

JRC IPSC/G03/P/SKA/ska D(2005)(4560)

Last revised: 12 July 2005

TASK 2

Draft specifications:

**Parcel Identification System
Creation and/or Updating**

Parcel Block interpretation and numbering

Contents

1.	TECHNICAL BACKGROUND TO THE WORK	3
2.	SCOPE OF WORK	3
2.1.	Area concerned by this call for tender	3
2.2.	Outputs	4
3.	PARCEL BLOCK INTERPRETATION AND DOCUMENT PRODUCTION	4
3.1.	Parcel identification - the interpretation and use of parcel blocks	4
3.2.	Block characteristics	5
3.3.	Block interpretation workflow	6
3.4.	Production technique; use of Geographic Information System (GIS)	8
3.5.	Block numbering system	10
3.6.	Project management and quality control	11
3.7.	Digital and other deliverables	11
3.8.	Optional analogue cartographic deliverables	11
3.9.	Project calendar	12
4.	FINANCIAL PROPOSAL	13
4.1.	General terms	13
4.2.	Parcel block interpretation and document production	13
5.	ANTICIPATED EXPERTISE AND EVALUATION CRITERIA	13
5.1.	Parcel block interpretation and document production	13
6.	ANNEX 1 - GEOGRAPHIC DEFINITION OF LOTS	14
7.	ANNEX 2 - PROJECTION SYSTEM AND MAP SHEET LAYOUT SPECIFICATIONS	14

1. Technical background to the work

- 1.1.1. The method proposed rests upon the use of advanced technology (digital photogrammetry, geographic information systems (GIS)) to create the GIS-OLI and GIS-VITI.
- 1.1.2. In brief, this work is anticipated to be made up of the following steps:
1. Acquisition of medium-scale aerial photography (1:40,000);
 2. Creation of digital orthophoto products;
 3. In option, creation of hard-copy output on stable material for the orthophoto products;
 4. Interpretation and digitisation “on-screen” of the parcel boundary system;
 5. In option, creation of hard-copy output on stable material of the interpreted limits and numbering system (on transparent overlays);
 6. Attribution of parcel numbers using GIS techniques;
 7. Delivery of associated databases (parcel number, characterisation);
 8. Distribution to the local offices of the graphical and alphanumeric data, either in digital (CD-ROM) either in analogue form.
- 1.1.3. A previous document (in this document called **TASK 1**), concerns the production of digital orthophoto maps, in other words steps 1 through to 3 above. Steps 4 through to 6 will be carried out under this tender specifications (from here-on referred to as **TASK 2**).
- 1.1.4. For some zones, steps 1 to 6 will have been already done for the purpose of the IACS. In this case, steps 4 to 7 will be repeated taking into account the available material and limiting the work to the modifications imposed by the particularities of the vineyards and olives groves (GIS-VITI or GIS-OLI). The tenderer should be aware that each lot is only of one type (creation or update).
- 1.1.5. In order to ensure the correct photointerpretation of vineyards and olive trees (a maximum of 2% of omission and commission error will be accepted in each case), the bidder can offer in option some of the following technical solutions:
- acquisition, in specific zones, of an additional colour or false colour infrared coverage of a scale and date targeted at the photointerpretation of vineyards and/or olive trees .
 - systematic photointerpretation in stereo of the B/W photos of the zones with vineyards,

2. Scope of work

2.1. Area concerned by this call for tender

- 2.1.1. The total area to be covered concerns an area of around xx.000 km², as defined in Annex.
- 2.1.2. Given the size of the task in hand and the schedule to which it must be carried out, the task will be split into lots of the following sizes:

Lot Number	Area in km ²	Administrative area concerned
1		
2		
..		

2.2. Outputs

- 2.2.1. The steps 1 to 3 above (§1.1.1) forming Task 1 - to be completed under a **separate previously announced tender procedure** - foresee the output of digital, ortho-rectified photography (hereafter referred to as “orthophotos”) for the entire area specified in §2.1. The orthophotos will be delivered in digital format, of a size corresponding to the map sheet dimensions defined in agreement with the Ministry of Agriculture, but in any case conforming to the IACS projection system.
- 2.2.2. The specification of the orthophoto data to be provided is as follows:
- Pixel size/ground sampling distance:
 - Original flight scale:
 - Date and season of imagery
 - Format, Bands available (or film type used)
 - Projection, geodetic information
 - etc
- 2.2.3. **This tender** foresees the interpretation of the orthophotos on-screen, using GIS techniques for the definition of a digital vector database of parcel (or parcel block) limits.
- 2.2.4. The eventual deliverables will be this GIS database (vector and attribute data), and [*optionally*] analogue (printed) copies of the orthophotos and a transparent overlay with the parcel (or parcel block) limits and numbers. A simple map collar, giving ancillary information (scale, data source, etc.) will also be defined. The map sheets to be produced will cover the entire area at 1:5,000 scale (note: the accuracy specification requirements will however, be of 1:10,000 scale). Each map sheet will be in principle of around size A1, and conform to the IACS projection system definition.

3. Parcel block interpretation and document production

3.1. Parcel identification - the interpretation and use of parcel blocks

- 3.1.1. In the context of the integrated system, agricultural parcels can be identified via an intermediate reference. In Greece and Portugal, this intermediate reference will be a **block**, grouping together a number of agricultural parcels.
- 3.1.2. Blocks should have stable limits (ie, not usually modify from year to year), which are easily recognisable on both the cartographic support documents that are used for the application process (orthophotos), as well as on the ground.
- 3.1.3. The type of limits foreseen to be used in block definition are, in order of hierarchical importance:
- Infrastructure (roads, railways, water channels, etc.)

- Farm tracks and other limits between land cover types that are considered mostly permanent (streams, vineyard borders, olive grove borders, woodland/farmland borders, etc.)
- Agricultural parcel limits between parcels of the same cover type that can be considered permanent (fence-lines, hedge-rows, etc.).

3.2. Block characteristics

- 3.2.1. The size and structure of a block is expected to vary according to the structure of the agricultural landscape, and according to the predominant land cover type in the block. However, an overall objective of average 10ha size and fewer than 15 agricultural parcels per block for **productive agricultural areas** should be applied.
- 3.2.2. The blocks will be interpreted according to the land cover classification using the categories listed below:
1. Woodland, forest and shrub-land,
 2. Built-up zones and permanent structures
 3. Pasture, grazing land
 4. Arable agriculture, including harvested forage land,
 5. Olive groves
 6. Vineyards
 7. Other permanent agriculture (orchards, etc.)
- 3.2.3. The blocks should be largely homogeneous in land cover, that is they should not contain more than 10% of cover from another class; and that non-productive areas >0.1ha should be excluded. Nevertheless, mixed blocks will be accepted, in the circumstances detailed below:
- At the borders of built-up areas, where no infrastructure limits can be utilised as block limits.
 - For blocks of less than 5ha in size, and where the non-productive elements within the block are smaller than 0.5ha in size.
- 3.2.4. For blocks labelled as olive groves and/or vineyards, additional constraints will need to be respected. In particular:
- a) blocks will be pure (but crop association will be accepted) in only one of each category in all cases where the size of the block exceeds 3ha,
 - b) the maximum block size will be limited to 10ha,
 - c) all non-productive areas over .1ha will be extracted, except if their minimum dimension is less than 2m.
- 3.2.5. For vineyards, the external perimeter of parcels in vines will be defined, providing an exhaustive definition of area under vines at the date of the photo acquisition. A maximum of 2% of omission and 2% of commission errors will be accepted in any checked commune.

- 3.2.6. The following norms will be applied to determine block size for different cover types and the more limiting constraint will be respected:

Table 1: Block interpretation parameters

Cover type Parameter	1. Woodland, forest, shrub	2. Built- up areas	3. Pasture	4. Arable	5 & 6. Olive groves & Vineyards	7. Other permanent
Max. block size	50ha	30ha	50ha	20ha	10ha	20ha
Max. nr. agricultural parcels	n/a	n/a	15	15	15	15

- 3.2.7. In the case of mixed blocks, the predominant land cover type (as listed in Table 1) must be used to determine the corresponding block parameters.
- 3.2.8. Examples of block interpretation and documents produced in the pilot study can be inspected upon request at the Ministry of Agriculture.

3.3. Block interpretation workflow

- 3.3.1. The work method should consider a **land systems approach** to land cover classification. This is especially important in areas of changing and variable cover-type, as found in non-intensive agricultural regions. In this approach, the main work is preceded by a stratification of the area to be interpreted into three zones: 1) farmed agricultural, 2) forest, and 3) a contact/transitional zone of broken/mixed cover. This broad classification is expected to be carried out by a relatively experienced photo-interpreter, probably on analogue products, and

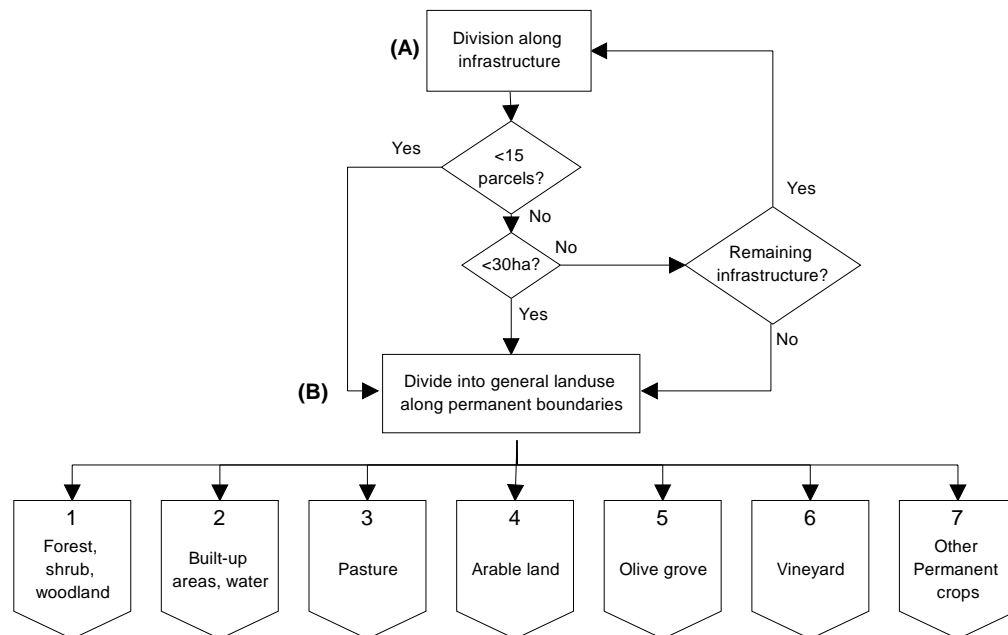


Figure 1: Workflow strategy for block interpretation

possible using simple stereo interpretation equipment. At this stage, the division of area is based upon the systems classification of the landscape, and not the detailed identification of linear features. It is acceptable to bridge “gaps” in linear details of up to 50m at this stage to form these zones.

- 3.3.2. Following on, the proposed workflow is made up of two stages (Figures 1 and 2). In the first stage, the basic infrastructure is used to divide the zone into blocks (box (A) in Figure 1). The blocks - as yet of undetermined land cover - are created to ensure that they contain no more than 15 parcels. Blocks with more than 15 parcels are tested to see if they are larger or smaller than 30ha; parcels over this limit are further subdivided, if there is any remaining internal infrastructure, otherwise they are passed onto the land cover assessment process (B in Figure 1).
- 3.3.3. The final process in the first stage is to undertake a classification of the **dominant** land cover types in the block. The intention is that a division - if necessary - of the blocks takes place along the general land cover classification into five classes, as outlined in Figure 1. However, in contrast to the procedure outlined in §0 above, the limits of these blocks should be based upon identifiable linear features.
- 3.3.4. Note that at this stage the block could have mixed cover types, although the objective is that these are to be avoided. This will occur for instance, where the boundary between two cover types is not interpretable as permanent. Note also that it is the **dominant** land cover that must be interpreted, **not** a detailed land cover classification.
- 3.3.5. Having divided the blocks according to cover type - keeping in mind the overall objectives of average size and <15 parcels per block - the final stage of interpretation is carried out as in Figures 2a to 2c. Each cover type is treated in the same manner, in essence, excepting that the area parameters are varied according to the importance (with respect to the IACS, GIS-Oli, GIS-viti) for each cover type.
- 3.3.6. In practice, blocks will be accepted if they are of less than 5ha in area, even if they still contain infrastructure or other definable limits (see §3.2.3). However, non-productive areas (buildings, farm-yards, lakes, etc.) should be excluded (and numbered) if they fall inside a productive arable or permanent agriculture block and for each case where these areas are greater than respectively 0.1ha in area.
- 3.3.7. Features (blocks, roads, etc.) shall be identified with a double limit when they exceed a width of 4m (2m when inside a block). Infrastructure features under this dimension can be identified with a single line. However, methods and algorithms for calculating a deduction in the associated parcel block area, based upon a width attribute for these features, should be proposed by the tenderer.
- 3.3.8. Blocks will be sub-divided until they meet either the minimum size criteria for that land cover, or they contain no further interpretable permanent boundaries for sub-division.
- 3.3.9. Blocks must be created so that they do not require the examination of adjacent map sheets to determine the extent of the limits; see §3.8.5 below.

- 3.3.10. The tender document must include an analysis of the work-load corresponding to the block interpretation method for the areas concerned. No major modifications to the work programme or method will be considered by the administration after attribution of the contract; equally, a weak assessment or insufficient breakdown of the task in the proposal will heavily prejudice the acceptance of a tender as realistic.

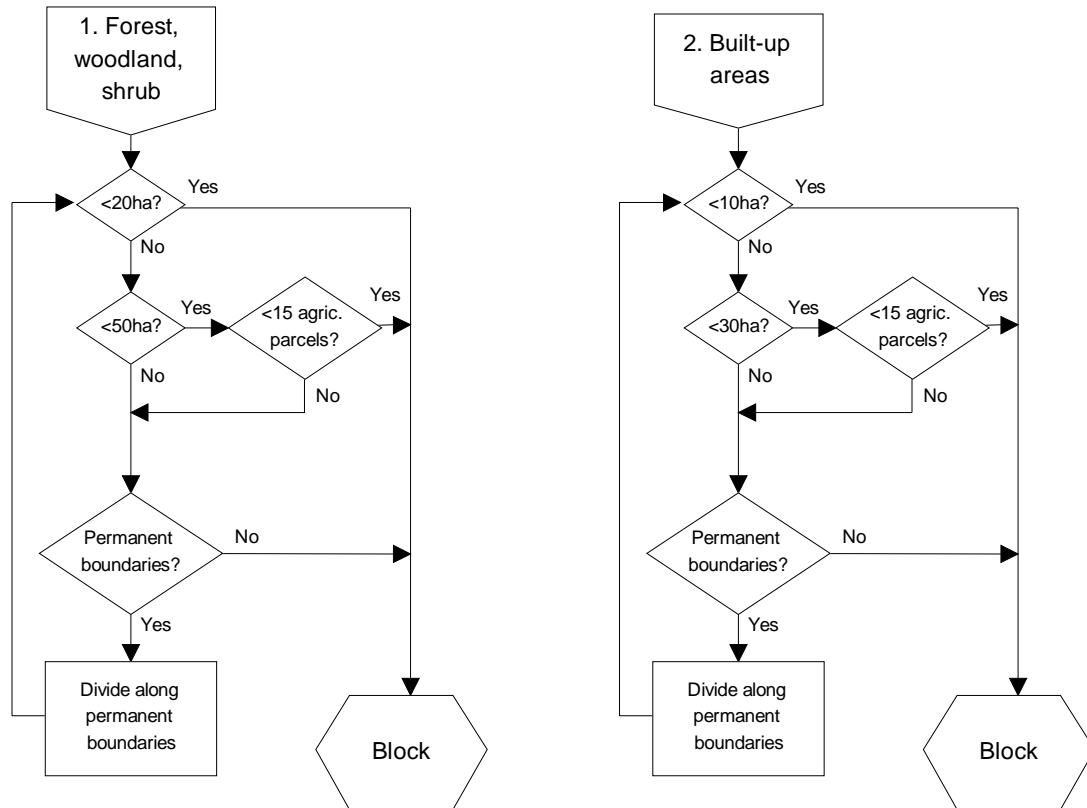


Figure 2a Workflow strategy, by cover type

3.4. Production technique; use of Geographic Information System (GIS)

- 3.4.1. The task of interpreting block limits is to be executed using a GIS-type interface on-screen (using PC's, workstations, etc.). The work will be carried out directly on the digital orthophotos. If necessary, the interpreter should have access to contact prints of the original photographs and suitable (simple) equipment for viewing in stereo, to assist interpretation. In addition, it is expected that exogenous sources of information may be considered by the tenderer as useful for supporting the interpretation process.
- 3.4.2. The GIS software interface should give the necessary information to the operator - in particular concerning block size - directly on-screen and in at least near real-time.
- 3.4.3. Attribute data must be recorded in the GIS database concerning the characteristics of the limit identified (i.e., road, stream, woodland/agriculture limit, etc.).

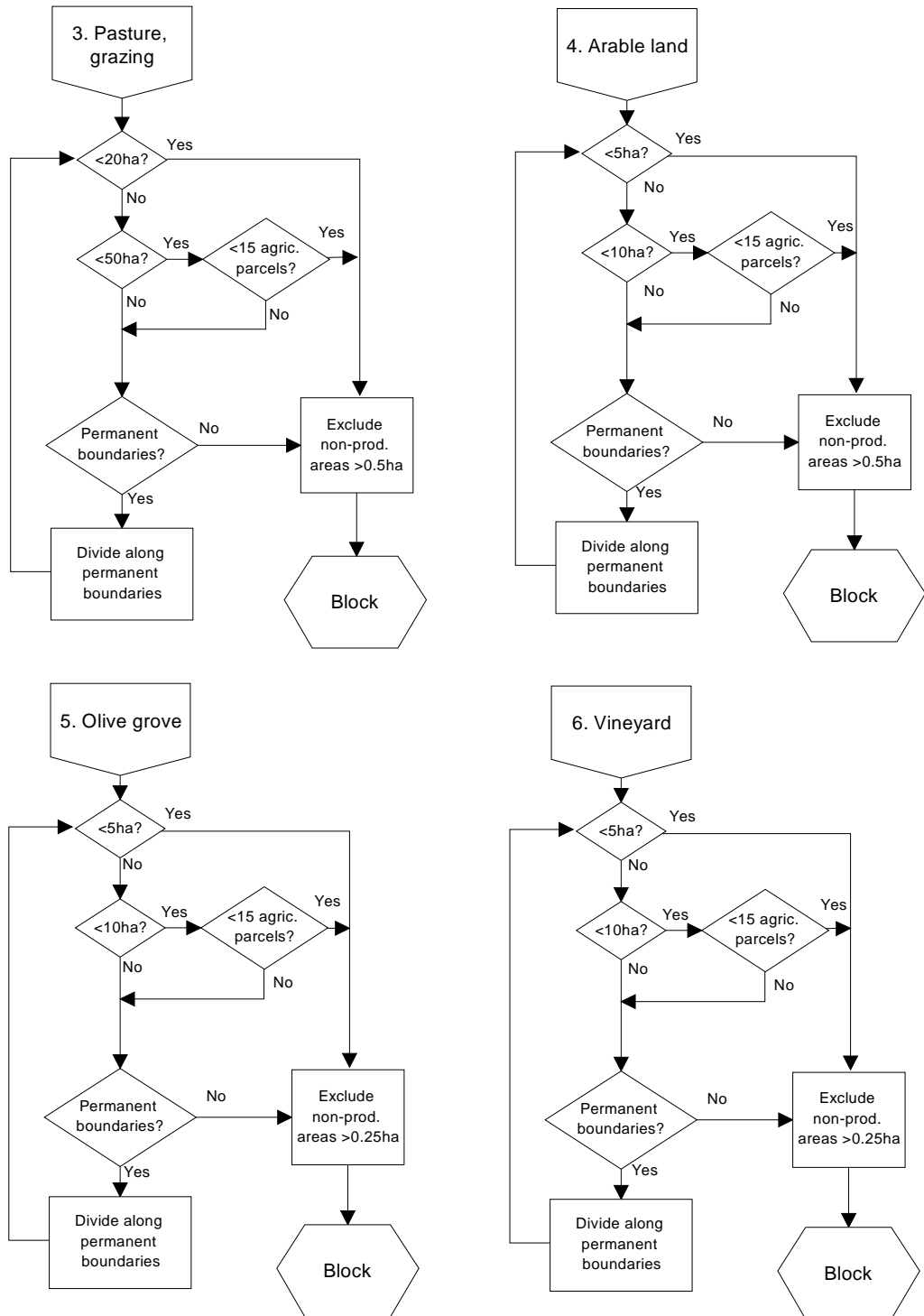


Figure 2b: Workflow strategy, by cover type

3.4.4.

The proposal should include details on the base (GIS) software to be used, as well as outline how this software will be adapted (if necessary) to undertake the application. The GIS should be capable of completing all necessary topological and database transactions in near real-time, i.e. capable of ensuring polygon closure and database integrity.

3.5. Block numbering system

3.5.1. A unique number will be automatically attributed to each block by the GIS software. This number will be derived from one or more of the following components:

- The geographic coordinates of the block centroid, four digits (Easting and Northing, inside a kilometre grid square to the nearest 10m)
- Information concerning the kilometre grid reference (probably seven or eight digits).

This numbering system will be indicated on the map by:

- the 4-digit number printed inside the block,
- the Easting kilometre printed on the top or bottom margin of the sheet
- the Northing kilometre printed on the left or right side of the sheet

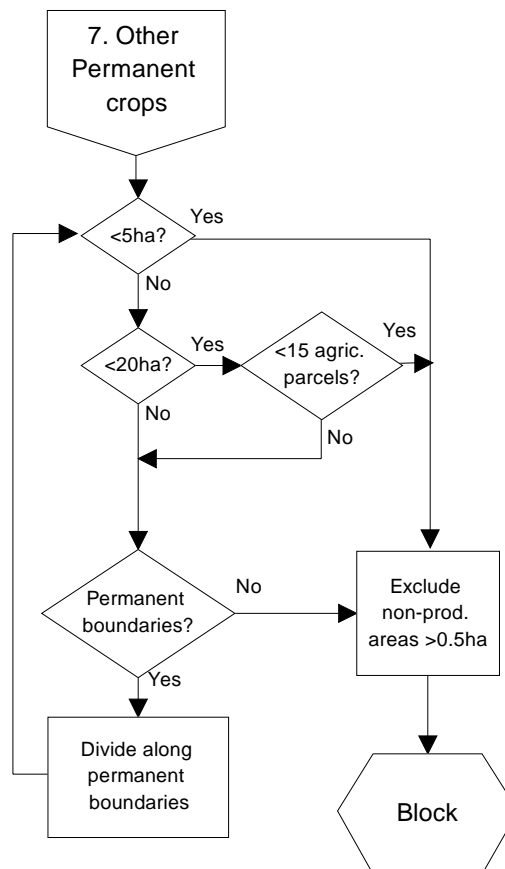


Figure 2c: Workflow strategy, by crop type

3.5.2. Blocks will be defined so that they can be identified and numbered with reference to one map only. Blocks falling across the overlapping margin (see §3.8.5 below), but still wholly visible from one map, will be numbered using a block “centroid” located inside the useful zone of the map concerned; on the adjacent map, no number will appear.

3.6. Project management and quality control

- 3.6.1. The proposal must outline quality control procedures to be applied during the interpretation and production stages. These procedures should, where possible, be implemented automatically using parameters as defined in the sections above. However, there will be great scope for the tenderer to define how and what other project management techniques will be applied to ensure the delivery of products within the terms of the technical specification.

3.7. Digital and other deliverables

- 3.7.1. The **GIS vector files** created in the interpretation process must be delivered at the end of the project. File structure and exact coverage will be optimised to simplify data distribution by the administrative bodies concerned. CD-ROM media is the preferred means for data delivery.
- 3.7.2. Similarly, all associated **database files** must be delivered at the end of the project.
- 3.7.3. Any information digitised for the execution of the project (for example, administrative limits, commune limits, etc.) should be supplied at the end of the project.
- 3.7.4. **Graphics files** (map collar etc.) used in the production process must be supplied at the end of the contract.
- 3.7.5. The tenderer must ensure that all data delivered in §3.7.1 through to §3.7.4 above is **compatible** with and can be **transferred directly** to the Intergraph and/or Arcinfo system currently available at the national administration. Proposals for the format to be used must be included in the tender document.
- 3.7.6. Five copies of a **technical report** (of around 50 pages) shall be supplied, in the national language with a summary in English (10 pages), detailing a number of aspects of the contract execution as listed below:
- Details of the interpretation method applied.
 - Statistics concerning the size and land cover classification (categories 1 through 4 as defined in §3.2.2 above).
 - Description of the chain of production used.
 - Details of internal quality control checks applied in production.
 - Problems and recommendations.

3.8. Optional analogue cartographic deliverables

- 3.8.1. Optionally, two copies of the following cartographic (hard-copy) documents will be delivered:
- Transparent overlays corresponding to each orthophoto map, at 1:5,000 scale, showing the (numbered) blocks. The limits of the block can be represented as a simple trace, so the number of different line styles required will be small. However, there must be a possibility to use at least four colours in the production of these overlays (black, red, blue, green).
 - A synoptic map, at 1:100,000 showing administrative limits and giving the 1:5,000 map sheet plan.
- 3.8.2. All documents must be output on **stable material**, not sensitive to distortion given normal use and storage conditions.

- 3.8.3. The **projection system** to be used will be the one retained for the IACS, as defined by the Ministry of Agriculture.
- 3.8.4. The maps will be produced in accordance with a regular division. The map sheet size will be of size around A1, conforming with that defined by the national map standard. The area covered by each sheet will be **EEE, NNN**.
- 3.8.5. An **overlapping margin** of 125m for each map edge (i.e., 250m in total) must be included, in order to limit the blocks and parcels falling across two neighbouring sheets. Blocks should be interpreted and numbered in a manner to avoid the need to reference two map sheets to identify one block.
- 3.8.6. A **map sheet collar** will be created, to be used for the overlay, which contains the following elements, to be used with one or both products as listed below:
- Kilometric grid (i.e., 20cm interval), using solid lines.
 - 10cm (500m at map scale) grid, marked with cross hairs.
 - Coordinate references marked in the margins.
 - Scale bar, scale, North point.
 - Title, administrative references, client identifier.
 - Sheet reference number, as defined in the projection system.
 - Information concerning projection, datum/spheroid applied.
 - Reduced size map sheet plan, showing adjacent map sheets and overlain with the administrative limits and names.
 - Date of production, data source and date.
 - Explanatory notes for the use of the block numbers.
- 3.8.7. In addition, the **main place names for villages and towns** in the mapped zones must be marked on the overlay, using the local language script.

3.9. Project calendar

- 3.9.1. The proposal must include a **work calendar** proposing regular batches of output (for example, completed batches of 100 map sheets).
- 3.9.2. Detail should be given concerning the total **production time to output** for each of these production batches. The first batches should be available as soon as possible following the start of the contract.
- 3.9.3. In any case, the calendar should confirm that the final batch shall be in time to permit the Ministry of Agriculture to meet its obligations under the relevant EEC regulations.
- 3.9.4. A secondary plan, explaining **contingency measures** and “critical path planning”, must accompany the tender.
- 3.9.5. The work calendar should include the timing of three meetings (kick-off, mid-contract, and final). Travel and mission expenses must be included in the financial proposal.

4. Financial proposal

4.1. General terms

- 4.1.1. The tasks presented constitute separate lots, as defined in Annex 1, and can be treated as distinct financial proposals. Bids can be presented for one to three of these lots.
- 4.1.2. However, an **option** exists for the two or more of the lots to be completed together by a company or consortium wishing to bid for combinations of lots. Such an option may only be presented in **addition** to individual proposals for the lots concerned.
- 4.1.3. The financial proposals, valid for a period of six months, must cover the complete range of tasks outlined in section 3.
- 4.1.4. A financial breakdown of the major elements must be given as in §4.2 below.

4.2. Parcel block interpretation and document production

- 4.2.1. A financial breakdown of the bid must be given under the topic headings as listed below:
1. Development or adaptation of GIS software for interpretation interface.
 2. Data collation (administrative limits, topographic mapping).
 3. Data processing (block numbering, area calculation, database management, etc.).
 4. Project management and quality control.
 5. Delivery, data transfer (GIS data, etc.).
 6. Cartographic production
 7. Report production.
 8. Expenses (travel, meetings)
 9. Option: Additional colour or (false) colour infrared acquisition and processing,
 10. Option: Prints of analogue cartographic products.

5. Anticipated expertise and evaluation criteria

5.1. Parcel block interpretation and document production

- 5.1.1. Successful bids for this call for tender are expected to be able to demonstrate:
- knowledge of the problems associated with the identification of agricultural parcels for the IACS in the national - or wider European - context;
 - experience of photo-interpretation in conditions found in Mediterranean countries;
 - installed facilities (GIS, database, cartography) upon which the work can be carried out;
 - personnel with the necessary experience to undertake project management;
 - sufficient production facilities to undertake and complete the task in the schedule specified;
 - personnel competent in the local language;
 - capacity to work closely with the local administration.

- 5.1.2. The proposal should include the names and (brief) CV's for:
- Project manager
 - GIS/Database information technology manager/specialist
 - Photointerpretation team
 - Cartographic production team

6. Annex 1 - Geographic definition of Lots

7. Annex 2 - Projection system and map sheet layout specifications