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Author: E4.LUCAS (ESTAT)

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(Land Use / Cover Area Frame Survey)

Technical reference document C1
Instructions for Surveyors

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(up to level 3)

DOCUMENT CHANGE RECORD			
ISSUE	DATE	CHANGE AUTHORITY / AUTHOR	REASON FOR CHANGE AND AFFECTED SECTIONS
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1 Introduction

The Land Use/Cover Area frame Statistical survey is designed to collect agricultural, environmental data and photographs by field observation of a specific geographically referenced point.

The document at hand gives detailed instructions for surveyors regarding data collection in the field. The following issues are treated:

In chapter 2, an overview is given about the information, which has to be collected. It is shown, which data is to be recorded in the field and how the field form has to be filled with all required data.

An overview of the necessary equipment and material (chapter 3) and of the preparatory work (chapter 4) is presented, which enables an efficient realisation of the field work.

The exact location of the point is crucial in the LUCAS survey. How this is done best is explained in chapter 5.

Chapter 6 highlights more details about the definition of the point and presents specific rules if the point location is ambiguous.

In chapter 7 a brief overview of the main land cover and land use categories is presented. More details can be found in the LUCAS reference document C-3 “Nomenclature”.

The aim of the photo shooting and the way how the photographs are to be taken best is explained in chapter 8.

2 Information to be collected

In the following chapter an overview of the items, which are to be recorded in the field, is given. The list given below shows that beside the land cover and land use information of the point concerned a lot of "meta information" has to be collected. The explanations given follow the structure of the Field Form (LUCAS reference document C-2) and provide a basic definition and description of each item. Moreover, references are given where to find more detailed information and explanations.

Items to be filled (including the item N° in the field form)	**Observed feature** (including the code in the field form)	**Short explanation / description**
Country Code (11)		Country of Observation
District Code (12)		District, contractor may subdivide the country in districts and is free to choose the coding
Surveyor ID (13)		Unique identity code of surveyor
Name of Surveyor (14)		
Type of observation (15)	Field survey (1)	Regular observation of the point.
	Photo interpretation in office (2)	If the point is in marine sea, an interpretation of the orthophoto can be done in the office.
	Photo interpretation in the field (3)	If the point is not visible in the field due to impossible access (e.g. located in forbidden zone), an interpretation of the orthophoto has to be done in the field (see chapter 5.2)
Survey Type (16)	Survey (1)	To be ticked if observation is done as regular survey.
	Control (2)	If internal quality controls are done by contractor (supervision).
	Double blind (3)	To be used for the independent survey by an independent contractor.
Point ID (17)		Unique code of the point as provided by Eurostat
GPS projection system (18)		"WGS 84", if no signal "X" required
Latitude/Longitude (19)		GPS position of the location from which observation is done.
Precision (20)		Indication of average location error as given by GPS receiver (in m)
Date (21)		Date of observation
Start time (22)		Observation time starts when leaving the car.
End time (23)		Observation time ends after returning to the car.

Items to be filled (including the item N° in the field form)	Observed feature (including the code in the field form)	Short explanation / description
Observed (24)	Observed (1)	Point could be regularly observed
	Out of territory (2)	Due to imprecise digital national borderlines, point might be located beyond the national borders (chapter 5.2)
	Forbidden Zone (3)	Point located in an area with restricted access (e.g. military camps). Point observed from distance or photo interpreted in the field (see chapter 5.2)
	Marine See (4)	Point located in marine sea (see chapter 5.2)
Distance (25)	0-3 m (1) 3-50 m (2) 50-100 m (3) >100 m (4) not relevant (8)	Indication of the distance between observation location and the LUCAS point.
Direction (26)	on the point (1)	Point regularly observed.
	north (2) east (3)	"Look to the North" rule applied, if point located on a boundary / edge or a small linear feature (<3m wide). See chapter 6 for more details.
	Not relevant (8)	
Land cover 1 (27)		Coding of land cover according to nomenclature (see chapter 7 and Reference Document C-3).
Land cover 2 (28)		A second cover can be registered if necessary (multiple coding, see chapter 0).
Radius (29)	1.5 m (1)	Simple observation of LC within a radius of 1.5 m.
	20 m (2)	The extended observation window (20m radius) for specific LC (see chapter 7.2)
	Not relevant (8)	If point is not observed (see chapter 5.2
Land use 1 (30)		Coding of the land use according to nomenclature (see chapter 7.4 and Reference Document C-3).
Land Use 2 (31)		A second land use can be registered if necessary (multiple coding, see chapter 0)
Photo of the Point (32)		Photo of the point aims at facilitating to find the point in the next survey. Therefore the image should contain a recognisable and stable landmark (see chapter 8.1.1)
Photo of Crop/Cover (33)		Photo of the crop/cover should allow the identification of the crop and its phenological stage or the land cover. An adequate zoom should be selected (see chapter 8.1.2).
North (34) **East (35)** **South (36)** **West (37)**		The landscape photos have to be taken in the four cardinal directions. The obligatory sequence (N-ES-W) has to be respected (see chapter 8.1.3).
Photo IDs		This information is for use by the surveyor himself. The renaming the photos is described in chapter 8.

In addition of the above-mentioned obligatory fields to be filled in, the surveyor has the opportunity - and in specific situations the obligation - to add specific comments and remarks.

Remarks in the field form are essential for transparent reasoning of any decision taken by the surveyor and for all future LUCAS surveys.

Description of the way to the point (42)	If the point can be accessed without any problem, a specific comment is not necessary. However, in all cases where the way to the point was hampered (long distance to walk), a short comment should be given (proposals for an easier approach to the point etc.). This information helps during the next survey and explains for example the effort required to reach the point (duration of the observation).
Remarks about specific circumstances (43)	It is important to note all those facts related to the observation of the point, which poses specific difficulties. Possible remarks are linked to: - Problems in the exact location of the point (radical changes in the field compared to the ortho-photo, lack of adequate landmarks for orientation, loss of the GPS signal etc.), - Restricted access to the point, - The necessity to make an observation from a large distance, - Point not visible therefore photointerpreted, the application of specific rules, such as “look north” rule, - Problems in the coding of land cover or land use (e.g. crop recognition etc). All such short comments should help to explain why the surveyor has taken a certain decision.

Land cover and land use observation refers to the point indicated on the orthophoto.

The point location and the real position of the surveyor might be different if it is not possible to stand exactly at the point. The information of GPS coordinates, precision and the landscape photographs are always referring to the position of the surveyor while doing the observation. In contrast to that, the information on land cover, land use and the photos of the point and of the crop/cover has to refer to the LUCAS point itself, determined by the orthophoto, even if it is further away from the real position of the surveyor.

3 Equipment and materials

The surveyor uses a **clipboard** on which survey documents are fixed in order to be used in the field for orientation with map, compass or GPS, for consultation of the aerial photograph and for filling in the form.

The following are needed for the survey:

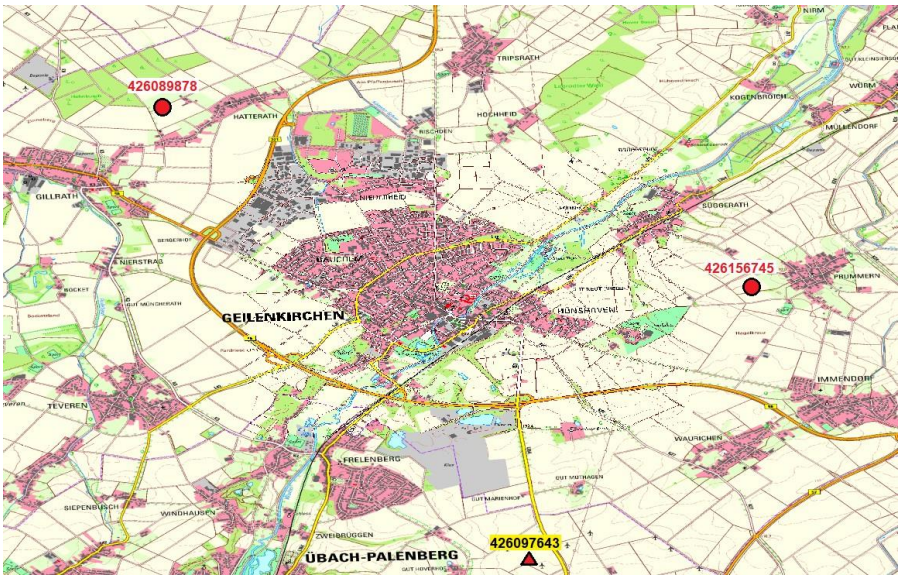
1. Blank field forms
2. Topographic maps
3. Ortho-photos
4. Compass
5. GPS + battery
6. Pencil or pen
7. Digital camera + battery+ memory card
8. Nomenclature
9. Decision tree
10. ID card, accreditation document

The **field form** can be found in LUCAS reference Document C-2.

Topographical map	**Topographical maps** are the most widely used types of maps. Their scale is usually between 1:10 000-1:200 000. The smaller the scale is, the more general the map. They illustrate the natural and man-made elements of the surface, and can also contain some administrative and economic information. There are several colours and symbols, which are used to indicate the different elements. Settlement names and altitude are usually indicated on them. The year of production of a topographical map is printed on it.
Ortho-photo	The **ortho-photo** (ortho-rectified aerial photograph, which is free from the distortion caused by inclination angle and relief) shows the position of the point to be observed and provides additional information on the situation. The scale of the ortho-photo varies between 1:10.000 and 1:2.000. Images at a scale between 1:2.000 and 1:5.000 are advantageous to better locate the points at the boundary of two types of land use or land cover categories. The recording year of the orthophoto should be shown on the field document, since the older the ortho-photo is, the more changes may be visible in the field.
Compass	A **compass** may be used to head in a particular direction. North is indicated on both the topographic maps and the ortho-photos. With the help of the compass, the surveyor can correctly orient the map and the ortho-photo before examining them. Moreover, the compass is helpful for the correct photo shooting towards the cardinal directions (N, E, S, W).
GPS	In the **Global Positioning System** (GPS), the location of the points on the surface of the Earth is determined with the help of satellites. Satellites transmit the data of their position continuously, enabling the GPS receiver to define its own position on Earth. A **hand-held GPS receiver** is to be used to approach the point. It is mandatory to register in the field form the GPS coordinates (Lat/Long) of the position, from which the surveyor does the observation of the point on the ground.

Digital camera	The **digital camera** is used to take pictures of the point, the crop and the N, E, S, W landscape photos.
Nomenclature	A detailed and a short version of the **nomenclature** are given to the surveyor. The detailed one describes the land cover and land use categories precisely, while the short one gives only the list of codes and category titles.
Decision tree	The **decision tree** provides guidance for the classification of land cover. On the graph, the meaning of the different colours is the following: yellow – questions which have to be answered in the field; blue – call for identification; and pink – gives instructions about what to do. It can be found in ANNEX 1.
ID card	The **ID card and the accreditation document** are necessary for the surveyor to explain and justify his mission and to present it to the farmer or land owner for example.

4 Preparatory work

Daily route planning increases efficiency	The surveyor has to prepare his itinerary before going out in the field. This preparation is essential for the efficient conduction of the survey. It is recommended to use an up to date road map to find the most suitable access to the point. GPS can be helpful as well. The surveyor needs to identify the different problems or obstacles he will have to deal with during his journey.
Small scale topographic map including LUCAS points	It is practical to use a small-scale topographic map to plan the travelling. The order of the points to be visited on the same day should be planned in advance to find the optimal route. Moreover, a quick photo analysis of the ortho-photo is helpful before starting the work.
	 © Geobasis NRW, Digitale Topographische Karte 1:25 000 (TIFF), dtk25_32296_5648_4_nw_col.tif, Data licence Germany - Zero - version 2.0. Edited: addition of the 3 plausible LUCAS points Figure 4 Example of a topographic map including the LUCAS points to be observed
Be prepared for difficult conditions	The surveyor should be aware that any kind of field conditions may be encountered at the point. Sometimes, bad land cover conditions are not visible from the ortho-photo. Adequate shoes and clothing are necessary. Even if the Be aware of survey is in the beginning of summer, clothing which covers the whole body is handling of GPS necessary. A proper bag should be taken to protect the equipment and the and digital camera documents in case of rain.
Be aware of handling of GPS and digital camera	The instructions for the camera and the GPS should be studied and their use should be practiced before the fieldwork. Spare batteries must be packed for them.

Fields 11 – 14, 17	Some parts of the questionnaire can be already filled in before the field visit. These include the **country code**, the **district code,** the surveyor's **ID number** (it is written on the ID card as well) and **name of surveyor**, the **survey type** (which is always "survey"), the point ID (it is printed on the maps and ortho-photos and loaded in the GPS), the **GPS projection system** and the **date of the survey** (first the day then the month).
GPS	Before going out into the field, the coordinates of the points have to be uploaded into the GPS. (It can be done by the contractor, centrally, or by the surveyors). Ortho-photos should be examined before the field work, to become generally familiar with the natural and man-made elements. As they are taken from the air, the view of the landscape is quite unusual at first sight. Roads and tracks can be recognised easily.

5 Approaching the point in the field

5.1 General cases

Following appropriate preparation, the surveyor has to get as close to the point as possible by car. Most of the points can be reached only on foot.

The survey starts as the surveyor starts to approach the point by foot, so this is going to be the starting time of the survey, which has to be recorded on the field form. So after leaving the car, the GPS is at first the most useful tool for orientation. The most appropriate mode of the GPS is to be used to find the point.

When the surveyor is close enough, the larger-scale topographic map can be used together with the ortho-photo point. There are several stable elements marked on a topographic map, like water-towers, bigger roads, rivers, lakes, look-out towers, etc., which can give good base for orientation. More detailed topographic features can be found on the ortho-photo. To locate a point, the surveyor must give priority to fixed landmarks rather than to uncertain ones, such as limits of plots. In regions where agriculture is receding, the border of a forest can gain ground over fields or meadows and cannot be used as a landmark.

Use the orthophoto for approaching the point	 Source of the orthophoto: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0). Edited: addition of the EW of observation Figure 5.1-1 Ortho-photo for approaching the point

Now, the exact location of the point can be identified by using the GPS, the compass, the ortho-photo and the topographical map together. On the whole, the ortho-photo has to be taken as the reference. In most of the cases, it is easy to orientate, especially when the image is a recent one, by comparing the image and the landmarks - roads, paths, hedges and ditches, limits of plots, buildings.

Check the enlarged subset for exact location of the point	  Source of the orthophoto: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0). Edited: addition of the EW of observation Figure 5.1-2 Figure 5.1-3 Enlarged subset of the ortho-photo enabling the exact location of the LUCAS observation point
Imagery date and land cover/use changes.	If the orthophoto is an old one, the surveyor has to pay attention to landscape modifications. For instance, an isolated tree or a hedge or a dirt track may have been removed. Buried - and invisible - tanks may have replaced water towers shown on a topographic map. In any case, difficulties to exactly locate the points are to be noted on the field form (in "comments").
Private property	When the surveyor enters fields or forests, he is usually on private property. He must be able to explain his mission and present his accreditation documents if asked by the farmer or owner of the property. If a point is in a building or a plot next to a building and enclosed by a wall, the surveyor will ask permission to enter if possible or stay outside to observe the point.
Don't damage the existing crops	The surveyor must not damage fences or crops.
Quality	**To ensure the highest quality of the survey, the above-mentioned tools for locating the point have to be used together, in tune with each other!**

5.2 Difficult cases in reaching the point

Some difficulties may arise that make it impossible to go to the point. There are 2 kinds of cases. The point falls either

- in a "forbidden zone" or inaccessible area or is
- "out of the territory" or "marine sea".

5.2.1 Point located in a forbidden zone and/or point inaccessible

If the point is located in a forbidden zone (military camp or privately-owned zone, in a fenced pasture for fighting bulls etc.) or an inaccessible area such as a larger wetland area or an impenetrable natural forest, the surveyor cannot reach the point. These points have to be either observed by approaching the point as close as possible so that the surveyor can make the observation from a distance or their land cover / use is to be photo-interpreted in the field.

Observation from distance:
If the surveyor is able to see the point, although in a forbidden or inaccessible zone, the regular observation can be done and the field form can be filled in. Field 24 (observation) and distance of observation (field 25) should be set accordingly. All other field entries have to be done, as well as **all photos** to be taken.

See example 1

Photointerpretation in the field:
If the surveyor is not able to see the point, he has to do an interpretation of the land cover and land use based on the orthophoto. In the field form, he has to register "**photo interpretation in the field**" as type of observation (field 15). All other elements in the field form have to be filled accordingly. The photo of the point and the photo of the crop/cover are not to be taken (not relevant), but the four landscape photos.

See example 2

5.2.2 Point out of territory or in marine sea

If Due to the coarse resolution of the digital overlay of the national boundaries and the coastline, it may happen that some points are located beyond the national territory or in the marine sea. If this is the (rare) case, fields 15 and 16 have to be filled. Field 24 has to be checked accordingly.

All other features are to be set as "not relevant". The circumstances must be recorded in the **remarks**.

No photos are to be taken.

See example 3

6 Definition and exact location of the point

It needs to be stressed that land use and land cover must be observed at the point, **i.e. as close as possible**. The points are marked on the ortho photo and the topographic map by a specific sign, i.e. the intersection of two bars resulting in a cross, which should not hide the land cover information on the aerial or ortho-rectified photo.

Theoretically, a point has neither width nor length. Considering the subject of the survey - land cover and land use – and its basic source of information (the aerial photograph), there is a standard definition to be applied for the basic size of the point:

The point corresponds to a circle with a 1.5m radius (or 3m diameter) so the point represents an area of about 7m2.

Normally, the point falls in a unique area (e.g. agricultural plot, top of a house etc.) and the above-mentioned point definition can be easily applied as well as the location of the point can be identified without any doubt.

However, two cases might occur, where the location of the point and the observation of the land cover/land use are ambiguous.

At first, it can happen that **the point is located on the boundary of two plots** and it is ambiguous which plot has to be observed. In a second case, **the point is located on a linear feature < 3m wide (small hedge, small track, roadside verge)**. In this case, the criteria of point definition (minimum width 3m!) is not fulfilled.

A simple rule has been defined to clarify such situations: the surveyor has to apply the "**look to the North**" rule, which means that he has to **observe land cover and use north of the point**.

If the point is located on a boundary, he has to observe the land cover/land use north of the point.

If the point falls on a small linear feature, i.e. smaller than 3 m in width, these small linear features are not considered as the "point area", so the same "look north rules" has to be applied.

In exceptional cases the border between two plots may be exactly in North-South direction (=meridian) and even when applying the "look to the north" rule a clarification cannot be obtained. In this (rare) case, he simply looks to the East and assigns the land cover he observes there.

In the survey field form, the surveyor must note this "virtual" shift of the point (**direction (26): north or east**). Moreover, he has to explain the decision under "**Remarks of special circumstances**". This is a must, because in the following surveys the observation has to be done at the identical location!

See examples 4 and 5

Point location clear, since it is entirely located in an agricultural field.	 Source of the orthophoto: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0) Edited: addition of the EW of observation Figure 6.1-1

Point located on a border	 Source of the orthophoto: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0) Edited: addition of the EW of observation Figure 6.1-2
Point located on a small linear feature (roadside verge)	 Source of the orthophoto: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0) Edited: addition of the EW of observation and LTN rule Figure 6.1-3

7 Land Cover and Land Use

7.1 General explanation

Information collected at the point is land cover and land use. Simplified tables on the land-cover and land-use types are attached in ANNEXES 2 and 3. After some general explanations, more details are provided below regarding difficult cases.

Detailed definitions of the categories for both land use and land cover are to be found in the nomenclature (Doc C-3).

Definitions of land, land cover and land use

LAND

The concept of land is extended to **inland water areas (lakes, rivers, coastal areas: estuaries, lagoons)**. The **land concept does not embrace uses below the earth's surface** (mine deposits, subways, mushroom beds, ground levels of buildings).

LAND COVER

The **land cover** is the **observed physical cover of the earth's surface.**

LAND USE

The **land use** is the **description of socio-economic function of the same area.**

Example A: the point is located in a common wheat field. The land cover is cropland of common wheat (B11) and the land use is Agriculture (U111).

Example B: the point is located in the lawn of a campsite. The land cover is grassland (E01) and the land use is holiday camp (U363).

Example C: the point is located on a road. If the road is wider than 3m, the land cover is Non-built-up linear feature (A22) and the land use is Road Transport (U312).

If the road is not wider than 3m, the point is considered to be located on a linear feature (<3m) and the surveyor has to apply the "Look to the North" rule, i.e. observe the land cover and land use in the Northern direction (or Eastern direction if the limit or the linear feature follows the N-S direction).

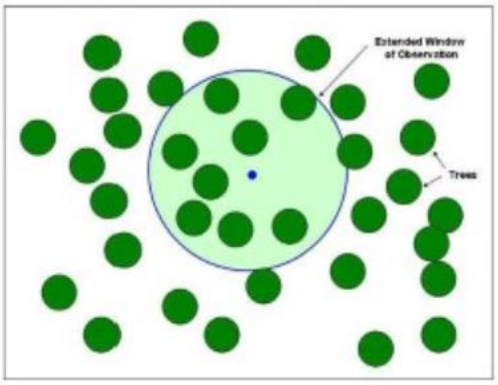
See example 6

Example D: the point is located in an urban park with mainly broadleaved trees. The surveyor has to apply the Extended Window of Observation around the point with a radius of 20m. The land cover is Other broad-leaved tree area (C21) if the wooded area is smaller than 0.5 ha, and the land use Leisure (U361).

7.2 Extended window

Some land cover classes require by definition the observation of a larger area, i.e. a reference larger than the point ”area” (7m2), for example the wooded areas, the grassland with or without trees etc. (see detailed class definitions in the Nomenclature). Also, when the land cover is not homogeneous, for example when it is composed of trees or shrubs interspersed with grassland, the scale of observation has to be changed to classify it. In these cases a **systematic observation of the “environment” of the point (Extended Window of Observation) within a radius of 20 meters** of distance (or 40m diameter) from the point has to be adopted (this represents an area of 0,13 hectares).

The following example illustrates the use of the extended window: The point is located in an area with a sparse tree coverage and grass. By means of the extended window of observation, the area share of the tree area can be estimated. If no extended window would be used and only the point with its 7m2 would be considered, no reasonable estimation of the tree coverage could be done. The area share of the trees accounts for approximately 20%, so that the point has to be recorded as woodland (minimum coverage of the tree crown 10%). If the coverage would range between 5 - 10% the corresponding land cover would be Grassland with sparse tree coverage. For a more detailed description of the categories see the LUCAS reference document C-3 Nomenclature.

Illustration of the application of the extended window of observation	 © European Union, CC BY 4.0 Figure 7.2-1

Systematically, the window of observation has to be extended whenever the land cover at the point is identified as:

- **permanent crops** (B7, B8, except nurseries B84): plots of permanent crops where the trees or other plants alternate with bare soils and/or grassland or another crop;

See example 7

- **grassland** (E), where land features may alternate e.g. grassland with trees
- **shrub land** (D): with a mix of e.g. shrubs and trees, or
- **woodland** (C).

Radius of Observation (Field 20)	The mandatory use of the extended window of observation has to be recorded on the field form under “**Radius**”.

Each deviation from the assumed 'normal' conditions must be described in the field form under "**Remarks on special circumstances**" to enable the surveyor to find the same point of observation again in the next survey.

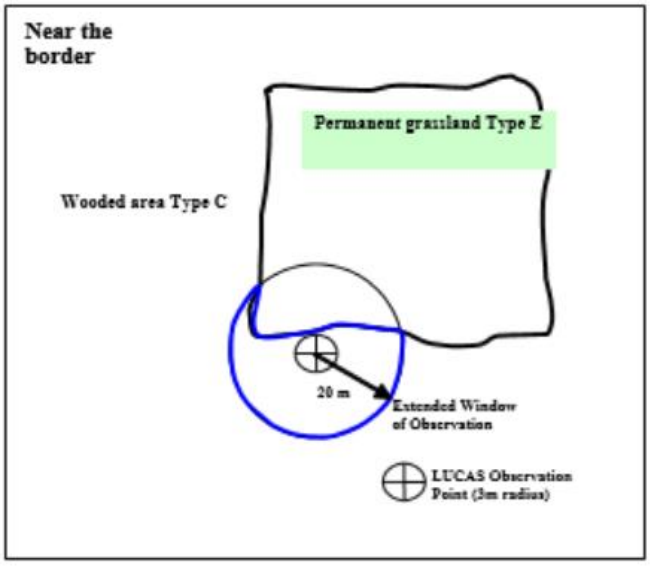
The use of the extended window

Second land cover code required (Field 28, 31)	Heterogeneity may be regarded as intrinsic to the nature of a particular land cover class (for example grassland with sparse trees or shrubs, an orange orchard where bare land alternates with trees). In the latter case, the Extended Window of Observation is applied to avoid the assignment of the bare land category in such cases where the point falls in the bare land intervals between the trees. Nevertheless, the cover type underneath is of interest from the environmental point of view, so the bare soil should be noted in second land cover (more details about the second land cover are given in chapter 7.5).

When the Extended Window of Observation is to be applied, the surveyor has to observe the land cover **within the borders of the plot where the point is located**. Three specific cases should then be considered:

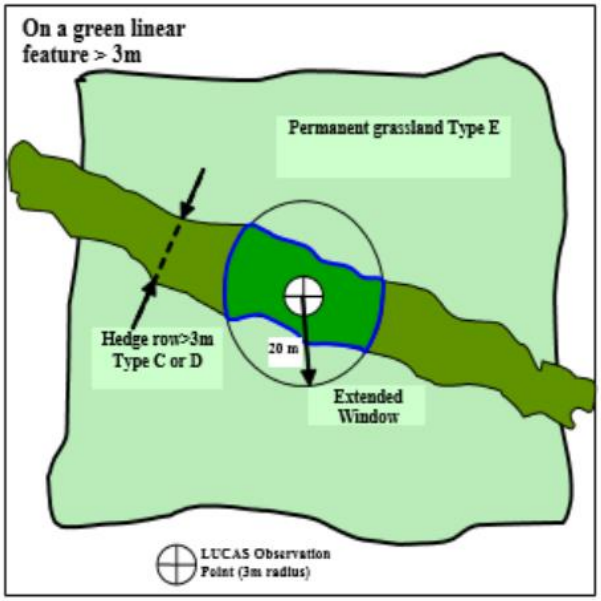
Case 1: The point is located near the border of two plots or near a linear feature. At the point, the cover being a wooded area, the observation has to be done within the extended window. The latter has to be extended within the plot defined by the border of the wooded area and the grassland or by the ditch and the river.

The density of trees and or shrub is to be assessed in the hatched part of the circle to decide whether it is a shrubland (D) or a wooded area (C), and in the latter case whether it is coniferous (C12 or C22) or broad-leaved (C11 or C21).

The extended window of a point falling on a linear feature wider than 3 m	 Figure 7.2-2

Case 2: The point is located on a linear feature wider than 3 m. In this case, the point is assigned to the existing land cover of the specific linear feature (road, river, wooded area). If the linear element is a green one (e.g. hedgerow, line of trees/shrub) as in the example opposite, the observation has to be made within the extended window.

The window has to be extended within the area defined by the green linear feature in order to assess the density of trees and/or shrubs. In the example opposite, the density is to be assessed in the hatched part of the circle to define whether it is a shrub land (D) or a wooded area (C), and in the latter case whether it is coniferous or broad-leaved.

The extended window of a point falling on the grassy area of a garden belonging to a residential building	 © European Union, CC BY 4.0 Figure 7.2-3

Case 3: Sometimes the situation is complex such as in the example opposite. The point is located within the grassy area of a garden of a residential building. The surveyor has to observe the plot in which the point is located. In this example the grass zone enclosed by a wall (dashed square in the figure) defines the plot to be observed within the extended window of observation. As within this area shrubs and trees are growing, the point is to be classified as E01.

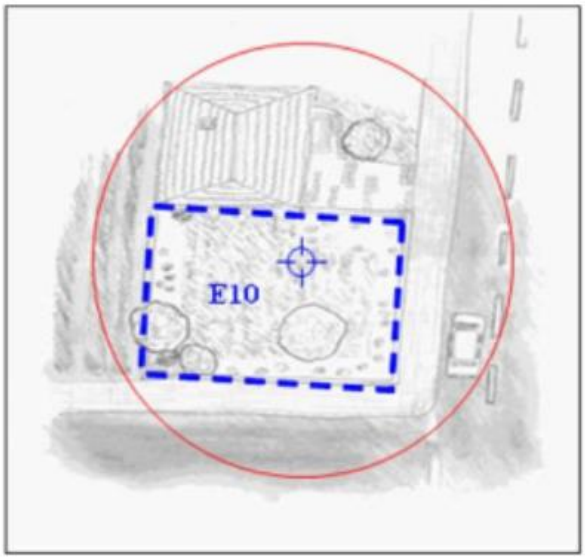


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Figure 7.2-4

7.3 Land cover categories

In general, there is no difficulty in observing the land cover (LC) because the land cover is frequently homogeneous. Some specific cases are listed herewith.

7.3.1 Artificial land (A)

Built-up areas (A1) include roofed constructions (buildings) distinguished in 2 categories by the number of floors or the height (< 3 floors: A11 and > 3 floors: A12) and Greenhouses (A13). If crops grown in the greenhouse can be identified, a second land cover code should be noted.

Non-built-up areas with artificial cover (A2) include area (A21) or linear features wider than 3 meters (A22).

Example A: the point is located on a parking area of a super market. The point is categorised as land cover A21 (Non built-up area features) and in terms of land use as U34 (Commerce, Finance, Business).

Example B: the point is located in a building hosting offices of a textile products' manufacturer on the same plot. The point is categorised as A12 (Buildings with more than three floors) and U222 (Textile products).

Greenhouses (A13) are defined as 'installations of glass, plastic or any material which is translucent but impervious to water' and are categorised as artificial land (A13). If greenhouses are dedicated to agricultural production - as is mostly the case - a second information on land cover will be taken (multiple registration): the type of crop beneath the greenhouse will be noted as second land cover, the land use is U111 Agriculture, in this case. If the greenhouses are not dedicated to agricultural production, the land use maybe different (see detailed information in Doc C-3 "Nomenclature").

7.3.2 Cropland (B)

Arable land

Arable land means crop production on a parcel. The recent crop must be classified according to the nomenclature.

Mixtures of crops have to be recorded through assigning a double cover (relating to the two main crops observed, e.g. mixed cereals for fodder like oats and barley in the same parcel).

If the point falls in arable land that does not have a growing crop at the time of the survey, or it is snow covered, the point has to be revisited.

Example of a prepared seed bed, but not yet any crop visible.	 © European Union, LUCAS 2022, CC BY 4.0 Figure 7.3.2

Permanent crops

Permanent crops mean orchards, berries, olive groves, vineyard, and nurseries.

Bare or grassy areas of an orchard (B7x) or a vineyard (B82): there are stripes of bare ground or of grassy ground between and around the rows of fruit-trees. They are considered as belonging to the orchard (or vineyard). So land cover is fruit tree (or vineyard) wherever the point is inside the orchard. A **second land cover** should be assigned to get environmentally important information, e.g. on the grass cover (E01) or bare soil (F00).

Orchards (B7x) organised with mixed species: the different species may be in alternate rows or mixed within a given row. If the two species have a significant presence in the orchard (at least 33% each), **two types of land cover** are noted. Otherwise, the major one is noted and the others are ignored.

Orchards (B7x) with annual crops: Some orchards are organised in association with annual crops besides the rows. If the annual crop has a significant presence (at least 33%) within the extended window (20 m radius), two types of land cover are noted the first is the permanent crop and the second is the annual one.

Isolated fruit trees: If a point is in the crown of an isolated tree, the zone is heterogeneous, the extended window has to be used, and the land cover of the surrounding is coded (grass for instance). Sparse woody area or fruit trees will be coded grassland with tree cover (E01) if the density of trees is between 5 and 10% in the Extended Window of Observation.

Cropland vs. woodland

When crops are cultivated under trees (forest species) a double registration will be necessary: two land covers and their attached land uses. This case is frequent in southern countries where cereals, dry pulses, potatoes, fresh vegetables may grow in areas corresponding to definitions of woodland (more than 10% of tree canopy). As the **first land cover code the woodland** should be registered and **the crop as LC2**.

Crops no longer cultivated

Crop areas, which are no longer cultivated, must be classified by observing the cover: if the cover is grass, it will be coded grassland (E), if the cover is bushes, criteria to classify between grassland and shrubland will be applied. For abandoned vineyards and orchards, the corresponding land cover code (B82 or B7X) has to be assigned to the point through assigning as a land use category the ´unused´ code (U40) unless they became shrubland or woodland after some years.

7.3.3 Woodland (C)

Areas covered by trees as woody species capable of achieving >5m height and with a tree crown area of at least 10%

This definition must be interpreted very broadly, if we accept the examples presented in the cropland part (Bxx classes). The density of 10 % is easy to respect in a plot and the visual aspect is different owing to species and location of the trees in the plot.

If the plot size is greater than 0.5 ha, the area is categorised under Forest area (C1x). If the plot size is less than 0.5 ha, this is too small to be considered as 'forest' and it is categorised as "other tree land area" (C2x). To assess an area of 0.5 ha in the field, the surveyor has to have in mind that a circle of 40m radius (4 x Extended Window of Observation) around the observation point represents an area of 0.5027 ha.

When broad-leaved and coniferous trees are mixed, the criterion to respect is the 75% or more of the canopy occupied by one group. Otherwise it is considered as mixed. The canopy is the aerial volume occupied by boughs and leaves. The breakdown between broad-leaved and coniferous may be difficult when coniferous have been planted under the broad-leaved trees they will replace. During the first few years it will be coded broad-leaved until the coniferous trees dominate the canopy.

Example of woodland	 © European Union, LUCAS 2022, CC BY 4.0 Figure 7.3.3-1

Clear-cuts

After a clear-cut, when there are no more trees left in the plot, it will be classified according to the actual land cover (E, D or F for example) with a note. The U12 land use code has to be assigned to these areas.

Example of clearcut	 © European Union, LUCAS 2022, CC BY 4.0 Figure 7.3.3-2

Woodland and cropland/grassland

When grass is under forest-trees (density more than 10%), land cover is woodland even if pasture is used for cattle-breeding. In this case, two land uses will be coded: forestry (U12) + agriculture (U111).

For crops under forest trees (see 7.3.2 Cropland vs. woodland)

Hedges having an average width larger than 3m are classified as woodland (Cxx) if they are made up of woody species meeting the criteria of the forest definition (see above).

Burnt areas

Burnt areas are coded according their present cover, e.g. shrubland or bare land.

7.3.4 Shrub land (D)

Areas dominated (more than 20% of the surface) by shrubs and low woody plants generally below 5 meters in height.

Shrubland may include sparsely occurring trees within a limit of a tree-crown area density of 10%. This can be encountered in two cases:

− Permanent vegetation in regions where soil and climate conditions are poor;

− Temporary covers evolving from a cultivated state to woodland in regions with better conditions.

Example of Shrub land	 © European Union, LUCAS 2022, CC BY 4.0 Figure 7.3.4

7.3.5 Grassland (E)

Land predominantly covered by communities of grassland, grass like plants and shrubs. The density of tree-crown is less than 10% and the density of tree+shrub-crown is less than 20%. Pastures under tree or shrub cover are not recorded as land cover (with the exception referred to the 7.3.2 and 7.3.3).

Temporary (and artificial) grassland is also included in this category.

Example of Grassland	 © European Union, LUCAS 2022, CC BY 4.0 Figure 7.3.5

7.3.6 Bare land (F)

Areas with no dominant vegetation cover. 50% of the ground or more is bare.

If the survey is being carried out before the planting period of certain crops, a second visit has to be organised for those fields found bare in arable land.

7.3.7 Water (G)

Areas covered by water and flooded surfaces or likely to be so over a large part of the year. It excludes rice fields which are classified as crop land. It also excludes brackish or stagnating water bearing a vegetation cover of grass, herbaceous type, shrub or tree.

The average water level of the river defines inland running water, so a sandbank inside the mean bed of the river is considered as water.

The areas permanently covered by snow do not include those under snow for a certain period of the year. It is, though, necessary to dig a little to find the bare soil or the grass, or to organise a second visit for these points that were found under snow cover during the survey to assess the actual land cover.

Example of Water	 © European Union, LUCAS 2022, CC BY 4.0 Figure 7.3.7

7.4 Land use categories

Land use (LU) will be noted for each point according to the nomenclature mentioned in LUCAS reference document C-3:

Correspondence between LC1 – LU1	The LC1 and LU1 information need to correspond to each other. If the land use of two land cover types is the same, only one land use class is to be assigned.

Possible combinations of LC and LU are presented in ANNEX 4.

In general, the use is easy to define, the orchard (B7X) is trimmed, traces of work are visible in the fields and there is no ambiguity about the use. It is more difficult when there is no visible proof of the use: a forest may be abandoned (no recent tracks, no cuttings, etc.), there is no trace of cattle or of cultivation in poor meadows, etc. In this case, it will be classified as unused.

The land use class **Unused** cannot be registered in combination with another land use code.

Shrubland or a forest may be mainly used for the feeding of cattle (agriculture). Parts of forest may be also be exploited for the leisure of people during weekends (recreation, leisure, sport). Some other areas may have also several uses: Where a dam has been built for the production of electricity, the lake may also be used for water-skiing. The lake would be classified as energy production and leisure-recreation.

As a principle, a second land use code is justified if there is a visible sign of this use, e.g. a fence around the shrubland or forest area to prevent people from entering a hunting area, a landing stage for boats at the lakeside, a special track for persons to walk on or for horse-riding etc.

Areas planted with forest species (usually fast rotation plants) for exploitation purposes are assigned to the ´Forestry´ land use category. The same land-use category has to be assigned to Nurseries (B83) of forest species.

Small tracks need second land LU code	In case of roads, the first land use has to be always transportation (U312). A second land use might be added, of the final socio-economic use of the road, e.g. agriculture (U111) if it is for agricultural machines, forestry (U12) if it is used in forests and so on.

Military zones are to be included in community services (U35).

For the grassland in residential areas, the land cover should be observed in combination with the relevant land use (if it belongs to a hotel or a residential house, for example, the land uses U34 and U37 should be respectively adequate).

Wetland is the land use of surfaces which are flooded or likely to be so over a large part of the year by fresh, brackish or stagnant water.

Turfs and peat bogs are to be observed according to their real land cover (bare land or scrubland), and their first land use code will be wetland (U50). A second land use might be added, such as peat extraction (U14) if so.

7.5 Multiple registration

Land cover 2 (28) *Land use 2 (31)*	In specific landscapes such as agro-forestry areas and complex or heterogeneous areas, where the Extended Window of Observation is to be used, the surveyor may **separately register a second land cover / land use** in order to keep the richness of information. The surveyor has to register the components and not to make any pro-rata calculation. The information recorded under LC1 and LU1 must correspond. If the land use is the same, (e.g. "U111" Agriculture for different species of fruit trees), only one land use is to be registered in the database. Specific attention has to be paid to greenhouses, association of crops and crops under cover (e.g. under trees). A list of possible combinations is provided in ANNEX 5.

For complex or **heterogeneous areas** particularly in semi-natural areas, the inclusion of land-cover categories in the classification system on the basis of most important physiognomic features will avoid difficult problems of registration: for example grassland with sparse shrub/tree cover (E01) or shrubland with sparse tree cover (D01).

The ortho-photo on the right shows a **heterogeneous area** with grass land and fruit trees. In such situations, the Extended Window of Observation is to be applied. The area is to be classified on the basis of the fruit trees (e.g. apple trees B71). As second land cover, the grassland (E01) should be classified to get information that is interesting from the environmental and landscape points of view.

Example of Extended Window of Observation	 Source: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0). Edited: addition of the EW of observation Figure 7.5-1

On the ground, the scene may look like in the photo on the left (fruit trees in rows). Between the rows, and under the trees, grass can be seen.

Example: an orchard with grass between the rows	 © 2014, Gary Fisher (@gafisher), Pixabay License Figure 7.5-2

To facilitate data collection in **urban** areas, the principle of **dominant use** is to be applied. This is the typical problem of buildings with multi-functional purposes that should be solved in a single way by estimating the most important use (by number of floors). E.g. the point falls at an office building with 20 floors and there is a museum downstairs. Land cover is A12 (Buildings with more than 3 floors), and land use is simply U34 (Commerce, finance, business).

Example of urban areas	 © European Union, LUCAS 2022, CC BY 4.0 Figure 7.5-3

8 Photographs

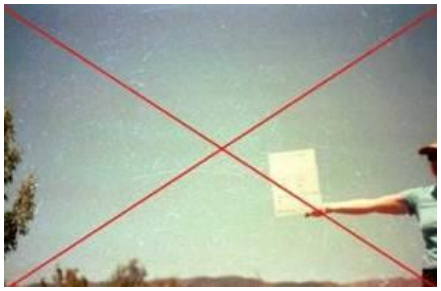
The surveyor has to document his observation by means of several photos. The surveyor has to take a photo of the point, a photo of the crop/cover (Land cover classes B1x- B4x and Exx) and he has to take four landscape photos.

Photo ID (32-37)	In order to permit simple handling and archiving of the landscape photos, they are to be delivered in digital format (.jgp file). The image dimension should be 1600 x 1200 pixel at 300 dpi, resulting in a file size of approximately 1.9 megabytes uncompressed.

8.1 Photos to be taken during field work

8.1.1 Photo of the point

Photo of the point (32)	The photos of the point should facilitate finding the exact location of the observed point in the next LUCAS survey. Therefore a point indicator might be put into the point exactly. The photo has to be taken in landscape format (horizontally) with the point **in the centre**. So, if the indicator is not so visible in some circumstances, then the middle of the picture can be considered as the point. The distance and the direction of the photo is up to the surveyor's own judgement. The most important aspect is to have **stable field elements which act as locational references** on the picture to ease the work in the next survey (e.g. house, barn, track or any other "quasi-stable" landmark. If the point could be observed only from a distance, than photo of the point should be taken only if the point is visible. Obviously, in case of photo-interpretation, no photo of the point is to be taken (the photo of the point is not relevant in this case).
Example of a point picture (observation at 100m or less)	 © European Union, LUCAS 2018, CC BY 4.0 Figure 8.1.1-1 Photo of the point, including a recognisable landmark.

Keep the camera levelled	 © European Union, CC BY 4.0 Figure 8.1.1-2 Unacceptable photo example, neither able to show the location of the point nor reflecting the surrounding landscape.

8.1.2 Photo of the crop/cover

Photo of the crop (33) *For B1- B4 and E*	Aim of the photo of the crop/cover is to enable the identification of the recorded land cover by means of the photo. **Annual crop/grassland photos are to be taken only for the categories B1- B4 and E!** This means, for example, if the point falls in cropland, the crop has to be photographed from a distance of <2m (macro-mode if available!), to be classifiable from the picture. See examples below!
Macro may be used for crops	Photos of the point and of the crop/cover are collected to corroborate and prove the surveyor's work and decisions. Photos of the crop/cover will also help to evaluate the development stage of the crop. The zoomed picture should be taken at a close distance, so that the structure of leaves can be clearly seen, as well as flowers, fruits or ears if present (cereals)..
Example: red cabbage	 © 2019, Ralph (@Capri© 23Auto), Pixabay License Figure 8.1.2-1

Example: common wheat	 © 2019, Osoian Marcel (@osoian-marcel), Pixabay License Figure 8.1.2-2  © European Union, 1995-2022, CC BY 4.0 Figure 8.1.2-2 Fructification or leaves can be used as a means of crop identification.

8.1.3 Landscape photos

There are several aims in photographing the LUCAS survey points.

Landscape images illustrate the character and the special features of landscapes the best. Images can transmit information from the landscape that could not be expressed in words or numbers. With images it is also possible to illustrate changes in the landscapes, when the photographs are taken from the same places in different years. Photographic material also creates a basis for a new kind of long-term monitoring of landscape changes.

Moreover, LUCAS photos will serve as ground truth information for several satellite based mapping projects, such as the European CORINE Land cover project.

Landscape photos in digital format will be taken from the place where the observation was done, using a wide-angle lens (35 mm). In every other situation, a photo must be taken in each of the 4 main compass directions, even if there is a dense forest, or a wall close by. The compass can help to identify the exact cardinal direction

The **photograph sequence** will be taken successively looking **North, East, South and West** (clockwise rotation). The directions are determined with a handheld compass. This order must be respected in order to archive the pictures without any misinterpretation. If an error is made during photo-taking, for example a picture is taken twice, incorrect order etc., the wrong ones should be deleted and the correct photo sequence has to be taken again.

The objective is to photograph the landscape, so sharp foreground details are not necessary and the **focus** must be on the middle ground and background; this is obtained with a camera lens focused at infinity. **Automatic focusing** should be used carefully and automatic flash is not to be used!

The camera should be kept level (i.e. not tilted) and the horizon should be about 2/3 of the way up the viewfinder. The pictures are taken horizontally (landscape format). It is important to take care that the photographer's equipment's, fingers, backpacks, cars, assistant, people etc. are not visible in the picture.

Particular cases

If the point is out of reach, for instance in a forbidden zone (behind a high wall) or in a swamp or a lake, the point is to be observed from a distance (which is recorded under **observation distance**). The surveyor will take the **photos from the point where the observation was done**. He will mention the particular observation conditions on the field form under 'Remarks'.

Although a photo shooting in a dense or dark coniferous forest might be difficult, all photos are to be taken according to the rules (sequence NESW).

Example: landscape photos in NESW sequence	 Figure 8.1.3-1-2-3-4 LUCAS 2018 N, E, S and W photos

8.2 Documentation

The correct **documentation** of the photographs is essential. The identification is of high importance to enable correct archiving.

The camera will assign a name to the image. In order to ease renaming of the photos, the surveyor should write the photo name given by the camera on the field form (**Photo ID**). The surveyor has to rename the photos according to the naming conventions (see below), and before delivery. Together with the date and time of the field survey, it will be an unambiguous identification.

Naming conventions

For each photo a unique identification code has to be given before delivery, composed of:

- Point ID (8 digits) and the
- Photo identifier:
  - P – Point
  - C – Crop/Cover
  - N – North
  - E – East
  - S – South
  - W – West

Example: The name of the East photo for point 23456789 is **23456789E.jpg**

9 Quality of the work

The elements of the good quality fieldwork are the followings:

- correct and continuous use of GPS and ortho-photos,
- precise location of the point in the field,
- correct and complete observation,
- compliance with the instructions given in this paper,
- filling the questionnaire with readable marks/letters,
- relevant remarks.

It is also very important to note every unusual circumstance in the **remarks** fields and to give a brief description of the route to the point, to justify the decisions of the surveyor and to ensure the quality of the work in time.

The work is accepted only if the field form is precisely filled in with remarks as well, and if the photographs of the point, of the 4 cardinal directions and of the crop where required are taken.

The fieldwork will be checked using a blind survey. An independent company will carry out control visits in the field.

10 Annexes

10.1Annex 1: Decision tree

Attached as separate document.

10.2Annex 2: Overview of LUCAS land cover categories

Attached as separate document.

10.3Annex 3: Overview of LUCAS land use categories

Attached as separate document.

10.4Annex 4: Land cover 1 and land cover 2 matrix

Attached as separate document.

10.5Annex 5: Land cover and land use matrix

Attached as separate document.

10.6Annex 6: Examples

Attached as separate document.

10.7Annex 7: Cereal Identification

Attached as separate document.

10.8Annex 8: Third party copyright

Table 1: Third party copyright

No.	Section	Figure	Copyright	Source	License (Name)	License (Link)
1	4. Preparatory work	4	© Geobasis NRW, Digitale Topographische Karte 1:25 000 (TIFF), dtk25_32296_5648_4_nw_col.tif, Data licence Germany - Zero - version 2.0 Edited: addition of the 3 plausible LUCAS points	https://www.opengeodata.nrw.de/produkte/geobasis/tk/akt/tk25/dtk25_farbe_tiff/	Data licence Germany - Zero - version 2.0	https://www.govdata.de/dl-de/zero-2-0
2	5.1 General cases	5.1-1	Source of the orthophoto: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0). Edited: addition of the EW of observation	https://map.geoportail.lu/theme/main?lang=en&version=3&zoom=11&X=720515&Y=6389005&rotation=0&layers=2056&opacities=1&bgLayer=basemap_2015_global	CC0 1.0 Universal	https://creativecommons.org/publicdomain/zero/1.0/
3	5.1 General cases	5.1-2	Source of the orthophoto: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0). Edited: addition of the EW of observation	https://map.geoportail.lu/theme/main?lang=en&version=3&zoom=11&X=720515&Y=6389005&rotation=0&layers=2056&opacities=1&bgLayer=basemap_2015_global	CC0 1.0 Universal	https://creativecommons.org/publicdomain/zero/1.0/
4	5.1 General cases	5.1-3	Source of the orthophoto: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0) Edited: addition of the EW of observation	https://map.geoportail.lu/theme/main?lang=en&version=3&zoom=11&X=720515&Y=6389005&rotation=0&layers=2056&opacities=1&bgLayer=basemap_2015_global	CC0 1.0 Universal	https://creativecommons.org/publicdomain/zero/1.0/
5	6 Definition and exact location of the point	6.1-1	Source of the orthophoto: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0) Edited: addition of the EW of observation	https://map.geoportail.lu/theme/main?lang=en&version=3&zoom=11&X=720515&Y=6389005&rotation=0&layers=2056&opacities=1&bgLayer=basemap_2015_global	CC0 1.0 Universal	https://creativecommons.org/publicdomain/zero/1.0/
6	6 Definition and exact location of the point	6.1-2	Source of the orthophoto: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0) Edited: addition of the EW of observation and LTN rule	https://map.geoportail.lu/theme/main?lang=en&version=3&zoom=11&X=720515&Y=6389005&rotation=0&layers=2056&opacities=1&bgLayer=basemap_2015_global	CC0 1.0 Universal	https://creativecommons.org/publicdomain/zero/1.0/
7	6 Definition and exact location of the point	6.1-3	Source of the orthophoto: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0) Edited: addition of the EW of observation and LTN rule	https://map.geoportail.lu/theme/main?lang=en&version=3&zoom=11&X=720515&Y=6389005&rotation=0&layers=2056&opacities=1&bgLayer=basemap_2015_global	CC0 1.0 Universal	https://creativecommons.org/publicdomain/zero/1.0/
8	7.5 Multiple registration	7.5-1	Source: ortho_2020 WMS, Open Data WMS and WMTS de l'Administration du cadastre et de la topographie du Grand-Duché du Luxembourg (data.public.lu), Creative Commons 1.0 Universal (CC0 1.0) Edited: addition of the EW of observation	https://map.geoportail.lu/theme/main?lang=en&version=3&zoom=11&X=720515&Y=6389005&rotation=0&layers=2056&opacities=1&bgLayer=basemap_2015_global	CC0 1.0 Universal	https://creativecommons.org/publicdomain/zero/1.0/

9	7.5 Multiple registration	7.5-2	© 2014, Gary Fisher (@gafisher), Pixabay License	https://pixabay.com/photos/orchard-apple-agriculture-fruit-244297/	Pixabay License	https://pixabay.com/nl/service/license/
10	8.1.2 Photo of the crop/cover	8.1.2-1	© 2019, Ralph (@Capri© 23Auto), Pixabay License	https://pixabay.com/zh/photos/red-cabbage-cabbage-vegetables-4398122/	Pixabay License	https://pixabay.com/zh/service/license/
11	8.1.2 Photo of the crop/cover	8.1.2-2	© 2019, Osoian Marcel (@osoian-marcel), Pixabay License	https://pixabay.com/de/photos/weizen-feld-gr%c3%bcn-landwirtschaft-4380142/	Pixabay License	https://pixabay.com/de/service/license/

10.9Annex 9: Image / Figure Table - EU Eurostat LUCAS

Table 2: European Union copyright

No.	Section	Figure	Copyright	Source	License (Name)	License (Link)
1	7.2 Extended window	7.2-1	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
2	7.2 Extended window	7.2-2	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
3	7.2 Extended window	7.2-3	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
4	7.2 Extended window	7.2-4	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
5	7.3.2 Cropland (B)	7.3.2	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
6	7.3.3 Woodland (C)	7.3.3-1	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
7	7.3.3 Woodland (C)	7.3.3-2	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
8	7.3.4 Shrub land (D)	7.3.4	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
9	7.3.5 Grassland (E)	7.3.5	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
10	7.3.7 Water (G)	7.3.7	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
11	7.5 Multiple registration	7.5-3	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
12	8.1.1 Photo of the point	8.1.1-1	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
13	8.1.1 Photo of the point	8.1.1-2	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
14	8.1.2 Photo of the crop/cover	8.1.2-3	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
15	8.1.3 Landscape photos	8.1.3-1	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
16	8.1.3 Landscape photos	8.1.3-2	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
17	8.1.3 Landscape photos	8.1.3-3	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833
18	8.1.3 Landscape photos	8.1.3-4	© European Union, CC BY 4.0	EU	CC BY 4.0	https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011D0833