

# Best Practice Guide

## GWS File Generation: WindSim Accelerator vs. Global Mapper

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### Introduction

A GWS file is the primary input for WindSim CFD simulations, containing the elevation and surface roughness data that define the terrain model for a wind resource assessment. This document compares two tools for generating GWS files: the WindSim Accelerator (cloud-based, integrated platform) and Global Mapper (professional GIS software). Understanding their respective strengths and limitations will help you select the right approach for each project type.

## 1. Tool Overview

### 1.1 WindSim Accelerator

The WindSim Accelerator is a cloud platform purpose-built for running WindSim CFD models and generating GWS files. It automates the download and projection of required datasets, making the workflow accessible to users with limited GIS expertise.

#### Key characteristics:

- Cloud-based, no local GIS software installation required
- Datasets (elevation and roughness) are downloaded and projected automatically
- Native integration with WindSim simulation workflow
- Supports global roughness coverage and CORINE land cover (Europe)
- Includes map interface for defining center point and refinement area

### 1.2 Global Mapper

Global Mapper is a professional GIS application that supports a wide range of geospatial data formats and operations. It is used to manually build the GWS file from custom elevation and roughness datasets, with full control over coordinate systems, data sources, and terrain editing.

#### Key characteristics:

- Supports broad range of elevation sources: SRTM (30m/90m), ASTER GDEM (30m), national LiDAR (1m), Copernicus DEM (30m), and custom user datasets
- Landcover data via ESA LULC2024 (10m) and NASA/USGS GLC30/NLCD2023 (30m)
- Full coordinate system and projection control (all predefined and custom projections)
- Manual editing of elevation and roughness layers (polygon overrides, irregular areas)
- Requires a paid software license and foundational GIS expertise

*Note: High-precision elevation sources recommended for simulation: 1m–30m resolution. Radar scanning data and field-measured contour maps are also supported via Global Mapper.*

In Global Mapper, the process of generating the GWS file involves three core steps:

Step 1: Site Verification	Step 2: Data Preparation	Step 3: Export .gws
Verify mast location coordinates Draw wind farm boundary polygon	Load in or download the elevation & roughness data for the site. Edit the layers if necessary.	Export the elevation and roughness data as a .gws file

*Critical: Ensure consistent coordinate systems throughout the entire process to avoid spatial errors in the WindSim simulation.*

## 2. Zone Structure

The three-zone strategy applies to both tools:

- Core zone – turbines and mast area, highest resolution (defines the inner calculation grid)
- Refinement zone – 2-5 km buffer around core for detailed flow modelling
- Calculation zone – 5-10 km beyond refinement zone, covering terrain that influences wind flow

## 3. Comparison: Benefits and Limitations

The table below summarizes key differences across the criteria most relevant to selecting a tool for GWS file generation.

Dimension	WindSim Accelerator	Global Mapper
<b>Ease of Use</b>	Very easy. All datasets are downloaded and projected automatically. No GIS knowledge required.	Requires foundational GIS knowledge. Learning curve for new engineers.
<b>Elevation Data Sources</b>	Pre-loaded from ArcGIS LiveAtlas map server (Airbus 25m, local high-resolution sources). Limited to available sources on the platform. Updated & high resolution data-sets available.	Full flexibility: SRTM (30m/90m), ASTER GDEM (30m), national sources (LiDAR 1m), Copernicus DEM, and custom datasets. Available data sources are pre 2018.
<b>Roughness / Landcover Data</b>	Two options: ESA Sentinel-2 LULC2024 (10m) (worldwide) and CORINE (Europe only). Manual editing of roughness values is possible.	Wide choice of roughness data-sets, Most data sets are pre 2018.
<b>Coordinate / Projection Handling</b>	Handled automatically. No manual projection conversion required.	Full control. Supports all predefined and custom projections. Manual verification required for consistency.
<b>Custom Data Integration</b>	Not supported. Users are limited to the platform's built-in datasets.	Fully supported. Users can import and process any terrain-related data format.

**Commented [VBI]:** This is not the specific Map-module /GM workflow, but the combined workflow of all the tools (Google Earth-->GM-->WindSim) In Global Mapper we only input the required elevation & roughness data and export it as a .gws file without any zone structure

**Commented [TZ1R2]:** this calculation zone design could be done in Google Earth or Global Mapper, it need to be done at very early stage of gws generation, so we may tell the clients that this zone design could help you to consider the influence from surrounding terrain, and also make sure your simulation area is big enough. both for the GM and our accelerator

Dimension	WindSim Accelerator	Global Mapper
<b>Zone Definition (Core / Refinement / Calculation)</b>	Handled via the Accelerator interface. Refinement area is set directly on the map.	Manual setup using buffer tools (Core Area → Refinement 2-5 km → Calculation 5-10 km). Full visual control.
<b>Data Editing / Customization</b>	Limited. Some roughness value editing is available; no terrain elevation editing.	Advanced. Full manual correction of terrain and roughness layers, including irregular area overrides.
<b>Software License</b>	Included as part of WindSim Accelerator platform subscription.	Requires a separate paid Global Mapper license.
<b>Integration with WindSim</b>	Native. Designed for direct GWS file generation and WindSim CFD model setup.	Export-based. GWS file created via Global Mapper export tools, then imported into WindSim.
<b>Time to Generate GWS</b>	Fast. Streamlined workflow with minimal manual steps.	Slower for simple cases; but appropriate for complex or high-precision projects.

## 4. Best Practice Checklist

### 4.1 General – Both Tools

- Confirm accurate coordinates for the site, met masts and turbine locations (verify against satellite imagery)
- Use consistent coordinate systems across all data sources to prevent spatial misalignment
- Apply the three-zone strategy: Core / Refinement (2-5 km) / Calculation (5-10 km)
- After generating the GWS file, always verify: grid size, UTM zone, min/max elevation, and roughness fields

### 4.2 WindSim Accelerator

- Set the correct center point using the map or by entering coordinates directly
- Define a refinement area large enough to capture terrain effects, but not oversized
- Select the appropriate roughness dataset – Global Sentinel-2 dataset for worldwide, CORINE for European sites
- Edit roughness values manually when local ground-truth knowledge is available
- Depending on the project type, select the appropriate resolution for your simulation domain

### 4.3 Global Mapper

- Import KML/KMZ with site boundaries and tower locations as the starting reference
- Use buffer tools to define Core, Refinement, and Calculation zones from inside outwards
- Combine high-resolution and global datasets where appropriate (e.g., local LiDAR + SRTM)
- Edit the Roughness\_table.txt for project-specific roughness values per land cover class
- Use manual polygon overrides for areas where the online roughness dataset is outdated
- Export final elevation and roughness as a .GWS file via the export tools

Questions? Contact the WindSim team at [support@windsim.com](mailto:support@windsim.com) or visit [www.windsim.com](http://www.windsim.com)