_to\_costline\_gl2\_v1.tif**

Distance to open-water coastline .

**NGA\_dist\_to\_inlwater\_gl2\_v1.tif**

Distance to inland water .

**NGA\_GHS\_wMGW\_BUILT\_{S|V}\_E\*\*\*XXX\_R2023A\_4326\_3ss\_V1\_0\_gl2.tif**

Built-up surface and volume for years 2015, 2020, 2025, 2030 defined by [GHS built-up \(R2023\)](#) combined with Microsoft, Google Building footprint as well with World Settlement Footprint. Missing build up pixels in GHSL but existed in Microsoft, Google Building footprint and World Settlement Footprint were added to base GHSL layer.

#### **NGA\_GHS\_BUILT\_{S|V}\_NRES\_E\*\*\*XXX\_R2023A\_4326\_3ss\_V1\_0\_gl2.tif**

Non residential built-up surface and volume for 2015, 2020, 2025, 2030 years.

<https://ghsl.jrc.ec.europa.eu/download.php>

#### **NGA\_GHS\_wMGW\_BUILT\_S\_DIST\_E\*\*\*XXX\_R2023A\_4326\_3ss\_V1\_0\_gl2.tif**

Distance to Built-up surface for 2015, 2020, 2025, 2030 years. Built-up surface is based on GHSL combined with Microsoft, Google Building footprint as well with World Settlement Footprint.

#### **NGA\_GHS\_wMGW\_BUILT\_S\_E\*\*\*XXX\_R2023A\_4326\_3ss\_V1\_0\_gl2\_Binary\_0\_1.tif**

Binary representation of Built-up surface for 2015, 2020, 2025, 2030.

#### **NGA\_GHS\_wMGW\_BUILT\_{S|V}\_INT\_E\*\*\*XXX\_R2023A\_4326\_3ss\_V1\_0\_gl2.tif**

Built-up surface and volume for years 2016-19, 2021-24, 2026-29. Built-up surface is based on GHSL combined with Microsoft, Google Building footprint as well with World Settlement Footprint. Data was produced by interpolation of Built-up surface between the following time points 2015, 2020, 2025, 2030.

#### **NGA\_GHS\_wMGW\_BUILT\_S\_INT\_E\*\*\*XXX\_R2023A\_4326\_3ss\_V1\_0\_gl2\_Binary\_0\_1.tif**

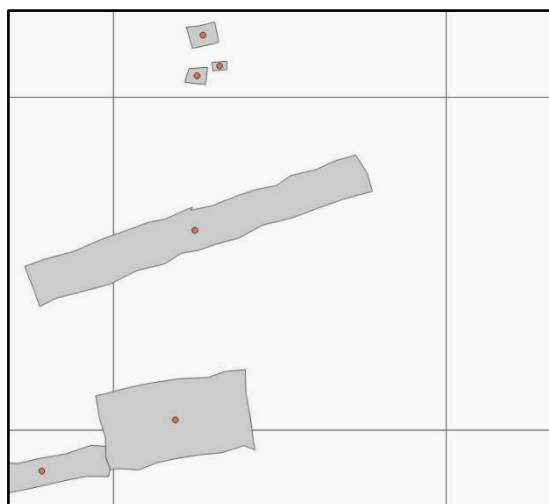
Binary representation of Built-up surface for years 2016-19, 2021-24, 2026-29.

### **Building centroid based and pixel intersected based method overview.**

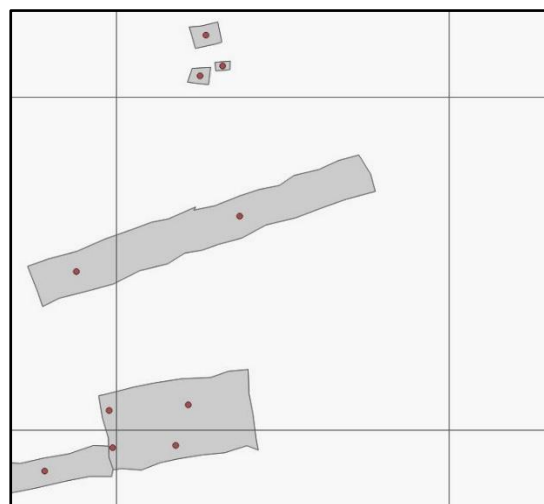
The **Building Centroid Based** (BCB) method allocates values to grid cells based on building centroids located within respective grid cells' bounds. In cases where buildings straddle multiple grid cells, their metrics (area, length, etc.) will only be allocated to the grid cell in which the buildings' centroids are located, as shown in Figure 1. All grid datasets are 3 arc second (approximately 100m at the equator) projected to WGS84. This method is more suited to building count and distance-to-neighbour related metrics.

The **Pixel intersected Based** (PIB) method makes use of the geometric intersections between building footprints and grid cells to calculate values, resulting in building metrics being allocated to all grid cells in which building footprints are present. Figure 1. All grid datasets are 3 arc second (approximately 100m at the equator) projected to WGS84. This method results in a more continuous grid, with exact measurements related to building area and length being allocated to the pixels in which they are proportionally located.

It should be noted that the number of valid (non-NoData) grid cells in the PIB method will most likely be greater than the corresponding dataset using the BCB method, due to the BCB method only considering building centroids in its calculations. This may result in slightly different grid cell extents when comparing outputs from the respective methods. Please read above file descriptions to select the most appropriate dataset for your project's requirements.



**Figure 1.**



**Figure 2.**

## References

Baugh, K., C. D. Elvidge, T. Ghosh, and D. Ziskin. 2010. "Development of a 2009 Stable Lights Product Using DMSP/OLS Data." Proceedings of the Asia Pacific Advanced Network 30: 114–130. doi:10.7125/APAN.30.17

Global Gas Flaring Reduction Partnership (GGFR)

<https://www.worldbank.org/en/programs/gasflaringreduction/global-flaring-data>