

This drawing had been produced for discharge of planning conditions only.
All levels and details to be checked for Building Regulations approval and construction purposes.

Site Plan scale 1:200

Mate GeoTechnic Services

02	Updated Permeable Paving	RC	07-09-21
01	Original	RC	30-06-21
Rev.	Description	Drn.	Date

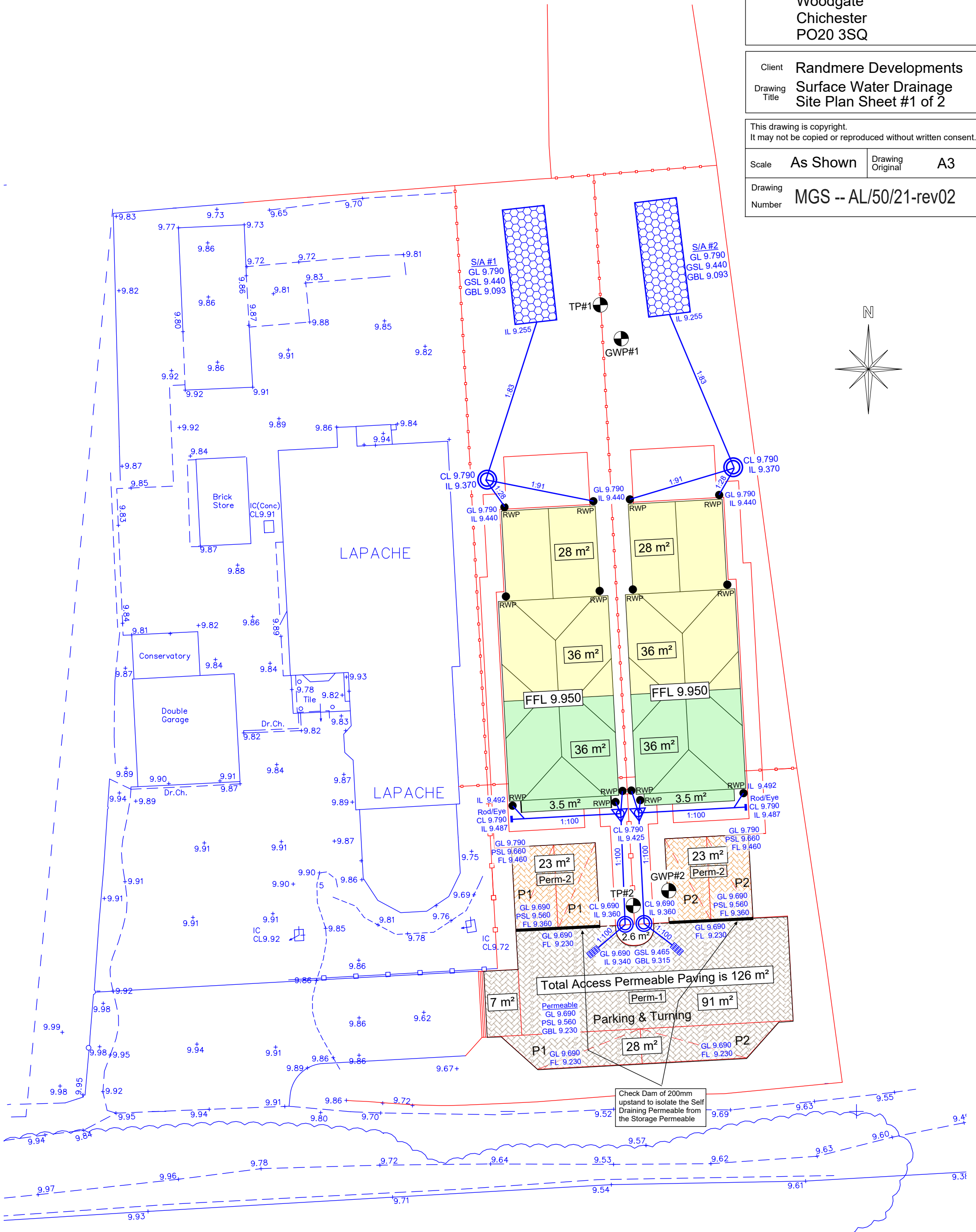
Project	Proposed Development “L’Apache” Westergate Street Woodgate Chichester PO20 3SQ
---------	---

Client	Randmere Developments
Drawing Title	Surface Water Drainage Site Plan Sheet #1 of 2

This drawing is copyright.
It may not be copied or reproduced without written consent.

Scale	As Shown	Drawing Original	A3
-------	----------	---------------------	----

Drawing Number MGS -- AL/50/21-rev02



Winter Soil Infiltration Testing Results

TP#1 BRE365 Trial Pit
1250mm long x 650mm wide x 765mm deep

February 25th 2021 -- 6.779 E-06 m/s
February 26th 2021 -- 5.195 E-06 m/s
March 1st 2021 -- 5.282 E-06 m/s

The Minimum Rate used in the calculations from the three tests within the Trial Pit TP#1 was 5.195 E-06 metres / second.

A Factor of Safety of 2 was applied in the calculations for the design for each Soakaway located in each of the rear gardens.

TP#2 BRE365 Trial Pit
1300mm long x 640mm wide x 555mm deep

February 25th 2021 -- 1.477 E-05 m/s
February 26th 2021 -- 6.515 E-06 m/s
March 1st 2021 -- 7.723 E-06 m/s

The Minimum Rate used in the calculations from the three tests within the Trial Pit TP#2 was 6.515 E-06 metres / second.

A Factor of Safety of 2 was applied in the calculations for the design of each of the Front Permeable Paved Self Draining Parking areas.

A Factor of Safety of 3 was applied in the calculations for the design of the Front (Storage) Permeable Paved Entrance Turning and Parking area.

KEY



GWP Groundwater Monitoring Test Point.



TP Soil Infiltration Testing
BRE365 Trial Pit.



Proposed 250mm diameter surface water inspection chamber.
Osma shallow IC or similar approved.
Cover & Frame class A15 to BS EN 124



Proposed silt trap inspection chamber
Polypipe Ridgistorm Basic or similar approved.
Cover & Frame class A15 to BS EN 124



Proposed Rainwater Diffuser Unit.
Polypropylene core and 2mm HDPE mesh surround.
Typical size 708mm x 354mm x 150mm deep.
Polypipe Permavoid HD Diffuser or similar approved.



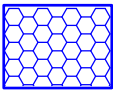
Proposed surface water drainage.
100mm diameter PVC pipe.
Minimum fall of 1:100



Proposed Permeable Paving for Self Drain Infiltration only, CGA Type 4 / 20 aggregate, (minimum 30% voids) with a Minimum Hydraulic Depth of 200mm. Structural Depth to be Calculated by Others. (Perm-2)



Proposed Permeable Paving for Storage and Infiltration, CGA Type 4 / 20 aggregate, (minimum 30% voids) with a Minimum Hydraulic Depth of 330mm. Structural Depth to be Calculated by Others. (Perm-1)



Proposed Geocellular Soakaways.
S/A #1 to be 6m60 x 2m40 x 347mm deep.
S/A #2 to be 6m60 x 2m40 x 347mm deep.
Each has a footprint area of 15.84 square metres.
Brett-Martin StormCrate55 GeoCells each of 1200mm x 600mm x 347mm

GL ####

Ground level at detailed items

CL ####

Cover level of surface water chambers

IL ####

Invert level of surface water drains

GSL ####

Soffit (top) level of Geocell infiltration structure

GBL ####

Base level of Geocell infiltration structure

PSL ####

Soffit (top) level of Permeable (storage &) infiltration Structure

FL ####

Formation level of Permeable Structure

+ 5.999

All levels are to AOD unless otherwise stated

Mate GeoTechnic Services

02	Updated Permeable Paving	RC	07-09-21
01	Original	RC	30-06-21
Rev.	Description	Drn.	Date

Project
**Proposed Development
“L’Apache”
Westergate Street
Woodgate
Chichester
PO203SQ**

Client
Randmere Developments
Drawing
Title
**Surface Water Drainage
Site Plan Sheet #2 of 2**

This drawing is copyright.
It may not be copied or reproduced without written consent.

Scale
As Shown
Drawing
Original
A3

Drawing
Number
MGS -- AL/50/21-rev02

Surface Water Drainage Design Notes

As detailed from the British Geological Survey, the Superficial Geological ground conditions here indicates River Terrace Deposits of sand, silt and clay over Bedrock of the London Clay Formation. The bedrock was not encountered in either of the Groundwater Monitoring BoreHoles.

In mid January 2021 a 75mm diameter BoreHole was augered to a depth of 2070mm (7.720 AOD) below ground level (BGL) and groundwater was initially encountered at a depth of 1682mm BGL rising to a depth of 1432mm BGL on installation. An Open Head Piezometer (a slotted monitoring pipe) GWP#1 was installed to this maximum depth at the approximate position of the proposed rear soakaways and groundwater was monitored on a weekly basis from mid January 2021 to mid March 2021. During the monitoring period, the highest level of groundwater of 751mm BGL at 9.039 AOD, was recorded on 31st January 2021. A second highest level of groundwater was recorded on 21st February 2021, at 892mm BGL at 8.898 AOD. These to inform the use of infiltration systems for each of the rear garden soakaways to a typical depth of 750mm BGL whilst still maintaining a minimum of freeboard.

A second 75mm diameter BoreHole was augered to a depth of 1680mm BGL (8.010 AOD), as groundwater monitoring point GWP#2 and groundwater was encountered at 1505mm BGL rising to 1388mm BGL. This borehole was left open but covered. Groundwater was again monitored on a weekly basis from mid January 2021 to mid March 2021. During the monitoring period, the highest level of groundwater of 792mm BGL at 8.898 AOD, was recorded on 31st January 2021. A second highest level of groundwater was recorded on 21st February 2021, at 879mm BGL at 8.811 AOD. These to inform the use of infiltration systems for the proposed front access and parking areas to a typical total depth of 550mm BGL, whilst maintaining freeboard.

The drainage design is based on percolation tests carried out in late February 2021 to BRE365 principles within Trial Pit TP#1, at a depth of 765mm BGL and within Trial Pit TP#2, at a depth of 555mm BGL. The Soil Infiltration Rates obtained are detailed in the table above.

Testing produced a range of Infiltration Rates and a minimum soil infiltration rate from Trial Pit TP#1, used for each of the rear garden soakaways, of 5.195 E-06 metres / second was obtained. In the calculations, this minimum rate from TP#1 has a Factor of Safety of 2 applied, where the consequence of failure is "no damage".

Testing in Trial Pit TP#2, for the front permeable paving areas, produced a minimum soil infiltration rate of 6.515 E-06 metres/second. For each of the two self draining parking areas marked as Perm-2, the rate obtained from TP#2 has a Factor of Safety of 2 applied, where the consequence of failure is "no damage". Whereas for the main entrance, turning and additional parking area, marked as Perm-1, a Factor of Safety of of 3 has been applied to the rate obtained from TP#2, where the consequence of failure is "minor inconvenience".

The impermeable roof areas for each building has been split along the natural architectural width centre-line, of each building, resulting in 4 symmetrical areas each of 36 square metres. The front halves of each of the 2 buildings will drain into the Permeable Paved area of the main access, turning and additional parking areas. The Front Porch and Bay Window areas, for each building, each of 3.5 square metres, will additionally drain into the Permeable Paving. Each building will have an impermeable roof area of 39.5 square metres draining through a separate Silt Trap and into separate Diffusion Units and ultimately into the Sub-Base of the Permeable. This separates each building and results in no common draining infrastructure with no common maintenance issues.

The rear halves of each of the 2 buildings will drain into their own individual Soakaways. The rear gabled extension of each building, each of 28 square metres, will additionally drain into their respective soakaways. Each building will have an impermeable roof area of 64 square metres draining through a separate Silt Trap. Each of the rear halves of their main building rainwater down-pipes will discharge into the guttering of the gabled extension and thence into the silt trap. For this rear gabled extension deep flow guttering may be required. This minimises the fall of the final discharge into the soakaway. This also separates each building and results in no common draining infrastructure with no common maintenance issues.

Two 347mm deep rectangular geocellular soakaways S/A #1 & S/A #2 have been designed, 6.60 metres long x 2.40 metres wide, with a cover of 350mm, which will be suitable to drain all of the rear roof areas, each of 64 square metres.

Each of the front 2-bay parking areas for each property of 23 square metres, is self-draining' Permeable Paving only with a hydraulic depth of 200mm Coarse Graded Aggregate (CGA), and has no storage features, with a linear fall of approximately 1:48, but each has a 'Check Dam' of 200mm high included at it's low end to eliminate overspill into the main storage Permeable Structure.

The proposed main driveway access, turning and additional parking area of 126 square metres, is Permeable Paving. It's area plus the 2 building's front roof areas of 79 square metres (39.5 square metres each) results in the requirement for infiltration and storage of 205 square metres and will require a hydraulic depth of 330mm Coarse Graded Aggregate (CGA).

These depths of CGA for the two types of permeable structures may have to be increased for Structural Loading Capacities but will be calculated by others.

The proposed soakaways S/A#1 and S/A#2 and the Permeable Paved access driveway, turning and additional parking area have been designed to meet Building Regulations, below their lowest incoming pipe, on a 1 in 10 year rainfall return event.

In addition all the infiltration structures (soakaways and both types of permeable paved areas) have been designed, without flooding above ground level, on a 1 in 100 year rainfall return event plus 40% climate change addition.

The location of the Geocellular Soakaways S/A #1 and S/A #2 are at the far end of each of their respective gardens. This is as a consequence of the site having high groundwater thus requiring a shallow cover depth of 350mm (less than that normally used for typical design purposes). This shallow depth means that in the summer periods of reduced rainfalls, the grass covering tends to brown out. Having the soakaways distancing further than the minimum requirement of 5 metres reduces the visual impact, of any browning of the grass , from each of the properties.

The separation of the impermeable roof areas and the turning & parking areas, optimises the available infiltration resources.

Soakaways S/A #1 & S/A #2 should be sited a minimum of 5 metres from each other to avoid any saturation of the ground.

Soakaways S/A #1 & S/A #2 and the Diffusion Units within the permeable should be sited a minimum of 5 metres from any habitable building or garage to avoid any saturation of the ground and settlement affecting the building structure.

The drainage for the original buildings of L’Apache remains untouched as existing, with investigations not indicating that the proposed two new buildings would compromise their discharge / drainage or the new building proposed drainage schemes, thus they will retain their respective discharge points and drainage structures.