



**BIO4HUMAN**

## D2.1 Final Data Management Plan

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Due date: 31/05/2026

Responsible partner: Enspire

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\*R — Document, report; DMP — Data Management Plan; DATA — data sets, microdata, etc; DEC — Websites, patent filings, videos, etc.

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## 1. Executive Summary

This document presents the final version of the Bio4HUMAN Data Management Plan (DMP). While the first version of the DMP established the overall framework for data management within the project, this final version reports on how those procedures were implemented in practice and records the final decisions taken by the consortium regarding the collection, processing, storage, sharing, preservation and reuse of project data.

Compared with the initial DMP, this final version has been updated to reflect the actual data collected, generated and reused during the project, rather than only the data anticipated at the proposal and early implementation stages. It also provides a clearer distinction between the main categories of project data, including primary research data, operational and engagement data, and secondary data sources. This distinction was introduced to ensure that each type of data was managed according to its purpose, level of sensitivity, ownership, and potential for reuse.

The final DMP also clarifies the consortium's decisions regarding open, restricted and confidential data. Public project outputs, including deliverables, reports, policy briefs, guidance documents, tools and other non-confidential materials, were made available through the Bio4HUMAN website and/or the Bio4HUMAN Zenodo community to support long-term accessibility and reuse. In contrast, raw qualitative data, personal data, confidential business information, sensitive local information and internal working documents were not made publicly available and remain subject to access restrictions, confidentiality requirements and applicable data protection rules.

Throughout the project, the consortium ensured that all data management activities were conducted in full alignment with the FAIR data principles, ensuring that data were Findable, Accessible, Interoperable, and Reusable, and in compliance with the requirements of the European Commission. In this final version, the implementation of the FAIR data principles has been updated from a planned approach to a final implementation status. The consortium applied common naming, versioning and documentation practices to make data and outputs findable; used appropriate repositories and project platforms to make non-confidential outputs accessible; applied standard formats, metadata and methodological documentation to support interoperability; and promoted reuse through open access publication, clear documentation and, where relevant, standard reuse licences.

Data security procedures were further specified in this final version of the DMP. Project data were stored on secure, access-controlled platforms managed by the responsible partners, including KoBoToolbox, SharePoint, Google Drive, ELO and partner-managed institutional systems. Access to personal or sensitive data was limited to authorised personnel only. Where appropriate, datasets were anonymised or pseudonymised before analysis or sharing within the consortium. Physical records, where used, were stored securely and digitised or destroyed in line with partner data protection procedures.

Ethics and privacy measures were also updated to reflect the final procedures applied during the project. All data collection involving human participants was conducted in line with GDPR, Horizon Europe ethics requirements and the project's dedicated ethics deliverables. Informed consent procedures were applied, personal data collection was limited to what was strictly necessary, and no special category personal data were collected. The final DMP therefore confirms that Bio4HUMAN applied the principles of data minimisation, purpose limitation, confidentiality, accountability and "as open as possible, as closed as necessary" throughout the project.

The final DMP addresses the following main areas:

- The scope and objectives of data management covered within the project;
- An overview of the data that were collected, processed, and/or generated during the project;
- The implementation of the FAIR Data principles;
- The security measures established to protect project data throughout its lifecycle;
- The ethics and privacy strategy applied to safeguard personal and sensitive information.

This final version of the DMP summarises how data management was effectively implemented by the Bio4HUMAN Consortium. It demonstrates that all relevant procedures were established and maintained to ensure responsible, secure, and sustainable handling of project data, in accordance with FAIR principles and the European Commission's open data policies. It also confirms that the data management framework was adapted as the project evolved, that final decisions on openness, restriction, preservation and reuse were made, and that the project's data and outputs were handled in accordance with FAIR principles, European Commission open science requirements, GDPR and the ethical standards applicable to research in humanitarian contexts.

## 2. Introduction

### 2.1 Scope and Objectives

The purpose of the initial DMP was to provide an analysis of the main elements of data management during the Bio4HUMAN project, and how data will be handled in line with the European Commission's requirements. The final version of the DMP describes the data gathered, processed, and/or generated with the metadata attached to ensure their compliance with the FAIR data principles. The data management practices ensured that the project's data can be preserved, exploited, and shared in a consistent manner. As a final DMP, this document also explains how data management procedures were implemented in practice across the project lifecycle, including data categorisation, access conditions, security measures, responsibilities, preservation, and post-project handling.

Bio4HUMAN aimed to provide humanitarian aid operators and bio-based sector stakeholders, with science-based information on the application potential, sustainable performances, and circularity of bio-based products and systems, suitable for humanitarian purposes. In data management terms, the project generated and used several interrelated types of data to support this objective: primary research data from interviews, focus group discussions, surveys and observations; technical and analytical datasets related to the identification, assessment and comparison of bio-based solutions; operational and engagement data from communication, dissemination, training and stakeholder activities; and secondary data from literature, policy documents, humanitarian platforms, existing datasets and partner sources.

The role of the DMP was therefore not only to describe these data types separately, but also to define how they were connected and managed throughout the project. For example, secondary data supported stakeholder mapping, needs assessment and the scoping of bio-based solutions; primary data from humanitarian contexts informed the feasibility, socio-economic and governance analysis; and technical datasets, including Life Cycle Assessment (LCA) and Life Cycle Costing (LCC)-related data, supported the assessment of environmental and economic performance. These different data streams were then consolidated into project outputs such as reports, guidance documents, tools, policy recommendations and the replication roadmap.

To address the different nature and sensitivity of these data, the DMP established procedures for data collection, documentation, storage, access, sharing and reuse. Public, non-confidential outputs were prepared for open access and long-term preservation through the project website and Zenodo, while personal data, raw qualitative data, confidential business information and sensitive contextual information were subject to restricted access, anonymisation or pseudonymisation where appropriate, and secure storage by the responsible partners. This ensured

that the project could maximise the reuse and impact of its results while protecting participants, partners and stakeholders.

This last version of the Data Management Plan is submitted to the EU in May 2026.

## 2.2 List of Abbreviations

BIC	Bio-based Industries Consortium
BSF	Black Soldier Fly
CBO	Community-based organisations
DRC	Democratic Republic of Congo
DMP	Data Management Plan
FAIR	Findable, accessible, interoperable, reusable
FGD	Focus Group Discussion
GDPR	General Data Protection Regulation
HNPW	Humanitarian Networks and Partnerships Week
HO	Humanitarian Organisation
ICRC	International Committee of the Red Cross
IFRC	International Federation of Red Cross and Red Crescent Societies
INGO	International non-government organisation
KII	Key Informant Interview
LCA	Life Cycle Assessment
LCC	Life Cycle Costing
LCI	Life Cycle Inventory
LCIA	Life Cycle Inventory Assessment
NGO	Non-government organisation
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
PAH	Polska Akcja Humanitarna (Polish Humanitarian Action)
PII	Personally identifying information
PIN	People in Need
PRO CIVIS	Fundacja Edukacji i Dialogu Społecznego PRO CIVIS
SME	Small and medium-sized enterprise
SWM	Solid Waste Management
WP	Work Package
WREC	Waste Management Measuring, Reverse Logistics, Environmentally Sustainable Procurement and Transport, and Circular Economy

### 3. Data Summary

The data collected, generated, and used in the Bio4HUMAN project are structured into three distinct and non-overlapping categories. This categorisation was introduced to reflect the different purposes, sensitivity levels, access conditions, and reuse potential of the data generated across the project. It also ensured that data were managed proportionately, depending on whether they were public, internal, confidential, anonymised or pseudonymised. In line with the principle of data minimisation, the consortium collected only the data necessary to answer the project's research questions, support technical and socio-economic analysis, and produce the planned deliverables.

#### 1. Project-generated (primary research) data

Data produced directly through research activities carried out within the project. This includes, for example, surveys, observations, key informant interviews (KIIs), focus group discussions (FGDs), and any analytical datasets derived from these. This category included both anonymised and pseudonymised data. Personal identifiers, where collected for KIIs, were kept separate from analytical findings and were not included in public outputs. FGDs did not collect personal identifying data. Raw interview notes, transcripts, consent forms and other sensitive research materials were treated as restricted data and stored only by the responsible partners.

#### 2. Activity-generated (operational and engagement) data

Data generated through non-research project activities, such as dissemination and communication actions, training sessions, workshops, and events. This includes participant lists, feedback forms, attendance records, and engagement metrics. These data were mainly used for project implementation, reporting and communication monitoring. Where they contained personal data, such as names, affiliations or contact details, access was restricted and the data were not made publicly available. Aggregated or non-identifiable results could be used in public reporting.

#### 3. External (secondary) data sources

Data not generated by the project but used to support its objectives. This includes scientific literature, policy documents, existing datasets, reports from previous or ongoing projects, and data provided by partners or stakeholders. These data were mainly public or already available to partners, but some partner-provided datasets or business-related information were treated as confidential where they contained proprietary, commercially sensitive or context-sensitive information.

Where datasets could potentially fall into multiple categories, classification is based on their primary purpose within the project.

### 3.1 Re-use of Existing Data

Existing data were reused because the project addressed a field where primary data are difficult to collect, and where humanitarian solid waste management (SWM) data are often fragmented, context-specific or unavailable. The use of secondary data helped reduce unnecessary data collection, limit respondent fatigue, contextualise findings from the Democratic Republic of Congo (DRC) and South Sudan, and triangulate primary data from KIIs, FGDs, surveys and observations. It was also necessary for technical assessments, including the LCA work, where existing Life Cycle Inventory (LCI) databases and methodological datasets were required to ensure consistency and comparability.

- **Internal partner datasets and databases**, including data from previous and ongoing projects;
- **Humanitarian data platforms and coordination systems**, including databases and information systems of humanitarian clusters and organisations, as well as repositories such as ReliefWeb and other humanitarian knowledge platforms. This also includes data generated through coordination mechanisms and events (e.g. Humanitarian Networks and Partnerships Weeks (HNPW), working groups), such as recordings, transcripts, and summary outputs;
- **Specialised humanitarian and sustainability platforms and repositories**, including EHA Connect, Climate Action Accelerator, Elrha, and resources from United Nations Environment Programme and the Red Cross/Red Crescent Environmental Hub (REH);
- **Governmental and institutional data sources**, including ministries, local authorities, and environmental agencies providing policy frameworks, implementation data, and contextual information relevant to waste management, bioeconomy, and humanitarian operations;
- **Publicly available policy, legal, and regulatory documents**, including national legislation (e.g. country-specific legal frameworks such as those of South Sudan), as well as European and international strategies relevant to the bioeconomy and circular economy;
- **Reports and grey literature from humanitarian organisations (HOs)**, including publications from the International Committee of the Red Cross (ICRC), International Federation of Red Cross and Red Crescent Societies (IFRC), UN agencies, and non-government organisations (NGOs). This includes annual reports, technical guidelines, project reports, and donor requirement documents;
- **Humanitarian standards, guidelines, and toolkits**, including SWM manuals, operational guidance, and internationally recognised standards such as the Sphere Handbook and guidance from the Inter-Agency Standing Committee;

- **Baseline studies and sector-wide assessments**, including programme baselines, environmental and waste assessments, and broader analytical work (e.g. WREC baselines, Joint Initiative analyses), used to contextualise project findings and benchmark results;
- **Scientific and academic literature**, including peer-reviewed publications accessed through open-access repositories and search platforms such as Google Scholar;
- **Databases and outputs from EU-funded projects**, including those available via CORDIS;
- **Databases related to intellectual property rights**, including those of the European Union Intellectual Property Office and the European Patent Office;
- **Platforms and networks relevant to the bioeconomy and humanitarian sectors**, such as Bio-based Industries Consortium (BIC), Circular Cities and Regions Initiative, Humanitarian 4.0 Community, EU CAP Network, and EU FarmBook;
- **Databases and catalogues of bio-based solutions**, including listings compiled by national and international organisations and award schemes recognising innovative products and technologies;
- **LCA databases and methodologies**, including Industry 2.0 and ecoinvent datasets, as well as Life Cycle Inventory Assessment (LCIA) methods such as Impact World+ and the European Commission Environmental Footprint (EF) 3.1, implemented in SimaPro;
- **Additional secondary datasets** used to support specific analyses and project activities.

These data sources supported key project activities, including stakeholder identification, the humanitarian sector needs assessment (WP3), the scoping and selection of bio-based solutions, LCAs (WP5), and feasibility assessments conducted under WP6.

### 3.2 Data types and formats

The outputs produced in Bio4HUMAN were primarily in the form of text-based resources, including reports, toolkits, and procedural descriptions. These were, where relevant, supported by structured datasets, most commonly in Excel format. Examples include internal project databases developed under specific tasks, such as T3.1 (D3.1 stakeholder database), T4.2 (database of bio-based solutions), and the Life Cycle Costing (LCC) tool developed under D6.1.

In addition, structured data collection templates were developed and used, particularly for technical assessments. For example, standardised Excel-based templates were created for the LCI stage of the LCA, covering both current and

innovative solutions (products and processes), as documented in Annex 2 and Annex 3 of D5.1. These templates were populated by LCA partners based on their technical expertise.

Throughout the project, a wide range of data were collected, processed, and generated, covering the following key areas:

- Stakeholder engagement
- Humanitarian sector needs assessment
- Scoping exercise for bio-based solutions
- LCA (environmental and social)
- LCC
- Feasibility assessment
- Replication and capacity building

The following data formats and types were used:

- **Research data and outputs** - raw and processed data collected/generated through scientific and fieldwork activities, including KIIs with stakeholders (e.g. businesses, government representatives, humanitarian actors, and research institutions), FGDs with community members, and associated analytical outputs;
- **Project internal databases** - structured datasets (primarily in Excel format), including stakeholder databases, bio-based solutions inventories, LCA/LCC datasets, and other analytical datasets developed within the project;
- **Project operational and reporting data** – project deliverables and internal documents in formats such as Word, Excel, and PDF (e.g. reports, toolkits, procedural documents);
- **Audio-visual materials** - video recordings from training sessions and workshops;
- **Photographic documentation** – images collected during fieldwork and project activities, including:
  - Waste streams and formal/informal dumping sites in case study locations;
  - Stakeholder engagement activities (e.g. interviews and community interactions, where consent was obtained);
  - Operational aspects of waste management (e.g. waste collection and transport, including waste trucks);
  - Waste valorisation processes and technologies (e.g. Black Soldier Fly (BSF) systems, biogas technologies, production of eco-briquettes from bio-waste, and paving stones from plastic waste).

Data collected via the project website are processed in accordance with the project's privacy policy, available at: <https://bio4human.eu/privacy-policy/>

All publicly accessible project materials and data outputs—including reports, policy briefs, guidance documents, and replication tools—are archived in the Zenodo Bio4HUMAN community (<https://zenodo.org/communities/bio4human/records>) to ensure long-term preservation, accessibility, and reuse, and are also made available through the project website's Resources page (<https://bio4human.eu/resources/>) for dissemination purposes.

At project completion, public and non-confidential outputs will be archived or made available through the Bio4HUMAN Zenodo community and/or the project website, including public deliverables, reports, guidance documents, policy briefs, tools, templates and non-confidential datasets. Internal analytical datasets needed to support project results were retained securely by the responsible partners, subject to the applicable retention period and access restrictions. Raw personal data, consent forms, interview notes/transcripts, confidential business information, sensitive local information, duplicate working files and any data not necessary for future verification or legal/project obligations were not retained as open data and were not made available for reuse. Where such data must be retained temporarily for accountability or audit purposes, they remain stored under restricted access and will be deleted or anonymised after the applicable retention period.

### 3.3 Data Utility

The data collected/generated/re-used in the Bio4HUMAN project proved valuable for a wide range of stakeholders, including:

- **Humanitarian and development organisations and donors**, including United Nations agencies, international non-governmental organisations (INGOs), national NGOs, and governmental development agencies (e.g. Japan International Cooperation Agency),
- **Civil society organisations**, including non-governmental organisations (both international and national), community-based organisations (CBOs), and social movements;
- **Scientific and academic community**, including researchers, universities, and research institutes working on bio-based solutions, circular economy, and related fields;
- **EU-funded projects and research initiatives** operating in the bioeconomy, circular economy, and humanitarian sectors;
- **Business community**, including small and medium-sized enterprises (SMEs), start-ups, entrepreneurs, companies, trade associations, and business chambers, in particular BIC;
- **Policymakers and public authorities** at European, national, and regional levels.

The utility described in this section mainly concerns public, aggregated, anonymised or otherwise non-confidential data and outputs. Raw personal data, confidential business information, sensitive local information, and restricted internal datasets

are not intended for public reuse and remain subject to the access and retention conditions described in this DMP.

Members of these stakeholder groups can use the project's data and outputs to support the replication of identified bio-based solutions, inform further scientific research, and contribute to the development of collaborative projects and actions.

For example, key deliverables and outputs, such as the list of bio-based solutions, the gap analysis report, and the hotspot analysis of current and innovative solutions, can be used by HOs and donors to inform decision-making, guide investments, and support the uptake and replication of suitable solutions in relevant contexts.

Furthermore, bio-based research institutions and companies can use the results of the scoping and LCA to strengthen collaboration between the bioeconomy and humanitarian sectors, including by applying the developed guidelines in other contexts.

Policymakers can use the data and outputs generated by the Bio4HUMAN project to inform, adapt, or develop policies addressing SWM challenges in humanitarian settings.

In addition, tools developed within the project, such as the needs assessment tools under D3.3, can be used by stakeholders to conduct their own SWM assessments and support evidence-based decision-making in different operational contexts. These tools also increase the replicability of the project approach by allowing other organisations to adapt the Bio4HUMAN methodology to different humanitarian settings.

## 4. FAIR Data

The FAIR data principles — Findable, Accessible, Interoperable, and Reusable— guided all data management activities within the Bio4HUMAN project. Throughout the project, the consortium ensured that all datasets and outputs were properly documented, stored, and shared in line with these principles and the requirements of the European Commission.

As this is the final DMP, this section reports the final status of the FAIR measures implemented during the project. Compared with the initial DMP, which described planned procedures, this version clarifies which outputs were made openly available, which data remain restricted or internal, and how access, preservation and reuse were managed in practice.

This section describes the measures taken to ensure the alignment with the FAIR data principles.

## 4.1 Making data findable, including provisions for metadata

To allow the reuse of non-confidential Bio4HUMAN data, metadata and data should be easy to find. The data generated/collected/reused in the Bio4HUMAN project is identifiable and locatable by means of unique identification mechanisms. Files are uniquely identifiable by using standardized name conventions and clear versioning.

The following common rules for dataset/output naming and versioning were used to ensure data visibility, discoverability, citation, and permanent online tracking. The title for each dataset consists of:

Project acronym: Task title or short description Task aims: additional information specifying coverage and nature of data/output (optional: version number in case of revisions or updates).

For example:

Bio4HUMAN: Data Management Plan V.1

Bio4HUMAN: List of bio-based solutions

Furthermore, specific, and consistent keywords were associated with each dataset or output to enhance semantic discoverability. For public records deposited on Zenodo, findability was further supported through persistent DOIs, metadata fields, author information, funding information, keywords, licensing information and links to the Bio4HUMAN project/community.

## 4.2 Making data accessible

Bio4HUMAN followed the principle “as open as possible, as closed as necessary.” Namely, all data has been made available, except for the type of data that is defined as confidential for various reasons, including commercial, privacy, and security considerations. Where relevant, scientific publications were published with green/golden Open Access.

To facilitate access, data and other outputs were repositied and published through project platforms such as the website, social media, as well as self-archived by the Bio4HUMAN consortium members’ websites, repositories, and other platforms.

By the end of the project, the accessibility status of Bio4HUMAN data and outputs was clarified as follows:

<b>Data/output type</b>	<b>Final status</b>
Public deliverables and reports	Deposited or planned for deposit on Zenodo and/or made available through the Bio4HUMAN website. This includes, for example, D3.3, D4.1, D4.2 and WP5 outputs.

Public datasets and tools	Made openly available where they do not contain personal, confidential or sensitive information. This includes, for example, the DRC and South Sudan stakeholder database and reusable templates/tools.
Communication and dissemination materials	Made publicly available where relevant, including presentations, abstracts and event materials uploaded to Zenodo and project website.
Raw qualitative data from KIIs and FGDs	Restricted. Interview notes, transcripts and consent forms were not deposited openly and remain stored securely by the responsible partners.
Personal data	Restricted and not publicly available. Where needed for analysis, data were anonymised or pseudonymised.
Confidential business, municipal or locally sensitive information	Restricted/internal. Such data were not uploaded to Zenodo and are shared only with authorised partners or stakeholders where legally and ethically appropriate.
Internal working files and administrative project records	Internal. These are retained according to project, audit and partner retention obligations, but are not intended for public reuse.

**Table 1: Accessibility status of Bio4HUMAN data and outputs**

#### 4.2.1 Data Accessibility and Preservation

The consortium has stored the research data in formats suited for long-term preservation and accessibility, ensuring compliance with FAIR data principles and Horizon Europe open science requirements.

By the end of the project, the following measures had been implemented:

##### 1. Specification of openly available and confidential data

The Bio4HUMAN consortium clearly distinguished between openly available and confidential datasets, based on their content, ownership, and potential sensitivity:

- **Openly available data and outputs** included all public deliverables, reports, policy briefs, replication manuals, guidelines, templates, tools (including the D3.3 Needs assessment tools), and marketplace data that did not contain confidential or proprietary information. These resources were made publicly accessible through the Bio4HUMAN Resources website page and Zenodo community page. Examples of open Zenodo records include the Humanitarian Sector Needs Assessment Report, the List of Bio-based Solutions, the Gap Analysis Report, WP5 LCA-related outputs, stakeholder database material, and dissemination presentations.

- **Confidential data** included internal documentation, business information from entrepreneurs and investors regarding products and technologies, sensitive municipal information, and qualitative data collected through stakeholder engagement activities. This includes, in particular, transcripts and notes from KIIs and FGDs involving stakeholders such as businesses, government representatives, humanitarian organisations, research institutions, and community members (as outlined in Section 3.3).

These data were stored on secure servers of the respective partners and were shared only within the consortium or with authorized stakeholders, in line with confidentiality agreements and data protection regulations. This represents an adaptation from the initial DMP: instead of treating data accessibility only as a planned measure, the final DMP records the actual access status of each main data category.

#### **4.2.2 Data and Metadata Deposition**

All public datasets and materials were deposited in repositories supporting long-term preservation and open access, primarily Zenodo, which assigns a persistent DOI (Digital Object Identifier) to each record. The deposited materials included:

- Project deliverables and reports in PDF format;
- Communication materials;
- Publications and papers published by the consortium;
- Datasets.

At the time of finalising this DMP, the Bio4HUMAN Zenodo community included a combination of public deliverables, datasets and dissemination materials. Remaining public outputs that were still under finalisation, approval or submission at the time of this DMP will be uploaded after validation, provided that they do not contain confidential, personal or otherwise restricted information.

Metadata accompanying each dataset described its origin, content, author(s), creation date, licensing, access rights, and links to related deliverables or publications.

Non-public datasets were stored in the internal repositories of the partners responsible for their generation under secure access controls.

#### **4.2.3 Access Restrictions and Provision of Access**

Access restrictions were applied only, when necessary, primarily to protect privacy, business confidentiality, or sensitive local data. In such cases:

- The data description and metadata remained discoverable in project documentation and internal registries, even if the dataset itself was restricted.

- Access to restricted data could be granted upon formal requests to the data owner or project coordinator, subject to the terms of a data-sharing agreement ensuring lawful and ethical use.
- For qualitative data collected through KIIs and FGDs, access and reuse were further subject to the conditions defined in the informed consent forms signed by respondents.
- Sensitive data were stored on secure password-protected platforms managed by the respective partners.

Electronic data were stored on encrypted platforms (KoBo Toolbox, ELO, SharePoint, Google Drive). In addition, qualitative data analysis was conducted using ATLAS.ti (cloud version) for WP3 and WP6. Only pseudonymised datasets, where all personally identifiable information (PII) had been removed, were uploaded and processed within this environment.

All open data were made available under a Creative Commons Attribution (CC BY) license, ensuring that users could freely access, use, and adapt the materials with appropriate credit to the Bio4HUMAN consortium. Raw personal data, confidential business information, sensitive local data and internal working files were not licensed for open reuse and were excluded from public deposition.

Through these measures, the Bio4HUMAN consortium ensured that all research data and outputs were properly preserved, clearly classified, and accessible according to FAIR and ethical standards—balancing transparency and openness with the necessary protection of sensitive information.

### 4.3 Making data interoperable

Datasets follow the convention of the repository they are hosted at. All relevant documentation explaining methodologies and data, including data collection procedures, processing, and data quality information has been made available alongside the datasets in order to guarantee reproducibility and enable validation of the findings. All datasets are described using standard descriptive metadata schemas, such as Dublin Core and DataCite Metadata Schema.

For T3.3, T6.1 and T6.2, data from surveys and direct observations were collected using KoBoToolbox (KoBoCollect). Kobo uses metadata vocabulary associated with Open Data Kit (ODK). For direct observations, PIN & PAH also used geopoint functionality to collect geographic data (GPS coordinates).

Qualitative data from KIIs and FGDs were collected using structured questionnaires in Word format and subsequently processed for analysis. Quantitative survey data and direct observations were collected using KoBoToolbox to ensure standardisation and consistency.

Data was collected and shared in a standardized way using a standard format for that data type. References were made to the software(s) required to run it. There

have been no barriers or interoperability issues. The table below summarises the types of metadata applied.

<b>General information</b>	<b>Sharing and Access</b>	<b>Methodology</b>
Title	Access restrictions	Description of methods
Identifier (e.g. DOI)	Link to data repository (e.g. Zenodo)	Data collection methods (e.g. surveys, KIIs, FGDs, observations)
Author(s)/ data creator(s)	Links to publications citing the data	Instruments / software used (e.g. KoBo Toolbox, ATLAS.ti)
Date of production	Link to data source (if reused)	Data processing (e.g. cleaning, coding, pseudonymisation)
Project information (acronym, grant number)	Conditions for reuse / data-sharing	Ethical considerations (e.g. informed consent procedures)
Data type and format (e.g. Excel, Word, PDF, audio-visual)		Quality assurance and validation procedures
Versioning / update status (if applicable)		Geographic information (e.g. GPS/geopoints, where relevant)

**Table 2: Bio4HUMAN Metadata types**

#### 4.4 Increase data reuse

Throughout the project, the Bio4HUMAN consortium actively promoted the re-use of data and outputs by making all non-confidential materials easily accessible, well-documented, and aligned with FAIR and open science principles.

In general, data and outputs were uploaded to the Bio4HUMAN website and Zenodo community to make them more accessible for reuse. Relevant documentation explaining data collection/generation/reuse procedures (e.g., methodologies) were made available with the data, to guarantee reusability.

When relevant, the data generated will be licensed using standard reuse licenses, in line with the obligations set out in the Grant Agreement.

The examples of data to be reused: humanitarian sector needs assessment data, the list of bio-based solution and its sustainability scoring matrix, gap analysis report on supply chain management in the humanitarian context, substantive

content of policy briefs, images and videos collected during the project. The template for data collection of innovative products and technologies/processes as well as the needs assessment tools can be used for gathering data in other projects, making it replicable.

## 5. Allocation of resources

The activities related to data management, open access, and long-term preservation were successfully implemented within the framework and budget of the Bio4HUMAN project. These activities were carried out in line with Horizon Europe's requirements for FAIR and open data.

All costs associated with preparing, maintaining, and publishing datasets and outputs were covered through the respective work packages (WPs) and recognized as eligible costs under the project's Grant Agreement.

The consortium partners integrated data-related tasks into their existing responsibilities, ensuring that the collection, documentation, and sharing of data were coordinated efficiently across all project activities.

### 5.1 Budget and funding

Resources for data management were allocated as part of:

- **Work Package 1 and 2**– coordinated by *Enspire Science*, which oversaw the preparation and maintenance of the DMP and ensured alignment with FAIR principles;
- **Work Package 3** – coordinated by PIN, which oversaw the identification of key stakeholder in South Sudan and the DRC (D3.1), the planning of the scoping exercise (D3.2), and the identification of challenges and opportunities related to SWM in humanitarian settings, as documented in the Humanitarian Sector Needs Assessment Report (D3.3).
- **Work package 4** – Coordinated by PRO CIVIS, responsible for the scoping of bio-based innovative technological solutions and bio-based systems, identification of supply chains gaps in SWM system for humanitarian action and delivering Gap Analysis for the existing solutions and supply chains. All datasets generated were made publicly available with Deliverables D4.1 and D4.2.
- **Work package 5** – coordinated by WeLOOP, focused on the development of LCI for both reference and solution items, as well as the associated impact assessment results. The LCI datasets generated within this WP are documented and made available in Deliverable 5.1. The subsequent environmental impact assessment results and their interpretation are presented in Deliverables 5.2 and 5.3.

- **Work package 6** – coordinated by PAH, which included the collection and analysis of qualitative data (e.g. KIIs and FGDs), building on anonymised datasets provided by PIN and additional data collected by PAH. All sensitive data were pseudonymised and stored in restricted-access folders. WP6 also incorporated the use of secondary data sources, as described in Section 3.1, to support feasibility assessments;
- **Work Package 7 and 8** – which covered project communication activities, website management, and open-access data sharing of non-confidential materials such as reports, guidelines, and replication resources.

### Open access publication costs

Open access publication costs were covered by the project partners responsible for leading the respective publications, typically the main authoring institutions. Where applicable, these costs were planned within the partners’ institutional budgets or covered through project resources allocated for dissemination and communication activities.

The consortium ensured that all peer-reviewed publications were made openly accessible in line with Horizon Europe open science requirements, either through gold open access (publisher-mediated) or green open access (self-archiving in repositories such as Zenodo).

## 5.2 Responsibilities

The project coordinator (Enspire Science) was responsible for the overall coordination of data management, including updates to the DMP, monitoring of FAIR compliance, and ensuring adherence to the consortium’s data policies.

Each partner organisation was responsible for:

- Safely storing the data, it generated or managed;
- Providing metadata and documentation according to project standards;
- Uploading or transferring data to designated repositories (e.g., Zenodo);
- Ensuring compliance with data protection and confidentiality agreements.

The consortium collectively reviewed data-sharing practices at regular intervals to ensure coherence, transparency, and compliance with European Commission requirements.

## 5.3 Long-term Preservation and Sustainability

At project completion, the consortium ensures that all public data and outputs were deposited in trusted repositories supporting long-term preservation and open access, primarily the Bio4HUMAN Zenodo community. Public outputs deposited in Zenodo will remain available beyond the project lifetime through persistent records

and identifiers. In addition, the Bio4HUMAN website will remain available for five years after the project end to support the findability and accessibility of project results.

Long-term storage of internal and confidential data will be maintained by the partners on secure institutional servers, following the same data protection and confidentiality standards applied during the project. In line with the Horizon Europe Grant Agreement, project records and supporting documents, including data necessary to demonstrate proper project implementation, will be retained for five years after the final payment, unless a longer retention period is required because of ongoing audits, reviews, investigations, litigation, national legal obligations, or institutional retention rules.

Confidential data will therefore be retained only where necessary for project accountability, auditability, legal compliance, or verification of results. Such data include restricted internal documentation, confidential business or technical information, sensitive contextual information, and non-public analytical datasets. These data will remain accessible only to authorised personnel and will not be deposited in open repositories. After the applicable retention period, confidential data that are no longer needed will be securely deleted or anonymised, depending on the nature of the data and the partner's internal data protection procedures.

Personal data and raw qualitative research materials, including consent forms, interview notes, transcripts, and any files containing directly or indirectly identifiable information, will be retained only for as long as necessary and proportionate to fulfil project, legal, audit and ethics obligations. Where retention is required, these data will be stored under restricted access by the responsible data-collecting partners, primarily PIN and PAH for field research data from the DRC and South Sudan. After the retention period, these records will be securely deleted or fully anonymised, unless further retention is required by law or an ongoing procedure.

Responsibility for secure storage, retention and deletion remains with the partner that generated or manages the relevant data. Enspire, as project coordinator, remains responsible for overall coordination of the DMP and project-level records. PIN and PAH remain responsible for primary field data and related consent documentation collected in the DRC and South Sudan. Other work package leaders remain responsible for the internal or confidential datasets generated under their tasks, including technical, LCA/LCC, scoping, stakeholder, policy and dissemination-related data.

The consortium also defined a simple sustainability plan for maintaining access to key outputs and materials beyond the project's lifetime, ensuring that results, policy recommendations, remain available to stakeholders, policy makers, and researchers. The website will be available for 5 years after the project end to ensure findability and long-term access of results.

Through a combination of clear partner responsibilities, adequate budget allocation within WPs, and the use of permanent open-access repositories, Bio4HUMAN ensured the sustainable and compliant management of all data and outputs, leading to the maximisation of the project's long-term value and impact.

## 6. Data security

During the project, data and outputs were stored on the reliable and secured storage system of the partners. Every partner was responsible for ensuring that the data are stored safely and securely and in compliance with European Union data protection laws and in accordance with Article 27 (Appendix A).

At project completion, responsibility for secure storage does not transfer automatically to a repository for all categories of data. Public, non-confidential outputs deposited in open repositories, such as Zenodo, will be preserved through those repositories. However, internal, restricted, confidential and personal data will remain under the responsibility of the partner that generated or manages the data. This distinction is necessary because not all project data are suitable for open deposition or long-term public reuse.

Only authorized personnel working directly with the Bio4HUMAN project were granted access to the files containing personal data.

Electronic data were stored on encrypted platforms (KoBo Toolbox, ELO, SharePoint, Google Drive), while physical records of data were stored in locked cabinets on PIN DRC/HQ and PAH SS/HQ premises, with access restricted to authorized personnel only. Where appropriate, physical records were digitised (scanned), with the resulting electronic versions stored on encrypted platforms, and the original physical copies securely destroyed in accordance with data protection procedures.

PIN and PAH's internal data protection and information security policies that use GDPR-compliant tools to collect, process, and store data are applied. These policies include measures such as pseudonymisation and/or encryption of personal data, storage on secured cloud platform, and policies and procedures to ensure confidentiality, integrity, and availability. When needed, DPOs were consulted for advice on how to achieve a level of data security that is commensurate to the potential risks to Bio4HUMAN data subjects. These measures are consistent with D9.2, which specifies that personal data collection was minimised, that no health data or special categories of personal data were processed, and that only data strictly necessary for WP3 and WP6 research purposes were collected.

After the end of the project, sensitive and confidential data will continue to be treated according to the same security standards applied during implementation. In line with the Horizon Europe Grant Agreement, project records and supporting documents necessary to demonstrate proper implementation will be retained for

five years after the final payment, unless a longer period is required due to audits, reviews, investigations, legal proceedings, national law or institutional rules. The standard Horizon Europe time limits also set confidentiality and record-keeping at five years after final payment.

Personal data, consent forms, interview notes, transcripts, pseudonymisation keys and other raw qualitative research materials will not be made publicly available. They will be retained only where necessary for auditability, accountability, legal compliance or verification of project results, and only by the responsible partner, primarily PIN and PAH for field data collected in the DRC and South Sudan. After the applicable retention period, these records will be securely deleted, destroyed or fully anonymised, depending on the nature of the data and the relevant partner's internal procedures. Paper records containing personal data will be destroyed securely, and electronic files will be deleted from active storage and restricted-access systems in line with organisational data protection procedures.

Confidential business information, sensitive contextual information, internal working files and restricted analytical datasets will also remain stored under access control by the responsible partners and will not be deposited in open repositories. Access after the project will be limited to authorised staff only and granted solely where necessary for audit, legal, verification or legitimate follow-up purposes. Where such data are no longer required, they will be securely deleted or anonymised.

In the event of security incidents, relocation, device loss or operational disruption in the field, PIN and PAH procedures remain applicable. D9.4 specifies that HO staff and security focal points are responsible for safeguarding or evacuating assets such as laptops, phones, tablets and storage devices, while IT departments are responsible for restricting access to organisational resources on devices that cannot be recovered. D9.5 further confirms that fieldwork-related notes and materials must be kept carefully and stored safely, and that PIN and PAH internal safety and security procedures apply to Bio4HUMAN field activities.

Overall, post-project data security will follow a differentiated approach: public outputs will remain available through trusted repositories and the project website; internal and confidential data will remain securely stored by the responsible partners; personal and sensitive data will be retained only for the required period and then securely deleted, destroyed or anonymised; and access to all restricted data will remain limited to authorised personnel.

## **6.1 Data security of HOs**

### **6.1.1 PAH Data security**

PAH'S IT structure is based on the Microsoft Azure hybrid environment configured with the Azure AD connect tool. The centralized IT structure, i.e. the on-premises environment along with local resources, is located at the HQ and is available in the

internal network or via VPN. In addition, most of the resources are in the Azure environment with access to all authorized domain users including country offices. In total, data is backed up in 3 different places with different frequency depending on data priority and criticality. For daily backups PAH uses tapes and the IBM TS3100 3573 tape libraries. Tapes are stored outside the server room in a fireproof strongbox. The same data is also backed up to external disk drive storage, which is part of the PAH's IT infrastructure. In addition, once a week data is backed up to the Azure cloud. In summary, PAH keeps data backup on tapes (manual backup) on external disk drive storage (automatic backup) and in the Azure cloud (automatic backup). The software used for this purpose is MABS and Veeam. In principle PAH does not have a data recovery plan, however every single backup solution is occasionally tested. PAH is in progress of implementation of a data recovery plan, but so far because of the relatively small size of the IT infrastructure it was not officially in usage. For now, PAH's IT service provider is responsible for data recovery.

### **6.1.2 PIN Data Security**

PIN stores project quantitative data directly in KoboCollect that uses the Humanitarian Server, which is a cloud server hosted by UN Office for the Coordination of Humanitarian Affairs (OCHA). PIN also stores their qualitative data in restricted folders on SharePoint, which also stores data in an online cloud. This means that even if PIN's work devices face technical challenges, their data is safely accessible from any other device given that the user has access rights and credentials.

## **7. Ethics**

All the ethics issues related to the data collection and use during the Bio4HUMAN project were covered by WP9 Ethics and its deliverables. Namely:

D9.1 H - Requirement No. 1 covering the procedures and criteria that were used to identify/recruit research participants (including inform consent and preservation of data).

D9.2 POPD - Requirement No. 2 covering the processing of personal data (including a description of the security measures that were implemented to prevent unauthorised access to personal data and Description of the anonymisation/pseudonymisation techniques that were implemented, personal data transfers from a non-EU country to the EU or another third state).

These ethics deliverables also define the conditions for any future use of data generated through the project. D9.1 established that participants had to be informed not only about participation in the research, but also about how their data would be collected, protected, stored, potentially published, and whether raw data would be destroyed or only findings reused after the project. Therefore, the future use of

Bio4HUMAN research data is limited to the purposes explained to participants and covered by the informed consent procedures.

The following general practices were applied:

All data collection and processing activities in Bio4HUMAN were conducted in full compliance with Horizon Europe ethical requirements, the General Data Protection Regulation (GDPR), and relevant national legislation. Ethical procedures were defined and implemented through dedicated ethics work package deliverables, including informed consent protocols and personal data protection measures.

Participation in all research activities (e.g. KIIs, FGDs, and observations) was voluntary and based on informed consent. Participants were clearly informed about the purpose of the study, data usage, storage, and their rights, including the right to withdraw at any time. Personal data collection was limited to what was strictly necessary, and no special category data were collected. In line with D9.1, personally identifiable information was collected only where necessary, mainly for KIIs, while FGDs did not collect personal data that could identify individual participants. Published outputs refer to respondents only in an anonymised or aggregated way, for example by organisation type, role or stakeholder group, and not by name.

Data were anonymised and/or pseudonymised where appropriate, and access to sensitive data was restricted to authorised personnel only. Data processing followed the principles of data minimisation, purpose limitation, confidentiality, and accountability. D9.2 further limits future use by requiring that personal data are processed only for the purposes related to the implementation of the project and only for as long as necessary. Where possible, research was carried out using anonymous information; where personal data were needed, only adequate, relevant and necessary data were collected.

For post-project use, this means that public reuse is limited to aggregated, anonymised and non-confidential findings, tools, reports and datasets. Raw personal data, consent forms, interview notes, transcripts, pseudonymisation keys and other identifiable or sensitive materials are not intended for public reuse and will not be deposited in open repositories. These materials may only be retained for audit, accountability, legal or verification purposes, in line with the retention periods defined in the DMP, the informed consent forms, donor requirements and partner data protection procedures. After the applicable retention period, they will be securely deleted, destroyed or fully anonymised.

Any future use of project data beyond the original Bio4HUMAN purposes would require either fully anonymised data or a valid lawful basis, and, where identifiable data are concerned, would need to remain compatible with the original informed consent or require renewed consent. Any future sharing of restricted data with additional partners would also require appropriate data-sharing arrangements, as foreseen in D9.1 and D9.2.

All project activities adhered to key ethical principles, including “do no harm”, respect for human dignity, and cultural sensitivity, particularly in the humanitarian

contexts in which the project operated. These principles also apply to future use of the data, meaning that data will not be reused in a way that could identify participants, expose communities or organisations to harm, disclose confidential information, or create expectations of direct assistance that were not part of the research.