



**Verified Carbon
Standard**

A VERRA STANDARD

Geolocation File Requirements

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1 INTRODUCTION

1.1 Scope

This document provides the requirements for geolocation files submitted as part of registration, crediting period renewal, and verification approval requests under the Verified Carbon Standard (VCS) Program. It ensures all geolocation files are consistent, valid, and contain review-ready geospatial data. The *VCS Standard* refers to this document¹ for preparing geolocation files.

One or more geolocation files must be submitted when requesting registration. Geolocation files are only required for other request types under specific conditions, which are outlined in Section 2.

All geolocation files must be validated or verified by a validation/verification body (VVB) prior to submission to Verra.

This document is updated periodically. Readers shall ensure they are using the most recent applicable version of the document.

1.2 Glossary

Concept

This section describes the terminology used in this document and supports implementation of the requirements. The terminology and descriptions below are not applicable outside the scope of this document.

This glossary is informed by terminology and definitions published through the *Open Geospatial Consortium (OGC)*.²

Extensible markup language (XML)

A text-based markup language and file format used to store, transmit, and reconstruct data

Keyhole markup language (KML)

An extensible markup language-based geolocation file format used to store geographic data, including points, lines, and polygons. It is the native format used by Google Earth and is compatible with standard GIS tools.

¹ Section 3.10.2 of the *VCS Standard, v5.0* refers to a *Geolocation File Preparation Tool*. This document, which has been renamed the *Geolocation File Requirements*, is the document referenced in Section 3.10.2.

² See *Simple Feature Access – Part 1: Common Architecture (ISO 19125)*, available at: <https://www.ogc.org/standards/sfa/>

Keyhole markup language file (KML file)

A geolocation file with file ending .kml or .kmz that acts as a primary container to hold sub-elements like keyhole markup language (KML) folders

Keyhole markup language folder (KML folder)

A keyhole markup language (KML) element used to logically group other KML elements like nested folders and placemarks

Keyhole markup zipped file (KMZ file)

A compressed (zipped) version of a keyhole markup language (KML) file. A KMZ file can contain a single KML file and optional supporting files (e.g., icons or overlays). It functions identically to a KML file when opened in GIS tools or Google Earth.

Layer

A geolocation file element that contains a logical collection of geographic features like points, lines, or polygons grouped together so they can be displayed, styled, and managed as a single unit within a GIS application

Multipolygon

A collection of more than one, non-overlapping polygon elements represented as a single feature

Placemark

A KML element used to represent an individual geospatial feature, which may include a single point, line, polygon, or multipolygon along with associated metadata

Polygon

A two-dimensional geometry that represents a closed area on the Earth's surface, defined by one exterior ring and zero or more interior rings

Project geodata

Geographic data and information required by the applied methodology that are referenced, monitored, or used to determine net greenhouse gas (GHG) emission reductions and carbon dioxide removals and do not describe the project area (e.g., waste collection sites, end-use sites, leakage belt, leakage management zone, WRC buffer zone, reference region)

2 GENERAL REQUIREMENTS

When submitting a geolocation file, project proponents are required to include the most recent project location information. The file must include key spatial elements such as the project area and project geodata, and it must be formatted and organized in accordance with the requirements below.

Where a project's geolocation file is revised, the new file replaces all previously submitted geolocation files for the project.

2.1 General

2.1.1 A geolocation file shall be submitted when requesting registration.

2.1.2 An updated geolocation file shall be submitted when requesting crediting period renewal or verification approval where any of the following occur:

- 1) Addition or removal of one or more project activity instances or project areas
- 2) Change in the physical boundary of one or more project geodata
- 3) Addition or removal of one or more project geodata
- 4) Corrections or improvements to previously submitted geolocation information
- 5) Addition of or change in geolocation data for community lands and territories with associated customary rights, and areas with competing claims to land or resource rights

2.1.3 The geolocation file shall:

- 1) be formatted as a KML or KMZ file, unless otherwise specified in the applied methodology.
- 2) include all project areas and project activity instances.
- 3) include all project geodata.
- 4) where the project is a grouped project, include all eligibility areas.
- 5) where identified as part of a land or resource rights analysis³ and geolocation data is available, include community lands and territories with associated customary rights and areas with competing claims to land or resource rights
- 6) exclude personally identifiable information.⁴

³ See Section 3.6.3 – 3.6.7 of the *VCS Standard, v5.0* for more information about land or resource rights analysis,

⁴ Personally identifiable information (PII) is any information that can be used to identify a natural person (e.g., name, physical and email addresses, telephone number, date of birth, nationality and race, employer, title of position if employed).

2.2 Energy and Industry and Geological Carbon Storage Projects

2.2.1 The geolocation file of an energy and industry or geological carbon storage project shall contain:

- 1) geodetic coordinates of all instances, except for mobile project instances under sectoral scope 7.
- 2) any project geodata required by the applied methodology. Such geodata shall be represented as polygons or, where the instance is visually discrete (e.g., a power plant), as coordinates =. **Table 1** lists examples for select project categories.
- 3) for non-grouped projects, polygon(s) that delimit the smallest administrative division of land recognized by the local government.⁵

Table 1. Examples of common project geodata required by energy and industry and geological carbon storage methodologies

Project category ⁶	Common project geodata
Renewable energy generation and fuel switch, supply-side fuel switch, and supply-side energy efficiency	Fuel collection areas
Demand-side energy efficiency and fuel switch	Baseline and project fuel collection areas
Manufacturing industries	Feedstock plantations, grid/power plant units of electricity system
Chemical industries	Feedstock plantations
Transport	Electric vehicle charging stations
Mining and mineral production	Mining well zones of influence
Waste treatment	Waste collection sites, landfill sites, end-use site
Waste reduction and recycling	Waste collection sites
Carbon capture and storage	GHG emissions source locations, CO ₂ transportation network, project expansion area, flowing CO ₂ connection points, injection and monitoring wellhead surface location, bottom hole location, vertical surface projection of storage reservoir area of review, storage reservoir surface footprint ⁷

⁵ For example, if the project activity takes place within six villages, each village must have its own polygon.

⁶ See the *VCS Sectoral Scopes and Project Classification Guidance* for information about project categories.

⁷ See Section 2.2.1 of the *GCS Requirements, v5.0* for more information about required project geodata for projects under the carbon capture and storage project category.

Biomass-based carbon removals

Biochar application sites

2.3 AFOLU Projects

2.3.1 The geolocation file of an agriculture, forestry, and other land use (AFOLU) project shall contain:

- 1) polygons delineating all instances.
- 2) where required by the applied methodology, polygons of any project geodata. **Table 2** lists examples for each project category.

Table 2. Examples of common project geodata required by AFOLU methodologies

Project category	Common project geodata
Afforestation, reforestation, and revegetation	Control plots, donor pool area
Reduced emissions from deforestation and degradation	Reference area, reference region, reference regions for projecting rate of deforestation, reference region for projecting location of deforestation, leakage belt, activity shifting leakage area, leakage management area, proxy areas
Wetland restoration and conservation	Buffer zone and proxy areas
Avoided conversion of grasslands and shrublands	Project accounting area, reference area, activity-shifting leakage area, market leakage area
Agricultural land management	Control sites

2.3.2 For a jurisdictional REDD+ program, the geolocation file shall contain:

- 1) polygon(s) that delimit the jurisdictional forest reference emission level (FREL) area (for scenario 1) or the jurisdictional program area (for scenarios 2 and 3).
- 2) any project geodata specified in the VCS JNR requirements for the relevant scenario and the relevant jurisdictional program.

3 GEOLOCATION FILE STRUCTURE REQUIREMENTS

Geolocation files contain a large amount of information. Therefore, the file structures and naming conventions of the different elements presented must be standardized.

Each geolocation file contains folders, subfolders, and placemarks. Geometries (i.e., polygons, lines, or points) are stored as placemarks in folders and subfolders.

For example, a typical geolocation file for a project applying VCS methodology *VM0044 Biochar Utilization in Soil and Non-soil Applications* will have at least two folders: one folder depicting the project area (i.e., all project activity instances) and the other folder depicting the project geodata of the biochar application sites.

A typical geolocation file for a project applying VCS methodology *VM0047 Afforestation, Reforestation, and Revegetation* and using the area-based approach will have at least four folders: one folder depicting the project area (i.e., all project activity instances), one folder depicting the project geodata of the project plots, one folder depicting the project geodata of the donor pool area, and another folder depicting the project geodata of the control plots.

3.1 File Structure

3.1.1 The geolocation file of a grouped project shall be structured as follows:

- 1) Project activity instances shall be represented as placemarks and grouped by batch.⁸
- 2) Each batch shall be in a separate folder and grouped by eligibility area.
- 3) Each eligibility area shall be in a separate folder and nested in a single project area folder.
- 4) Each project geodata shall be represented as a placemark and grouped by project geodata type.
- 5) Each type of project geodata shall be in a separate folder.
- 6) Where available, each community land and territory associated with customary rights shall be represented by a placemark and nested in a single folder.
- 7) Where available, each area with competing claims to land or resource rights shall be represented by a placemark and nested in a single folder.

⁸ For more information about batches, see Section 3.5 of the *VCS Standard, v5.0* or equivalent section in a more recent version.

- 3.1.2 The geolocation file of a non-grouped project shall contain the following structure:
- 1) Project activity instances shall be represented as placemarks and grouped into a folder.
 - 2) Each project geodata shall be represented as a placemark and grouped by project geodata type.
 - 3) Each type of project geodata shall be in a separate folder.
- 3.1.3 For projects applying more than one methodology, the geolocation file shall be structured so that the relevant geolocation information (i.e., project area and project geodata) is nested within one folder per applied methodology.
- 3.1.4 The geolocation file elements shall be displayed as follows:
- 1) Each folder represented as a layer
 - 2) Each project activity instance represented as a geodetic polygon or a geodetic point (depending on the placemark type)
 - 3) Each eligibility area represented as a geodetic polygon, styled as a non-filled polygon with a bold outline
 - 4) Each project geodata represented as a geodetic polygon, styled as a filled polygon with 50% transparency
- 3.1.5 All geolocation files shall include an attribute table for the project area folder, which includes information on all project activity instances. The table shall include at least the following information:
- 1) Project activity instance ID
 - 2) Eligibility area ID (for grouped projects)
 - 3) Batch ID (for grouped projects)
 - 4) Project activity
 - 5) Project activity instance implementation date⁹
 - 6) Latitude (where the instance is represented by a polygon, list the latitudinal coordinate of the polygon's centroid)
 - 7) Longitude (where the instance is represented by a polygon, list the longitudinal coordinate of the polygon's centroid)
 - 8) Area in hectares (for instances represented by a polygon)

⁹ Date on which the instance started generating greenhouse gas emission reductions and carbon dioxide removals

3.1.6 All geolocation files shall include an attribute table for each project geodata folder. The table shall include at least the following information:

- 1) Project geodata ID, based on the naming convention in **Table 3**
- 2) Area in hectares (for polygons)
- 3) Latitude (where the project geodata is represented by a polygon, list the latitudinal coordinate of the polygon’s centroid)
- 4) Longitude (where the project geodata is represented by a polygon, list the longitudinal coordinate of the polygon’s centroid)

3.1.7 All coordinates shall:

- 1) be submitted in decimal degree format.
- 2) use the WGS 84 (EPSG:4326) coordinate system.

3.2 File Structure Naming Conventions

3.2.1 Geolocation files and their elements shall be identified using the naming conventions listed in **Error! Reference source not found..**

Table 3. Required naming conventions for geolocation file elements

Geolocation file element	Type	Naming convention for file
Geolocation file	Document	[ProjectID]_KML_DDMMYYYY
Methodology ¹⁰	Folder	[ProjectID]_[MethodologyID]
Project area	Folder	[ProjectID]_project_area
Eligibility area	Subfolder	[ProjectID]_EAs
	Placemark	[ProjectID]_EA#
Batch	Subfolder	[ProjectID]_EA#_B#
Instance in grouped project	Placemark	[ProjectID]_EA#_B#_I#
Instance in non-grouped project	Placemark	[ProjectID]_I#
Community lands and territories with associated customary rights	Folder	[ProjectID]_CR

¹⁰ Only applicable where more than one methodology is applied in the project

Community land or territory with associated customary rights	Placemark	[ProjectID]_CR_#
Areas with competing claims to land and resource rights	Folder	[ProjectID]_CC
Area with competing claim(s) to land and resource right(s)	Placemark	[ProjectID]_CC_#

3.2.2 Project geodata folders, subfolders, and placemarks shall be identified using naming conventions that:

- 1) are defined by the project proponent.
- 2) clearly identify the project ID and the project geodata type.
- 3) contain a unique identifier (e.g., a numerical ID) for each placemark.

Table 4 sets out recommended naming conventions for select project geodata types.

Table 4. Recommended naming conventions for select project geodata types

Geolocation file element	Type	Naming convention for file
Waste collection area	Folder	[ProjectID]_waste
	Placemark	[ProjectID]_waste_#
End-use site	Folder	[ProjectID]_end_use
	Placemark	[ProjectID]_end_use_#
Control site	Folder	[ProjectID]_control_site
	Placemark	[ProjectID]_control_site_#
Reference region or reference area	Folder	[ProjectID]_reference_region
		[ProjectID]_reference_area
	Placemark	[ProjectID]_reference_region_# [ProjectID]_reference_area_#
Leakage belt or leakage area	Folder	[ProjectID]_leakage_belt
		[ProjectID]_leakage_area
	Placemark	[ProjectID]_leakage_belt_# [ProjectID]_leakage_area_#

Buffer zone	Folder	[ProjectID]_buffer_zone
	Placemark	[ProjectID]_buffer_zone_#

3.2.3 Illustrative examples of XML views that reflect the file structure and naming convention requirements are depicted in Boxes 1 and 2.

Box 1. Example of an XML view of a properly structured KML file for a non-grouped biochar project applying VM0044

```

<Document>
  <name>9999_KML_01JAN2026</name>
  <Folder>
    <name>9999_project_area</name>
    <Placemark>
      <name>9999_I1</name>
      <ExtendedData>
        <Data name="InstanceID"><value>I1</value></Data>
        <Data name="ProjectActivity"><value>High technology production facility
        pyrolysis</value></Data>
        <Data name="InstanceImplementationDate"><value>01 JAN 2026</value></Data>
        <Data name="Latitude"><value>...</value></Data>
        <Data name="Longitude"><value>...</value></Data>
      </ExtendedData>

      <Point>
        <coordinates>...</coordinates>
      </Point>

    </Placemark>
  </Folder>

  <Folder>
    <name>9999_biochar_application_site</name>
    <Placemark>
      <name>9999_biochar_application_site_1</name>
      <ExtendedData>
        <Data name="BiocharAppSiteID"><value>1</value></Data>
        <Data name="Latitude"><value>...</value></Data>
        <Data name="Longitude"><value>...</value></Data>
      </ExtendedData>
    
```

```

    <Point>
      <coordinates>...</coordinates>
    </Point>

  </Placemark>
  <Placemark>
    <name>9999_biochar_application_site_2</name>
    <ExtendedData>
      <Data name="InstanceID"><value>2</value></Data>
      <Data name="Latitude"><value>...</value></Data>
      <Data name="Longitude"><value>...</value></Data>
    </ExtendedData>

    <Point>
      <coordinates>...</coordinates>
    </Point>

  </Placemark>
</Folder>
</Document>

```

Box 2. Example of an XML view of a properly structured KML file for a grouped reforestation project applying VM0047 with an area-based approach

```

<Document>
  <name>8888_KML_01JAN2026</name>
  <Folder>
    <name>8888_project_area</name>
    <Folder>
      <name>8888_EAs</name>
      <Folder>
        <name>8888_EA1_B1</name>
        <Placemark>
          <name>8888_EA1_B1_I1</name>
          <ExtendedData>
            <Data name="InstanceID"><value>I1</value></Data>
            <Data name="EligibilityAreaID"><value>EA1</value></Data>
            <Data name="BatchID"><value>B1</value></Data>
            <Data name="ProjectActivity"><value>Direct planting and seeding</value></Data>
          </ExtendedData>
        </Placemark>
      </Folder>
    </Folder>
  </Folder>
</Document>

```

```

        <Data name="InstanceImplementationDate"><value>01 JAN 2026</value></Data>
        <Data name="Latitude"><value>...</value></Data>
        <Data name="Longitude"><value>...</value></Data>
        <Data name="Area(ha)"><value>2</value></Data>
    </ExtendedData>

    <Polygon>
        ...[Polygon-specific XML]...
    </Polygon>

</Placemark>
</Folder>
</Folder>
</Folder>

<Folder>
    <name>8888_projectplots</name>
    <Placemark>
        <name>8888_projectplots_1</name>
        <ExtendedData>
            <Data name="ProjectPlotID"><value>1</value></Data>
            <Data name="Area(ha)"><value>1</value></Data>
            <Data name="Latitude"><value>...</value></Data>
            <Data name="Longitude"><value>...</value></Data>
        </ExtendedData>

        <Polygon>
            ...[Polygon-specific XML]...
        </Polygon>

    </Placemark>
</Folder>

<Folder>
    <name>8888_donorpool</name>
    <Placemark>
        <name>8888_donorpool_1</name>
        <ExtendedData>
            <Data name="DonorPoolID"><value>1</value></Data>
            <Data name="Area(ha)"><value>3</value></Data>
        </ExtendedData>
    </Placemark>
</Folder>

```

```
<Data name="Latitude"><value>...</value></Data>
<Data name="Longitude"><value>...</value></Data>
</ExtendedData>

<Polygon>
  ...[Polygon-specific XML]...
</Polygon>

</Placemark>
</Folder>

<Folder>
  <name>8888_controlplots</name>
  <Placemark>
    <name>8888_controlplots_1</name>
    <ExtendedData>
      <Data name="ControlPlotID"><value>1</value></Data>
      <Data name="Area(ha)"><value>1</value></Data>
      <Data name="Latitude"><value>...</value></Data>
      <Data name="Longitude"><value>...</value></Data>
    </ExtendedData>

    <Polygon>
      ...[Polygon-specific XML]...
    </Polygon>

  </Placemark>
</Folder>
</Document>
```

3.3 Valid Geometry

3.3.1 Geolocation files shall contain only valid geometries. Valid geometries possess the following characteristics:

- 1) Topologically correct polygons (i.e., closed outer rings, fully contained inner rings, correct ring orientation, non-self-intersecting)
- 2) Coordinates that are ordered to form continuous, non-self-intersecting boundaries
- 3) Complete and consistent vertices (i.e., free of nulls and malformed coordinates)

- 4) No duplicates, overlaps, cut lines, spikes, punctures, or unintended fragments
 - 5) No unnecessary complexities (e.g., duplicate ring nesting or excess vertices)
 - 6) Polygons within a multipolygon that do not overlap with other polygons nor form separate, non-contiguous parts of the multipolygon
- 3.3.2 All geometries should be reviewed using established GIS tools such as QGIS, ArcGIS, or GDAL.
- 3.3.3 Geolocation files shall not include areas irrelevant to the project. Examples of irrelevant geographic information include:
- 1) roads or building structures in an AFOLU project.
 - 2) rivers and lakes in a project taking place on cropland or forested areas.
 - 3) water bodies, dense forests, or building structures in a livestock management project.
 - 4) roads or open grasslands in a cookstove project.
 - 5) unrelated adjacent facilities in a landfill gas capture and flaring project.

3.4 Recommended Practices for Optimizing KML Files

- 3.4.1 To maintain reliable performance across platforms and efficient rendering, project proponents should apply the following optimization practices:
- 1) Keep geolocation file size below 10 MB.
 - 2) Include only essential geometries. Avoid large numbers of points, lines, vertices, or other non-critical features, as excessive geometries slow rendering and inflate file size. Remove unused styles, icons, images, folders, and metadata that provide no analytical value.
 - 3) Reduce coordinate precision and eliminate redundant geometry. Limiting coordinates to five decimal places maintains up to one-meter accuracy while significantly reducing file size.
 - 4) If the geolocation file size exceeds 200 MB, contact secretariat@verra.org for support.

4 RESOURCES

The following resources provide further guidance and best practices for creating and structuring KML files and ensuring they are valid. The resources include official specifications, user guides, and commonly used tools that support KML development, visualization, and quality assurance.

EPSG Geodetic Parameter Registry. n.d. "EPSG:4326. WGS 84 - WGS84 - World Geodetic System 1984, used in GPS." <https://epsg.io/4326>

Google Earth. n.d. “Google Earth Web.” https://earth.google.com/intl/en_/

Google for Developers. n.d. “KML Reference.”
<https://developers.google.com/kml/documentation/kmlreference>

Open Geospatial Consortium (OGC). 2015. “KML Specification (v2.3): OGC 12-007r2.”
<https://docs.ogc.org/is/12-007r2/12-007r2.html>

Open Geospatial Consortium (OGC). 2011. *Simple Feature Access – Part 1: Common Architecture*.
<https://www.ogc.org/standards/sfa/>

QGIS. n.d. “QGIS User Guide.” https://docs.qgis.org/3.40/en/docs/user_manual/index.html

DOCUMENT HISTORY

Version	Date	Comment
V5.0	9 June 2026	Initial version released under VCS <i>Version 5</i> .

ABOUT VERRA



Verra sets the world's leading standards for climate action and sustainable development. We build standards for activities as diverse as reducing deforestation, improving agricultural practices, addressing plastic waste, and achieving gender equality. We manage programs to certify that these activities achieve measurable high-integrity outcomes. We work with governments, businesses, and civil society to advance the use of these standards, including through the development of markets. Everything we do is in service of increasingly ambitious climate and sustainable development goals, and an accelerated transition to a sustainable future.

Verra's certification programs include the [Verified Carbon Standard \(VCS\) Program](#) and its [Jurisdictional and Nested REDD+ \(JNR\) framework](#), the [Climate, Community & Biodiversity Standards \(CCBS\) Program](#), the [Sustainable Development Verified Impact Standard \(SD VISta\) Program](#), and the [Plastic Waste Reduction Program](#).



Standards for a
Sustainable Future



**Verified Carbon
Standard**



**Jurisdictional and Nested
REDD+ Framework**



**Climate, Community
& Biodiversity Standards**



**Scope 3
Standard**



**Sustainable Development
Verified Impact Standard**



**Plastic Waste
Reduction Standard**