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RSB Food Security Guidelines

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Notes on the use of this document

The RSB has developed a set of principles for the sustainable production of biomass, biofuels and biomaterials together with criteria that have to be met in order to achieve each principle. Food security is one of the principles required under the RSB standard, since access to sufficient food is a basic human right, yet many people lack sufficient dietary energy and even more suffer micronutrient deficiencies.

Operators in a region of food insecurity must therefore comply with RSB Principle 6 on food security by meeting the two criteria (6a and 6b) in order to gain RSB certification. The two criteria call for operators to ensure that they do not have a negative impact on food security in their region, and that they enhance food security to directly affected households in their locality. If operators do have a negative impact on food security, they must ensure that they mitigate that impact in order to achieve compliance with the RSB standard.

This document provides guidelines on measuring food security and conducting a food security impact assessment (FSIA). The FSIA should provide information on the status of, and the impact of the operation on, food security in the locality. The assessment should also provide guidance to operators on the most relevant measures they can employ to mitigate any negative impacts and enhance the food security of directly affected stakeholders.

The food security guidelines (FSGs) are designed for the general reader, but should also assist experts employed to carry out an independent food security assessment, as well as auditors in their verification of compliance. Note that each food insecurity situation is unique, and hence the approach, and especially the interpretation of information and data, has to take into account the local context and the regional food security environment.

This document is not a basis for verification of compliance or audits of operators. No aspect of this document is normative. It is intended to advise operators on best practice.

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1. Introduction to food security issues

RSB Principle 6 states, “*Operations ensure the human right to adequate food and improve food security in food insecure regions*”. This principle applies to operators deemed to be in food insecure countries and regions where a significant proportion of the population is deemed to be at risk of food insecurity.

The definition of food security used in the RSB standard is that from the World Food Summit of 1996:

– “*Food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*”.

The International Covenant on Economic, Social and Cultural Rights defines the right to food as: “*to have regular, permanent and unrestricted access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of people to which the consumer belongs, and which ensures a physical and mental, individual and collective fulfilling, and dignified life free of fear*”.

Food security is commonly conceptualised as having four different components, as defined by the Food and Agriculture Organisation (FAO) of the United Nations (UN)¹:

- i. **Food availability** reflects the supply side of the food security equation. It means that food is physically present because it has been grown, processed, manufactured, stored and/or imported into the area. For example, food may be available because it can be found in local markets and shops, or it has been produced on local farms and home gardens, or it has been stored, or it has arrived as part of a food aid shipment. Food availability can be affected by many factors, including weather-related plantings and yields of crops, pasture availability for livestock, a switch from food crops to cash crops, transport problems, changes in domestic and import/export volumes, and the availability and quality of storage.
- ii. **Food access** reflects the demand side of food security, referring to the way in which people obtain available food. This may include using stocks from home production, purchasing food, bartering, borrowing, sharing, gifts from relatives, and provisions by welfare systems or food aid. Food access therefore largely depends on a household's available production, stocks and income and the distribution of each within the household, as well as on the price of food and access to safety net systems. Food access can be influenced by shocks such as the loss of livelihood assets, unemployment, food price changes (which are affected by many factors, including relationships between domestic and external/import prices, exchange rates, tariffs and subsidies) and the collapse of safety-net institutions that may have previously protected people on low incomes. It is also affected by the distribution of food within households, and socio-cultural factors within communities.
- iii. **Food utilisation** is the way in which people use food to achieve their dietary, nutritional and cultural needs. It is dependent upon a number of inter-related factors, including the quality of the food and its method of storage, processing, preparation and cooking, as

¹ For a full description of the basic concepts of food security see FAO (2008). An Introduction to the Basic Concepts of Food Security. Rome, Food and Agriculture Organisation of the UN.



well as the health status of the individuals consuming the food. Food utilisation is therefore negatively affected by disease, poor sanitation and lack of nutritional education. Food utilisation may also be adversely affected if people have limited resources for preparing food, for example due to a lack of fuel, cooking utensils or clean water.

- iv. **Food stability** is about having access to adequate food at all times. People should not be vulnerable to losing access to food as a consequence of sudden shocks, such as losing jobs, crop and pasture failures, price spikes and conflict, as well as cyclical events such as seasonal food production and employment. Food security is often measured in terms of the duration of food insecurity, with “chronic” food insecurity tending to be more persistent or occurring over a sustained period of time, “transitory” food insecurity occurring on a short-term or temporary basis due to shocks, whilst “seasonal” food insecurity is often regarded as being both chronic and transitory.

The first three of these concepts are hierarchical since availability of food is “*necessary but not sufficient to ensure access, which is, in turn, necessary but not sufficient for effective utilization*” (Barret 2010). Stability influences the other three pillars as various shocks affect the availability of, access to, and utilisation of, food. Thus, households may have a large choice of available food in their locality, but can only access what they can produce, collect, barter and afford. Then the food accessed will be utilised according to how it is stored, processed and cooked, and according to cultural factors and the health status of each individual within the household. Shocks and seasonal factors can then affect the stability of available, accessible and utilisable food, so that, for example, a locality may appear to have sufficient available food over the year, but may suffer significant deficits at certain times within that year. Information on how operations can affect the four pillars of food security can be found in Appendix 1.

2. Determining whether a food security impact assessment is required

This section briefly describes how food security is incorporated into the RSB standard in order to determine whether a food security assessment is required. Principle 6 of the RSB standard has two criteria - 6a and 6b - that must be addressed by any food security impact assessment (FSIA).

Criterion 6a states: “**Operators shall assess risks to food security in the region and locality and shall mitigate any negative impacts that result from their operations.**”

In order to assess risks in a particular locality, it is necessary to determine first whether the region (or country) is prone to, or at risk of, food insecurity and then whether the operation may lead to negative impacts in the locality and surrounding area.

Criterion 6b states: “**in food insecure regions, operations shall enhance the local food security of the directly affected stakeholders**” (excluding small and micro operations).

Thus, large and medium-sized operations in countries deemed to be food-insecure would need to enhance the local food security of directly affected stakeholders. However, there may be local areas in food insecure countries that are evidently food-secure: where there is clear evidence of food security in such areas, there would be little point in trying to enhance it

further.

The RSB Screening Tool guides the operators through a number of questions to assess whether a food security impact assessment is required.

3. Measuring food security

It is important to decide how food security will be measured and assessed before embarking on methods to collect information for an impact assessment. Many indicators are used for measuring food security, but most provide only a partial picture, and some may be misleading when used out of context. For example, a common measure of food security is the proportion of income spent on food, but in areas of mainly subsistence farming, many households may spend most of the little income they have on education and health. This makes it difficult to choose which methods to use, so the following sections recommend indicators that could be used by operators to best measure food security.

3.1 Measuring household food and nutrient intake

In order to ensure that any negative food security impacts resulting from an operation are identified, it is important that food consumption outcomes for households in the locality are measured before and after the establishment of the operation. This would ideally involve a baseline survey pre-establishment and a follow-up impact survey once the operation is fully established. Where an operation has already been established, a retrospective impact assessment could be carried out as part of the baseline survey.

Perhaps the most comprehensive way of measuring food and nutrient intake would be to ask people to estimate their household's normal consumption of food over a period of time (preferably over the whole year or season), incorporating any seasonal patterns, such as shortfall periods. This might be difficult for people to recall with any accuracy, but in many food insecure countries meals tend to be quite similar over long periods, so people can be asked what their usual food consumption would be at normal times in the year (or over a more recent period such as an average month) and this can then be adjusted for any seasonal shortfalls in order to calculate estimated annual totals. From the adjusted consumption data, it is possible to calculate the estimated nutrient availability (calories, protein, fat, micronutrients) from that food using food composition tables. This can then be compared with the calculated nutrient requirements for the household using WHO and FAO guidelines (see FAO 2004), and the resulting difference can then be expressed in terms of **household nutrient gaps**.

In order to provide a single measurement that is generally reflective of nutrient consumption, the **household calorie gap** could be used. Thus, the household calorie gap would show the calories provided by the household consumption of different foods (using food composition tables such as the FAO Infofoods database or national food composition tables²) versus the recommended minimum requirements for the household calculated from the latest WHO/FAO or national government dietary energy guidelines for gender and age groups (FAO 2004).

This then provides a single percentage calorie gap measure for each household, which can be used to express its food security status over a given period. Any increase in a deficiency gap from the baseline to the impact survey would then suggest a decline in food security for

² For example, the Tanzania Food Composition Tables jointly published in 2008 by Muhimbili University of Health and Allied Sciences, the Tanzania Food and Nutrition Centre and Harvard School of Public Health. See Lukmanji, Z., E. Hertzmark, et al. (2008). Tanzania Food Composition Tables. Dar Es Salaam, Tanzania Food and Nutrition Centre, Muhimbili University College of Health and Allied Sciences, Harvard School of Public Health.

that household (or a negative movement) between the survey periods.

In order to assess the contribution of the operation to any increases in household calorie and nutritional gaps, other indicators could be used to assess the extent of its impact on availability, access, utilisation and stability (AAUS) issues. If any of these indicators suggest a possible negative impact by the operation, then measures can be used to mitigate that particular issue in order to reduce the calorie and nutritional gaps. An expert analysis would be required to estimate the proportion of any negative impact that could be attributed to the operation.

Criterion 6b requires an enhancement of food security for directly affected local stakeholders and communities. Household calorie (and/or nutritional) gaps could also be used as an indicator to assess whether food security is improving in a particular locality. For example, if the calorie gaps were to fall between the baseline and impact assessment, food security can be said to have improved. As with Criterion 6a, it would be difficult to assess the contribution of the operation's actions to any enhancement outcome.

The fact that enhancement measures are being taken, and evidence has been provided and then verified with the agreement of stakeholders, should be sufficient to provide an acceptable level of enhancement to comply with Criterion 6b.

3.2 Measuring the four pillars of food security

The RSB standard requires that food security is assessed according to the four dimensions of availability, access, utilisation and stability. Operations can have both positive and negative impacts on all four dimensions (see Appendix 1). This is particularly the case for price impacts, as higher food prices may benefit the farming households with net sales of farm produce (as well as encouraging farmers to move from subsistence to surplus production), whilst at the same time reducing the food security status of net food purchasing households. The four dimensions of food security can provide vital information to understand the underlying forces behind food consumption outcomes for households. They are therefore important in terms of analysing the impact of the operations in relation to other factors.

For **availability**, surveys can provide information on the calorie availability from own-food production (crops, livestock, hunting, fishing and gathering), as well as from purchases. This can help to identify changes in the availability of calories between sources, as well as the amount of wastage from household food balances³. Thus, if the survey analysis shows that calories of purchased food for farmers are stable, whilst the calorie availability from own-food production is falling, the operator should try to help farmers improve their own food production and/or provide better prices to help them purchase more food. Availability indicators would also include the planted/harvested area of food crops and pasture, which may help to explain any negative impacts from operations reducing local food crop plantings. Yields of food crops in the locality should also be monitored, and any significant decline (below the normal variation) should trigger an evaluation of the operation's impact against other factors (e.g. measurement of the water table or any significant increase in pest damage). Changes in market supplies could be recorded by market surveys where public market information is not available or insufficient.

For **access**, a useful indicator that could be calculated from the household survey data would be the minimum cost of a healthy diet in the locality. This would provide a benchmark for required incomes, and hence, wages paid by the operation and prices paid to out-growers. Prices of foodstuffs could be captured by household and/or market surveys and compared with

³ For example, by calculating own production, net of sales, plus purchases minus consumption and seed = waste
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regional and national trends to identify any unusual local impacts. As well as measuring changes in incomes and prices, surveys should also measure any loss in access to free foods and medicines, such as fishing, hunting and collecting wild plants and berries.

For **utilisation**, key measures would be access to water, improved sanitation and cooking facilities, and fuel, as well as health and education issues. Surveys could measure any significant changes, for example, in access to clean water and fuelwood, as well as changes in health that may affect the utilisation of food. Utilisation outcomes would be evident from the nutritional gaps recorded by surveys and health outcomes, as well as through anthropometric indicators where such information is available (see Section 3.3).

For **stability**, a key measure would be the depth of hunger during the year. One way of measuring this would be to find the largest monthly calorie deficit for households from the surveys conducted, and compare this gap between periods. This might show, for example, that the average annual gap may have fallen but that the largest monthly deficit gap has increased, suggesting increased instability in food security. This would then require interventions to reduce the variability of calorie consumption during the year through better storage measures or different planting patterns or seasonal wage bonuses.

3.3 Other measures of food security

Anthropometric measures of body dimensions would be useful indicators for assessing utilisation outcomes. Stunting and underweight measures (height for age, weight for height and weight for age) of children under 5 years of age are often used by the health sector as key proxy indicators of household food security, although it should be noted that these measures can be affected by many factors not related to food security. If the local health sector is already conducting such surveys, the operation could use the results, both to ascertain the current status of food security and to help target any remedial action.

Perception-based measures of food security are usually used in more developed countries where the variety of the diet is so complex that it would be difficult to analyse household food consumption over an extended period. Such measures are also being increasingly used in less developed countries. The Household Food Insecurity Access Scale (HFIAS) for developing countries has recently been developed by the FANTA project and from this the Household Hunger Scale (HHS) was formed to measure food deprivation in the most food insecure regions. An advantage of using the HHS is that it has been specifically developed and validated for cross-cultural use (Ballard 2011).

The **RSB household survey questionnaire** contains a section for providing a perception-based HHS score, which could then be used to compare with the household calorie gap measure. For more developed countries where it might be difficult to measure food consumption patterns due to the diversity of the diet and the consumption of many types of processed foods for which nutritional information may not be available, it may be more relevant to use perception-based measures like the HHS.

Other measures and indicators of food security have been developed in recent years, such as the Household Dietary Diversity Score (HDDS) to assess the variety of the diet (Kennedy 2011). A food consumption survey would generally provide sufficient details on the variety of the diet, but the HDDS could, for example, be used in conjunction with perception-based measures if or where household food consumption was not measured. The World Food Programme uses a Food Consumption Score (FCS) for measuring the adequacy of diets, which also takes into account the diversity of the diet.

A summary of the indicators and thresholds outlined in the above sections are contained in Appendix 4. This is not designed to be an exhaustive list, but rather a focused set of recommended indicators to help operators comply with the RSB principles and criteria for food security and to guide mitigation measures, as described in Section 5. The following section also provides guidance on how to analyse and use the above indicators in determining the food security status of a locality, and the possible impacts from an operation (see Section 4.3)

4. Conducting a food security impact assessment (FSIA)

This section is designed to guide operators and experts in conducting relatively low-cost yet accurate methods for assessing food security. The methods chosen by each operation will largely depend on the type of measures chosen (see above) and the type of operation.

4.1 Objective of the FSIA

There are two basic objectives in undertaking a FSIA to meet the RSB standards:

- i. Before the operation is established: How do people in the locality make a living and meet their food needs? Which households are food insecure and to what degree?
- ii. After the operation has been established: How have people's livelihoods and access to, and utilisation of, food changed following the establishment of the operation? How much of this change can be attributed to the operation, how should any negative change be mitigated, and how can the food security of local directly affected people be enhanced?

In order to answer these questions, operators who are required to assess their impact on food security will need reliable and timely information on livelihoods and food production and consumption in their locality before and after the establishment of their operation. This can be gained through doing a baseline survey (incorporating a household or key informant survey, and focus groups and market surveys), followed by an impact assessment. A recommended household survey questionnaire for baselines and impact assessments can be found in RSB-GUI-01-006-02 (version 3.0)⁴, and this can be adapted to suit each circumstance.

4.2 FSIA steps for operators

The flowchart below (Figure 1) provides a framework for undertaking a food security impact assessment. It has six basic steps, including the baseline survey and subsequent impact assessment. It is important to note that a food security impact assessment is considered a specialist study, which means that the operator should employ an independent expert wherever possible, particularly where household surveys are recommended.

Figure 1: Food security impact assessment process

⁴ It should be noted that assessments often encounter timing difficulties, as the nutritional status of populations varies both between and within years. Any reference or baseline measures in particular should therefore ensure that any unusual circumstances or shocks be accounted for.



4.2.1 Profile of the operation

The RSB operation typology should be used to determine the scale (large, medium, small and micro) and type (biomass cultivation, industrial processing, trade) of operation. Given that large non-farm operations are more likely to have a greater impact on food security in their locality, it is important that they carry out a more detailed analysis of the food security situation to a relatively higher degree of statistical accuracy and over a wider geographical area than smaller operations. Given their much smaller impact, all biomass cultivation operations of under 500 ha and micro-processors (less than 5,000 tonnes of feedstocks) and micro-producers (less than 1 million litres of biofuel) would not be required to complete a food security assessment.

It is also important that operators identify whether any of their feedstock sources have completed, or are in the process of doing (or planning to do), an FSIA. Those processors sourcing from separate feedstock estates that had already carried out a satisfactory FSIA

would only have to carry out an FSIA for its other feedstock sources, such as out-grower farms.

4.2.2 Overview of the local socio-economy

In order to assess the profile of the local socio-economy in relation to the regional and national picture, operators should assemble relevant, reliable and timely secondary data from public and private sources. Many operators may already have much of this information on hand from feasibility and planning studies, including land maps and food production and price statistics for the local administrative region from local government departments. Much of the national, and some regional data, may be readily available from online databases at UN organisations, such as FAO (FAOSTAT), ILO, UNDP, UNICEF and WHO, as well as national government websites and statistical agencies⁵.

Although official statistics are often outdated and lacking sufficient detail at a local level, they may provide a useful reference for patterns and trends. For example, population trends in the locality could be used to project estimated food needs over future years, whilst local crop areas and production can be used to assess whether prevailing yields are within or outside the regional and national yield trend range.

A useful source of information to assess food security at local level is often from the nearby hospital or health clinic, particularly if they are involved in regular monitoring of young children in the population. Malnutrition rates in a population are often estimated from anthropometric measures for children under five years old. Data may already be available from demographic and health surveys of the locality, or household economy surveys conducted by government.

The data inventory should therefore provide as comprehensive a picture as possible from the secondary information readily available, of the socio-economic profile of the locality and region, as well as maps for assessing the likely impact catchment areas. Key interviews should also be undertaken with local community leaders and chiefs, health officers, agricultural extension workers, and the operation management and key staff.

4.2.3 Defining the main stakeholders and impact catchment areas

The impact of the operation on food security will largely depend on the nature of the population in the locality, including the population density. An important step therefore is to identify and map all possible stakeholders, ensuring inclusivity and representivity. The Impact Assessment Guidelines (RSB-GUI-01-002-01) provide guidance on stakeholder identification, including mapping techniques to identify directly affected stakeholders and those affected by secondary impacts. The stakeholder identification exercise helps to ensure no stakeholder is omitted, but may result in a long list over a wide geographic area.

In order to conduct a more targeted household survey, a geographic area could be defined, and within which the survey could focus on those households most likely to be directly affected (e.g. those resulting from the stakeholder identification exercise). This geographic area could be determined by the pattern or highest concentration of affected stakeholders. Another way of defining the impact catchment area would be to identify the watershed in which the operation is located. Any impacts that the operation has on the water table or downstream flow could then be captured by covering nearby households close to the operation or downstream in the watershed. The impact catchment area should also take into consideration, as far as

⁵ For example, the Tanzanian National Bureau of Statistics released its food security and nutrition analysis of the 2000/1 and 2007 household budget surveys at the end of 2010. See NBS (2010). Trends in Food Insecurity in Mainland Tanzania. Dar Es Salaam, National Bureau of Statistics, Tanzania.

possible, the local foodshed, covering food trade patterns, commodity flows and local markets in order to track impacts on food security at the community and regional level. The geographical basis of the labour pool and the official administrative boundaries should also be taken into account.

Stakeholder mapping, watersheds, foodsheds and labour pools can be hard to define and may result in very large areas, incorporating many settlements and even conurbations, which would be very time-consuming and costly to cover in a food security assessment. A more practical approach would be to estimate a smaller impact radius zone around the operation in order to identify any directly affected communities close to the operation, and to then identify any important settlements that might be affected (e.g. immediately downstream of the operation) within a secondary impact zone or catchment area. In practice, this would work by first overlaying the calculated primary and secondary radii over the operation boundary on the map, and then defining any important settlements outside of this from the stakeholder mapping and within the watershed (downstream), foodshed and labour pool (where such information is available).

Table 1 provides an example of how impact catchment areas might be defined for estate production models using the RSB operation typology. The starting point would be the primary radius, calculated according to the size of the estate, within a range of 1km minimum to 10km maximum.

For medium and large operations, a secondary radius would also be calculated, within which key settlements would also be identified. Finally, any important settlements likely to be affected outside the secondary radius (and within the estimated watershed, foodshed and labour pool) should also be included in the secondary impact catchment area.

Table 1: Example of impact catchment areas for different-sized feedstock sources

Size category	Feedstock area range	Primary catchment area ¹	Example 1° catchment	Secondary catchment area ²
Large estate or equivalent pPool	>10,000ha	Minimum 4km radius around operation boundary. Maximum - 10km (see note 1 below for how to calculate 1° catchment area)	20,000ha operation =5km radius (20/4) around operation boundary	Assess main stakeholders likely to be affected using stakeholder mapping, watershed boundary (downstream) and/or main corridor routes outside primary catchment and/or any nearby affected conurbations. Apart from these considerations, as a general rule the secondary catchment would be about double the primary radius (see note 2 below).
Medium estate or equivalent pool	>3,000ha-10,000ha	3km radius around operation boundary	3km for all	
Small estate or equivalent pool	>500ha-3,000ha	2km radius around operation boundary	2km for all	NA
Large farms and equivalent pools ³	>75ha-500ha	1km radius around operation boundary	1km for all	NA



1. *The calculation for the primary catchment area radius for large operators in km = feedstock area size (in thousand hectare units), divided by 4, up to a maximum of 10km and with a minimum 4km radius.*
2. *The boundary of the secondary catchment area would largely depend on the anticipated impacts and the location of those people impacted (e.g. the shape of the downstream watershed or the areas where displaced people have been relocated), but as a general rule the secondary catchment area would be about double the size of the primary catchment radius. So, if primary catchment is 3km radius, secondary would be 6km around the operation boundary, except where significant displacement, watershed and other impacts have been identified outside that area.*
3. *Although large farms would not have to undertake an FSIA, processors sourcing from such farms or from equivalent pools of out-growers would need to assess the impact of growing feedstocks on such areas within the suggested catchment.*

Thus, for a 9,000 hectare feedstock estate, the table suggests that those households in a 3km radius around the estate would be considered as being directly affected and this would form the basis of any household survey. A secondary radius of 6km might then provide a second tier of affected settlements, from which a smaller sample of households or key informants or focus groups could be selected, ensuring that any important settlements, including those directly downstream of the operation, are included (which might be outside the secondary radius). This example is illustrated in Appendix 2, showing that the secondary impact catchment area has been extended outside of the 6km radius toward a major town downstream of the operation, and along a major road from where some of displaced people may have to re-locate and where labour may be drawn from.

For out-grower systems the catchment area(s) could be based on the location, number and size of the out-grower pools. A pool might be defined as a group of out-growers in a particular locality or a producer group or co-operative. Each pool could be defined in a similar manner to the estate catchment area methodology discussed above, so that a pool of out-growers with 1,000ha would be equivalent to the small estate in terms of its catchment areas.

Thus, for a processor drawing on (or planning to draw on) feedstocks from out-growers covering 5,000 hectares in ten different locational pools, for example, it would be necessary to know the size of each pool first before impact assessments are undertaken. For example, five of the pools may cover less than 75ha of feedstock each, in which case the impact would be minimal and no assessment would be required. However, two other pools might cover 2,000ha each, in which case it would be important to survey households in the catchment areas of those pools (in this example the catchment area would be 2km radius around the centre of the main pool area).

Processors sourcing their material from out-growers could therefore be subject to many assessments for each pool source, each of which might give similar results. So where there are more than three and less than 12 pools of over 75ha of feedstock, sampling of at least three of the pools could be considered to be representative, ensuring that the largest pools located in the most food-insecure regions (if known) are included in any FSIA. It would then be important to apply any mitigation measures and enhancements to similar pools, whether they had been included in an FSIA survey or not. For out-grower systems with 12 to 20 pools of at least 75ha, at least four should be sampled, and for more than 20 pools, at least five should be sampled.

Where there are no obvious pools, it may be necessary to map out all the villages from which feedstocks are sourced, and then select an appropriate number using systematic random sampling. One method to ensure that there is a good geographical spread would be centric

systematic area sampling (CSAS) where a square grid is placed over a map, with each square representing the number of sites from which information would be collected, and the villages nearest the centre of each square would then be used, or a random sample of them selected. However, if there are likely to be greater impacts at particular locations (e.g. downstream of the operation), then such locations should be purposively sampled. Appendix 3 provides an illustration of CSAS for selecting sample sites.

Market centres should be identified within the primary and secondary catchment areas (particularly those markets that the poorest households in the locality are known to purchase their food from), in order to conduct market surveys for large and medium operations. Where there is a large number of market centres it may be necessary to use the CSAS methodology explained above.

When the stakeholders have been identified and catchment areas defined, the operator can then plan the main part of the impact assessment process, comprising of a baseline survey and subsequent impact survey.

4.2.4 Baseline survey

A baseline survey prior to (or at, or just after) the establishment of the operation is required in order to provide an appraisal of the food security situation from which the impact of the operation can be assessed (as per Criterion 6a) and from which enhancements can be made (as per Criterion 6b). For existing operations that have been established for some time, a combined baseline and impact assessment can be undertaken.

There are various methods for establishing a baseline. Some of the methodologies, such as household surveys, will be more time-consuming and costly to carry out than others, such as focus groups. Operators and independent assessors will need to decide which methodologies best suit their situation regarding the size and type of operation and location, and the information already available. For example, ongoing health surveys in the locality could provide anthropometric measures of food security for a baseline assessment, but the operator would then have to ensure that similar data could be accessed for comparison in a subsequent impact or monitoring survey.

Appendix 5 provides some guidance on the methodologies recommended for different types and sizes of operators. In the absence of recent and reliable secondary data, large and medium-scale operations should undertake a household survey of their catchment area using a questionnaire⁶, with focus groups and market surveys providing additional information, whilst smaller operations could establish a baseline from key informant interviews and focus groups.

An independent expert would usually undertake the baseline and impact assessment. The expert would assemble a team of evaluators and translators, and plan the logistics and schedule for the survey, as well as deciding what type of assessments should be carried out for the size and location of the operation, including the geographical and population coverage (see Section 4.2.3).

Baselines should also use the secondary information gathered for the socio-economic profile (Section 4.2.2) and site observation before meeting with community leaders and local government officials, to ensure cooperation and security, official permission and to obtain key

⁶ Other RSB principles and criteria may also require a household survey to be conducted, so the food security section forms one part of the recommended standard questionnaire



information such as populations of villages in catchment areas, languages, livelihood groupings, main crops and markets, and seasonality.

The following sections describe some of the recommended methodologies for the baseline, which could also apply to the impact and monitoring surveys.

4.2.4.1 Household survey

Household surveys can provide detailed information on actual food consumption compared to calculated requirements. They require careful planning, with a tested questionnaire and sampling methodology to capture the selected indicators. Household surveys can be time-consuming and costly to conduct, but if well-focused, accepting of less stringent sampling accuracy, and employing local student evaluators, the costs and time can be constrained.

Household surveys need to determine a sample number of households or key informants in the defined catchment area(s) of the operation. Sampling would generally focus on the primary impact catchment area, but large and medium estates may also decide to survey households in their secondary impact catchment areas⁷.

Once the catchment areas have been defined, the population settlements within that area should be identified. For example, there may be 11 villages within the primary and secondary catchment area of a 9,000-hectare estate operation (see Appendix 2); four villages in the primary and seven in the secondary. The total household population of the four villages in the primary catchment area may be 2,000, spread relatively evenly (i.e. around 500 households per village). This could then form the household population from which the sample would be taken.

The operator may decide that a few settlements might be directly affected outside the primary impact area, so the total population for the sample would then be that of the primary catchment plus the identified settlements in the secondary impact area. As a general rule, all the population in the primary impact area should be included, and then any settlements likely to be directly affected outside the primary impact area should also be included.

Any sizeable towns (e.g. greater than 5,000 people) within the defined catchment could be treated separately, as the food security situation in such centres would be affected by many different influences other than that of the operation. Where there is a potential impact on a significant proportion of a large town, such as downstream impacts on water availability and quality, this might be investigated through a sample of households or through other means such as focus groups or key interviews.

Determining the actual sample size for each operation category mainly depends on the population that could be affected in the catchment area, and the acceptable margin of error and confidence interval⁸. Since larger operations are more likely to have a greater influence on local food security than medium-size and smaller operations, a higher confidence interval should be used for large operators. Also, the larger the population concentration within the catchment area, the greater the number of households that could be affected; thus, a smaller margin of error could be justified for highly populated catchments.

⁷ Particularly where there are few vulnerable households in the primary catchment but more in the secondary impact area. Note also that if the household or key informant survey is undertaken in the primary catchment area, other methods, such as interviews and focus groups, could be employed for any important stakeholder groups located in the secondary catchment

⁸ The sample size would also depend on whether the population is deemed to be normally distributed.



Table 2 - Suggested sample size requirements for different-sized operations and household populations for the baseline, impact assessment and sentinel monitoring surveys

Biomass cultivation size (and required confidence level for large and medium operators)	Example household numbers in impact catchment areas	Recommended sample size for baseline survey* (and margin of error)	Recommended representative sample size for impact (and sentinel) surveys*
Large estate >10,000 ha (at 95% confidence level and maximum 25% sample)	1. 10,000 or more 2. 5,000 3. 2,500 4. 1,000 5. 200 6. <100	1. 193 (7%) 2. 146 (8%) 3. 114 (9%) 4. 88 (10%) 5. 50 (n/a) 6. 25% of total / at least 10 key informants	1. 96 (60) 2. 73 (50) 3. 57 (40) 4. 44 (30) 5. 25 (25) 6. 25% of total / at least 10 key informants
Medium estate >3,000ha-10,000 ha (at 90% confidence level and maximum 20% sample)	1. 5,000 or more 2. 2,500 3. 1,000 4. 200 5. <100	1. 104 (8%) 2. 81 (9%) 3. 64 (10%) 4. 40 (n/a) 5. 20% of total / at least 10 key informants	1. 52 (35) 2. 40 (30) 3. 32 (25) 4. 20 (20) 5. 20% of total / at least 10 key informants
Small estate >500ha-3,000ha	1. 2,500 or more 2. 1,000 3. <500	1. 50 (n/a) 2. 40 (n/a) 3. Key informants (at least 10)	1. 25 (25) 2. 20 (20) 3. Key informants (at least 10)
Large farm >75ha-500ha	n/a	n/a	n/a
Small farm <=75ha	n/a	n/a	n/a
Processor operation size (and required confidence level for large and medium operators)	Example household numbers in catchment pools (note total for all pool areas)	Recommended sample size for baseline survey* (and margin of error)	Recommended representative sample size for impact (and sentinel) surveys*
Large processor >100 MI (million litres) per annum of biofuels or >500,000t of total feedstock processed (at 95% confidence level and maximum 25% sample)	1. 20,000 or more 2. 10,000 3. 5,000 4. 2,000 5. 1,000 6. 200 7. <100	1. 377 (5%) 2. 260 (6%) 3. 189 (7%) 4. 140 (8%) 5. 107 (9%) 6. 50 (n/a) 7. 25% of total / at least 10 key informants	1. 188 (75) 2. 130 (60) 3. 94 (50) 4. 70 (40) 5. 53 (30) 6. 25 (25) 7. 25% of total / at least 10 key informants
Medium processor 10-100 MI of biofuels or >50,000-500,000t of total feedstock processed (at 90% confidence level and maximum 20% sample)	1. 20,000 or more 2. 10,000 3. 5,000 4. 2,000 5. 1,000 6. 200 7. <100	1. 267 (5%) 2. 185 (6%) 3. 135 (7%) 4. 101 (8%) 5. 78 (9%) 6. 40 (n/a) 7. 20% of total / at least 10 key informants	1. 133 (60) 2. 92 (50) 3. 67 (40) 4. 50 (30) 5. 39 (25) 6. 20 (20) 7. 20% of total / at least 10 key informants

Small processor 1 - <10 Ml of biofuels or >5-50,000t of total feedstock processed	n/a	<i>Key informants (at least 10 in each major feedstock source)</i>	<i>Key informants (at least 10 in each selected major feedstock source)</i>
Micro-processor <=1M litres of biofuel production or <=5,000t of total feedstock production	n/a	n/a	n/a
<i>Note: Maximum precision for household surveys would be 95% confidence and 5% margin of error. Minimum would be 90% confidence and 10% margin of error, except for small operations and where the number of households in the catchment area is low. Farms and micro-processors excluded – n/a = not applicable *Refers to results required so a slightly larger sample may be needed in order to account for non-responders and incorrect responders or spoilt documents.</i>			

There are standard statistical formulae for defining the sample size of a given population, assuming a normal distribution and given a desired confidence interval and margin of error. Table 2 suggests acceptable confidence intervals and margins of error for different operations in order to arrive at sample sizes for different sized populations in the relevant catchment areas.

Thus, a 9,000ha estate with a household population of 2,000 in four villages in its primary catchment area would be classified as a medium-size operation, requiring a suggested minimum 90% confidence interval and a minimum 9% margin of error, which gives a sample size of 81 households for the baseline. The next step would be how to select that sample given the geographical spread of the households. In the above example, the operator may decide to spread the 81 households evenly between the four villages in the catchment areas, so that 20 households are randomly selected from each village.

However, it is possible that certain villages (and certain households within each village) are more likely to be affected by the operation than others (which may have become apparent in the stakeholder identification analysis). Those villages closest to the operation, or where most of the land is expected to be used for feedstocks production, or where most people are expected to be employed from, or the villages and households most at risk of food insecurity in the locality, could be purposively selected (where such information is available). Also, in cases where dividing the sample size by the number of villages would result in a very small sample of households in each village (e.g. less than 20), then it would usually be better to randomly or purposively select villages from the overall list.

Thus, in the above example, it may be determined that three of the four villages in the primary catchment would be most at risk, and that 27 households should be surveyed for the baseline in each of these villages. It should be noted that other methodologies could be used to assess the food security status in other villages outside of the three selected, particularly any in the secondary impact areas that are thought to be most at risk of food insecurity⁹.

It would be useful to stratify the sample of households into livelihood and income groups if information is available, particularly from the local government office or village leaders or chiefs. This would help in ensuring that the most vulnerable households are taken into account in the survey, and will also help in the analysis of the impact assessments, particularly if the sample has been stratified into households involved in the operation and non-involved households. For example, the following groups might be used to stratify the sample where such information is available:

⁹ The operator or expert might also decide to include village in the secondary area within the overall sample population.



- Livelihood groupings, such as households involved in operation (i.e. households with employees of the operation or households acting as feedstock out-growers, or both) and those not, as well as other livelihood groupings
- Income and asset groups, ensuring that the poorest households who are likely to be most at risk from food insecurity are captured, and that the sample is representative of different income groups in the locality¹⁰
- Gender and dependent groupings, such as female-headed and female-predominant households, households with large numbers of dependents, etc.
- Geographical zones: where households are spread over different geographic zones within the catchment areas, it would be important to stratify the sample so as to provide a representative picture of the main locations likely to be affected, which may take into account soil types, watersheds and administrative boundaries

The operator and/or independent expert would need to assess their own particular situation and decide how best to conduct the household survey and choose a suitable sampling frame. It is generally recommended that the survey focuses on those stakeholders most likely to be affected in the primary catchment area, and a smaller selection of directly affected stakeholders in the secondary impact area may then also be sampled or covered by another methodology.

A baseline questionnaire can be used to gather the information required for a food security assessment. The previous section of the report contains some recommended indicators, including measures of household calorie/nutritional gaps. In order to meet such information requirements, the questionnaire could include the following;

- Household age and gender profiles (from which nutritional requirements can be calculated);
- Food consumption: normal daily/weekly patterns, together with shortfall periods (seasons/months), by each of the main foods consumed and perceptions of food security;
- Food purchases: normal weekly purchases of each of the main foods by amount and price (or amount spent) and amounts bought in shortfall periods;
- Food from hunting, fishing, foraging, gifts/relatives, food aid and special occasions;
- Other main essential household expenditures: school fees, medicines, fuel, etc.;
- Cooking and sanitation: type, fuel source, water sources and quality, hours collecting fuelwood and water, sanitation;
- Health and education profile: HH members with ARS and other illness, days sick in month, carer days, hospital visits, school attendance;
- Crop production by area and yield over the latest (or typical) year (i.e. covering all harvests in the year), sales from production and prices received (including biofuel or biomaterials feedstocks);
- Livestock numbers and sales, and own use in latest (or typical) year;
- Employment and estimated income of HH members.

A recommended questionnaire for the baseline and impact assessment survey is contained in the RSB household survey document RSB-GUI-01-006-02. The questionnaire is also designed to meet the needs of other social and environmental requirements under the RSB Standard. It should be noted that the RSB questionnaire is for guidance, and that the operator may choose to adapt it (e.g. in the case of an operator in a more developed region focusing mainly on perception-based measures of food security) or use a different means of collecting

¹⁰ Note that income groups should also take into account equivalent income estimates from home-produced food consumption, especially for the mainly subsistence households.

the information¹¹.

For each household surveyed the household head would normally be interviewed, although the interviewer should encourage female members of the household to attend as they are often in control of food provision. A translator will often be required, and the interview should take place either at each household or a communal location where householders could congregate, although in such cases each interview would need to be conducted at a reasonable distance and in relative seclusion to encourage accurate responses.

4.2.4.2 Key informant baselines

Smaller operations might find it difficult and relatively costly to conduct a household survey, plus their impact on food insecurity would generally be much smaller than that of a large operation. Also for medium and larger operations it could be very costly to conduct a household survey in both primary and secondary impact catchment areas. Thus, for smaller operations and secondary catchment areas, a baseline could be established using quicker and cheaper methods, such as using key informants¹², local NGOs and community leaders, and/or a smaller survey composed of representative households, as well as focus groups. The important point is that the key informants and/or focus groups should be able to provide a representative picture of households in the locality (where there is any uncertainty, a household baseline survey should be used). For example, local NGOs and community leaders may be able to identify different livelihood groupings and provide an assessment of the food security and livelihood status for each, or suggest a few typical households who could represent each livelihood group within a survey.

4.2.4.3 Focus groups and community consultations

Focus groups usually comprise 7-12 individuals sharing a common characteristic, such as a type of livelihood or gender or geographic location, or they may be chosen to be representative of a number of groups (e.g. income groups). They are usually purposively selected as being key informants or experts for their particular characteristic.

Focus groups would be needed to provide supportive information at the time of a household baseline survey. A farmer focus group, for example, would be useful to confirm market prices of food goods, crop inputs and prices, labour hours, and other vital farming and market information to supplement the household questionnaire. Indeed, where possible, focus groups should be held both before and after any household baseline survey in order to first gain a picture of livelihoods and then to clarify or fill any missing information gaps evident from the survey.

So, before conducting the baseline, focus groups can be used to determine information that is not unique to individual households (i.e. where triangulated responses from the group would provide the same information as hundreds of households). For example, the location of the nearest market, the seasonality of production and farm input costs could be gathered using focus groups rather than having the same question answered by many households.

The focus groups could also provide vital information for assessing the impact of operations

¹¹ The recommended RSB household survey questionnaire has six sections, the first five of which are relevant for conducting a baseline for an operation that has yet to be established, in order to determine the prevailing level of food security in the locality. For operations that have already been established, the baseline could be conducted using all six sections of the questionnaire

¹² Key informants are those people most likely to be able to provide a reliable picture of how people live in the locality, especially with regard to the information required for the FSA. They often include long-term residents, such as village leaders, local NGO staff, etc.

at the time of the impact assessment. They could provide information on the food security and livelihoods analysis for their particular livelihood group. They would also be able to determine whether mitigation and enhancement actions were satisfactory, if negative impacts on food security were recorded by the assessment, to what extent the operation contributed to any negative impacts, and which food security issues to focus on in the mitigation process.

The type of focus groups would depend on the livelihood groupings in the location and the information required. As well as a farmer focus group, it is recommended that a gender group also be conducted in order to assess the food security status and impact on women and children in the locality.

Community consultations may be required as part of a screening exercise to verify the potential food security impacts of operations and to verify that satisfactory mitigation and compensation measures are being taken where there are potential negative impacts. These can take the form of a series of focus groups, but are normally open public meetings within each community likely to be affected by the operation. Community consultations could also be used to verify that satisfactory mitigation and enhancement measures have been undertaken under impact assessments.

4.2.4.4 Market surveys

Market surveys would be useful for high-impact projects (e.g. large biomass cultivation estates and industrial operators), as these would be the most likely to impact on the availability and price of goods in the locality, and should therefore form part of the baseline. Market surveys would provide information on volumes and prices at the main local markets at both surplus (e.g. post-harvest) and shortage periods (e.g. pre-harvest) and should therefore be conducted twice in the year. The market survey should include traders, consumers and officials, and both wholesale and retail prices wherever possible.

Note that official surveys are often conducted each week at the major markets by government departments. These surveys could be used for price and volume information where reliable, and to build up a picture of seasonal prices and volumes over recent years; this would help to shorten the market survey process or even (where sufficient information is available) replace the need for such a survey.

In the context of interpreting the market survey information, it is important that the data collection exercise includes an analysis of local, national and regional market volumes and prices to understand the level of market integration and how production, imports and consumption relate to one another at each level. This, for example, would determine to what extent import parity prices influence local prices, and hence, how much (or little) influence operations could have on prices.

4.2.5 Impact assessment survey

Whilst the baseline records the food security status before change (ideally before the operation is fully established), an impact assessment measures the change in key indicators since the baseline.

The first impact survey should be carried out between one and two years after the full establishment of the operation. If the project start-up is delayed after the baseline for a gap of more than two years, another baseline should be conducted just before the operation is established. Also, those operations established before a baseline was undertaken should carry

out a combined baseline and impact assessment and use retrospective questions (e.g. those in the last section of the RSB household survey questionnaire, RSB reference code: RSB-GUI-01-006-02) to assess impacts; comparable data would then be available to the operator in the subsequent impact assessment.

The food security impact assessment survey should use the same process as for the baseline, using the same guidelines as in Table 2 to ensure consistency. Table 2 recommends that the impact assessment sample size should be about half that of the baseline. The baseline analysis would provide livelihood and income groupings from which the impact assessment sample could be chosen to ensure it remains representative of the original baseline sample. It would therefore be preferable to use the same villages or pools in the impact survey as in the baseline, and, if possible, the same households; this would depend on whether the baseline was conducted using random sampling and whether it was decided to sample household members anonymously or to request names for each response¹³. If the baseline used key informants and focus groups then the same process should be used for the impact survey, preferably with the same numbers involved.

The impact survey should be repeated until a satisfactory outcome is achieved. This would mean that the operation would have to provide evidence that any negative outcomes from the survey had been mitigated or were solely due to factors outside the control of the operation, as well as providing evidence of efforts to enhance food security. The surveys would help to provide evidence of improvements, but focus groups and/or community consultations (particularly for large operations) could also be used to verify satisfactory outcomes.

It is recommended that at least one other sentinel monitoring survey (see next section) or impact assessment survey be conducted to confirm a satisfactory outcome for medium and large operations, after which no further action will be required for an extended period unless there is a significant change to the operation¹⁴.

4.2.6 Sentinel monitoring survey

The sentinel survey would act as a monitoring survey to highlight any emerging food security issues in between the impact assessments or following a significant change to the operation, or to monitor any potential changes after an extended period following a satisfactory impact assessment.

For household surveys, a small number of households (see Table 2) would be selected from the baseline and/or impact assessment surveys¹⁵. These should be selected from the baseline sample to be representative of the baseline population, as far as possible, in terms of income and livelihood groups and geographical differences. Key informants or focus groups could be employed if also used in the baseline and impact assessment.

A copy of the same questionnaire used for that household in the most recent baseline or impact

¹³ In some circumstances, it may be not be appropriate to ask for respondents names, particularly where this might lead to a biased response. The decision on how to sample households should become evident in the initial meeting with community leaders and officials.

¹⁴ Note that for an existing operation conducting a provisional impact assessment on the baseline, only the baseline and provisional impact assessment is required.

¹⁵ If possible, it would be useful to know which households would agree to be involved in future sentinel surveys at the time of the baseline survey, and it may be necessary to pay a small fee for their participation (although it is recognised that this is contrary to standard practice with household surveys). Indeed, it may be necessary to provide a financial contribution to the local community group and NGO or farmers groups for time spent in assisting the survey work and focus groups, etc.



assessment survey could be used to monitor developments in the sentinel survey, in order to simplify the process and avoid repetition. For example, the household composition in Section 1 is unlikely to change that much, so adjustments could just be made to the ages of household members where necessary.

The sentinel survey would generally be conducted one year (or 6-18 months) after any unsatisfactory outcome resulting from an impact assessment survey, or one year after there is a significant change made to the operation, such as an expansion into new lands. If the sentinel survey shows a negative impact, then another impact assessment should be carried out one year (6-18 months) after the sentinel survey in order to assess the performance of any remedial actions. The sentinel survey could also act as confirmation of satisfactory outcomes for any mitigation and enhancement measures.

The onus is therefore on the operations to ensure that no negative impacts on food security result from the impact and monitoring surveys, otherwise this will trigger more regular sentinel and impact assessment surveys until the negative impacts are abated¹⁶. If there is insufficient evidence of actions being taken by the operation to both prevent negative impacts on food security and to enhance food security in their locality, then RSB certification would not be granted.

If the sentinel and impact assessments suggest positive results from the mitigation and enhancement measures, then the monitoring audits should be able to verify compliance, although this should also be verified by directly-affected stakeholders, particularly for large operators. No further monitoring would then be required for an extended period, which could be determined by the independent auditors; as a guideline it is recommended that this extended period be three years for large operations, four years for medium-size projects, and five years for small operations. At the end of the extended period, sentinel monitoring surveys or other assessments could be conducted in order to assess the new food security status and any potential new negative impacts.

4.3 Analysing baseline, impact and monitoring assessments

The analysis of the baseline and impact assessments will depend on the mix of methodologies employed by each operation. For larger operations, the emphasis would be on the household survey analysis for the primary catchment areas and the major out-grower pools, but with other methodologies from secondary impact areas. For smaller operations, key informant interviews and focus group results from the primary catchment area would form the main part of the analysis. The analysis should, wherever possible, show results for different livelihood and income groups so as to improve the targeting of mitigation and enhancement measures.

4.3.1 Analysing the food consumption status

The main recommended measures of food security are the household calorie deficiency gaps and the equivalent nutritional deficiency gaps for protein, fat and micronutrients, such as iron and vitamin A. These can be calculated from the food consumption information in household surveys, using food composition tables and recommended minimum dietary intakes¹⁷ (see Section 3.1).

¹⁶ For large operations, this should also be confirmed by directly-affected stakeholders through a community consultation process.

¹⁷ For smaller operations, the deficiency gaps could be calculated using a key informant survey and focus groups to estimate the proportion of households with a calorie deficit and their average percentage deficit. Where it is not possible to calculate proportions, an average deficit could be calculated and compared between periods.

In order to assess the overall food security situation for a particular group of households, the individual household gaps need to be combined into a single measure that can be compared between the baseline and impact assessments. An overall score can be calculated as the proportion of households with calorie and other nutrient deficiency gaps in the survey multiplied by the average percentage deficiency gap for such households. This can then be used as a threshold value for comparisons between the baseline and impact assessment results.

The recommended basic indicator for measuring the food insecurity status of a particular location or stakeholder group would be the calorie deficit score (CDS), calculated as;

CDS = Average household calorie deficit percentage¹⁸ x proportion of households in the locality with a calorie deficit.

Alternatively, a composite nutrient deficit score (NDS) could be calculated as a weighted average of calorie, protein, fat and micronutrient deficits. For example, food composition data may be available for calories, protein, iron and vitamin A for the main foodstuffs consumed in a particular location. The weighting of each nutritional element would depend on the importance attached to each in a typical diet in each location. Calorie and protein values, as macronutrients, would usually be weighted higher than micronutrients. Thus, in this example it could be decided that calories are given a 40% weighting, protein 30% and iron and vitamin A 15% each.

*NDS = (average household calorie deficit percentage x proportion of households in the locality with a calorie deficit x 0.4) +
 (average household protein deficit percentage x proportion of households in the locality with a protein deficit x 0.3) +
 (average household iron deficit percentage x proportion of households in the locality with an iron deficit x 0.15) +
 (average household vitamin A deficit percentage x proportion of households in the locality with a vitamin A deficit x 0.15)*

Note that only those households with a deficiency gap would be included in the CDS or NDS, as those without a deficiency are deemed to be food secure using this measure.

The CDS and NDS would provide useful measures of the food security status in a particular location and/or for particular groups of people, as any score greater than 0 would suggest some form of food insecurity¹⁹. The advantage of the NDS is that it would highlight any particular nutrient deficiencies that could then be addressed in mitigation and enhancement measures.

Other methods of assessing the food security situation could include the perception-based Household Hunger Score²⁰. If used without the detailed food consumption survey, this would only provide an indication of the level of food security and its overall changing status, without providing important dietary and other information. The HHS can be analysed using the scoring system in the RSB household survey questionnaire (i.e. a range of 0-9) where any score above 0 would suggest some level of food insecurity in the locality and any score of 4 or above would indicate significant food insecurity. The scores could then be compared between

¹⁸ Required calories for household composition minus available calories for household from survey results, expressed as a percentage of requirements

¹⁹ Whilst the target score for no food insecurity is zero, a de minimis score could be applied, recognising that there is always likely to be some form of micronutrient deficiency in the diet, such as iron or calcium.

²⁰ This was developed from the Household Food Insecurity Access Scale (HFIAS) in order to create a scale that was consistent across cultures.

the baseline, impact and monitoring assessments in order to assess impacts, mitigation measures and enhancements.

The HDDS, which measures the variety of the diet, usually uses 12 food groups, with a score of 1 attributed to each food group consumed, providing a score of 1-12. An average can then be calculated and compared between baselines, impact, and monitoring assessments in order to assess whether improvements are being made or negative impacts mitigated. The RSB household survey questionnaire does not contain a section for the HDDS, although it can be calculated from the consumption data produced by the questionnaire. Operators in areas where households have more complex dietary patterns may decide to use the HDDS in conjunction with the HHS, in which case they should refer to the HDDS guide by Kennedy, Ballard et al from 2011 (see references in Section 6).

4.3.2 Analysing the AAUS indicators

Changes in the food security status between surveys can be analysed using the availability, access, utilisation and stability (AAUS) indicators (see Section 3.3.2), which would also support the analysis for assessing the impact of the operations on food security.

The **availability** indicators would include a comparison of food crop and pasture areas and yields from the baseline in order to assess any unusual changes in relation to past trends and weather patterns. Market availability of food crops and other essential livelihood goods would also be important to assess from the market surveys, as well as wastage levels from household surveys.

For example, if a 3,000 ha biofuel operation led to the transfer of 2,000 ha of land out of food production, this might be reflected in reduced local food production. If households who previously occupied that land for food production witnessed a drop in their food security as measured by the CDS or NDS, this would suggest that insufficient compensation and mitigation measures had been put in place to ensure that those households had equivalent land or incomes to maintain or enhance their food security status. Yield levels would also provide important information in this analysis, since households may have been provided with equivalent land, but yields may have been low that year, which would trigger further analysis on whether the new land was indeed equivalent in quality or whether it was due to unusual weather conditions.

One method of analysing **access** is to calculate the least-cost dietary profile for a locality, which provides the required nutrients for a typical household. This could be estimated from the survey data, but linear programming analysis could also be used to estimate this²¹, such as the Cost of the Diet methodology designed by Save the Children²². Information on the main foods available and consumed, food prices and typical family sizes for the location would be available from the household and market surveys. The resulting least-cost diet can then help to determine whether wages paid by the operation, or prices paid to out-growers are sufficient to allow households to be food secure.

For **utilisation**, it is recommended that time spent in collecting water and fuel be measured for any impacts between surveys, such as loss of access to fuelwood supplies or water sources.

²¹ For example, where detailed household survey data is not available, the least-cost diet analysis would only require information on retail prices in the locality.

²² Save the Children UK has developed a methodology known as "Cost of the Diet" using linear programme software. Survey results could be analysed with this software to identify a least cost diet for the locality. See Chastre, C., A. Duffield, et al. (2007). The Minimum Cost of a Healthy Diet. Findings from piloting a new methodology in four study locations. London, Save the Children UK.

In the above example of a 3,000 ha operation, 1,000 ha of that land could have previously been under forest, the removal of which may have led to increased distances and time spent collecting fuelwood, which could then have negative consequences for food production and income earning.

Anthropometric measures could also be used as outcome indicators of utilisation where available²³. Anthropometry is probably the most common technique used to measure protein-energy malnutrition, involving the measurement of body parameters, often of young children, to indicate nutritional status. Weight for height of children under five years of age is a common indicator of malnutrition (and particularly of wasting) in a particular community. Height for age and weight for age are also used to assess malnutrition and stunting of young children, with the results being compared to standard values for a reference population. For adults, the Body Mass Index (BMI) is a more common measure, which is weight in kg divided by height squared (in metres).

The analysis of underweight, stunting and wasting measures is usually related to the expected weight or height of children, so that any children outside two standard deviations of the reference level are deemed to be underweight or suffering from stunting or wasting. A BMI of less than 16 would indicate severe malnutrition in adults, and less than 17 would be considered moderate malnutrition. Independent experts should ideally undertake the analysis of anthropometric data.

For **stability**, the baseline and impact survey responses could be used to measure any changes in the seasonality and depth of hunger through the year. For example, the survey results might show that households have sufficient calories to meet requirements over the year as a whole, but that there are significant seasonal deficits and surpluses, so the deficits need to be addressed through improved storage or seasonal food vouchers, etc.

4.3.3 Analysing the impact of the operation

Any increase in the calorie deficit score (CDS) or nutrient deficit score (NDS) or equivalent measures in the impact assessment should trigger an assessment of the extent of the operation impact, and relevant mitigation measures.

It is difficult, however, to isolate the actual extent of any negative impacts arising from an operation as against other factors. In order to arrive at a statistical measure of the impact of the operation, a more complex analysis would be required. One form of analysis to assess the impact of different independent variables on a continuous dependent variable, such as the household calorie gap, would be a multiple regression model. This would provide an estimated measure of the proportion of the impact on calorie gaps and equivalent food security measures that could be attributed to the operation. Much, however, would depend on which factors are included in the model (e.g. size of household, size of farm, etc.), but an independent assessment by a food security expert should provide a reliable analysis.

Given the complex nature of statistical modelling, many operators and independent assessors may choose to assess the impact through the AAUS analysis, which should highlight any factors outside the control of the operators, and also factors likely to have been influenced by the operation. The analysis should also, wherever possible, show the results for households

²³ Anthropometric indicators can be affected by many factors not related to food security, such as non-food related illnesses and disease. Some of the anthropometric measures also miss certain types of malnutrition such as oedema and certain micronutrient deficiencies, which are identified by different observation and blood tests.

involved with the operation as out-growers or as employees, compared to other households, as this would also help to measure the degree of impact of the operation.

5. Mitigating and enhancing food security impacts

Operators are required to mitigate any negative impacts on food security, whilst medium to large operators are also required to enhance the food security of their local directly affected stakeholders. It is therefore vital that any mitigation and enhancement measures are designed to meet the particular problems identified by the impact assessment analysis.

5.1 Examples of mitigation and enhancement measures

Five mitigation measures are available for operators to enhance food security:

- i. setting aside land for growing food
- ii. increasing yields of food crops
- iii. providing opportunities for workers to carry out household-level food production
- iv. sponsoring agricultural support programmes and activities
- v. making value-added food by-products available to local markets

Appendix 4 of this document provides some recommended mitigation and enhancement examples to match the various food security indicators. The main measures proposed are as follows²⁴:

- i. The **setting aside** of productive land by the operation for community food production aimed at high-nutrient crops (or pasture and feedstuffs for livestock-rearing) and supported through the provision of improved seeds and other inputs, as well as technology and training.
- ii. The provision of **subsidised inputs** (including seed and other crop inputs, animal feed and equipment) for local farmers to improve productivity on a sustainable basis (e.g. integrated pest management techniques suited to the locality might be prioritised above purchased pesticides, and fertiliser could also be provided on a sustainable basis by using by-products of the feedstock processing, whilst tractors and other equipment could be made available for cultivation and other field practices).
- iii. The provision of **training and extension** advice to local farmers aimed at improving the nutritional value and productivity of food in the locality (particularly where certain nutritional deficits have been identified from the surveys). This could include the sponsoring of farm-support programmes on a sustainable basis and technology transfer programmes by the operation for local farmers.
- iv. Paying employees **fair wages** which at least meet the cost of a minimum healthy diet plus other essential household expenses, as calculated in the impact assessment analysis.
- v. Allowing adequate and appropriate time for employees to practice **home food production**, such as during daylight hours and at peak harvest times, and ensuring other fair working conditions to minimise health risks.
- vi. Paying out-growers **fair prices** for their feedstocks, which provide for a remunerative margin above costs.
- vii. Providing **temporary food vouchers** and/or cash, as temporary measures in times

²⁴ These are not an exhaustive list and other measures may be more appropriate to particular circumstances
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- viii. of emergency food shortfalls, whilst in the longer-term encouraging different patterns of cropping and improved storage to prevent such shortfalls in the future.
- viii. Providing RUTFs and other **food supplements** in the community where assessments show inadequate diets. Again this would be a temporary measure as local farmers are encouraged and helped to phase-in new crops and livestock products to address the nutrient deficiencies in the longer-term.
- ix. Improving **market infrastructure and** access through the building of feeder roads and bridges to the local community, as well as assistance with communal transport to major market centres, and assistance in improving public market facilities to encourage increased availability of more diverse foods.
- x. Improving or building **new storage, processing and energy facilities** in the locality for community use, with an emphasis on assisting local farm groups and co-operatives to build and manage such facilities on a sustainable basis.
- xi. Providing **clean energy** (and improved stoves), such as electricity, ethanol gel or SVO, for cleaner cooking and for generators (e.g. to power irrigation pumps), hand motorised-ploughs, storage cooling systems and refrigeration and motor transport for farming and market access.
- xii. Providing water boreholes and taps for clean **drinking water**, and improved sanitation facilities.

5.2 Targeting and implementing mitigation and enhancement measures

The food security assessment report will determine which mitigation measures are most relevant for the operation. This will form part of the Environmental and Social Management Plan.

During implementation, it will be vital to ensure that the relevant measures are used to address the main reasons identified for food insecurity. For example, the stability analysis may show that the CDS/NDS is high due to a regular shortage month; thus, mitigation would then address the seasonal instability by targeting measures aimed at improving food security for that period, such as improved storage facilities in the community, or the provision of an irrigated land parcel for community food production during the drought-season, or the provision of food vouchers in the shortage period where there are relatively few stakeholders in the catchment area.

If the utilisation analysis shows that households have to spend longer hours collecting fuelwood due to the loss of forested areas to the operation, then mitigation could include the provision of alternative cleaner fuels and improved stoves (providing this does not lead to increased household reliance, and expenditure, on expensive stoves and fuel). Loss of access to wild foods and medicines following the establishment of the operation could be mitigated by providing land for community food production or the provision of vouchers to purchase equivalent foods and medicines.

The minimum cost of diet analysis might suggest that the local minimum wage is not sufficient to purchase the required food for a typical family in the locality, so the operator could ensure sufficient access to food by paying wages above the minimum rate. If the food consumption analysis suggests there is a significant lack of a particular nutrient, such as vitamin A, then the mitigation measures could include the provision of vitamin supplements in the locality or the promotion of high vitamin A crops, such as orange-fleshed sweet potatoes, through sponsoring a farm support/extension programme and perhaps even providing seeds and technical support.

Mitigation and enhancement measures should also be targeted at the appropriate

stakeholders. Thus, if the analysis shows that the CDS or NDS mainly comprised households in the low-income group or households with large numbers of dependents, such groups should be targeted for mitigation and enhancement measures, wherever possible. Similarly if any increase in the CDS or NDS was concentrated in farming households, and this was then linked to reduced yields, then mitigation actions should focus on helping to improve yields for those farmers. For Criterion 6b, only directly affected local stakeholders should be targeted where possible from the sampling frame.

Gender issues should also be taken into account when implementing the mitigation measures, as men are often the main employees of such projects or the growers of feedstocks, whilst women may lose part of their market garden plot to the feedstock cultivation or have to cope with more of the labour burden of home food production. Also, a significant proportion of wages earned by men may be spent on leisure and non-essential items, whilst women tend to spend most of their wages on food and essentials for the family. The operator could therefore provide more employment opportunities for women to help maximise the beneficial impact of wages, as well as providing land for women's groups to grow food, and ensuring that any food vouchers are distributed to female members of the household.

5.3 Monitoring and verification of mitigation and enhancement measures

Monitoring of progress toward the targets set in the impact assessment reports and management plans, and verification of compliance, would be undertaken by independent auditors appointed by the RSB certification bodies.

There should be evidence that the AAUS dimensions of food security have been assessed and that the methodology used provides for an adequate assessment of the status of food security in the locality and the potential impacts of the operation.

If the auditor is satisfied with such assessments, then the operator must also provide evidence of satisfactory actions to mitigate any negative impacts caused by its operation. In practice, this would mean that if the CDS or NDS or HHS or equivalent measures were to signal increased food insecurity, and that there was evidence of a potential contribution of the operation to this rise, then mitigation measures would have to be put in place to address the changes identified for the increased level of food insecurity. If implemented to the satisfaction of stakeholders, this should provide sufficient evidence for compliance, particularly where the CDS or NDS or HHS measures were to fall in a subsequent monitoring or impact assessment.

Large and medium operators would also have to provide evidence of enhancements for local directly affected stakeholders. The CDS, NDS or HHS or equivalent measures could be used to assess whether a satisfactory level of enhancement had been made since the previous assessment. However, it should be noted that other circumstances, outside the influence of the operation, could prevent the key food insecurity measures from falling. Thus evidence of enhancements, including records of activities and costs, made by the operator in agreement with stakeholders should also be sufficient for verification of compliance.

Note that the operation would still have to monitor the food security status in its locality after an extended period. It is recommended that after any verification of compliance regarding satisfactory food security outcomes, small operators would have an extended period of five years before further monitoring action is required under the screening provisions, medium operators four years, and large operators three years. Sentinel monitoring surveys and other assessments could then be used to assess the food security status and potential negative

impacts again, from which future mitigation and enhancement measures could be adopted.

6. Appendices

Appendix 1 provides a description of some of the potential impacts of operations on food security.

Appendix 2 provides an example map to illustrate how the primary and secondary impact catchment areas could be defined.

Appendix 3 provides an example map to illustrate how Centric Systematic Random Sampling might be used to sample out-grower sites where there are no obvious pools of out-growers.

Appendix 4 summarises the recommended indicators and thresholds and how they apply to the principles and criteria, how the information required for such indicators could be collected, and the recommended mitigation measures for each indicator.

Appendix 5 provides a guide to the methodology of measurement recommended for each size category of operation.

Appendix 1: Assessing the impact of operations on food security

Operations may affect food security in a number of ways. The following notes provide examples of how each of the four pillars of food security might be affected by an operation (i.e. they are illustrative rather than exhaustive lists).

Impacts on food availability

The physical availability of food could be negatively affected by an operation, if:

- The cultivation land was previously used for food production or inputs (e.g. food crops, pasture, or hedge/tree shading and protection)
- The land was previously used for other livelihood activities that would indirectly affect food production (e.g. local sources of fuelwood or water or wild foods, the removal of access to which could result in longer distances and hours collecting fuelwood and reduced labour hours for agricultural production, as well as reduced wild food availability)
- Demand for feedstock or inputs by the operations reduced market supplies for other customers (i.e. market availability was insufficient to meet the new demand from the operations and prevailing local demand; although this should also trigger increased supply from surrounding farms – see below)
- Food yields were negatively affected by the operation (e.g. through soil erosion, a lowering of the water table, or an increased prevalence of pests and disease from the feedstock, etc.)
- Local labour resources were drawn away from food to biofuel or biomaterial production, particularly at key planting and harvesting times, and without sufficient inward migration or increased food imports to offset the loss
- Working conditions for employees were such that they had little or no time or energy to spend on home production of food, reducing the amount and variety of home food production

On the other hand, food availability could be positively affected by an operation,



if:

- The operation provided additional land for food production to the community, which might be cleared or ready-cultivated
- Technical expertise and inputs were made more accessible by the operation, helping to improve food productivity and storage²⁵
- Other livelihood supports were made more accessible by the operation (e.g. affordable clean fuel and safe water supplies, freeing labour resources for agricultural production²⁶)
- New demand from the operation (e.g. wage-earners) stimulated farmers in the locality to produce more foodstuffs for sale relative to subsistence production (i.e. through effective market demand and higher prices)
- The operation itself produced more food for sale into local markets (although this might have a negative impact on prices for local farmers)

Measurements could include land area devoted to food production in the baseline against that after the project has been fully established, main food-crop yields and variances pre and post project, yield levels associated with weather and climate change impacts, market assessments of supply impacts, and records of farm sales pre and post project. Such details could be captured in household questionnaires, focus groups and market surveys.

Impacts on food access

It is generally agreed that access is the most important factor determining food security, as there is often adequate availability of food but many households lack the income to afford access to sufficient nutritious food. Access is not just about purchasing food, but all means of accessing food, including home production, bartering, aid and hunting and gathering of wild foods. Access is also affected by the accessibility and quality of food markets in the vicinity. Hence, there is some overlap between availability and access.

Access to food can be negatively affected by operations, if:

- The land on which feedstocks are now grown (and providing water access) was previously used for crops, livestock, inputs or other income-generating and income-saving sources (e.g. hunting and gathering of wild foods and medicines and craft materials, as well as fishing), the removal of which would reduce incomes or incur increased expenditure for local households
- The operation paid low wages to workers, or low prices to out-growers, which were insufficient to cover household needs for food and other essential goods
- The new operation generated demand for food, inputs and other essential goods (e.g. fuel) at local markets which increased the price of such goods, reducing the amount of food and other essentials that could be purchased by other customers

Access to food can be positively influenced by operations, if:

- Fair wages were paid to workers which allow them to purchase a sufficient amount and variety of food to meet their nutritional needs
- Local food prices increased following the establishment of an operation, increasing the incomes of those households selling farm products (i.e. net sellers of food), thereby enabling them to purchase more goods
- Operations improved the local infrastructure, including roads, making food markets and more diverse food diets more accessible
- If storage facilities were improved in the locality, encouraging less waste, particularly

²⁵ Note that technology transfer can also lead to negative impacts if inappropriate for the region and conditions.

²⁶ Note that improved access to affordable clean fuels could not only save time in fuelwood collection but could also reduce illness associated with smoke inhalation. On the other hand, if households have to pay for such fuels it could lead to reduced expenditure on food.

of foodstuffs containing valuable micronutrients, such as fresh produce.

Access measures generally focus on price and income levels. A key measure would therefore be the minimum cost of a healthy diet for the locality for various age and gender groups, which could then be applied at household level and compared with wages paid by operations and prices of feedstocks paid to out-growers. Diversity of diet could also be measured, and, again, household surveys could provide much of the data needed for these calculations.

Impacts on food utilisation

Utilisation of food refers to how food is actually used by people in order to meet their nutritional needs. Thus, foodstuffs have to be stored, prepared and cooked to make them utilisable, and the way in which food is prepared can affect the nutritional status of the food. Food utilisation is also affected by the health status of different people as this can affect their ability to absorb nutrients. Adequate diets also rely on a balance of different foodstuffs as some nutrients can influence the absorption of others.

Utilisation of food can be negatively influenced, if:

- Poor health and illness reduced the absorption of essential nutrients (indeed poor access to food and low utilisation can lead to poor health and illness)
- Households lacked access to cooking essentials, such as fuelwood and clean water, as a result of the operation (e.g. if land used for collecting wood was shifted to feedstock production or if the operations removed access to water by taking over dams or waterholes or withdrawing water from water supplies so that the community was unable to fulfil subsistence needs)
- Poor education and insufficient income prevented households from purchasing a well-balanced diet to meet nutritional needs
- The diversity of food production was reduced in the locality of the project (e.g. if out-growers use land previously devoted to crops and livestock that provide valuable micronutrients such as fruit and vegetables)
- If poor storage reduced the quality of food and hence, utilisation.

Utilisation can be positively affected by an operation, if:

- Traditional wood stoves were replaced by improved cooking stoves using biofuels or processed biofuel feedstocks (e.g. ethanol gel or straight vegetable oil), reducing smoke-related respiratory illness and improving cooking efficiency
- Operations provided improved access to clean water for drinking and cooking and improved storage
- Operations helped to improve local education and health and sanitation facilities
- Operations improved the diversity of food available in the locality, which may occur through better storage facilities and other infrastructure

Measurements could include anthropometric indicators to assess malnutrition rates, time and distances for collecting water and fuelwood, and travelling to schools and health centres, cost and quality of fuel and water where purchased, and the prevalence of acute-respiratory and other diseases and the amount of time spent sick or caring for the sick. Most of this data could be captured by household surveys and focus groups.

Impacts on food stability

Stability of food security entails households and individuals having access to a sufficient quantity and quality of food at all times. In many food insecure regions, people face seasonal shortfalls in food access during the year, particularly as stocks run low in the period leading up to the next harvest. Many food insecure regions are also in predominantly rural areas, where

farmers suffer weather-related shocks from year to year. So, it is important to measure such gaps at the household level in order to identify nutritional gaps both during and between years.

Stability can be negatively affected, if:

- The operation accentuated any seasonal shortfall in availability and access of particular foods (e.g. if seasonal work is the main form of employment by an operation, which could leave households short of income and/or labour at certain times of the year, disrupting local food production and consumption).
- The operation accentuated the variability in food production between years (e.g. by reducing the water table in the locality and making crops and livestock more vulnerable to drought)

Stability can be positively affected, if:

- The operation provided access to additional food supplies or inputs, or temporary income measures (e.g. food vouchers) in times of shortage
- There were technical transfers of knowledge in reducing the size and duration of food shortfalls through the introduction of new crops and livestock, or better varieties and breeds, or a better application of inputs, such as irrigation
- Storage and transport facilities were improved to reduce wastage, increase the length of food conservation, and improve distribution to markets

Measurements could include seasonal patterns of household food consumption, including shortage periods and depth of hunger. Again, this could be largely captured by household surveys and focus group methods.

Given that the linkages between biofuel or biomaterial operations and food security are mainly at the food availability and access level, it would be more relevant to focus on measuring household availability and access to food in any impact assessment. However, anthropometric indicators could also be used, particularly in a scoping exercise to assess the prevalence of undernourishment in a particular area.

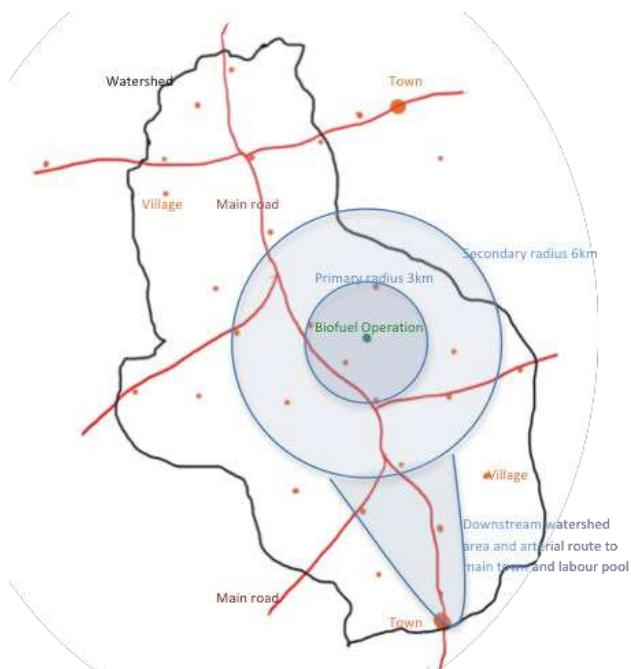
Impact of different operations

Impacts on food security may also differ according to the type of the operation. Large estates are more likely to result in land transfers from farmers and pastoralists in order to produce feedstocks at the expense of crops and pasture and a loss of biodiversity. Large feedstock operations are also more likely to have a significant impact on the local environment, especially where irrigation systems are used and intensive farming practices are employed, using large amounts of water, fertiliser and pesticides. On the other hand, large operations may offer more employment to the region, helping to diversify livelihoods and create demand for food from local farmers. Large processors and industrial producers may withdraw feedstock from a food market to another market, and thus have a larger impact than feedstock producers. Often the feedstock producers are not sure what market their commodity ends up in, and may not be able to ensure its destination has not impacted on food security.

Out-grower operations may also lead to a loss of food areas, as farmers switch part of their farm from crops and pasture to biofuel or biomaterial feedstocks. This could lead, for example, to areas previously employed for crops with high nutritional values, being diverted to biofuel or biomaterial feedstocks. Depending on the type of contract that an out-grower has with the supplier, much of the production risk would usually be with the out-grower, including any losses due to pests and disease, as well as any impacts on other crops. Out-growers may also lack negotiating strength in any contractual arrangements, making them susceptible to onerous credit terms and low product prices.

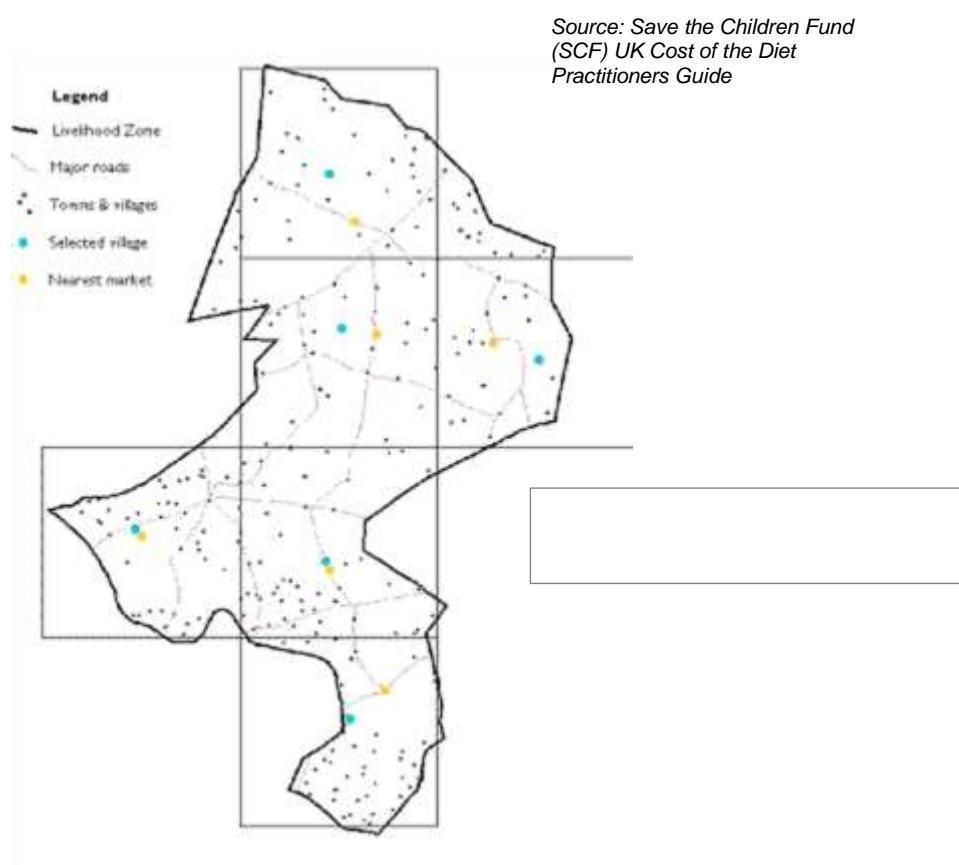
Appendix 2: Example for mapping the potential catchment area of a 9,000 hectare feedstock operation

Note the primary radius is 3 km around the boundary of the operation, encompassing four villages, which would be the prime focus of any baseline survey. Five villages could also be impacted within the secondary radius at 6km around the operation. Potential impacts should also be considered in two villages, and the main town downstream of the operation, and on a main road from where some of the labour pool is likely to be sourced.



Appendix 3: Example of Centric Systematic Area Sampling

The following diagram provides an example of how this methodology can be used to select villages and market centres from a wide geographical area with many small villages.



Appendix 4: Summary of recommended indicators, thresholds, methodologies and mitigation

A. Required measures	B. Proposed indicators	C. Proposed thresholds	D. Recommended methodologies	E. Mitigation examples
<p>1. Criterion 6a “Assess risks to food security in the region and locality and... mitigate any negative impacts that result from operations”</p>	<p>i) Calorie or Nutrient Deficit Score (CDS/NDS) or Household Hunger Scale (HHS) or equivalent measures (e.g. FCS or HFIAS)</p> <p>ii) Group average CDS/NDS/HHS or equivalent Average scores should also be calculated for HH groups in the baseline and impact surveys: 1. HHs involved (and not) in biofuel or biomaterial production 2. HHs in different locations 3. Income and gender groups</p>	<p>Comparison with baseline</p> <p>i) Any rise in the CDS/NDS/HHS or equivalent measures should be analysed for impacts, and relevant mitigation measures implemented in relation to the estimated impact from the operation (see measures 3-6 for assessing impacts).</p> <p>ii) as i) above</p> <p>Evidence should be provided of stakeholder satisfaction with any mitigation measures applied, which should also result in an offsetting reduction in the CDS/NDS/HHS or equivalent (unless there is clear evidence that other factors outside the control of the operation are preventing any offsetting reduction in food insecurity).</p>	<p>HH baseline survey – before or at project start and informed by focus groups, market survey and key interviews</p> <p>HH impact survey – no more than 18 months after establishment or two years after baseline. Positive outcomes must be confirmed by preceding or following positive outcome in sentinel/monitoring survey (see Note A at bottom of table)</p> <p>HH sentinel survey - monitoring no more than one year after a negative impact survey and after an extended period following positive outcomes</p> <p>Key informant survey and focus groups - for small operations re baselines, impact assessment and monitoring</p> <p>Community consultation or equivalent – to confirm stakeholder satisfaction</p>	<p>a) Provide compensating area and inputs for community food production (e.g. women's groups), encouraging high nutrient food production</p> <p>b) Provide subsidised inputs (including improved seed) to local farmers</p> <p>c) Support and training to local farmer and women groups linked to nutrition outcomes</p> <p>d) Allow flexible hours and fair working conditions to allow employees time for home production of food</p> <p>e) Improve wages for biofuel employees and contract prices and terms for out-growers (e.g. fair prices with a margin above costs)</p> <p>f) Provide subsidised energy (e.g. SVO to power irrigation pumps, hand-ploughs)</p> <p>Note: See also suggestions for measures 3 to 6.</p>
<p>2. Criterion 6b “enhance the local food security of the directly affected stakeholders”</p>	<p>i) Calorie and/or Nutrient Deficit Score (CDS/NDS) or Household Hunger Scale (HHS) or equivalent measures</p>	<p>Comparison with baseline</p> <p>i) Where the CDS/ NDS/ HHS or equivalent food security measures show a significant level of food insecurity for local directly-affected stakeholders, appropriate targeted enhancement measures should be taken.</p> <p>Evidence should be provided of local directly-affected stakeholder satisfaction with any enhancement measures applied, which should also result in a significant reduction in the CDS/NDS/HHS or equivalent measure (unless there is clear evidence that other factors outside the control of the biofuel or biomaterial operation are preventing an overall enhancement of food insecurity).</p>	<p>As above</p>	<p>As above (plus see below)</p>

Appendix 4: Summary of recommended indicators, thresholds, methodologies and mitigation

A. Required measures	B. Proposed indicators	C. Proposed thresholds	D. Recommended methodologies	E. Mitigation examples
	ii) Anthropometric measures	<p>Comparison with baseline</p> <p><i>ii) Improvement in WFH % of median and z-score (significant movement toward target where no oedema and a WFH z-score of -2 or above or 80% of the median and above is achieved).</i></p>	Available records from recent health survey of local population	<p>g) Support production of, and provide land for, food production linked to identified nutrient deficiencies (e.g. sweet potato for vitamin A)</p> <p>h) Provide targeted supplements and RUTFs (e.g. to under-5s and/or specific income groups)</p> <p>Note: See also suggestions for measures 3 to 6.</p>

Note: The indicators and thresholds for criteria 6a and 6b above (i.e. CDS/NDS/HHS or equivalent measures) represent the ideal measures of the food security status, using household surveys, key informant surveys, focus groups, market surveys, key interviews and secondary information. The food security status would then be compared between baseline, impact and monitoring assessments using the same indicators and methodologies in order to assess whether food security was improving or worsening in a particular area and for particular groups of stakeholders.

In order to assess the contribution of an operation to any decline in food security or to assess the impact of any mitigation or enhancement measures taken by the operation, further analyses would need to be made. In particular, the RSB standard requires an assessment of the availability, access, utilisation and stability (AAUS) components of food security. Each of these 4 AAUS pillars can be assessed in relation to the impact of the operation in order to guide any mitigation and enhancement measures.

The following AAUS indicators are therefore recommended as a means of linking the key outcome indicators back to the operation and the type of mitigation and enhancement efforts that will be required. It is not an exhaustive list, but more as an illustration of the type of AAUS issues that should be considered.

The effectiveness of any subsequent mitigation and enhancement measures could then be assessed through satisfactory feedback from stakeholders, combined with developments in the key CDS/NDS/HHS or equivalent indicators and AAUS indicators.

A. Required measures	B. Proposed indicators	C. Proposed thresholds	D. Recommended methodology	E. Mitigation examples
3. Availability	i) Area – food crops/pasture/fallow <i>In locality of the operation (e.g. catchment area)</i>	6a - Decline in area of food crops/pasture in local area attributable to the project (displaced area)	Focus group combined with HH survey results and key interviews and data (<i>Note - focus groups and interviews at same time as HH surveys</i>)	a) Provide equivalent area to community for food production (e.g. women's groups for fresh produce or allocated to HHs in compensation for lost access to land from the operation)
	ii) Yields of food crops <i>Average crop yields and range of yields for HHs in locality</i>	6a - Decline in food crop yields outside the normal range of yields expected 6b – Yields well below potential and/or those of surrounding regions	Focus group combined with HH survey results and key interviews and data to determine yield ranges and potential	a) Provide inputs to local farmers, including improved seed varieties, cultivation, irrigation b) Provide improved technology and training for crop and livestock production
	iii) HH calorie availability source - Own production calories (includes livestock, hunting, fishing, gathering, bartering) - Purchased calories	6b - Supporting information for mitigation measures, so no threshold required	HH survey results and focus groups	a) Provide improved community and farm storage where wastage from HH food balances is high b) Support move to nutrition-based cropping patterns to minimise need to purchase non-traditional foods
	iv) Market availability <i>Market supplies as assessed by local traders and consumers</i>	6a - Decline in reported market supplies outside the normal range, as reported by traders and consumers.	Market survey and focus groups	a) Support local farmers to grow more food to meet market needs b) Provide and/or repair feeder roads from the local community to improve market access
4. Access	i) HH least-cost diet	6b - Minimum cost of a healthy diet for common foodstuffs in the locality.	Calculate from HH survey and HH sentinel data and market surveys and 2 data (eg using software model). Focus groups to support data.	a) Ensure wages of operators employees meet the minimum cost of an adequate diet in the locality b) Support farmers in producing crops which have more of the expensive nutrients in order to lower the diet cost
	ii) Anthropometric indicators <i>e.g. Weight for height, Weight for age of under 5s</i>	6b - Any significant stunting or underweight cases in the locality or poor BMI 6a - any increase in such after the operation is established	Local health survey (if available of local population) compared with recent pre-operation establishment survey	a) Provide or subsidise RUFs for vulnerable under 5s in the locality and/or support the production of crops for, and processing of, RUFs in the locality. Plus provide food/vouchers for low BMI labourers
5. Utilisation	i) Access to clean drinking water <i>Hours collecting water per week</i>	6b - Communities with >50% of HHs not having adequate access to clean water in locality (e.g. catchment area) 6a - Increase in average HH hours collecting water due to operation	HH surveys (and focus groups reporting a lack of clean water or an overall increase in collection hours)	a) Provide clean water pumps and improved sanitation facilities for any local community without such and/or where there is an increase in average hours collecting water
	ii) Hours collecting fuel per week	6a - Increase in average HH hours collecting fuelwood and other fuel due to operation	HH surveys (and focus groups reporting an increase in hours)	a) Provide subsidised improved cooking stoves and/or fuel (e.g. straight vegetable oil or ethanol gel) b) Provide woodlots for community for production of fuelwood and charcoal for outside cooking

A. Required measures		B. Proposed indicators	C. Proposed thresholds	D. Recommended methodology	E. Mitigation examples
	iii) Indoor wood cooking	6b - Proportion of HHs using indoor wood fires for cooking in locality. If baseline is above 50% action should be taken to help improve the situation.	HH survey and focus groups	a) Provide or subsidise improved cooking stoves and clean fuel (e.g. straight vegetable oil or ethanol gel) to a significant share of local community b) Support or help establish local public health clinic/facility (investments that contribute to the sustainability of the service, such as buildings and capital equipment)	
6. Stability	i) Seasonality of hunger <i>Estimated monthly calorie gap average and HH group averages in locality</i>	6a – Increase in any average monthly calorie deficit score (from baseline) for all HHs and/or for any HH grouping in locality	HH survey results and focus groups	a) Improve storage facilities in locality for community food storage b) Support change in cropping patterns amongst local farmers to enable increased productivity and smoother seasonal supply of foods c) Provide temporary food vouchers or cash for shortfall periods to target groups identified	
	ii) Depth of hunger <i>Lowest monthly calorie deficits</i>	6b – Any month or season where average HH calorie deficit score is greater than 40 and recorded by 3% or more HHs in locality	HH survey results and focus groups	As above	
a) Satisfactory outcomes would mean no deterioration in food security as measured by the key indicators for two successive impact and monitoring assessments. Where an existing operation recorded satisfactory outcomes in the baseline and impact assessment, no monitoring survey would be required. After a satisfactory outcome, no further actions would be required for an extended period (recommended as three years for small operations, four years for medium operations, and five years for large operations). However, this would not prevent the operation from continuing to improve food security of directly affected stakeholders in a food insecure locality. Note - RUTF = Ready-to-use therapeutic foods, such as plumpy nut. ARD = Acute respiratory diseases often caused by smoke inhalation from indoor cooking.					

Appendix 5: Recommended food security assessment methodologies for industrial operations

Biofuel operation category	Size of operation	2 ^o data (eg official HH income/health surveys)	Household survey ¹	Key informant survey ¹	Sentinel HH survey	Market survey	Focus groups	Key interviews
6a Negative impacts								
Large estate, processor	>10,000ha OR >100Ml biofuels OR >500,000t processed feedstock	✓	✓✓	✓	✓✓	✓✓	✓✓	✓✓
Medium estate, processor	>3,000-10,000ha OR >10-100Ml biofuels OR >50-500,000t processed feedstock	✓	✓✓	✓	✓✓	✓	✓✓	✓✓
Small estate, processor	>500-3,000ha OR 1-10Ml biofuels OR >5,000-50,000t processed feedstock	✓	✓	✓✓	✓	x	✓✓	✓

Micro-processors	<=1MI biofuels OR<=5,000t of all feedstock processed	xx							
Large farm	>75-500ha	xx							
Small and micro farms	10-75ha & <10ha	xx							
6b Enhancements									
Large estate, processor	>10,000ha OR >100MI biofuels OR >500,000t processed feedstock	√	√√	√	√√	√√	√√	√√	√√
Medium estate, processor	>3,000-10,000ha OR >10-100MI biofuels OR >50-500,000t processed feedstock	√	√√	√	√√	√	√√	√√	√√
Small estate, processor	>500-3,000ha OR 1-10MI biofuels OR >5,000-50,000t processed feedstock	√	√	√√	√	x	√√	√	
Micro-processors	<=1MI biofuels OR<=5,000t of all feedstock processed	xx							
Large farm	>75-500ha	xx							
Small and micro farms	10-75ha & <10ha	xx							

Key - √√ = recommended as most suitable. √ = suitable for use. x = not suitable. xx = operation category not required to conduct assessment
 1= Baseline and impact surveys



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Abbreviations and acronyms



AAUS	Availability, Access, Utilisation and Stability
ARD	Acute Respiratory Disease
BMI	Body Mass Index
CDS	Calorie Deficit Score
CSAS	Centric Systematic Area Sampling
EC	European Commission
ESIA	Environmental and Social Impact Assessment
EU	European Union
FANTA	Food and Nutrition Technical Assistance of USAID
FAO	Food and Agriculture Organization of the United Nations
FCS	Food Consumption Score
FSIA	Food Security Impact Assessment
GHI	Global Hunger Index
GUI	Guidelines
HDDS	Household Dietary Diversity Score
HFIAS	Household Food Insecurity Access Scale
HH	Household
HHS	Household Hunger Scale
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
ILO	International Labour Organisation
ILUC	Indirect Land-Use Change
Kcal	Kilo calories
Kg	Kilograms
L	Litre
M	Million
NA	Not Applicable
NDS	Nutrient Deficit Score
NGO	Non-governmental Organization
RESA	Rapid Environmental and Social Assessment
RSB	Roundtable on Sustainable Biomaterials
RUTF	Ready-to-Use Therapeutic Food (such as plumpy nut)
SCF	Save the Children Fund
SIA	Specialist Impact Assessment
SLA	Sustainable Livelihoods Approach
SMART	Standardized Monitoring and Assessment of Relief and Transitions
STD	Standard
SVO	Straight Vegetable Oil
T	Tonnes (metric)
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WFH	Weight For Height
WFP	United Nations World Food Programme