

# **maccy biochar**

A Task Group of the Macclesfield Community Association Inc.

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## **OPERATIONS MANUAL**

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## **1.0 INTRODUCTION**

Maccy Biochar exists to combat climate change by reducing atmospheric carbon dioxide; reduce Macclesfield's carbon footprint; and improve local soils by increasing the organic carbon in the soil.

Our target markets for sale of our biochar are those in the agricultural sector as those markets have the greater potential for multiplying the effects of biochar by improving plant and animal health and reducing GHG emissions.

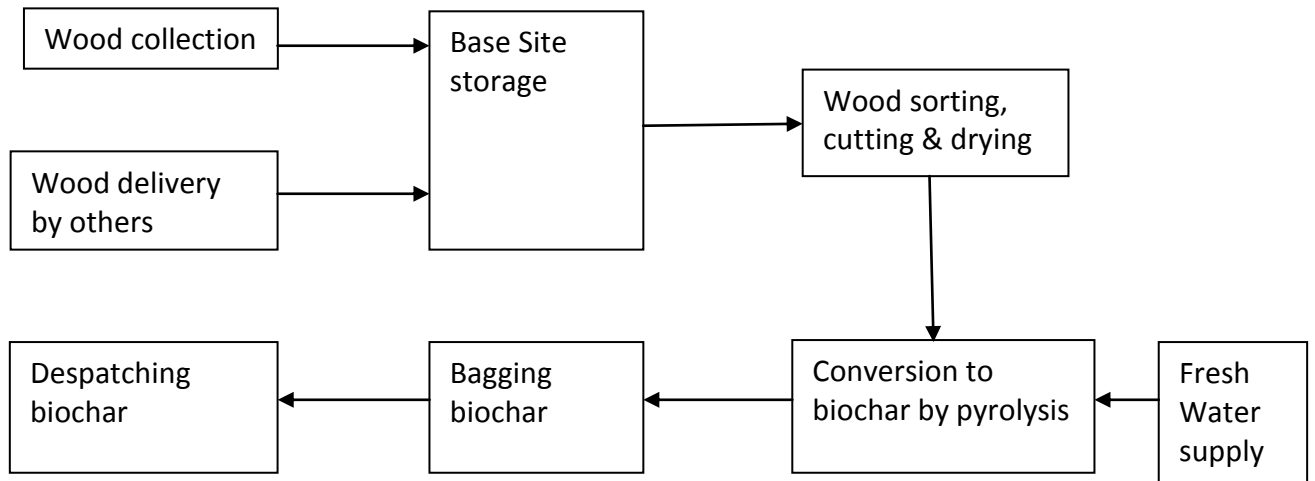
In order to establish and maintain a credible reputation within the agricultural sector we need to ensure, and be seen to ensure, that our biochar is of the highest quality and free of any contamination likely to be detrimental to the targeted applications.

In addition we insist on rigorous adherence to all safety measures needed to mitigate the risks to our volunteers, landholders and surroundings.

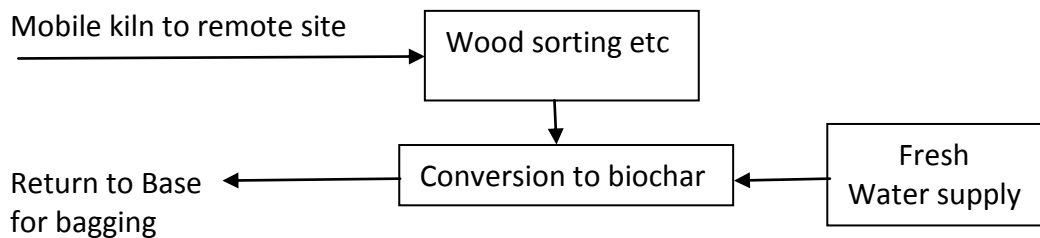
## 2.0 BIOCHAR PRODUCTION PROCESS SUMMARY

The below summary of our production processes provides a guide to understanding the quality control and safety measures set out in this Manual.

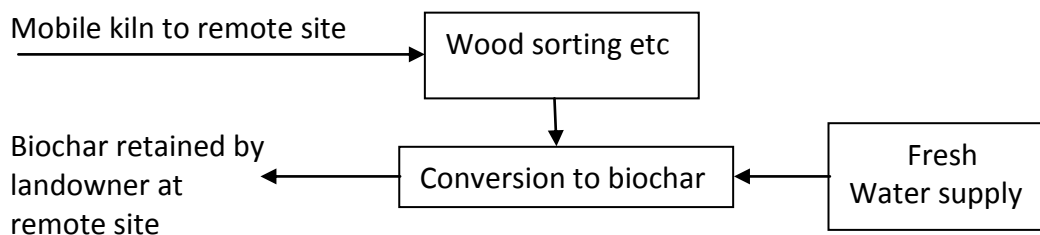
### Type 1: Base Site process



### Type 2A: Remote site process



### Type 2B: Remote site process



### Applicable Documentation:

- a) Landholder Approval Letter No.1.
- b) Landholder Approval Letter No. 2.

### 3.0 WOOD COLLECTION

The characteristics of the preferred feedstocks are listed below as a guide based on the kilns that we are currently using:

1. **Moisture Content <15%.** Higher moisture levels cause the pyrolysis process to take more time as more heat is needed to drive off the excess moisture. In addition high moisture levels tend to cause smoke emissions which contain potentially harmful particulates and also are an indication that methane is being released to the atmosphere.
2. **Density - High:** High density material is preferred as that tends to indicate a higher carbon content. So hardwoods are preferred over soft woods. And dry leaves and other such light material should only be used for initial lighting up. Tree bark is also unsuitable for the same reason.
3. **Size <100 mm diameter and < 1m long.** The thickness and density of the feedstock determines how long it will take to dry off and how long it will take to completely pyrolyse. Larger items take longer. Clearly bamboo-type feedstock will dry out within a few weeks whereas some tree prunings and timber offcuts may take up to a year when stored out of the weather.
4. **Toxicity - Nil.** It is very important that no plastics, no metals, and no chemically hazardous residues are allowed to contaminate the feedstock as any such hazardous residues will become fixed in the charcoal produced and render it unable to be classified as biochar. Examples of commonly encountered hazardous materials are: Plastics; Painted wood; Creosote; Permapine.

#### **Applicable Documentation:**

- a) Job Event Register.
- b) Landholder Approval Letter No.3.
- c) Risk Management Plan – wood collection.

### **3.1 WOOD DELIVERY BY OTHERS**

Wood delivery to site by others must be by prior arrangement and the off-loading of the delivered material must be supervised and checked for acceptable quality as per the requirements set out above in section 3.0.

Where wood delivery involves more than one trailer load or where the quality is impossible to determine prior to off-loading a written declaration relating to quality is required from the person responsible for the delivery.

**Applicable Documentation:**

- a) Supplier Letter.

#### **4.0 WOOD STORAGE, SORTING & CUTTING**

The storage location must be a clean area free of contamination from petroleum products or chemicals or traces thereof.

The wood heap must be checked for non-woody items, litter (eg plastic bottles, bottle-tops, food scraps, beer cans, cigarette butts, fencing wire, nails, rocks etc) that may have been caught up in the wood and if found all such items must be removed to a disposal bin.

Any chain saw cutting that may be required to reduce the size of the wood must be carried out after ensuring compliance with the Risk Management Plan – wood collection.

**Applicable Documentation:**

a) Risk Management Plan – wood collection.

## 5.0 WOOD “BURNING” OR PYROLYSING

### 5.1 Prior to lighting up

Lighting up must not commence until compliance with the Risk Management Plan – Making Biochar has been ensured.

### 5.2 Lighting up

Loose paper, dry leaves and small dry sticks are generally used initially to start a small fire on which to feed the larger branches.

**AVOID** the following:

- **Staples** as in stapled newspaper or other papers.
- **Firelighters.** They are mostly non-organic and will not necessarily burn away to nothing, especially when oxygen is limited.

### 5.3 Building up the fire

Apply fuel as needed to maintain flames at the top of the fuel heap.

**AVOID** the following:

- **Smoke** emissions (except for a short period at the very start).
- **Leaves** and other small items that may be caught up in the flame swirl and blown away.
- **Dumping** large items heavily onto the fuel heap (eg to push it down) as this may cause ash particles or hot embers to fly up and be blown away.
- **Fast-filling** of items to the extent that they may not be adequately pyrolysed.
- **Over-filling** the kiln with wood to the point where the flame-cap cannot be safely contained.

## 5.4 Quenching

On completion of “burning” fill the kiln with fresh water until the char is just floating; push down any lumps above the surface to ensure that they are submerged; and leave for about 15 minutes or until all the char has cooled to ambient temperature.

This ensures that the char is thoroughly wetted (but not soaked) and will not re-combust after the water is drained.

If large pieces of wood remain uncharred remove them to another container where re-ignition would not pose a fire or a safety risk.

The char will absorb and retain some water while it is soaking together with the nutrients contained in the water. So the quality of the quench water is important. The quality of the quench water must be monitored regularly with a calibrated water quality meter and the results recorded.

After draining the water from the kiln:

- remove all uncharred wood and
- break up the char to <50mm particle size.

### **Applicable documentation:**

- a) Risk Management Plan – making biochar.
- b) Safe Operating Procedure – Biochar Kiln.
- c) Water quality record sheet.



## 6.0 BAGGING

- Shovel biochar from kiln into measuring bins (60 or 75L).
- If grading the biochar to a particle upper size limit use an appropriate sieve on top of measuring bin to limit the particle size entering the bin.
- Check biochar for foreign matter and uncharred particles at this time.
- Rejected char (larger than grade) can be returned to the kiln for further breaking up or transferred into another measuring bin.
- Uncharred wood particles can be put aside for re-burning.
- Foreign matter must be put into a rejects bin.
- Transfer accepted biochar into a new 1 cubic metre bulk bag until bag is full.
- Identify the bulk bag with a colour coded tag to indicate the grade of biochar as follows:  
  
Grade 1 (<5mm): Blue  
Grade 2 (<10mm): Yellow.  
Grade 3 (<50mm): Black.
- When a bulk bag contains 1000L of biochar (as measured using the bins) tie down the bag loops and mark the bag as **READY FOR DESPATCH**.

## **7.0 SAMPLING FOR 3<sup>RD</sup> PARTY ANALYSIS**

### **7.1 SAMPLE PER BULK BAG**

- On completion of filling each bulk bag and prior to despatch take 15 or more cup-size (eg 200mL) samples from various parts/depths of the bag and place all together into a clean container; alternatively sample progressively during the filling of the bag by taking one 200mL sample each time the 60L bin is used to transfer biochar from the kiln to the bag.
- Mix contents of container;
- Take 15 or more 20mL samples from various parts/depths of the container and place all together into a clean container; mix contents and label the container with the product batch number.

### **7.2 SAMPLE PER CAMPAIGN**

- On completion of a campaign (eg one season) place all the product samples all together into a clean container;
- Mix contents of this container;
- Take 15 or more 20mL samples from various depths of this container and place all together into another clean container; mix contents and transfer entire contents of this container into a clean plastic sealable bag;
- Complete EAL Sample Submission Form;
- Post sample together with Sample Submission Form to EAL.

#### **Applicable Documentation:**

- a) EAL Sample Submission Form

## **8.0 DOCUMENTATION**

1. Job Event Register.
2. Landholder Approval Letter No.1.
3. Landholder Approval Letter No. 2.
4. Landholder Approval Letter No. 3.
5. Risk Management Plan – wood collection.
6. Supplier Letter.
7. Risk Management Plan – making biochar.
8. Safe Operating Procedure – Biochar Kiln.
9. Water quality record sheet.
10. EAL Sample Submission Form.



## Attachment 2 – Landholder approval letter No. 1



**3 August 2021**

Hills and Fleurieu Landscape Board  
Communications & Engagement Coordinator  
Attn: Dana Miles  
Upper level, Corner Mann & Walker Street  
Mount Barker SA 5251

To Hills and Fleurieu Landscape Board

### **RE: APPROVAL FOR COMMUNITY GROUP ACTIVITY TO BE CARRIED OUT**

I am aware that the **Maccy Biochar group** is applying for independent community group insurance under the cover offered through the policy between the Department for Environment and Water and the SA Government Insurers SAicorp.

I am also aware that their project entitled **Biochar Production Centre**, will be carried out on/at **329B Shady Grove road, Macclesfield**, and details of the activities the volunteers will undertake and the estimated timing have been provided to me.

As the property owner and authorised representative of the landholder, I give approval for the activities comprising **Biochar Production Centre** to be carried out on the land described in their application.

Yours sincerely,

**Greg Goding**  
**Godings Farm Supplies**  
**0418807437**

Independent community group insurance application form

Issue 1 Rev. 0 dated 20 January. 2022

## Attachment 2 – Landholder approval letter No. 2



*4 August 2021*

Hills and Fleurieu Landscape Board  
Communications & Engagement Coordinator  
Attn: Dana Miles  
Upper level, Corner Mann & Walker Street  
Mount Barker SA 5251

To Hills and Fleurieu Landscape Board

### **RE: APPROVAL FOR COMMUNITY GROUP ACTIVITY TO BE CARRIED OUT**

I am aware that the **Maccy Biochar group** is applying for independent community group insurance under the cover offered through the policy between the Department for Environment and Water and the SA Government Insurers SAicorp.

I am also aware that their project entitled **Pasture biochar trial**, will be carried out on/at **104-162 Davis road, Macclesfield**, and details of the activities the volunteers will undertake and the estimated timing have been provided to me.

As the property owner and authorised representative of the landholder, I give approval for the activities comprising **Pasture biochar trial** to be carried out on the land described in their application.

Yours sincerely,

**Roger Salkeld**  
**Landholder**  
**Mob: 0414 422 109**

Independent community group insurance application form

Issue 1 Rev. 0 dated 20 January. 2022

Attachment 2 – Landholder approval letter No. 3



**Date:** .....

Hills and Fleurieu Landscape Board  
Communications & Engagement Coordinator  
Attn: Dana Miles  
Upper level, Corner Mann & Walker Street  
Mount Barker SA 5251

To Hills and Fleurieu Landscape Board

**RE: APPROVAL FOR COMMUNITY GROUP ACTIVITY TO BE CARRIED OUT**

I am aware that the **Maccy Biochar** group is applying for independent community group insurance under the cover offered through the policy between the Department for Environment and Water and the SA Government Insurers SAicorp.

I am also aware that their project entitled **Wood collection**, will be carried out on/at:

.....  
.....

and details of the activities the volunteers will undertake and the estimated timing have been provided to me.

As the property owner and authorised representative of the landholder, I give approval for the activities comprising **Wood collection** to be carried out on the land at the above mentioned address.

Yours sincerely,

**Name:** .....

**Mob:**.....

Independent community group insurance application form

**MACCY BIOCHAR  
RISK MANAGEMENT PLAN – Wood collection -2021**

**Name of Activity** Wood collection  
**Date & Time**  
**Team Leader**  
**Convener** Maccy Biochar group of Macclesfield Community Association Inc.  
**Location**  
**Expected numbers** 4 - 5

**Description of activity:**  
 Collect dry wood (eg tree litter) and take to site on Shady Grove road for conversion to biochar.

<b>Tasks</b> List the tasks required to perform the activity in the sequence they are carried out.	<b>Potential Hazards</b> Against each task list the hazards that could cause injury when the task is performed.	<b>Risk Control Measures</b> List the control measures required to eliminate or minimize the risk of injury arising from the identified hazard.	<b>Responsibility</b> Write the name of the person responsible to implement the control measure identified.
1. Meet team members to explain and conduct risk assessment etc.	Covid19	Physical separation 1.5m min. No handshaking etc. Wear gloves.	Team leader.
2. Cut wood to fit on trailer.	Injury from chain saw etc.	Wear PPE as needed for operation of chain saw. Eg Safety glasses or helmet with visor. Gloves. Ear plugs.	Operator.
3. Load trailer.	Poke in eye with branch. Cuts and abrasions.	Maintain separation. Wear Safety glasses. Have First Aid kit on hand.	Team leader
4. Transport to Shady Grove road site.	Covid 19	Limit 1 person per car unless married.	Team leader. Team leader.
5. Unload at site.	As per 3.	As per 3.	As per 3.
6. Other?			

**Signed:** B.M. Lewis.....**Date:** 26 April 2021.



**MACCY BIOCHAR  
RISK MANAGEMENT PLAN – Making Biochar -2021**

**Name of Activity** Making biochar  
**Date & Time**  
**Team Leader**  
**Convener** Maccy Biochar group of Macclesfield Community Association Inc.  
**Location**  
**Expected numbers** 4-5 (Maximum 10)

**Description of activity:**  
 Make biochar from dry wood (eg tree litter) using a flame-capped kiln.

<b>Tasks</b> List the tasks required to perform the activity in the sequence they are carried out.	<b>Potential Hazards</b> Against each task list the hazards that could cause injury when the task is performed, or reason for task.	<b>Risk Control Measures</b> List the control measures required to eliminate or minimize the risk of injury arising from the identified hazard.	<b>Responsibility</b> Write the name of the person responsible to implement the control measure identified.
1A. Meet team members to explain and conduct risk assessment etc.	Covid19	Physical separation 1.5m min. No handshaking etc.	Team Leader.
1B. Confirm Permit to Operate conditions are satisfied.	Eg No fire ban, water available etc.	Wear gloves. See Permit to Operate.	Team Leader.
2. Cut wood to fit in kiln.	Injury from chain saw etc.	Wear PPE as needed for operation of chain saw. Eg. Safety glasses or helmet with visor. Gloves. Ear plugs.	Team Leader.
3. Light fire in kiln.	Smoke; flames.	Maintain separation. Wear Safety glasses. Have First Aid kit on hand.	Team Leader
4A. Load kiln with wood as needed. 4B. Monitor operation until kiln is full.	Flames, sparks, smoke. Ember escape.	Gloves, safety glasses, mask. Spray back-pack available.	Team Leader.
5. Fill kiln with water and leave to cool.	Steam, vapours.	As per 3.	Team Leader.
6A. Drain water from kiln. 6B. Shovel char into bags.	Slippery ground. Still hot char.	Ensure all char is thoroughly quenched and cold before bagging.	Team Leader.

**Signed:** B. M. Lewis.....**Date:** 16 May 2021.

## **SAFE OPERATING PROCEDURE – BIOCHAR KILN**

**Do not operate this kiln unless you have been instructed in its safe use and operation.**

**Fire-resistant gloves  
Safety glasses  
Sturdy footwear (eg steel-capped boots)  
must be worn at all times.**

### **PRE-OPERATIONAL SAFETY CHECKS**

1. Weather: no fire ban declared. Check CFS info hotline 1300 362 361. Wind direction & speed acceptable. No rain expected.
2. 4 metre clearance from public areas and flammable items.
3. Fire extinguisher or water hose, & shovel ready at hand.
4. Feedstock is dry and all organic (i.e.no permapine etc).
5. Quenching water supply is available.
6. “Permit to operate” has been signed by Supervisor.

### **OPERATIONAL SAFETY CHECKS**

1. Avoid smoke generation by feeding wood carefully so as not to smother fire.
2. Maintain flame cover over the whole surface area.

### **HOUSEKEEPING**

1. Maintain the 4 metre public exclusion zone around each kiln.
2. Use shovel or long stick to adjust position of wood items as needed.
3. Quench entire contents of kiln when full.

### **POTENTIAL HAZARDS**

■ Hot surfaces    ■ Hot sparks    ■ Smoke

### **FORBIDDEN**

Never leave kiln unattended when fire is alight.  
Never leave any char unquenched.  
Never bag unquenched char.

**MACCY BIOCHAR  
WATER QUALITY ANALYSIS**

**Analysed by:** Dean Hewlett  
**Analysis method:** APERA PC/60 EC meter  
**Analysis report date:** 10-Nov-21

**Notes**

<b>Production year:</b>	<b>2021</b>			
<b>Location</b>	<b>329B Shady Grove road</b>			
<b>QUENCH WATER</b>				
<b>Water source</b>	<b>Dam</b>			
<b>Temp of test solution °C</b>	<b>16.8</b>			
<b>pH</b>	<b>7.29</b>			
<b>Electrical Conductivity (µS/cm)</b>	<b>265</b>			
<b>Total Dissolved Solids (ppm)</b>	<b>191</b>			
<b>Salinity (g/L)</b>	<b>0.13</b>			
<b>Salinity (EC)</b>	<b>130</b>			
<b>DRAIN WATER (from kiln)</b>				
<b>Temp of test solution °C</b>	<b>17.4</b>			
<b>pH</b>	<b>9.64</b>			
<b>Electrical Conductivity (µS/cm)</b>	<b>3700</b>			
<b>Total Dissolved Solids (ppm)</b>	<b>2640</b>			
<b>Salinity (g/L)</b>	<b>1.85</b>			
<b>Salinity (EC)</b>	<b>1850</b>			



PO Box 157 (Military Road)  
 USMORE NSW 2480  
 T: 02 6620 3678 E: eal@scu.edu.au W: www.scu.edu.au

**Sample Submission Form (SSF) - Chain of Custody (COC)**

**Submitting Client Details**

Quote ID: MACCY BIOCHAR  
 Job Ref:  
 Company:  
 Contact: Brian Lewis  
 Phone: 08 8388 9572  
 Mobile: 04 1 148 0935  
 Email: macybiochar@adam.com.au  
 Postal address: PO Box 535, Macclesfield  
 SA 5153

**Billing Client Details**

Tick if same as submitting details  
 ABN: 26395 848 783  
 Company: Macclesfield Community Assoc  
 Contact: Brian Lewis  
 Phone: 08 8388 9572  
 Mobile: 04 1 148 0935  
 Email:  
 Postal address:

**Payment Method:**

- Purchase Order
- Cheque
- xx Credit/Debit Card (EAL staff will phone for details)**
- Invoice (prior approval)

**Relinquished:**

Received:  
 Preservation:  
 Condition on receipt:

Time/Date:

Time/Date:

none  
 ambient - cool - frozen - other

Please note **compositing or mixing of samples MUST be written on the Sample Submission Form. Otherwise, each sample listed will be analysed and charged separately.**  
 In submitting samples, the Client agrees to the EAL Laboratory Services Terms and Conditions. These Terms and Conditions are available on the EAL website: scu.edu.au/eal, or on request.

**Comments:**

Biochar Totals Analysis

Likelihood and nature of Hazardous material:						Sample Analysis Request	
Lab ID	Sample ID	Sample Depth	Sampling Date	Sampler	Your Client	Crop ID	Sample Type (e.g. water, leaf, soil)
	MACCYBIOCHAR		28/01/2021	Manual	N/A	N/A	Biochar
							1
							SS-PACK-111
							Price list code (e.g. SW-PACK-06)
Total number of samples							