Table of Contents

1 LPIS TG ETS

version 6.4

FINAL

1.1 LPIS Technical Guidance for ETS

This article is the table of contents of the revised LPIS QA data test suite (ETS).

1. Chapter 1 provides the key concepts, activities and decision in the Data Product Specification (DPS) setup.
2. Chapter 2 provides any ancillary data that does not form part of the formal ETS isnpection, such as illustrations, examples and elaborations. These have mostly been recovered and adapted from the ETS v6.3 wikipages.
3. Chapter 3 consitutes a single page with download links to all relevant files and documents
4. Chapter 4 consitutes a single page with some errata

Printing:

1. You can make a pdf version of the first chapter of this ETS guidance
2. You can make a pdf version of the second, third and fourth chapter of this ETS guidance .

2 ETS Documentation

2.1 Executive summary

The quality assurance framework of LPIS is an integral part of LPIS management and upkeep processes. In this framework, the LPIS of a MS/Region is regarded as a system under test (SUT), which is composed of two major components: the local application schema and the data records stored in the system. The so called Executable Test Suite (ETS) targets at the data component by annually assessing conformity according to Article 6 of (EU) Regulation No 640/2014.

For data testing, the high level requirements (abstract test cases) are explicitly provided by Article 6 of (EU) Regulation No 640/2014. For simplicity and historic reasons, the abstract and executable test cases are merged into a single workflow and are referred to as ETS. The ETS proposed by DG JRC can be directly implemented by all MS/Regions. The conformance testing procedure is based on data quality assessment according to ISO 19157:2013 (Geographic information ? Data quality) and ISO 2859-2:1985 (Sampling procedures for inspection by attributes, Part 2: Sampling plans indexed by limiting quality (LQ) for isolated lot inspection).

These standards are used to define the data quality measures, the prescribed sample sizes, and the acceptance numbers for the quality measures. These elements together with the basic concepts (inspected item, critical defect, observed area, contamination, and land cover classification according to MS eligibility profile) are detailed in the LPIS QA documentation, comprising a set of technical guidance documents (TG population, TG MTS, ETS Annexes, etc..) given in ETS Downloads and a structured list of the wikiCAP support pages.

The technical guidance (TG) on Model Test Suite (MTS v.2.2) can be found on TG MTS. The correspondent reporting schemas for the MTS can be found on MTS Downloads

=== Release notes - June 2019

The needs for update in the quality assessment methodology were triggered by:

◊ EU Member state feedback (as usual)
◊ Bilateral communication with AGRI (D3)
◊ Feedback from the workshops and conferences in 2018 - 2019
◊ Findings of the GTCAP team
◊ External input

Revisions made in the ETS (v6.3) **NO NOT** affect the inspection procedure itself. They can additions to the instructions

◊ for better consistency and clarity of both inspection and reporting
◊ to reduce the loop of answering bilateral questions
◊ to remove further bias in results

2.1.1 General and Inspection - related

• General: Errata identified on the previous ETS version (v 6.3 from 2018) have been corrected

• ANNEX I: LPIS data quality measures

2.1.1.1 edits/revisions from version 6.3 2018

◊ Clarifications added and updates made in relation to the delineation of parts making traditional practices inside the LUI, usage of vaiwer E and calculation of LPIS cumulative land changes.

• ANNEX II: ETS inspection procedure

2.1.1.2 edits/revisions from version 6.3 2018

◊ Clarification made to account the dimensions of the features part of traditional practices and technical areas inside and along the LUI
◊ Scope of the use of Waiver E is specified to those cases when PG is observed but not found recorded in LPIS

• ANNEX III: The concept of land cover and ?eligible hectares"

2.1.1.3 edits/revisions from version 6.3 2018

◊ Reference is given to the technical guidance on pro rata
◊ Systematic approach: It is specified that the percentage of scattered features (as basis for the reduction coefficient) should be reported in the LCCS code.
◊ Sporadic approach: It is specified that individual estimation of the percentage can be applied also on an individual grassland present within the reference parcel.

• ANNEX IV: Four-eye control

2.1.1.4 edits/revisions from version 6.3 2018

◊ no changes from version 6.3

• ANNEX IX: LPIS population for LPIS QA inspection

2.1.1.5 edits/revisions from version 6.3 2018

◊ no changes from version 6.3

2.1.1.6 Publishing (WikiCAP)

REVISIONS TRIGGERED BY THE ABOVE-GIVEN UPDATES IN THE ETS ANNEXES ARE IN PROGRESS

NOTE: All important edits and revisions from ETS 6.3 to ETS 6.4, as well as all resulted modifications/additions in the Chapter 1 and Chapter 2 articles of WikiCAP are highlighted in Maroon colour. This includes any modifications in the wiki articles needed to ensure consistency between the WikiCAP pages and the ETS Annexes.

2.1.1.7 Reporting

ETS schemas - **There are SOME modifications of the schemas. Please check the latest uploads are available on the LPIS Registry**

A revision of the examples for better clarity and consistency is foreseen.

2.2 Foreword

2.2.1 Rationale

The importance of the LPIS comes from the requirement that it must channel all area based aids; the corresponding financial value exceeded ?40bn for 2012 (see item 05.03 on pages 17-18) and 2013. It concerned in 2013 around 7.40 million beneficiaries ([1]). For this specific purpose, LPIS quality can roughly be defined as the ability of the system to fulfill two explicit LPIS functions:

1. the unambiguous localisation of all declared agricultural parcels by farmer and inspectors,
2. and the quantification of all eligible area for crosschecks during the administrative controls by the paying agency.

Failure of an LPIS in the unambiguous localisation induces risks for double declaration of land. Inadequate quantification of eligible area renders the crosschecks ineffective for preventing and identifying over-declarations by farmers. Both failures involve financial risks for the EU Funds.

Furthermore, any well functioning LPIS greatly facilitates operations by farmers, inspectors and paying agencies, resulting in a better overall performance. Obviously, a better LPIS substantially improves IACS effectiveness and management of EU Funds.

2.2.2 Quality Assurance
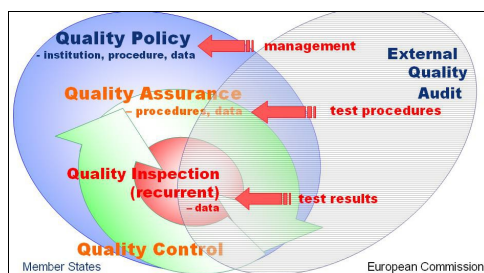
Figure 1: quality concepts

Both Member States and the EU have therefore a keen interest in demonstrating the quality of the LPIS and in addressing quality issues, if any. Such processes of planned and systematic quality demonstration form the hearth of a quality assurance (QA) system. A QA framework relies on mutually agreed quality testing between ?consumer? (the European Commission) and ?supplier? (the Member State). A test or series of tests assesses compliance for each specified quality requirement.

A distinction is made between ?prime? and ?secondary? quality elements. The prime elements are those that the European Commission considers fundamental for a correct LPIS operation. They are applicable to all LPIS systems. Secondary quality elements might not be applicable for all systems, but may provide additional input for analysing and remediating issues identified on the prime quality elements.

The Commission Delegated Regulation (EU) No 640/2014 calls for an annual reporting on the six prime quality elements grouped into two conformance classes. For each quality element, one or more measures, the inspection procedure and conformance levels have been designed.

A former discussion document has been elaborated in 2011 on these LPIS properties and the reasons why they are essential for a good functioning. It also proposed a methodology to implement and integrate an adequate quality policy in the regulatory framework. The main application of this quantitative information is to provide an instrument for achieving business process improvement. Essentially, this quality assurance framework constitutes a yearly check-step within the commonly known plan-do-check-act (PDCA) cycle.

2.3 Glossary

2.4 Abbreviations

Go up to the main ETS page

3 ETS Scope

3.1 Reference parcel as item for inspection

A reference parcel is ?a geographically delimited area retaining a unique identification as registered? that contains ?a unit of land representing agricultural area? and where appropriate, includes other eligible hectares. Agricultural area means ?taken up by arable land, permanent grassland and permanent pasture, or permanent crops?.

From these definitions follows that any reference parcel, for the purpose of inspection of ETS, must include at least one occurrence of agricultural land. Landscape features, although representing eligible hectare resulting from their adjacency to agricultural, should not be submitted as an individual reference parcel even if they are implemented as a standalone polygons in the SUT. For the purpose of each annual LPIS quality assessment, SUT where IXIT feature C (integrating eligible hectares from GAEC landscape features) yielded ?complementary? LF implementation shall follow the adjudication procedure below to compile the reference parcel in scope and to ensure sizeable and measureable item for inspection. In the context of this document it is assumed that the temporary adjudication of landscape features has been performed unless stated differently.

Furthermore, the definitions relate to ?a unit of land representing agricultural area?, which is not necessarily the unit of ?identification as registered? and state that a reference parcel ?is measurable, enables the unique and unambiguous localisation ? and as a principle, is stable in time?. MS are invited to reflect how these considerations that constitute the foundation of all data value tests of TG ETS, are implemented in their SUT.

3.1.1 Relevance for the assessment year

For the LPIS QA only the first pillar of IACS is currently considered. In particular, any reference parcel that is part or can be part of a holding applying for first pillar area based payments BPS/SAPS) shall be subject to inspection. This translates the scope into that:

- were declared during the previous direct payment application year for either 1st pillar area support or for other uses **OR**[1]
- present ?eligible area? available for payment; i.e. can appear on the pre-printed form or re-enter an application for 1st pillar support without triggering an additional verification procedure

Correct execution of this combined query on an appropriately implemented LPIS should result that this "scope of the LPIS QA", does NOT include reference parcels holding agriculture land, that are not available for direct aid applications as their standalone size is below the minimum threshold established at national/regional level. Pending on the reference parcel design (IXIT feature A), the resulting set of reference parcels in scope is therefore not necessarily the complete set of "blocks" that are managed in the "LPIS-layer" of the GIS-environment. In many cases it will be a subset.

3.1.2 Homogeneous lots

An assessment based on sampling implies and requires a homogenous population of reference parcels. There are situations that clearly contradict these requirements to constitute a single "sampling lot" within the nominal territory of the LPIS:

- Simultaneous occurrence of different RP-design or eligibility profiles
- Simultaneous occurrence of different update rules

If any of the above conditions occur, most likely identified via the presence of several possible answers to the IXIT polychotomy, MS are invited to subdivide the nominal territories in smaller parts and

- prepare separate lots for inspection; for each lot, the model test suite should be performed and a separate lpisPointZeroState produced.
- Inform the EC services, so appropriate imagery can be obtained

Although inspecting and analysing two or more sub-lots will require more resources than testing the combined set of heterogeneous reference parcels, it is the only to obtain meaningful, reliable and useful assessment results.

1. ? BOOLEAN LOGIC

4 ETS Data structure

The key characteristics of each references parcel are described in the combination of its identification, location and reference area values. This limited set of attributes provides all information the EC services need to verify the integrity of the sampling to inspection process in a given assessment year and to monitor the evolution of the population between assessment years.

This verification and monitoring is essential to help Member States prevent scoping problems.

The resulting lpisPointZeroState holds eight elements; after introduction of the classification correctness test, area values of arable land, permanent grassland, permanent crops and non-agricultural eligible area have been introduced.

Classification correctness verifies the threshold for greening obligations and applies to the holding as a whole. This extends the object of ETS inspection to all agricultural area of the holding, regardless whether that land is declared for BPS/SAPS or other uses. The value tested (formerly the field ?ReferenceArea?) should now reflect all available agricultural area as defined in Article 4(1)(e) of EC 1307/13, within the reference parcel.

To avoid confusion, the former element <cap:ReferenceArea> in the lpisPointZeroState is replaced by cap:etsReferenceArea> to make it distinct from the element ReferenceArea defined in the MTS, referring to the maximum area for which payment can be made. The value in <cap:etsReferenceArea> is directly derived from the values stored in the corresponding attributes in the SUT as reported in the executable test ?checkAgriculturalLandAreaValue? of the MTS. This synonym is introduced for ETS purposes only.

The lpisPointZeroState includes a Boolean flag to indicate whether the available agricultural area reported in the <cap:etsReferenceArea> for that reference parcel represents the maximum eligible area for direct aid payment or not; If ?True?, cap:etsReferenceArea> for the RP is identical to <cap:reference area>[1].

In previous ETS versions, only RP that were involved in the area payment (utilized for SAPS or active entitlements for BPS) were in scope, the Boolean flag thus indicates which parcels would have belonged to the previous, more restrictive scope and only these items will be inspected for eligibility related tests.

Note that, as the <cap:etsReferenceArea> can hold contributions from landscape features, the sum of the three partial areas (AL+PG+PC) can be less or equal than the etsReferenceArea, depending on whether or not the area of the landscape features is added to the area of the correspondent agriculture land cover they belong to. In any case, the area of the landscape features is added to the value of the cap:etsReferenceArea. Non-agricultural eligible area (ref. Art.32(2)(b) of EC 1307/13) is not included in the cap:etsReferenceArea as it is not agricultural area in its' nature.

Element name	Definition	Description
<cap:geometryProperty>	Spatial representation of the reference parcel as referred to in Art.5 of (EU) R 640/2014.	Geometry of reference parcel, representing its geographical position. For this entry the representation GM_Point is required.
<cap:rpID>	Unique thematic ID of reference parcel referred to in Article 70 of Regulation (EU) No 1306/2013.	Nation-wide unique alphanumerical thematic identification code of reference parcel (thematic identifier or GUID as defined by the MTS model).
<cap:etsReferenceArea>	Value for the quantification of agricultural area as referred to in Art. 4 of (EU) R 1307/2013.	Officially known area taken up by arable land, permanent grassland and permanent pasture or permanent crops (and/or associated eligible landscape features) for which an aid application can be made or which can be declared as part of the holding. NOTE 1: Reference area value shall be expressed in hectares with 4 decimals.
<cap:arableLandArea>	Point 2.1.2 of LPIS guidance (DSCG/2014/33 ? FINAL REV 2)	Officially known area of the arable land within the RP. NOTE 1:reference area value shall be expressed in hectares with 4 decimals.
<cap:permanentCropArea>	Point 2.1.2 of LPIS guidance (DSCG/2014/33 ? FINAL REV 2)	Officially known area of the permanent grassland within the RP. :NOTE 1:reference area value shall be expressed in hectares with 4 decimals.
<cap:permanentGrasslandArea>	Point 2.1.2 of LPIS guidance (DSCG/2014/33 ? FINAL REV 2)	Officially known area of the permanent crop within the RP. NOTE 1:reference area value shall be expressed in hectares with 4 decimals.
<cap:nonAgriEligibleArea>	Point 2.1.2 of LPIS guidance (DSCG/2014/33 ? DRAFT REV 5)	Officially known eligible area as referred to in Art. 32(2)(b) of Regulation (EU) No 1307/2013 NOTE 1:reference area value shall be expressed in hectares with 4 decimals.
<cap:etsReferenceAreaAvailabilty>	Boolean related to availability for payment (TG IXIT feature G)	If etsReferenceArea = MEA, True else False

Some examples of possible reporting of the etsReferenceArea and the correspondent agriculture land cover categories are given on LpisPointZeroState examples.

1. ? For former agriculture area converted to forest or NATURA 2000 that can represent eligible hectares (Art. 32(2)(b) of EC 1307/13), etsReferenceArea will be zero, while the Boolean flag will be FALSE.

5 LpisPointZeroState examples

5.1 Introduction

This page contains some examples of different scenarios for the reporting of the etsReferenceArea and the corresponding agricultural land cover categories in the LpisPointZeroState, depending on the specific LPIS implementations adopted by the EU MS. The examples are collection of the RPs from real cases taken from the annual ETS reports (except for some area values).

5.2 Example 1 - Basic

Reference parcel in the picture 1. below is a physical block with graphical RP area of 2,8141 ha. Reference parcel polygon contains 4 agricultural parcels each classified as arable land. Ineligible part inside the block is excluded from the RP polygon and RP area. In such case a LpisPointZeroState.gml record should have following attributes:

LpisPointZeroState	Ha
etsReferenceArea	2,8141
arableLandArea	2,8141
permanentCropArea	0
permanentGrasslandArea	0
nonAgriEligibleArea	0
etsReferenceAreaAvailability	true

Picture 1.

5.3 Example 2 - Grassland with pro-rata coefficient

Reference parcel in the picture 2. below is a parcel with graphical RP area of 6,6797 ha. It is classified as a mix of grass and ineligible vegetation, hence graphical area should be reduced. Pro-rata category for this grassland was observed to be Grassland80 and eligibility rate of 80% was used for area reduction (sporadic assesment). In such case a LpisPointZeroState.gml record should have following attributes:

LpisPointZeroState	Ha
etsReferenceArea	5,3438
arableLandArea	0
permanentCropArea	0
permanentGrasslandArea	5,3438
nonAgriEligibleArea	0
etsReferenceAreaAvailability	true

Picture 2.

5.4 Example 3 - RP with multiple LC classes

Reference parcel in the picture 3. below is a physical block with graphical RP area of 3,7218 ha. Reference parcel contains 7 agricultural parcels: 2 parcels classified as arable land (0,1856+0,3923 ha), 3 parcels classified as permanent crop (0,8874+0,1137+0,0585 ha) and 2 parcels classified as permanent grassland (1,2596+0,4726 ha). Note that RP boundary is not following the physical limits of the landuse as visible on the orthophoto image. We assume that the ineligible vegetation, located along the RP boundary, has penetrated inside the RP over the years. Still, all agricultural parcels within the RP have been updated in the system with available agriculture areas so the sum of all three LC categories equals the available land (can be also equal to MEA). In such case a LpisPointZeroState.gml record should have following attributes:

LpisPointZeroState	Ha
etsReferenceArea	3,3697
arableLandArea	0,5779
permanentCropArea	1,0596
permanentGrasslandArea	1,7322
nonAgriEligibleArea	0
etsReferenceAreaAvailability	true

Picture 3.

5.5 Example 4 - RP with landscape features

This specific case is from a system containing landscape features as individual reference parcels. For the purpose of the ETS quality assessment a data manipulation should be conducted in order to spatially join the landscape features and correspondent reference parcel. In the picture 4. below is the reference parcel polygon bounding 8 smaller polygons of landscape features. So each polygon is a single spatial unit. Note that one LF with a red point is considered being out of ETS scope by the EU Member State (possibly a landscape feature recorded as EFA, but not subject to retention (GAEC 7); thus not considered as eligible for BPS/SAPS).

Picture 4.

Since ETS scope cannot have LFs as individual polygon with an unique RP identifier, all LF polygons in scope should be merged with RP like in the picture 5 below.
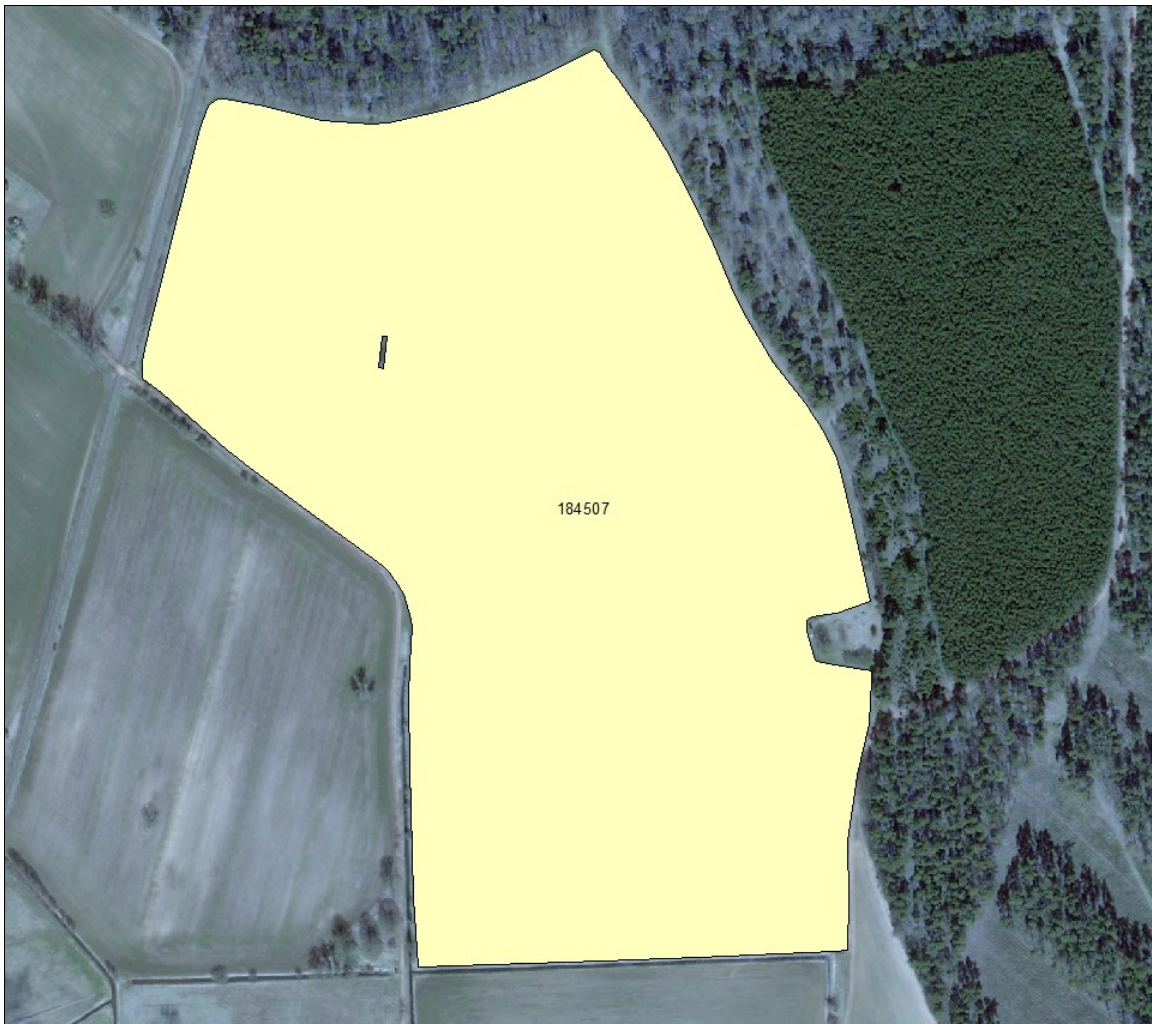
Picture 5.

Finally, this reference parcel is represented as single RP polygon where the available RP area does per category not sum up the LF areas. The area of the landscape features allotted (or adjudicated as specified in the Annex IX) to the RP during the preparation of the LPIS population is accounted and added to the etsReferenceArea for the purpose of the ETS, but it might not be reflected in the area per agriculture category if the latter is stored in the corresponded attribute fields in the LPIS. In such case a LpisPointZeroState.gml record should have following attributes:

LpisPointZeroState	Ha
etsReferenceArea	18,4507
arableLandArea	0
permanentCropArea	0
permanentGrasslandArea (*does not include the area of adjudicated LFs*)	18,1350
nonAgriEligibleArea	0
etsReferenceAreaAvailability	false

The last picture 6. below is labelling graphical areas of each polygon within the LUI in subject.

10

Picture 6.

5.6 Example 5 - RP with non-agricultural but eligible area with reference to Art.32

This specific case is from a system containing afforested areas as individual reference parcels. Since afforested area is not agricultural area in its nature, it will not count in the sum of etsReferenceArea where we keep only agricultural area of the RP. In the picture 7. below is the reference parcel polygon where the LUI represents forest eligible for payment and has 5,0810 hectares. This area is a former agricultural area, converted to a forest, thus system holds evidence of a previous agricultural activity.
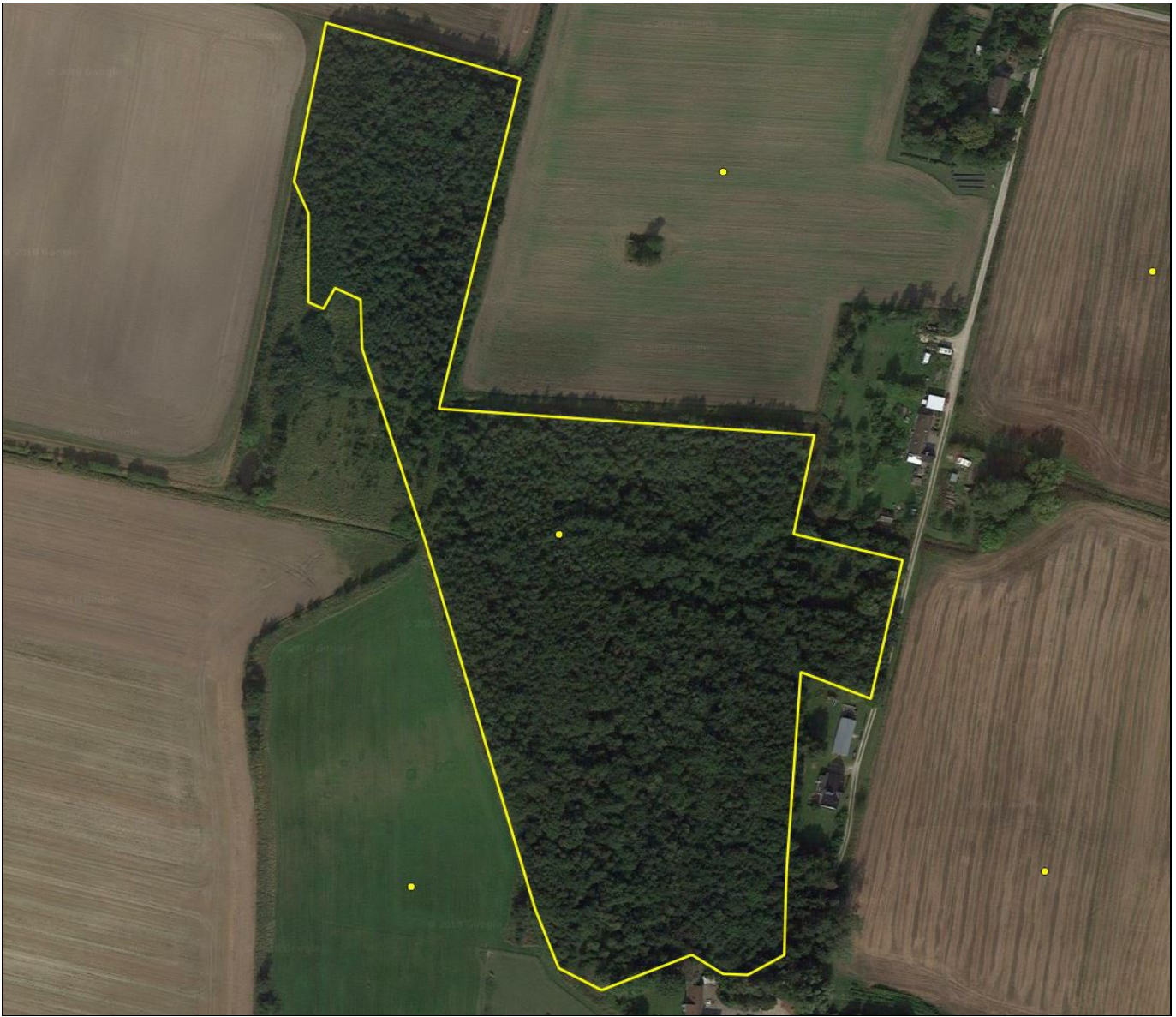
Picture 7.

In such case a LpisPointZeroState.gml record should have following attributes:

LpisPointZeroState	Ha
etsReferenceArea	0
arableLandArea	0
permanentCropArea	0
permanentGrasslandArea	0
nonAgriEligibleArea	5.0810
etsReferenceAreaAvailability	false

Go to the main ETS page

6 ETS Sampling zones

6.1 Representativeness of the sampling

ECA?s Special Report 25/2016 on the performance of LPIS recommended to carry out a cost-benefit analysis to determine whether quality assessment could be improved to achieve better coverage of parcels. The results of this analysis have lead to some changes in the sampling procedure that were implemented from 2017 onwards.

6.2 Zone selection

As mandated by the Regulations (Article 6.2 of (EU) Regulation No 640/2014), the LPIS QA zones and reference parcels are selected and defined by the EC services.

In collaboration with the contracted image provider, a procedure has been designed to achieve a number benefits compared to the CwRS-image coupling from ETS v5.3. General goal is to reach imagery of sufficient quality to serve as a true reference for the current situation on the ground with an unbiased sampling.
Different criteria have been taken into account:

- an equal probability of inspection for all reference parcels while preventing the exclusion of zones and bias
- independence from CwRS zoning, further ensuring absence of bias
- improved geometric and radiometric image quality by means of

  1. related timing of capture when cloud and haze free conditions arrive
  2. restricting image capture to near-nadir conditions
  3. using sensors with a Ground Sampling Distance (GSD) of 50cm or less

- concentration of field activities in a few representative locations, lowering the resources needed for the inspection process.

In practice, the zone selection procedures operates through a 4 level stratification based on reference parcel abundance and agricultural area representativeness. These two parameters are derived from the LPIS populations uploaded by the custodians for the previous LPIS quality assessment. The resulting 81 image zones are shown in Figure 1.
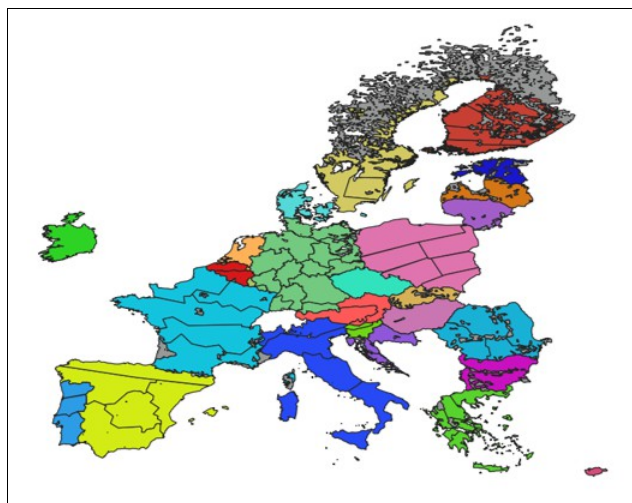
Figure 1: LPIS QA data capture zones over EU

In Figure 1, each color represents a single LPIS system subdivided into the zones where a one or more images will be acquired. Additional imagery may be acquired in a given zone to reach the minimum sample size. Special imagery is captured in low reference parcel density zones.

6.3 Reference Parcel Sampling

This sample of reference parcels to be inspected in the ETS will be generated in the intersection of the LPIS QA zones acquired as above and the full population of reference parcels (scope of the quality assessment). In practise this means that LPIS custodians have to upload their population to the LPIS QA portal so this sampling can be generated by DGJRC.

In order to receive a sample pre-selection Member States shall:

- do **Steps 2, 3** and **4**;
- download the sample pre-selection list in **Step 9**.

To ensure correct timing of this assessment, upload of population data to DGJRC will be possible only **from the last date of submittal of applications**, in line with Article 13(1) of (EU) Regulation No 809/2014. "*Member States shall fix the final dates by which the single application, aid applications or payment claims shall be submitted. The final dates shall not be later than 15 May each year. However, Estonia, Latvia, Lithuania, Finland and Sweden may fix a later date which shall not be later than 15 June.*".

There is no particular deadline for the uploading of the 2019 LPIS QA population by the EU MS. However, the LPIS QA imagery acquired by JRC, is still delivered to the MS administrations together with their sample pre-selection as a bundle, which means that the source imagery can be obtained only after a valid population upload is made. The deadline for the production of the assessment report remains **January 31st, 2020** as laid down in the Regulations.

DGJRC will produce the sample within 15 days after LpisPointZeroState upload.

6.4 Population data and sample exchange instructions

Creating the sample pre-selection requires:

- **Step 1** (by EC): prepare LPIS Control Zones data:
  - ApplicableLpisqaZones.xsd (GML)
  - ApplicableCidZones.xsd (XML) ? in exceptional cases as contingency measure

- **Step 2** (by MS): create a point representation from the reference parcel polygons (total population of parcels from the Lot);
- **Step 3** (by MS): convert reference parcels' point data into a harmonised data structure: LpisPointZeroState.xsd,
- **Step 4** (by MS): upload the LPISPointZeroState through the LPIS QA Web Application. For instructions, go to:

    - Logging into the LPIS QA Web Application
    - Establishing LPIS Settings

- **Step 5** (by EC): receive and analyse reference parcel data and LPIS Control Zones data (**by EC**),
- **Step 6** (by EC): select reference parcel points which are within the LPIS control zones,
- *Step 7'* (by EC): determine the sample size for the ETS inspection, based ISO 2859/2-1985, procedure A,
- **Step 8** (by EC): generate a sequential list of randomly selected reference parcels, and send a notification e-mail. See details on

    - Creating a sample pre-selection

- **Step 9** (by MS): download the pre-selection list LpisSamplePreselectionStatus.xsd For instruction go to:

    - Logging into the LPIS QA Web Application
    - Downloading a sample pre-selection
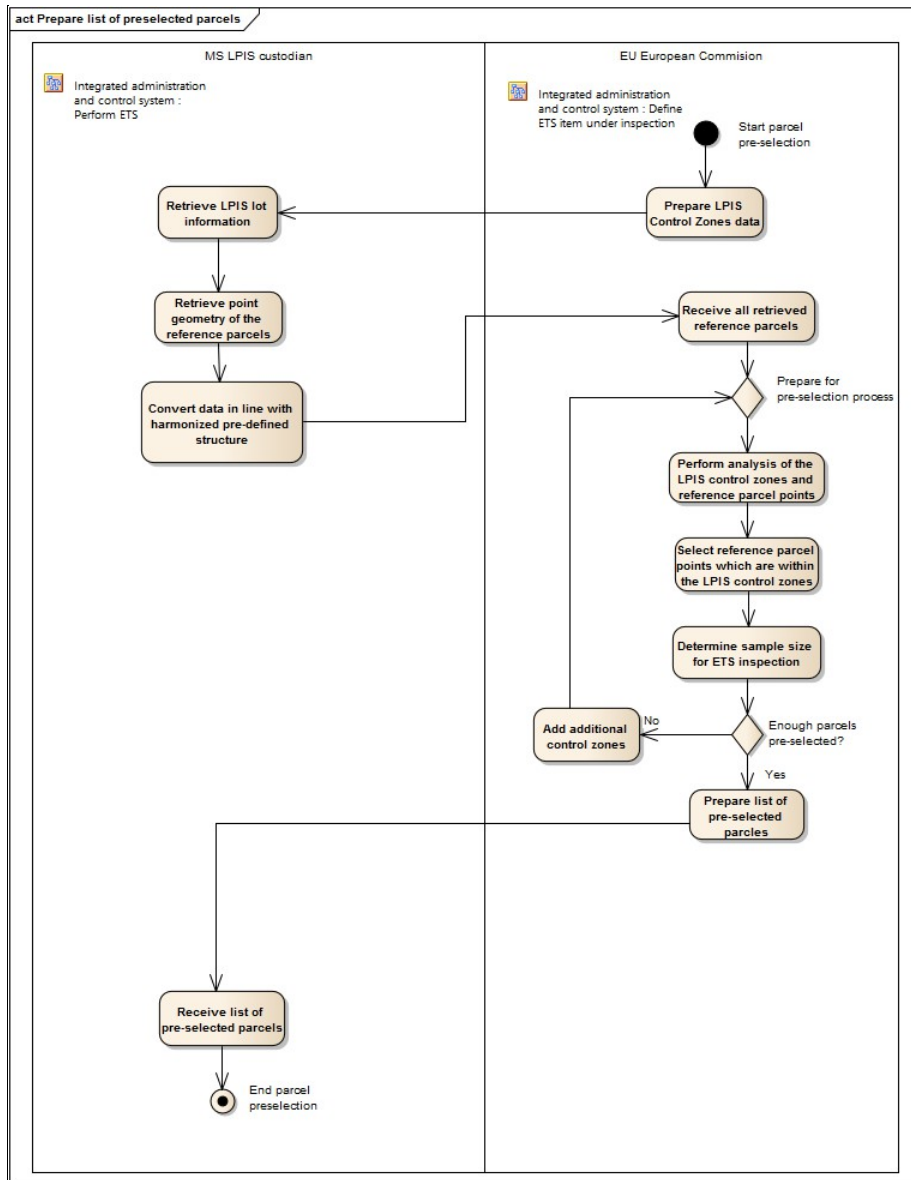
This methodology is presented in diagram 1, below.

Diagram 1 Workflow of the ETS sampling methodology.

Go up to the main ETS page

7 ETS Inspection workflow

8 Flow of Events

The main activity flow comprises the following steps:

8.1 I. Data preparation (I1-I3b)

1. Retrieve the necessary orthoimagery
2. Retrieve the relevant LPIS sample pre-selection
3. Retrieve the relevant ancillary (and historic) data, including any performed field observations and previous year ETS results)
4. For the Reference Parcels, part of the sample pre-selection, retrieve the up-to-date etsReferenceArea and the correspondent LUI, as recorded in the LPIS that was:
>   i. provided by the farmer at the moment of his application or
>   ii. obtained from any other relevant source ?in tempore non suspecto?.
5. If the sum of the rate of reference parcels that failed measurement (10101) exceeds 50% from previous year ETS results, apply the parcel aggregation method consistently throughout the current LPIS QA exercise. Decide on the use of national orthophoto as supplementary to VHR satellite imagery

8.2 II. Check for data completeness and geometric consistency (I4)

1. Check the conformance statement of the MTS and for the availability of the Eligibility Profile. This includes also any methodological decisions with relevance to ETS (such as: previous results, approach to the calculation of pro-rata)
2. Check for completeness and geometric consistency of the vector and raster data
>   i. Navigate through the data (LPIS vectors, orthoimages) using the GIS tools and interface
>   ii. Check the vector and raster datasets for the relevant metadata
>   iii. Check for completeness of the vector, raster and alphanumeric data (fields and attributes)
>   iv. Check for geometric coherence (fit) between the different spatial datasets
>   v. Check the orthoimage properties

8.3 III. Refine the Inspection Environment (I5)

> i. Enhance or change, if necessary, the radiometric and spectral parameters of the orthoimage
> ii. Set the ranges for the visual scale
> iii. Adapt the visual appearance of the graphical data (modify colours, add labels if necessary)

8.4 IV. Sort the parcel pre-selection by ordinal number (I6)

8.5 V. Check the feasibility for inspection (II1 ? II6)

1. Select the first/next sequential Reference Parcel from the ordered list of the sample pre-selection.
2. Navigate through the data (LPIS vectors, orthoimages) using the GIS tools and interface, in order to locate the selected Reference Parcel.
3. Set the appropriate visual scale (see Important Notes).
4. Check the feasibility for inspection (II3 - II4)
>   1) Analyze visually if the area represented by the parcel (LUI) can be inspected based on the available input information.
>>   i. Check if the Reference parcel thematic ID is persistent in the LPIS
>>   ii. Check if the geometry of the Reference Parcel is valid
>>   iii. Check if the Reference Parcel is fully or partly outside the active area of the image (the active area is the area of the image, which contains meaningful pixel information)
>>   iv. Check for presence of cloud cover or haze, which prevent the inspection of the parcel
>>   v. Check for the occurrence of isolated image processing-related artifacts that cannot be attributed to a particular land cover or land use phenomenon (ex. smoke from a chimney or passing airplane).
>>   vi. Check for presence of any force majeure circumstances occurring on the land that prevent the inspection of the RP (floods, fires).
>>   vii. Check if RP does not belong to the scope and check if the RP was part an **a priori** RP aggregation (remaining part of the aggregation)
>   2) Assign a code to the Reference Parcel as a result of the analysis, based on a pre-defined code list.
>   3) Report additional evidence when field "F1" is true in a separate "Comment" field.
>   4) If the area represented by the parcel (LUI) is not affected by the above technical issues (all occurrences are set as FALSE),
>>   ◊ flag the parcel as feasible for inspection
>>   ◊ flag the parcel as belonging to the QC sample (set to ?true?) and,
>>   ◊ proceed with the ETS inspection for that Reference Parcel.
>   5) Else, flag the Reference Parcel as skipped
5. Check the value of the , as recorded in the LPIS. Verify that the etsReferenceArea and the correspondent RP polygon are updated with the most recent information from the farmer, related to explicit Reference Parcel change notification or from any other relevant source ?in tempore non suspecto?.
6. For those reference parcels where the etsReferenceArea equals the maximum eligible area for direct payment, flag the reference parcel, when there is a recorded evidence that the maximum eligible area, as recorded in the LPIS, was established based on means different from GPS/CAPI area delineation or mapping (for example, use of scorecards or observed reduction coefficients, specific for each reference parcel).

8.6 VI. Inspect the Reference Parcel (A)

8.6.1 Data Collection

1. To check if the LUI can be inspected, perform a visual verification to ascertain all reference parcel boundaries match distinctive land features or follow well identifiable limits of land cover and/or land use. If affirmative, flag it as feasible for measurement, consider this reference parcel henceforth as ?item for inspection? and proceed to the next Step VI.4.
2. Else, check if II.2 foresees application of the reference parcel aggregation:
>   i. If negative, flag the Reference Parcel as not feasible for measurement and put the observed eligible area, area declared and the etsReferenceArea to value zero. Put also both values for RP_CNF (Area Percentage and Area Difference) to zero. Go to step VI.6.i and proceed with the instructions.
>   ii. If affirmative, expand the LUI to completely cover any and all visible crops, agricultural land cover type or land use units, whichever is smaller, occurring partially or completely inside the original LUI.
>>   ◊ If any continuous aggregation of reference parcels (cluster) matches the smallest LUI expansion, substitute the original LUI with this resulted cluster and use it as new LUI in steps VI.3 and VI.4.
>>   ◊ Register and link in a separate file all RPid?s belonging to the correspondent aggregation of reference parcels (RPid). Proceed to the next Step VI.3.
>>   ◊ Else, flag the Reference Parcel as not feasible for measurement and put the observed eligible area, area declared and the etsReferenceArea to value zero. Put also both values for RP_CNF (Area Percentage and Area Difference) to zero. Go to step VI.6.i and proceed with the instructions.

NOTE: In case the visual verification on the orthoimage cannot reveal or confirm the presence of distinct limits, supplementary verification on the field can be optionally made. Field evidence that the FULL perimeter is identifiable and measurable by GNSS needs to be provided. This dataset should comprise: RP vertices measured with GNSS, pictures revealing the existence of these vertices on the ground and any relevant metadata). Mark in the LpisPreselectionStatus file that the ancillary data for the given item is available.

3. Delineate individual agriculture land cover features, which represent eligible land (B) **on the LUI**

   i. Individually identify on the orthoimagery all single agriculture land cover features larger than 0.03 ha. Use the reflectance (pixel grey values), color combination; shape; texture; location; and any other context-related information to determine the agriculture land cover features, based on the pre-defined land cover types and photo interpretation keys, listed in the eligibility profile (for more information see the Annex III). Take into account the dimensions of the features part of traditional practices and technical areas inside and along the LUI. NOTE: In case the LUI limits are detected and confirmed using GNSS measurements, perform the land cover mapping either exclusively by field measurement, following the compatible surveying specification applicable in the EU Member States, or by combining GNSS and CAPI measurements, by applying the procedure described in the technical guidance to ensure compatible relative accuracy.

   ii. Map (delineate) all single features, enclosing the agriculture land cover that are larger than 0.03 ha. Take into account useful permanent features, as rural roads, river banks, limit of forest or build up areas visible on the orthoimage. Consider also the possible visual obstruction of features and boundaries, due to oblique image acquisition (image taken with low elevation angle).

   iii. Identify by visual inspection, map out and exclude from the area of the agriculture land cover, all non-agriculture land cover features bigger than 0.03 ha (or 0.01 ha, if the spatial resolution of the reference orthoimage and the nature of the feature allow), as well as all non-agriculture linear features wider than 2 meters. Take into account the dimensions of the features part of traditional practices and technical areas inside and along the LUI. Use the reflectance (pixel grey values), color combination; shape; texture; location; and any other context-related information to determine the non-agriculture land cover features (see the pre-defined list in Table 6 of Annex I). Exclude by mapping (as polygons, lines or points) the area of any distinguishable landscape features given in the eligible profile from the inner area of the mapped agriculture land cover features. Use the mapping instructions and specifications, defined by the EU Member State Administration in their Eligibility Profile. NOTE: The area of Landscape elements with up to 2 meters of width could be incorporate in the agriculture land cover feature adjacent to them.

   iv. Assign the land cover type for each agriculture land cover feature according to the Eligibility Profile.

   v. Calculate and sum up the area (in square meters) of the agriculture land cover features (digitized polygons), taking into account any mappable exclusion found (all non-agriculture land cover features, as well as landscape features). This area will be calculated by the GIS using the applicable national projection and ellipsoid. Calculate the eligible area for each of the agriculture land cover feature, using the information from the eligibility profile. Sum up to derive the maximum eligible area.

   vi. Sum up by land cover type, the eligible area of the digitized agriculture land cover polygons.

   vii. Count the occurrence of the different land cover class types, eligible for payment **on the LUI**. Use up to two letter abbreviation code from the ?User-defined Legend Code? field of the Eligibility Profile.

4. Map (or detect, if already mapped) and account for any landscape features (subject to Article 9 (2) of Reg. 640/2014), found **on the LUI** (C)

   i. Identify by visual inspection (as seen on the orthoimagery) any individual landscape features, based on the list of landscape features (subject to Article 9 (2) of Reg. 640/2014), as defined by the EU Member State Administration in their Eligibility Profile. Use the reflectance (pixel grey values), color combination; shape; texture; location; and any other context-related information to determine these features. Adjust the visual scale, if necessary.

   ii. Map (as polygons, lines and points) all remaining (not yet mapped) distinguishable landscape features, using the mapping instructions and specifications, defined by the EU Member State Administration in their Eligibility Profile. Take into account useful permanent features, as rural roads, river banks, limit of forest or built up areas visible on the orthoimage. Consider also the possible visual obstruction of features and boundaries, due to oblique image acquisition (image taken with low elevation angle).

   iii. Assign the land cover type for each landscape feature according to the Eligibility Profile.

   iv. Count and report the occurrence of the different landscape features types.

   v. Derive the area in square meters of the landscape features, using the mapping instructions and specifications, defined by the EU Member State Administration in their Eligibility Profile. This area will be calculated by the GIS using the applicable national projection and ellipsoid.

   vi. Select the individual delineated _eligible landscape features_ found, which are within OR on the immediate border of the agriculture land already determined in VI.3. Retrieve their area.

   vii. Sum up and report the assigned area (from 3.vi.) by type of the eligible landscape feature.

5. Identify non-agriculture land cover features **on the LUI**(D)

   i. Assign the land cover types of the non-agriculture land cover features, using the pre-defined list given in Table 6 of Annex I. Use the reflectance (pixel grey values), color combination; shape; texture; location; and any other context-related information to determine the land cover type of the non-agriculture land cover features, based on certain pre-defined criteria.

   ii. Count the number of individual non-agriculture land cover features, which has been already identified in Actions (B) and (C) given in the flow diagram of Fig.1, by type of major land cover class, according the predefined class list. Count and report the presence of **any other not delineated individual non-agriculture feature** found.

   iii. Provide point location for each of the individual non-agriculture features found.

NOTE: Only individual and distinct non-agriculture land cover features should be considered. Small intrusions of non-agriculture land cover at the border of the LUI, due to imprecise matching with the reference orthoimage and delineation artefacts are not counted.

8.6.2 Conformance Testing

6. Check the conformance of the Reference Parcel (E)

   i. Detect and count the presence of any critical defects, which obstruct the use of the Reference Parcel (Item for Inspection). Check for the occurrence of a given _critical defect on the Item for Inspection_, starting from the first defect listed at the top and going sequentially to the last one at the bottom (see Detailed Description 1 of Annex I).

   ◊ Identify and report on lack of any eligible area
   ◊ Report on the occurrence of invalid perimeter
   ◊ Report on the occurrence of invalid common boundary
   ◊ Report on the occurrence of incomplete block
   ◊ Report on the occurrence of a multi-polygon
   ◊ Report on the occurrence of multi-parcel

   Use the reflectance (pixel grey values), color combination; shape; texture; location; and any other context-related information, as well as the information on the RP type. Use also any data collected on the field revealing the LUI limits that should comprise: RP vertices measured with GNSS, pictures revealing the existence of these vertices on the ground and any relevant metadata).

ii. For those reference parcels where the etsReferenceArea equals the maximum eligible area for direct payment, check and report the area-based conformance of the Reference Parcel (Item for Inspection) respect to the area recorded (etsReferenceArea). Sum up the area found to be eligible on the orthoimagery, using the values derived in points 3.vi and 4.vii. ? Aobs. Then:

◊ Divide the result (Aobs) by the area recorded as eligible (etsReferenceArea) in the attribute table of the individual reference parcel or aggregation of reference parcels (Arec). Multiply by 100. Report the value.
◊ Subtract (Aobs) from the area recorded as eligible (etsReferenceArea) in the attribute table of the individual reference parcel or aggregation of reference parcels (Arec). Report the value (in absolute terms)
◊ Report the presence of non-conformity (if any), based on the conformance levels given in Table 8 of Annex I (Area purity)

NOTE: For those reference parcels with total lack of agriculture land cover, report the maximum eligible area as zero (0), RP_CNF v1 as 0% and v2 as negative value of Arec. Flag them having a critical defect (total absence of agriculture land).

iii. If the Reference Parcel (Item for Inspection) is found to be?conforming for quality measure 10102_2, check and report the contamination based conformance of the Reference Parcel in respect to the occurrence of triggers for contamination based on the information collected in in VI.5.

◊ Select those non-agriculture land cover features found on the area represented by the Item for Inspection that can be considered triggers for contamination. These features can be
a. any feature artificial in origin that seal the soil surface (buildings, roads), (regardless its size)
b. any natural non-agriculture features or manmade features that do not seal the soil that cannot be taken up by any agriculture activity and cannot be considered part of the local established practices of the region (EFA, Agroforestry, PG-ELP etc.), which
     i. split the reference parcel (functional objects), (regardless the size)
     ii. violates the local LPIS RP specifications esp. regarding non-agricultural features and their minimum dimensions and size
◊ Recover the point location for those triggers for contamination and report their occurrence per land cover type using the predefined list of 10105
◊ Flag the ?Reference parcel as ?contaminated? if for any of the given land cover types, the value for the occurrence is true
◊ For each occurrence check if the observation violates the relevant general and local ETS condition for the waiver
◊ Indicate whether the waiver vindicates the observed contamination, where applicable,
◊ Flag the parcel as non-conforming, if at least one occurrence of observed contamination remains ?unwaivered?.

NOTE: each LPIS custodian should duly document the criteria on ?local LPIS RP specifications esp. regarding non-agricultural features and their minimum dimensions and size?

iv. Check and report the correctness of the land cover classification with respect to the 3 main agricultural land categories (AL, PG and PC) and, where appropriate, pro rata PG category.

◊ For each agriculture land cover category observed:
a. Check if present as recorded in the LPIS.
b. If affirmative, sum all areas of the agriculture land cover features mapped within the LUI belonging to a that category
c. Add to the total area for each category (Aobs LCcat) the corresponding area of the landscape features found within or adjacent to the agriculture land belonging to that category
d. Divide the result (Aobs LCcat) for each category by the area attributed to this category as recorded in the LPIS for the individual reference parcel or aggregation of reference parcels (Arec LCcat). Multiply by 100. Report the value in percentage.
e. Subtract (Aobs LCcat) from the area attributed to this category as recorded in the LPIS for the individual reference parcel or aggregation of reference parcels (Arec LCcat). Report the value (in absolute terms)
◊ Check for agriculture land cover categories not recorded in LPIS but found on ETS
◊ Report the presence of non-conformity (if any), based on the conformance levels given in Table 8.3 of Annex I (Area classification)
◊ Verify if the land cover inventory of the LUI returns HV polygons AND the item is non-conforming due to any of the following:
a. PG area values are observed, but AL is recorded in the LPIS instead
b. The area difference for PG values observed and recorded is above the conformance threshold
◊ If so, retrieve the available historical records that evidence the recorded presence of any AL over the last 5 years preceding the ETS assessment for each HV polygon in the LUI. These records shall be either:
a. historical orthoimagery, less than 6 years old,
b. farmer?s declarations, less than 6 years old
c. conclusive third party evidence
◊ If such evidence is present for each HV polygon
a. Vindicate the non-conformity found by using waiver E (see Annex I - Detailed Instruction 4)
b. Else, keep the non-conformity found
◊ Record your findings and provide evidence for the use of waiver E as PDF document, including the relevant ID of the reference parcel.
◊ Flag the parcel as non-conforming, if at least one classification error remains ?unwaivered?.

v. Detect the causes for the presence of each of the non-conformities (possible weaknesses) identified in the previous ETS steps within the Reference Parcel (Item of Inspection), if it is flagged as non-conforming.
◊ For the given Reference Parcel check if:
a. it holds a critical defect
b. the difference between the eligible area observed and recorded exceeds the threshold
c. its contains unwaivered contaminations
d. the observed area attributed to the 3 main agriculture land cover categories, defined for BPS/SAPS, is correct with respect to the correspondent values recorded in the LPIS (BPS/SAPS layer).
◊ If any of the above statements are true, assign to each individual weakness found in the Reference Parcel, one and only one pre-defined cause from the cascade list given in Detailed Instruction 3 (Annex I). Consult MTS results, ancillary and historical data, wherever is needed.
a. Start with the first listed cause.
b. If the cause is not applicable, proceed with the next cause from the cascade list.
c. Stop when the correct cause is determined.
d. Geo-locate with a point the approximate location of the non-conformity.

NOTE 1: Each individual contamination reported in quality measure 10102_3 for the item of inspection is counted as one possible weakness (i.e. 5 contaminations found in a RP result as 5 weaknesses). Also, a reference parcel can have one contamination, can have a critical defect and its land can be wrongly classified. This will result in three individual weaknesses.

NOTE 2: The total absence of eligible land for a given Reference Parcel is reported as critical defect, but also as area-based and classification correctness non-conformities. However, such observation (no agricultural area found) is reported only as one single weakness.

7. Generate a report with all findings, associated to the Reference Parcel. (F)

8. Check whether you have reached the minimum number of Reference Parcels from the total population, to inspect, according to the Limiting Quality, as defined in quality measure 10205. If not, go to the next item for inspection. (G)

9. If reference parcel aggregation was not applied, check whether 40% of the reference parcels was measured. If not, re-inspect all reference parcels not feasible for measurement applying the reference parcel aggregation method. (G1)

10. Else, finalize the inspection and pass the package for verification (see Chapter 3).(H)

9 Activity Diagram

Diagram 3 illustrates the activities, related to the inspection of the Reference Parcel (Item)
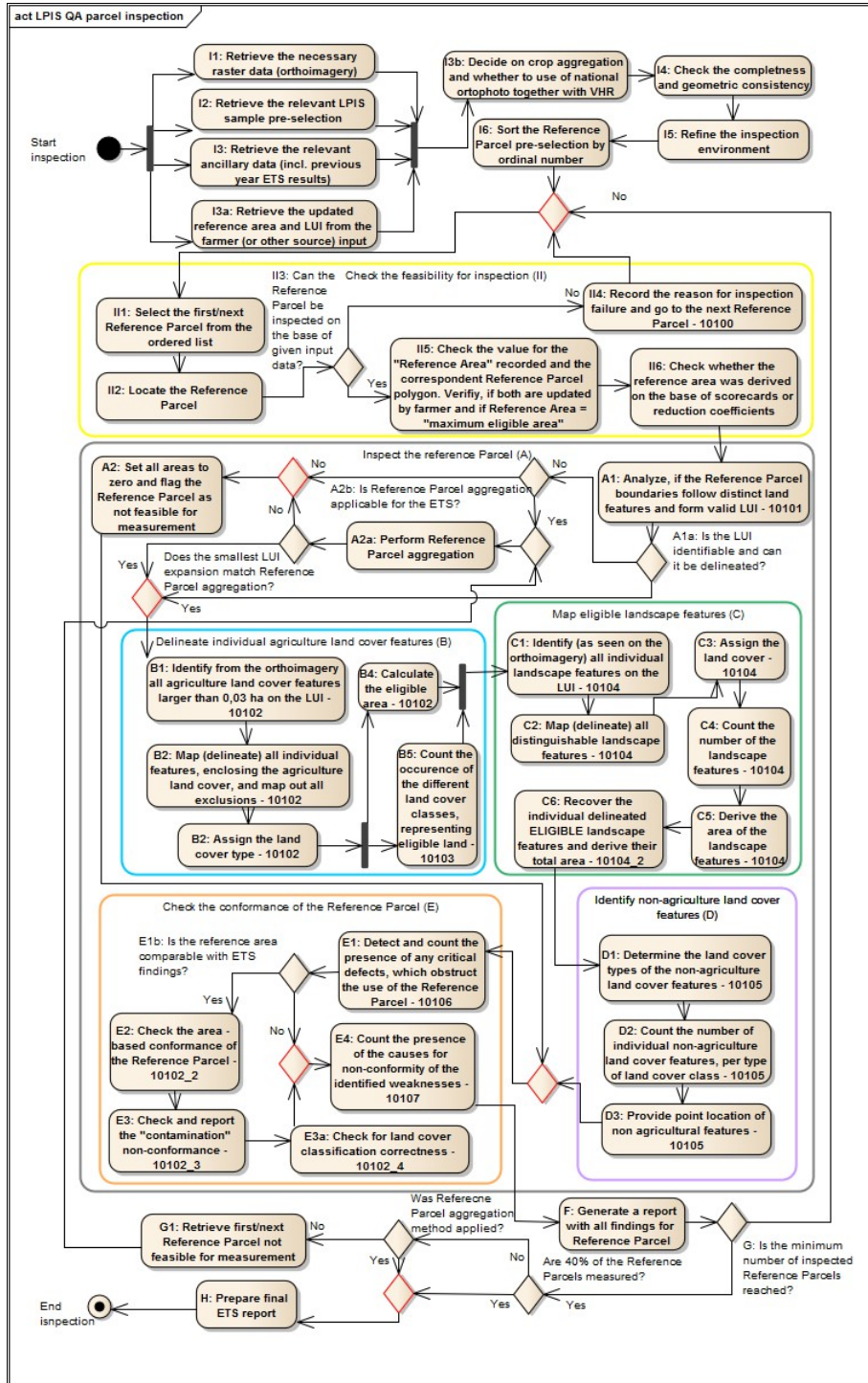

Diagram 3: Inspection procedure at Reference Parcel level

Go up to the main ETS page

10 ETS Inspection variants

10.1 Reference parcel aggregation

The reference parcel aggregation method was introduced for agricultural landscapes where the visible cropping pattern often coincides clusters of complete reference parcels. The principle of crop aggregation is analogous to OTSC AP measurement, where a full crop group is measured if it spans several reference parcels. RP aggregation method is foreseen for cadastar and agricultural parcel designs.

Using the reference parcel aggregations option remains in principle **optional**, but it becomes mandatory where low ?feasibility for measurement? results creates a methodological or perceived problem:

1. a methodological problem arises when less than 200 reference parcel are measured as this is often the minimum sample size for LQ 12.5 indexed tests.
2. a perceived problem can occur when more than 200 but less than half the RP measured. Indeed what is the true reference value of a LPIS when more than half of its reference parcels can not be measured?

So, application of the reference parcel aggregation is subject to **an a priori decision** made on LPIS quality assessment results from the previous year.

The estimated number of reference parcels that will not be feasible for measurement in the current year of assessment, can be equal to the sum of reference parcels found to be "not feasible for measurement" in the previous assessment year.

If that sum represents more than 50% of the inspected sample, then reference parcel aggregation becomes mandatory.

Any application of the reference parcel aggregation variant is systematic: if applied, aggregation and crop measurement needs to be **performed for all sampled reference parcels where the conditions apply**.

Notes:

1. By their very nature, all cadastral parcel and agricultural parcel designs could be more subject to the conditions that require reference parcel aggregation.

10.2 Field activities

10.2.1 Context

The introduction of a limited number of dedicated LPIS QA image zones has two direct consequences:

1. in areas with lower reference parcel density, there are fewer parcels in the sample pre-selection. It is no longer always feasible to skip an item, considering that the sample pre-selection list can be shorter than in ETS v5.3.
2. there should be fewer logistical challenges to organize field activities.

Furthermore, field activities will yield a better overall inspection result as well as a better analysis of those results.

Finally, the EC services expect a raise in field activities as some inspections (classification correctness) might not be correctly assessed from the imagery alone.

10.2.2 Different types of field activities

ETS v6.4 still recognizes four processes where field activities are relevant:

◊ **field inspection** - parcel inspection is fully based on GNSS field survey.
◊ **combined inspection** - parcel inspection is based on merging CAPI delineation and field survey. This usually involves a **border inspection** in the field
◊ **perimeter inspection** - inspection of a LUI to vindicate a critical defect (formerly called boundary inspection)
◊ **field observation** - other activities complementing the normal CAPI inspection

10.2.3 Implementation

All field activities are subject to a discretionary decision of the Member State whether it is to replace or support the CAPI inspection. However, that decision must be systematically, and not discretionary applied to all items in the sample. Any discretionary decision would lead to the inclusion of "nice" parcels in the sample and thus biasing the results of the ETS.

10.3 Conditional triggers

There are several alternative paths for item inspection. The path each item should follow is conditioned by the earlier findings on that item during ETS inspection. It is important to recall that any item can only follow a single path and cannot jump to activities that are not on that path. The path that an item follows will always determine the content of its inspection records of the ETS reporting package and will be subject to automatic screening during and after the upload of that package.

10.4 How to inspect land defined under Art. 32(2)(b) of R1307/2013 NEW

1. Reference parcels containing only non-agricultureal land cover, related to Art.32(b)(2)

These reference parcels will be checked for critical defects (all applicable, except of ?total absence of agricultureal area). They will not be subject to area-based quality measures (etsReferenceArea is NOT equal the MEA available for payment); however, they can be measured and associated area can be mapped. Theoretically, they will fall within the scope of the classification correctness. Nevertheless, no meaningful test can be conducted as: (1) none of these non-agricultureal and at the same time eligible LC types can be attributed to any of the three agricultureale land categories; (2) the correspondent value in the LPIS for the presence of these agricultureale categories will be always zero. Thus, the RP will be in principle always conformant with respect to the classification correctness.

NOTE: If a given natural vegetation as defined in Art.32(2)(b)(i) of 13007R2013 can be qualified as permanent grassland in line with Article 45(1) of the same regulation, then it must the recorded as such in the LPIS and treated in the LPISQA as part of the agricultureale area envelope. It will be processed in the ETS the same was as any agricultureale land cover.

2. Reference parcels containing both agricultureale land cover (Art. 4 of 1307R2013) and non-agricultureale land cover, related to Art.32(b)(2)

In the ETS, these reference parcels will be processed the same way as the ?normal? reference parcels having etsReferenceArea above zero. Since the etsReferenceArea will NOT equal the MEA available for payment, they will not be subject to area-based measures related to eligibilityal. They will fall within the scope of the classification correctness test: only the observed and the correspondent recorded agricultureal land cover will be taken into account - the eligible non-agricultureal land cover will be disregarded.

Go up to the main ETS page

11 ETS Data maintenance

11.1 Context

The reference data stored in the LPIS and being subject to ETS inspection can be the same as the deadline for the farmer's application or a later date linked with particular LPIS update on the basis of the annual MS upkeep cycle implemented by the MS Administration. The observations made during the inspection are based on imagery that can be earlier or later and possibly on field activities that are organized by the end of the year.

In this respect, it is acceptable that the sampled item under inspection would be updated to match any concurrent system update on condition that such system update occurred in "tempore non suspectu" (i.e. the LPIS custodian had no hand in the time when the update initiated).

Evidencing - NEW

The LPIS quality assessments of the previous years have revealed that the unstructured evidence instructions failed to provide sufficient reliability regarding the "in tempore non suspect" character of the updates and structured feature meta-information provides an easy but structured alternative:

ETS v6.4 has a dedicated xml schema, based on the LCM implementation of an anomaly and lifecycle information. It holds the following main attributes:

- **Identification**. A unique identification of the anomaly (e.g. an automatically generated sequential number)
- **Object**: this should be the identifier of the affected reference parcel (RPID)
- **Cause**. The cause of non conformity, according to the list of QE4, "changes in land" is expect to be the most frequent cause
- **Observation(s)**. The details on the observation, including:

    1. Author (stakeholder)
    2. Values that are suspected non-conforming: in case of discrepancies in the ETS reference area as reported in the LPISPointZeroState
    3. Observation date of the findings related to the anomaly (validFrom)
    4. Data selected for resolving the anomaly (supplementaryData)

- **Status in the process**. Details on the process closure of the anomaly, including:

    1. Date of reception (beginLifeSPanVersion)
    2. Status of actions regarding the processing of the anomaly: for example "completed" if the reference area has been already updated

Any discrepancy between the reference area values of the LPISPointZeroState and LPISPolygonAreaZeroState should be accompanied by a duly filled in record within this anomaly file. Its presence and correctness will be **automatically checked during the upload of the ETS Reporting Package**.

All vaiwered discrepancies in classification correctness test (vaiwer E) should be evidenced with additional written documentation or extracts from sourcing registers. These records can be unstructured and should be uploaded within the ETS reporting package in the LPIS QA Portal under "Optional Supportive Document"

For any potential incomplete block where the LPIS holds unaccounted land which has not been flagged as critical defect, an evidence from external or internal registries should be documented and uploaded as unstructured files within the ETS reporting package in the LPIS QA Portal under "Optional Supportive Document"

Any national rules of specific implementation for contamination occurrences (differing from the ETS methodology) should be documented and uploaded within the ETS reporting package in the LPIS QA Portal under "Optional Supportive Document".

12 ETS Data Capture

The ETS inspection procedure is explained in full technical detail in the ETS Annexes I and II. The main body of this chapter merely introduces the key activities, decisions and output of that workflow.

In general, there are the following phases:

1. the LPIS ETS performs an inspection (series of observations and measurements) on items preselected by DGJRC.
2. these observations and measurements are analyzed to come up with an item conformance statement (per reference parcel or non-conformity observation).
3. the resulting counts of these item conformance statements are used to come up with a conformance statement for each of the quality elements indicated in the Regulation

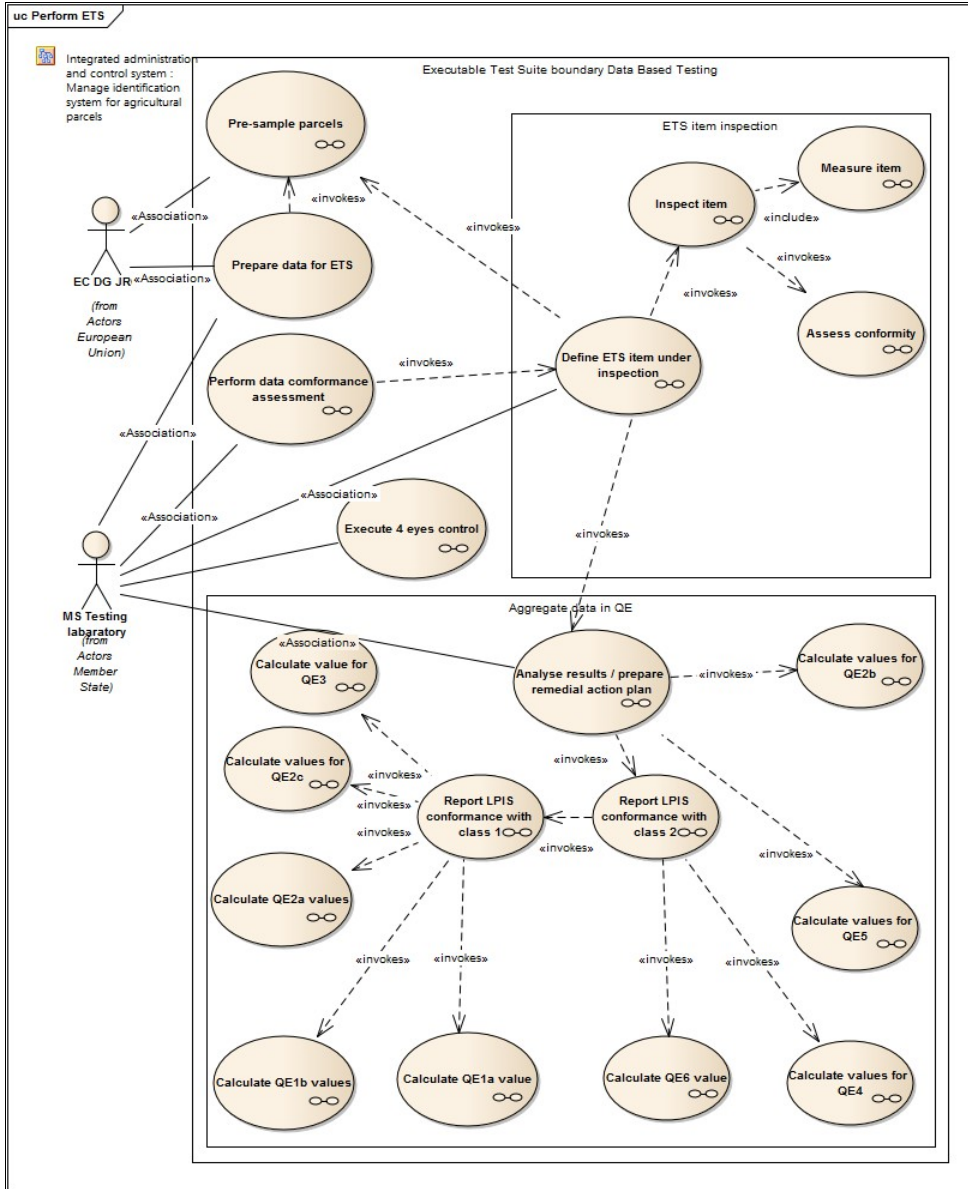The general process leading to the 3 phases as illustrated in diagram 2.

Diagram 2: ETS use case diagram - business level

13 ETS Conformance

13.1 Conformity for a quantitative quality element

The Regulation defines 6 quality elements, grouped into two conformance classes. Based on the item conformance verdicts issued for the various criteria during the item inspection, verdicts will be made on each conformance class.

All quality elements have been expressed in quantitative terms and require measuring or counting. To apply the verdict on each quality element will involve counting non-conforming items or non-conformities before applying the limiting quality (LQ) indexes from ISO 2859-2. Such indexes model the statistical relationship between an expectation, the required sample size and the resulting counts to provide acceptance numbers that represent a statistically robust verdict on conformity.

The table below offers an extract (relevant part for current LPIS sizes) of the sampling table of ISO 2859-2 for the LQ indexes 2 and 12.5.
n= sampling size, A_C= acceptance numbers.

Table 1

Lot Size	n/A_C	LQ 2	LQ 12.5
35001 -> 150000	n	500	200
	A_C	5	18
150001 -> 500000	n	800	200
	A_C	10	18
> 500000	n	1250	200
	A_C	18	18

13.2 Conformance class 1

13.2.1 Context

The conformance class 1 means to *?assess the quality of LPIS?*, and counts non-conforming items (either reference parcels or, where applicable, crop aggregates) This counting of items has been used for all quality elements in the past and is still relevant for the first three quality elements (QE1, QE2 and QE3). Furthermore, counting items offers a straightforward entry for the LPIS upkeep processes.

Table 2

Element	Value	Description	Expectation	LQ index
1		QE1 assesses the maximum eligible area of the system	-	-
	QE1a	absence of bias (i.e. accuracy) of the land represented in the LPIS as a whole.	>= 98%,<= 102%	-
	QE1b1	parcel level precision of the land represeneted in the LPIS as a whole: overestimation	LIB >= -2%	-
	QE1b2	parcel level precision of the land represeneted in the LPIS as a whole: underestimation	UIB <= 2%	-
2		QE2 assesses individual parcels with correctness issues.	-	-
	QE2a1	Proportion of RPs (whole set of data) with incorrectly recorded area or ?contaminated? or with ineligible features	<5%	12.5
	QE2a2	Proportion of RPs (>0.1 ha) with incorrectly recorded area or ?contaminated? with ineligible features	<5%	12.5
	QE2b	Distribution of RPs, according to the correctness of the eligible area recorded	-	-
	QE2c	Number of non-conforming reference parcels in LPIS with classification error	<5%	12.5
3	QE3	Number of reference parcels that have functional issues ("Critical Defects")	<1%	2

13.2.2 Expectations

As indicated in the table above, the expectations remain set at <5% (for QE2) and <1% (for QE3) **non-conforming items**. These expectations are tested through acceptance numbers for indexing with limiting quality LQ12.5 and LQ2 respectively.

An example: the quality expectation "less than 1%" is indexed at a LQ 2 so for a population that counts 300000 items, the table indicates that 800 items need to be inspected and that no more than 10 non-conforming items or non-conformities can be identified. The set will fail the measure as soon as 11 or more non-conformities or non-conforming items are counted in that sample of 800. Note that 11/800 is 1.4%, the 0.4% difference from 1% accomodates the statistical robustness given the sample size.

13.2.3 Procedure

Diagram 4 illustrates the procedure to aggregate observations for the conformance class 1 assessment.
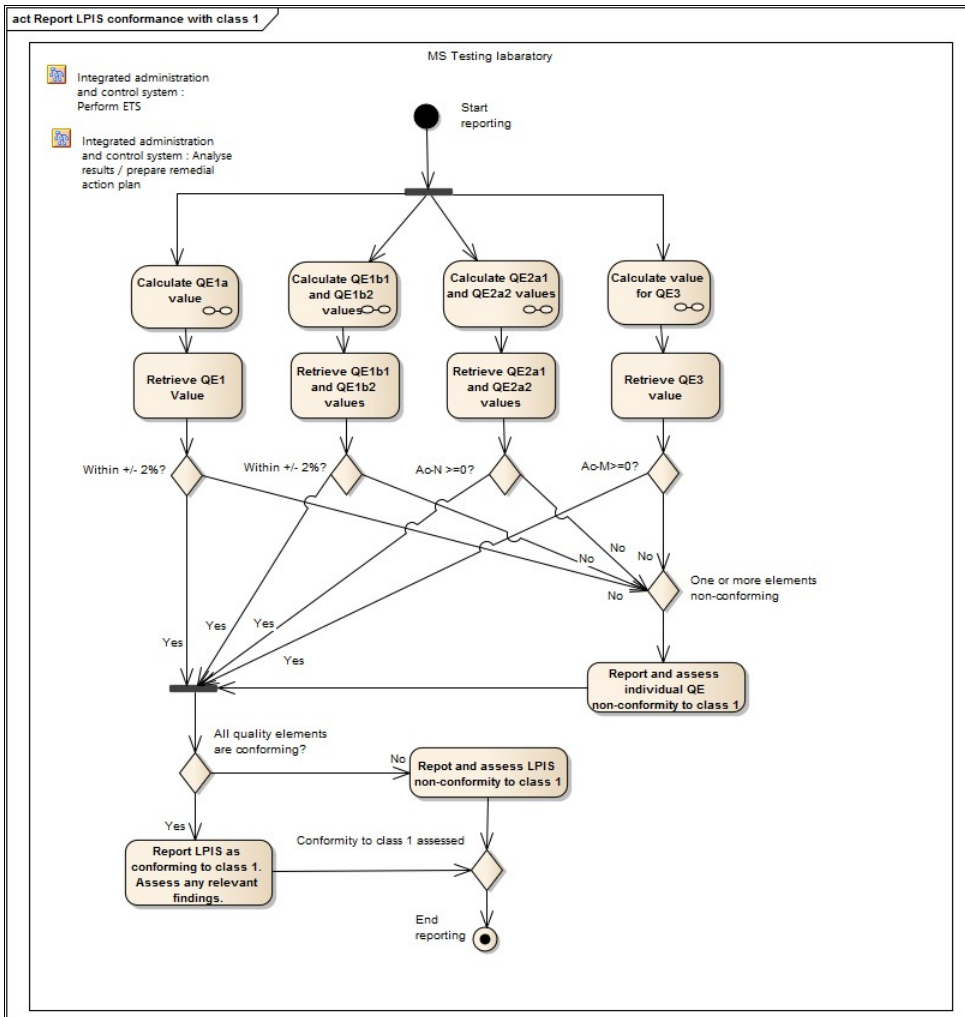
Diagram 4: conformance class 1 testing

13.3 Conformance class 2

13.3.1 Context

Conformance class 2 aims to *"identify possible weaknesses"*, and this requires a broader system wide analysis, beyond the individual item or reference parcel. This is most obvious for QE4 which analyses the LPIS processes and design as factors for creating quality problems. For instance, a single, large parcel can be contaminated, can have critical defect (for example, multi-parcel), and can have its land wrongly classified. Although this represents a single non-conforming item, it does reflect three different system weaknesses.

Table 3

Element	Value	Description	Expectation	LQ index
4	QE4	Categorization of the non-conformities	<5%	12.5
5	QE5	Ratio of total declared area in relation to the total area recorded for the area conforming RPs	-	-
6	QE6	Rate of non-conforming reference parcels due to undetected and unaccounted land cover change, as observed in ETS, accumulated over the years	< 25%	-

13.3.2 Expectation

For QE4, the expectation remains at <5%, however no longer counted as non-conforming items but counted in terms of **non-conformities per 100 items**. This expectation is tested through the acceptance number for indexing with limiting quality LQ12.5.

13.3.3 Procedure

Diagram 5 illustrates the procedure to aggregate observations for the conformance class 2 assessment.
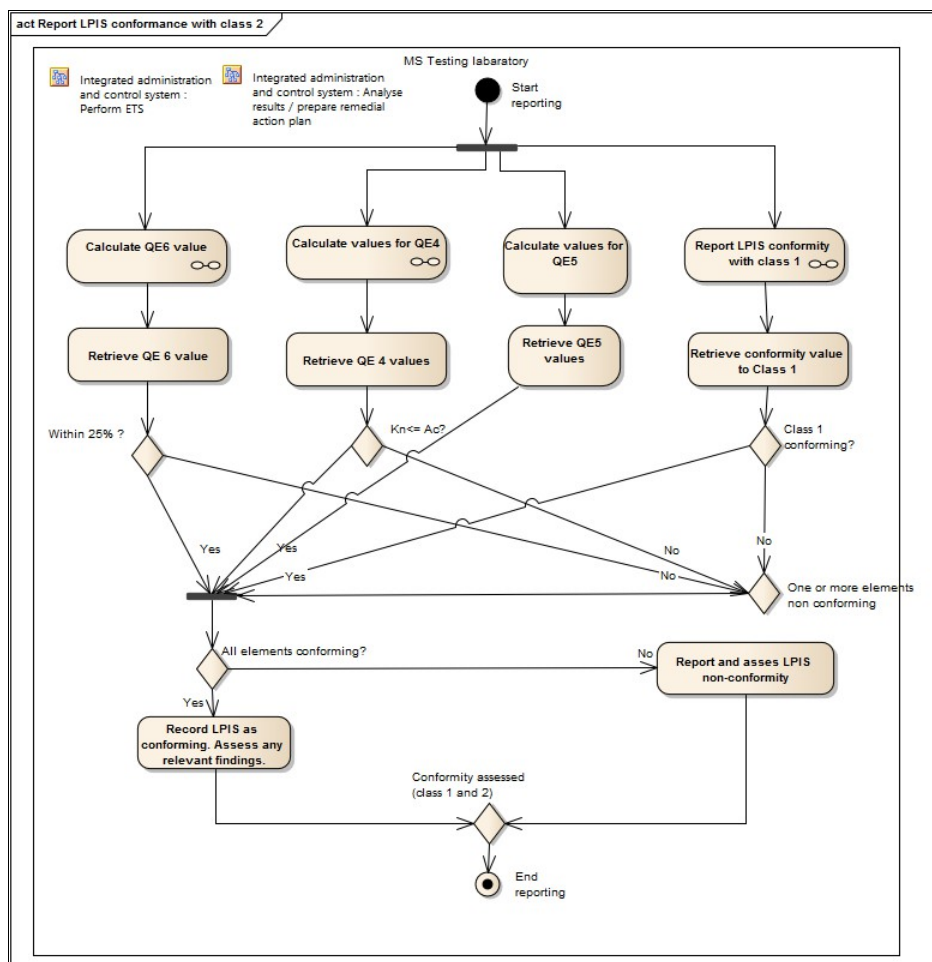
Diagram 5: conformance class 2 testing

13.4 Practical guidelines

The number of inspected parcels (sample size) has been determined by indexing on LQ 2 as required for QE3 (i.e. parcels checked for critical defects) and by indexing on LQ12.5 as required for QE2 (i.e. parcels measured). These separate determinations yield a different sample size and the inspection should continue until the number of inspected and measured parcels reaches the number required for each seperate index respectively.

The Member State shall, **for quality elements 2,3, and 4**

1. **use tables 2 and 3 to determine the Limiting Quality for a particular quality element based on the given expectations;**
2. **use table 1 to determine the sample size and acceptance number (AC) for a particular quality element;**
3. **when for any quality element the prescribed sample size is smaller than the actual sample size as inspected during the ETS, increase the initial acceptance number given in the table proportionally to the ratio of final sample size to pre-scribed sample size. Truncate (DO NOT round) to an integer number;**
4. **when the observed number on non-conforming items exceeds the acceptance number derived in point 2 (or 3 if applicable), assign ?non-conforming? for that quality element in the ETS scoreboard'**

The Member State shall **for quality element 1 and 6**

1. **use tables 2 and 3 to determine quality expectations for the particular quality element;**
2. **assign "non-conforming" to either element in the ETS scoreboard when its reported value exceeds the expectation.**

Table 4 (given below) provides an overview of the 3 main parameters needed for each of the quality elements to come to a given conformance verdict.

1. Data Quality scope (DQ scope) - the temporal and spatial extent identifying the data on which given data quality is to be evaluated. For example the Quality Element 3 (Critical Defects) is calculated from all reference parcel being inspected during the ETS. Thus, the Data quality Scope for QE 3 is "All inspected reference parcels"
2. non-conforming items - number of either non-conforming reference parcels or non-conformities found during the particular element. This number will, where appropriate, be the nominator for the calculation of the percent non-conforming (for QE1 and QE6) or the total number of non-conformities found in the sample (for QE2, QE3 and QE4)
3. total number of relevant items in the sample - number or items that were subject for this particular element. The number is mostly, but not always, equal to the DQ Scope. This number will, where apropriate, be used as the denominator for the calculation of the percent non-conforming and proportional acceptance number.

Table 4

Quality Element	Reported Items	Data Quality Scope	Non-conforming items/Observed items (nominator)	Total relevant items (denominator)	Type of reported value	ETS Annex I Alias
QE1a and QE1b	Rate of correct eligible hectares found with respect to the total number	All measured reference parcels with etsReferenceArea that equals the	All eligible hectares found during ETS on the reference parcels from the data quality	All eligible hectares recorded for the reference parcels from the	Percentage	LPIS_RP_MEA; LPIS_RP_MEA_B

27

		scope	data quality scope		
	of eligible hectares currently recorded in the LPIS.	maximum eligible area (MEA)			
QE2a	Number of area-based non-conforming Reference Parcels (incorrectly recorded area or contaminated with small eligible features)	All measured reference parcels with etsReferenceArea that equals the maximum eligible area (MEA), minus those with areas not directly comparable	Number of area non-conforming reference parcels from the data quality scope, with etsReferenceArea BIGGER THAN or EQUAL TO 0.1 ha	see "Data Quality Scope"	a number	LPIS_RP_NEA_B
QE2b	Distribution of the reference parcels in LPIS, according to the correctness of the eligible area recorded.	All measured reference parcels with etsReferenceArea that equals the maximum eligible area (MEA), minus those with areas not directly comparable	-	-	-	LPIS_RP_SEA
QE2c	Number of non-conforming Reference Parcels with classification error.	All measured reference parcels, minus those with areas not directly comparable	Number of area non-conforming reference parcels with classification error from the data quality scope[1]	see "Data Quality Scope"	Percentage	LPIS_RP_CLS
QE3	Number of Reference Parcels that have critical defects	All inspected reference parcels	Number of Reference Parcels having critical defects	see "Data Quality Scope"	a number	LPIS_RP_CRA
QE4	Categorization of non-conformities (Abundance of the causes for occurrence of non-conformities in the reference parcels)	All non-conformities (weaknesses) found on all inspected RPs	Number of non-conformities per cause	All inspected reference parcels	a number for each cause separately	LPIS_RP_CEA
QE5	Ratio of the total declared area in relation to the total area recorded for the conforming reference parcels	All measured and area-conforming (QE2a) reference parcels	V1:All eligible hectares declared in the assessment year for the RPs in the data quality scope; V2: All eligible hectares declared in the assessment year for the whole IACS	V1:All eligible hectares recorded in the LPIS for the RPs in the data quality scope; V2: All eligible hectares recorded in LPIS for the whole IACS	Percentage	LPIS_RP_DCA
QE6	Cumulated rate of non-conformities due to undetected or unaccounted land cover changes	All non-conformities with missed land update found from all inspected RPs	All non-conformities with missed land update found for the year of assessment	All inspected reference parcels in the years of assessment	Percentage (cumulative rate). Rate from previous years should be added starting from the last systematic update of the LPIS. See also the Example_of_QE6_calculation	LPIS_RP_CMC

Go to the main ETS page

<references>

1. ? *Except those with: (1) with only one type of agriculture land cover category recorded in the LPIS AND (2) same category found on the LUI during the ETS*

14 ETS Delivery

Go up to the main ETS page

14.1 Textual reports

14.1.1 Content and delivery

The Regulation requires the MS or its regions to send **by January 31st**, (ie. by 31/1/2021 for the 2020 QA), an assessment report and, where appropriate a remedial action plan, to the unit of the European Commission responsible for IACS (DG AGRI D3). **Please send this two documents by email to the email address: agri-implementation-support@ec.europa.eu**. The document set holds:

- an ETS assessment report (a generated PDF format via LPISQA Portal)
- if appropriate, a remedial action plan (via a doc template)

14.1.2 Guidance for compiling the assessment report and remedial action plan

Usability drives the assessment of raw scores to lead to meaningful evaluation results in the particular context of the LPIS. The etsAssessmentReport.xml merges the scoreboard and assessment report into a single document. This combined **scoreboard and assessment report shall contain a summary of the member states' analysis of its scores**, in particular relating the scores to the MS context. This combined assessment report should be generated via LPISQA Portal using structured schema file provided on ETS Downloads Wiki article (etsAssessmentReport.xml->etsAssessmentReport.pdf). The PDF can be downloaded from the ETS reporting package by clicking to the PDF icon next to the EtsAssessmentReport item.

If appropriate, i.e. **When either QE1a, QE1b, QE2a, QE2c and/or QE3 element fails to meet the acceptance threshold and (based on the assessment performed) that failure is expected to continue, a plan with the remedial actions and the timetable for their implementation shall be added as a separate document (doc template available in download section)**. This summary plan shall build upon the analysis and differentiate between earlier actions. Special consideration shall be given to ongoing refresh projects, if present. The remedial action plan shall hold not more than 2-3 pages. This remedial plan has two parts: A) specification of the detailed ETS analysis, LPIS weaknesses, planed remedial actions and risks, and B) summary table of the ETS remedial actions.

14.2 Data packages

Data packages hold both the inspection records (ETS reporting package) and the reference imagery.

14.2.1 ETS reporting package

To enable verification of the inspection method applied and the content expressed in the textual document, **the ETS reporting package, shall be provided to the European Commission.** It shall hold:

1. ETSAssessmentReport: holding the quality element data and scores
2. ETS observations: raw observations (observed values) for all measures on all inspected parcels of the sample
3. ETS inspection measurements: geographical features mapped during the ETS inspection for all relevant measures on all inspected parcels of the sample
4. Boundary inspections and Field Observations records containing a description of a field visit and a link to its graphical documentation
5. Non conformity: point file holding the location and type of non-conformities (weaknesses) found per reference parcel
6. Sample pre-selection status containing a list of the inspected reference parcels. Note that this file must also contain the skipped (with a valid reason) reference parcels as well as the remaining unprocessed reference parcels present in the LPIS sample pre-selection.
7. In case of significant number of reference parcel skipped due to scoping issue (S1) is found during ETS, a point file with all reference parcels, subject to this scoping issue present in the entire LPIS have to be reported in the dedicated LpisPointZeroStateOutOfScope.gml.
8. LPIS polygon zero state which is an extract from the LPIS data under inspection, i.e. reflecting the state at the first step of the ETS. It contains all reference parcels that were **either** inspected, aggregated **or** skipped (geographical and alphanumerical attributes). Note that this file must all contain boundaries, identifier and reference area of **any** parcel (additional parcels, not restricted to parcels within the scope of the current assessment year) **within a distance of 100 meters** from the boundary of the inspected, aggregated or skipped parcel.
9. Orthoimage set: metadata file related to the VHR and proprietary image data used in the ETS and the contact points as a reference. NOTE: Most of the data requested in this XML conserns some specific ETS-related characteristics of the orthoimagery, not entirely covered by the jrc_metadata.xml of the VHR image acquisition specifications for the CAP checks
10. Orthoimagery Url: metadata with information on the access to proprietary orthoimagery (if used in the ETS)
11. If a reference parcel aggregation is applied: the table of aggregated parcels containing RP ID of preselected RP and the list of all corresponding RPs inside its aggregate.
12. for cadastral parcel or topographic block or any non-production block system that operates, a separate layer to identify agricultural land units: Land administration: all original third party land identification polygons within a distance of 100 meters from the boundary of the inspected parcel (GML: INSPIRE Annex I, cadastral parcel)
13. If applicable, the file with reference parcel update data (LPIS update evidence and LPIS cardinal points).
14. Metadata: an ISO 19157 compliant meta record on the reported quality assessment.
15. If applicable, the file with applicable waivers.
16. If applicable, any unstructured file with clear additional explanations (description of established local practices, minimal dimensions of delineations coming from national legislation, force major evidences, waiver E evidences, ...).

14.2.2 Delivery instructions

For the 2021 implementation, **all deliveries are due by January 31st, 2022**.

Deliveries are of 3 different types:

1. **The ETS reporting package shall be uploaded on the LPIS QA portal**
2. **The final official ETS assessment report and, where appropriate, the remedial action plan shall be emailed to agri-implementation-support@ec.europa.eu. This ETS assessment report has to be created in PDF format by using LPIS QA Portal after uploading of the specific EtsAssessmentReport.xml file (see ETS Downloads page) and approving the ETS reporting package. This process allows you to create the pdf via the portal, to download it at your level, to double check it and then to send it officially by email to DG AGRI via the email address agri-implementation-support@ec.europa.eu in order to comply with conditions of EC regulation (article 6 of COMMISSION DELEGATED REGULATION (EU) No 640/2014).**
3. **Orthorectified Imagery**, for which the following instructions apply:

- LPIS QA VHR, **EU-financed**: This should follow the instructions of the VHR image acquisition specifications (see chapter 16) for the CAP checks (CwRS and LPIS QA). MS will be contacted and informed by the image provider on the orthoimage return protocol.

- ancillary images, **MS-financed: MS has to provide an approriate URL for the Web Map Service (WMS) or <u>alternatively</u> to deliver via the LPIS QA portal** (For the latter, please follow the procedure described in National image delivery)

Go up to the main ETS page

15 LPISQA National image upload

version 6.2

NOTE: This instruction only applies to imagery that was **not** acquired by the JRC under its annual LPIS QA campaigns. It therefore relates only to the aerial and other imagery that was independently acquired by the Member State for use in support of its inspection of the sample of reference parcels.

15.1 Step 1: Document the metadata

Prepare an entry for control zone and preparation of XML file according to the OrthoimagerySet.xsd, as available on the download article.

This xml-file is a part of the ETS reporting package

◊ **ZoneID** of this xml is the identification of the zone, analogue to the LPIS QA zone naming and mostly linked to acquisition processes.

15.2 Step 2: Check format

Make sure your image is in one of the supported file formats for the image datasets.

◊ GeoTIFF
◊ ERDAS Imagine (HFA)
◊ ECW

Convert or export your imagery to one of these three formats if needed.

If a compression method is applied solely for the purpose of transmission, it should be **lossless only** (for example LZW for GeoTIFF). Ideally, the uploaded or delivered orthoimagery should be in the same image format (same encoding and compression parameters) as used in the ETS.

Note: These considerations on conserving image quality also apply to the imagery made accessible via a web service.

15.3 Step 3: Organise your datasets/files per zone

Group all imagery produced in a single CRS that is relevant for a particular ETS reporting package (i.e. LPIS Authority/reporting year). Please note that

◊ a dataset can be provided as a single large image file or as a mosaic of non-overlapping image tiles.
◊ all image tiles of the same dataset must have the same coordinate reference system, else the zone needs to be split up in sub-zones.

To compile your complete dataset:

1. Name the dataset: if you have sub-zones, create a unique ID for each individual dataset, otherwise use the LPIS zone ID;
2. Create a folder with the name determined above;
3. Place all files of the dataset (=same CRS,LPIS,year) into that folder;
4. Place the XML file of step 1 in the folder and rename it to ***?lpis_ortho_meta.xml?***

15.4 Step 4: Deliver

Deliver the compiled folder(s) either by FTP upload to the JRC server or by shipping DVD's:

◊ **FTP-upload:** This requires the use of the FTP. Before any action:
  • indicate the approximate amount of data in GigaByte by contacting Slavko Lemajic (slavko.lemajic@ext.ec.europa.eu),
  • ask for a credentials (valid FTP username and password) that will be shipped to you by e-mail Slavko Lemajic (slavko.lemajic@ext.ec.europa.eu),
  • follow the file naming convention (following OrthoimagerySet schema version 6.1: OrthoimagerySet.xsd):
    reportingYear_lpisCode_zoneID_imageAcquisitionDate_platform_pixelSizeM_imageType.appropriateExtension.
    ◊ For instance: 2013_TEST-LPIS_MZ03_2013-08-17_WORLDVIEW2_0.5_PAN-MUL-FCC-RGB.ecw

◊ **Shipping of DVD?s or hard disks:** The shipping address is
  Joint Research Centre
  Directorate D - Sustainable Resources
  D5 - Food Security, TP 272
  Slavko Lemajic
  Via E. Fermi 2749
  I-21027 Ispra (VA)
  Italy
Please inform this responsible person via mail about the shipment (mailto: slavko.lemajic@ext.ec.europa.eu).

15.5 Aftermath

• JRC will return harddisks if the MS provides a shipping address.
• The imagery will exclusively be used for screening of the ETS observations by EC staff and will not be available through the CID portal for any other application.

16 Non-structured evidence

16.1 Important considerations

This instruction applies to data or information that is:

- consulted during the inspection or assessment process
- considered by the MS as methodology relevant to be reported to the EC/JRC
- but no template is available in the download pages.

Field inspection data (land cover survey or boundary point collection) and field observation records (formerly named RFV) **collected during the LPIS QA process, as well as metadata of LPIS update evidences, are <u>not subject to these non-structured evidence instructions</u> as for these, the normal schemas of the download page apply.**

Examples of such evidence are:

◊ an third party evidence in relation to critical defect "incomplete block"
◊ any evidence in relation to waiver E (classification correctness)
◊ information on last systematic LPIS update (location and extent of the update zone(s), and the year(s) of completion of the systematic update)
◊ any evidence in relation to F1 skipping reason (force majeure circumstances on LUI) or comments due to S1 skipping reason (erroneous scoping)
◊ paper documents
◊ any log file from the four-eye control
◊ any log file from the orthoimagery quality control
◊ ....

16.2 Preparing the non-structured evidence

To provide such unstructured evidence relevant for the inspection and analysis of a particular reference parcel, one needs to use a PDF format. The PDF file should be uploaded through the ETS Reporting Package as an OptionalSupportiveDocument.

To create the PDF, follow these steps:

1. **Indicate** at the top of the each page the Annex I quality measure number where the evidence is used (i.e.: 10106).
2. **Group** the various pieces of evidence per quality measure
3. **Order** the grouped pages of the evidence according to the measure identification on top (i.e.: 10106 before 10107)
4. **Scan, or "print as" PDF** all the individual pieces of evidence. The minimum resolution is 150dpi.
5. **Join/Merge** all individual scans/prints into one PDF document per unique reference parcel where unstructured evidence is to be provided.
6. **Name** the joined PDF according to the reference parcel unique identifier, with a prefix: ?E_?, i.e.: E_AG0192-12.pdf
7. **Zip** these pdf's for all concerned reference parcels in a single archive NonStructuredEvidence.zip

16.3 Delivery

The delivery of any non-structured evidence to JRC is left at the discretion of the EU MS Administration. It is <u>not a compulsory element</u> of the ETS reporting, however <u>an entry functionality is made available</u> in the LPIS QA Portal.

The following two entries are available:

- **_otherGisLayers_** ? for any spatially-related information implied from IXIT/MTS polychotomy and use of waivers
- **_OptionalSupportiveDocument_** ? for any other unstructured evidence (farmer paper documents, 4-eye control logs, etc.)

When a MS chooses not to upload the evidence above, it shall keep that information as archive to the ETS and make it available upon request.