

# **Protocol for Field Survey Management**

**(Instructions for the country supervisor)**

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## Acronyms

AU	African Union
CCO	Central Coordinating Office/Officer
CS	Country Supervisor
EoI	Expression of Interest
EU	European Union
FNSSA	Food and Nutrition Security and Sustainable Agriculture
GPS	Global Positioning System
IITA	International Institute of Tropical Agriculture
ISRIC	International Soil Reference and Information Centre
LoA	Letter of Agreement
NARES	National Agricultural Research and Extension Services
NGO	Non-Governmental Organisation
ODK	Open Data Kit
PSP	Proposed Sampling Location
PSU	Primary Sampling Unit
QR	Quick response
RHC	Regional Hub Coordinator
RSA	Republic of South Africa
SIS	Soil Information System
SDMT	Survey Data Management Tool
SOP	Standard Operating Procedure
SP	Service Provider
SS-ID	Soil Sample Identification
SSU	Secondary Sampling Unit
TSU	Tertiary Sampling Unit
VQC	Visual Quality Control



## 1.0 Scope and Introduction

The Soils4Africa project aims to build an open-access Soil Information System (SIS) for Africa that will allow for monitoring of soil quality. A set of key indicators of soil quality have been identified and they will be assessed using field data to be collected from 20,000 sampling sites spread across the African continent, Soil data is collected using standard protocols allowing for monitoring soil properties and soil quality over time. Apart from soil data, data on land use and land cover will be collected to provide relevant contextual information for the interpretation of the soil data and evaluation of changes in soil quality. This soil information system will become part of the knowledge and information system of the EU-Africa Partnership on Food and Nutrition Security and Sustainable Agriculture (FNSSA) and will be hosted by an African organisation with the requisite capacity to manage the system. This system will inform decision making towards sustainable agricultural intensification in Africa. The survey for the Soils4Africa project is planned for period from January 2022 to June 2023 and will provide the baseline for future monitoring of soil condition.

The Soils4Africa project will make use of service providers for carrying out the field survey. For future monitoring activities it is assumed that use is made of independent field surveyors as well. Given the scope of work, the 53 countries in Africa where the survey is potentially carried out, the different ways in which the national services are organised, and the wish to engage a large stakeholder group to increase the support base for the SIS, as well as out of cost considerations a flexible approach is required which includes engaging and hiring service providers that can provide their services in the most cost-effective way. These can be people from the national institutes (the national agricultural research and extension services - NARES) or external participants, from international organisations, NGOs or other type of organisations that are active in the area of soil conservation, sustainable agriculture or related fields. It may even concern individuals. Also, the country supervisor, though preferred, does not necessarily have to come from the national institution.

The recruitment process needs to be fair and transparent and needs to result in a formal arrangement for hiring the services because it involves also financial transactions. This applies to both internal and external agreements for carrying out the survey. The process needs to be open in that all possible interested parties will have the opportunity to apply for these assignments and be subjected to a transparent selection and negotiation process.

This document sets out the process of selection of candidates, awarding of survey contracts, the responsibilities, and duties of the country supervisor that will oversee the execution of the field surveys in his or her respective country, and the tasks of the field surveyor

## **2.0 Call for expression of interest for services to support the field survey**

The country supervisor (CS) will issue a notification that the Soils4Africa project is looking for individuals or organisations to carry out field surveys and will put a call out for the expression of interest (EoI). Different channels can be used for putting that call out. This can be through internal communications channels of the organisation that the CS belongs to, through the organisation's website, professional organisations at national and regional level, as well as through social media. The CS is expected to actively approach people in his/her professional and personal network to notify them of this opportunity and ask them to express their interest following the correct procedure. Preferable, several of the communication channels are used at the same time. The action needs to be coordinated with the project management such that these announcements are synchronized with the announcement on the Project's website and through social media channels that the project makes use of.

The announcement needs to specify the services that are expected to be delivered, what the general conditions are and provide clear instructions on how to express interest and how to submit the EoI. There will be a form to fill on the Project's website to register the EoI that the CS can access through the SDMT. Annex A provides a standard text for the announcement of the call for the EoI that the CS can adapt according to his/her own insights, but that specifies the minimum information that the announcement must contain. The information that the candidate service provider needs to provide is given in Annex B. This information will also be used to select the candidates (see section 3.0).

## **3.0 Selection of service providers / field surveyors**

There are two steps involved in the selection of the service providers for the field survey: 1) the selection of the prospective candidates for doing the survey, based on a set of selection criteria and 2) the negotiation and agreement on the price for conducting the survey. The surveyor can apply via: <https://sdmt.soils4africa-h2020.eu/surveyor/onboarding/>

Ad 1) Selection criteria:

The CS will make a tentative planning for the field survey to be conducted in his or her country. The requirement for the planning is that the survey is completed within the timeframe that is set by the project (that is June 2023, without any unforeseen delays), and that will require a highly efficient execution of survey (also in view of the costs). The planning needs to consider the number of Primary Sampling Units (PSUs) to be covered and their distribution within the country, and the number of months available within the timeframe available for conducting the survey in their country (that depends on the actual start of the survey and the period and duration of the rainy season(s)). In most cases, multiple survey teams will be needed to conduct the whole survey, with the time of operation of the various teams to partly overlap (so that they can be properly managed, not too many teams at the same time). The CS will therefor group/cluster the PSUs such that one group of PSUs can be handled by one survey team in one month time approximately (as an initial guideline). In addition, you do not want to have too many teams, because it will complicate the management and coordination of the survey; and you do not want a few teams working for a

prolonged period of time: It might be difficult to find teams that have that much time available, and it will increase the risk of possible interference with the execution of the survey. For each country such planning needs to be done. An example of the calculation of the desired number of teams is given in Annex C.

The following criteria are used to make a first selection of the candidates:

1. Closeness to (distance to) the set of PSU that is proposed to be surveyed by the same team. The number of km to travel needs to be minimized.
2. Time (number of working days) available to the survey team and period when they will be available. In first instance try to lower the number of surveyors to engage.
3. Experience and competency: Any demonstratable experience or training in conducting soil surveys and making observations on land use and land cover is required, qq. preferred. This should include competency in using a GPS and navigation in the field, use of electronic forms like ODK on smartphone (generally digitally savvy, e.g., using bar codes, etc.)
4. Access to means of transport, tools and equipment needed for the survey, bank account and access to mobile banking, access to printer, etc.
5. Cost considerations and financial demands (to be considered in relation to the above and support services required from the CS).

#### Ad 2) Price negotiations

When negotiating the cost price, the CS needs to consider the different circumstances the candidate is in. The cost will depend on the distance the SP will need to cover and an acceptable cost per km that is used, and it will depend on how much support and facilitation is required from the CS. In the end, there is a ceiling to the amount that can be spent on the survey for each particular country and there are general costs associated with handling and shipment of the samples that needs to be taken into account. So, there is not a fixed price per sample location or per sample that can be applied. Rather the price per sample location is flexible. General guidelines can be given to make a fair assessment of the cost for the survey and that can be used to make a fair offer or to evaluate the financial demands by the service provider. Some guidelines are also provided to determine the maximum available budget for the actual survey in the field per country. Guidelines are provided in Annex D.

Based on the calculations presented in Annex D an amount of \$6000 per survey team will be available on average. This is assuming a team will spend one months (that is 22 working days) on conducting their survey and that on average one PSU will be surveyed in one day. This comes down to an average budget available for surveying one PSU of US\$266. This is the maximum amount available and should be used as a ceiling in the negotiations (of course the CS can balance a bit between the different survey teams, based on the effort required to survey the PSU assigned to the team). This amount is calculated based on the total amount available for the survey, minus the cost for sample preparation, for shipment of the samples and the fee for the country supervisor. This again assumes that the CS spends 20% of the total time required for conducting the survey in the field on the management and coordinating of the field survey. Likewise, there is an assumption on the cost for sample preparation and shipment that will vary from one place to the other. These figures can be adjusted depending on the local conditions.

The funds available to the teams for conducting the survey should be paid as a lumpsum to cover all cost. That is, cost for transport, cost for purchase of equipment and materials (or cost incurred in obtaining the equipment and materials), daily upkeep and fee for the team members. The contractee is liable for any additional cost incurred in the execution of the survey activities and carries the risks associated with loss or failure of the equipment (e.g., car breakdown) and disease and which will be stated as such in the contract agreement. Assuming that not more than half of the budget is for operational cost, it follows that about \$150 is available as a daily fee for the survey team and that there still should be enough funds available for travelling about 100 km per day on average (depending a bit on the fuel price). These are just indicative figures and will vary from one country to the other but serve to demonstrate that the funds are enough to organise the field campaign.

#### **4.0 Assignment and awarding field survey contracts**

The country supervisor will be entitled to issue a contract to the service provider for conducting a field survey. The country supervisor must be authorized to issue such survey contracts, and this will require a contract between the country supervisor (the organisation he/she represents) and IITA, because it will also involve transfer of funds from IITA to the country supervisor's organisation, with the Regional Hub coordinating centre as a consenting partner.

The agreement between the CS and the service provider will be made official by means of a letter of agreement (LoA), signed by both parties. The LoA will specify the terms and conditions that both parties have agreed upon. The following details will be specified:

1. Personal details of the service provider
2. Description of the service to be delivered (tasks and duties)
3. Total sum to be paid for the services (in domestic currency)- financial agreement
4. Listing of the sampling unit (PSU/SSU) to be surveyed (in an addendum to the LoA)
5. Start and end data of the survey (as foreseen)
6. Deliverables (electronic data forms submitted and approved and soil samples submitted to specific aggregation point)
7. Support services and facilitation by the country supervisor (specification)
8. Payment conditions

A standard letter of agreement is provided in Annex E. This can be translated in the local language and adapted where and when needed, as long as the above-mentioned elements are included. Once the contract is signed, the advance payment as per agreement has to be made.

#### **5.0 Technical support by country supervisor**

##### **1. Establish channel of communication for field survey**

The country supervisor will establish communication channels through which he/she can communicate with all people involved in the survey within his/her country. This refers to the field surveyors, to the responsible persons in the lab where the soil samples will be assembled and prepared, but also the aides of the country supervisor

who are helping to facilitate the survey (providing support where needed). For this purpose, he will set up a WhatsApp group and administrate it.

## 2. Generate labels for the soil samples (soil sample-ID)

The Country Supervisor will generate labels for the soil sample ID (SS-ID) for all samples to be taken within the country and distribute these to the survey teams for them to label the soil samples they are collecting. These labels will be generated as machine readable QR codes (QR codes are used because they are easier to read) The number of unique codes to be generated is twice the number of sampling units allocated to his/her country plus a 10% extra for backup purposes. The labels need to be firm, such that they do not easily tear and rumple and need to be waterproof. For this purpose, the labels will be printed on quality cardboard paper 300gsm and the labels will be laminated using the generally available "ID-card laminating (pouch) film small"; that is laminating film cut to a dimension of 70x100mm. The labels will be generated in duplicate and be laminated as one duplicate label. An example is given in the picture below



*Figure 1 Example of duplicate label (SS-ID) to be added to each soil sample*

The labels are sent as PDF files to the surveyor to be printed by him/her locally and laminated according to instruction. Only if the surveyor does not have the possibility to print (anywhere) and to laminate the labels, the labels can be printed by the CS. But in that case the labels must be sent or shipped to the surveyor. In case laminating is not possible, one can use plastic pouches of which different types are generally available in the dimensions of 70x100mm (or larger if not available in this size). If these are zip bags the labels are still protected against water or moist, other types of bags may not be sealed or closed bags, but the risk of spoiling the labels will anyhow be minimal.

Batches of QR codes are generated at <https://tag.qed.ai/>. This is an open access website that allows to generate sheets of QR codes, but you will have to create an account. The QR codes are generated online and need to be downloaded (or sent as email attachment) as PDF files, to have the electronic files and to print separately. Instructions on how to generate the duplicate labels of the specified size are given in Annex F. The code will consist of a three (3) letter (standard) country code and a string of randomly generated characters separated by a hyphen (see Fig. 1 for an example).

### 3. Provide technical support and equipment/instruments as needed

The CS will facilitate the surveyor in conducting the field survey. This refers to 1) assuring that the surveyor has the minimum required equipment and materials and 2) providing instructions (including training if needed) such that the surveyor has the skills to correctly carry out the field survey.

Ad 1) Supplying materials and providing the means: The instructions for the field surveyor provides a list of all means (implements, materials, machines, software apps, etc.) required to carry out the survey. The surveyor is expected to source these items locally if he/she does not have them or has access to them. The Country Supervisor needs to review the list together with the surveyor and check whether these items are available and assist where and if needed.

Three items may require specific attention:

- One is the means of transport: Especially if the surveyor is part of the same organisation that the CS belong to, transport can be arranged through the company or organisation. There will be a cost associated with the means of transport provided and this should be discounted from the budget available to the surveyor. Possibly, if the organisation has facilities in the different regions this can be made use of (for accommodation for example, if needed)
- The second item of concern are the soil augers: For both sample taking and making observations on soil properties, use of an Edelman type soil auger is strongly recommended. Taking soil samples can still be done with a spade or pipe (specifically fitted or that purpose), but for observation on soil layers deeper than 50cm these will be very difficult. These types of implements will only be used as a last resort. The CS is expected to source for the soil augers from his/her own organisation and affiliated institutions (possibly private companies) and make these available for the survey. If Edelman type of soil auger is not available, the Bucket type soil auger (or Riverside type of soil auger) can be used as an alternative. However, the project has budget for the purchase of equipment. Soil augers can be purchased by the central coordinating office and shipped to the respective country. The need for the Edelman type augers needs to be expressed to the regional hub coordinator (RHC) and the Central Coordinating officer (CCO) well in time for the start of the survey such that these can be delivered in time. Note that not all teams will operate at the same time in the field, limiting the total number of augers required
- GPS devices: Navigating in the field is best done using a GPS device. The "Instructions for Field Survey" provides instruction for using a GPS for navigating in the field, because the most surveyors will be customised to using a GPS. The instruction manual does provide MAPS.ME, which is an app that can be free downloaded, as an alternative solution. It has the advantage that you can download the map for the area including satellite imagery as map layer, such that you have the map and satellite imagery data available in the field for ease of orientation. A third alternative is a free downloadable GPS application for the smartphone (viz., GPS Essentials), for which no further instructions are provided in the instruction manual for surveyors. The CS should organise GPS instruments to be available to the several survey teams if the teams do not already have them and if the alternative solutions are considered problematic. These can be purchased, if needed. As this a relatively small item that is readily available in most countries, this will not be coordinated centrally, and will

remain the responsibility of the CS and will be paid from the country budget available for the survey (either sourced centrally by the CS and distributed, or funds made available to the surveyor by the CS).

Ad 2) Provide instructions: Instruction materials (“Protocol for Field Survey”, the “Standard Operating Procedure (SOP) for Field Survey”, including various instruction videos) are available on the project’s website (<https://www.soils4africa-h2020.eu>). The CS must make sure the surveyor has fully understood and is able to follow the instructions. The best way of doing that is to organise a training workshop in which it is explained and demonstrated how the survey is done, preferably using an actual sampling location. The training should address all aspects of the survey; that is all activities that the surveyor is expected to carry out, as explained in section 6.0 below.

#### 4. Conduct field visit to check whether procedures are correctly implemented

If and when possible, the CS should visit the survey teams in the field to verify whether the procedures are correctly implemented. Preferably such field visits should be done at the start of the field survey and, if and when possible, the first one or two PSUs should be surveyed together with the CS. It is often only when observing the teams operating in the field that you find out whether they have properly understood the procedures and acquired the skills from the (online) meeting and training workshop alone. Therefore, not to run the risk of having to reject and correct too many observations afterwards, field visits will be quite instrumental.

In case it will be difficult to visit all teams, the CS should prioritise, considering the number of sampling points assigned to the teams and the trust the CS has in the various teams in conducting the surveys correctly.

Another option is to delegate this task to his/her deputies. In this case the CS will appoint field supervisors for the different regions in the country, who will deputise for the country supervisor. Especially if the country is big and the number of sampling point to be surveyed is large such an approach is advised. The field supervisor should preferably be located in the region he/she is assigned to, or hail from that region. Appointment of deputy country coordinators carries a cost, and the CS needs to make sure that these will not be appointed at the expense of the field survey. The decision to appoint possible deputies needs to be made with the approval of the RHC. Costs are at the expense of the budget reserved for the coordination by the CS, logically.

## 6.0 Task description for Field Surveyor

The terms of reference for the soil surveyor will be, for each sampling location assigned to him/her, to collect top and subsoil samples, make a description of the soil and terrain, to describe land use, land cover and land management, and handle the samples such that they are bagged, labelled, packaged, and shipped to the designated soil laboratory in his/her country. And all this is done according to instructions and specifications provided.

This execution of this tasks will involve taking the following steps (or activities):

#### Preliminary and preparatory activities

1. Access/download and study “Instructions for field surveyor” and all associated materials.
2. Prepare materials for field visit

3. Download the sampling point locations
4. Plan of the field survey
5. (Online) meeting on using ODK-Collect app, discuss methodology and preparation

#### Field visit – data and sample collection

6. Navigating to the sampling location in the field and confirm sampling location
7. Take soil samples, bag and label soil samples, record in ODK-Collect app
8. Make observations on soil and terrain and record them using the ODK-Collect app
9. Make observations on land use and land cover and record them in the ODK-Collect form

#### Post -field visit

10. Upload all filled forms of ODK Collect
11. Ship soil samples to the designated country aggregation point/laboratory
12. Communicate forms have been uploaded and samples have been shipped
13. Respond to any query on the submitted data
14. Close and sign off on the survey assignment
15. Get paid

## **7.0 Quality control of data from field observations**

The CS is to do a quality control on the survey data that has been uploaded by the field surveyor. This is being referred to as visual quality control (VQC) because the CS will check the data against the information derived from photos taken at the survey location or by visual interpretation of the satellite imagery for the specified and recorded sampling location. The VQC is facilitated by the Survey Data Management Tool (SDMT) by which a sampling point is selected and subsequently displayed against the backdrop of satellite imagery. Also, the photos taken in the field associated with the sampling point can be accessed and displayed. The SDMT allows the CS to select and display sampling points assigned to a specified surveyor (service provider) under his/her responsibility (*viz.* country). The CS will use the online SDMT to accept or reject the result for the point surveyed, indicate which rule in the protocol is violated (which parameter is wrongly assessed), and he/she will be able to submit his/her remarks. The CS will have the authority to edit the data, for those parameters for which is clear what error is made and for which the correct response can be identified from the other supporting data. Data/values that have been changed will be flagged. Records that have critical data lacking or entered wrongly (and that cannot be corrected) will be flagged for follow up action. This may involve the service provider given further clarifications but may ultimately require the SP to revisit the site and re-enter the data, and which will be at the cost of the service provider. Such decision on follow-up actions will always be taken in deliberation with the RHC. It may result in the final rejection of the sampling point. This is at the discretion of the RHC to decide and to decide whether the soil samples will still be analysed or whether these will consequently also be discarded. The latter will imply that the respective soil samples associated with this point will also be flagged not be further processed.

Instructions on how to use the SDMT will be available once the development of the tool has been completed.

Regarding the VQC, the CS has two main tasks to perform: 1) is to check the validity of the reason for rejecting a sampling point location by the SP in case rejected by the SP, and 2) to control the quality of the data entered by the SP for those points that have been accepted.

#### 1. Checking the validity of points rejected

Those points that have been rejected by the surveyor will be flagged in the SDMT (<http://sdmt.soils4africa-h2020.eu/>). The SP will have provided reasons for rejecting as per instructions provided in the "instruction manual for field surveyors". The reasons can either be because of restricted access, impassable terrain, the land being managed but not cultivated (like parks and parklands) or the land use type does not quality as agricultural land. Further details will have been provided by the SP. The CS can select those points individually and check the reasons provided.

Based on the information provided by the satellite imagery and the photos taken in the field, the CS will be able to verify the reason provided. The SP will have provided the location in the field at which point the TSU has been rejected together with an indication of the direction and distance to the locations of the proposed sampling point location. Violation of the rule is concluded if it can be positively determined (with certainty) that the reason provided is invalid. In case of doubt the rejection by the SP should be confirmed/accepted.

Direct corrective action is not needed in case the rules for rejection are violated. It is only if all the three possible sampling locations (the three TSUs) within the SSU have been rejected without a logical and convincing reason and under suspicious circumstances (e.g., if the location from where the observations is made is too far from the proposed sampling location (SSU or TSU)). The CS is to contact the SP and investigate what has occurred. Certainly, if this is a repeating pattern and there are more SSU from which all sampling points have been rejected the CS needs to take corrective action, which may ultimately involve closing the contract for not performing and appointing another service provider.

#### 2. Quality control of the survey data

The control is a) to check whether the actual sampling location agrees with the proposed sampling location, b) to check whether there are obvious errors in the data entry and c) to check on the consistency of the responses given (data entered). The CS can only do this once the data has been uploaded and needs to check daily for newly uploaded ODK-forms in the period when the survey teams are in the field.

- a. The actual sampling location: The actual sampling location may vary from the sampling location specified in the sampling design in special circumstances as specified in the "Instruction Manual for Surveyors". For example, if the PSP is located within a gully, or there is a stone wall, or the point is located on the border between two fields or two different land uses, or other. The distance between the PSP and the actual sampling location is indicated by the SDMT. A distance of more than 25m is not allowed. If the distance is more the point should have been rejected. At the same time the sampling point ID needs to be checked, to verify if there is no confusion on the actual sampling point being targeted. If the distance between the

proposed sampling locations and the actual sampling location is larger than 25m the observation record does not need to be rejected automatically in all cases, if implications of completely rejecting the point and having to revisit the site is too big (e.g., if the number of sampling points surveyed for a particular land use type is getting very low). if the point belongs to the same land use type as the originally designated sampling point location and if there is a logical and valid reason provided for selecting the alternative location. Otherwise, the record needs to be rejected.

- b. Check for errors in data entry: Obvious error in data entry may be observed when the data provided conflicts with the information that can be deduced from the satellite imagery data or from the photographic data. This may refer to the data and information on the soil surface characteristics (viz., the stoniness class) and land use, land cover and land management information. For example, trees can be well spotted on the high-resolution satellite imagery and from the photos taken and be used to corroborate the data provided or to reject it. In cases where it is obvious that a wrong option has been selected by mistake the CS will be able to edit the data and enter the more likely option. In case errors in the data entry are likely, these need to be flagged by the CS. However, it will not imply that the soil samples are also rejected. In cases where the correct sampling location coordinates are provided, and procedures of sample collection are properly followed the samples will still be submitted for analysis
- c. Checking for consistency: Consistency is checked by comparing the responses for the individual properties for one particular sampling point and by comparing the responses given for the various sampling locations. For example, it can be easily seen whether the information on the land use is consistent with the information on land cover. A maize field or cassava field will not have a high tree cover unless it is in recently colonized land within the agricultural frontier; terraces will not occur on flat land, etc. Again, the CS will correct the data in those cases where the errors are obvious. If the errors are consistent across the various records for the sampling points surveyed by the same SP, the SP has not understood the instructions or makes structurally the wrong judgement or wrong assessment, implying he/she will lack the skills (e.g., to identify the correct slope class). This will be especially obvious for sampling points that belong to the same type of terrain and same land use and land cover type. If such consistent errors are observed the CS will have to contact the SP immediately to further explain the instructions and to provide additional training. If problems persist (and if the CS does expect the SP to be able to improve his/her performance) the CS will terminate the contract and appoint another SP or will arrange for additional support to the field team in the field.

## 8.0 Monitoring and reporting on progress field survey by CS

The SDMT will show the sampling points for which the data has been uploaded and can do so for each job that is assigned to a specific SP. The SDMT will also display the starting date and foreseen end date for that specific job assignment, and the CS is able to monitor the progress of the survey [check the execution by taking the

percentage of the sampling points surveyed at that particular point of time against the percentage of the time (number of days) that has passed since the start of the survey (the number of days in the field as percentage of the total number of days allocated for the survey) for each survey job that is ongoing separately. The moment the execution lags behind by 10 – 15% the CS is to contact the surveyor to assess the situation and take action if needed (in case of a structural problem).

The CS is to report to the RHC every two weeks on the progress of the field campaign within his/her country. That is, the status of each individual survey assignment ('not started', 'ongoing', 'accepted/rejected', 'completed') together with the percentage of execution for those survey assignments that are ongoing. The CS will further report on the progress of the field campaign for his/her country. That is, report on the delay in the start for each of the survey jobs. The CS will report on the execution of the survey in his/her country by reporting the number of points survey as percentage of the total number of points allocated to his/her country. The execution will be plotted against the planned number of points in time. Hereby also the number of points rejected will be reported, such that these are considered in assessing the progress in execution and that at the same time the number of points rejected can be monitored. The percentage of points rejected and development of that percentage over time is important information for the RHC to steer the survey in the countries and to manage the overall survey in his/her region. The SDMT will have a dashboard function that will portray all that information. The report by the CS will include a narrative to explain the figures and provide the background information.

## **9.0 Closing the field survey contract**

The CS will inform the surveyor when the survey has been completed and the contract has been ended and will do the final payment to the surveyor as per agreement. Closing of the contract will be done only when all questions regarding specific sampling points have been answered and the CS has approved the data submitted. All soil samples that have been collected must have been received at the point of aggregation in that particular country and all equipment and materials that have been lend out to the surveyor must have been returned. The CS will inform the surveyor by means of a letter that will be considered as a legal document. The letter will state that there are no further claims to be settled and will not make any appeal for compensation or payment.

The contract with the CS will be closed when all duties of the CS have been completed. This refers to the surveys in his/her country are completed, all soil samples have been received, prepared and selected for shipment and having been shipped. The contracts are probably closed only at the end of the field campaign for the whole project.

## **10.0 Sample preparation, selection and shipment and storage**

The CS has the final responsibility, and must make arrangements, for the following:

- Soil samples (all samples collected) to be aggregated at one place within his/her country;
- Sample preparation according to the protocol provided by the Project;
- Determination of gravel content of each soil sample;

- Selection of the samples for wet chemistry analysis, and
- Shipment of the samples to designated lab.
- Temporary storage of soil samples for duration of the project

These arrangements are made in deliberation with the RHC. It could be that the samples are shipped to the regional hub centre, and that sample preparation takes place there rather than in the country of origin, depending on the facilities that are available and what is deemed the most convenient. For all these activities protocols are available and the CS must assure that these are strictly followed.

The arrangements must be made well in advance of the commencement of the field survey and have to be approved by the RHC. The RHC carries the final responsibility for these above-mentioned activities for his/her region and will make the most cost-effective arrangement (especially in reference to the shipment of the samples to RSA) and as such some coordination between the countries at regional hub level is required.

Considering the cost for shipment, the total volume that needs to be shipped will be kept at a minimum. This implies, that the selection of the samples to be analysed using wet chemistry analytical methods will be done at country/regional hub level and that the minimum amount of sample required for the wet chem analysis will be shipped. The remainder of the samples will have to be stored locally (at country/regional hub level) as back-up, such that it can still be shipped the moment the analysis for that particular sample has failed. This requires the proper administration of the samples and that a system for the management of the data is available locally. The SDMT provides the tools for the administration of the samples at project level.



## **Annex A – Standard text for the announcement of the call for the expression of interest for carrying out the field surveys for the Soils4Africa project.**

The Soils4Africa project is an EU-funded project being led by the World Soil Information centre (ISRIC). The project aims to build a soil information system for the whole of Africa that allows to monitor soil quality in land used for agricultural purposes. It is conducted in the context of sustainable intensification of agriculture and is part of the Food and Nutrition Security and Sustainable Agriculture (FNSSA) which is a program in partnership between the EU and AU.

The project will carry out a field survey and collect soil samples on 20,000 predefined locations within agricultural land across Africa and will, consequently, involve each country in Africa. The sampling points will be spread out across all agricultural land within the country and may include locations that are quite remote and difficult to access. The agricultural land does include pastoral lands with few croplands and low-intensive agriculture. For conducting the survey, the Project is looking for field surveyors that can assemble a team of minimal two persons (preferably three) for conducting the field survey. The project is looking for surveyors from the different regions in the country such that the separate regions can be surveyed by people from that region and hereby minimizing cost and time needed for travel. The survey will be coordinated at country level by the Country Supervisor. The Project hereby calls for people to express their interest in providing their services for conducting these surveys. The surveyor (service provider) will be compensated for the services provided as agreed with the Country Supervisor.

The surveyor, once selected, will be assigned a number of sampling points to be surveyed. The survey will be carried out using a standard protocol, and instruction materials are available. The surveyor (service provider) is expected to carry out the survey independently with minimal support required from the Country Supervisor. Therefore, the surveyor preferably has the following qualifications:

- Experience (some) in carrying out field surveys, related to soil inventory and/or land use and land cover inventory (field experience);
- Background in agronomy and/or soil science,
- Time available for carrying out the survey assignment (a few weeks to a month or more) and has
- Means of transport or access to means of transport to bring him/her to the field

If you think you qualify, please express your interest at the Project website (<https://www.soils4africa-h2020.eu>) to provide your details and answer some questions. You will be contacted by the Country Supervisor.

For further details you can contact the Country Supervisor

Name CS:

Affiliation:

Address:

Tel./Mob.:

Email address:

## Annex B – Information to be provided by the candidate for service provision for soil survey

Name/attrib	Description	Remarks
ROLE_ID	Provision of service for conducting field survey (SP)	This is the only position/role the service provide can apply for: field survey - to collect soil samples, make field observations on soil and terrain, the land use, land cover and land management
SP_NAME_LAST	User last name	
SP_NAMES_GIVEN	User given names	
COUNTRY_CODE	Code for the country where the person resides	Helps to identify the country and/or regional hub where user belongs to
ADD_STREET	Street name	Can be a description
ADD_STR_NUMBER	Street number	
ADD_CITY	City/Village name	
ADD_STATE_CNT	Name of the second level administrative unit	Depending on the country, this can be state, county, province
SP_PHONE	User telephone number	
SP_WHATSAPP	User Whatsapp number	If different from telephone number – communication will take place through WhatsApp mainly and is mandatory to have
SP_AFF	Affiliation of the SP Organisation the user works for	The institute or organisation that the SP is affiliated with. The service provider may work on personal title or for the company he/she belongs to (the latter being preferred). In case he/she executes the work in the name of the company, the company must be fully aware and approve
SP_POSITION	Position/function of the SP within the organisation	Official title the SP holds in his/her organisation
SP_QUAL	Service provider qualifications	Qualifications relevant to the soil and landuse/cover survey. Any formal training the SP has received relevant to conducting a field survey
SP_EXPER	Service provider experience	Experience in conducting field surveys – dropdown list of possible involvement of field survey indicating the responsibility within the team, the purpose of the field survey and frequency (how often)
SP_ACC_SPAN	Access to smartphone with Android operating system (Y/N)	The SP needs to have access to two phones of given specifications (for as yet the phones need to be Android because of the apps that we use)
SP_ACC_SPAD	Access to spade of desired specifications (Y/N)	
SP_ACC_SAU	Access to soil auger of required type (Y/N)	We need to make provisions for using pipes as alternative to soil augers for which specification should be provided.

SP_ACC_MTT	Access to means of transport (No, 4w drive, 2w drive)	Depending on the type of terrain 4x4 would be required or preferred, so it may be one of the selection criteria
SP_DRIV_LIC	Does the SP have driver's license (Y/N)	Could be if one of the team members has a driver's license that is also OK
SP_TEAM_MOB	Whether the SP can mobilize a team for the field survey	Minimal one extra team member is required to carry out the survey; two additional members are preferred
SP_ACTIV	User activation code (1/0)	When SP is accepted/approved (e.g. eligible for conducting survey) he/she will be activated. That means, he/she will be considered for conducting a survey.
SP_PAY_MODE	Mode of payment for the services	This can be through bank transfer, mobile money transfer (MPESA, AIRTEL wallets, etc.)
SP_BACC	Account details/number	

## **Annex C Example of calculation of the number of survey teams required.**

### **Ethiopia (fictitious example)**

Number of PSU: 314

Rainy season: June – mid September (3 month effectively)

February – May (4 month effectively)

Number of days required to complete survey of one PSU: one day.

Number of PSUs covered by one team in one month: 22

Maximum time to be spent in the field by one team: one month (22 working days)

Start of the field campaign: June 1, 2022

### **Number of teams required to conduct and complete the survey:**

Number of team x month:  $314:22 \cong 14$  teammonths

Number of months available: 7

Number of teams working in parallel:  $14/7 = 2$  teams

Number teams/clusters required: 14

The CS needs to group the PSUs in 14 clusters of comparable size, if possible

Fourteen (14) teams are required, of which two teams will have to work in parallel to cover the work in seven (7) months' time.

## Annex D – Budget allocation for individual field teams and field survey assignment – example of calculation based on fictitious situation (Ethiopia)

### Key figures and assumptions

Number of TSU per PSU	4
Budget avail per sampling location (€)	€ 72
Budget avail per sampling location (\$)	\$85
Number of samples per location	2
Weight sample for shipment wet chemistry anal (g)	350
Weight sample for shipment spectral anal (g)	50
Percentage samples for wet chem	15%
Percentage samples for spectral	85%
Cost shipment per kg (\$)	\$35
Cost sample preparation (\$)	\$3
Average time for survey PSU (days)	1
Percentage time allocation CS of time for field survey (days)	20%
Daily fee country supervisor (\$)	\$150

### Key figures for Ethiopia

A	Number of PSU	314
B	Number of TSU (sampling locations)	1256
C	Number of samples to be taken	2512
D	Number of samples for prep&ship	1884
E	Nr kg to be shipped	179
F	Total number of days field survey	314
G	Number of teams conducting field survey	14

### Budget calculation (based on above key figures and assumptions)

<b>Total budget avail survey</b>	<b>\$106,760</b>
Cost sample preparation	\$7,536
Cost shipment samples	\$6,264
Cost fee country supervisor	\$9,420
<b>Available budget field survey</b>	<b>\$83,540</b>
<b>Average bgt available per team</b>	<b>\$5,967</b>
<b>Average bgt available per primary sampling unit (PSU)</b>	<b>\$266.05</b>

## Annex E – Template for Letter of Agreement to conduct field survey

Date:

Addressee &  
Address

Re: Agreement to conduct a field survey for the Soils4Africa project according to specification provided

Dear Madam/Sir,

This letter of agreement serves as proof that the Soils4Africa project, as represented by *<name country supervisor>* of *<name organisation of the country supervisor>* and *<name service provider>* of *<name organisation of the service provider>* are at mutual understanding and agreement on services to be provided by the addressee under the terms and conditions as specified in this letter of agreement, once this letter is signed by both parties

The Soils4Africa project intends to hire *<name of service provider>* for providing services in reference to carrying out a field survey on specified locations and according to specifications provided. The survey involves the collection of soil samples and recording of observations on land use, land cover and land management. The locations to be surveyed are specified in the addendum to this letter of agreement. The protocol for the field survey is available on the project's website and can be forwarded by the country supervisor if needed.

The parties hereby agree on the following:

- (1) The service provider shall head a team of at least two (2) person, preferably three (3), including the service provider him or herself to conduct the field survey
- (2) The service consists of recording observations on soil terrain, land use and land cover, land and water management, including collection of soil samples, according to the standard protocol and following standard operation procedures established for this purpose and the survey will be conducted at the survey locations (sampling points) provided in the addendum.
- (3) The total sum for providing these services and deliverables is *<specify currency>* *<specify the total amount>*
- (4) The survey is scheduled to start *<provide starting date>*, and scheduled to end by *<provide end date>*
- (5) The deliverables will be completed electronic forms, one for each of the specified survey locations and uploaded to the system, and soil samples (one topsoil sample and one subsoil sample) for each specified location to the designated laboratory or aggregation point. The point of aggregation / laboratory is specified in the addendum II.
- (6) The following items will be provided by the country supervisor to facilitate the survey:



- a. <specify item a> ,
  - b. <specify item b> ,
  - c. Etc.
- (7) Half of the lumpsum will be paid upon signing of this agreement as an advance payment. And the final half will be paid after the deliverables have been submitted and have been approved and acknowledged by the service provider. The means of payments and details of the account the money has to be paid into is specified in Addendum III.
- (8) The service provider will contact the country supervisor for any explanation required on the methods and procedures to follow and any other technical support required. Furthermore, the service provider will update the country supervisor on progress made with the field survey through Whatsapp. The country supervisor will add the service provider to the Whatsapp group that is established for the purpose of this field survey.

The service provider, hereby, declares to have read and understood the instructions for the field survey and is able to follow the standard operating procedures. The service provider furthermore declares to have access to all the equipment and tools required and is able to use it.

Sincerely,

<Organisation of the country supervisor>

By: <signature> ,

<name of the country supervisor>  
<position within the organisation>

Agreed to and accepted this <date>

<name of organisation of the service provider> if applicable

By: <signature>

<name of service provider>  
<position within the organisation> (if applicable)

## Annex F – Instructions for generating QR codes to serve as soil sample labels

Step by step instruction on how to generate and print QR codes for sample bag labels

1. Get your computer connected to the internet
2. Log on to <https://tag.qed.ai/>
3. Click on "Generate Sheet of QR/Barcodes"
4. Signing into QED services requires you create an account. The account creation requires your email address and a password of your choice. You can also sign in through Facebook or Google if you already signed in on any of the site. This option will pop up once you click on "Generate Sheet of QR/Barcodes".
5. Once you are signed in you get a page showing "Code sheet generator"
6. Check or change to ensure the following settings:

- a. Pre-set size is A4
- b. Units is mm

For the **Page** settings:

- c. Dimensions of the page size will be indicated: Width 210 mm and Height 297mm
- d. Set Margins: Top - 5 mm, Left - 10 mm, Right - 10 mm and Bottom 5 mm

For **Codes'** settings:

- e. Image type is 'QR code'
- f. Code type is 'Random String'
- g. Separator: 'dash'
- h. Length (of random string) is '5'
- i. Start index from is 1
- j. Do not chose any text file
- k. Prefix: Type in your COUNTRY CODE – standard 3 letters code in uppercase letters) (E.g., for Nigeria – NGA; Democratic Republic of Congo – DRC)
- l. Aliquots: Do not select option to enable aliquots and do not select zero padding option (Leave it the way it is: default)

Settings for the **Layout**

- m. No. of codes: Enter double the number of the total sampling locations in the country plus 20% (for instance, if you have 50 sampling locations, double that is 100 and add 20% which is 20, so in total you will enter 120)
- n. No. of copies: enter '2'
- o. Columns is '6', Rows is '8'
- p. Code padding is 2 (should be mm)
- q. Label: select Show; and Number: select Show (should remain the way they are- default)

Settings for **Rulers**

- r. Rulers: Options to 'show horizontal separators' and to 'show vertical separators' should both be checked/ticked
- s. Font size: '14'
- t. Click on "Generate"
- u. Codes will be generated and after some few seconds (depends on the strength of your internet connection) a Download bar/option will appear

- v. Click on the Download and your QR codes will appear.
- w. Save it and print


Home   Single code   Sheet

Mesele   Log Out

## Code sheet generator

**Preset size:**  
A4

**Units:**  
mm

**Page Dimensions**

**Width:** 210 mm    **Height:** 297 mm

**Margins**

**Top:** 5 mm

**Left:** 10 mm    **Right:** 10 mm

**Bottom:** 5 mm

**Codes**

**Image type:**  
QRCode

**Code type:**  
Random String

**Separator:**  
 dash (-)  
 dot (.)

**Length:** 5    **Start index from:** 1

**Text file:**  
 No file chosen

**Prefix:**  
DRC

Short identifier that starts each code, automatically followed by the separator. Recommended structure: proj\_year\_country (e.g., QED\_2017\_KE).

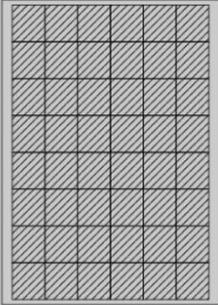
**Aliquots**

When enabled, each code will have an aliquot index appended to it.

Enabled     Zero padding

**No. of aliquots:** 2    **Start index from:** 1

**Preview**



**Layout**

**No. of codes:** 120    **No. of copies:** 2

Number of unique tags.    Number of repetitions of each tag.

**Columns:** 6    **Rows:** 8

**Code padding:** 2 mm

Padding around each tag.

**Label:**  Show    **Number:**  Show

Display code text.    Display code number.

**Rulers**

**Horizontal:**  Show    **Vertical:**  Show    **Font size:** 14

Show horizontal separators.    Show vertical separators.

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