



Guidelines for Eligibility for Bonus S02– “Use as Building Material “



**for Solar PV Applications under the
Feed-in-Tariff (FiT) Mechanism**

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1. INTRODUCTION

- a. These guidelines are intended for **Feed-in Approval Holders (FiAHs)** who have PV installations (regardless of category) with bonus S02 located in Peninsular Malaysia, Sabah and WP Labuan that have achieved commercial operation **since 2011**.
- b. The first guidelines entitled, **“Guidelines for BIPV Installation”** was prepared in 2014. At that point of time, the objectives of having the guidelines was to provide a simple guide on what a Building Integrated Photovoltaic (BIPV) installation typically looked like.
- c. However, over the years, it has been observed that **a number of FiAHs were still unsure of the requirement for eligibility of the bonus tariff for “use of Building Material” ie Bonus S02.** Hence it was concluded that a more detailed guidelines be published to address any ambiguity that existed in the past.
- d. The **“Guidelines for Eligibility of Bonus S02”** was prepared to tackle various misconception and misuse of the bonus by various FiAHs and to properly define the criteria for functionality of the buildings that have obtained the Bonus S02.
- e. By definition from the *Renewable Energy (Feed-in Approval and Feed-in Tariff Rate) Rules – Sub Rule 2;* a **building** is defined as

“roofed building structures which can be independently used and entered into by human beings and are primarily designed for the purpose of sheltering human beings, animals or objects from the external environment;”

The fulfilment of the above criteria as shall be verified by the Authority.

- f. **Bonus S02 – use as building material**, is one of the four bonuses for the feed-in-tariff rate offered for solar photovoltaic installations (see table below – Schedule (Section 2) from the *Renewable Resources, Feed-in Tariff Rates, Effective Period and Annual Degression Rates Table - Renewable Energy Act 725*).

Renewable Resource	Types of Bonuses	Effective Period (commencing from the feed-in-tariff commencement date)
Solar Photovoltaic	Bonus FiT rates having the following criteria (one or more) :	
	(i) use as installation in buildings or building structures	21 years
	(ii) use as building material	21 years
	(iii) use of locally manufactured or assembled solar PV modules	21 years
	(iv) use of locally manufactured or assembled solar PV inverters	21 years

Table 1 – Bonus FiT Rates for Solar PV (from RE Act 2011 Schedule – Section 2)

- g. **Bonus S02 - use as building material** is defined as **“in relation to a renewable energy installation utilizing solar photovoltaic as its renewable resource, means the use of the solar photovoltaic modules serving the function of a principal building material with no secondary building material beneath such solar photovoltaic modules serving the same function”** (from *Renewable Energy (Feed-in Approval and Feed-in Tariff Rate) Rules – Sub Rule 2*)

- h.** In order to retain the bonus rates, the FiAH shall ensure full compliance for eligibility **throughout the effective period** of his/her feed-in approval.
- i.** These guidelines are intended to complement, not replace, the Electricity Supply Act, the Renewable Energy Act, the Occupational Safety and Health Act, the Street, Drainage and Building Act, the Registration of Engineers Act, and their related subsidiary legislation.

2. CRITERIA FOR ELIGIBILITY OF BONUS S02 (USE AS BUILDING MATERIAL) FOR INSTALLATION OF PV SYSTEMS UNDER THE “INDIVIDUAL / COMMUNITY” CATEGORY

2.1 Structure Criteria & Bonus S02 Compliance

- a. FIAH shall ensure the PV installation complies with the authority’s definition of “use as building material” as defined in 1. g.
- b. FIAH shall ensure that the PV installations does not experience any water leakages, especially when installed as a roof.
- c. Before the Feed-In Tariff Commencement Date (FITCD), a **written confirmation from a practicing civil or structural engineer registered under the Registration of Engineers Act [Act 138]** is required, stating that in their opinion the **building structure shall be sound during the applicable effective period.**
- d. Other than that, FIAH **shall ensure** all the **final structure design drawings, roof top configuration, detailed engineering design calculations & Single Line Drawings (DC/AC, Interconnection etc) and others** with endorsements from their respective **Qualified Persons (QP) are updated in the e-FiT Online System (Project Files).**
- e. Since the capacity of the PV installation is small, the Bonus S02 compliance shall be met before FITCD is given. FIAHs shall show through proper pictures that the space under structure is **100% fully utilized** and meets definition stated in **1 e.** and **1 g.**
- f. After fulfillment of the criteria and obtaining with bonus S02, the FIAH shall ensure compliance for eligibility **throughout the effective period** of its feed-in approval. Failure to comply during this period may cause the authority to remove the bonus from the FiT rate indefinitely.
- g. Please take note that it is the FIAH’s sole responsibility to inform the authority **in written form** of any changes made to the structure or functionality of the building. The authority shall only grant a maximum of **6 months** for the FIAH to complete the new changes. If necessary, a site visit shall be conducted by the authority to confirm the changes. Please refer to **Appendix B** for the flow chart of the process flow.
- h. The Authority has the right to conduct **site inspections** to check the eligibility and the functionality of the BIPV installation at any time within the 21-year REPPA period. Site inspections can be conducted via site visits or through video conference with the FIAH. Failure to allow SEDA Malaysia’s enforcement officers from entering the premises or conducting the site inspection at the location of the Solar PV installation may result in the Feed-in Approval being classified as non-compliant to the Authority’s Bonus S02 requirements. **All site inspection reports shall be brought to the “Mesyuarat Anggota Pihak Berkuasa Pembangunan Tenaga Lestari (PBPTL) Malaysia” for a decision.**

i. Pictures of Installations that QUALIFY and are ELIGIBLE for the bonus S02 (Category – Individual/Community)



Figure 1 – Solar PV: Use as Roofing Material



Figure 2 – Solar PV: Use as House Porch/Garage or Carpark



Figure 3 – Solar PV – use as Roofed Balconies / Car Porches

- j. Pictures of Installations that **DO NOT QUALIFY** and are **NOT ELIGIBLE** for the bonus S02 (Individual Category)



Figure 4 - A Secondary Roof Beneath The Modules Serving The Same Function



Figure 5 – Example 1: Overlapping Of Modules On Top Of Existing Roof



Figure 6 – Example 2: Overlapping Of Modules On Top Of Existing Roof



Figure 7 – Example 3: Overlapping Of Modules On Top Of Existing Roof



Figure 8 - No Access Door As To Serve The Function Of Installation As A Balcony



Figure 9 - Overlapping of modules on top of existing roof



Figure 10 - Installation Does Not Serve As A Primary Roofing Function



Figure 11 - Overlapping Of Modules On Top Of Existing Roof & Using Inappropriate Construction Materials

3. CRITERIA FOR ELIGIBILITY OF BONUS S02 (USE AS BUILDING MATERIAL) FOR INSTALLATION OF PV SYSTEMS UNDER THE “NON INDIVIDUAL” CATEGORY

- a. For installations that fall under the Non-Individual category, the compliance requirements for Bonus S02 are:
 - i. **Installation Criteria;**
 - ii. **Functionality of the building**
 - **100% Space Utilization under the PV Structure**
 - **100% Functional activities under the PV Structure**
- b. FIAH shall comply to **both** requirements stated in 3. a. i. and 3. a. ii. for them to be eligible to claim for the bonus S02.
- c. The authority shall evaluate the compliance of the bonus S02 **during the Testing & Commissioning Witnessing exercise by SEDA Malaysia**. A report shall be presented during the **“Mesyuarat Anggota Pihak Berkuasa Pembangunan Tenaga Lestari (PBPTL) Malaysia”** for a final decision on the eligibility. Please refer to Section 4 for more information.
- d. After fulfillment of the criteria and obtaining Feed-in Tariff Commencement Date (FITCD) with bonus S02, the FIAH shall ensure compliance for eligibility **throughout the effective period** of its feed-in approval. (Please refer to Section 4 & 5 for conditions of Bonus S02 removal/reinstatement).

3.1 Installation Criteria

- a. FIAH shall ensure the PV installation complies with the authority’s definition of “use as building material” as defined in 1 g.
- b. FIAH shall ensure that the PV installations do not have any leaks.
- c. Before the Feed-in Tariff Commencement Date, a **written confirmation from a practicing civil or structural engineer registered under the Registration of Engineers Act [Act 138]** is required, stating that in their opinion, the **building structure shall be sound during the applicable effective period**.
- d. Other than that, FIAH **shall ensure** all the **final structure design drawings, roof top configuration, detailed engineering design calculations & Single Line Drawings (DC/AC, Interconnection etc) and others** with endorsements from their respective **Qualified Persons (QP) are updated in the e-FiT Online System (Project Files)**.

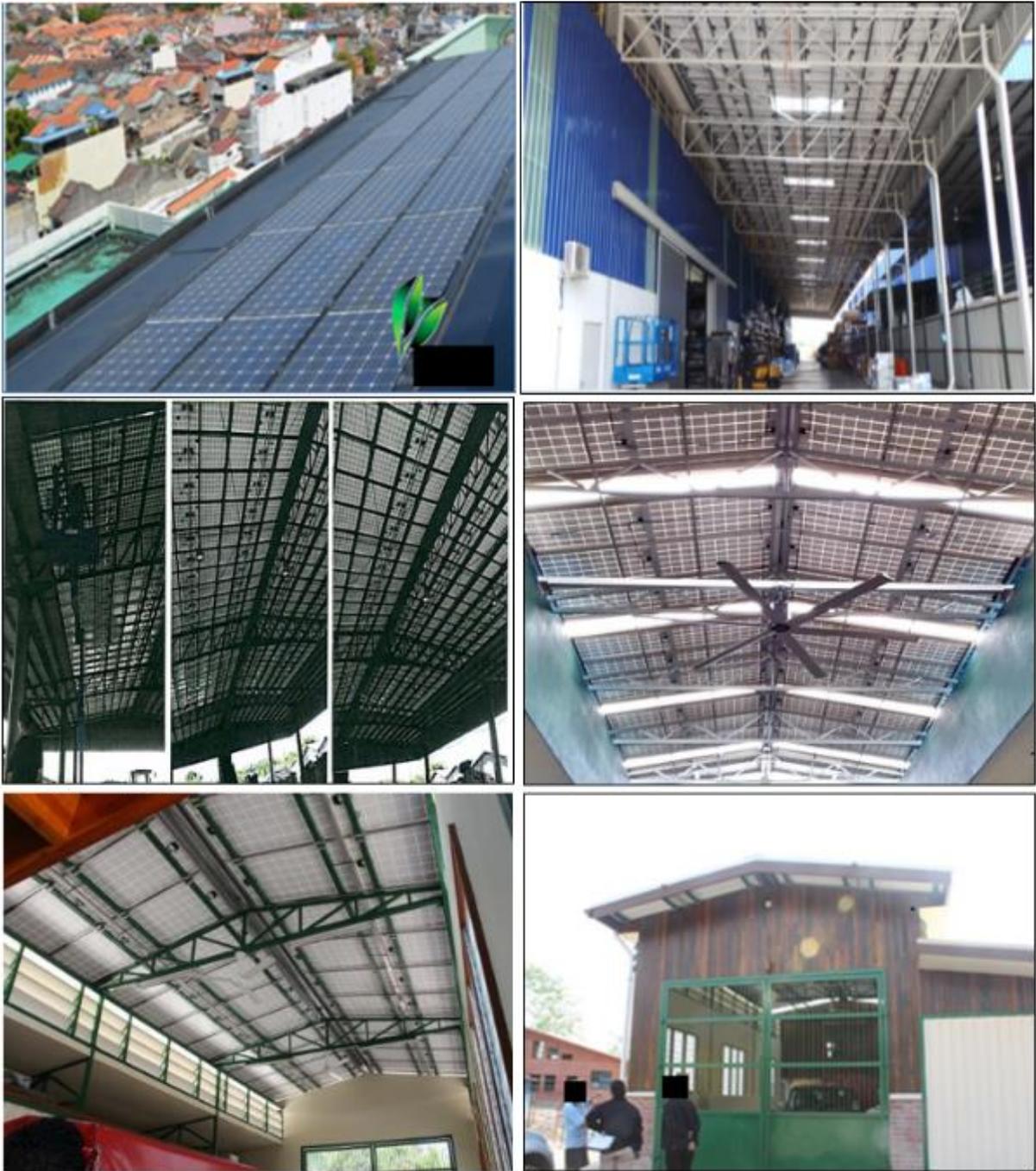


Figure 12 - Pictures of Installations that QUALIFY and are ELIGIBLE for the bonus S02 (Non Individual Category)

- e. Pictures of Installations that **DO NOT QUALIFY** and are **NOT ELIGIBLE** for the bonus S02 (Non Individual Category)



Figure 13 - Gaps Between PV Modules Are NOT Allowed



Figure 14 - Overlapping Of PV Roof On Top Of An Existing Roof

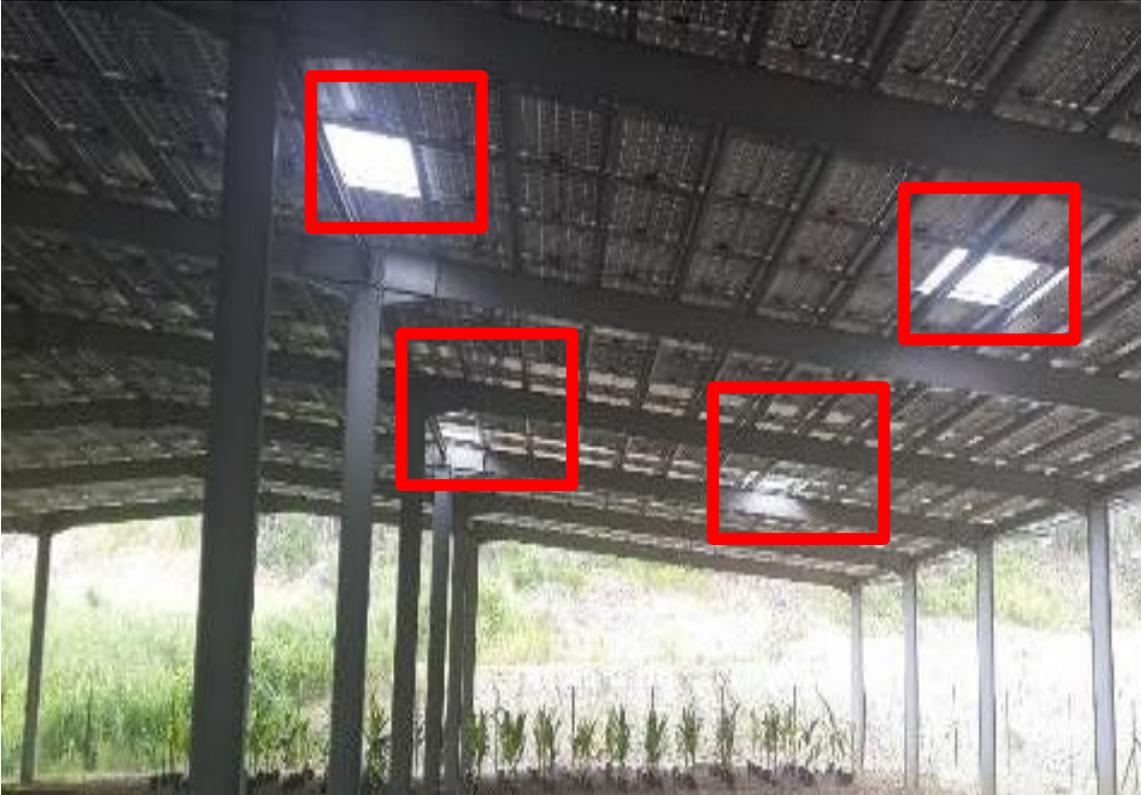


Figure 15 - All PV Arrays MUST BE COVERED. Sunroofs Can Be Installed To Allow Penetration Of Sun.



Figure 16 - Installation serves no function or purpose (PV Module Too High to Serve as Roof)



Figure 17 - Installation serves no function or purpose(Walls Do Not Need Roof)

4. CRITERIA FOR ELIGIBILITY OF BONUS S02 - FUNCTIONALITY OF THE BUILDING

This section shall present the criteria for eligibility of granting bonus S02 based on the functions of the building

a. General Criteria

- i The function shall cover **100%** of the area under the building.
- ii The functionality of the building should be practical to the location where it is being built.
- iii **Some examples of non-compliance (in no particular order) :**
 - Sports facilities in remote areas where there is no user or limited road access;
 - Car wash in the middle of plantation where there is no road access or cars to wash;
 - Large car park where there are no commercial or industrial building nearby);
 - Café/recreational facilities where there are no potential customers.
 - Agricultural activities that are not successful (produce not suitable for commercial purposes) due to low sunlight penetration or due to the unsuitability of having agricultural activities under the BIPV structure.
- iv In order for bonus S02 to be given to the FiAH, the building shall be **100% completed** and **100% functional** during the T&C Witnessing with the Authority. If it is not ready by then, **the Authority shall proceed to FITCD the application without the Bonus S02 and shall grant a period of 6 months to comply with the requirements.**
- v If the FiAH requires more time to comply with the requirements, the FiAH may **apply for extension of time (EOT) for a maximum of 2 times application for a period not more than 6 months for each application.** (subject to approval from **“Mesyuarat Anggota Pihak Berkuasa Pembangunan Tenaga Lestari (PBPTL) Malaysia”**). EOT application must include valid reasons for extension and time frame for completion. Please take note, if the **FiAH fails to rectify the non-compliance within the period given, the FiAH shall no longer be eligible to receive the bonus S02 from the date as may be determined by the Authority.** Please refer to **Appendix A** for flow chart on this;
- vi Please take note, when found that the functionality of the building does not comply with the Authority’s requirements during T&C witnessing, **the Authority shall not entertain any update reports from the FiAH until the application has been FITCD (without Bonus S02).** The **process of appealing for addition of Bonus S02 shall only start after the Authority issues the letter to comply within 6 months** as stated in a. iv.

b. Functionality of the Building – as Warehouse

- i** FiAH shall obtain permits/approvals from local/relevant authorities (municipal/city/district council etc) confirming that they are approved to operate such activities in the area (Certificate of Completion and Compliance, trading license etc);
- ii** FiAH may also obtain certifications/standards from relevant authority confirming the building set-up complies the standards set by the relevant authority.
- iii** The goods to be stored could be:
 - those that need to be under shade to protect it from wear and tear,
 - **For Example:** Raw materials, packing materials, spare parts, components, merchandise or finished goods associated with agriculture, manufacturing and production and others.
- iv** Goods that can be stored outside without shade **should not be stored** in the building (example scrap metal, faulty machine/equipment, culverts, pipes, construction materials, construction cabins that are originally kept outside under the sun);
- v** The building should be equipped with all essential services to reflect the purpose of the building, such as water and electricity supply, road/drainage system, firefighting systems, sanitary, sewerage as required by the standards set by relevant authority.

c. Functionality of the Building – for agriculture/ livestock/ aquaculture activities

- i** If the building is built for agriculture/aquaculture/livestock activities, FiAH shall ensure that their “commodity” thrives under partial/full shade.
- ii** The **density of space needed for the commodity** shall be practical and according to standards. **Please refer to Appendix E & F for Basic Requirements for Agriculture Activities, Appendix G for Basic Requirements for Livestock Activities and Appendix H for Basic Requirements for Aquaculture activities as advised by Jabatan Pertanian, Jabatan Perkhidmatan Veterinar and Jabatan Perikanan Malaysia respectively.**
- iii** For agricultural activities, FiAH are advised to plant only crops that are suitable to grow under partial/full shade as suggested by Jabatan Pertanian (Appendix E).
- iv** If the FiAH decides to plant crops that are not suitable to grow under partial/full shade, the risk is upon them to make sure it thrives and at the same time follow the guidelines set by Jabatan Pertanian (As in Appendix F). If these crops do not

thrive under the PV installation, the Authority may deem the activity as non-compliant where it may result in the removal of bonus S02.

- v The building should be equipped with all essential services to reflect the purpose of the building, such as rainwater harvesting (gutters, tanks and/or pumps), water piping system, drainage system, sanitary, sewerage, processing equipment, slaughter house, packaging area etc;
 - vi **FiAHs shall apply for license or register with the respective government departments (Agriculture, Aquaculture or Veterinary) in order to operate such activities.**
 - vii **The Authority may deem the activity as non-compliant to the requirements for Bonus S02 and has the right to remove the bonus S02 from the FiT rate if the FIAH is not able to show any proof of such license/registration.**
- d. **Functionality of the Building – others such as for Sports, Recreation, Restaurants etc**
- i Under this category, usually it involves people having activities below the building;
 - ii **FiAH shall obtain permits/approvals from local/relevant authorities (municipal/city/district council etc) confirming that they are approved to operate such activities in the area (trading license etc);**
 - iii FiAH shall ensure the building should be equipped with all essential services to reflect the purpose of the building, such as water and electricity supply, road/drainage system, firefighting systems, sanitary, sewerage as required by the standards set by relevant authority;
 - iv FiAH shall make sure all necessary steps are taken to make sure all safety measures are being put in place and adhered to.
- e. **Functionality of the Building – leased/sub-lease to another tenant**
- i If the building is being leased out to another party, the **FiAH shall not be allowed to transfer his/her responsibilities** in ensuring compliance for the bonus tariff to the tenant(s);
 - ii Instead, **the FiAHs are to ensure compliance to the authority's requirement of having 100% utilization and 100% functionality** as stated in part 3.2) a) to c). If in any event there is a default and the requirements are not met, the Authority reserves the right to remove the Bonus S02 from the awarded FiT rate;
 - iii **The Authority shall not liaise with any other parties/persons other than the FiAH or the FIAH's authorized representative for matters relating to the award/revocation of the bonus tariff.**

f. Examples of Good Utilization of Space – for Agriculture/Aquaculture Purposes



Figure 18 - Agriculture Produce (Four Angled Beans) Growing Healthily – subject to PV structure design which allow sufficient amount of sunlight for the crops



Figure 19 - Agriculture Produce (Chillies) Growing Healthily - subject to PV structure design which allow sufficient amount of sunlight for the crops



Figure 20 - Proper usage of space and set-up of aquaculture ponds



Figure 21 - Proper Method Used In Cultivation Of Mushroom Under The PV Installation



Figure 22 - Proper Usage Of Space And Set-Up Of Storage Facility



Figure 23 - Proper Utilization of PV Installation for Livestock Breeding (Goats)



Figure 24 - Proper Utilization of PV Installation for Livestock Breeding (Ducks)



Figure 25 - Rain Water Harvesting Constructed And Used For Agriculture/Aquaculture

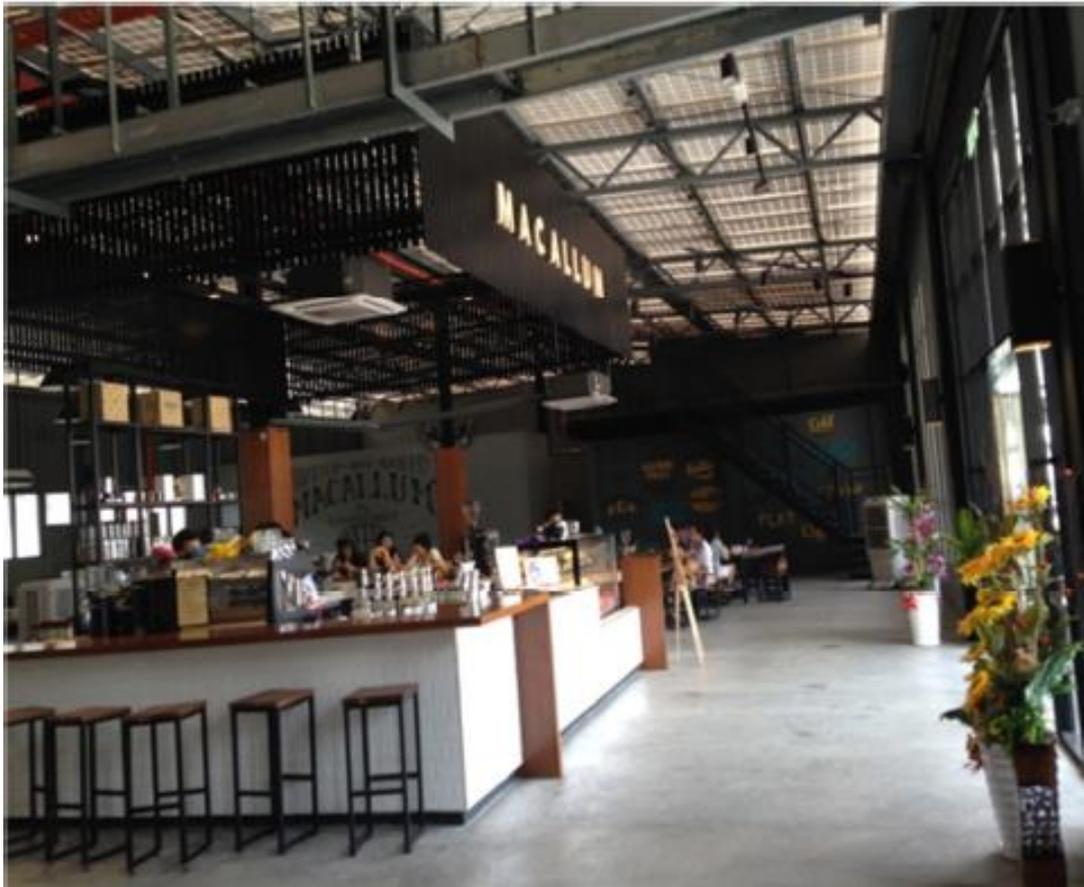


Figure 26 - Restaurant With PV Modules As Roof



Figure 27 – Futsal Court with PV Modules as Roof



Figure 28 – Broiler Houses for Chicken Farming



Figure 29 – Broiler House (proper facilities for Chicken Farm)

i Examples of Installations that **DO NOT** qualify for the SO2 Bonus



Figure 30 - Empty Plot Which Serves No Function



Figure 31 - Warehouse Which Serves No Function



Figure 32 - The Ground Below The Structure Is Not Fully Utilized



Figure 33 - The Ground Below The Structure Is Not Fully Utilized (And Concrete Floor Is Wet Maybe Due To Roof Leaking)



Figure 34 - The Area Below The Building Is Not Fully Utilized. Cabins Need Not Be Stored Under Shade



Figure 35 - There Is No "Real" Agriculture Produce



Figure 36 – Agriculture Produce Not Thriving Under The Building

5. RESPONSIBILITIES OF FIAH THROUGHOUT THE 21 YEARS REPPA PERIOD

5.1. The FIAH shall ensure that in order to be eligible for the bonus S02, they shall comply with the requirements for the entire duration of the REPPA period which is twenty-one (21) years for Solar PV. Therefore, **it is the sole responsibility of the FIAH throughout the 21 year REPPA period to ensure that the following is adhered to:**

- a. Submission of a **quarterly** report (in the form of softcopy, to be uploaded to the e-FiT Online System) on the functionality of the building. The report shall include the following (but not limited to):
- i. A short summary of the building functions;
 - ii. The latest financial report which includes Capital expenditure, Project cashflow (Cost, Revenue, Gross profit, projection, etc), ROI etc;
 - iii. Most recent pictures of the PV Installation;
 - iv. Most recent pictures of activities conducted below the building;
 - v. Report on the sale of produce for agriculture/aquaculture/livestock and any cost incurred – (such as orders, invoices, receipts etc);
 - vi. Report on sale of activities such as for sports, recreation, restaurants, etc – (such as sales report, invoices, bookings etc);
 - vii. Inventory Movement Report for storage facility/warehouse;
 - viii. Current Layout plan showing dimensions of the building and its functions;
 - ix. Activity schedule (planting, harvesting, seasonal plants etc);
 - x. Any other documents that are relevant (tenancy agreement etc); and
 - xi. Future plans (expansion, change of type of building function etc).

The reports shall be submitted based on the following months (each year):

Quarter	Month (Latest on the 7 th of the Month)	Duration to Report
1	January	1 October – 31 December (of previous year)
2	April	1 January – 31 March
3	July	1 April – 30 June
4	October	1 July – 30 September

Failure to submit the quarterly reports at the stipulated **may be classified as non-compliant to the Bonus S02 requirements** and therefore the Authority has the right to remove the bonus S02 from the FiT rate.

- b. Informing the Authority **IMMEDIATELY** of any changes in the functionality of the building in the **form of a formal writing** requesting for an **Extention of Time (EOT)** to comply. The request should consist of the following:
- i. Project Summary (shall state valid reasons for changes and feasibility of the new function);
 - ii. Financial report which includes Capital expenditure, Project cashflow (Cost, Revenue, Gross profit, projection, etc), ROI etc.;
 - iii. Layout plans of the functionality of the building (see example in Appendix D);
 - iv. Project timeline for the new project to be completed and functional; and
 - v. Pictures showing current progress.

Please take note, it shall be the **FiAH’s responsibility to inform the authority of any changes made to the functionality of the building.**

- c. If the FiAH requires more time to complete the change of functionality, the FiAH may **apply for extension of time (EOT) for a maximum of 2 times application for a period not more than 6 months for each application.** (subject to approval from **“Mesyuarat Anggota Pihak Berkuasa Pembangunan Tenaga Lestari (PBPTL) Malaysia”**). EOT application must include valid reasons for extension and time frame for completion. **Please take note, if the FiAH fails to complete the change of the functionality within the period given, the FiAH shall no longer be eligible to receive the bonus S02 from the date as may be determined by the Authority.** If necessary, a site visit shall be conducted by the authority to confirm the new functionality of the building. Please refer to **Appendix B** for the flow chart of the process flow.
- d. The Authority has the right to conduct **site inspections** to check the eligibility and the functionality of the BIPV installation at any time within the 21-year REPPA period. Site inspections can be conducted via site visits or through video conference with the FiAH. Failure to allow SEDA Malaysia’s enforcement officers from entering the premises or conducting the site inspection at the location of the Solar PV installation may result in being classified as non-compliant to the Authority’s Bonus S02 requirements. **All site inspection reports shall be brought to the “Mesyuarat Anggota Pihak Berkuasa Pembangunan Tenaga Lestari (PBPTL) Malaysia” for a decision.** Please refer to Appendix C for the process flow.
- e. For FiAHs appealing for reinstatement of bonus S02 (after Bonus S02 was removed due to non – compliance), the decision to reinstate the bonus S02 will be decided at the earliest **“Mesyuarat Anggota PBPTL Malaysia”**. If it is proven to the satisfaction of the Authority that the FiAH has rectified the non-compliance within the period given, the Authority shall reinstate the eligibility of the FiAH to receive the bonus S02 from the date as may be determined by the Authority.
- f. If there are any questions or further clarifications required pertaining to the bonus S02, FiAHs can get in touch with the following personnel:

For Individual FiAHs:	Email:	Tel no
Sharina Hishamuddin	Sharina.H@seda.gov.my	03 – 8870 5809
Nor Azlin Sharom	Azlin@seda.gov.my	03 – 8870 5830
For Non – Individual FiAHs:		
Frederick Wong Tsun Kiong	Frederick@seda.gov.my	088 – 252 101
Fikri Mohd Shamsuddin	Fikri@seda.gov.my	03 – 8870 5828
For Community FiAHs:		
Frederick Wong Tsun Kiong	Frederick@seda.gov.my	088 – 252 101
Asrati Abdul Manan	Asrati@seda.gov.my	03 – 8870 5831

Appendix A

Eligibility of Bonus S02 during T&C Witnessing (Before FITCD for Non – Individual)

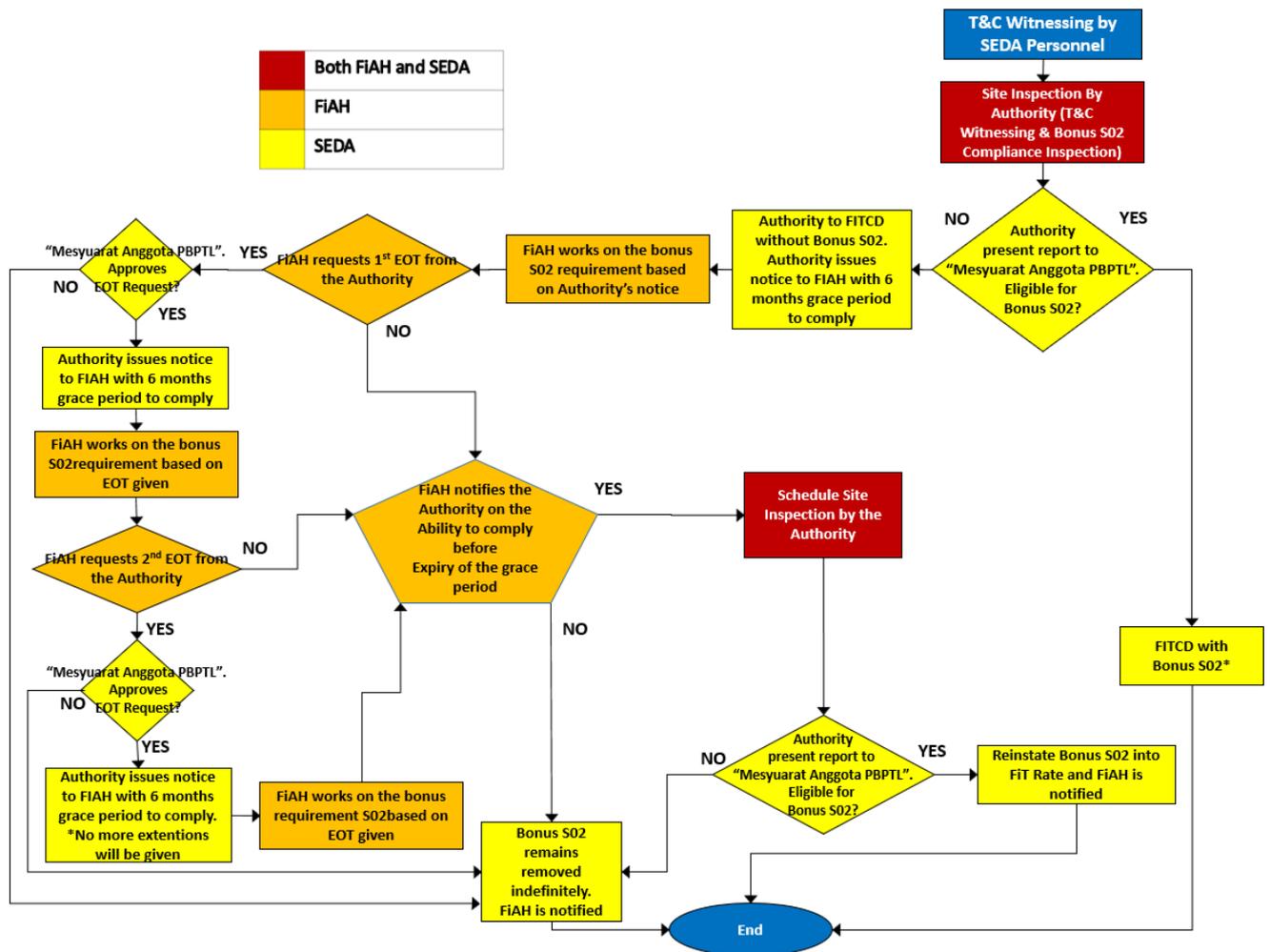


Figure 37 – Flow chart for Eligibility of Bonus S02 during T&C Witnessing (Before FITCD for Non – Individual)

Appendix B

Compliance Over The 21 Year Tenure (After FITCD) – Individual/Community/Non-Individual

Flow Chart showing process when FIAH Requests to Change or Vary the Activities/ Functionality of the Building

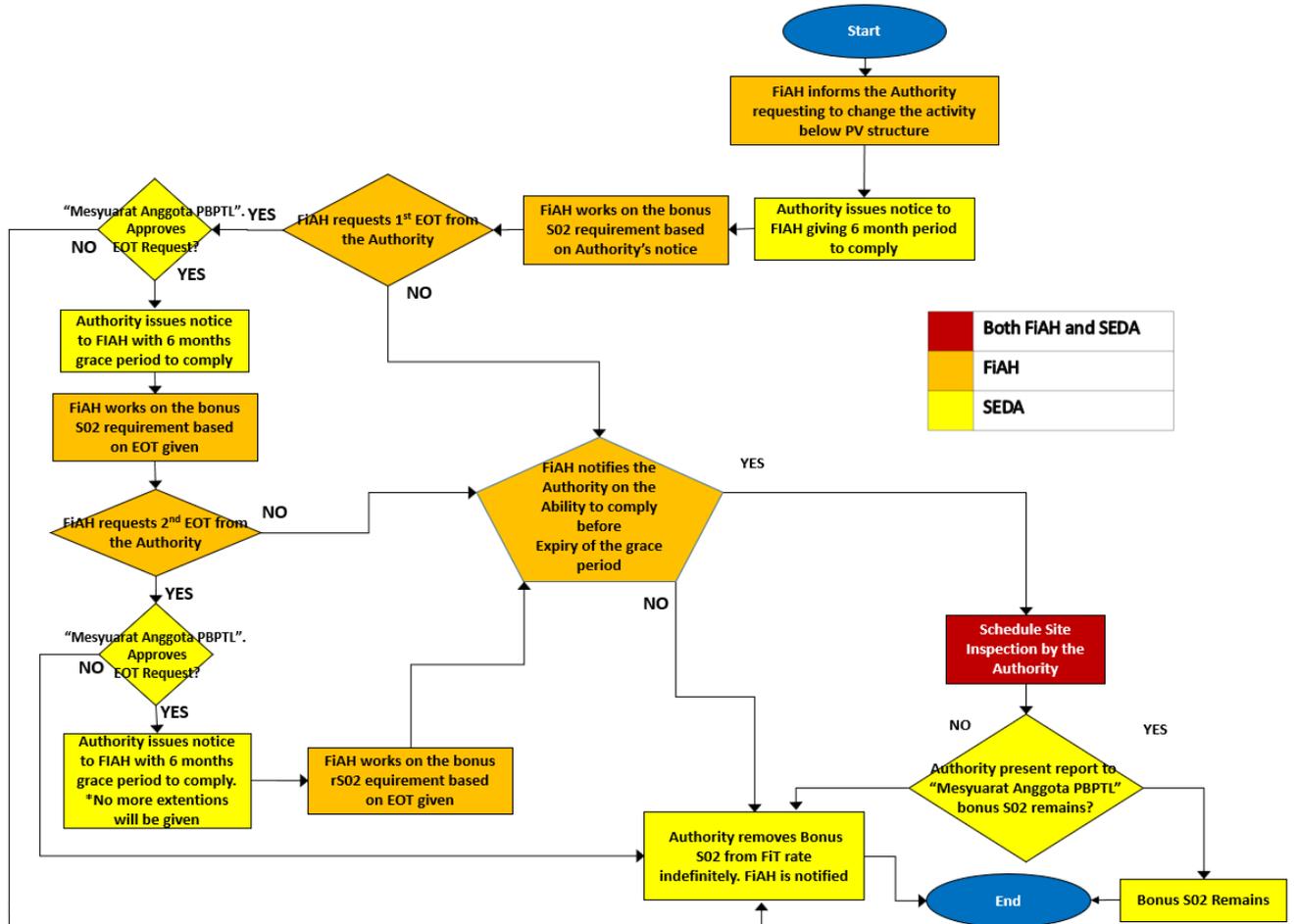


Figure 38 – Flow Chart Process When FIAH Requests To Change Or Vary The Functionality Of The Building.

Appendix C

Compliance Over The 21 Year Tenure (After FITCD) – Individual/Community/Non-Individual

Flow Chart showing process when Site Inspection Shows Non-Compliance.

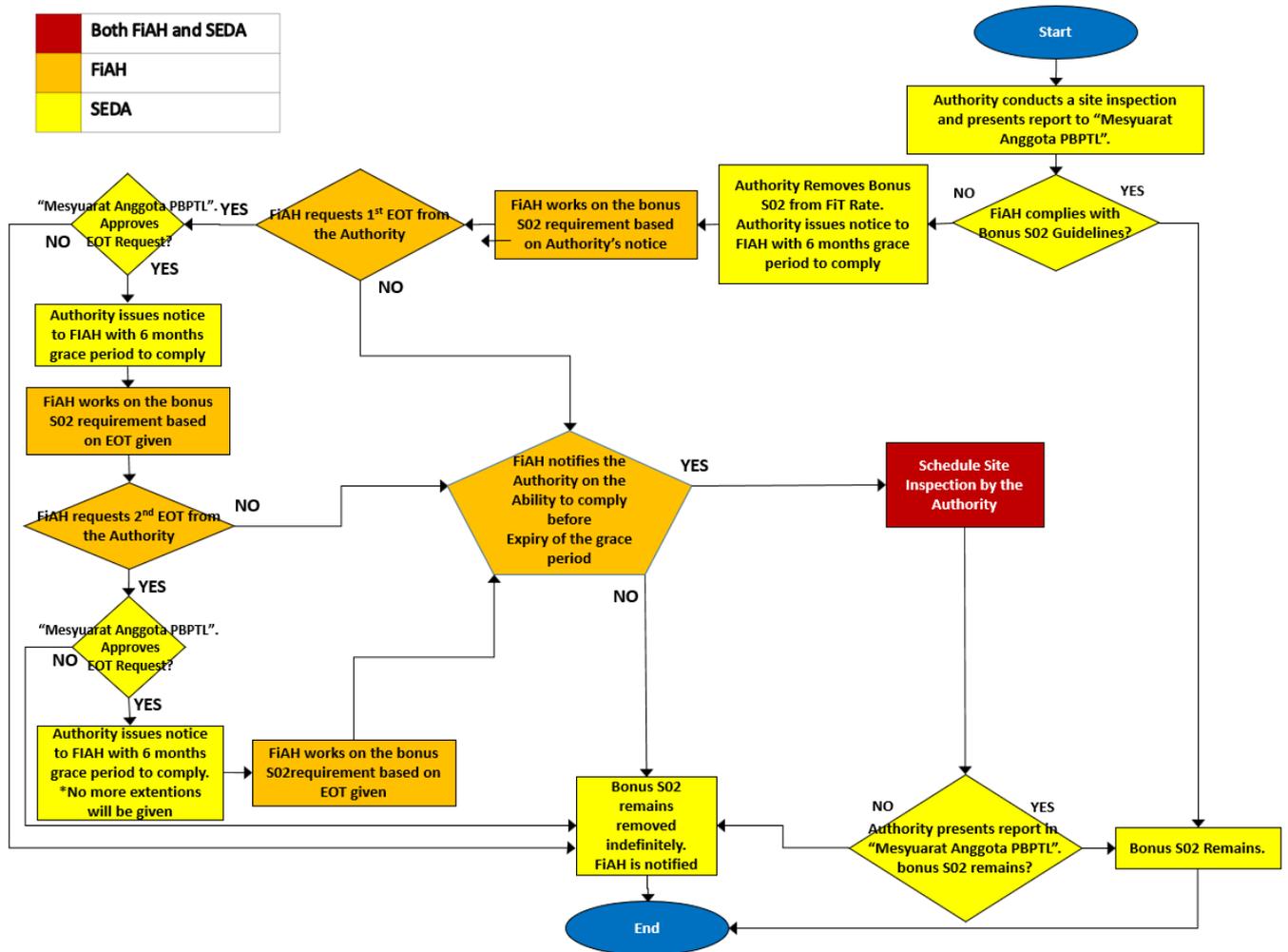


Figure 39 – Flow Chart Showing Process When a Site Inspection Shows Non-Compliance

Appendix D

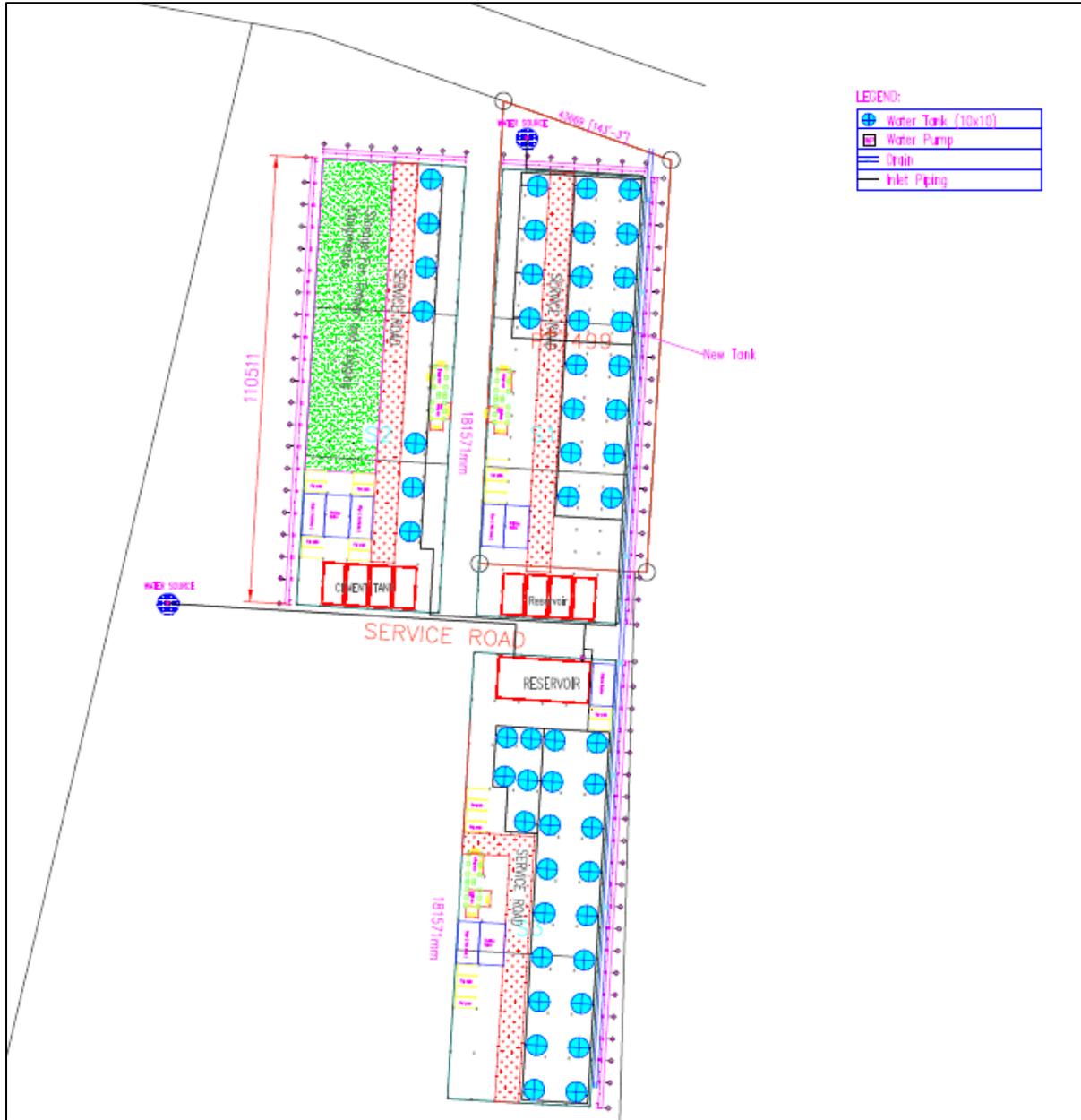


Figure 40 - Example Of Layout Plans Of Activities Below Building

Appendix E

Plants that are suitable to be planted under shade (As advised by Jabatan Pertanian Malaysia)

These are some of the plants that are suitable to be planted under partial shade which require sunlight between 3 to 6 hours a day to achieve good growth.

NO	JENIS POKOK HERBA	NO	JENIS POKOK HIASAN
1	Basil	1	Aglaonema
2	Bay Leaf (Kesum)	2	Alocasia
3	Coriander (Daun Ketumbar)	3	Begonia
4	Chives	4	Calathea
5	Dill	5	Coleus
6	Fennel	6	Colocasia
7	Mint (Pudina)	7	Diffenbachia
8	Oregano	8	Dracaenia
9	Parsley	9	Epipremnum
10	Rosemary	10	Impatiens
11	Sage	11	Orchids
12	Tarragon	12	Sanseveria
13	Thyme	13	Strelitzia
		14	Violets

Table 2: Plants that are suitable to be planted under shade

Appendix F

As advised by Jabatan Pertanian Malaysia, these plants require a lot of sunlight in order to grow and is not suitable to be planted under shade.

No	Type of Crop	Method of Planting	Crop Period	Quoted From
1	Ginger (Halia)	<ul style="list-style-type: none"> Plant distance – 60cm each row 	<ul style="list-style-type: none"> Young Ginger – 4 to 5 months Old Ginger – 9 months 	<ul style="list-style-type: none"> Panduan Penanaman Halia, Jabatan Pertanian, Putrajaya
2	Yam (Ubi Keladi)	<ul style="list-style-type: none"> Plant distance – 75cm x 75cm 	<ul style="list-style-type: none"> 7 to 12 months 	<ul style="list-style-type: none"> Panduan Penanaman Keladi, Jabatan Pertanian, Putrajaya
3	Turmeric (Kunyit)	<ul style="list-style-type: none"> Distance between each row – 45cm – 60cm Distance from crop – 25cm 	<ul style="list-style-type: none"> 3 months 	<ul style="list-style-type: none"> Panduan Penanaman Kunyit, Jabatan Pertanian, Putrajaya
4	Pineapple (Nanas)	Plant distance <ul style="list-style-type: none"> 90cm x 60cm x 30cm 	<ul style="list-style-type: none"> 115 – 130 days after flowering (depends on type) 	<ul style="list-style-type: none"> Sistem Penanaman Nanas Berkepadatan Tinggi - Jabatan Pertanian, Putrajaya.
5	Chilli (Cili))	Cili Api/Padi <ul style="list-style-type: none"> Plant Distance – 100cm between crop and 150cm between each row 	Cili Api/padi <ul style="list-style-type: none"> 3 – 4 months (8-9 months for Cili Api) 	<ul style="list-style-type: none"> Panduan Penanaman Cili, Jabatan Pertanian, Putrajaya
6	Lemongrass (Serai)	Plant Distance – <ul style="list-style-type: none"> (0.6m –1m) between each row (0.3m - 1m) between each crop 	<ul style="list-style-type: none"> 6 – 8 months 	<ul style="list-style-type: none"> Panduan Penanaman Serai, Jabatan Pertanian, Putrajaya
7	Sweet Potato (Ubi Kayu)	<ul style="list-style-type: none"> Plant distance – 90cm x 90cm 	<ul style="list-style-type: none"> 9 – 12 months 	<ul style="list-style-type: none"> Panduan Penanaman Ubi Kayu, Jabatan Pertanian, Putrajaya
8	Tomato	<ul style="list-style-type: none"> Plant distance – 90cm 	<ul style="list-style-type: none"> 2 months 	<ul style="list-style-type: none"> Panduan Penanaman Tomato, Jabatan Pertanian, Putrajaya
9	Vegetables (Sayur-Sayuran)	<ul style="list-style-type: none"> Distance between each crop – 10 - 15cm 	<ul style="list-style-type: none"> 27 – 30 days Kailan – 45 days 	<ul style="list-style-type: none"> Panduan Penanaman Sayuran, Jabatan Pertanian, Putrajaya
10	Winged Bean (Kacang Botor)	<ul style="list-style-type: none"> Plant distance – 60cm x 60cm 	<ul style="list-style-type: none"> 10 – 12 months 	<ul style="list-style-type: none"> Panduan Penanaman Kacang botor, Jabatan Pertanian, Putrajaya
11	Luffa (Petola Segi)	<ul style="list-style-type: none"> Plant distance – 60cm x 60cm 	<ul style="list-style-type: none"> Approximately 45 days 	<ul style="list-style-type: none"> Panduan Penanaman Petola Segi, Jabatan Pertanian, Putrajaya
13	Brinjal (Terung)	<ul style="list-style-type: none"> Distance between each row – 60cm Distance between each crop – 90cm 	<ul style="list-style-type: none"> 6 weeks 	<ul style="list-style-type: none"> Panduan Penanaman Terung, Jabatan Pertanian, Putrajaya
14	Soursop “Durian Belanda”	Plant Distance – 5m x 5m	3 – 4 years	

Table 3 - Basic Requirements for Agriculture Activities

Appendix G

No	Type of Animal	Area Requirements	Maturity Period	Quoted From																					
1	Goat (Kambing)	<ul style="list-style-type: none"> The ideal size for an adult goat is between 12-15 square feet. For 25 female goats and one male, a total of 312 square feet is required 	<ul style="list-style-type: none"> 1 year 	Siri Panduan Asas Penternakan Kambing – Ibupejabat Perkhidmatan Veterinar Putrajaya																					
2	Chicken (Ayam)	<p>Intensive Systems (Sistem Intensif)</p> <ul style="list-style-type: none"> Floor area (height / bottom) 0.8 – 1.2 square feet /chicken <p>Semi - Intensive or Free Range System</p> <ul style="list-style-type: none"> Ground floor area of 1 - 1.2 square feet for a chicken 	<ul style="list-style-type: none"> 4 weeks 	<ul style="list-style-type: none"> Panduan Penternakan Ayam Daging, Ibupejabat Jabatan Perkhidmatan Veterinar, Putrajaya Buletin Penternakan Ayam Kampung, Ibupejabat Jabatan Perkhidmatan Veterinar Malaysia, Jilid ke 3, 2010 																					
3	Duck (Itik)	<ul style="list-style-type: none"> Maintenance System (Intensive / Semi - intensive) <table border="1" data-bbox="336 1108 895 1384"> <thead> <tr> <th rowspan="2">HOUSING SYSTEM</th> <th colspan="3">TYPE</th> </tr> <tr> <th></th> <th>8 - 30 Days</th> <th>> 1 Month</th> </tr> </thead> <tbody> <tr> <td rowspan="2">CLOSED COOP (INTENSIVE)</td> <td>MEAT</td> <td>8 ducks /m2</td> <td>5-6 ducks /m2</td> </tr> <tr> <td>EGGS</td> <td>5 - 20 Weeks 8 ducks /m2</td> <td>>29 Weeks 4-5 ducks /m2</td> </tr> <tr> <td rowspan="2">OPEN COOP (SEMI-INTENSIVE)</td> <td>MEAT</td> <td>8 - 30 Days 7 ducks /m2</td> <td>> 1 Month 4-5 ducks /m2</td> </tr> <tr> <td>EGGS</td> <td>5 - 20 Weeks 7 ducks /m2</td> <td>>29 Weeks 2-3 ducks /m2</td> </tr> </tbody> </table> <p>Table 1: The floor area for Duck /m2</p>	HOUSING SYSTEM	TYPE				8 - 30 Days	> 1 Month	CLOSED COOP (INTENSIVE)	MEAT	8 ducks /m2	5-6 ducks /m2	EGGS	5 - 20 Weeks 8 ducks /m2	>29 Weeks 4-5 ducks /m2	OPEN COOP (SEMI-INTENSIVE)	MEAT	8 - 30 Days 7 ducks /m2	> 1 Month 4-5 ducks /m2	EGGS	5 - 20 Weeks 7 ducks /m2	>29 Weeks 2-3 ducks /m2	<p>Production</p> <ul style="list-style-type: none"> Meat →7 weeks Eggs – > 18 weeks 	Panduan Penternakan Itik, Ibupejabat Jabatan Perkhidmatan Veterinar Malaysia, Jilid 1, 2010
HOUSING SYSTEM	TYPE																								
		8 - 30 Days	> 1 Month																						
CLOSED COOP (INTENSIVE)	MEAT	8 ducks /m2	5-6 ducks /m2																						
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	EGGS	5 - 20 Weeks 7 ducks /m2	>29 Weeks 2-3 ducks /m2																						
4	Quail (Burung Puyuh) – both meat and eggs	<ul style="list-style-type: none"> Brooder (Kotak Perindukan Palsu) <ul style="list-style-type: none"> Area of 1m2– 100 chicks ((1 day – 3 weeks) Area of 1m2 – 60 – 80 quails (4 – 6 weeks) 	<p>Meat Production</p> <ul style="list-style-type: none"> Ready for sale 30 days <p>Eggs Production</p> <ul style="list-style-type: none"> Lay eggs 75% at 40 – 42 days Able to lay 250 – 300 eggs a year 	Panduan Penternakan Burung Puyuh, Ibupejabat Jabatan Perkhidmatan Veterinar Malaysia, Jilid ke 2, 2010																					
5	Rabbit (Arnab)	<p>Cage Dimension</p> <ul style="list-style-type: none"> 2 ft x 3 ft x 1.5 ft for 6 rabbits (1 male dan 5 female) 	<ul style="list-style-type: none"> Meat Production (2 – 3 months) Weight - Approximately 2kg 	A-Z Mengenai Penternakan Arnab, Jabatan Perkhidmatan Haiwan Malaysia																					

Table 4 - Basic Requirements for Livestock Activities

Appendix H

No	Type of Fish	Area Requirements	Maturity Period	Advice from
1	Fresh Water Fish (Ikan Air Tawar)	<p>Pool Type (Kolam)</p> <ul style="list-style-type: none"> • Tilapia – 5 – 10/m² • Catfish (Ikan Keli) – 30 – 200/m² • Catfish (Ikan Patin) – 5 – 10/m² <p>Tank Type (Tangki)</p> <ul style="list-style-type: none"> • Tilapia – 15 - 30/m² • Catfish (Ikan Keli) – 40 - 80/m² 	<ul style="list-style-type: none"> • 6 – 8 months • 3 months • 6 – 8 months <ul style="list-style-type: none"> • 6 – 8 months • 4 months 	Jabatan Perikanan Malaysia Cawangan Pengurusan Akuakultur Bahagian Pembangunan Akuakultur
2	Shrimp (Udang)	<p>Pool Type (Kolam)</p> <ul style="list-style-type: none"> • Tiger Prawn (Udang Harimau) – 20 – 60/m² • White Shrimp (Udang Putih) – 50 -150/m² • Lobster (Udang Galah) – 10 – 20/m² 	<ul style="list-style-type: none"> • 5 months • 4 months • 6 months 	

Table 5 - Basic Requirements for Aquaculture Activities



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