

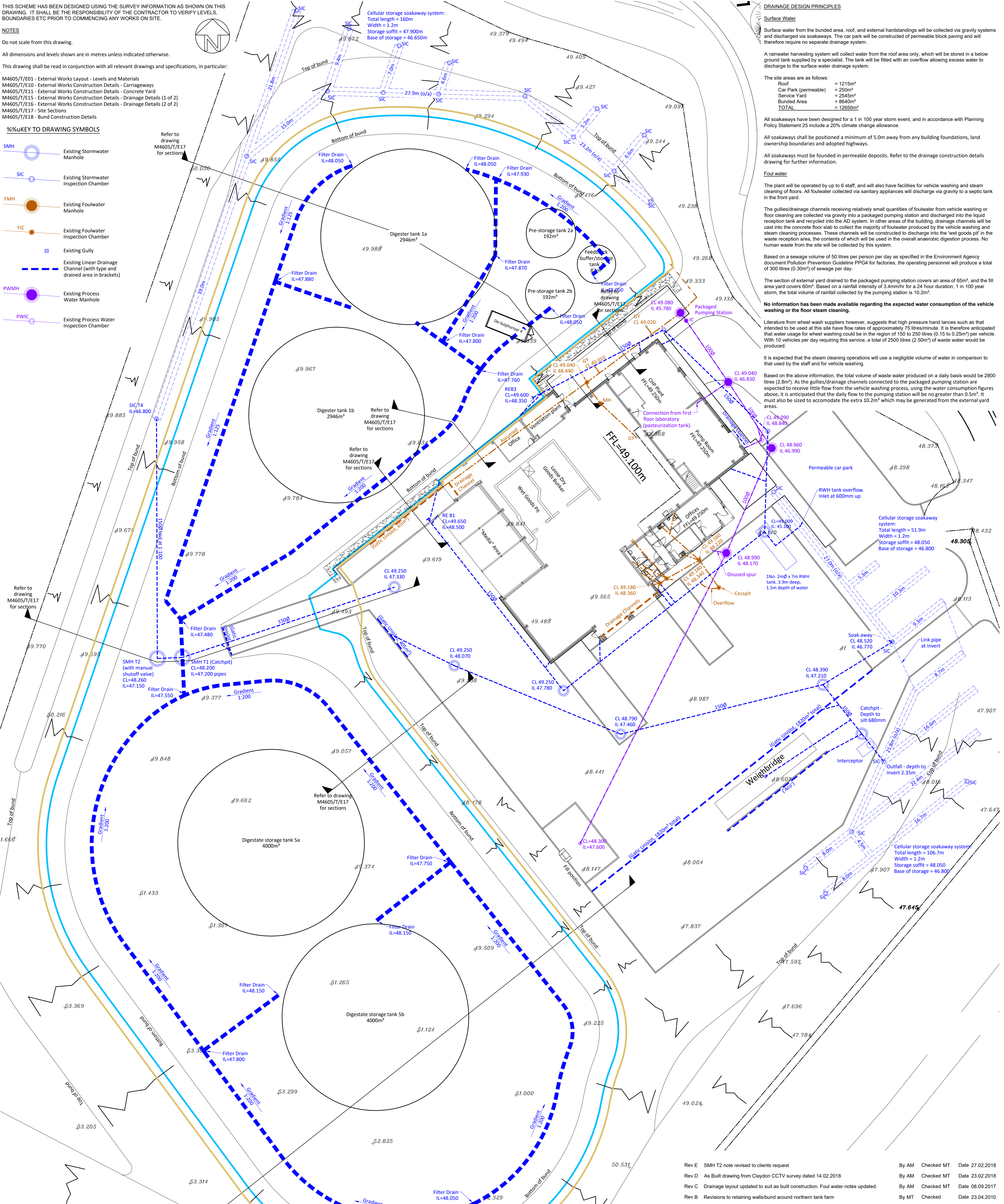
THIS SCHEME HAS BEEN DESIGNED USING THE SURVEY INFORMATION AS SHOWN ON THIS DRAWING. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY LEVELS, BOUNDARIES ETC PRIOR TO COMMENCING ANY WORKS ON SITE.

**NOTES**

- Do not scale from this drawing.
- All dimensions and levels shown are in metres unless indicated otherwise.
- This drawing shall be read in conjunction with all relevant drawings and specifications, in particular:
  - M4605/T/E01 - External Works Layout - Levels and Materials
  - M4605/T/E10 - External Works Construction Details - Carriageways
  - M4605/T/E11 - External Works Construction Details - Concrete Yard
  - M4605/T/E15 - External Works Construction Details - Drainage Details (1 of 2)
  - M4605/T/E16 - External Works Construction Details - Drainage Details (2 of 2)
  - M4605/T/E17 - Site Sections
  - M4605/T/E18 - Bund Construction Details

**%%uKEY TO DRAWING SYMBOLS**

- SMH** Existing Stormwater Manhole
- SIC** Existing Stormwater Inspection Chamber
- FMH** Existing Foulwater Manhole
- FIC** Existing Foulwater Inspection Chamber
- Existing Gully
- Existing Linear Drainage Channel (with type and drained area in brackets)
- PWMH** Existing Process Water Manhole
- PWIC** Existing Process Water Inspection Chamber



**DRAINAGE DESIGN PRINCIPLES**

**Surface Water**  
Surface water from the bunded area, roof, and external hardstandings will be collected via gravity systems and discharged via soakaways. The car park will be constructed of permeable block paving and will therefore require no separate drainage system.

A rainwater harvesting system will collect water from the roof area only, which will be stored in a below ground tank supplied by a specialist. The tank will be fitted with an overflow allowing excess water to discharge to the surface water drainage system.

The site areas are as follows:  
 Roof = 1215m<sup>2</sup>  
 Car Park (permeable) = 250m<sup>2</sup>  
 Service Yard = 2545m<sup>2</sup>  
 Bunded Area = 8640m<sup>2</sup>  
 TOTAL = 12650m<sup>2</sup>

All soakaways have been designed for a 1 in 100 year storm event, and in accordance with Planning Policy Statement 25 include a 20% climate change allowance.

All soakaways shall be positioned a minimum of 5.0m away from any building foundations, land ownership boundaries and adopted highways.

All soakaways must be fitted in permeable deposits. Refer to the drainage construction details drawing for further information.

**Foul water**  
The plant will be operated by up to 8 staff, and will also have facilities for vehicle washing and steam cleaning of floors. All foulwater collected via sanitary appliances will discharge via gravity to a septic tank in the front yard.

The gullies/drainage channels receiving relatively small quantities of foulwater from vehicle washing or floor cleaning are collected via gravity into a packaged pumping station and discharged into the liquid reception tank and recycled into the AD system. In other areas of the building, drainage channels will be cast into the concrete floor slab to collect the majority of foulwater produced by the vehicle washing and steam cleaning processes. These channels will be constructed to discharge into the 'wet goods pit' in the waste reception area, the contents of which will be used in the overall anaerobic digestion process. No human waste from the site will be collected by this system.

Based on a sewage volume of 50 litres per person per day as specified in the Environment Agency document Pollution Prevention Guideline PPG4 for factories, the operating personnel will produce a total of 300 litres (0.30m<sup>3</sup>) of sewage per day.

The section of external yard drained to the packaged pumping station covers an area of 65m<sup>2</sup>, and the fill area yard covers 60m<sup>2</sup>. Based on a rainfall intensity of 3.4mm/hr for a 24 hour duration, 1 in 100 year storm, the total volume of rainfall collected by the pumping station is 10.2m<sup>3</sup>.

No information has been made available regarding the expected water consumption of the vehicle washing or the floor steam cleaning.

Literature from wheel wash suppliers however, suggests that high pressure hand lances such as that intended to be used at this site have flow rates of approximately 75 litres/minute. It is therefore anticipated that water usage for wheel washing could be in the region of 150 to 250 litres (0.15 to 0.25m<sup>3</sup>) per vehicle. With 10 vehicles per day requiring this service, a total of 2500 litres (2.50m<sup>3</sup>) of waste water would be produced.

It is expected that the steam cleaning operations will use a negligible volume of water in comparison to that used by the staff and for vehicle washing.

Based on the above information, the total volume of waste water produced on a daily basis would be 2800 litres (2.8m<sup>3</sup>). As the gullies/drainage channels connected to the packaged pumping station are expected to receive little flow from the vehicle washing process, using the water consumption figures above, it is anticipated that the daily flow to the pumping station will be no greater than 0.5m<sup>3</sup>. It must also be sized to accommodate the extra 10.2m<sup>3</sup> which may be generated from the external yard areas.

**RAINWATER HARVESTING TANK**

The anaerobic digestion process requires the addition of water at various stages, and it is intended to collect rainfall from roof areas for this purpose, thus reducing the demand on potable supplies.

The Environment Agency document 'Conserving Water in Buildings - A Practical Guide' includes information on the sizing of rainwater harvesting (RWH) tanks. It recommends that the tank be sized for the lesser of 18 days worth of demand (of clean but non-potable water) or 5% of annual yield.

The water consumption for this site, based on the criteria listed in the foulwater drainage design notes, is approximately 2.8m<sup>3</sup> per day, requiring a tank volume of 50.4m<sup>3</sup> to store 18 days demand.

The Standard Average Annual Rainfall for this site is approximately 650mm. The roof area of the building is 1215m<sup>2</sup>, and thus the annual yield is some 790m<sup>3</sup>. It must be appreciated that this is a statistical figure and will vary on a yearly basis. Nor will this volume be distributed evenly throughout the year.

Using drainage and filter efficiency factors of 0.9 as recommended in the above document, 5% of the annual yield would be 32m<sup>3</sup>, and this would therefore be the optimum tank size, equivalent to some 11 days water demand. It has been requested however by the Client that the RWH tank have a nominal volume of no less than 100m<sup>3</sup>.

The RWH tank shall be a proprietary product complying with all relevant requirements and standards, including but not limited to the following:  
 It shall comply with BS 8515 'Rainwater harvesting systems - Code of practice'  
 It shall be designed to have a nominal capacity of 100m<sup>3</sup>, as requested by the Client.

It shall be fitted with integral pumping equipment and an automatic mains water 'top-up' facility, with appropriate air gaps and backflow prevention devices as required by the above British Standard.

It shall be fitted with remote monitoring devices, including equipment to alert staff to disruption in its operation, and be capable of operating between the manufacturers recommended service intervals without attention or inspection.

The location of the control kiosk and alarm system supplied with the RWH tank shall be in accordance with the Architects requirements.

It shall be supplied by a specialist manufacturer to meet the storm drainage requirements as shown on this drawing and installed strictly in accordance with their requirements.

Construction drawings of the RWH tank shall be submitted to the Engineer prior to installation to determine any concrete surround requirements to avoid flotation.

Draft operating instructions and maintenance manuals shall be submitted to the Contractors for approval prior to installation. Working operating instructions and maintenance manuals shall be provided within 3 months of instruction.

**PACKAGED PUMPING STATION**  
 The packaged pumping station shall be a proprietary product complying with all relevant requirements and standards, including but not limited to the following:  
 It shall be designed to have a nominal capacity of 10.7m<sup>3</sup>, to provide 24 hours of storage capacity in accordance with Building Regulations Approved Document H1 Paragraph 2.39, to allow for interruptions in service.

It shall be fitted with remote monitoring devices, including equipment to alert staff to disruption in its operation, and be capable of operating between the manufacturers recommended service intervals without attention or inspection.

The location of the control kiosk and alarm system supplied with the pumping station shall be in accordance with the Architects requirements.

It shall comply with Approved Document H1 of The Building Regulations and BS EN 752.

It shall be supplied by a specialist manufacturer to meet the foul drainage requirements as shown on this drawing and be installed strictly in accordance with their requirements.

Facilities for odour control shall be installed as necessary to suit the location.

Construction drawings of the packaged pumping station shall be submitted to the Engineer prior to installation to determine any concrete surround requirements to avoid flotation.

Draft operating instructions and maintenance manuals shall be submitted to the Contractors for approval prior to installation. Working operating instructions and maintenance manuals shall be provided within 3 months of instruction.

Rev E	SMH T2 note revised to clients request	By AM	Checked MT	Date 27.02.2018
Rev D	As Built drawing from Claydon CCTV survey dated 14.02.2018	By AM	Checked MT	Date 23.02.2018
Rev C	Drainage layout updated to suit as built construction. Foul water notes updated.	By AM	Checked MT	Date 08.09.2017
Rev B	Revisions to retaining walls/bund around northern tank farm	By MT	Checked	Date 23.04.2010
Rev A	Issued for construction	By MT	Checked	Date 04.03.2010

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**Client** Fernbrook Builders

**Project** Proposed Anaerobic Digestion Plant Rothwell Lodge Farm

**Title** External Works Layout Drainage Design

Scale at A1	1:250	Drawn by	Checked by	Date	August 2009
Status	As Built	Project ref	M4605/T	Drawing no.	E02
		Revision			E