

**6938**

## **Llay Miners Welfare Institute and Recreation Ground**

### **Surface Water Proposals**

#### Introduction

Gower Homes are proposing a new residential development consisting of 18 detached properties with associated highway, driveways, gardens and POS. The site is currently greenfield with no positive drainage connections.

The design for a surface water drainage system for the proposed development will be guided by the principles set out in the Welsh Government's 'Recommended non-statutory standards for sustainable drainage (SuDS) in Wales – designing, constructing, operating and maintaining surface water drainage systems' (2017)

The SuDS Standards Wales sets out the following hierarchy for surface water runoff destination:

Priority Level 1: Surface water runoff is collected for use;

Priority Level 2: Surface water runoff is infiltrated to ground;

Priority Level 3: Surface water runoff is discharged to a surface water body;

Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system;

Priority Level 5: Surface water runoff is discharged to a combined sewer.

Note that Priority Level 1 is the preferred (highest priority) and that 4 and 5 should only be used in exceptional circumstances.

#### Priority 1

Whilst rainwater harvesting has been considered for the proposed development it should be noted that any device enabling water re-use cannot be taken into account when sizing attenuation as the storage facility may be full when a storm event occurs. Therefore, an over flow to an infiltration device (where ground conditions allow) or to a watercourse / sewer will be required.

Gower Homes are not proposing to incorporate rainwater harvesting within the development, however they are proposing to install a water butt to each dwelling which will allow for water collection for garden re-use.

## Priority 2

GroundSolve Ltd have undertaken infiltration testing on site in accordance with BRE365. All tests failed due to the cohesive soil characteristics of the strata and therefore disposal of surface water flows on site via infiltration methods is not considered feasible.

Refer to Appendix 1 for the infiltration test results.

## Priority 3

The nearest watercourse is an un-named tributary of the River Alun approximately 350m north east of site flowing through Nant-y-Gaer Wood. A connection to the watercourse would require a new network through a residential estate highway and third-party land. The overall length would be nearer 500m which is not considered a practical or cost-effective solution for this development.

## Priority 4

Welsh Water have advised that the surface water flows from this development will only be permitted to the public surface water network once it has been demonstrated that all other options in the hierarchal approach have been discounted. As we have demonstrated other run-off destinations are unfeasible we are proposing to discharge surface water flows at a restricted flow rate of 5 l/s into the surface water public sewer in Llay New Road to the south of the site.

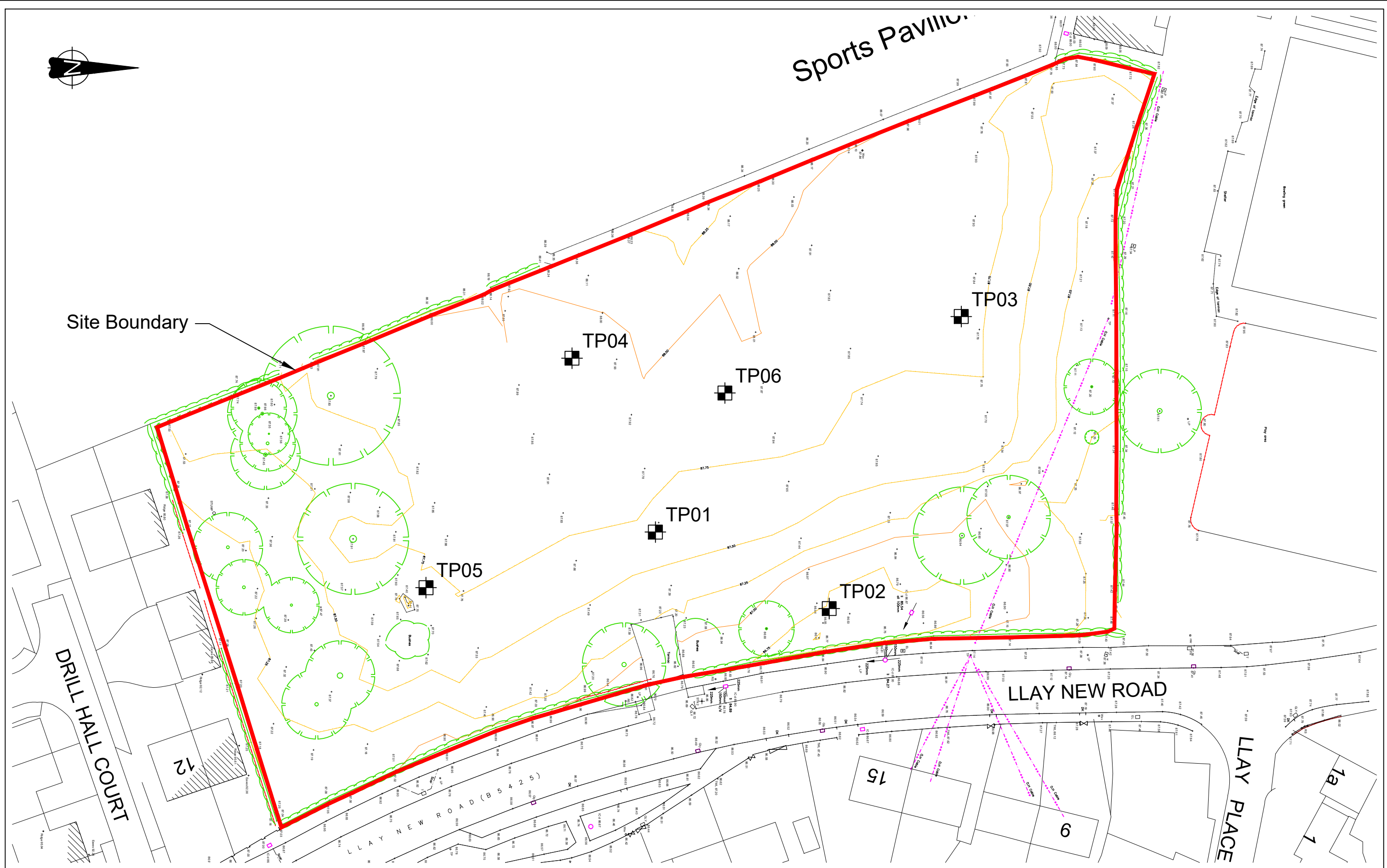
Attenuation for the 30-year flood event will be provided within a network of on-line oversized pipes and manholes. This will be offered to Welsh Water for adoption under a S104 Agreement.

Attenuation for the 100-year flood event plus 30% climate change allowance will be provided within off-line swale surface features. These will remain private and will maintained by a management company to ensure all components are fully functional at all times.

Andy Jones  
Senior Infrastructure Engineer

## Appendix 1

### Infiltration Testing



SCALE 1:500 @ A3

Figure Title  
**EXISTING SITE LAYOUT &  
LOCATIONS OF TRIAL PITS**  
  
**FIGURE 2**

TRIAL PIT 01 – SJ 32938 55842

| Depth (m)   | Strata                                                                                                                                                                          |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.00 – 0.30 | Grass over brown clayey slightly sandy SILT (TOPSOIL)                                                                                                                           |
| 0.30 – 0.60 | Firm to stiff light red brown with grey fissures slightly sandy very gravelly CLAY. Gravel is fine to coarse sub-angular to rounded (WEATHERED TILL)                            |
| 0.60 – 2.30 | Stiff to very stiff red brown with some grey fissures slightly sandy very gravelly CLAY with occasional cobble. Gravel is fine to coarse sub-rounded to rounded. (GLACIAL TILL) |

Notes

1. Pit dimensions – 0.60 x 1.80 x 2.30m depth
2. Pit sides were stable.
3. No groundwater encountered.
4. Pocket penetrometer reading at 450mm depth = 200 – 250 kPa.
5. Pocket penetrometer reading at 800mm depth = 350 – 400 kPa.



Trial Pit 01



Trial Pit 01 – Pit Walls



Trial Pit 01 - Arisings

TRIAL PIT 02 – SJ 32949 55867

| Depth (m)   | Strata                                                                                                                                                                          |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.00 – 0.30 | Grass over brown clayey slightly sandy SILT (TOPSOIL)                                                                                                                           |
| 0.30 – 0.80 | Stiff light red brown with grey fissures slightly sandy very gravelly CLAY. Gravel is fine to coarse sub-angular to rounded (WEATHERED TILL)                                    |
| 0.80 – 2.10 | Stiff to very stiff red brown with some grey fissures slightly sandy very gravelly CLAY with occasional cobble. Gravel is fine to coarse sub-rounded to rounded. (GLACIAL TILL) |
| 2.10 – 2.20 | Very stiff blue grey clayey sandy SILT with very stiff red brown clay (GLACIAL TILL)                                                                                            |

Notes

1. Pit dimensions – 0.60 x 1.80 x 2.20m depth.
2. Pit sides were stable.
3. No groundwater encountered.
4. Pocket penetrometer reading at 0.40m depth = 250 - 300 kPa.
5. Pocket penetrometer reading at 0.90m depth = 400 – 450 kPa.



Trial Pit 02



**Trial Pit 02 – Pit Walls**



**Trial Pit 02 - Arisings**

TRIAL PIT 03 – SJ 32907 55886

| Depth (m)   | Strata                                                                                                                                                                          |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.00 – 0.30 | Grass over brown clayey slightly sandy SILT (TOPSOIL)                                                                                                                           |
| 0.30 – 0.80 | Stiff light red brown with grey fissures slightly sandy very gravelly CLAY. Gravel is fine to coarse sub-angular to rounded (WEATHERED TILL)                                    |
| 0.80 – 2.20 | Stiff to very stiff red brown with some grey fissures slightly sandy very gravelly CLAY with occasional cobble. Gravel is fine to coarse sub-rounded to rounded. (GLACIAL TILL) |

Notes

1. Pit dimensions – 0.60 x 2.00 x 2.20m depth.
2. Pit sides were stable
3. No groundwater encountered.



Trial Pit 03



**Trial Pit 03 – Pit Walls**



**Trial Pit 03 - Arisings**

TRIAL PIT 04 – SJ 32913 55830

| Depth (m)   | Strata                                                                                                                                                                          |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.00 – 0.35 | Grass over brown very clayey SILT with occasional cobble of broken brick (MADE GROUND)                                                                                          |
| 0.35 – 0.80 | Stiff light red brown with grey fissures slightly sandy very gravelly CLAY. Gravel is fine to coarse sub-angular to rounded (WEATHERED TILL)                                    |
| 0.80 – 2.60 | Stiff to very stiff red brown with some grey fissures slightly sandy very gravelly CLAY with occasional cobble. Gravel is fine to coarse sub-rounded to rounded. (GLACIAL TILL) |

Notes

1. Pit dimensions – 0.60 x 2.30 x 2.60m depth.
2. Old electricity feed encountered at 0.45m depth, possible feed to demolished building.
3. Pit sides were stable.
4. No groundwater encountered.



Trial Pit 04



**Trial Pit 04 – Pit Walls**



**Trial Pit 04 - Arisings**

TRIAL PIT 05 – SJ 32946 55809

| Depth (m)   | Strata                                                                                                                                                                          |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.00 – 0.30 | Grass over brown clayey slightly sandy SILT (TOPSOIL)                                                                                                                           |
| 0.30 – 0.60 | Stiff light red brown with grey fissures slightly sandy very gravelly CLAY.<br>Gravel is fine to coarse sub-angular to rounded (WEATHERED TILL)                                 |
| 0.60 – 1.80 | Stiff to very stiff red brown with some grey fissures slightly sandy very gravelly CLAY with occasional cobble. Gravel is fine to coarse sub-rounded to rounded. (GLACIAL TILL) |
| 1.80 – 2.00 | Medium dense light red brown fine to medium SAND (GLACIAL DEPOSIT)                                                                                                              |

Notes

1. Pit dimensions – 0.60 x 1.60 x 2.00m depth.
2. Pit sides were stable.
3. No groundwater encountered.
4. Soakaway test carried out in trial pit.

TRIAL PIT 06 – SJ 32918 55852

| Depth (m)   | Strata                                                                                                                                                                          |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.00 – 0.30 | Grass over brown very clayey SILT with occasional cobble of broken brick (MADE GROUND)                                                                                          |
| 0.30 – 0.60 | Stiff light red brown with grey fissures slightly sandy very gravelly CLAY. Gravel is fine to coarse sub-angular to rounded (WEATHERED TILL)                                    |
| 0.60 – 2.40 | Stiff to very stiff red brown with some grey fissures slightly sandy very gravelly CLAY with occasional cobble. Gravel is fine to coarse sub-rounded to rounded. (GLACIAL TILL) |

Notes

1. Pit dimensions – 0.60 x 1.80 x 2.40m depth.
2. Pit sides were stable.
3. No groundwater encountered.



Trial Pit 04



**Trial Pit 04 – Pit Walls**

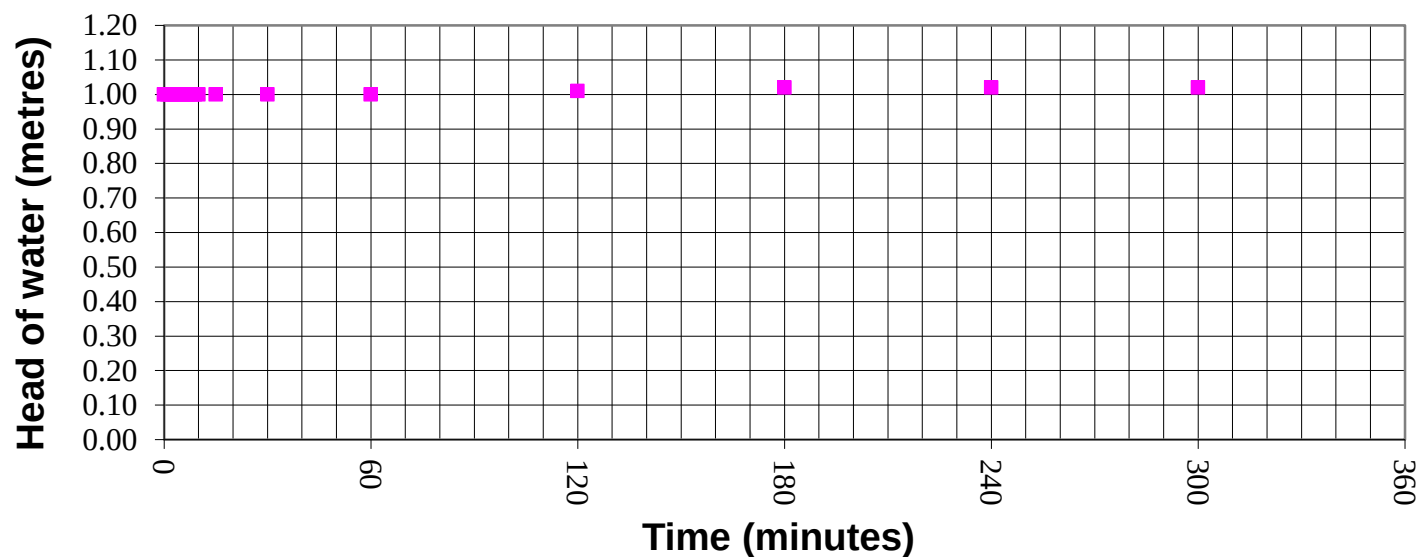


**Trial Pit 04 - Arisings**

| Time<br>(Mins) | Depth of<br>Water | Head of<br>Water |
|----------------|-------------------|------------------|
| 0              | 1.20              | 1.00             |
| 1              | 1.20              | 1.00             |
| 2              | 1.20              | 1.00             |
| 3              | 1.20              | 1.00             |
| 4              | 1.20              | 1.00             |
| 5              | 1.20              | 1.00             |
| 6              | 1.20              | 1.00             |
| 7              | 1.20              | 1.00             |
| 8              | 1.20              | 1.00             |
| 9              | 1.20              | 1.00             |
| 10             | 1.20              | 1.00             |
| 15             | 1.20              | 1.00             |
| 30             | 1.20              | 1.00             |
| 60             | 1.20              | 1.00             |
| 120            | 1.19              | 1.01             |
| 180            | 1.18              | 1.02             |
| 240            | 1.18              | 1.02             |
| 300            | 1.18              | 1.02             |
|                |                   |                  |
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GroundSolve Ltd

Llay New Road, Llay  
**TP02 Test 1**  
 22/02/18



| Depth | Length | Width | Head at 75% Vol | Head at 25% Vol | Water depth(t=0) | Effective Area | Vp75-Vp25          | Adjustment Factor * | t75    | t25    | Infiltration |
|-------|--------|-------|-----------------|-----------------|------------------|----------------|--------------------|---------------------|--------|--------|--------------|
| (m)   | (m)    | (m)   | (m)             | (m)             | (m)              | Ap50 m2        | Volume of water m3 |                     | (mins) | (mins) | rate m/s     |
| 2.20  | 1.60   | 0.70  | 0.750           | 0.25            | 1.00             | 3.420          | 0.560              | 1.00                | N/A    | N/A    | #VALUE!      |

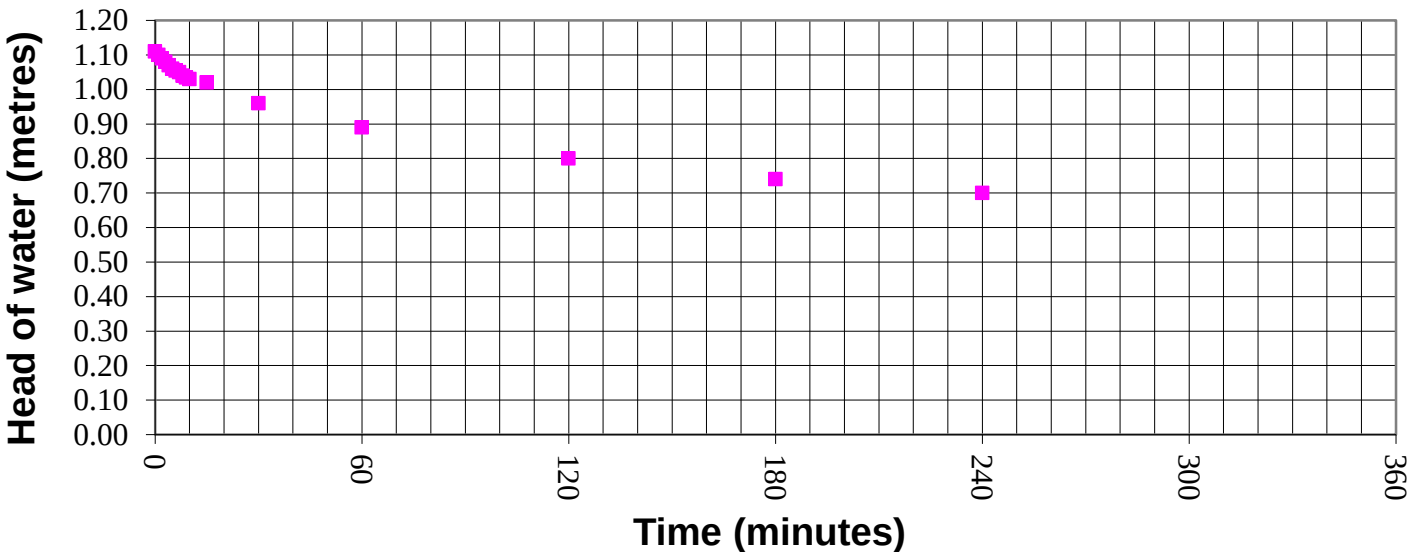
\* with gravel filter adjustment factor = 0.30, with no filter = 1.0

Test abandoned after 5 hours, no infiltration of water

[illegible]

GroundSolve Ltd

Llay New Road, Llay  
**TP05 Test 1**  
 22/02/18



| Depth | Length | Width | Head at 75% Vol | Head at 25% Vol | Water depth(t=0) | Effective Area | Vp75-Vp25          | Adjustment Factor * | t75    | t25    | Infiltration |
|-------|--------|-------|-----------------|-----------------|------------------|----------------|--------------------|---------------------|--------|--------|--------------|
| (m)   | (m)    | (m)   | (m)             | (m)             | (m)              | Ap50 m2        | Volume of water m3 |                     | (mins) | (mins) | rate m/s     |
| 2.00  | 1.60   | 0.60  | 0.833           | 0.28            | 1.11             | 3.402          | 0.533              | 1.00                | N/A    | N/A    | #VALUE!      |

\* with gravel filter adjustment factor = 0.30, with no filter = 1.0

Test abandoned after 4 hours. Head at 65% after 4 hours