

## Delafield, James

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**From:** John Birch <JBirch@glanvillegroup.com>  
**Sent:** Thursday, 01 September 2022 17:05  
**To:** David Schofield; Alexandros Tsavdaris  
**Cc:** Sarah Smith; George Burgess; Delafield, James; Adrian Quigley  
**Subject:** [Ext Msg] RE: 05/2022/0927 Land South Of Chiswell, Green Lane, St Albans, Hertfordshire  
**Attachments:** 8210856\_Borehole Test Locations.pdf; Falling Head Test Soakaway Results - 22-08-11.pdf; 8210856 - SK01-2 - Indicative Drainage Strategy\_220822-North\_P10.pdf; 8210856 - SK01-2 - Indicative Drainage Strategy\_220822-South\_P9.pdf

Hi David / Alex

I am writing to provide a further update on work we have undertaken since our Teams call on 22 August 2022, and ahead of Alex returning from leave on Monday 5 September.

Firstly, borehole infiltration testing has been undertaken at three locations co-incident with proposed infiltration basins. The attached drawing "Borehole Test Locations" shows where the tests have been carried out. Also attached are the results of the falling head tests undertaken at each location. As expected, these have yielded very good results with infiltration rates of between 1 and  $7 \times 10^{-4}$  m/s. The infiltration basins have been sized on a assumed infiltration rate of  $1 \times 10^{-4}$  m/s at the lower end of this range. Assuming this rate, a 300mm diameter borehole taken 10m down into the chalk would achieve a discharge rate of 1.0l/s per borehole. As such, the recent infiltration testing validates the assumptions that have informed our surface water drainage strategy.

Secondly, we have amended the drainage strategy drawings as attached to provide a more robust treatment train to provide greater protection against pollution by adding Hydro-International's Downstream Defender product (or similar) upstream of every outfall to an infiltration basin – shown as purple manholes on the drawing.

I trust that the above and attached, in conjunction with the response provided previously, allows you to confirm you have no objection to the proposals from a flooding and drainage perspective.

However, do contact me if you have any queries or require further information

Many thanks.

Regards

**John Birch** BEng CEng MICE

Director

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Structural Engineering | Transport and Highways  
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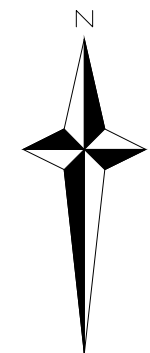
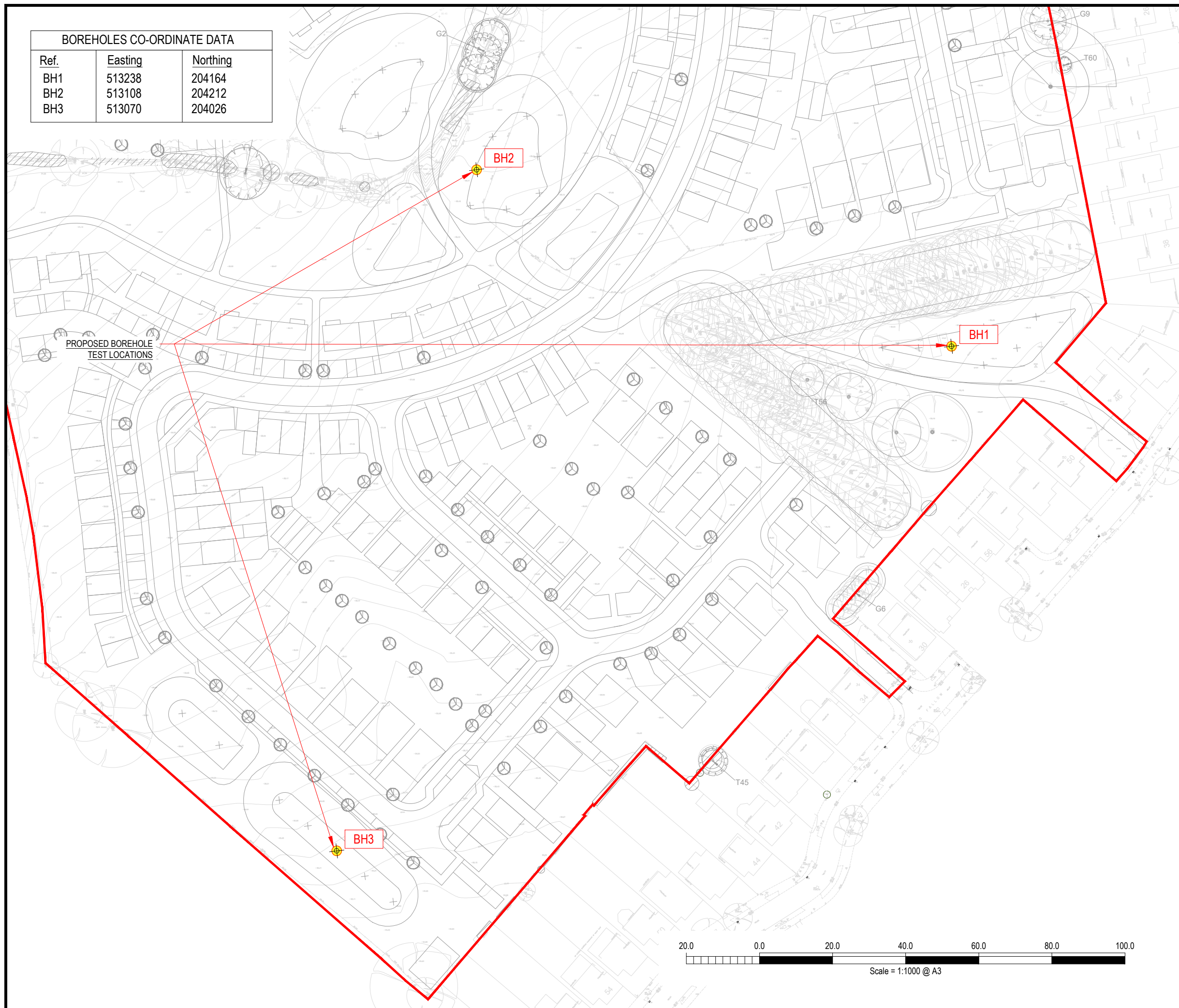
BOREHOLES CO-ORDINATE DATA		
Ref.	Easting	Northing
BH1	513238	204164
BH2	513108	204212
BH3	513070	204026

**NOTES**

1. This drawing to be read in conjunction with all other drawings and specifications.
2. Dimensions not to be scaled for construction purposes.

**KEY**

 Proposed borehole test locations



Rev.	Description	Date	Chkd



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Client :  
 Alban Developments, Alban Peter Pearson,  
 CALA Homes (Chiltern) & Redington Capital

Project :  
 Land south of Chiswell Green Lane

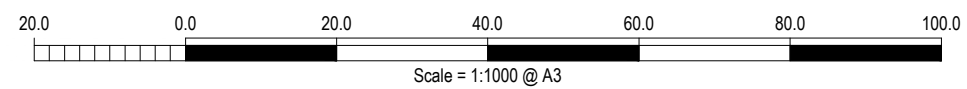
Title :  
 Proposed Borehole Test Locations  
 Setting Out

Project Engineer : A. Quigley Scale : 1:1000@A3

Project Director : J. Birch Date : August 2022

Status : Information

Drawing No. 8210856 - Boreholes Rev 11



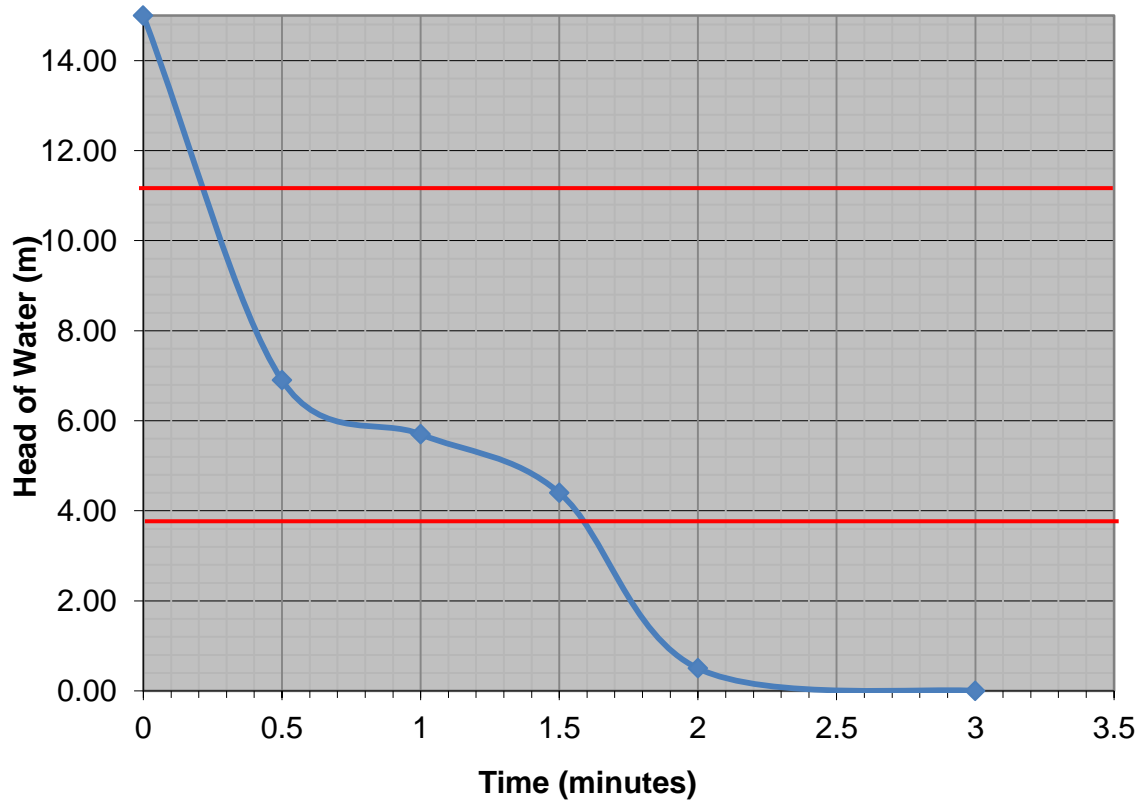
### Soakaway Testing in Borehole (Calculated to BRE Digest 365)

<b>Client:</b>	Cala Homes (Chiltern) Ltd	<b>Job No:</b>	22-08-11
<b>Site:</b>	12-16 Forge End, St Albans, AL2 3EQ	<b>Date:</b>	25/08/2022
<b>Depth:</b>	19.70m	<b>CT No:</b>	BH 1
<b>Diameter:</b>	0.2m	<b>Test No:</b>	1

#### TEST DATA

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.00				
0.5	8.10				
1	9.30				
1.5	10.60				
2	14.50				
3	DRY				

Head vs. Time



Soil Infiltration Rate =  $5.91 \times 10^{-4}$  m/s

Comments:

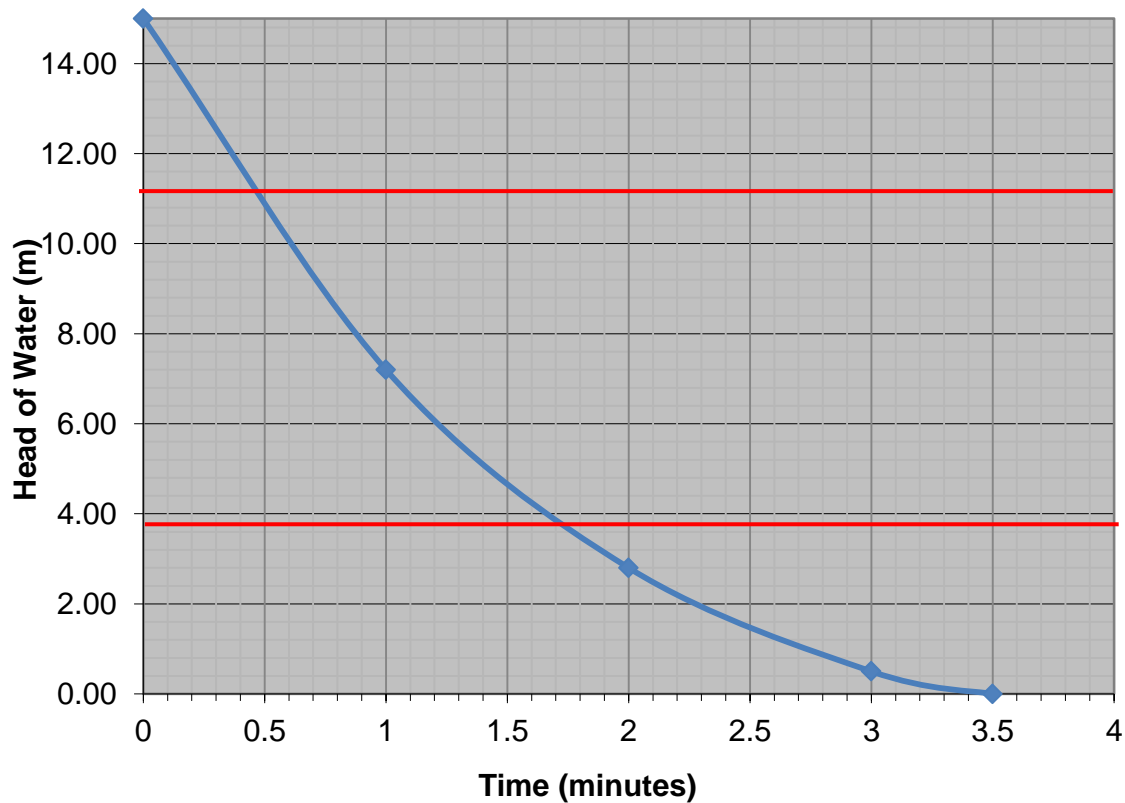
### Soakaway Testing in Borehole (Calculated to BRE Digest 365)

<b>Client:</b>	Cala Homes (Chiltern) Ltd	<b>Job No:</b>	22-08-11
<b>Site:</b>	12-16 Forge End, St Albans, AL2 3EQ	<b>Date:</b>	25/08/2022
<b>Depth:</b>	19.70m	<b>CT No:</b>	BH 1
<b>Diameter:</b>	0.2m	<b>Test No:</b>	2

#### TEST DATA

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.00				
1	7.80				
2	12.20				
3	14.50				
3.5	DRY				

**Head vs. Time**



**Soil Infiltration Rate =  $6.57 \times 10^{-4}$  m/s**

**Comments:**

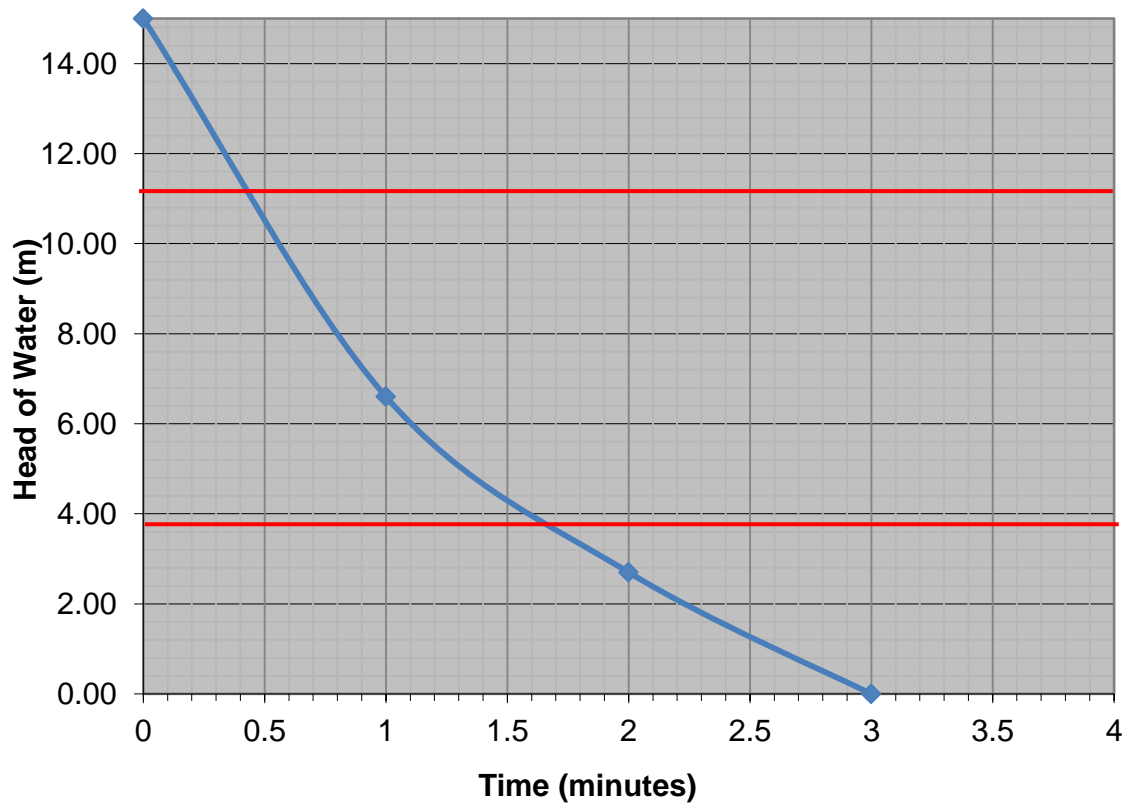
### Soakaway Testing in Borehole (Calculated to BRE Digest 365)

<b>Client:</b>	Cala Homes (Chiltern) Ltd	<b>Job No:</b>	22-08-11
<b>Site:</b>	12-16 Forge End, St Albans, AL2 3EQ	<b>Date:</b>	25/08/2022
<b>Depth:</b>	19.70m	<b>CT No:</b>	BH 1
<b>Diameter:</b>	0.2m	<b>Test No:</b>	3

#### TEST DATA

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.00				
1	8.40				
2	12.30				
3	DRY				

Head vs. Time



Soil Infiltration Rate =  $6.73 \times 10^{-4}$  m/s

Comments:

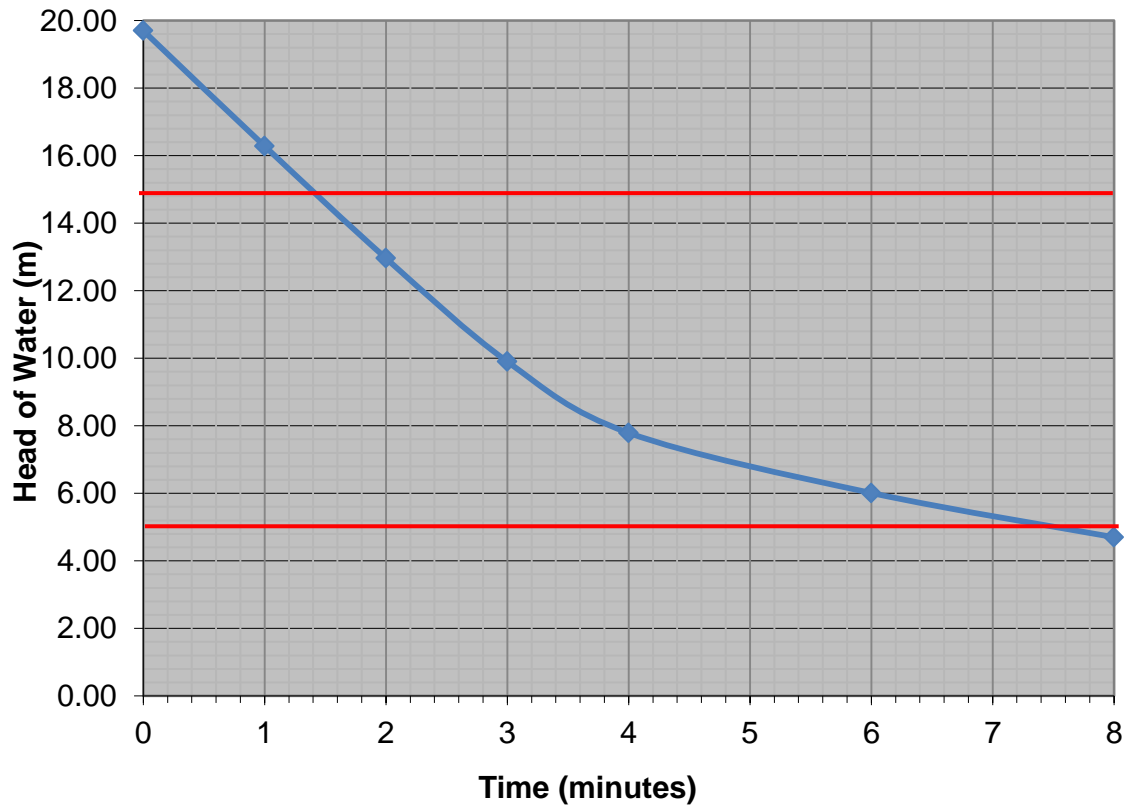
### Soakaway Testing in Borehole (Calculated to BRE Digest 365)

<b>Client:</b>	Cala Homes (Chiltern) Ltd	<b>Job No:</b>	22-08-11
<b>Site:</b>	12-16 Forge End, St Albans, AL2 3EQ	<b>Date:</b>	25/08/2022
<b>Depth:</b>	19.70m	<b>CT No:</b>	BH 2
<b>Diameter:</b>	0.2m	<b>Test No:</b>	1

#### TEST DATA

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.00				
1	3.42				
2	6.74				
3	9.80				
4	11.91				
6	13.69				
8	15				

Head vs. Time



Soil Infiltration Rate =  $1.36 \times 10^{-4}$  m/s

Comments:



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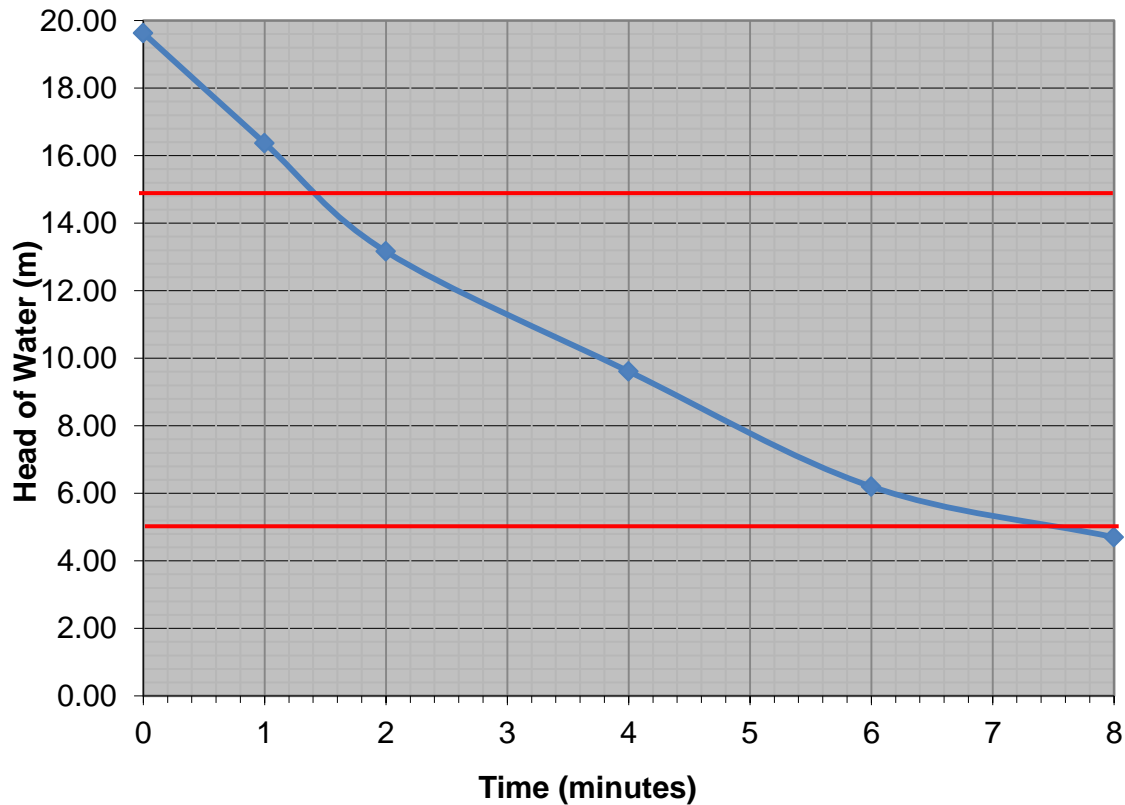
### Soakaway Testing in Borehole (Calculated to BRE Digest 365)

<b>Client:</b>	Cala Homes (Chiltern) Ltd	<b>Job No:</b>	22-08-11
<b>Site:</b>	12-16 Forge End, St Albans, AL2 3EQ	<b>Date:</b>	25/08/2022
<b>Depth:</b>	19.70m	<b>CT No:</b>	BH 2
<b>Diameter:</b>	0.2m	<b>Test No:</b>	2

#### TEST DATA

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.07				
1	3.33				
2	6.54				
4	10.09				
6	13.50				
8	15.00				

Head vs. Time



Soil Infiltration Rate =  $1.38 \times 10^{-4}$  m/s

Comments:



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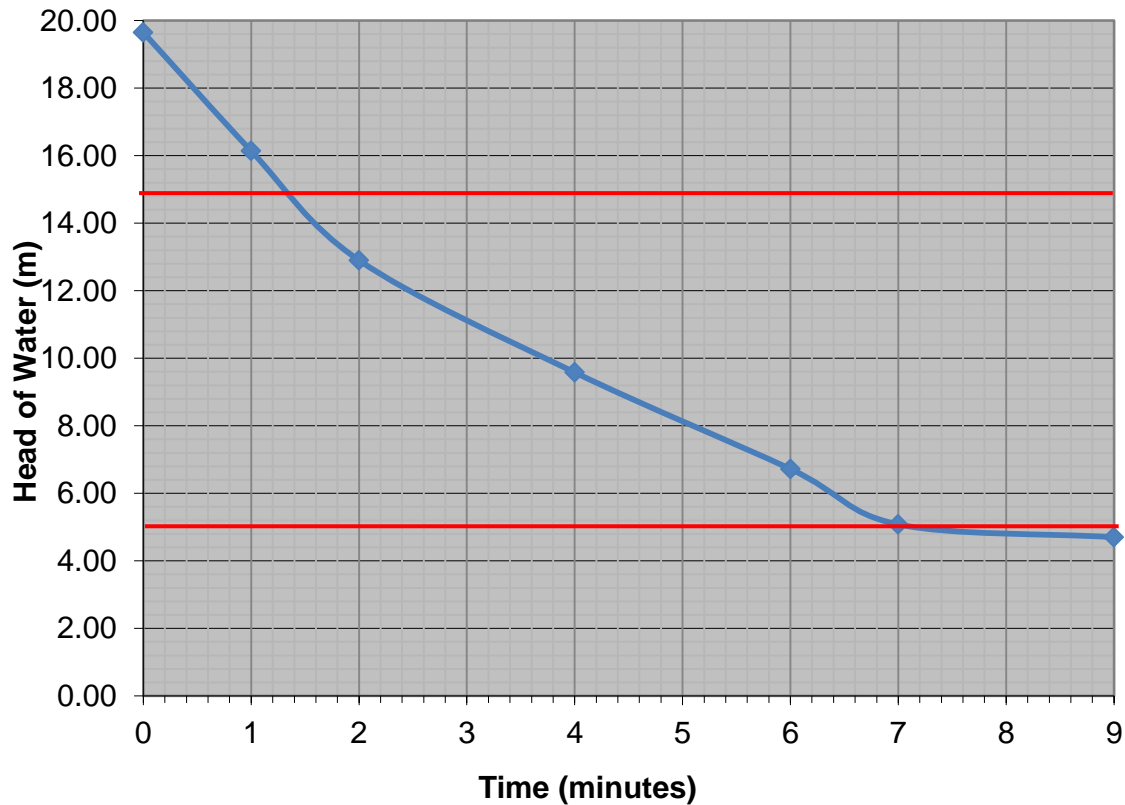
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<b>Client:</b>	Cala Homes (Chiltern) Ltd	<b>Job No:</b>	22-08-11
<b>Site:</b>	12-16 Forge End, St Albans, AL2 3EQ	<b>Date:</b>	25/08/2022
<b>Depth:</b>	19.70m	<b>CT No:</b>	BH 2
<b>Diameter:</b>	0.2m	<b>Test No:</b>	3

#### TEST DATA

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.05				
1	3.56				
2	6.80				
4	10.12				
6	12.98				
7	14.62				
9	15				

Head vs. Time



Soil Infiltration Rate =  $1.48 \times 10^{-4}$  m/s

Comments:



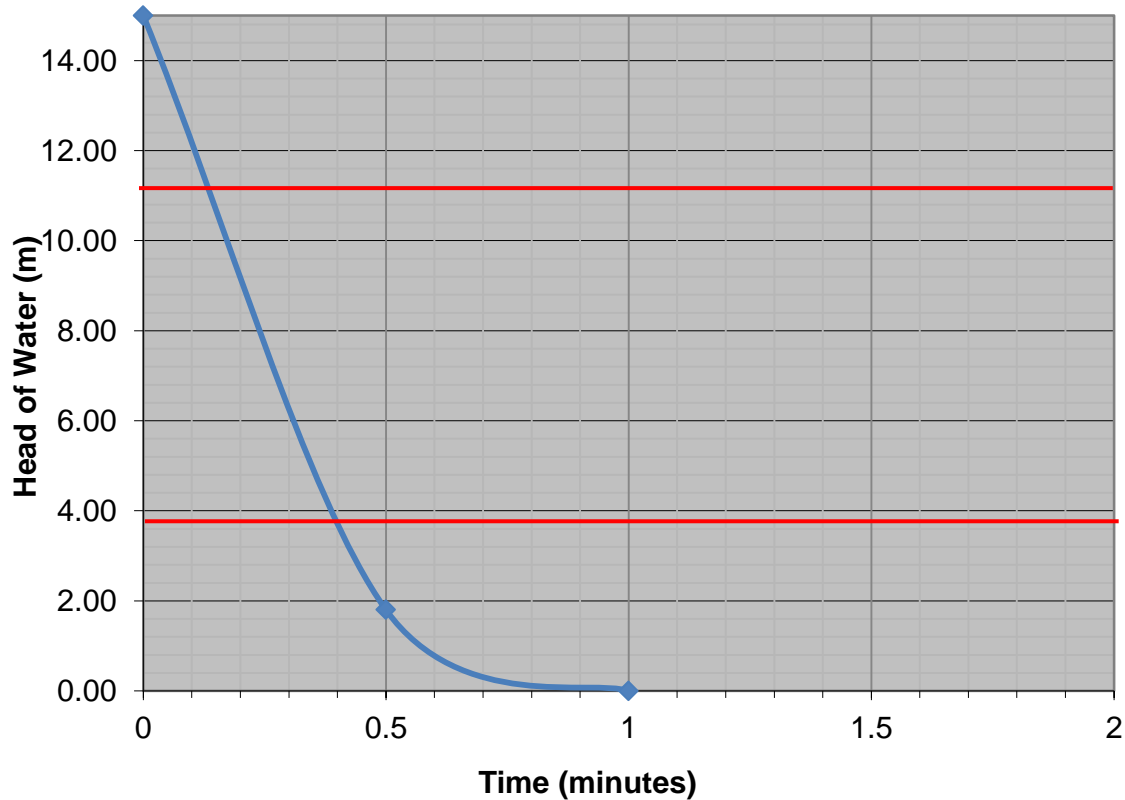
### Soakaway Testing in Borehole (Calculated to BRE Digest 365)

<b>Client:</b>	Cala Homes (Chiltern) Ltd	<b>Job No:</b>	22-08-11
<b>Site:</b>	12-16 Forge End, St Albans, AL2 3EQ	<b>Date:</b>	25/08/2022
<b>Depth:</b>	19.70m	<b>CT No:</b>	BH 3
<b>Diameter:</b>	0.2m	<b>Test No:</b>	1

#### TEST DATA

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.00				
0.5	13.20				
1	DRY				

Head vs. Time



Soil Infiltration Rate =  $3.18 \times 10^{-3}$  m/s

Comments:

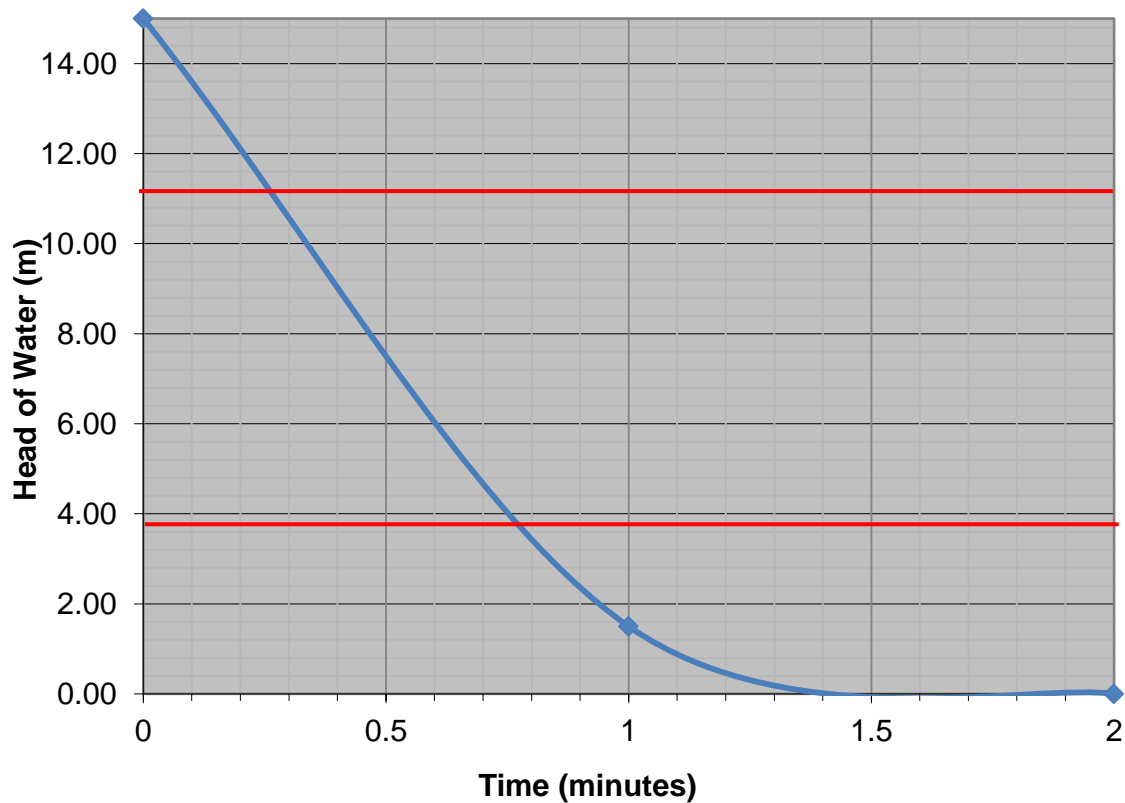
### Soakaway Testing in Borehole (Calculated to BRE Digest 365)

<b>Client:</b>	Cala Homes (Chiltern) Ltd	<b>Job No:</b>	22-08-11
<b>Site:</b>	12-16 Forge End, St Albans, AL2 3EQ	<b>Date:</b>	25/08/2022
<b>Depth:</b>	19.70m	<b>CT No:</b>	BH 3
<b>Diameter:</b>	0.2m	<b>Test No:</b>	2

#### TEST DATA

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.00				
1	13.50				
2	DRY				

Head vs. Time



Soil Infiltration Rate =  $1.66 \times 10^{-3}$  m/s

Comments:



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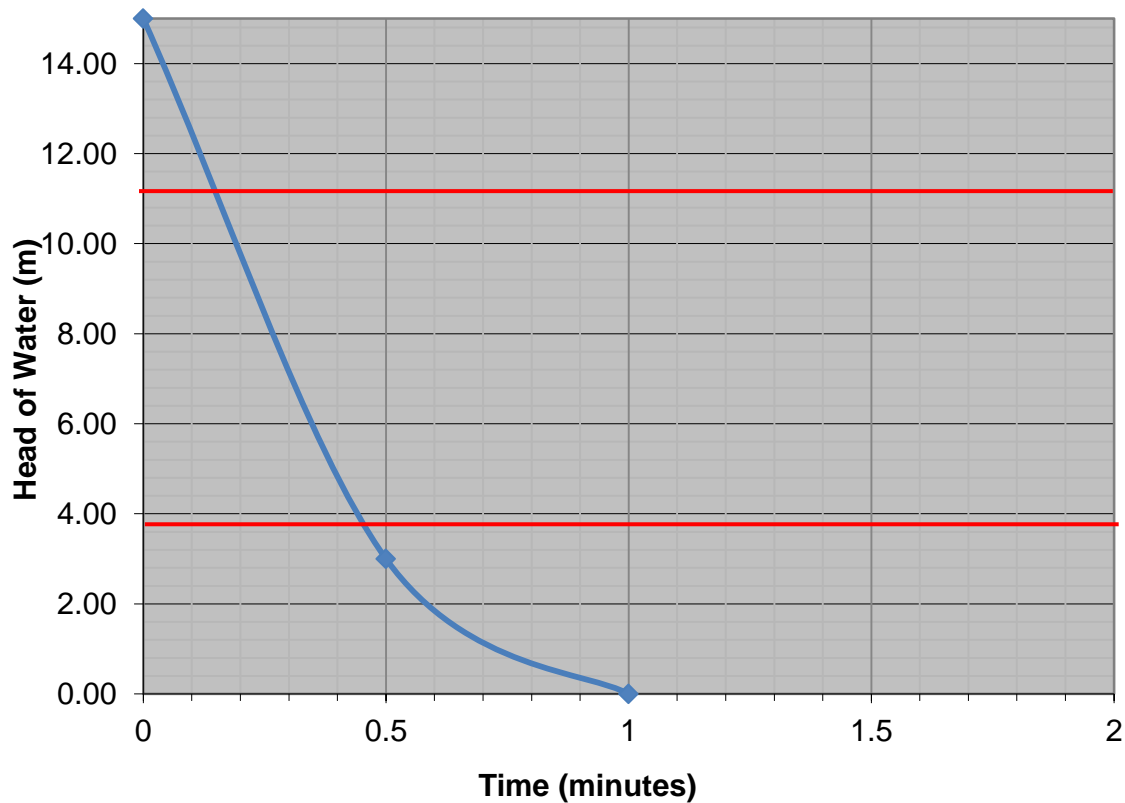
### Soakaway Testing in Borehole (Calculated to BRE Digest 365)

<b>Client:</b>	Cala Homes (Chiltern) Ltd	<b>Job No:</b>	22-08-11
<b>Site:</b>	12-16 Forge End, St Albans, AL2 3EQ	<b>Date:</b>	25/08/2022
<b>Depth:</b>	19.70m	<b>CT No:</b>	BH 3
<b>Diameter:</b>	0.2m	<b>Test No:</b>	3

#### TEST DATA

Time	Depth BGL	Time	Depth BGL	Time	Depth BGL
0	0.00				
0.5	12.00				
1	DRY				

Head vs. Time

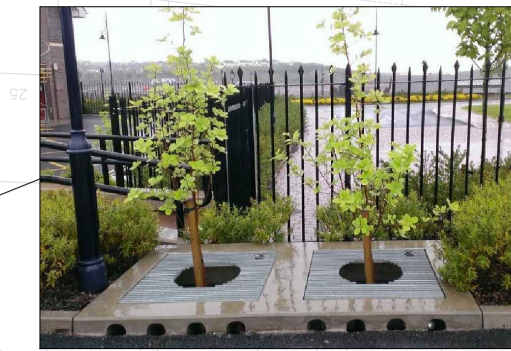


Soil Infiltration Rate =  $4.14 \times 10^{-3}$  m/s

Comments:

**DRAINAGE STRATEGY**

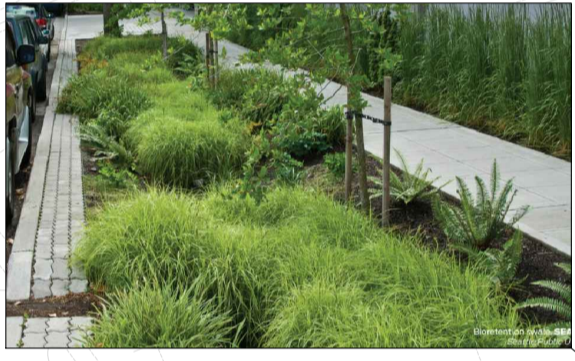
- All surface water run-off from the proposed development area to be discharged by gravity into two infiltration basins, established in 'cascade' before discharging to the underlying chalk bedrock via deep boreholes, with no direct discharges off-site.
- Two attenuation basins will be established both to the west and south of the infiltration basins location in order to provide additional surface water storage. Flows will be attenuated at a restricted maximum rate of 3.0 l/s and 7.0 l/s for all rainfall events including 1:100 year+40%CC event, using Hydro-Brake flow controls, before discharging into infiltration basin 2 and then into the downstream drainage system allocated within the southern land parcel.
- Deep borehole soakaways will be assigned to the base level of the infiltration basin, in order to reach the chalk bedrock (Lewes Nodular Chalk and Seaford Chalk Formations) and allow store run-off from the proposed development to infiltrate into the underlying chalk bedrock.
- Tree pits and swales will be established along the proposed major access roads as primary surface water treatment stage. Run-off from the proposed shared surfaces streets and private drives will be treated via permeable pavement as primary treatment stage. Hydro-International's Downstream Defender units, or similar, will be established at the immediate upstream side of each attenuation / infiltration basin to provide additional water treatment.
- The SuDS features have been designed to cater for all storm events up to and including the 1 in 100 year + 40% climate change storm event.



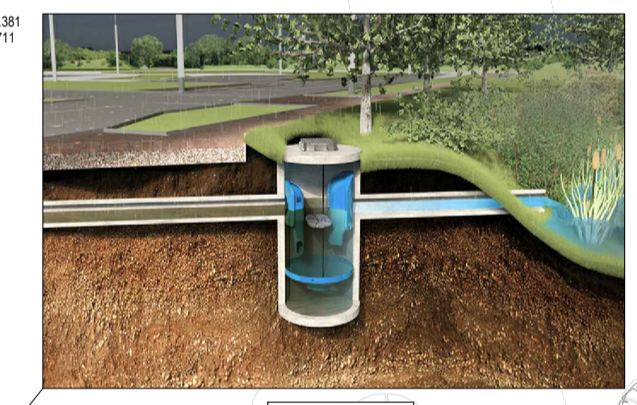
Tree Pits



Permeable Pavement



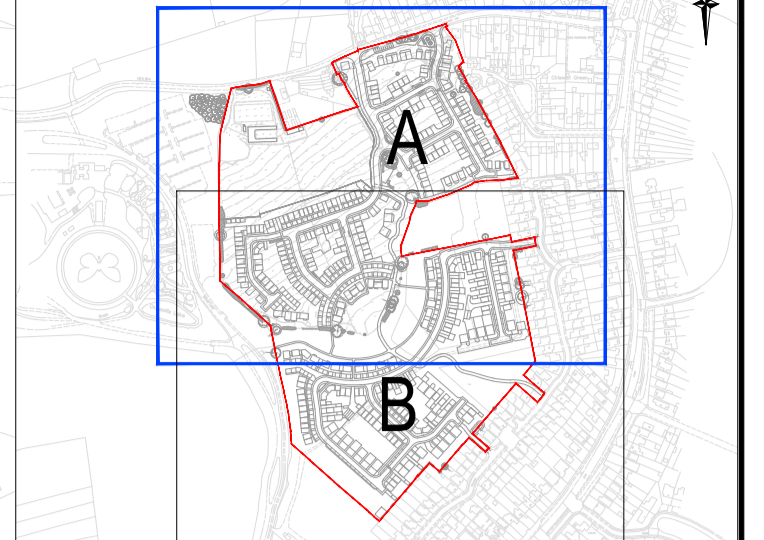
Swale



Downstream Defender



Infiltration / Attenuation Basin



**KEYPLAN**  
SCALE: N.T.S.

- Notes**
- The drawing is based on OS mapping and McBains Illustrative Masterplan (Job No. LHC61860, Drg. No. RED001-MCB-ZZ-ZZ-DR-A-0210-D5-P1, date: March 2022).
  - Dimensions not to be scaled.
  - All proposed surface water sewers and levels shown on this drawing are indicative only.
  - SuDS features sized based on MicroDrainage calculations.
  - All drainage works to be constructed as detailed in Sewers for Adoption 7th Edition or as stipulated by Local Drainage Authority as appropriate.
  - All works within root protection areas to be agreed with Arboricultural Services to be installed using sensitive construction methods under supervision of an arboriculturist.

- KEY**
- Proposed Surface Water Drain
  - Exceedance Flow Paths
  - Impermeable Area managed by the SuDS
  - Impermeable Area: 32,085m<sup>2</sup>
  - Imp. Area+10% Urban creep = 35,294m<sup>2</sup>
  - Infiltration Basin (1):  
Base Area: 291.2m<sup>2</sup>  
Top Area: 1,150m<sup>2</sup>  
Depth: 1.705m  
IL: 88.095m AOD  
Min. CL: 89.800m AOD  
Max. Water level: 89.759m AOD (1%AE+40%CC)  
Max. Water depth: 1.664m deep (1%AE+40%CC)  
Max. Volume: 1,122.0m<sup>3</sup> (1%AE+40%CC)
  - Infiltration Basin (2):  
Base Area: 411m<sup>2</sup>  
Top Area: 810m<sup>2</sup>  
Depth: 1.4m  
IL: 87.000m AOD  
Min. CL: 88.400m AOD  
Max. Water level: 88.335m AOD (1%AE+40%CC)  
Max. Water depth: 1.335m deep (1%AE+40%CC)  
Max. Volume: 794.4m<sup>3</sup> (1%AE+40%CC)
  - Attenuation Basin (1):  
Base Area: 175.6m<sup>2</sup>  
Top Area: 420m<sup>2</sup>  
Depth: 1.094m  
IL: 87.442m AOD  
Min. CL: 88.536m AOD  
Max. Water level: 88.509m AOD (1%AE+40%CC)  
Max. Water depth: 1.067m deep (1%AE+40%CC)  
Max. Volume: 310.5m<sup>3</sup> (1%AE+40%CC)  
Max. Outflow rate: 3.0 l/s (1%AE+40%CC)
  - Attenuation Basin (2):  
Base Area: 181.2m<sup>2</sup>  
Top Area: 530m<sup>2</sup>  
Depth: 1.4m  
IL: 86.000m AOD  
Min. CL: 87.400m AOD  
Max. Water level: 87.364m AOD (1%AE+40%CC)  
Max. Water depth: 1.364m deep (1%AE+40%CC)  
Max. Volume: 459.7m<sup>3</sup> (1%AE+40%CC)  
Max. Outflow rate: 7.4 l/s (1%AE+40%CC)
  - Deep Borehole Soakaways:  
Infiltration rate: 1l/s per borehole  
6 No. Deep boreholes (Infiltration Basin 1)  
7 No. Deep boreholes (Infiltration Basin 2)
  - Hydro-Brake Optimum unit (as shown in plan)
  - Weir Manhole (as shown in plan)
  - Hydro International's Downstream Defender unit - or similar
  - Proposed headwall
  - Proposed permeable pavement
  - Indicative location of potential tree pits
  - Indicative location of potential swales

P10	Updated in accordance with the comments from LPA	22/08/2022	AQ	JB
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Rev.	Description	Date	Chkd
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**Glanville**  
Cornerstone House  
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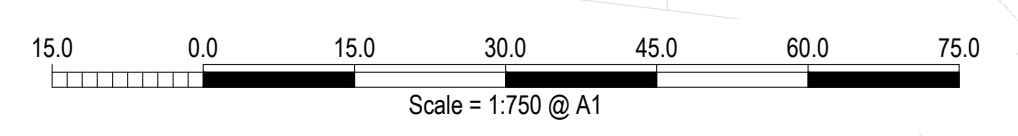
Client:  
Alban Developments, Alban Peter Pearson,  
CALA Homes (Chiltern) & Redington Capital

Project:  
Land south of Chiswell Green Lane

Title:  
Indicative Surface Water  
Drainage Strategy (North Catchment)

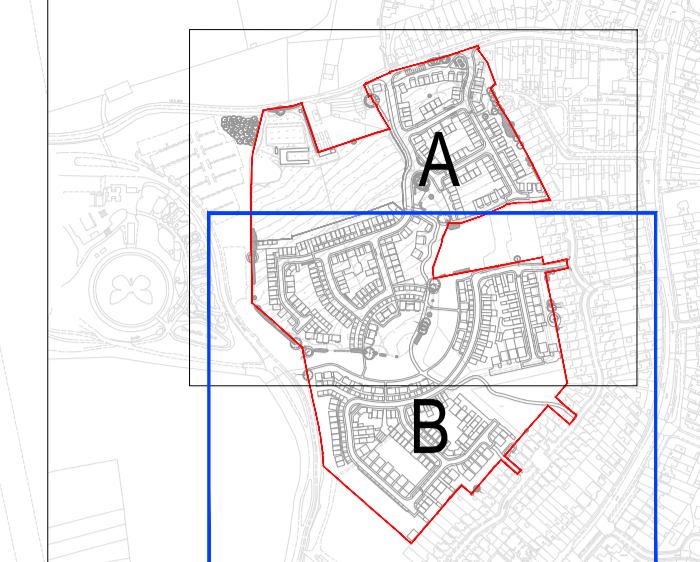
Project Engineer : A. Quigley Scale : 1:750 @ A1  
Project Director : J. Birch Date : August 2022  
Status : Planning

Drawing No. 8210856 - SK01/A Rev P10



**DRAINAGE STRATEGY**

- All surface water run-off from the proposed development are to be discharged by gravity into three infiltration basins before discharging to the underlying chalk bedrock through three infiltration basins before discharging to the underlying chalk bedrock via deep boreholes, with no direct discharges off-site.
- Infiltration basin 1 established to the east of the site, behind the tree line, would also managed attenuated run-off rates from northern drainage system, allocated within the northern land parcel. Deep borehole soakaway will be assigned to the base level of the infiltration basin, in order to reach the chalk bedrock (Loves Nodular Chalk and Seaford Chalk Formations) and allow store run-off from the proposed development to infiltrate into the underlying chalk bedrock.
- Tree pits and swales will be established along the proposed major access roads as primary surface water treatment stage. Run-off from the proposed shared surfaces streets and private drives will be treated via permeable pavement as primary treatment stage. Hydro-International's Downstream Defender units, or similar, will be established at the immediate upstream side of each attenuation / infiltration basin to provide additional water treatment.
- The SuDS features have been designed to cater for all storm events up to and including the 1 in 100 year + 40% climate change storm event.



**KEYPLAN**  
SCALE: N.T.S.

- Notes**
- The drawing is based on OS mapping and McBains Illustrative Masterplan (Job No. LHS1860, Drg. No. RED01-MCB-ZZ-ZR-A-0210-D5-P1, date: March 2022).
  - Dimensions not to be scaled.
  - All proposed surface water sewers and levels shown on this drawing are indicative only.
  - SuDS features sized based on MicroDrainage calculations.
  - All drainage works to be constructed as detailed in Sewers for Adoption 7th Edition or as stipulated by Local Drainage Authority as appropriate.
  - All works within root protection areas to be agreed with Arboriculturalist. Services to be installed using sensitive construction methods under supervision of an arboriculturalist.

- KEY**
- Proposed Surface Water Drain
  - Exceedance Flow Paths
  - Impermeable Area managed by the SuDS:
    - Impermeable Area: 26,055m<sup>2</sup>
    - Imp. Area+10% Urban creep = 28,661m<sup>2</sup>
  - Infiltration Basin (3):
    - Base Area: 427.2m<sup>2</sup>
    - Top Area: 1,151m<sup>2</sup>
    - Sides Slope: 1/3
    - Depth: 1.5m
    - Min. CL: 85.000m AOD
    - IL: 83.500m AOD
    - Max. Water level: 84.964m AOD (1% AEP+40% CC)
    - Max. Water depth: 1.464m deep (1% AEP+40% CC)
    - Max. Volume: 1,108.3m<sup>3</sup> (1% AEP+40% CC)
  - Infiltration Basin (4):
    - Base Area: 300m<sup>2</sup>
    - Top Area: 659.7m<sup>2</sup>
    - Sides Slope: 1/3
    - Depth: 1.573m
    - Min. CL: 85.000m AOD
    - IL: 83.427m AOD
    - Max. Water level: 84.813m AOD (1% AEP+40% CC)
    - Max. Water depth: 1.386m deep (1% AEP+40% CC)
    - Max. Volume: 623.0m<sup>3</sup> (1% AEP+40% CC)
  - Infiltration Basin (5):
    - Base Area: 300m<sup>2</sup>
    - Top Area: 335.5m<sup>2</sup>
    - Sides Slope: 1/3
    - Depth: 1.0m
    - Min. CL: 85.855m AOD
    - IL: 84.855m AOD
    - Max. Water level: 85.727m AOD (1% AEP+40% CC)
    - Max. Water depth: 0.872m deep (1% AEP+40% CC)
    - Max. Volume: 208.0m<sup>3</sup> (1% AEP+40% CC)
  - Deep Borehole Soakaways:
    - Infiltration rate: 1/6 per borehole
    - 7 No. Deep boreholes (Infiltration Basin 3)
    - 5 No. Deep boreholes (Infiltration Basin 4)
    - 2 No. Deep boreholes (Infiltration Basin 5)
  - Hydro-Brake Optimum unit (as shown in plan)
  - Weir Manhole (as shown in plan)
  - Hydro International's Downstream Defender unit - or similar
  - Proposed headwall
  - Proposed permeable pavement
  - Indicative location of potential tree pits
  - Indicative location of potential swales



Tree Pits



Swale



Permeable Pavement

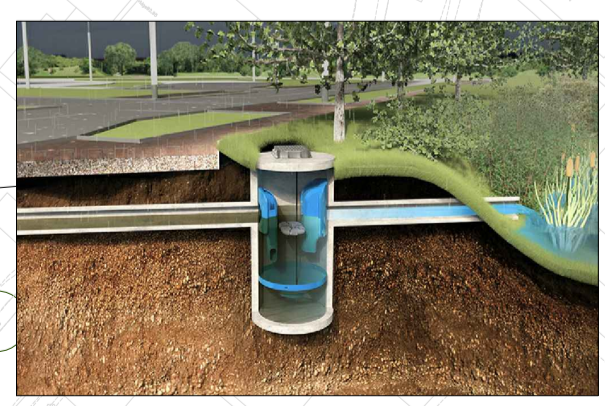
Infiltration basin (3)  
IL = 83.500m  
Highest water level = 84.964m  
Min. CL = 85.000m

Infiltration basin (5)  
IL = 84.855m  
Highest water level = 85.727m  
Min. CL = 85.855m

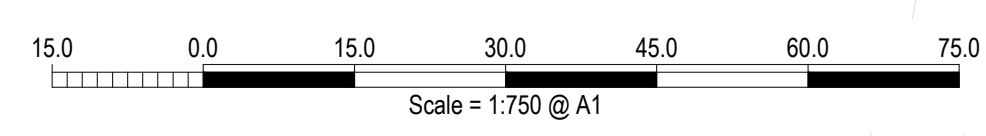
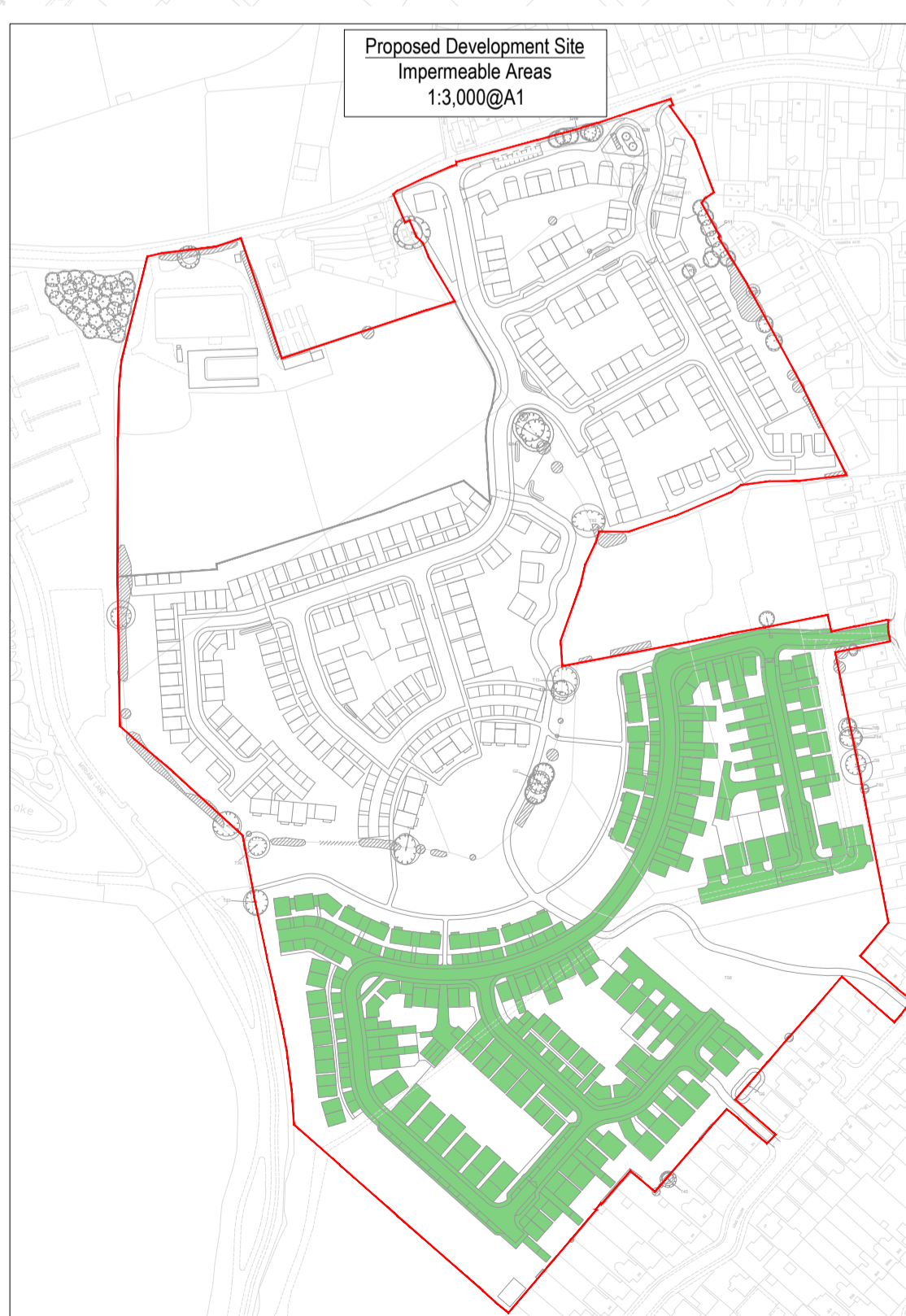


Infiltration Basin

Infiltration basin (4)  
IL = 83.427m  
Highest water level = 84.813m  
Min. CL = 85.000m



Downstream Defender



P9	Updated in accordance with the comments from LPA	22/08/2022	JB
Rev.	Description	Date	Chkd

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Client: Alban Developments, Alban Peter Pearson, CALA Homes (Chiltem) & Redington Capital

Project: Land south of Chiswell Green Lane

Title: Indicative Surface Water Drainage Strategy (South Catchment)

Project Engineer: A. Quigley Scale: 1:750@A1  
Project Director: J. Birch Date: August 2022  
Status: Planning

Drawing No. 8210856 - SK01/B Rev P9