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BUILT DENSITY: SITEX

Information on block-level built density data

APRIL 2026

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COLOPHON

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Date
April 2026

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1. Introduction

One of the three objectives underpinning the SitEx project (Existing Situation Inventory of the Brussels-Capital Region) is to produce a series of built density indicators. These indicators were initially established at the finest spatial scale, namely individual buildings. At this level, the indicators include: the number of above-ground levels, the number of setback levels, the maximum building height, the building footprint, and the estimated total floor area.

The database contains 248 305 buildings, of which 248 127 are directly derived from UrbIS Admin (late 2023 version), which originally recorded 248 324 buildings. The difference of 197 buildings is due to the fact that they were identified as demolished during the field surveys (2023–2026) and were therefore excluded from the database. In addition, 178 new buildings were incorporated following the same field surveys carried out in selected areas.

The field surveys determined the number of levels (both above ground and setback levels) for 229 111 buildings, as well as the floor area for 26 225 buildings. For the remaining buildings, the floor area was estimated by combining information on the number of levels with the building morphology derived from UrbIS 3D products (see Section 3.2.2.1). Where information on the number of levels was unavailable (19 291 buildings), the building's floor area was assumed to be equal to its footprint. This methodological choice was made because these missing data mainly concern small buildings (16 346 buildings have a footprint of less than 15 m²), which are typically garden sheds or small garages with a single level.

2. Contenu et structure des données

Attribute	Name	Definition
Id	Identifier	Unique identifier of the block
Gsi	Ground space index	Measures the proportion (%) of the block area occupied by the building footprints located within it.
Fsi	Floor space index	Measures the ratio between the total floor area of buildings within the block and the area of the block. Often abbreviated as FAR (floor area ratio).
Level_mean	Average number of building levels	Sum of the number of levels of all buildings within a block divided by the number of buildings making up that block.
Height_max	Maximum building height	Height (in metres) of the tallest building within a block.

3. Product description

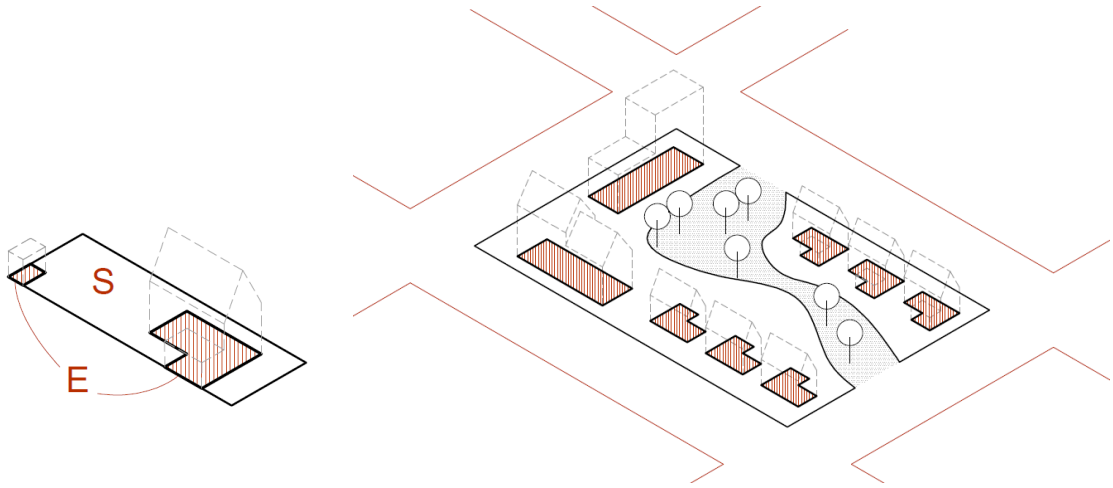
3.1. Analytical scale

The blocks derived from **UrbIS Vector** (6 January 2026 version) were used as the spatial unit of analysis for the built density assessment. Only blocks identified as built-up areas (TYPE = CB, i.e. blocks predominantly covered by residential, industrial and service-related buildings) were used. In order to favour a morphological approach rather than an administrative one, blocks intersected by municipal boundaries were merged. This operation makes it possible to obtain spatial units that are more coherent in terms of urban structure.

3.2. Data

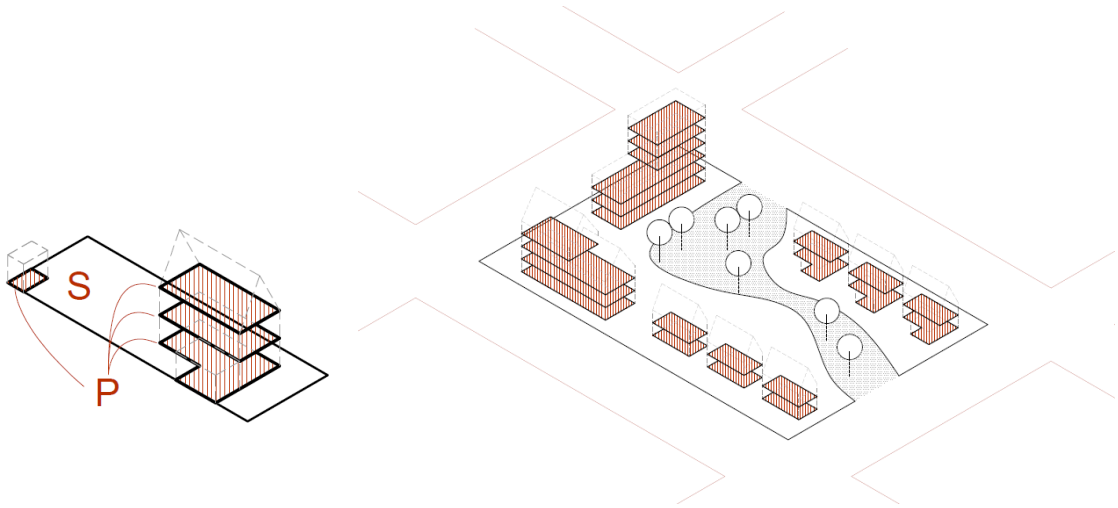
3.2.1. Ground Space Index (GSI)

Ratio between the total building footprints within a block (E) and the area of the block (S) $gsi = \frac{E}{S}$.



3.2.2. Floor Space index (FSI)

Ratio between the total floor area of the buildings within the block (P) and the area of the block (S). $fsi = \frac{P}{S}$



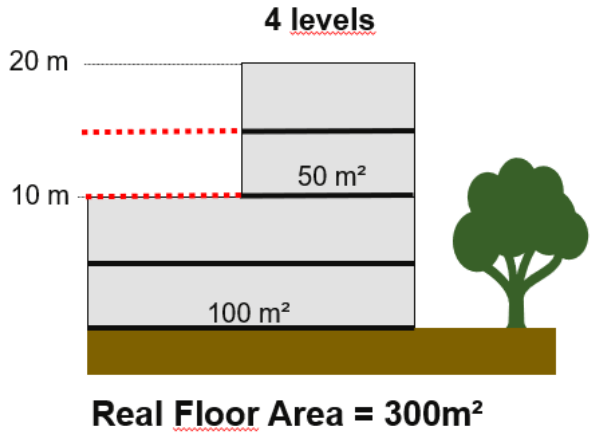
3.2.2.1. Estimation of building floor area

A floor area value was determined for each building using one of two methods.

The first method applies exclusively to the 26 225 buildings surveyed in the field. In these cases, surveyors used a geospatial application to determine the floor area of each building level. The building footprint was directly available to determine the floor area of the first level (ground floor), which was considered the default standard level. However, where certain levels presented setbacks compared with this standard level, a measurement tool was used to calculate the floor area of the level more accurately. The total floor area of the building therefore corresponds to the sum of the areas of all observed levels making up the building.

The second method, applied to the remaining 222 080 buildings, combines information on the number of levels collected during a previous survey with the building morphology derived from UrbIS 3D products (UrbIS-Adm 3D and UrbIS 3D – Construction, early 2024 version). The starting principle is as follows: a building's floor area can initially be approximated by multiplying its footprint by its total number of levels (*nblevel_sum*, including both above-ground and setback levels). This approximation is valid when the building has a simple shape that can be considered as a "solid block", comparable to a rectangular parallelepiped. However, when a building includes setbacks or variations in its shape (see diagram below), this approach tends to overestimate the actual floor area (400 m² compared with 300 m² in the example below). To correct this overestimation, the excess areas (shown as red dotted areas in the diagram) resulting from these variations in form must be subtracted. This correction is achieved by incorporating the building volume factor (*fv*) into the initial estimate. This factor, which can be considered as a measure of building compactness, corresponds to the ratio between the actual volume of the building and the theoretical volume it would have if it were a rectangular parallelepiped. When setbacks are present, this ratio is below 1, allowing the estimate to be adjusted and brought closer to the actual floor area.

The estimated floor area calculated using our method is given by:



$$\boldsymbol{sp} = nblevel\_sum \,.\, E \,.\, fv$$

$$= nblevel\_sum \,.\, E \,.\, \frac{\mathrm{V}}{\mathrm{E\ h}}$$

$$= \mathbf{4.100}\boldsymbol{m^2}.\frac{1500\mathrm{m}^3}{100\mathrm{m}^2 20\mathrm{m}}$$

$$= \mathbf{400}\boldsymbol{m^2}.0{,}75$$

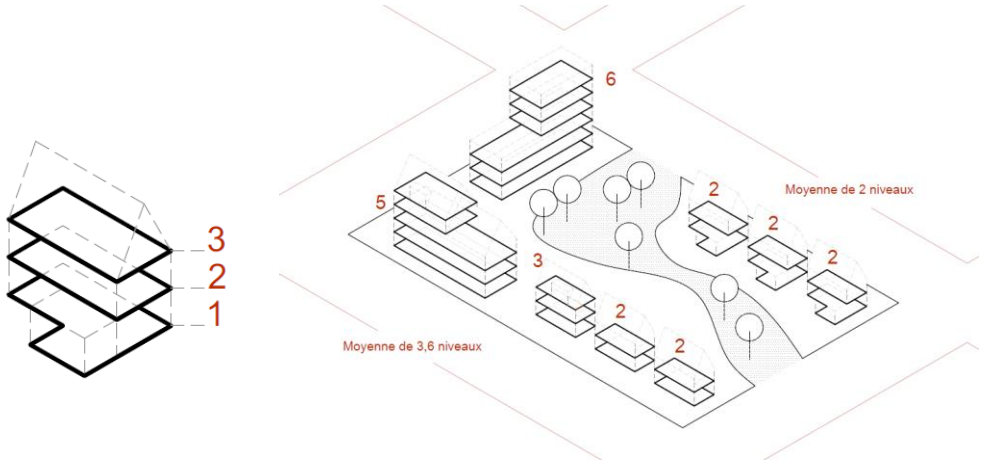
$$= \mathbf{300}\boldsymbol{m^2}$$

*where **fv** is the volume factor, **V** is the building volume, **E** is its footprint, and **h** is its maximum height.*

3.2.3. Average number of levels

The average number of levels of a block (*level_mean*) corresponds to the arithmetic mean of the total number of levels of all buildings making up the block (**n** = total number of buildings intersecting the block).

$$level\_mean = \frac{1}{n}\sum_{i=1}^{n} nblevel\_sum_i$$



3.2.3.1. Estimation of the number of building levels

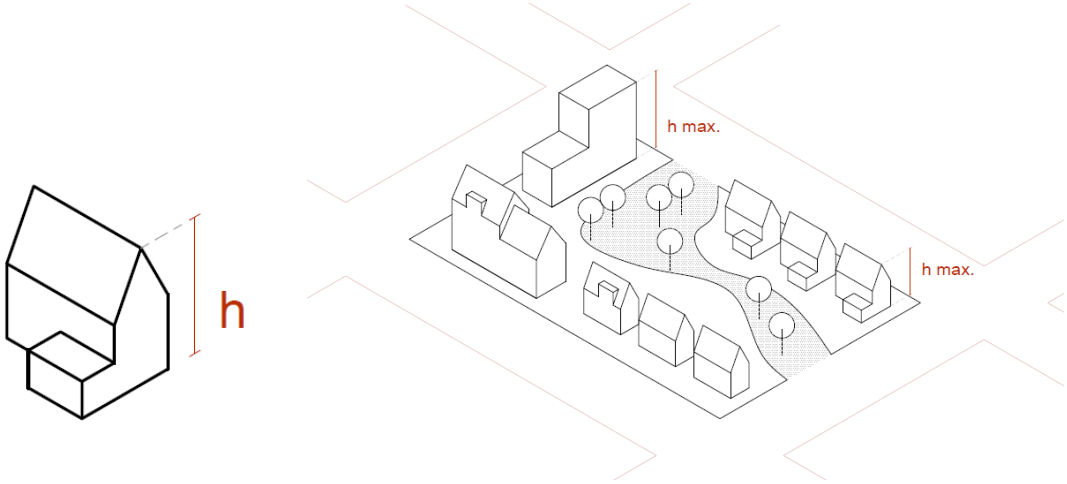
This indicator is derived from field surveys carried out between 2020 and 2026. These surveys made it possible to determine the number of levels for almost all buildings in the Region (92%

of the 248 000 buildings in the Region). A level is counted whenever it has a street-facing opening located at least 1 metre above ground level (above-ground levels). Setback levels, located above the cornice line, are also included. The total number of levels of a building therefore corresponds to the sum of the number of above-ground levels and the number of setback levels.

3.2.4. Maximum building height

The maximum building height within a block *(height_max)* corresponds to the height of the tallest building intersecting the block.

$$height\_max = \max_{i=1}^{n} height_i$$



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3.2.4.1. Estimation of maximum building height

The maximum height of 245 243 buildings was determined using UrbIS 3D products. It is important to note that, in this context, the maximum height of a building is defined as the difference in elevation between the highest point of the Z polygon of at least 1 m² making up the building and the building base level. This 1 m² threshold makes it possible to exclude non-habitable or secondary elements that could disproportionately influence the calculation of the building's maximum height. It should also be noted that the maximum height value is missing for nearly 3 000 buildings due to an issue with the interpretation of certain 3D objects.

3.3. Summary

Indicateurs	Intitulé	Formule
GSI	Ground Space Index: building ground coverage ratio calculated at block level	$gsi = \frac{E}{block\ area}$
FSI	Floor Space Index: ratio between the total floor area of the buildings within the block and the area of the block	$fsi = \frac{P}{block\ area}$
Level_mean	Average number of levels of the buildings making up the block	$level\_mean = \frac{1}{n}\sum_{i=1}^{n} nblevel\_sum_i$
Height_max	Height of the tallest building within the block	$height\_max = \max_{i=1}^{n} height_i$
*Where **n** is the number of buildings within the block, **E** is the sum of the building footprints, **P** is the sum of the building floor areas, and **nblevel_sum** is the total number of storeys of the building.*		