

## Appendix D

# OVERVIEW OF SUBSTRATE PRODUCTION

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## 1. ELF FARM SUPPLIES

Prior to development of bulk substrate processing, mushroom farms produced their own substrate at each individual farm. This activity was conducted outdoors with limited ability to control the process or the quality of substrate produced.

Mulgrave was one of the first facilities in NSW producing substrate in bulk for supply to mushroom farms. Bulk processing brought efficiency in production techniques, consistency of product and better control of environmental issues. In those earlier years just the pre-wet and Phase 1 composting was undertaken at Mulgrave, leaving mushroom farms to pasteurise the material (Phase 2) and introduce mushroom spawn to the mix (Phase 3) as part of the horticultural process.

In 1988 Elf Farm Supplies developed the “air under” system of air injection into composting material to assist in maintaining aerobic conditions, essential for odour control. This technology was subsequently supplied world-wide by the Tolson Group.

In 2003 Elf Farm Supplies significantly upgraded the Mulgrave plant, totally enclosing the substrate production process and introducing a bioscrubber to remove organic compounds from air emissions. This was the first plant in the southern hemisphere to adopt these measures.

In 2005 Elf Farm Supplies pioneered in Australia processing and preparation of “finished” substrate on one site. Phase 2 (pasteurisation) and Phase 3 (spawn running) processing was commenced in a new purpose designed building at the Mulgrave plant. After proving to mushroom farms the benefit of receiving Phase 3 substrate, the company began phasing out supply of Phase 1 product to enable it to process its entire product run to the Phase 3 “finished” state.

The Tolson Group supplies Phase 3 substrate to its own farms and to an increasing number of other mushroom farms in New South Wales. Elf Farm Supplies remains the only bulk supplier of Phase 3 substrate in New South Wales.

## 2. PROCESS DESCRIPTION

The process described below is as currently carried out at Elf Farm Supplies, prior to the application to the Department of Environment and Planning in January 2015 for project modification.

### (i) *Raw Materials Storage*

Raw materials used in substrate manufacture include straw, water, poultry manure, cotton plant products, gypsum and dry stable bedding. Solid raw materials other than straw have been stored in a three-sided shed, leaving an open side for material to be delivered by tip truck. The material is kept in a dry state under cover. Straw is stored in the bale wetting area and at the front of the site.

### (ii) *Bale Wetting*

As a prelude to the first stage of pre-wet, straw bales are spray watered for several days to soften the straw by removing the waxy layer and to increase water content. Water running off the bales is collected, filtered and recirculated via the sprays.

### (iii) *Pre-Wet*

Straw bales are laid out in rows in the pre-wet building and blended with other ingredients and water using a mobile blending machine. Dry ingredients are transported by a Kuhn mixing trailer to the building. Air is recirculated through the floor beneath the rows as this first low-temperature composting stage progresses. Extracted air passes through ducts into the Phase 1 building which houses the bioscrubber.

The low temperature pre-wet process takes up to one week, with the mobile blending machine adding water, mixing and turning each row at least every second day.

The proposed modification to the Part 3A approval is aimed at superseding this method of pre-wet processing in favour of a tunnel system, similar in operation to that described below for Phase 1 composting.

### (iv) *Phase 1 Composting*

The high-temperature composting phase takes place in tunnels for up to one week. The mix must remain above 75° Celsius for at least 90 hours to enable the process to reach completion. During the process, each tunnel is emptied and the contents

placed in the hopper where water is added uniformly and the mix returned to an empty tunnel by conveyor.

The finished Phase 1 product is placed in the hopper so that the conveyor system can either load it to trucks for delivery or transfer it to the Phase 2 and Phase 3 tunnel building for further processing.

(v) *Phase 2 and Phase 3 Processing*

Phase 2 is a pasteurisation process undertaken at high temperature after the completion of composting to kill unwanted spores and organisms. Phase 3 is the initial growth of mushroom spawn from introduced mycelium, undertaken in controlled atmospheric conditions. These operations take about two to three weeks of processing, depending upon dispatch days.

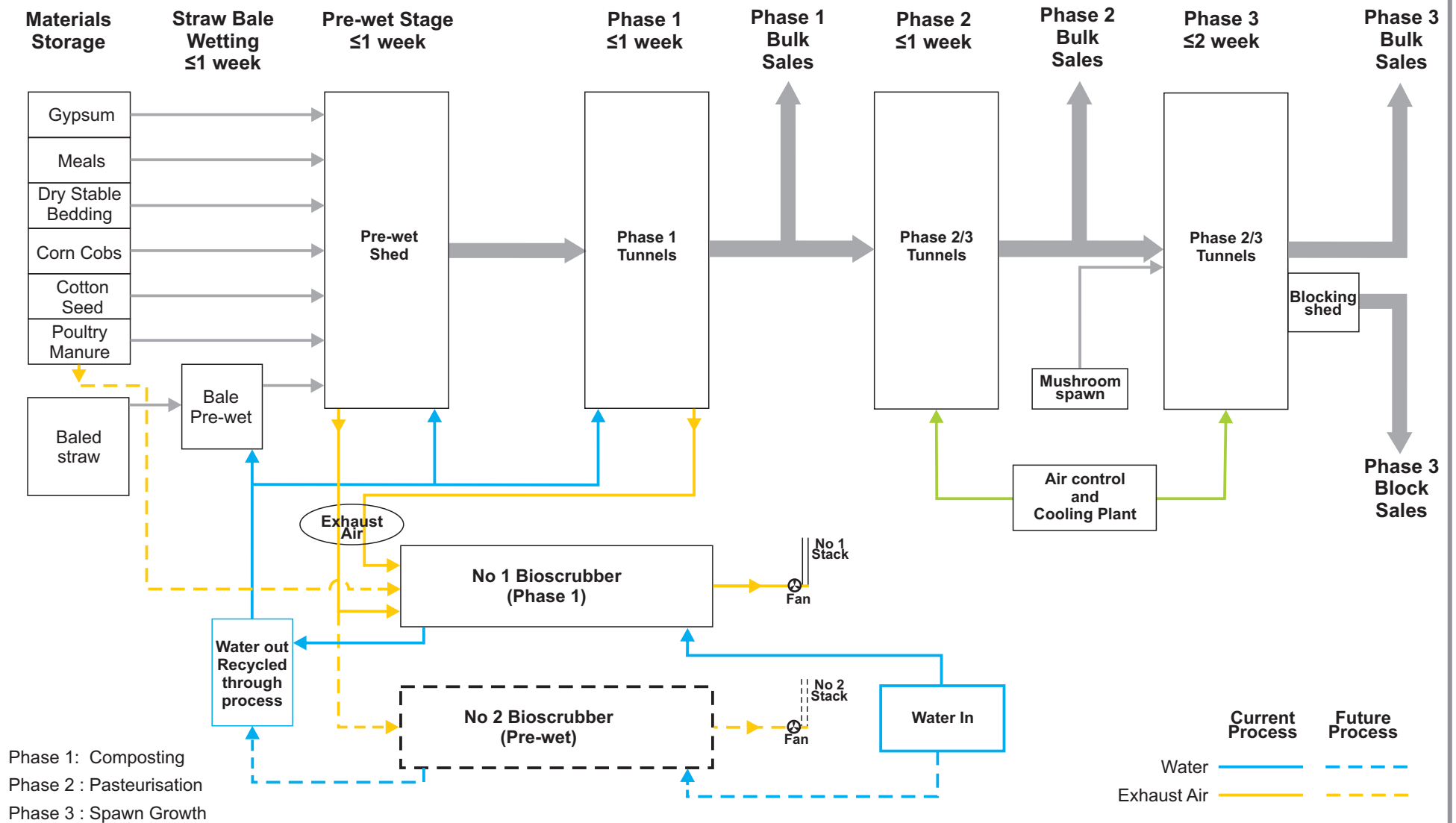
Utmost cleanliness is required to avoid contamination of the pasteurised substrate by foreign spores or pathogens. Finished product loading is carried out indoors with trucks being cleaned down prior to entering the loading area, if necessary.

Elf Farm Supplies has also moved into supplying products tailored to specific needs of the commercial and home markets. Some mushroom farms experience greater efficiency if the spawned substrate is prepared in the form of plastic-wrapped blocks, suitable for placing directly on growing shelves or trays. There is also a home market for do it yourself growers who require spawned substrate pre-wrapped and ready to place in a suitable growing environment.

The following diagrams show a flow chart of the current substrate production process as submitted with the 2010 project application and a modified flow chart that will apply with the alterations now proposed.

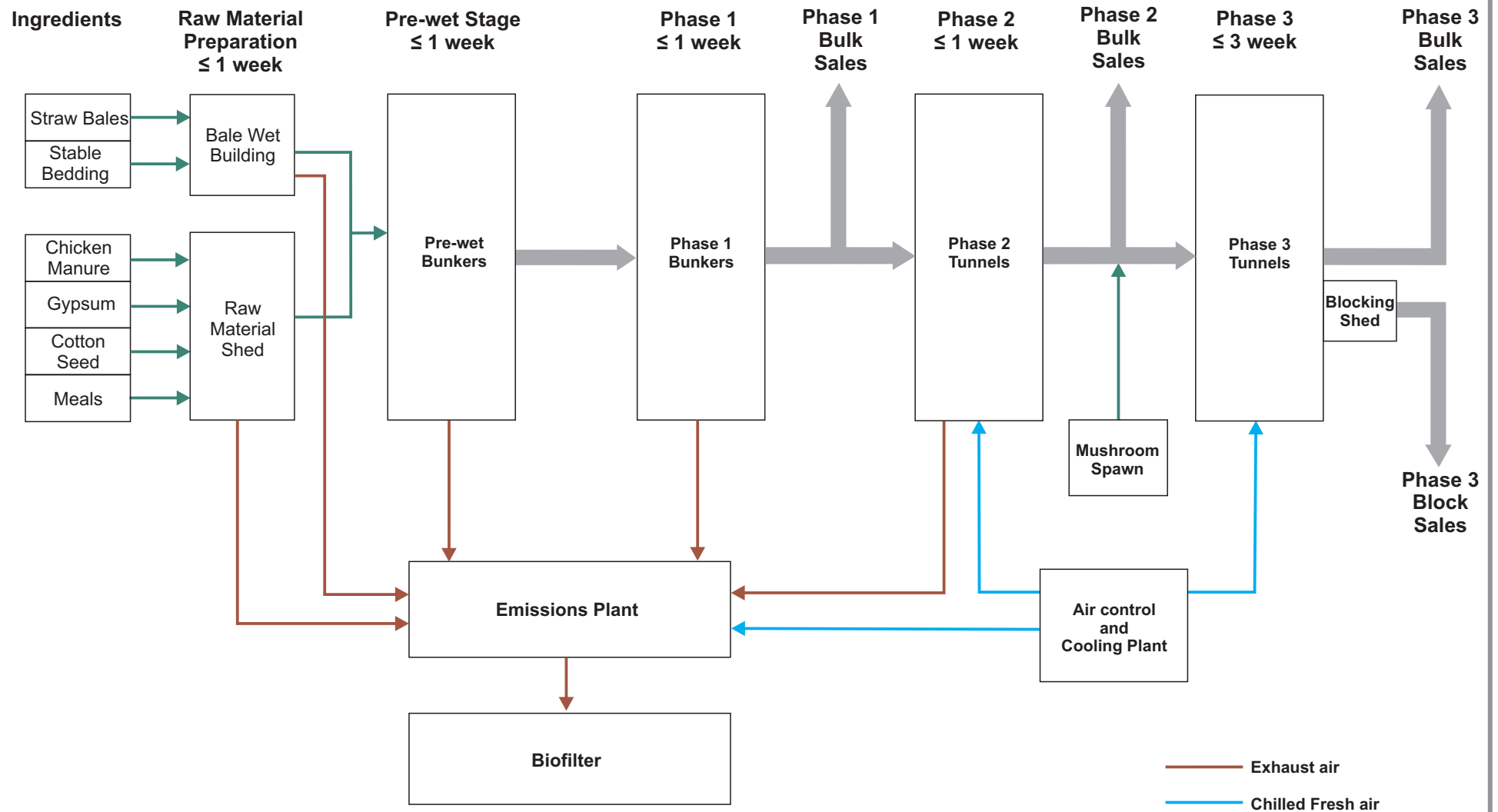
Accompanying photos show various stages of the process.

## Minimum 6 Weeks Production Process Time



Process Flow Diagram (2010 project application)

## Elf Farm Supplies - 7 Week Production Cycle



Modified Flow Diagram



PHOTOGRAPH 1      Bale Wetting



PHOTOGRAPH 2      Raw Materials Area



PHOTOGRAPH 3      Mixing Manure



PHOTOGRAPH 4      Mixing Compost in the pre-wet shed





PHOTOGRAPH 5      Mixing Compost in the Phase 1 Hall



PHOTOGRAPH 6      Spawning in Phase 2 working hall



PHOTOGRAPH 7 Ship out in Phase 3 hall



PHOTOGRAPH 8 Phase 1 building with conveyor in front and bioscrubber chimney behind





PHOTOGRAPH 9 Existing Pre-wet building



PHOTOGRAPH 10 Phase 2/3 building, western end