ELF FARM SUPPLIES
MUSHROOM SUBSTRATE PLANT, MULGRAVE
WATER MANAGEMENT PLAN

1 INTRODUCTION

Water management procedures at Elf Farm Supplies' Mulgrave substrate plant have been developed consistent with previous conditions of approval and to minimise water consumption. The approved expansion of the plant will result in some modifications to operational water and stormwater management. *Figure 1* shows the layout of the substrate plant with the approved staged development.

2 OPERATIONAL WATER

Figure 2 is an operational water flow chart for the plant.

2.1 Water Sources

Mushroom substrate production is a water-intensive process. Operational water is obtained from a number of sources:

- Water for use in the Phase 1 process is pumped from South Creek and/or from a bore in accordance with licences administered by the Office of Water. Creek water is pumped either directly to the bioscrubber reservoir or to a 120,000 litre water tank located beside the maintenance workshop. The Sydney Water service is also connected as a backup to provide operational water should either the South Creek or borehole sources be unavailable.
- Potable water used for the Phase 2/3 processing area is sourced from the metered Sydney Water supply. The Phase 2/3 processing area requires clean water to minimise the risk of contaminating the pasteurised substrate.
- Potable water for the office, staff amenities, maintenance workshop and cooling towers is also supplied from Sydney Water. Fire hose reels are also connected to this supply. Fire hydrants are connected to the Sydney Water fire mains.
- Rainfall runoff from the sealed work area around the raw materials storage shed, Phase 1 tunnel building and the pre-wet shed drains to the west water recycle pit adding to the supply of operational water.
- The farm dam and sediment retention basins on the property collect building roof water and site drainage water. This water is not currently used in the operation, but may be available for use with future capital investment and licensing, where appropriate.

134R3 23-4-12

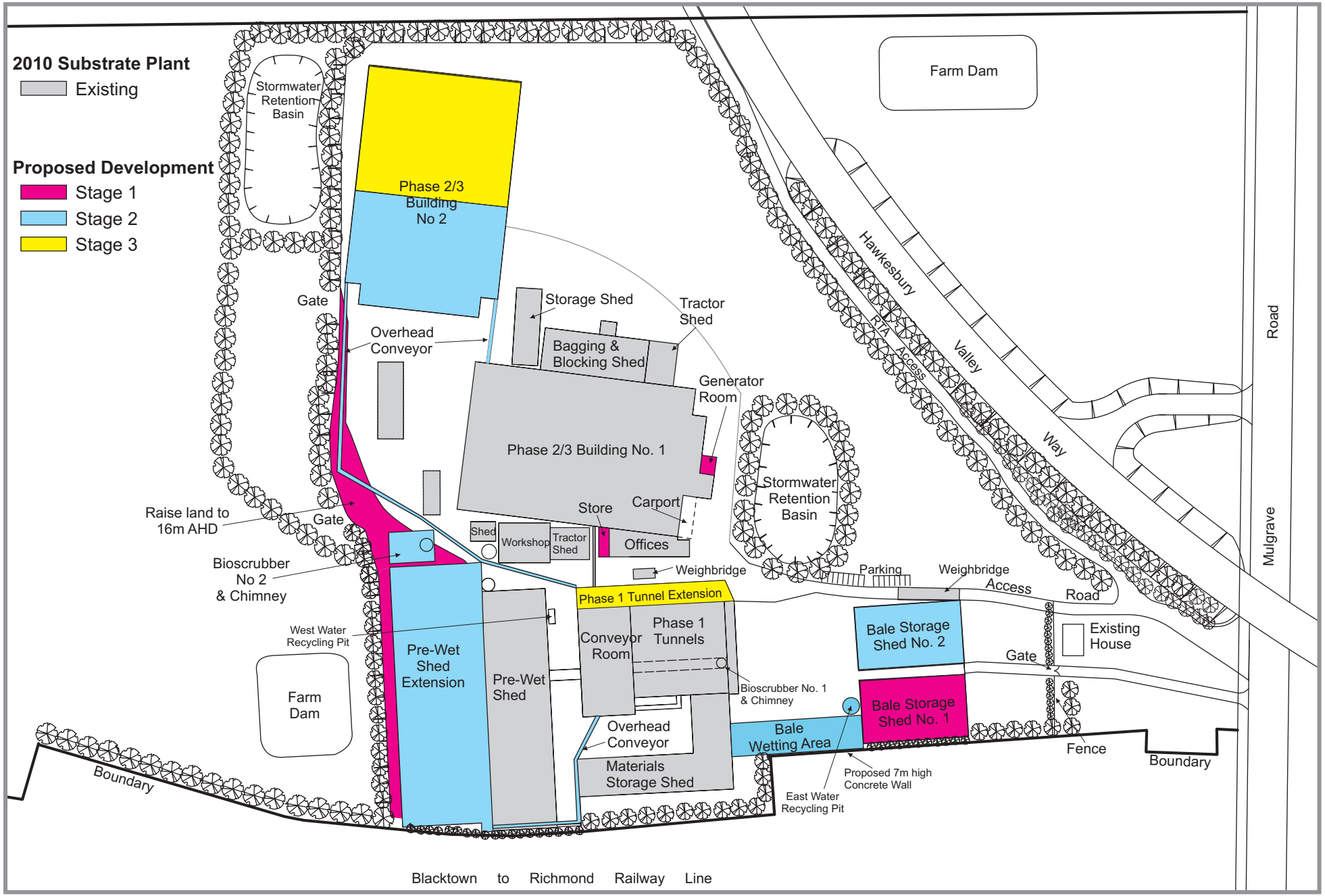


FIGURE 1 Substrate Plant Staging Plan

2.2 *Pre-Wet and Phase 1 Process Water*

Water for use in the pre-wet and Phase 1 process is preferentially drawn from the bioscrubber to maintain a flow of fresh water through the bioscrubber. The pool of water in the base of the No 1 bioscrubber has an operating depth range between 600 and 1,500 mm with automatic top up. If the level reaches the minimum setting, process water is drawn from the creek supply until the bioscrubber level is restored.

Water is used in the Phase 1 processing area for bale wetting, addition to the pre-wet mixture, addition to composting material in the Phase 1 tunnel building and for daily wash down in the Phase 1 buildings and work area. Wash down water collects in the recycle pit for reuse in the process. There is no waste water generated from the Phase 1 process.

2.3 *Bale Wetting*

The straw bale wetting operation is a circulatory system with water being pumped from the water recycle pit and sprayed over the stacked straw bales. Surplus water drains from the bales and flows back to the collection pit for recirculation. A gross solids trap is installed in the drain leading to the pit to reduce the volume of solid material entering the pit and allow easy cleaning. Standby pumps are installed in the pit to reduce the risk of interruption to service. The pumps and spray nozzles are designed to allow solids to pass through, minimising the likelihood of blockage. An aeration pump is installed in the pit to oxygenate the water and maintain aerobic conditions.

The water recycle pit is de-sludged fortnightly, producing about a wheelbarrow load of material that is added to the processing substrate. Apart from bale twine, there is no liquid or solid waste from this operation.

2.4 *Phase 2/3 Process Water*

The Phase 2/3 processing building requires water for wash down, the refrigeration system, steam boiler and for adding to the substrate if required. There is no waste water from this building as all drainage water from the Phase 2/3 operation is pumped to the west water recycle pit for use in Phase 1 processing.

2.5 *Summary of Water Requirements*

Table 1 provides an estimate of water usage at the substrate plant currently and when all stages of development are fully operational.

134R3 10/05/2012

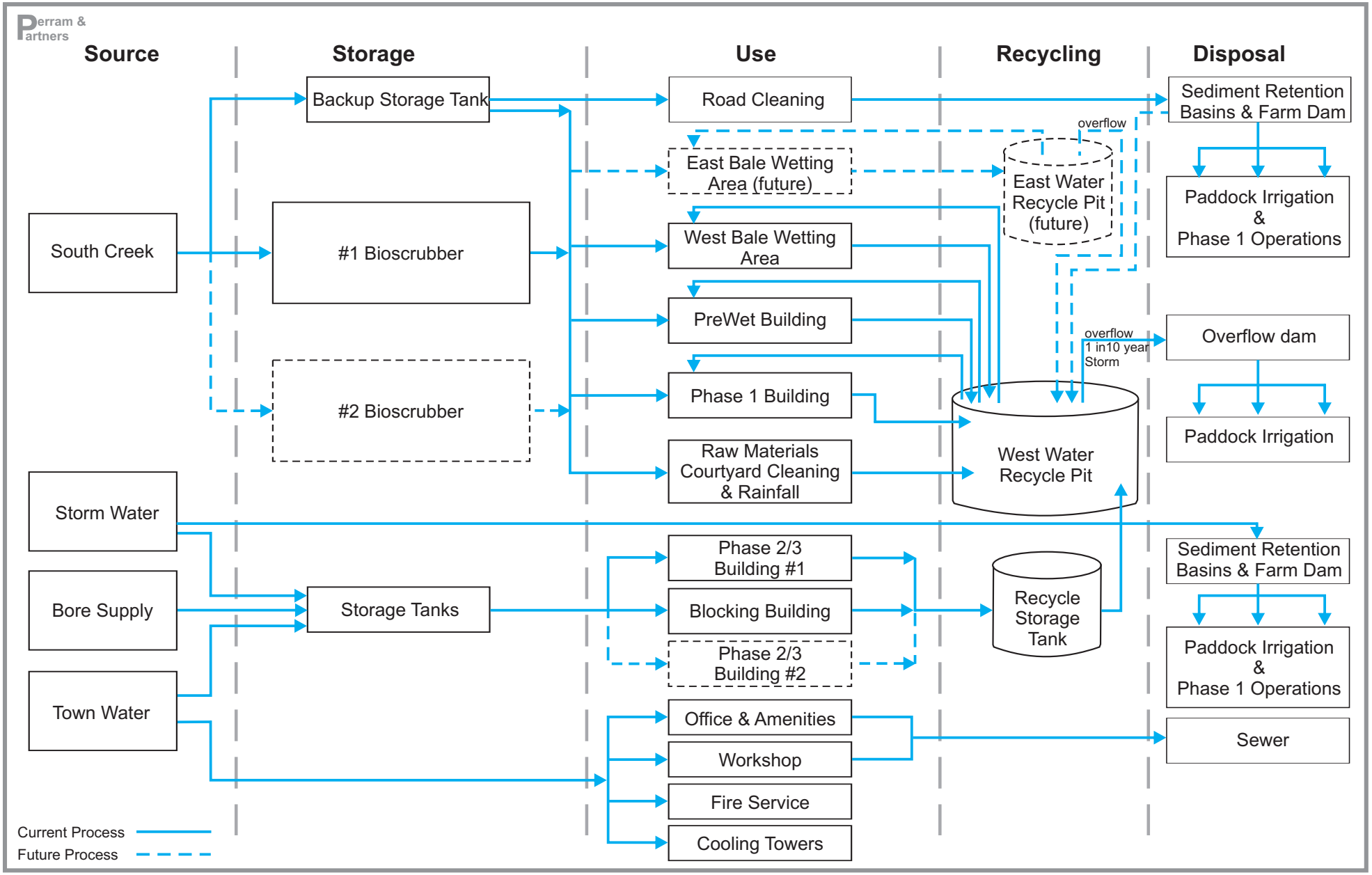


FIGURE 2 Substrate Plant Operational Water Flow Chart

Table 1 SUMMARY OF WATER USE

Water Use	Source	Estimated Water Consumption	
		Current production (1,000 t/w)[1]	Stage 3 production (3,200 t/w)[1]
Phase 1 processing area	South Creek, Phase 2/3 recycled water[2], with borehole[3] and town water backup	40 megalitres /year	80 to 100 megalitres/year
Phase 2/3 building incl. wash down	Town water	15 megalitres/year	35 megalitres/year
Potable uses	Town water	200 kilolitres/year	250 kilolitres/year
Fire fighting	Town water	nil	nil

1 Tonnes per week of Phase 1 substrate

2 Approximately 92% of the Phase 2/3 water consumption is recovered and recycled for Phase 1 use.

3 Following an extended wet period the quality of water from the borehole has declined and it is not currently in use.

2.6 *Domestic Wastewater*

Wastewater from the maintenance shed and staff amenities is discharged to sewer. This is the only operational wastewater generated on the site.

2.7 *Operational Water Management Procedures*

2.7.1 Water Usage Priority

The priority for sourcing process water for Phase 1 operations is as follows:

(i) West water recycle pit - whenever the pit contains water above its normal operating level, extract water to lower the level and restore holding capacity for stormwater;

(ii) Bioscrubber reservoir;

(iii) 120,000 litre storage tank;

(iv) Bore supply (when of suitable quality);

(v) Sydney Water service.

2.7.2 *Process Water Control*

The following procedures prevent the possibility of process water escaping to South Creek:

(i) Apply process water only at locations where there is a sealed operational surface so any spillage or surplus will drain to a collection system;

(ii) Maintain adequate holding capacity in the west water recycle pit with the backup farm dam as described in section 3;

(iii) Clean the solids filter on the input to the west water recycle pit when water flow is present (operational water or stormwater);

(iv) Remove any solids or sludge present in the collection pit at intervals not greater than fortnightly.

3. STORMWATER MANAGEMENT

A Stormwater Management Plan for the proposed expansion was prepared by Barker Ryan Stewart and included in the Environmental Assessment (Perram & Partners 2010).

3.1 Existing Arrangement

Existing stormwater drainage at the site includes the following features:

- roof water from most major structures at the site is drained either:
  - to two stormwater detention basins, one discharging to the farm dam in the north east corner of the property and the other discharging to the South Creek flood plain;
  - from some areas, directly to the farm dam; or
  - directly to the South Creek flood plain
- roof water from buildings near the southern boundary flows beneath the Blacktown – Richmond Railway to the neighbouring market garden which has a large storage dam;
- surface water from non-operational areas and roadways on the site is directed to two stormwater detention basins, one discharging to the farm dam in the north east corner of the property and the other discharging to the South Creek flood plain; and
- surface water from the Phase 1 operational area of the site drains to the west water recycle pit, from which it is re-used in the process.

A catchment plan prepared by Barker Ryan Stewart for the project application is appended to this water management plan.

3.2 *West Water Recycling Pit*

The west water recycle pit has been designed with sufficient capacity to retain the first flush of rainfall runoff from operational surfaces of the site. The pit can retain at least 29 cubic metres of stormwater, equivalent to 10 millimetres of runoff from the operational surface area of the plant. This capacity exists above a sump where bale-wetting water accumulates for recirculation through the bale sprays. The pit capacity was designed in accordance with requirements specified at the time by the EPA.

Should the pit become full, a weir diverts any surplus runoff to the farm dam immediately west of the plant. The dam is configured so as not to receive runoff water from any other source. Water collecting in this dam is used for farm irrigation with the level of water in the dam maintained at a minimum.

Whenever rainfall results in surplus water being present in the west water recycle pit it is preferentially used for operational purposes, quickly restoring capacity of the pit to collect water from subsequent rainfall.

3.3 *Approved Expansion Works*

Expansion of the plant will alter the existing stormwater arrangement as follows:

- an east water recycle pit will be installed to serve the second bale wetting area and will receive stormwater runoff from this area;
- the total surface area draining stormwater to the various dams and discharges on the property will increase only marginally as a result of the development.
- the additional area of roof and paving will increase the volume of stormwater and its flow rate; and
- additional paved and hardstand areas may contribute increased sediment to stormwater runoff.

The following works are included in the project to manage the changed stormwater conditions resulting from the development. These works were described in the Environmental Assessment (Perram & Partners 2010) and the stormwater management plan for the development enclosed in that document:

- the east water recycle pit will be sized to contain the first flush of rainfall runoff from its catchment as for the existing (west) pit. Any surplus runoff will be diverted at the inlet to the west water recycle pit and thence to the western farm dam;
- the two existing sediment basins will be modified to better detain stormwater during storm events. Works include fitting orifice plates to the outlets of both basins and minor earthworks at the north-western basin; and
- water quality works include enlarging a reed bed at the inlet to the north eastern farm dam and installing a bio basin to receive stormwater discharging to the west onto the flood plain;

The detention basin modifications are designed to ensure there will be no increase in stormwater flow from the developed area. The enlarged reed bed and new bio basin will ensure that stormwater quality does not deteriorate as a result of the development.

When construction work is in progress, the detention basins will also serve as sediment basins. The enlarged reed bed will be vegetated by transplanting existing aquatic vegetation.

3.4 Stormwater Management and Maintenance Procedures

The stormwater system requires the following intervention to ensure continued correct operation:

(i) As soon as possible following rainfall, ensure that sufficient stormwater is removed from the west water recycling pit to restore 29 cubic metres of available stormwater storage capacity;

(ii) Ensure the maximum water level in the pit for normal (dry weather) operations remains clearly marked;

(iii) Utilise stormwater from the farm dam west of the site as first priority for pasture irrigation whenever water collects in the dam;

(iv) Maintain the operational areas of the site in a clean state to minimise the quantity of solid materials washed into the stormwater system;

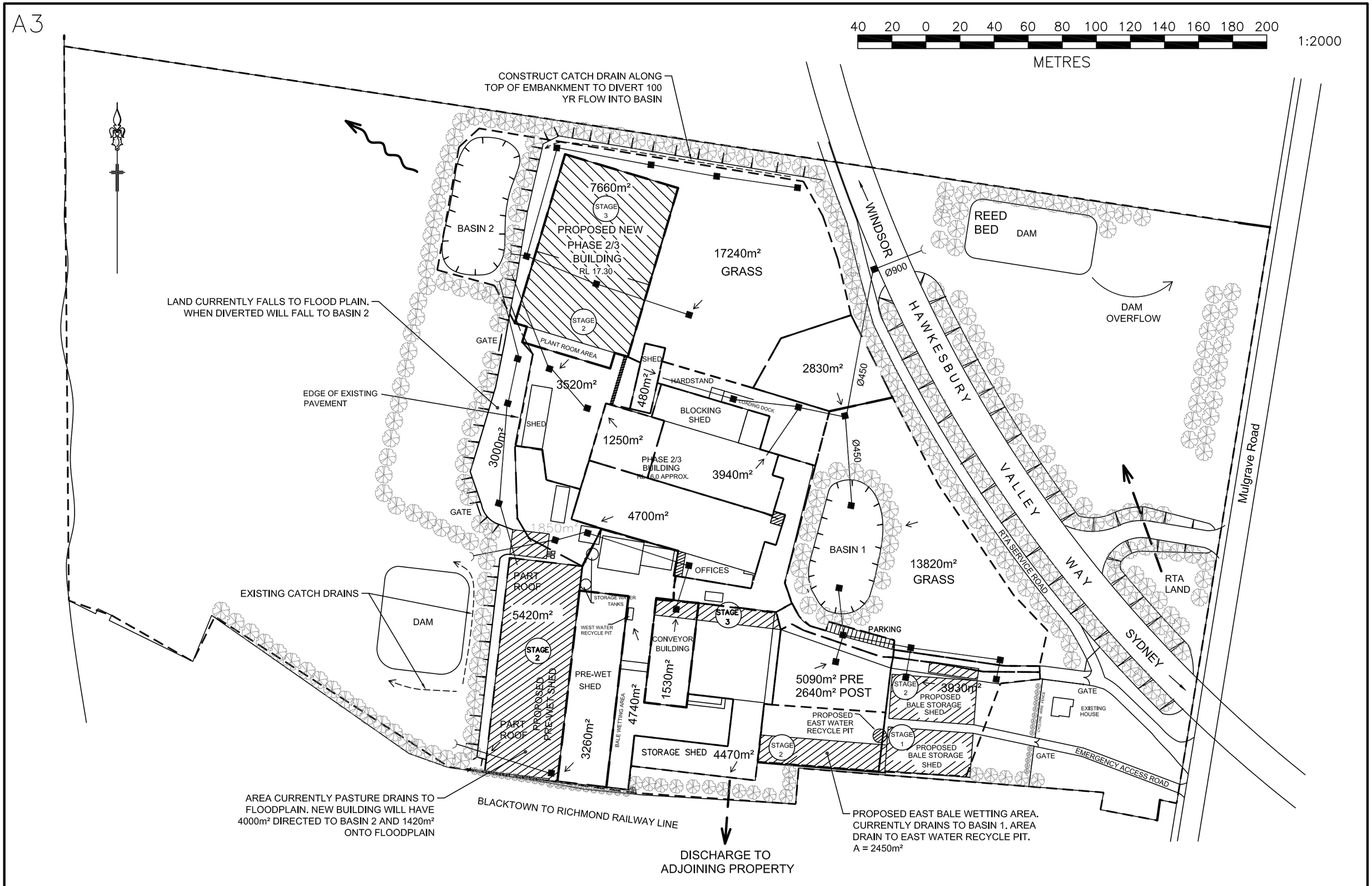
(v) Apply maintenance protocols to the water recycle pits indicated in section 2:7.2

- clean the solids filter on the input to the water recycle pits when water flow is present (operational water or stormwater);
- remove any solids or sludge present in the collection pits at intervals not greater than fortnightly.

(vi) Remove any accumulated sediment or sludge from the detention basins when required; and

(vii) Inspect and maintain vegetation in the reed bed and bio-retention basin as required, including harvesting and desludging should this become necessary.

A3



No.	DATE	AMENDMENT
A	18/11/10	FIRST ISSUE

Barker Ryan Stewart
Planning • Sustainability • Infrastructure • Development • Certification
ABN: 26 134 067 842
barkerryanstewart.com.au
mail@barkerryanstewart.com.au
Sydney P: 02 9659 0005
Central Coast P: 02 4304 1144
Hunter P: 02 4929 3639
Brisbane P: 07 3118 5158
Proud Member CONSULT AUSTRALIA

Designed: GJ
Drawn: JB
Checked: GJ
Approved: ..../..../....

Scales: Plan 1:2000
Horiz.
Vert.
X-Sect.
Datum: A.H.D.

Client: ELF FARM SUPPLIES PTY LTD
LGA: HAWKESBURY
Council Ref:

108 MULGRAVE ROAD
MULGRAVE
MUSHROOM SUBSTRATE PLANT EXTENSIONS
CATCHMENT PLAN

Plan No. 07166E20
REV. A
File Ref. 07166E20.dwg
SHEET 1 OF 1 SHEETS