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Flood Risk Assessment

For a residential development at

Land South of Littlehampton Academy Littlehampton

On behalf of

West Sussex County Council

February 2014

ARUN DISTRICT COUNCIL LU/51/14/

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1 Non Technical Summary

1.1 This Flood Risk Assessment has been undertaken in accordance with the National Planning Policy Framework in support of a Planning Application for the construction of 68 residential dwellings, onsite highways and landscaping incorporating public open space and private gardens on behalf of West Sussex County Council on land south of Littlehampton Academy, Littlehampton.

1.2 This Assessment confirms that the site is not at risk of flooding from tidal or fluvial sources, overland flows or from groundwater.

1.3 The site formerly accommodated part of Littlehampton Community College and although there was a previous surface water flow from the roof drainage of the previous building the site has been demolished and currently has no positively drained impermeable areas.

1.4 Surface water drainage will be discharged to ground via soakaway utilising boreholes into the underlying chalk stratum as was constructed on the adjacent Littlehampton Academy.

1.5 Foul drainage will be discharged to the public foul sewer at the southern site boundary.

1.6 This report concludes that the proposed residential properties are suitable at this location.

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2 Planning Policy Context

2.1 National Planning Policy Framework

2.1.1 National Planning Policy Framework aims to reduce flood risk through development opportunities. The policy framework aims to ensure flood risks and the predicted effects of climate change have been taken into account and appropriate measures put in place to ensure that:

- The development is safe
- Where possible the flood risk overall is reduced
- Increased flood risk does not occur elsewhere
- Appropriate mitigation measures are employed to deal with these effects and risks.

2.2 Local Planning Policy

2.2.1 Arun Local Development Framework

2.2.1.1 The new Arun Local Development Framework documents have yet to be finalised and adopted but will eventually replace the Arun District Council Local Plan.

2.2.2 Arun Local Plan (2003)

2.2.2.1 The Current 2003 Local Plan contains the following Polices which are relevant to the development proposals.

2.2.2.2 **POLICY GEN9** Foul and Surface Water Drainage states that *'planning permission for development which will materially increase foul and/or surface water discharges will be refused unless the Local Planning Authority is satisfied that either adequate drainage capacity exists or appropriate drainage capacity can be provided as part of the development. Consideration should also be given to the use of Sustainable Urban Drainage Systems (SUDS) as alternatives to conventional drainage where appropriate.'*

2.2.2.3 **POLICY GEN10** Tidal Flooding and Coastal Defence states that *'planning permission will be refused for development which would be at an unacceptable risk of tidal flooding and/or where proposals are detrimental to the integrity of tidal defences or the ability to maintain or improve them.'*

2.2.2.4 **POLICY GEN11** Inland Flooding states that *'permission for development which would be at risk from flooding and/or materially decrease the capacity of a floodplain to store or pass flows of floodwater, will be refused unless the Local Planning Authority is satisfied that compensatory flood storage/waterway areas can be provided as part of the development and the function and effectiveness of existing watercourses, or their replacements, are not adversely affected.'*

2.2.3 Strategic Flood Risk Assessment

2.2.3.1 Capita Symonds produced a Strategic Flood Risk Assessment on behalf of Arun District Council in February 2008.

2.2.3.2 The SFRA has been reviewed and is referenced within this Assessment.

2.3 Lead Local Flood Authority

2.3.1 West Sussex County Council became a Lead Local Flood Authority under the Flood and Water Management Act 2010 and was given a series of new responsibilities to coordinate the management of local flood risk.

2.3.2 As part of their role the County Council have produced a Preliminary Flood Risk Assessment which is referenced within this Assessment.

3 Existing Site

3.1 Site Location

3.1.1 The development site is located south of the new Littlehampton Academy on the north side of the cycle route that links the west end of Cornwall Road and the east end of Elmgrove Road in Littlehampton, West Sussex at grid reference TQ 033026, Postcode BN17 6FE.

3.1.2 The site is located approximately 870m to the northeast of the tidal estuary of the River Arun and 1.2kn north of the coast and is within a well established developed area of Littlehampton comprising predominantly residential sites and associated infrastructure and facilities.

3.1.3 A copy of the site location plan is located in Appendix 1 at the rear of this report.

3.2 Site Description

3.2.1 The site is approximately 2.4ha in area and typically at a ground level of 7 - 8m AOD. The site is generally flat with a slight gradient falling towards the north.

3.2.2 The site formerly accommodated part of Littlehampton Community College, the buildings of which have since been demolished.

3.2.3 The pre demolition impermeable area of the site was approximately 1.6ha and represents approximately 65% of the total area of the site.

3.2.4 Access is currently available at the southeast corner of the site from Elmgrove Road.

3.2.5 A copy of the existing site plan showing a recent topographical survey together with a plan showing the previous site layout is located in Appendix 2.

3.3 Existing Drainage

3.3.1 There are no records available of the previous drainage system.

3.3.2 Surface water from the site may have previously drained to ground by infiltration or there may have been a discharge to the sewer on the southern boundary of the site which is highlighted on the Southern Water Sewer Records as a combined sewer.

3.3.3 Southern Water no longer allows surface water flows to combined sewers.

3.3.4 Foul water was previously discharged to the public sewer at the southern site boundary.

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3.3.5 The sewer crossing the site is a 525mm diameter concrete circular pipe sewer flowing west to east at shallow gradients between 1:200 and 1:700 with approximately 2m of cover.

3.3.6 A copy of the sewer records is located in Appendix 3 at the rear of this report.

3.4 Geology and Groundwater

3.4.1 The site is within a Groundwater Vulnerability Zone which is classified as a Major Aquifer with High vulnerability.

3.4.2 Borehole records hosted by the British Geological Society on their website and undertaken in the late 1970s at Southfields Road 480m to the southeast of the site show approximately 2m of drift deposits (Light Brown Sandy Clay with Gravel Seams) above at least 100m of Upper and Middle Chalk stratum which includes bands of Clay and Marl.

3.4.3 Arun District Council's Strategic Flood Risk Assessment identifies the wider area in which the site lies as a Groundwater Emergence Zone.

3.4.4 Further onsite testing will be required to confirm the local geology beneath the development site to assess site specific soakage rates and ground water levels to inform the detailed design of the surface water drainage system.

3.4.5 Copies of the Borehole Records are located in Appendix 4 at the rear of this report.

4 Local Watercourse and Flood Defences

4.1 The River Arun

4.1.1 The tidal estuary of the River Arun is located approximately 870m to the southwest of the site.

4.1.2 The river is approximately 41km in length, rising in St Leonards Forest and flowing through Horsham and Arundel to the sea at Littlehampton.

4.1.3 The limit of the tidal reach is approximately the Black Rabbit public house to the north of Arundel.

4.2 Flood Defences

4.2.1 There are coastal defences on Littlehampton seafront comprising sea wall, groynes and shingle beaches with an estimated standard of protection of a 200 year return period tidal event.

4.2.2 There are flood defences on the east side of the River Arun comprising a mixture of concrete, masonry and sheet pile walls with a varying standard of protection of between a 50 and 200 year return period event.

4.2.3 The immediate vicinity of the site is outside the area defended by these defences and does not require defending against either tidal or fluvial flooding.

5 Flood Zone and Flood History

5.1 Flood Zone

5.1.1 The Environment Agency's online mapping confirms that the site is located in Flood Zone 1 and is not at risk of flooding from rivers or the sea from anything less extreme than a 1:1000 year flood event.

5.1.2 The Strategic Flood Risk Assessment prepared by Capita Symonds in 2008 identifies the location of the site as being in Flood Zone 1.

5.2 Flood History

5.2.1 Arun District Council

5.2.1.1 The Strategic Flood Risk Assessment dated 2008 includes a map of historic flood incidents in the District.

5.2.1.2 There are no records of flooding from any source in the immediate vicinity of the site

5.2.1.3 The closest recorded incident was related to sewer flooding 485m to the west of the site.

5.2.1.4 Arun District Council hold no record of flooding having affected the site.

5.2.2 West Sussex County Council

5.2.2.1 The Preliminary Flood Risk Assessment prepared by West Sussex County Council in May 2011 does not identify any specific flood incidents at the proposed development site.

5.2.2.2 West Sussex County Council have also confirmed in writing that they hold no record of flooding having affected the development site.

5.2.3 Southern Water

5.2.3.1 Southern Water have confirmed that they hold no record of flooding of the public sewers in the vicinity of the site.

5.2.4 Copies of the Environment Agency and West Sussex County Council Flood Maps and correspondence received from Arun District Council, West Sussex County Council and Southern Water are located in Appendix 5 at the rear of this report.

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6 Flooding Potential

6.1 Tidal and Flooding

6.1.1 The site is within Flood Zone 1 and is not at risk of flooding from rivers or the sea from anything less extreme than a 1:1000 year flood event.

6.1.2 The Strategic Flood Risk Assessment prepared by Capita Symonds in 2008 confirms that site will remain in Flood Zone 1 at least up until 2106 irrespective of whether the existing flood defences along the River Arun remain in place or not.

6.2 Groundwater Flooding

6.2.1 Groundwater has been recorded at a depth of approximately 2.2m below ground level during the spring months in the late 1970s when it is likely to be at its highest levels for the year.

6.2.2 The Strategic Flood Risk Assessment confirms that the wider area in which the site lies is classified as a Groundwater Emergence Zone.

6.2.3 There are however no historic records of groundwater flooding in the immediate vicinity and the risk is not considered significant.

6.3 Overland Flow

6.3.1 West Sussex County Council as Lead Local Flood Authority have produced a map of Littlehampton which is included in the Local Flood Risk Management Strategy showing 1:200 year pluvial wet spot predictions as well as 1:100 year tidal and fluvial flooding predictions.

6.3.2 Possible surface water flooding due to a 1:200 year pluvial event is identified on the cycle route to the south of the site.

6.3.3 Given that the development site slopes to the north and that there is no flooding indicated within the development site itself it is not considered a significant risk to the development proposals.

6.3.4 The local area is generally relatively flat and the risk of surface water runoff entering the site from the surroundings is considered negligible.

6.4 Flooding from Sewers and Drains

6.4.1 Southern Water have confirmed that they have no record of historic flooding of the sewers in the vicinity of the site.

6.4.2 Flooding from the local sewers and private drains is not anticipated to be a significant risk at this site.

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7 Development Proposals

7.1 Description

7.1.1 The development proposal is for the construction of 68 residential dwellings comprising 16 two bedroom houses, 36 three bedroom houses, 4 four bedroom houses and 12 two bedroom flats together with onsite highways, parking areas and landscaping incorporating public open space and private gardens.

7.1.2 House footprints vary from between approximately 50m^2 to 80m^2 each in area.

7.1.3 The proposed highways and parking areas make up approximately 7,000m^2 and there are two paved amenity areas each of approximately 500m^2.

7.1.4 Approximately 1.34 ha or 56% of the proposed developed site will be impermeable, a decrease of approximately 2,600m^2 from the former school buildings and hard standing.

7.1.5 A copy of the proposed site layout plan is located in Appendix 6 at the rear of this report.

7.2 Drainage Strategy

7.2.1 No diversion or alteration is proposed to the onsite public sewer.

7.2.2 Foul water will be discharged to the public foul sewer at the southern site boundary. This will be done via existing connection where one can be found or new connection if necessary.

7.2.3 Surface water drainage will mimic that of the adjacent Littlehampton Academy being infiltration to ground via borehole soakaways to puncture through the clay layer and utilising ponds and chambers to provide storage above.

7.2.4 The Environment Agency made the following comments on pollution risk to groundwater from possible oil spill contamination from road drainage with the following statement on mitigation: *'Deep sealed trapped gullies are adequate systems to remove oil and sediment but regular inspection and maintenance must be undertaken for effective pollution prevention. Swale and filter drains can also provide attenuation of contamination (prevention of contaminates reaching groundwater). However, contamination can build up in infiltration media and regular inspection, maintenance and possible removal of poor and*

contaminated material must be undertaken for effective pollution prevention and increased infiltration.'

7.2.5 Surface water collected from the onsite highways will be discharged to a balancing pond located centrally within the site and discharged by infiltration via two boreholes within manholes.

7.2.6 The balancing pond will be sized to accommodate the full volume of a six hour 1:100 year pluvial event including an additional 30% to account for the predicted effects of future climate change.

7.2.7 Preliminary calculations indicate a volume of approximately 385m^3 will be required, a similar size to the existing balancing pond to the west of the site. Approximately 15m^3 will be available within the manholes. The remainder will be allowed to flood the public open space which will be profiled to accommodate the water whilst remaining a usable open space outside of long return period events.

7.2.8 Clean rainwater collected from the roof of buildings will be discharged to ground by soakage via borehole soakaways with storage within the manhole above.

7.2.9 These soakaways will be designed such that they have sufficient storage to accommodate the full volume of a six hour 1:100 year pluvial event including an additional 30% to account for the predicted effects of future climate change.

7.2.10 Preliminary calculations indicate 2m deep ring soakaways of between 1.8 and 2.1m diameter will be required for each property.

7.2.11 Private drives will be of permeable construction and drain directly to ground. Storage will be incorporated within the construction and a high level overflow will link to the private borehole soakaway of that house.

7.2.12 The storage volumes proposed are worst case in terms of an assumption of nil soakage for a highly robust assessment in the absence of ground investigation. The precedent of borehole soakaways with storage above on the adjacent Littlehampton Academy site demonstrates the drainage strategy is achievable.

7.2.13 Soakage testing and drainage calculations will need to be confirmed as part of a detailed design and may reduce the necessary storage volumes stated in this report.

7.2.14 A preliminary drainage strategy drawing together with calculations is located in Appendix 7 at the rear of this report.

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8 Safe Development

8.1 Safe Access

8.1.1 The site and its wider area are in Flood Zone 1 and will remain so into the foreseeable future even if the existing flood defences on the River Arun were removed.

8.1.2 Safe and dry access to the site is assured for all tidal and fluvial events up to a 1:1000 year event including the predicted effect of climate change.

8.2 Risk to Others

8.2.1 The impermeable area of the site will be reduced from the previous school buildings by approximately 0.8ha and the risk of flooding off site is reduced as a result of the reduction in flows entering the surface water sewer during storm events.

8.2.2 The new onsite surface water drainage system will be designed to current standards incorporating SuDS elements providing attenuation storage which reduces the risk of runoff leaving the site during times of heavy rain.

8.2.3 Foul flows from the residential development will be lower than those of the former school and will discharge to the public sewer within the site.

8.2.4 The risk of flooding to others due to the development proposals is limited to a failure of the onsite drainage and the risk is negligible.

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9 The Sequential and Exception Tests

9.1 Sequential Test

9.1.1 With reference to the Technical Guidance to the National Planning Policy Framework 'Table 2: Flood Risk Vulnerability Classification' the development is classified as 'More Vulnerable'.

9.1.2 With reference to the Technical Guidance to the National Planning Policy Framework 'Table 3: Flood Risk Vulnerability and Flood Zone 'Compatibility'' confirms that the development is appropriate in Flood Zone 1.

9.1.3 The Sequential Test is passed as the site is in Flood Zone 1.

9.2 Exception Test

9.2.1 With reference to the Technical Guidance to the National Planning Policy Framework 'Table 3: Flood Risk Vulnerability and Flood Zone 'Compatibility'' an Exception Test is not required.

10 Conclusions

10.1 Neither the Environment Agency, Arun District Council, West Sussex County Council nor Southern Water hold any record of the site having flooded.

10.2 This site is not at risk of flooding from rivers, the sea or overland flows. The highest flood risk to the site is from groundwater which historically has never emerged above ground in the vicinity of the site or from a failure of the onsite drainage system.

10.3 The former impermeable area of the site will be reduced by the development proposals.

10.4 Surface water will be discharged to ground with sufficient onsite storage to accommodate a 1:100 year pluvial event including an additional 30% to account for the predicted future intensity attributed to climate change.

10.5 The drainage solution for the adjacent Littlehampton Academy demonstrates the proposed drainage strategy for this proposed development is feasible and can be confirmed subsequent to granting of Planning Consent subject to detailed design.

10.6 Foul water will be discharged to the existing public sewer at the southern site boundary.

10.7 In terms of flood risk the proposed development is appropriate to this location and is considered acceptable.

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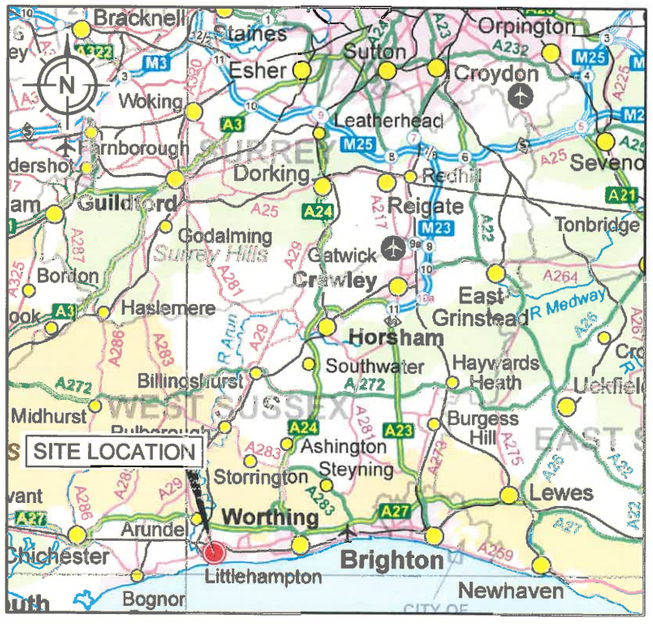
Appendix 1	Site Location Plan
Appendix 2	Existing and Pre-Demolition Site Layout Plans
Appendix 3	Sewer Records
Appendix 4	Borehole Records
Appendix 5	Environment Agency and West Sussex County Council Flood Maps and correspondence received from Arun District Council, West Sussex County Council and Southern Water
Appendix 6	Proposed Site Layout Plan
Appendix 7	Preliminary Drainage Strategy Drawing and Calculations

Appendix 1

Site Location Plan

the civil engineering practice

SITE LOCATION



Site Location Plan - Land South of Littlehampton Academy BN17 6FE
OS Reference: TQ 033 026

SCALE 1:10000 @ A3

DRG. No. 1

ARUN DISTRICT COUNCIL LU/51/14/

Appendix 2

Existing and Pre-Demolition Site Layout Plans

the civil engineering practice

N

ELM GROVE ROAD

-10m 0 10m 20m 30m 40m

Scale 1:1000

TITLE

Existing Site Layout

SCALE

1:1000 @ A3

DRG. No.

2

ARUN DISTRICT COUNCIL LU/51/14/

RevNo	Revision note	Date	Signature	Checked

Contractor		Surveyed by	Drawn by
Harlequin		DL/SW	MH
1 ABBEY WOOD ROAD, KINGS HILL, WEST MALLING, KENT, ME19 4YT. T: +44 (0) 1732 220700. F: +44 (0) 1732 220701 www.harlequin.info		Approved by	Approved by - date

Ward Bdy
FF
FW
FF
Business Enterprise Centre
Grass
Elm Grove
County Infants School
School House
Garage
Surrounding buildings
Garages
GROVE CRESCENT
7.3m
32
41
40
53
52
54
Youth Wing
BM
7.74m
21
17
15
13
ELMGROVE ROAD
8.2m Post
7.9m
Posts
El Sub Sta
85
Und
CB
Posts
C Cycle Tk
8.2m
Cycle Track
8.2m
Playground
24
91
12
36
30
55
56
STANHOPE ROAD
42
DORSET CLOSE
49
43
24
63
36
PATERSON WILSON ROAD
1
3
Ward Bdy
Und

All dimensions to be checked on site before work commences.

Quick name	Property ref	DfES No.
LitComm.Low	676	4062

west sussex county council

Littlehampton Community School
Elm Grove & Youth Wing
Elm Grove
Littlehampton

Property Services, The Tannery
Westgate, Chichester PO193JR
Tel. 01243 752290

Drawing number		Date	Maint. area
00676_LitComm.Low		07/04/04	8
CAD filename	Sheet	Edition	Scale
00676_LitComm.Low	1/1	1st	1:1250 @ A1

North

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Appendix 3

Sewer Records

SEWER RECORDS

Node	Cover	Invert	Size	Material	Shape
0001X	6.54	4.35	225	CP	CIRC
0501X	8.09	6.43	225	VC	CIRC
0502X	8.05	6.97	225	VC	CIRC
0601X	7.46	1.76	450	CP	CIRC
0701X	6.54	2.03	450	CP	CIRC
0702X	7.21	1.86	450	CP	CIRC
0801X	5.12	2.25	450	CP	CIRC
0802X	5.06	2.29	450	CP	CIRC
0803X	5.8	2.17	450	CP	CIRC
0901X		4.61	225	CP	CIRC
0902X	5.32	4.14	225	CP	CIRC
0903X			UNK	VC	CIRC
0904X			UNK	VC	CIRC
1401X	7.45	1.37	525	CP	CIRC
1501X	7.95	1.62	525	CP	CIRC
1502X	7.97	6.5	500	CI	CIRC
1503Y	7.95	6.59	525	CP	CIRC
1503X	7.95	6.45	450	BAC	CIRC
1505X	8.31	1.49	525	CP	CIRC
1506X	8.12	6.12	525	BAC	CIRC
1507X	7.93	6.08	525	BAC	CIRC
1701X	7.09	5.49	150	CP	CIRC
1901X			UNK	VC	CIRC
2400X	7.574	6.144	150	PVC	CIRC
2401X	8.032	5.602	150	PVC	CIRC
2501X	7.98	6.01	525	BAC	CIRC
3401X	9.65	8.15	150	VC	CIRC
3501X	8.02	5.4	525	BAC	CIRC
4001X	7.46	5	225	VC	CIRC
4405X	7.54	5.76	225	VC	CIRC
440BX		7.36	150	VC	CIRC
4416X	10.19	8.29	150	VC	CIRC
441DX			225	VC	CIRC
442BX	8.13	7.12	150	VC	CIRC
44BDX	7.8	6.74	150	VC	CIRC
44CDX	8.22	7.19	150	VC	CIRC
44DDX	8.27	7.55	150	VC	CIRC
44EDX	7.81	6.73	150	VC	CIRC
44JDX	8.32	7.63	150	VC	CIRC
44KDX	7.95	7.29	150	VC	CIRC
4502X	8.23		525	BAC	CIRC
4503X	8.4	6.46	225	VC	CIRC
4508X	8.56	6.94	225	VC	CIRC
4511X	10.39	8.79	150	VC	CIRC
4512X	8.32	6.61	225	VC	CIRC
4513X	10.47	8.62	150	VC	CIRC
4514X			150	VC	CIRC
4515X			UNK	UNK	CIRC
4516X			UNK	UNK	CIRC
4517X			UNK	UNK	CIRC
451DX			225	VC	CIRC
452DX			525	BAC	CIRC
453DX	8.45	7.41	150	VC	CIRC
454DX	8.47		150	VC	CIRC
45ADX	8.55	7.5	150	VC	CIRC
45BDX	8.77	7.75	150	VC	CIRC
45CDX	8.64		150	VC	CIRC
45DDX	8.58	7.41	150	VC	CIRC
45EDX	8.62		150	VC	CIRC
460BX			UNK	UNK	UNK
460DX			UNK	UNK	CIRC
461BX			UNK	UNK	CIRC
461DX			UNK	UNK	UNK
462DX			UNK	UNK	UNK
463DX			UNK	UNK	CIRC
464DX			UNK	UNK	UNK
4701X			UNK	UNK	CIRC
4801X	7.22	5.94	225	VC	CIRC
4802X	7.57	3.86	225	VC	CIRC
4803X	7.18	4.18	225	VC	CIRC
4804X			225	VC	CIRC
4805X			225	VC	CIRC
4806X			225	VC	CIRC
5411X	6.51	1.86	900	CP	EGG
543DX	7.78	7.08	150	VC	CIRC
544DX	7.76		150	VC	CIRC
54ADX	7.97	7.29	150	VC	CIRC
54BDX	8.33	7.47	150	VC	CIRC
54CDX	8.24		150	VC	CIRC
54EDX	8.23	7.43	150	VC	CIRC
5501X	6.7	4.09	525	BAC	CIRC
5507X	6.68	1.75	900	CP	EGG
5508X	8.54	6.24	225	VC	CIRC
5509X	8.51	4.59	525	BAC	CIRC
550BX			UNK	UNK	UNK
550DX			UNK	UNK	UNK
5510X			UNK	UNK	UNK
5512X			UNK	UNK	UNK
551TX			UNK	UNK	UNK

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Appendix 4

Borehole Records

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL
Geology of Britain viewer
More BGS map viewers
Surface Geology
3D Models
Borehole Scans
Earthquake Timeline
Borehole Scans
Click on a borehole to view scan.
Borehole depth
0 - 10m
10 - 30m
30m+
Unknown
Confidential or Restricted
More on boreholes
Go to Location
Switch Basemap
100%
0%
Geology Transparency
Grid Ref: 504361, 102232
TQ00SW36
TQ00SW189
TQ00SW194
TQ00SW195
TQ00SW198
TQ00SW196
TQ00SW205
TQ00SW199
TQ00SW200
TQ00SW197
TQ00SW206
TQ00SW202
TQ00SW203
TQ00SW204
TQ00SW201
TQ00SW133
TQ00SW221
TQ00SW222
TQ00SW52
TQ00SW54
TQ00SW32
TQ00SW176
TQ00SW77
TQ00SW78
TQ00SW76
TQ00SW178
TQ00SW209
TQ00SW72
TQ00SW66
TQ00SW65
TQ00SW57
TQ00SW210
TQ00SW75
Oakcroft Gardens
B2187
B2140
Beacon Road
Sussex Street
Stanley Road
Lansdowne
Highdown Drive
Jays Close
Madehurst Way
Kent Road
Blakehurst Way
Parham Close
Cornwall Road
Mantling Road
East Ham Road
York Road
Queen Street
North Ham Road
Maxwell Road
Gloucester Place
Gloucester Lane
Arundel Road
Franciscan Way
East Street
Goda Road
St Martins Road
Littlehampton
Arcade Road
Thorncroft Road
Townsend Crescent
Hill Road
Grove Crescent
Horsham Road West
Horsham Road
Peregrine Road
Timberleys
The Faroes
Keelson Way
Bell Davies Road
Davits Drive
Gosden Road
Carvel Way
Admirals Way
Beacon Way
Fastnet Way
Armada Way
Elm Grove Road
Dorset Close
Stanhope Road
Norman Close
Falkland Avenue
Southfields Road
Windward Close
Parkside Avenue
Meadow Way
Esher Drive
St Mary's Close
St Flora Road
The Winter Knoll
The Hooe
Sternway
The Mole
The Cape
Leeward Road
Malin Road
0
100
200m
POWERED BY esri

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 569756 : BGS Reference: TQ00SW32
British National Grid (27700) : 503780,102490
Report an issue with this borehole

British Geological Survey

TQ00/147

F. SMITH & SON (GRIMSBY) LTD. TS 6554
Cheapside Works
Waltham Grimsby

332/116

CLIENT : SOUTHERN WATER AUTHORITY
CONSULTANT :
SITE : LITTLEHAMPTON
SOUTHFIELDS RD PLAYING FIELD

BOREHOLE : Nº 75
TYPE OF BORING: CABLE
LINING TUBES :
NGR TQ 0378 0249

Commenced : 23rd MARCH 1976 Completed : 30th APRIL 1977

Strata	thickness	depth	legend	Casing detail
TOP SOIL	0·200	0·200		
LIGHT BROWN SANDY CLAY GRAVEL SEAMS WATER	7·300	7·500		
PUTTY CHALK SOME FLINTS	2·000	9·500		
SOFT CHALK & FLINTS	5·500	15·000		
FIRM CHALK FLINTS WITH SOFT SEAMS	7·000	22·000		
GREY MARLY CLAY	1·000	23·000		
CHALK WITH SOFT SEAMS	11·000	34·000		casing:- 6·19m plain 13·57m slotted
SOFT CHALK STONES & FLINTS	18·000	52·000		
CHALK & MARL WITH HARD SEAMS	24·000	76·000		
FIRM CHALK SOME FLINTS	2·000	78·000		
HARD CHALK & MARL SEAMS	16·000	94·000		
HARD GREY WHITE CLAY	6·000	100·000		
BANDS OF HARD & SOFT MARL	35·500			

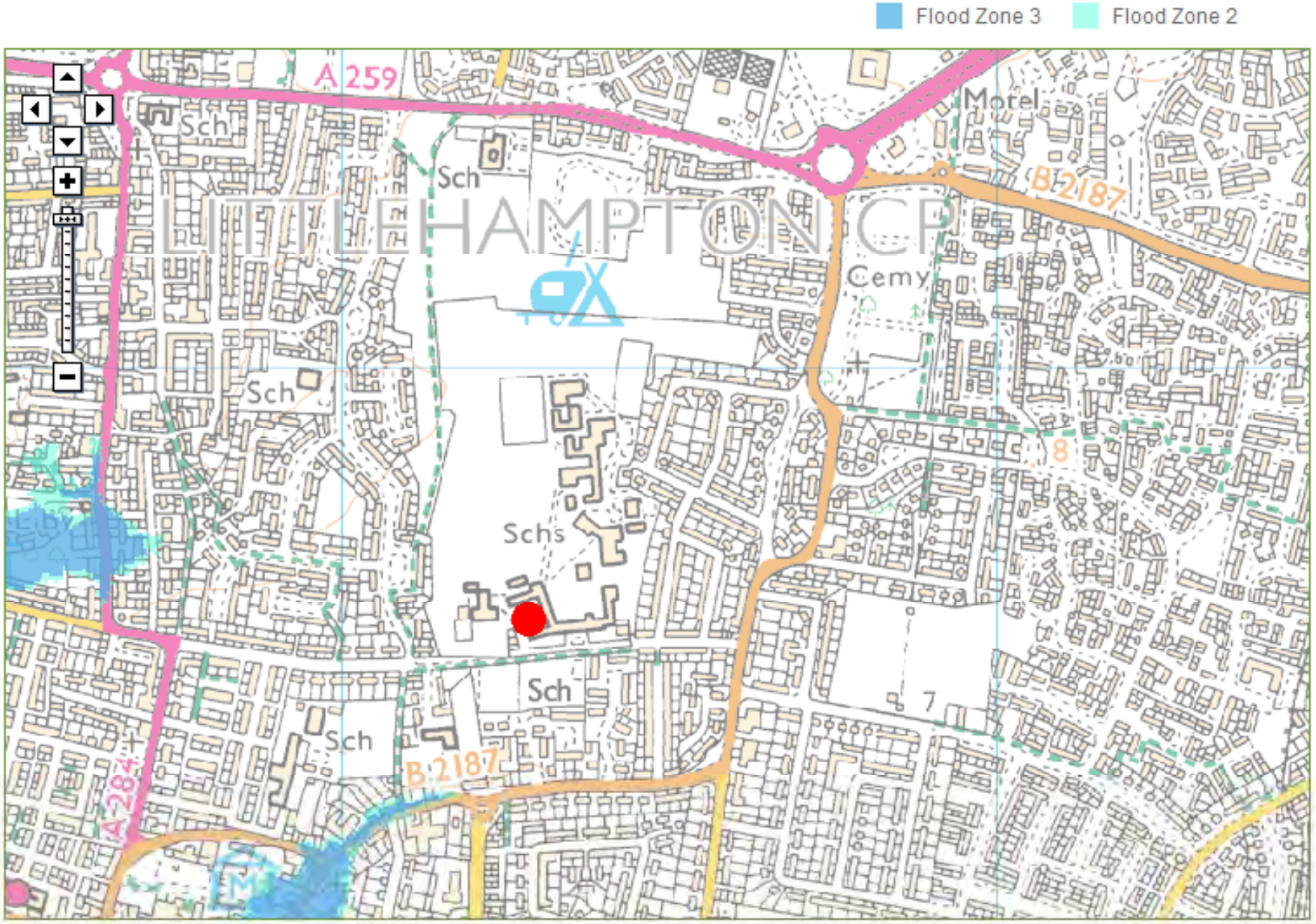
DRIFT

UPPER & MIDDLE CHALK

ARUN DISTRICT COUNCIL LU/51/14/

Appendix 5

Environment Agency and West Sussex County Council Flood Maps and correspondence received from Arun District Council, West Sussex County Council and Southern Water



Customers in Wales - From 1 April 2013 Natural Resources Wales (NRW) will take over the responsibilities of the Environment Agency in Wales.
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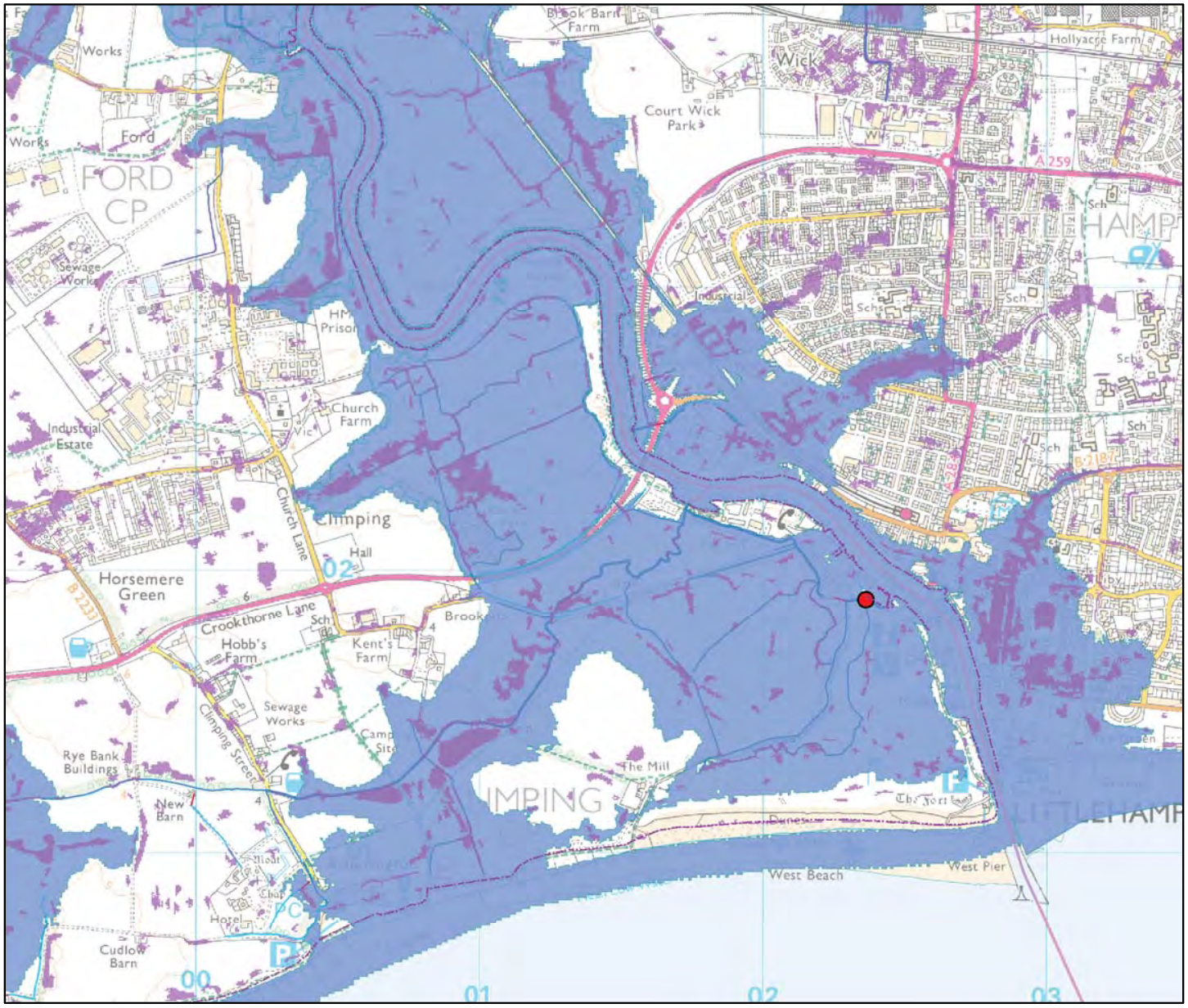
Littlehampton West & Climping Wet Spot



Legend

- Surface Water Flood Map 1 in 200 yr rainfall event
- Rivers and Sea Flood Map 1 in 100 year river event, 1 in 200 year sea event

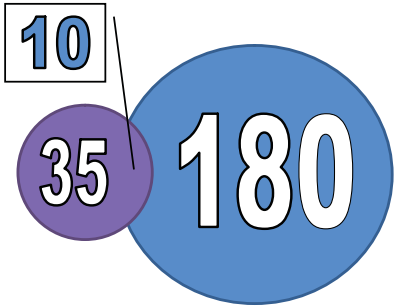
River obstructions

- ARTIFICIAL
- NATURAL
- UNKNOWN

River network

- Primary River
- Secondary River
- Tertiary River
- D/S of High Water Mark
- D/S of Seaward Extension
- Lake / Reservior
- Canal
- Extended Culvert (> 50m)
- Canal Tunnel
- Underground River (inferred)
- Underground River (local knowledge)

Numbers of properties at risk from surface water vs. rivers and sea



N

0 0.5 1

Miles

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Steve Doughty

From: Nicola Spencer [Nicola.Spencer@arun.gov.uk] on behalf of Planning [Planning@arun.gov.uk]
Sent: 13 December 2013 16:06
To: 'Steve Doughty'
Subject: RE: 22306 Land South of Littlehampton Academy

Thank you for your email. We do not hold records you would need to contact the Environment Agency.

Yours sincerely

Nicola Spencer

Nicola Spencer | Technical Support Manager, Planning Department, Arun District Council | Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF
Internal: 37446 | External: +44 (0) 1903 737500 ext 37446 | E-mail: nicola.spencer@arun.gov.uk
Visit Arun's web site at www.arun.gov.uk Save the environment - think before you print.

From: Steve Doughty [mailto:steve@civil.co.uk]
Sent: 13 December 2013 14:53
To: Planning
Cc: reception@civil.co.uk
Subject: 22306 Land South of Littlehampton Academy

Good Afternoon.

I am in the process of preparing a Flood Risk Assessment for a site in Littlehampton as shown on the attached Site Location Plan.

Can you confirm whether you hold any record of historic flooding in the vicinity of the site.

Many thanks.

<<...>>

Steve Doughty

Tel: 01273 424424
Fax: 01273 424425
Email: steve@civil.co.uk

The Civil Engineering Practice
11 Tungsten Building
George Street
Fishersgate
West Sussex
BN41 1RA

As an ISO 9001 : 2008 certified company, we invite you to reply to this email with any feedback (positive or negative) that you would like to share. Any response will be reviewed by the directors and quality assurance department.

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ARUN DISTRICT COUNCIL LU/51/14/

Steve Doughty

From: Kevin Macknay [kevin.macknay@westsussex.gov.uk]
Sent: 18 December 2013 10:25
To: steve@civil.co.uk
Subject: FW: 22306 Land South of Littlehampton Academy Southern
Attachments: Site Location Plan.pdf

For the attention of Steve Doughty.

Steve,

Further to your recent email, dated 13 December 2013.
We have no records of historic flooding in the vicinity of your site. I have also checked with Arun DC, who also have no knowledge of any problems in the area.
Littlehampton was one of the areas affected following the June 2012 flooding event. You may want to view our investigation and report that was published following the event. A link to the report is given below:

http://www.westsussex.gov.uk/living/environment_and_planning/environment/managing_flood_risk/flood_investigation_within_wes.aspx

Regards

Kevin

Kevin Macknay | Drainage Strategy Team Leader, West Sussex County Council
West Sussex Highways, Drayton Depot, Drayton Lane, Drayton, Chichester, West Sussex. PO20 2AJ
Internal: 26429 | External: +44 (0) 330 22 26429 | E-mail: kevin.macknay@westsussex.gov.uk

---

From: Graham Hicks
Sent: 16 December 2013 15:32
To: Kevin Macknay
Subject: FW: 22306 Land South of Littlehampton Academy Southern

Kevin

Please can you respond to the request below.

Thanks
Graham

From: Rebecca Scarratt **On Behalf Of** Highways
Sent: 16 December 2013 09:34
To: Richard Speller; Graham Hicks
Subject: FW: 22306 Land South of Littlehampton Academy Southern

Please see below

ARUN DISTRICT COUNCIL LU/51/14/

Steve Doughty

From: SW Customer Services [SWCustomerServices@southernwater.co.uk]
Sent: 16 December 2013 08:05
To: 'steve@civil.co.uk'
Subject: CSMS Ref 3373786 - Land South of Littlehampton Academy

Customer Services

steve@civil.co.ukOur Ref:CSMS 3373786Date:16 December 2013Contact:Tel: 0845 278 0845Fax: 01903 535060

Dear Mr Doughty,

Thank you for your e-mail received on 13 December, regarding obtaining sewer flooding information at the land to the South of the Littlehampton Academy.

I have checked our system as requested, and can confirm that we have no incidents logged to the area that you specified on the map or the surrounding area.

I trust this information is satisfactory, however if you require any further information please feel free to contact us again.

Yours sincerely,

Isobel Fumagalli
Customer Advisor

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This e-mail is issued by Southern Water Services Limited, company number 2366670, registered in England and having its registered office at Southern House, Yeoman Road, Worthing, BN13 3NX, England.

ARUN DISTRICT COUNCIL LU/51/14/

Appendix 6

Proposed Site Layout Plan

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Do not scale from this drawing, work to figured dimensions. All dimensions to be checked on site and any discrepancies reported to the Architect immediately.

REVISION NOTES

REV.	DESCRIPTION	DATE

SITE OF NEW ACADEMY

PROPOSED SCHOOL ACCESS

NEW LINK ROAD

SITE OF NEW NURSERY

CYCLE STORE

DRAINAGE POND

AMENITY SPACE

PAVED SQUARE

PAVED SQUARE

CYCLE STORE

ELMGROVE ROAD

Access across square for emergency service vehicles

SHARED SURFACE STREET

CYCLE PATH

CORNWALL ROAD

PLAY AREA

PUBLIC PARK

DORSET CLOSE

PRELIMINARY

0m 10m 20m 30m 40m 50m
1:1000m

N

SCHEDULE OF ACCOMODATION:

SITE AREA: 2.42 Ha

DENSITY: 28 dwellings per hectare

68 DWELLINGS COMPRISING:

OPEN MARKET HOUSING:

2 BED FLATS @ 65-80M²	4
2 BED HOUSES @ 70-80M²	11
3 BED HOUSES @ 85-100M²	36
4 BED HOUSES @ 120M²	4

AFFORDABLE HOUSING:

2 BED FLATS @ 65-80M²	8
2 BED HOUSES @ 70-80M²	5

PARKING:

139 spaces

2.04 spaces per dwelling

WILLIAMS LESTER
CHARTERED ARCHITECTS
2 Pullman Way, Ringwood, BH24 1EX
01425 485234 mail@williamslester.com
www. williamslester.com

Client: west sussex county council

Project: Land south of Littlehampton Academy

Title: Site Plan Unit Types

Scale 1:1000 @ A3 Date 10/07/2013
Drawn MS Checked SJ

Drawing No. 4777-PL-002 Revision G

ARUN DISTRICT COUNCIL LU/57/14

Appendix 7

Preliminary Drainage Strategy Drawing and Calculations

N

SITE OF NEW ACADEMY

PROPOSED SCHOOL ACCESS

NEW LINK ROAD

SITE OF NEW NURSERY

CYCLE STORE

DRAINAGE POND

PAVED SQUARE

1 in 4 Banking

PAVED SQUARE

GROVE CRESCENT

ELMGROVE ROAD

SHARED SURFACE

CYCLE PATH

Existing Southern Water sewer

CORNWALL ROAD

PLAY AREA

PUBLIC PARK

DORSET CLOSE

Highway Drainage 2No borehole soakaways. Additional storage for large return period storms within basin formed in public open space. Storage Volume within basin 370m³ to accommodate the entire 100 year storm + 30%. Effective depth 800mm over hatched area.

Legend:

- Private drainage borehole soakaway with storage within manhole
- Highway drainage borehole soakaway with storage within manholes and basin

-10m 0 10m 20m 30m 40m

Scale 1:1000

TITLE

Proposed Drainage Strategy

SCALE 1:1000 @ A3

DRG. No. 4

ARUN DISTRICT COUNCIL LU/51/14/

ARUN DISTRICT COUNCIL LU/51/14/

Storage Calculation - Houses (up to 50m^2)

Project Name: Land south of Littlehampton Academy
Project Number: 22306

Impermeable Area

Impermeable Area	50 m^2
Outflow Restriction	0 l/s

Return Storm Period Assessments available are: 1, 2, 5, 10, 20, 25, 50, 100 years.
Ratio r1 in the range 0.12, 0.15, 0.18, 0.21, 0.24, 0.27, 0.30-0.45

Storm Profiles

Return Period	100 years
M5-60	20 mm
Ratio r1	0.35

Consider Storms Beyond 6 hour duration? No

Storm Duration (mins)	Z1	R M5-D (mm)	Z2	R M(x)-D (mm)	I (cu.m)	Outflow (cu.m)	Storage Required
5	0.36	7.20	1.84	13.25	0.66	0.00	0.66 m^3
10	0.51	10.20	1.91	19.48	0.97	0.00	0.97 m^3
15	0.62	12.40	1.95	24.18	1.21	0.00	1.21 m^3
30	0.79	15.80	1.99	31.44	1.57	0.00	1.57 m^3
60	1.00	20.00	2.03	40.60	2.03	0.00	2.03 m^3
120	1.23	24.60	2.01	49.45	2.47	0.00	2.47 m^3
180	1.37	27.40	1.99	54.53	2.73	0.00	2.73 m^3
240	1.51	30.20	1.97	59.49	2.97	0.00	2.97 m^3
300	1.60	32.00	1.96	62.56	3.13	0.00	3.13 m^3
360	1.69	33.80	1.94	65.57	3.28	0.00	3.28 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3

Peak Storage

3.3 m^3

Additional 30% for future climate change

4.3 m^3

Assuming: 2 m deep ring soakaway
1.8 m diameter required

ARUN DISTRICT COUNCIL LU/51/14/

Storage Calculation - Houses (up to 80m²)

Project Name: Land south of Littlehampton Academy
Project Number: 22306

Impermeable Area

Impermeable Area	80 m²
Outflow Restriction	0 l/s

Return Storm Period Assessments available are: 1, 2, 5, 10, 20, 25, 50, 100 years.
Ratio r1 in the range 0.12, 0.15, 0.18, 0.21, 0.24, 0.27, 0.30-0.45

Storm Profiles

Return Period	100 years
M5-60	20 mm
Ratio r1	0.35
Consider Storms Beyond 6 hour duration?	No

Storm Duration (mins)	Z1	R M5-D (mm)	Z2	R M(x)-D (mm)	I (cu.m)	Outflow (cu.m)	Storage Required
5	0.36	7.20	1.84	13.25	1.06	0.00	1.06 m³
10	0.51	10.20	1.91	19.48	1.56	0.00	1.56 m³
15	0.62	12.40	1.95	24.18	1.93	0.00	1.93 m³
30	0.79	15.80	1.99	31.44	2.52	0.00	2.52 m³
60	1.00	20.00	2.03	40.60	3.25	0.00	3.25 m³
120	1.23	24.60	2.01	49.45	3.96	0.00	3.96 m³
180	1.37	27.40	1.99	54.53	4.36	0.00	4.36 m³
240	1.51	30.20	1.97	59.49	4.76	0.00	4.76 m³
300	1.60	32.00	1.96	62.56	5.00	0.00	5.00 m³
360	1.69	33.80	1.94	65.57	5.25	0.00	5.25 m³
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m³
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m³
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m³
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m³
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m³

Peak Storage

5.2 m³

Additional 30% for future climate change

6.8 m³

Assuming: 2 m deep ring soakaway
2.1 m diameter required

ARUN DISTRICT COUNCIL LU/51/14/

the Civil Engineering Practice

Storage Calculation - Paved Amenity Areas

Project Name: Land south of Littlehampton Academy
Project Number: 22306

Impermeable Area

Impermeable Area per	100 m^2	(5 soakaways
Outflow Restriction	0 l/s	required)

Return Storm Period Assessments available are: 1, 2, 5, 10, 20, 25, 50, 100 years.
Ratio r1 in the range 0.12, 0.15, 0.18, 0.21, 0.24, 0.27, 0.30-0.45

Storm Profiles

Return Period	100 years
M5-60	20 mm
Ratio r1	0.35
Consider Storms Beyond 6 hour duration?	No

Storm Duration (mins)	Z1	R M5-D (mm)	Z2	R M(x)-D (mm)	I (cu.m)	Outflow (cu.m)	Storage Required
5	0.36	7.20	1.84	13.25	1.32	0.00	1.32 m^3
10	0.51	10.20	1.91	19.48	1.95	0.00	1.95 m^3
15	0.62	12.40	1.95	24.18	2.42	0.00	2.42 m^3
30	0.79	15.80	1.99	31.44	3.14	0.00	3.14 m^3
60	1.00	20.00	2.03	40.60	4.06	0.00	4.06 m^3
120	1.23	24.60	2.01	49.45	4.94	0.00	4.94 m^3
180	1.37	27.40	1.99	54.53	5.45	0.00	5.45 m^3
240	1.51	30.20	1.97	59.49	5.95	0.00	5.95 m^3
300	1.60	32.00	1.96	62.56	6.26	0.00	6.26 m^3
360	1.69	33.80	1.94	65.57	6.56	0.00	6.56 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3

Peak Storage

6.6 m^3 per soakaway

Additional 30% for future climate change

8.5 m^3 per soakaway

Assuming: Five 2 m deep ring soakaways
2.4 m diameter required

ARUN DISTRICT COUNCIL LU/51/14/

Storage Calculation - Highways

Project Name: Land south of Littlehampton Academy
Project Number: 22306

Impermeable Area

Impermeable Area	4500 m^2
Outflow Restriction	0 l/s

Return Storm Period Assessments available are: 1, 2, 5, 10, 20, 25, 50, 100 years.
Ratio r1 in the range 0.12, 0.15, 0.18, 0.21, 0.24, 0.27, 0.30-0.45

Storm Profiles

Return Period	100 years
M5-60	20 mm
Ratio r1	0.35

Consider Storms Beyond 6 hour duration? No

Storm Duration (mins)	Z1	R M5-D (mm)	Z2	R M(x)-D (mm)	I (cu.m)	Outflow (cu.m)	Storage Required
5	0.36	7.20	1.84	13.25	59.62	0.00	59.62 m^3
10	0.51	10.20	1.91	19.48	87.67	0.00	87.67 m^3
15	0.62	12.40	1.95	24.18	108.81	0.00	108.81 m^3
30	0.79	15.80	1.99	31.44	141.49	0.00	141.49 m^3
60	1.00	20.00	2.03	40.60	182.70	0.00	182.70 m^3
120	1.23	24.60	2.01	49.45	222.51	0.00	222.51 m^3
180	1.37	27.40	1.99	54.53	245.37	0.00	245.37 m^3
240	1.51	30.20	1.97	59.49	267.72	0.00	267.72 m^3
300	1.60	32.00	1.96	62.56	281.52	0.00	281.52 m^3
360	1.69	33.80	1.94	65.57	295.07	0.00	295.07 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00 m^3

Peak Storage

295.1 m^3

Additional 30% for future climate change

383.6 m^3