

## Review ESSD-2020-3, Land Development USA

This product elicits a very mixed response from this reviewer. Deficiencies seem to substantially outweigh positive benefits. Needs - at minimum - very substantial revision. Several typographic errors persist (the authors several times confuse 'phrase' with 'phase') but those can wait until authors fix larger problems.

### Positive factors:

1. I find (or know of) few or no similar compilation efforts, the authors having apparently produced a unique product;
2. The authors help users understand some of their motivation;
3. Data and tools seem accessible and useful (I can open shape files in QGIS, for example, avoiding license expenses associated with ESRI); and
4. The authors have made a reasonable attempt at providing validation evidence.

### Deficiencies:

1. This reviewer questions whether the authors have identified and incorporated factors with the highest impact - at least in USA - on land developability;
2. Agriculture - a politically, economically and geographically huge factor in USA land use, land availability and land developability where it severely restricts for example "residential, commercial, or other types of land development" (lines 108-109) - seems largely ignored;
3. One wonders whether the authors ignored agriculture or other developability factors due to lack of data (imagery), lack of open access to such data, or due to some impact weighting factor not clarified? Convenience from a remote sensing viewpoint - yes. Highest impact?;
4. Related to prior comment, reader/user misses a data source table identifying each specific data source with exact source information, version, URL or DOI, etc. If authors expect readers to accept their claim of free and open remote sensing imagery as the basis of their index product, they need to provide exact explicit access information.
5. Visually, largest changes in land use developability seem to occur 2006 to 2010, rather than 2001 to 2006. If quantitatively true, the authors provide neither mention, explanation, nor validation;
6. Authors rely primarily on their own prior work (e.g. for Wisconsin) but seem to miss (or to neglect to explain the absence of) other prominent (in the land use community and in this journal) products such as night light data, census data, fertilizer use data, stream and ground water quality data, etc. Of products used here, water no water or slope > 20% seem historical and static (e.g. existing long before 2001), not changing much over their period of analysis, impervious surfaces (their surrogate for built-up area) seems weak and horizontal (did I see a different impermeable surface data set in ESSD, produced by and for hydrologists?) despite the fact that authors claim several times about the need to assess land use impacts vertically as well as horizontally, and tax exempt status (apparently binary in this analysis) misses a morass of benign to aggressive local-, county- or state-specific land tax policies. Which if any of their factors seem most likely to have changed over 2001 to 2010? Readers get no hint. Relates directly to uncertainty ...;
7. A user gains no sense of uncertainty, either of individual factors nor of the composite developability index / percentage. This reviewer suspects that authors can quantify developability in any USA county to no better than  $\pm 20\%$  in any time snapshot. Large uncertainties of specific snapshots then propagate to substantial uncertainties on any trend analysis. Authors owe users/readers an expert quantitative source level and compilation (index) level uncertainty analysis.