

## Drainage installation

### Trench excavation

Please refer to the accompanying drawing **17010 01 Airfield Park 5AS Drainage** for the layout of the drainage scheme. Drain cross sections are presented on the same drawing.

The trenches shall be clean cut, with a level base, to the dimensions shown in the cross sections. All trenches shall be excavated with machinery fitted with laser grade control. Excavation shall begin at the outfall, the profile to be established at the outfall, and carried upstream with adjustments for grade and depth as work proceeds. Any under drains encountered are to be marked so they can be renovated and connected into the new system if considered viable. All spoil from this operation shall be assumed to be disposed off site unless directed by the clients engineer for disposal on site.

### Trench dimensions

Lateral drains (80 mm Ø plastic perforated pipe)

- 500 mm below nominal ground level.
- 4 m spacing
- Not more than 0.150 m wide
- Grade at natural fall of finished surface and not less than 0.50% (1:200)

Collector drain (100 mm Ø plastic perforated pipe).

- 600 mm below nominal ground level
- Not more than 180mm wide
- Grade at natural fall of finished surface and not less than 0.50% (1:200)

Outfall main drain (100mm Ø non-perforated twin wall pipe)

- Depth and grade may vary but ideally no shallower than 600mm with a minimum gradient of 0.5% (1:200)
- Not more than 0.200 m wide.

### Gravel backfill for lateral and collector drains

The material shall be clean, hard, gravel or chippings (e.g. quartz or quartzite) with dimensions not greater than 6 mm and not less than 2 mm. The calcium carbonate content shall not exceed 10%. The material shall be free of fines and placed in a 25 mm layer on the trench floor prior to laying the pipe (unless the trencher cuts a "V" shaped trench base when the pipe can be laid directly on the trench floor). The gravel backfill shall be placed immediately and carefully over the pipe to the permeable fill surface level. Any damage to the pipe shall be made good at the Contractor's expense.

Backfill for 100mm diameter main outfall drain will use clean spoil derived from the drain trench.

### Sand fill material for lateral and collector drains

The sand shall comply with the following grading:

- |                                 |          |
|---------------------------------|----------|
| • V. coarse sand (2.0 – 1.0 mm) | <5%      |
| • Coarse sand (1.0 – 0.5 mm)    | 10 – 20% |
| • Medium sand (0.5 – 0.25 mm)   | 55 – 70% |
| • Fine sand (0.25 – 0.15 mm)    | 10 – 20% |
| • V. fine sand (0.15 – 0.05 mm) | <5%      |

The sand shall have a capillary rise of no more than 250 mm when compact (1.65 g/cm<sup>3</sup>), shall have at least 15% air-filled porosity in the top 50 mm of the capillary rise and shall have a saturated hydraulic conductivity of at least 300 mm/h when compact (1.65 g/cm<sup>3</sup>). The sand

shall be non-saline (electrical conductivity < 0.75 dS/m), and contain less than 0.5% (w/w) CaCO<sub>3</sub> and have a pH in the range of 5.5 – 7.0.

Provision shall be made for topping up drain lines during the first 12 months following practical completion to take into account natural settlement of material within the trenches, including soil shrinkage from drying, such that a level playing surface is achieved. This shall be taken into account when preparing cost estimates.

#### Pipe laying

Pipes shall be laid to the correct depth stipulated above and to an even grade. Drainage depth is to be measured from finished ground levels (unless indicated otherwise). The pipe shall be corrugated plastic corresponding to BS EN 1401- 1:2009. There should be no damage to the pipe. Upper ends of drain runs shall be plugged to prevent ingress of soil or animals.

The outfall drain shall be solid, smooth, twin-walled plastic pipe to BS EN 1401-1:2009.

#### Junctions and connections

Connection of lateral drains to the collector drains shall be made with purpose made junctions (80/100 mm).

The collector and main drains shall be let into the inspection chamber and caulked with either a sand/cement mix concrete or external silicone sealant to make good the pipe/wall seal.

#### Inspection Chambers/silt trap

The inspection chamber is to be positioned as indicated on the accompanying plan. The chamber can be constructed of brick, concrete or plastic (conforming to BS EN 13598-2:2009) and shall be large enough to permit access for cleaning, jetting and rodding. A sump of at least 150 mm below the lowest pipe shall be incorporated to act as a silt trap. The top of the chambers shall be set level with the ground surface. The cover loading (to BS EN 124-1 to -6: 2015) for the inspection chambers on the playing surface shall be Class B125.

#### Outfall

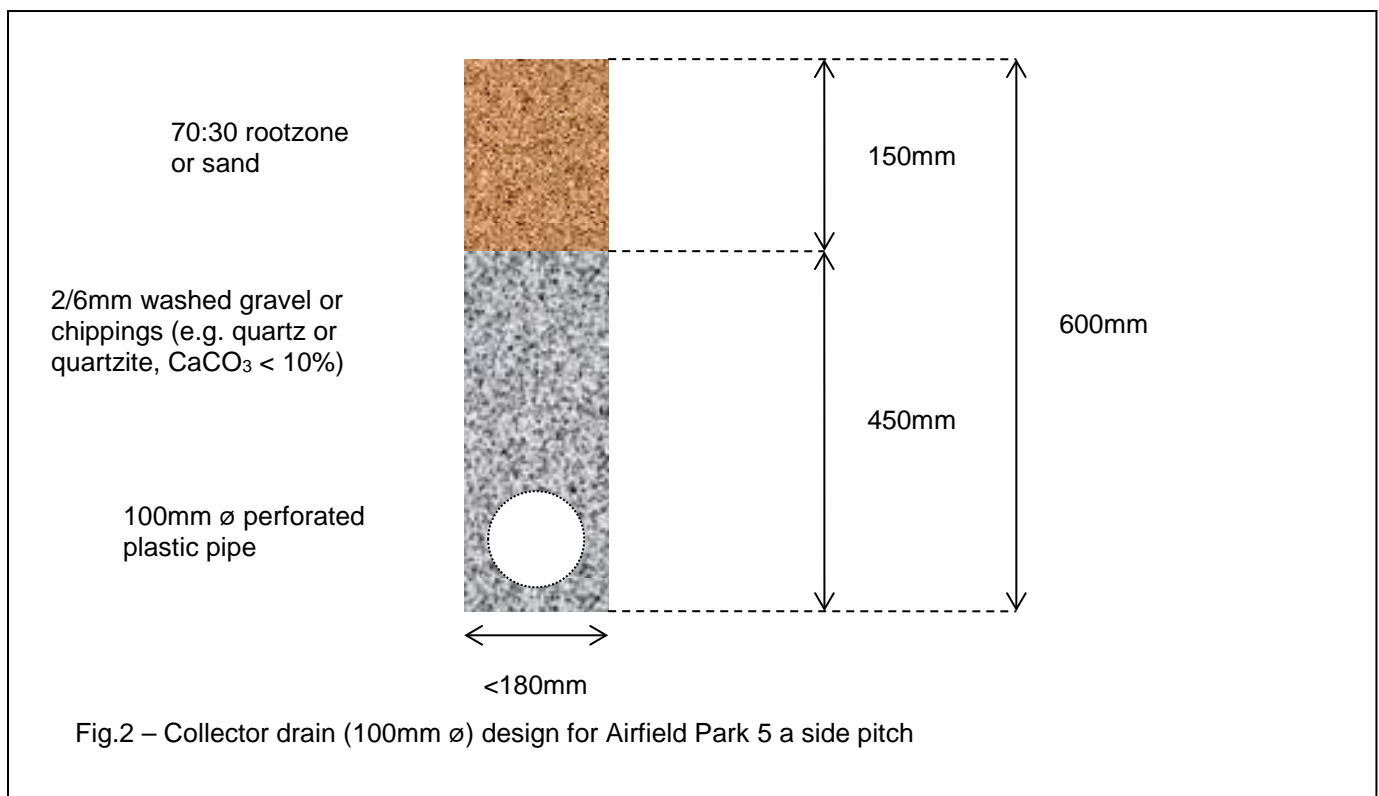
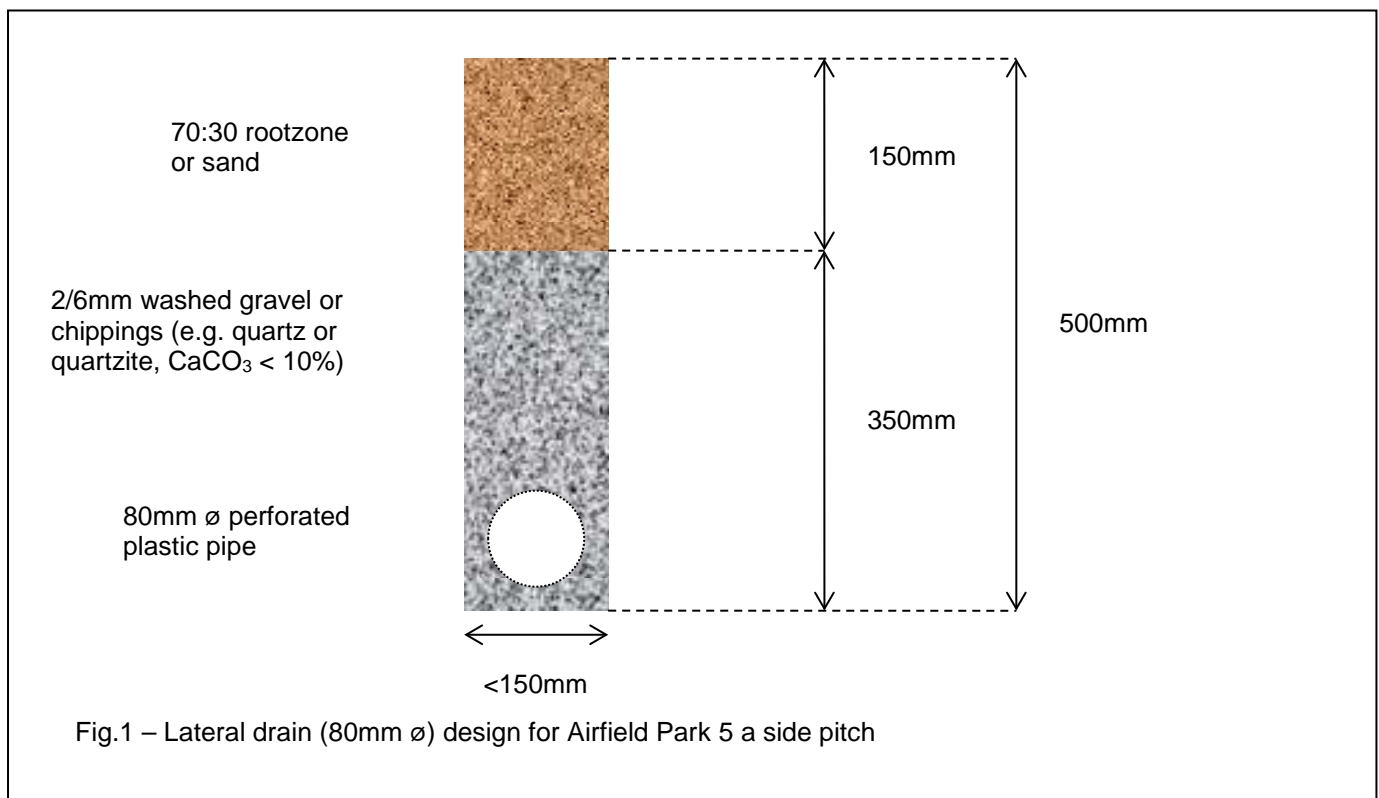
The outfall drain will discharge to the balancing pond. Final connection shall be made using a GRC headwall and the outlet fitted with a suitable pipe flap valve.

#### Rootzone fill material for lateral and collector drains

In the event that the drainage scheme is installed to established grass, the sand shall be replaced with a rootzone. The rootzone material shall:

- comprise an 70:30 sand/soil mix
- have a capillary rise of no more than 250 mm at a dry bulk density of 1.6 mg m<sup>-3</sup>
- have at least 15% air-filled porosity in the top 50 mm of the capillary rise
- have a saturated hydraulic conductivity of at least 150 mm/h at 20 cm tension and a dry bulk density of 1.60 mg m<sup>-3</sup>

## Drain cross sections



Backfill with as dug material,  
all joints bedded & haunched  
in concrete

100mm  $\varnothing$  non  
perforated plastic pipe

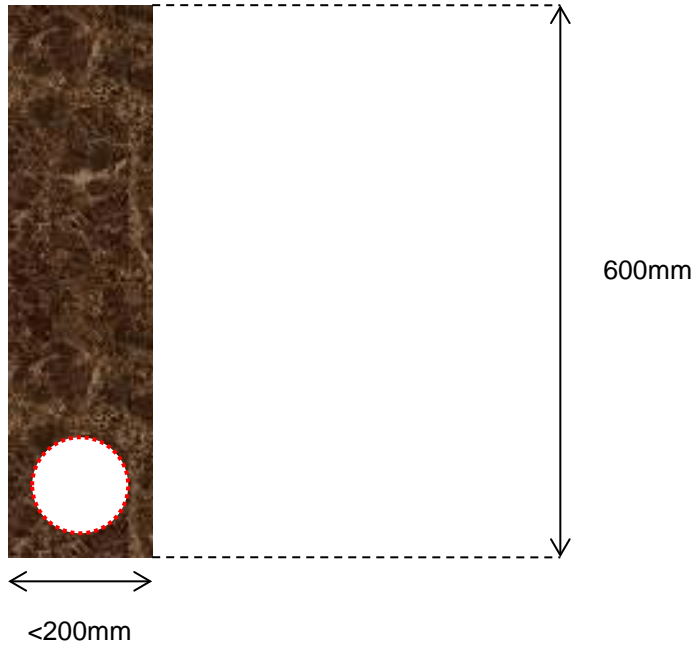


Fig.3 – Carrier drain (100mm  $\varnothing$  twin wall) design for Airfield Park 5 a side pitch