



Hampshire
County Council

LABURNUM GROVE JUNIOR SCHOOL EXTENSION

FLOOD RISK ASSESSMENT

Prepared by: Peter White

Signed: Date:

Checked by: Simon Fryer

Signed: Date:

Approved by: David Devenish

Signed: Date:



Job No: R.J509876



Stuart Jarvis, BSc DipTP FCIHT MRTPI, Director of Environment, The Castle, Winchester

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1. SUMMARY

The Engineering Consultancy of Hampshire County Council has been commissioned to carry out a Flood Risk Assessment (FRA) on behalf of West Sussex County Council for a proposed development at Laburnum Grove Junior School, Bognor Regis, PO22 9HT.

This report has been undertaken with direct reference to Planning Policy Statement 25: Development and Flood Risk. It is stated in paragraph 22 that the developer is responsible for providing a FRA, demonstrating:

- Whether any proposed development is likely to be affected by current or future flooding from any source;
- Satisfying the LPA that the development is safe and where possible reduces flood risk overall;
- Whether it will increase flood risk elsewhere; and
- The measures proposed to deal with these effects and risks. Any necessary flood risk management measures should be sufficiently funded to ensure that the site can be developed and occupied safely throughout its proposed lifetime.

Furthermore, Annex E states *"Planning applications for development proposals of 1 hectare or greater in Flood Zone 1 and all proposals for new development in Flood Zones 2 and 3 should be accompanied by a FRA"*.

This reports makes reference to the following documents:

- West Sussex County Council Level 2 Strategic Flood Risk Assessment by Capita Symonds dated January 2010.
- West Sussex County Council Report on June 2012 Flood Event dated November 2012.
- Arun District Council Strategic Flood Risk Assessment by Capita Symonds dated February 2008.
- Site specific Flood Risk Assessment for the Berkeley Homes development at North Bersted by WSP Development Ltd dated April 2004.
- Desktop study: Flood risk and Flood Mitigation Measures by Archibald Shaw dated January 2013.

The site being considered is in Flood Zone 1 of the EA Indicative Flood Maps (EA IFM) and is less than 1 hectare in size. Although PPS25 does not require this site to be the subject of a FRA, a recent flood incident (June 2012) has highlighted the need for one.

This FRA will look at the site details, assess how the proposed scheme is currently at risk from flooding, specify expected flood risk on neighbouring sites in the light if development, and make a recommendation on future action to be taken.

2. INTRODUCTION

2.1. Existing Site

Laburnum Grove Junior School (the School) is located to the north of Bognor Regis, on the southern side of Laburnum Grove at OS grid reference 493155E, 100625N.

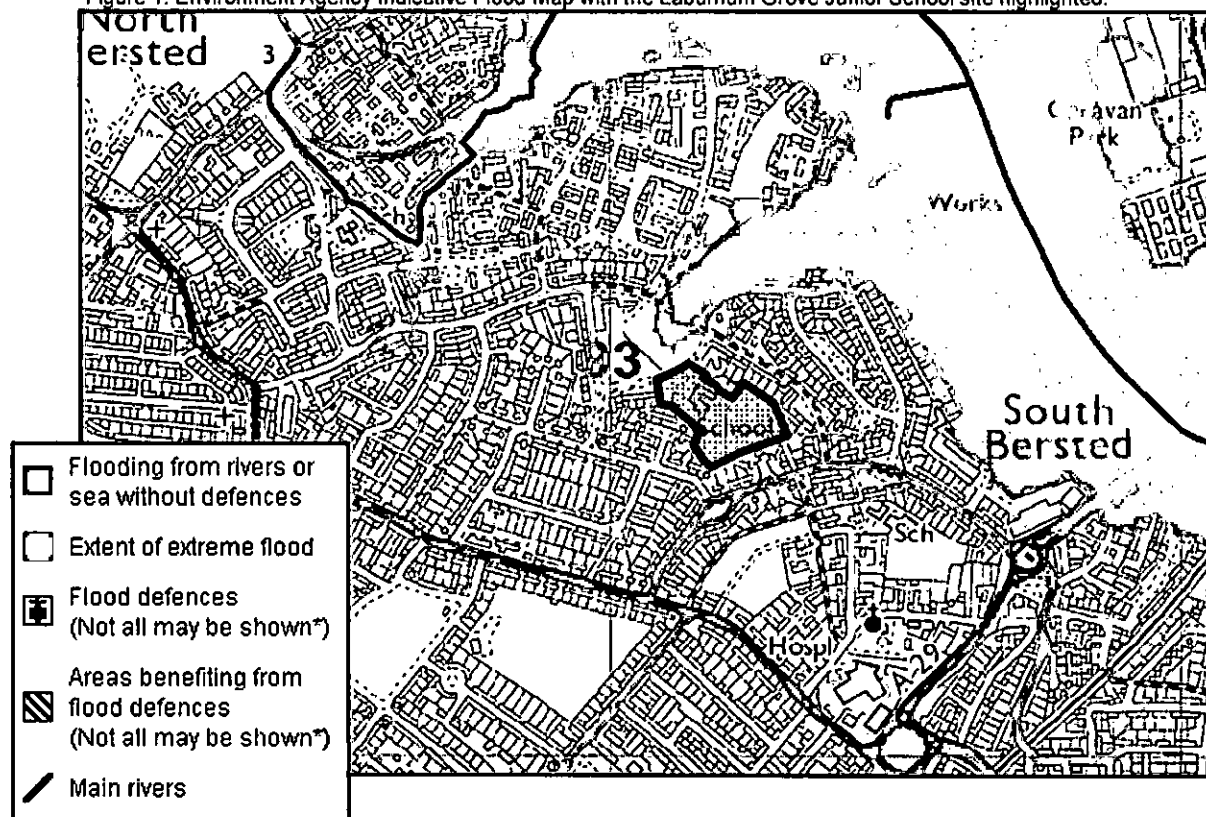
The school consists of the main building and associated hard play areas, staff/visitor car parking, and grassed playing fields. A mobile classroom is also located within the school grounds. The total site area is 18,410m² (1.841ha). The school building and other impermeable areas cover 4,890m² (0.489ha), 26.6% of the total site area.

It is proposed to construct a new single storey extension to the rear of the existing school building. The new extension will be predominantly on existing hard play area and as such it is proposed to extend the existing hard play areas to the rear and the south west of the school. It is also proposed to extend the existing car parking area and create a new hard play area for the pre-school.

The EA IFM show the site to be located in Flood Zone 1 which is defined in PPS25 as land assessed as having less than 0.1% AEP (1 in 1000 annual probability) of river or tidal flooding in any year (low probability). All uses of landed development are considered appropriate.

The EA IFM (Figure 1) illustrates that there are areas within Bognor Regis which are within Flood Zone 3. A review of the EA IFM concluded that the site would not become an isolated island as the result of an extreme event and there would be safe access to and egress from the site via Laburnum Grove during an extreme event.

Figure 1: Environment Agency Indicative Flood Map with the Laburnum Grove Junior School site highlighted.



Although the site is located within Flood Zone 1, a recent flood incident (12th June, 2012) has shown that there are flood issues in this area and therefore a Flood Risk Assessment is required to accompany the planning application.

Examination of the West Sussex County Council (WSCC) Strategic Flood Risk Assessment (SFRA) shows that the School is predicted to fall within Flood Zone 2 by 2056 and Flood Zone 3a by 2106. Appendix A shows an extract from WSCC SFRA, Map C2-T-Future Flood Zones based on Climate Change Predictions at: Land adjacent to Durban Road Industrial Estate.

The existing site (topographic survey dated November 2012) layout plan is shown on drawing number R.J509876.001 in Appendix B which includes the existing drainage layout.

Figure 2: Aerial photograph.



The site falls gently from south to north at an average gradient of 1:118 (0.84%). The existing school building is "cut in" to the slope and, as such, the rear courtyard creates a trapped area where water can accumulate.

2.2. Proposed development

The proposed development consists of :-

- The construction of 8 new classrooms with associated staff-rooms and WCs;
- the construction of new hard play areas and ramped access paths adjacent to the new building;
- the construction of a hard play area for the pre-school; and
- the extension of the existing hard play areas at the rear and south west of the school.

This development will result in an overall increase in impermeable area of 1,967m².

Using the modified rational method, the additional run-off from a 30 year event will be approximately 44 litres per second.

The additional hard-standing areas are shown on drawing number R.J509876.002 in Appendix C.

2.3. Ground Investigation

A ground investigation was undertaken by Ashdown Site Investigation Limited in December 2012. The investigation consisted of 1 number 10m deep borehole, 4 number 5m deep window samples, and 8 number 0.5m deep trial pits.

The site investigation location plan and borehole/Window Sample/Trial pit logs are shown in Appendix D.

Ground water was encountered as per the following table.

Reference	Water encountered at (m bgl)	Standing water level on completion (m bgl)
BH1	1.6	1.1
WS1	2.0 – 3.0	1.5
WS2	3.0 – 4.0	1.6
WS3	2.0 – 3.0	1.7
WS4	2.0 – 3.0	1.1

Table 2.3: Groundwater levels

2.4. CCTV Survey

A CCTV survey was undertaken in December 2012 by Clearview Surveys Limited. This survey highlighted a number of structural defects within the storm water drainage system as detailed in the table below.

Structural Defect Grade	Number of defects
1	11
2	3
3	24
4	9
5	2

Table 2.4: Structural defects

Structural defect grades 1 to 3 should be rectified within three to five years. Grade 4 defects are required to be rectified within one to two years. Grade 5 defects require immediate attention.

In addition to the structural defects, a number of service defects are affecting the performance of the drainage system, for example, the final discharge pipe is partially blocked with what looks to be a deposit of concrete which is reducing its capacity by approximately 50%.

It would appear that the majority of the site is discharged into the public surface water sewer via a 100mm diameter drain. Based on a catchment area of approximately 4,300m², together with the above restriction, this pipe clearly has insufficient capacity and appears to be a major contributory factor to the recent flooding incident.

The grade 3, 4, and 5 defects are shown on drawing number R.J509876.001 in Appendix B.

3. FLOOD RISK

3.1. Flood Mechanisms

This flood risk assessment has considered all the possible flooding mechanisms and table 3.1 below shows the expected risk identifying the key areas.

Potential source	Site at Risk?	Reasoning
Fluvial	No	Site located in Flood Zone 1
Tidal/Coastal	No	Site located outside of the tidal flooding zones.
Urban Drainage	Yes	A blocked sewer exacerbated flooding in June 2012
Groundwater	Yes	Evidence of groundwater emerging at southern boundary.
Overland Flow	Yes	Water observed flowing across playing field
Infrastructure Failure	No	No groundwater pumping present/no water abstraction
Artificial Drainage	No	There are no significant artificial water sources.

Table 3.1 – Expected risk from flood mechanisms

3.2. Fluvial (River) Flooding

The Aldingbourne Rife is a main river flowing north to south approximately 650m to the east of the school. The EA flood maps show the flood zone 3 associated with this river extend within 100m of the school. The FEH CDROM indicates the catchment area of the river at this location covers approximately 52.5km². It should be noted that surface water sewer efficiency would be reduced in times of high river flow/flooding due to surcharged outfalls.

3.3. Tidal/Coastal Flooding

The site is approximately 2km from the sea (to the south) and is shown lying outside to 200 year coastal floodplain on the AE IFM.

The 1 in 200 year surge tide level for the year 2060 is predicted to be 4.004m AOD. However the existing sea wall is well maintained and, given the site's location to the coast, provides sufficient defence against the predicted 1 in 200 year tide level in the year 2060. As such the potential for flooding by the sea is negligible.¹

3.4. Existing Drainage

Historical mapping (Appendix E1) shows a natural watercourse crossed the northern portion of the school site. It would appear that this watercourse was diverted and culverted during the development of the school in the 1960s and is now shown as a public surface water sewer on Southern Waters asset plans (Appendix E2). The sewer flows in a northerly direction and is assumed to ultimately outfall into the Aldingbourne Rife.

It is understood that this sewer was blocked on the 12th June, 2012 which exacerbated the flooding to the school.

¹ Site specific flood risk assessment for Berkeley Homes development at North Bersted.

The school boundary takes a similar shape to that shown in mapping published in 1877. It was common practice to form boundaries with drainage ditches. It is possible that a ditch on this southern boundary was infilled as part of the school development.

3.5. Groundwater

In times of rising groundwater and peak flows within the culverted watercourse, the infilled ditch and watercourse offers a weakness through which water could emerge. Such a mechanism would be consistent with the flooding event of 2012 when ground water were seen to emerging from the southern boundary.²



Photograph 1: Groundwater emerging from southern boundary (June 2012).

Map G of the WSCC SFRA indicates that the school lies within an area "*More prone to groundwater flooding*".

3.6. Historic Flooding

The British Hydrochronology database has been searched with reference to the Sussex Rivers Group. The Chronology is intended to contain records of rainfall, runoff, snow, etc. It is limited to Great Britain and to the years up to 1935 only. No reference to Bognor Regis were found.

Prior to June 2012, flooding in the Bognor Regis area occurred in 1960 when the Aldingbourne Rife flooded to an approximate level of 1.5m AOD, this flood was

² Desktop study: Flood risk and flood mitigation measures. Archibald Shaw

assumed to have a return period of 1 in 50 years. A plan showing the flooded area in relation to the school site is shown in Appendix F.³

In June 2012, an extreme weather event occurred which caused wide-spread flooding throughout the Bognor Regis Area. A plan of the affected areas is shown in Appendix G. A meteorological report for the month of June shows that the average rainfall for the Bognor Regis area in June is 47.5mm. During June 2012, over 248mm of rain fell, with 170.9mm (over 5 times the monthly average) falling in one 24 hour period (11th - 12th). This equates to a storm return period of approximately 1 in 1320⁴ years. The meteorological report is attached in Appendix H.

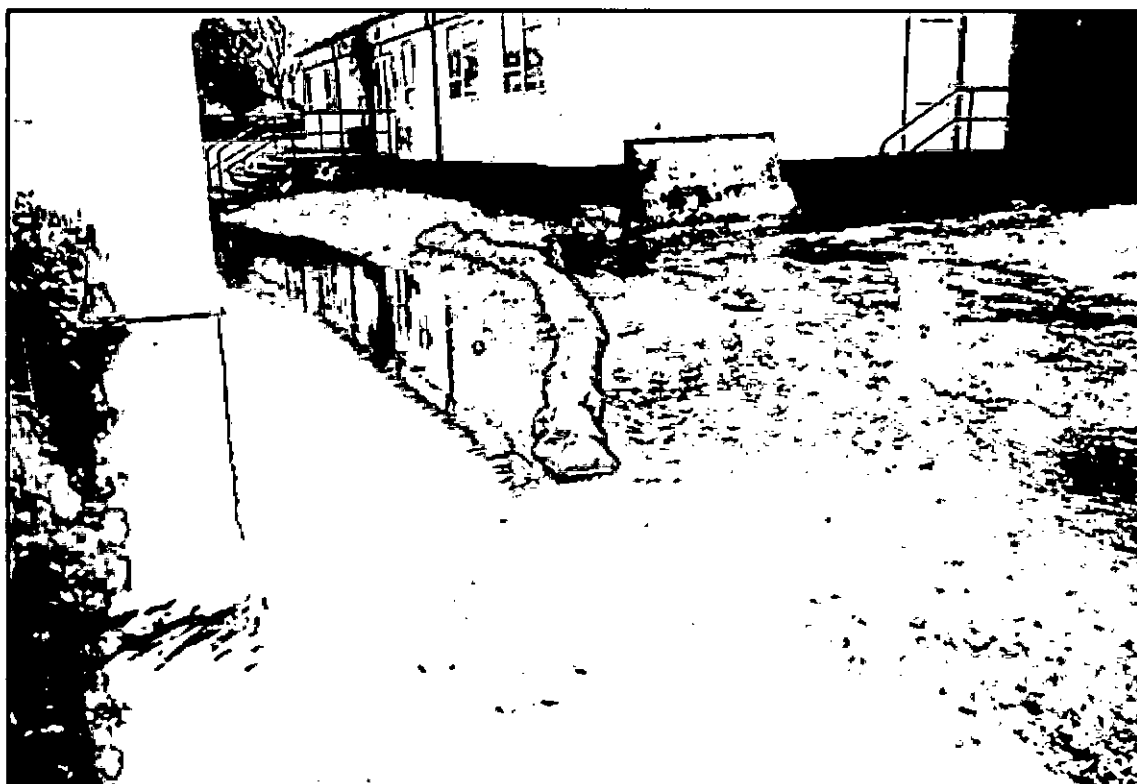
On 12th June 2012, the school suffered severe flooding with water depths up to 50mm within the school building. This flooding caused extensive damage and as such the school was re-located into temporary accommodation while the flood damage was repaired. Water flowing across the playing field and hard playground accumulated in the rear courtyard. This trapped water rose to a level where the only means of escape was through the main school building resulting in extensive damage.



Photograph 2: Flooded rear courtyard (June 2012)

³ Site specific flood risk assessment for Berkeley Homes development at North Bersted.

⁴ Calculated using the FEH CDROM 1999



Photograph 3: Flooded western perimeter footpath (June 2012)

3.7. Flooding from other sources

A new children's centre was constructed on grassed land to the north of the school in 2007. The storm water drainage system for this new centre was connected directly to the existing drainage system for the school without any attenuation of its flows.

There are no reservoirs or other artificial water sources nearby to contribute a flood risk.

3.8. Flood Zones

The site is within Flood Zone 1 on the EA IFM. The definitions of Flood Zones are given in Table 3.2 below.

Zone 1 Low Probability	
Land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).	Appropriate uses All uses of land are appropriate in this zone. FRA requirements For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a FRA. Policy aims In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques.
Zone 2 Medium Probability	
Land assessed	Appropriate uses

as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.	The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in Table 3.3 are appropriate in this zone. Subject to the Sequential Test being applied, the highly vulnerable uses in Table 3.3 are only appropriate in this zone if the Exception Test is passed. FRA requirements All development proposals in this zone should be accompanied by a FRA. Policy aims In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques.
Zone 3a High Probability	
Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.	Appropriate uses The water-compatible and less vulnerable uses of land in Table 3.3 are appropriate in this zone. The highly vulnerable uses in Table 3.3 should not be permitted in this zone. The more vulnerable and essential infrastructure uses in Table 3.3 should only be permitted in this zone if the Exception Test is passed. FRA requirements All development proposals in this zone should be accompanied by a FRA. Policy aims In this zone, developers and local authorities should seek opportunities to: • reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; • relocate existing development to land in zones with a lower probability of flooding; • create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.
Zone 3b The Functional Floodplain	
Land where water has to flow or be stored in times of flood. (Land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes).	Appropriate uses Only the water-compatible uses and the essential infrastructure listed in Table 3.3 that has to be there should be permitted in this zone. It should be designed and constructed to: • remain operational and safe for users in times of flood • result in no net loss of floodplain storage • not impede water flows • not increase flood risk elsewhere. FRA requirements All development proposals in this zone should be accompanied by a FRA. Policy aims In this zone, developers and local authorities should seek opportunities to: • reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques • relocate existing development to land with a lower flood risk.

Table 3.2 - Flood Zones

3.9. Flood Risk Vulnerability and Zone Compatibility

The proposed development is classified as 'More Vulnerable' in PPS25 as shown in table 3.3 below.

Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	• Police stations, Ambulance stations, Fire stations, Command Centres and telecommunications installations required to be operational during flooding & Emergency dispersal points; • Basement dwellings, caravans, mobile homes and park homes intended for permanent residential use; • Installations requiring hazardous substances consent.
More Vulnerable	• Hospitals, residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses; student halls of residence, drinking establishments, nightclubs and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste.
Less Vulnerable	• Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment plants and sewage treatment plants (if adequate pollution control measures are in place).
Water compatible Development	• Flood control infrastructure, water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel workings. • Docks, marinas, wharves and navigation facilities. • MOD defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 3.3 - Flood Risk Vulnerability Classification

Notes:

- 1) This classification is based partly on DEFRA/Environment Agency research on Flood Risks to People (FD2321/TR2)²¹ and also on the need of some uses to keep functioning during flooding.
- 2) Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity.
- 3) The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.

Source: PPS25 Table D2

Vulnerability Classification (see Table 3-3)		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table 3-2)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test	✓	✓
	Zone 3a	Exception Test	✓	x	Exception Test	✓
	Zone 3b	Exception Test	✓	x	x	x

Table 3.4 - Flood Risk Vulnerability and Flood Zone 'Compatibility'

Key

- ✓ Development is appropriate.
- x Development should not be permitted.

Source: PPS25 Table D3

In summary, Table 3.2 (Flood Zones) within PPS25 classifies the flood zone for the site as 'Zone 1 - Low Probability'. The development is classified as 'More Vulnerable' within Table 3.3 (Flood Risk Vulnerability Classification). Therefore, from Table 3.4, the development is appropriate.

4. MITIGATION OF FLOOD RISK

The existing storm drainage system of the school is inadequate with pipes too small to effectively drain the catchment area with a significant amount of pipe-work having little or no gradient thus not achieving self cleansing velocities.

The existing drainage system has 3 outfalls into the public surface water sewer (denoted as A, B, and C on drawing number R.J509876.001 in Appendix B). Connection A accepts the majority of flows from the School and its playgrounds, the children's centre, and both car parks; connection B accepts flows from a single gully serving the playground at the western corner of the school, and connection C accepts flows from the mobile classroom.

Both connection points A and B are connected invert to invert with the public surface water sewer and as such are adversely affected by flows within the sewer even before it becomes surcharged. Connection point C is a high level connection and is not affected in this way.

It is proposed to retain connection points A (albeit at a higher level) and C, and to abandon connection B.

Taking into account the sizes and gradients of the existing connection pipes, the existing discharge rate from the school has been calculated to be approximately 28 litres per second.

It is proposed to abandon the existing storm drainage system and replace it with a new system designed to current standards and legislation.

The new drainage system will include the following...

- Upsized pipes around the perimeter of the building to accept flows from the extended playgrounds at the rear and south west of the building, the children's centre, and the car park extension. This will also include the existing rainwater downpipes in the central courtyard which currently discharge directly to the surface. This section of the drainage system will discharge to Connection A via a pumping station and attenuation tank limiting the flow to 20 litres per second.
- The new building will be served by a separate drainage system discharging to the public sewer at connection C. Discharge at this connection will be limited to 8 litres per second using a hydrobrake (or other) flow control device and an attenuation tank.
- Run-off from the playing field will be collected in a cut-off filter drain running at the toe of the embankment of the new build. This filter drain will discharge into existing connection C and a new catchpit which will eventually discharge into connection A.
- Excess run-off will be routed to accumulate on the hard surface playground at the western corner of the school. This playground will be shaped to retain this excess run-off until such time that it can discharge into the sewer.

This drainage strategy is shown on drawing number R.J509876.003 in Appendix J.

5. CONCLUSIONS

The school is located in Flood Zone 1 and is at little risk of flooding from the sea or rivers.

However, the school suffered a serious flood event in June 2012 due to a number of coinciding factors...

- An extreme rainfall event occurred in the 24 hour period prior to the flood (this was calculated to be in the region of a 1 in 1320 return period;
- The ground was heavily waterlogged due to the inclement weather in the preceding weeks;
- Ground water was seen to be emerging from the southern boundary line (possible route of historic ditch-course);
- The school is "cut-in" to the ground resulting in a natural ponding area;
- The Southern Water sewer which crosses the school grounds was blocked on the 12th June;
- The existing storm drainage systems is inadequate to cope with the catchment area, pipe sizes are too small and the gradients of some pipe runs are too shallow to achieve self cleansing velocity; and
- The new (2007) children's centre was connected directly to this drainage system with no attenuation of flows.

From Table A 3.4 of PPS25 a development of type in this flood zone is considered appropriate.

Flood risk at the school can be minimised by the following actions...

- Upgrading the existing drainage system to comply with current standards and legislation to include an attenuation system to reduce the load on the public surface water sewerage system.
- Install a new separate drainage system for the new building and associated hard standing areas with attenuated storage to reduce load on the existing public surface water sewerage system.
- Install a cut-off filter drain around the perimeter of the new build to redirect overground flows into the sewerage system.
- Excess overground flows to be directed to an above ground storage area in a location to avoid flooding of the school buildings.

6. APPENDICES

Appendix A – Future Flood Zones (West Sussex County Council Strategic flood Risk Assessment)

Map C2-T- Future Tidal Flood Zones based on Climate Change Predictions at: Land adjacent to Durban Road Industrial Estate

Scale 1:10,000

Drawing No: T_FFZ20

Version: December 2009



Legend

- WSCC Boundary
- Gravel Extraction Sites
- Landfill Sites
- Permanent Built Waste Facilities
- Sand Extraction
- Flood Defences:**
 - Sea (Coastal)
 - River
 - River / Sea (Tidal)
 - Sea (Tidal)
 - Main River
- Future Flood Zone 3b 2056
- Future Flood Zone 3b 2106
- Future Flood Zone 3a 2056
- Future Flood Zone 3a 2106
- Future Flood Zone 2 2056
- Future Flood Zone 2 2106

**Appendix B – Topographic survey and existing drainage layout drawing
(R.J509876.001)**

Appendix C – Hard-standing area increases drawing (R.J509876.002)

Appendix D – Site Investigation logs

ASHDOWN SITE INVESTIGATION **L.I.M.I.T.E.D**

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

Borehole No.: BH1

Site Name: Laburnum Grove Junior School, Bognor Regis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Standpipe Installation	Samples and Testing					Strata			
	Sample Type	Depths		U100 Blows / SPT 'N'	SPT vs Depth N 10 30 50	Legend	Depth / Reduced Level	Strata Descriptions	
		From (m)	To (m)						
							0.00	Ground Level	
							0.20	Topsoil.	
	D	0.30						Firm brown silty gravelly CLAY. Gravel is fine to coarse flint. (River Terrace Deposits)	
	D	0.50							
	D	1.00					1.20	Light brown sandy gravelly SILT. Gravel is fine to coarse flint and chalk. (River Terrace Deposits)	
	D S	1.20	1.65	7	•				
	W	1.80							
	D S	2.00	2.45	20	•				
									
	D S	3.00	3.45	23	•		3.00		
								Structured CHALK recovered as gravelly silt. Gravel is weak low density off white. Matrix is off white with occasional light brown staining. With occasional flints. (White Chalk Subgroup, Grade C or better)	
	D S	4.00	4.45	18	•				
									DRAFT
	D S	5.00	5.45	26	••				
									
	D S	6.50	6.95	24	•				
									
	D S	8.00	8.45	16	•				
									
	D S	9.50	9.95	8	•				
							10.00		

DRAFT

Remarks:

Borehole cased to 10.0m depth.

Groundwater encountered at 1.6m depth, rising to 1.1m in 30 minutes. Standing water level at 1.2m on morning after completion of borehole.

Excavation Method: Cable Percussion

Borehole Diameter: 150mm

Casing Diameter: 150mm

Made By: MA

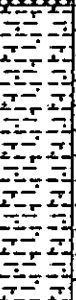
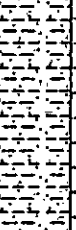
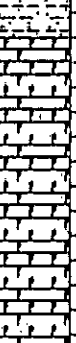
Borehole No.: WS1

Site Name: Laburnum Grove Junior School, Bognor Regis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
							0.30	Topsoil with a trace of fine gravel of brick and clinker.
	J T	0.20						Firm brown slightly gravelly sandy very silty CLAY. Gravel is fine ironstone and coarse flint. (River Terrace Deposits)
	J T	0.40						
	D H	0.50		60				
	H	0.90		90				becoming stiff below 1.0m depth.
	D V	1.00		105				
	H	1.40		90			1.50	
								Very loose light brown clayey gravelly very silty fine to medium SAND. Gravel is fine chalk with a trace of fine to coarse flint. (River Terrace Deposits)
	H	1.80		60			2.10	
	D	2.00						
	H	2.10		<25				
	D H	2.50		<25				Soft orange brown and grey brown mottled slightly gravelly silty very sandy CLAY. Gravel is fine chalk. (River Terrace Deposits)
								DRAFT
	H	2.80		<25				
	V	3.00		30				
	H.	3.20		75				
	D	3.50						
							3.70	with layer of slightly clayey slightly gravelly fine to medium SAND (100mm thick) at base.
	D	4.00						Structured CHALK recovered as silt and gravel. Clasts are very weak medium density off white. Matrix is off white. With occasional flints. (White Chalk Subgroup, Grade C or better)
	D	5.00					5.00	

DRAFT

Remarks:

Groundwater encountered between 2.0m and 3.0m depth. Standing water level at 1.5m on completion.

Borehole stable on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: LG

Borehole No.: WS2

Site Name: Laburnum Grove Junior School, Bognor Regis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
	JT	0.20						Topsoil with a trace of fine gravel of clinker.
	JT	0.45					0.35	
	H	0.50		60				Firm brown slightly gravelly sandy very silty CLAY. Gravel is fine ironstone and coarse flint. (River Terrace Deposits)
	D	0.55						
	H	0.90		90				becoming firm to stiff and stiff below 0.9m depth.
	DV	1.00		120				
	H	1.05		75				
							1.40	
	D	1.50						Soft grey brown silty gravelly very sandy CLAY. Gravel is fine chalk and fine to coarse flint. (River Terrace Deposits)
	H	1.80		<25			1.95	
								Loose grey and occasionally light orange brown slightly gravelly silty fine to medium SAND. Gravel is fine chalk and fine to coarse flint. (River Terrace Deposits)
	D	2.50						DRAFT becoming sandy CLAY between 2.6m and 2.9m depth.
	H	2.80		170				
	D	3.00						becoming medium dense below 3.0m depth.
							3.50	
	D	4.00						Structured CHALK recovered as silt and gravel. Clasts are very weak medium density off white. Matrix is off white. With occasional flint. (White Chalk Subgroup, Grade C or better)
	D	5.00					5.00	

Remarks:

Groundwater encountered between 3.0m and 4.0m depth. Standing water level at 1.6m on completion.

Borehole collapsed to 2.5m depth on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: LG

ASHDOWN SITE INVESTIGATION

L.I.M.I.T.E.D
GEOTECHNICAL AND ENVIRONMENTAL
ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

Borehole No.: WS3

Site Name: Laburnum Grove Junior School, Bognor Regis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
							0.10	Topsoil.
	J T	0.25						Firm to stiff brown slightly gravelly sandy very silty CLAY. Gravel is fine ironstone and coarse flint. (River Terrace Deposits)
	H	0.50		75				
	D	0.60						
	H	0.90		115				Stiff light grey and occasionally light orange brown slightly gravelly very sandy very silty CLAY. Gravel is fine to medium chalk with a trace of flint. (River Terrace Deposits)
	V	1.00		75			1.10	
	D	1.20						
	H	1.50		170				Medium dense light grey/ off white slightly clayey slightly gravelly silty fine to medium SAND. Gravel is fine to medium chalk and flint. (River Terrace Deposits)
	H	1.80		115			2.00	
	D	2.20						
							2.80	Firm off white and grey brown silty very sandy very gravelly CLAY. Gravel is fine to medium chalk and occasional flint. (River Terrace Deposits)
	D	3.00					3.10	
	D	3.50	4.00					
	D	4.50	5.00					Structured CHALK recovered as silt and gravel. Clasts are very weak medium density off white. Matrix is off white. With occasional flints. (White Chalk Subgroup, Grade C or better)
							5.00	

Remarks:

Groundwater encountered between 2.0m and 3.0m depth. Standing water level at 1.7m on completion.

Borehole stable on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: LG

End Date: 05/12/2012

DRAFT

Made By: LG

ASHDOWN SITE INVESTIGATION **L · I · M · I · T · E · D**

GEOTECHNICAL AND ENVIRONMENTAL
ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

Trial Pit No.: TP1

Site Name: Laburnum Grove Junior School, Bognor Regis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Samples and Testing				Strata		
Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
					0.10	Topsoil.
J T B	0.30	0.50			0.50	Firm brown gravelly silty CLAY. Gravel is fine to medium flint. (River Terrace Deposits)
						End of Pit

DRAFT

Remarks:

Trial pit dry and stable on completion.

Excavation Method: Hand Dug

Dimensions:

Made By: DC

ASHDOWN SITE INVESTIGATION

L · I · M · I · T · E · D
 GEOTECHNICAL AND ENVIRONMENTAL
 ENGINEERS
 Swanborough Farm
 Swanborough
 Lewes, East Sussex
 BN7 3PF

Trial Pit No.: TP2

Site Name: Laburnum Grove Junior School, Bognor Regis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Samples and Testing

Strata

Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
					0.10	Topsoil.
1 T B V	0.30 0.45	0.50	75		0.50	Firm to stiff brown slightly gravelly silty CLAY. Gravel is fine to medium flint. (River Terrace Deposits)
						End of Pit

DRAFT

Remarks:

Trial pit dry and stable on completion.

Excavation Method: Hand Dug

Dimensions:

Made By: DC

Trial Pit No.: TP3

Site Name: Laburnum Grove Junior School, Bognor Régis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Samples and Testing				Strata		
Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
					0.10	Topsoil.
JTB V	0.30 0.40	0.50	80		0.50	Firm to stiff brown slightly gravelly silty CLAY. Gravel is fine flint and nodular chalk. (River Terrace Deposits)
						End of Pit
Remarks: Trial pit dry and stable on completion.						Excavation Method: Hand Dug
						Dimensions:
						Made By: DC

DRAFT

ASHDOWN SITE INVESTIGATION

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 GEOTECHNICAL AND ENVIRONMENTAL
 ENGINEERS
 Swanborough Farm
 Swanborough
 Lewes, East Sussex
 BN7 3PF

Trial Pit No.: TP4

Site Name: Laburnum Grove Junior School, Bognor Regis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Samples and Testing

Strata

Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
					0.10	Topsoil.
J T B	0.30	0.50			0.50	Firm light brown and orange slightly gravelly silty CLAY. Gravel is fine to coarse flint and fine nodular chalk. (River Terrace Deposits)
						End of Pit

DRAFT

Remarks:

Trial pit dry and stable on completion.

Excavation Method: Hand Dug

Dimensions:

Made By: DC

Trial Pit No.: TP5

Site Name: Laburnum Grove Junior School, Bognor Regis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Samples and Testing

Strata

Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
					0.10	Topsoil.
JTB V	0.30 0.40	0.50	65		0.50	Firm brown slightly gravelly silty CLAY. Gravel is fine to medium flint. (River Terrace Deposits)
						End of Pit

DRAFT

Remarks:

Trial pit dry and stable on completion.

Excavation Method: Hand Dug

Dimensions:

Made By: DC

ASHDOWN SITE INVESTIGATION **L · I · M · I · T · E · D**

GEOTECHNICAL AND ENVIRONMENTAL
ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

Trial Pit No.: TP6

Site Name: Laburnum Grove Junior School, Bognor Regis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Samples and Testing				Strata		
Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
					0.15	Topsoil:
1 T B	0.30	0.50			0.50	Firm brown slightly gravelly silty CLAY. Gravel is fine to medium flint. (River Terrace Deposits)
						End of Pit

DRAFT

Remarks:

Trial pit dry and stable on completion.

Excavation Method: Hand Dug

Dimensions:

Made By: DC

Trial Pit No.: TP7

Site Name: Laburnum Grove Junior School, Bognor Regis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Samples and Testing				Strata		
Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
					0.10	Topsoil.
JTB	0.20	0.50			0.30	MADE GROUND: Dark brown slightly gravelly clayey silt. Gravel is fine brick and flint.
	0.30				0.50	Firm brown slightly gravelly silty CLAY. Gravel is fine to medium flint. (River Terrace Deposits)
						End of Pit

DRAFT

Remarks:

Trial pit dry and stable on completion.

Excavation Method: Hand Dug

Dimensions:

Made By: DC

ASHDOWN SITE INVESTIGATION

L · I · M · I · T · E · D

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

Trial Pit No.: TP8

Site Name: Laburnum Grove Junior School, Bognor Regis, West Sussex

Job No.: LW23300

Start Date: 05/12/2012

End Date: 05/12/2012

Samples and Testing

Strata

Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
					0.10	Topsoil.
JTB	0.30	0.50			0.50	MADE GROUND: Brown slightly gravelly clayey silt. Gravel is fine to coarse charcoal, flint, chalk, brick and plastic. with plastic waste water pipe (100mm diameter) at 0.35m depth.
						End of Pit

DRAFT

Remarks:

Trial pit dry and stable on completion.

Excavation Method: Hand Dug

Dimensions:

Made By: DC

ASHDOWN SITE INVESTIGATION LTD

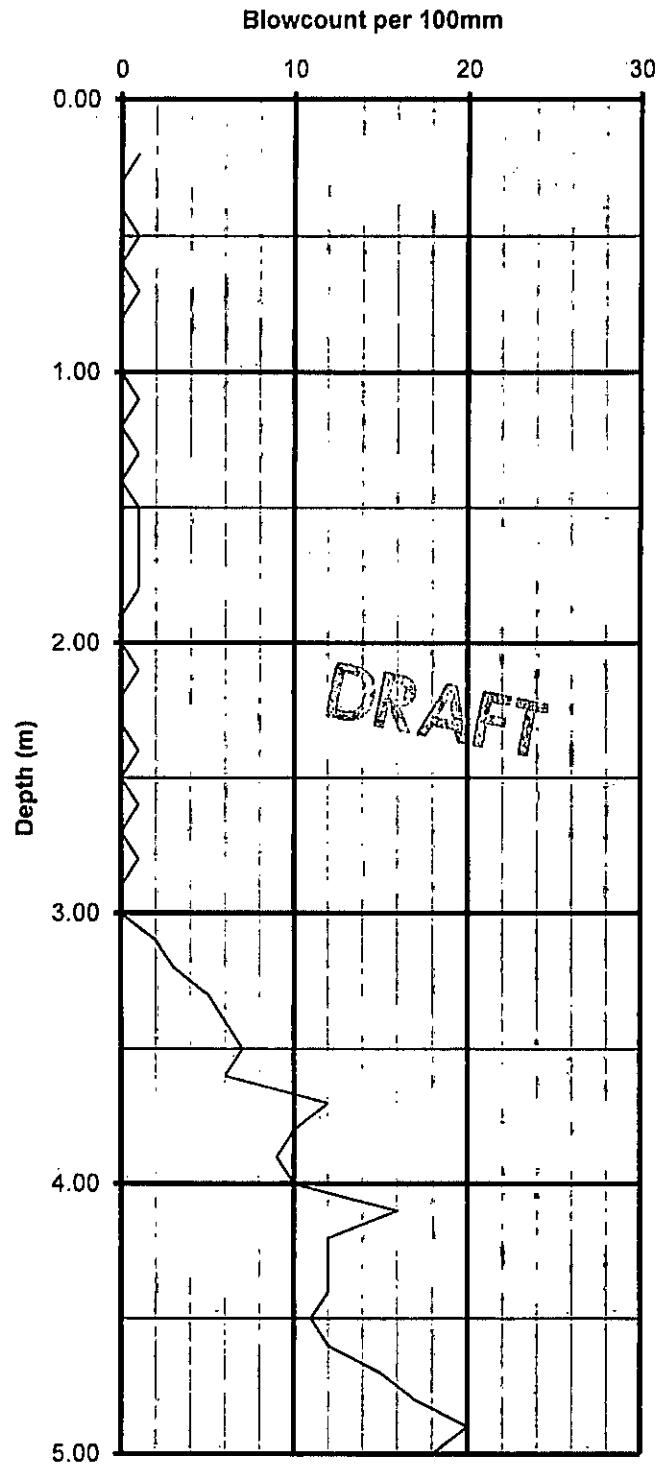
DPSH Continuous Dynamic Probe N₁₀₀ vs Depth Profile

SITE Laburnum Grove Junior School, Laburnum Grove
Bognor Regis, West Sussex

Report Ref. LW23300

DP No. WS1

Depth (m)	Blows	Torque (kgm)
0.00		
0.10		
0.20	1	
0.30	0	
0.40	0	
0.50	1	
0.60	0	
0.70	1	
0.80	0	
0.90	0	
1.00	0	
1.10	1	
1.20	0	
1.30	1	
1.40	0	
1.50	1	
1.60	1	
1.70	1	
1.80	1	
1.90	0	
2.00	0	
2.10	1	
2.20	0	
2.30	0	
2.40	1	
2.50	0	
2.60	1	
2.70	0	
2.80	1	
2.90	0	
3.00	0	
3.10	2	
3.20	3	
3.30	5	
3.40	6	
3.50	7	
3.60	6	
3.70	12	
3.80	10	
3.90	9	
4.00	10	
4.10	16	
4.20	12	
4.30	12	
4.40	12	
4.50	11	
4.60	12	
4.70	15	
4.80	17	
4.90	20	
5.00	18	



Comments

ASHDOWN SITE INVESTIGATION LTD

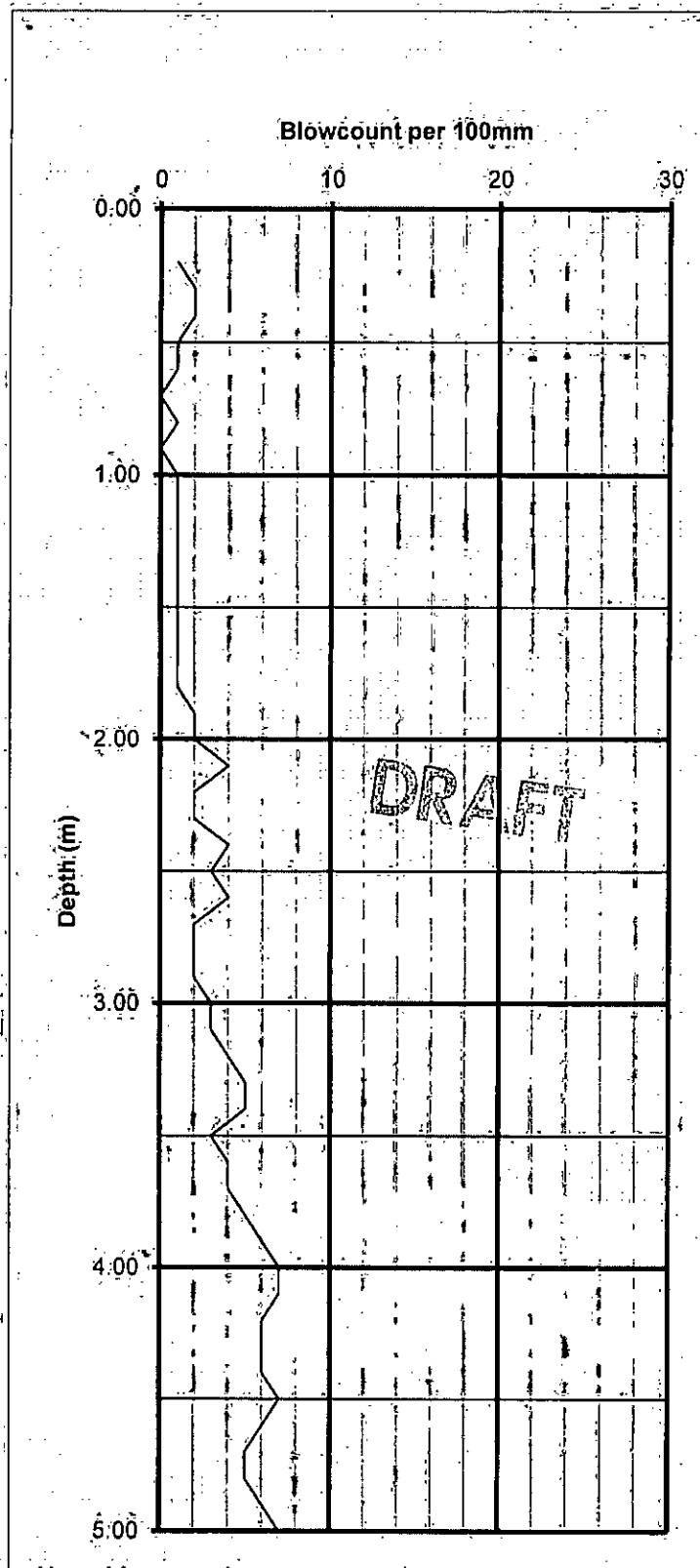
DPSH Continuous Dynamic Probe N₁₀₀ vs Depth Profile

SITE Laburnum Grove Junior School, Laburnum Grove
Bognor Regis, West Sussex

Report Ref. LW23300

DP No. WS2

Depth (m)	Blows	Torque (kgm)
0.00		
0.10		
0.20	1	
0.30	2	
0.40	2	
0.50	1	
0.60	1	
0.70	0	
0.80	1	
0.90	0	
1.00	1	
1.10	1	
1.20	1	
1.30	1	
1.40	1	
1.50	1	
1.60	1	
1.70	1	
1.80	1	
1.90	2	
2.00	2	
2.10	4	
2.20	2	
2.30	2	
2.40	4	
2.50	3	
2.60	4	
2.70	2	
2.80	2	
2.90	2	
3.00	3	
3.10	3	
3.20	4	
3.30	5	
3.40	5	
3.50	3	
3.60	4	
3.70	4	
3.80	5	
3.90	6	
4.00	7	
4.10	7	
4.20	6	
4.30	6	
4.40	6	
4.50	7	
4.60	6	
4.70	5	
4.80	5	
4.90	6	
5.00	7	



Comments

ASHDOWN SITE INVESTIGATION LTD

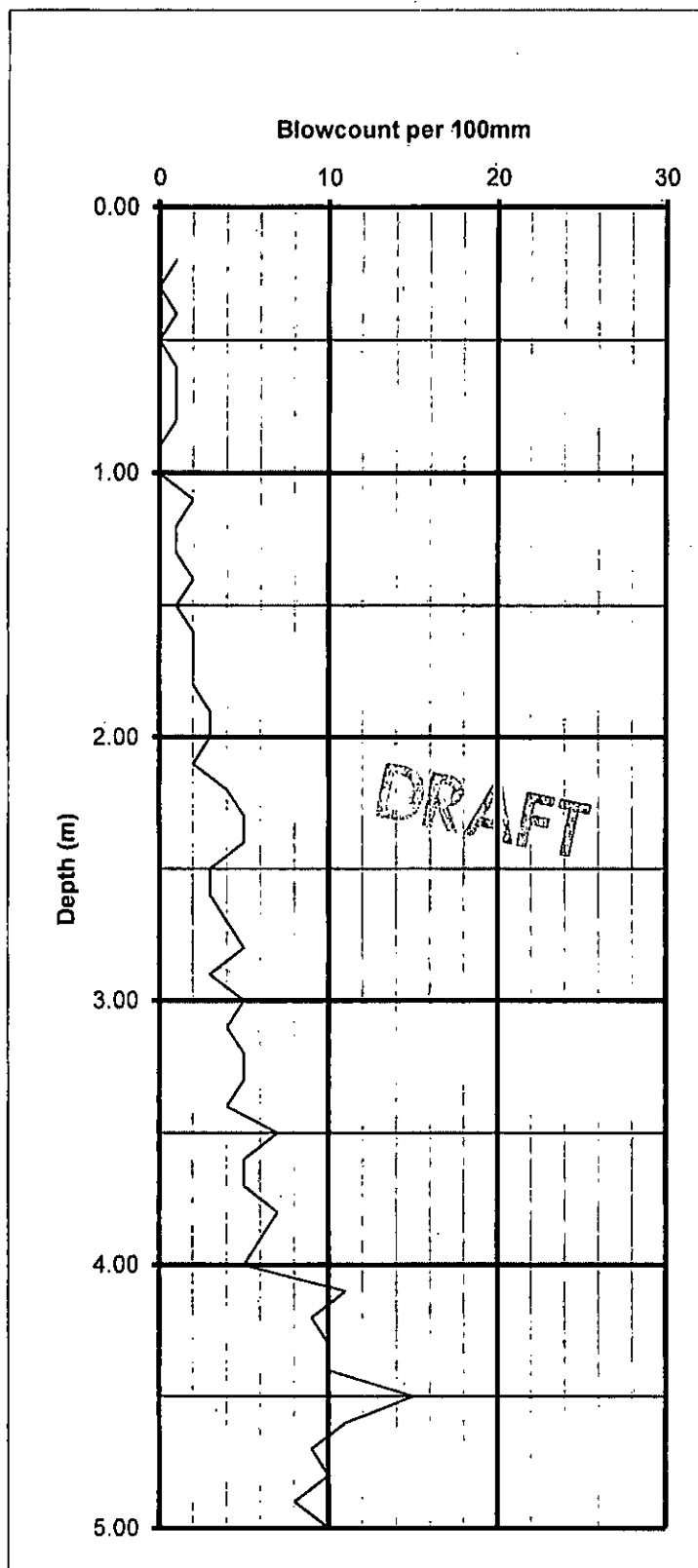
DPSH Continuous Dynamic Probe N₁₀₀ vs Depth Profile

SITE Laburnum Grove Junior School, Laburnum Grove
Bognor Regis, West Sussex

Report Ref. LW23300

DP No. WS3

Depth (m)	Blows	Torque (kgm)
0.00		
0.10		
0.20	1	
0.30	0	
0.40	1	
0.50	0	
0.60	1	
0.70	1	
0.80	1	
0.90	0	
1.00	0	
1.10	2	
1.20	1	
1.30	1	
1.40	2	
1.50	1	
1.60	2	
1.70	2	
1.80	2	
1.90	3	
2.00	3	
2.10	2	
2.20	4	
2.30	5	
2.40	5	
2.50	3	
2.60	3	
2.70	4	
2.80	5	
2.90	3	
3.00	5	
3.10	4	
3.20	5	
3.30	5	
3.40	4	
3.50	7	
3.60	5	
3.70	5	
3.80	7	
3.90	6	
4.00	5	
4.10	11	
4.20	9	
4.30	10	
4.40	10	
4.50	15	
4.60	11	
4.70	9	
4.80	10	
4.90	8	
5.00	10	



Comments

ASHDOWN SITE INVESTIGATION LTD

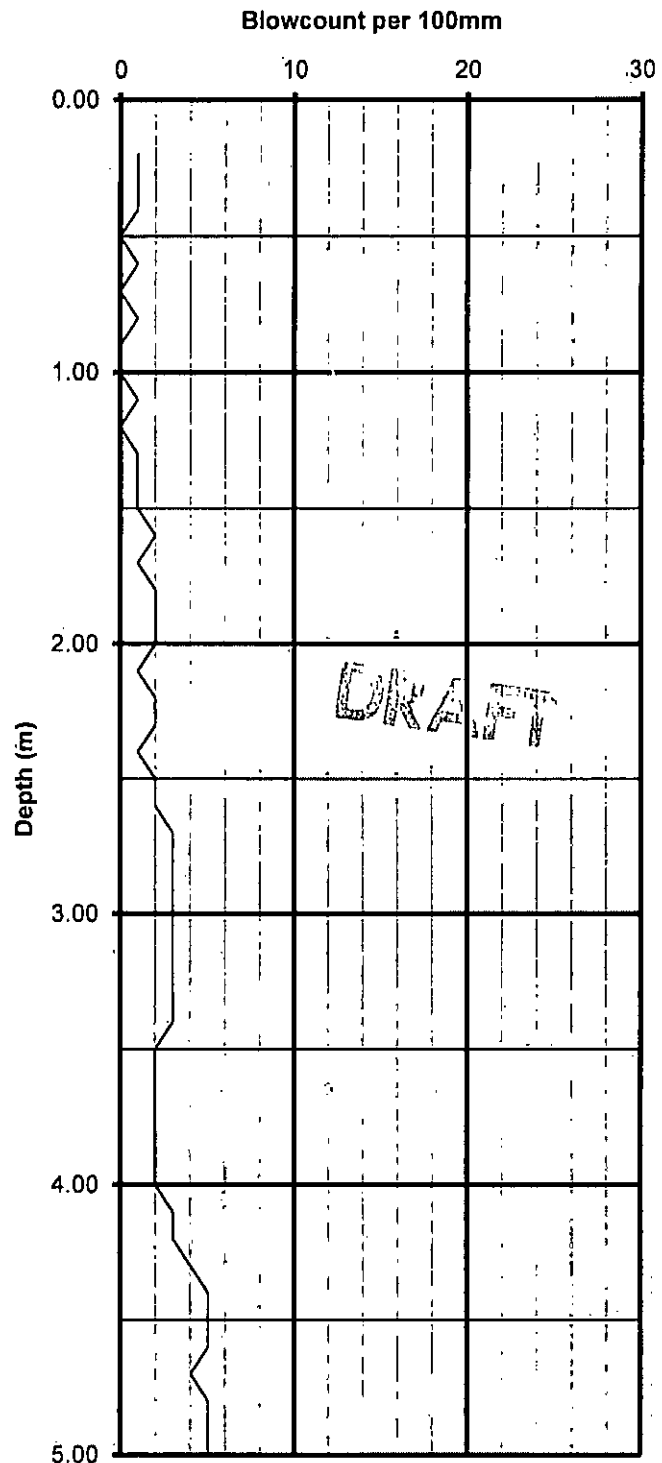
DPSH Continuous Dynamic Probe N_{100} vs Depth Profile

SITE Laburnum Grove Junior School, Laburnum Grove
Bognor Regis, West Sussex

Report Ref. LW23300

DP No. WS4

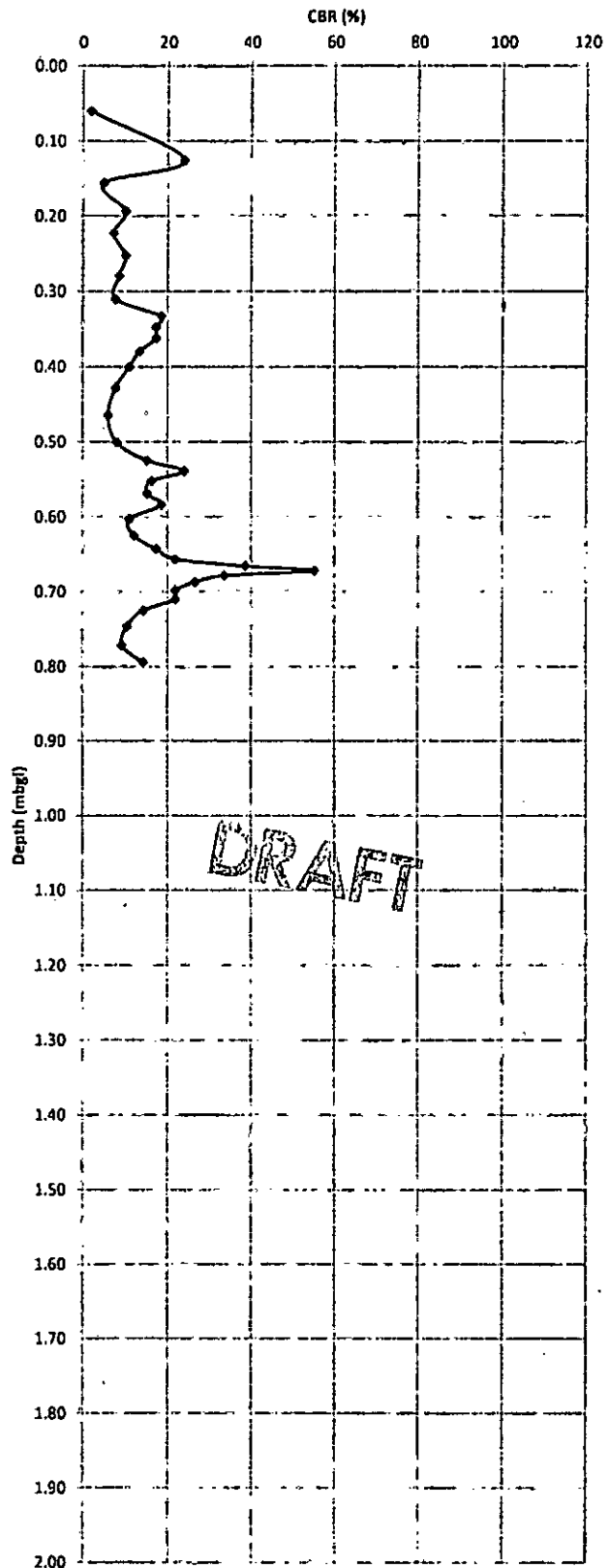
Depth (m)	Blows	Torque (kgm)
0.00		
0.10		
0.20	1	
0.30	1	
0.40	1	
0.50	0	
0.60	1	
0.70	0	
0.80	1	
0.90	0	
1.00	0	
1.10	1	
1.20	0	
1.30	1	
1.40	1	
1.50	1	
1.60	2	
1.70	1	
1.80	2	
1.90	2	
2.00	2	
2.10	1	
2.20	2	
2.30	2	
2.40	1	
2.50	2	
2.60	2	
2.70	3	
2.80	3	
2.90	3	
3.00	3	
3.10	3	
3.20	3	
3.30	3	
3.40	3	
3.50	2	
3.60	2	
3.70	2	
3.80	2	
3.90	2	
4.00	2	
4.10	3	
4.20	3	
4.30	4	
4.40	5	
4.50	5	
4.60	5	
4.70	4	
4.80	5	
4.90	5	
5.00	5	



Comments

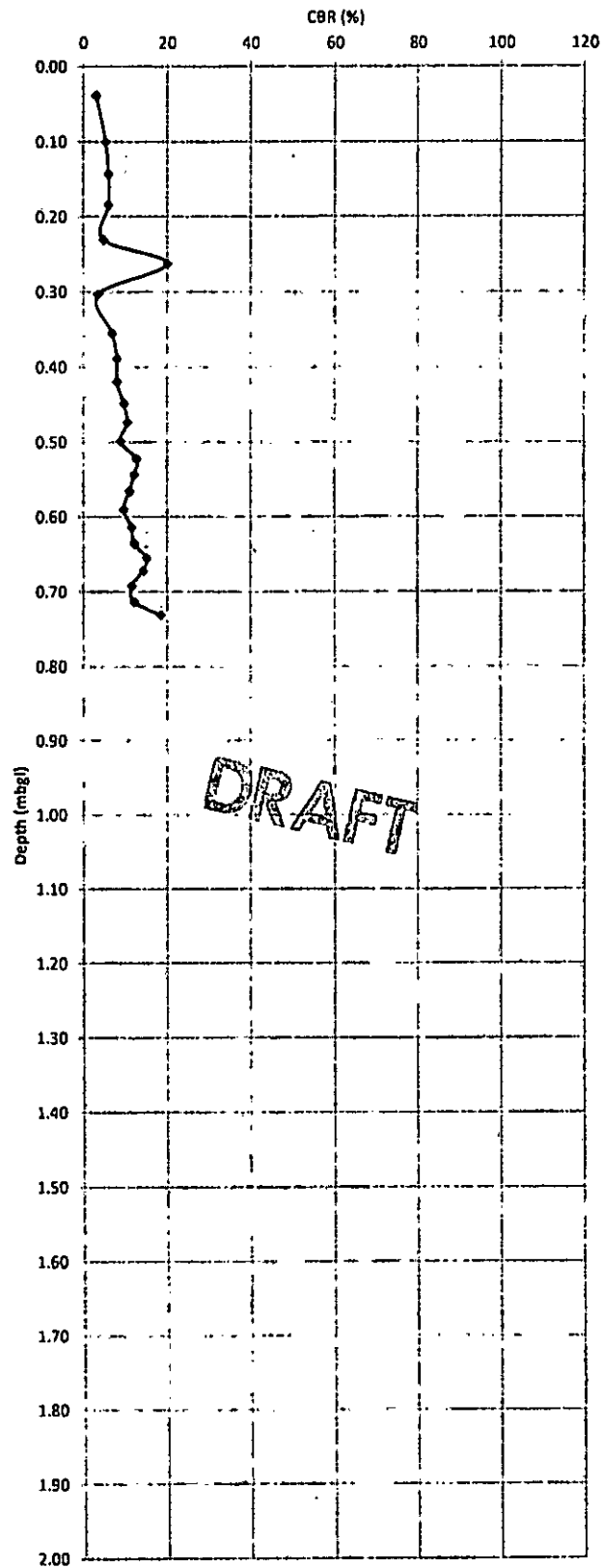
TRL Dynamic Cone Penetrometer Record

LW23300



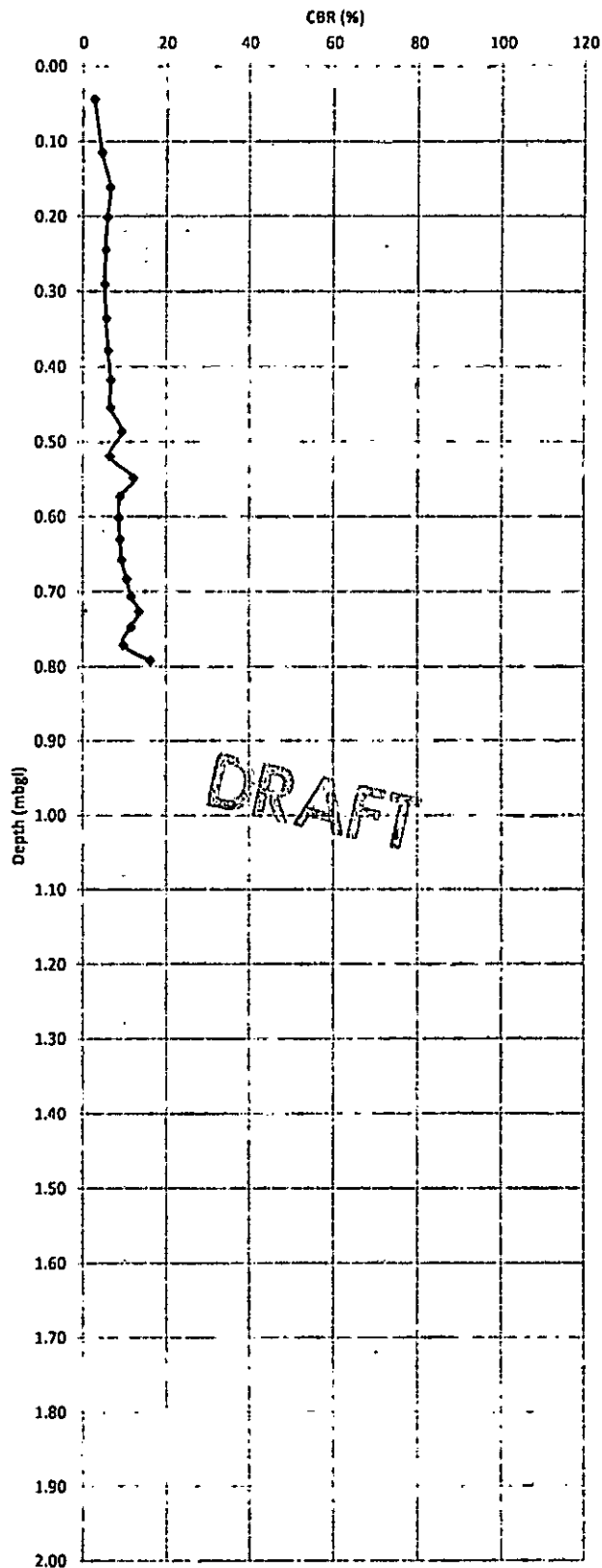
TRL Dynamic Cone Penetrometer Record

LW23300



TRL Dynamic Cone Penetrometer Record

LW23300



TRL Dynamic Cone Penetrometer Record

Report Ref.

LW23300

Graph showing CBR (%) versus Depth (mbgl) for Draft 1962. The Y-axis represents Depth (mbgl) from 0.00 to 2.00. The X-axis represents CBR (%) from 0 to 120. The data points show a sharp drop in CBR from 0% at 0.00 mbgl to 0% at 0.05 mbgl, followed by a gradual increase to 10% at 0.70 mbgl, and then a sharp drop to 0% at 0.75 mbgl. The word "DRAFT" is written across the graph.

Depth (mbgl)	CBR (%)
0.00	0
0.01	0
0.02	0
0.03	0
0.04	0
0.05	0
0.06	0
0.07	0
0.08	0
0.09	0
0.10	0
0.11	0
0.12	0
0.13	0
0.14	0
0.15	0
0.16	0
0.17	0
0.18	0
0.19	0
0.20	0
0.21	0
0.22	0
0.23	0
0.24	0
0.25	0
0.26	0
0.27	0
0.28	0
0.29	0
0.30	0
0.31	0
0.32	0
0.33	0
0.34	0
0.35	0
0.36	0
0.37	0
0.38	0
0.39	0
0.40	0
0.41	0
0.42	0
0.43	0
0.44	0
0.45	0
0.46	0
0.47	0
0.48	0
0.49	0
0.50	0
0.51	0
0.52	0
0.53	0
0.54	0
0.55	0
0.56	0
0.57	0
0.58	0
0.59	0
0.60	0
0.61	0
0.62	0
0.63	0
0.64	0
0.65	0
0.66	0
0.67	0
0.68	0
0.69	0
0.70	10
0.71	10
0.72	10
0.73	10
0.74	10
0.75	0
0.76	0
0.77	0
0.78	0
0.79	0
0.80	0
0.81	0
0.82	0
0.83	0
0.84	0
0.85	0
0.86	0
0.87	0
0.88	0
0.89	0
0.90	0
0.91	0
0.92	0
0.93	0
0.94	0
0.95	0
0.96	0
0.97	0
0.98	0
0.99	0
1.00	0
1.01	0
1.02	0
1.03	0
1.04	0
1.05	0
1.06	0
1.07	0
1.08	0
1.09	0
1.10	0
1.11	0
1.12	0
1.13	0
1.14	0
1.15	0
1.16	0
1.17	0
1.18	0
1.19	0
1.20	0
1.21	0
1.22	0
1.23	0
1.24	0
1.25	0
1.26	0
1.27	0
1.28	0
1.29	0
1.30	0
1.31	0
1.32	0
1.33	0
1.34	0
1.35	0
1.36	0
1.37	0
1.38	0
1.39	0
1.40	0
1.41	0
1.42	0
1.43	0
1.44	0
1.45	0
1.46	0
1.47	0
1.48	0
1.49	0
1.50	0
1.51	0
1.52	0
1.53	0
1.54	0
1.55	0
1.56	0
1.57	0
1.58	0
1.59	0
1.60	0
1.61	0
1.62	0
1.63	0
1.64	0
1.65	0
1.66	0
1.67	0
1.68	0
1.69	0
1.70	0
1.71	0
1.72	0
1.73	0
1.74	0
1.75	0
1.76	0
1.77	0
1.78	0
1.79	0
1.80	0
1.81	0
1.82	0
1.83	0
1.84	0
1.85	0
1.86	0
1.87	0
1.88	0
1.89	0

Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

LW23300

Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

Report Ref.

LW23300

The graph displays the California Bearing Ratio (CBR) in percent on the horizontal axis (0 to 120) against the depth in meters below ground level (mbgl) on the vertical axis (0.00 to 2.00). The data points, marked with dots, show a high CBR of approximately 100% at the surface, which decreases rapidly to about 10% at a depth of 0.65 mbgl. Below this depth, the CBR remains relatively low, fluctuating between 10% and 15% down to 0.75 mbgl, where the data ends. A large, stylized 'DRAFT' watermark is superimposed on the graph area.

Depth (mbgl)	CBR (%)
0.00	100
0.05	100
0.10	100
0.15	100
0.20	100
0.25	100
0.30	100
0.35	100
0.40	100
0.45	100
0.50	100
0.55	100
0.60	100
0.65	10
0.70	10
0.75	15

Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

Report Ref.

LW23300

CBR (%)

Depth (mbsgl)

DRAFT

Depth (mbsgl)	CBR (%)
0.00	0
0.05	0
0.10	0
0.15	0
0.20	0
0.25	10
0.30	10
0.35	0
0.40	0
0.45	0
0.50	0
0.55	0
0.60	0
0.65	0
0.70	0
0.75	0
0.80	0
0.85	0
0.90	0
0.95	0
1.00	0
1.05	0
1.10	0
1.15	0
1.20	0
1.25	0
1.30	0
1.35	0
1.40	0
1.45	0
1.50	0
1.55	0
1.60	0
1.65	0
1.70	0
1.75	0
1.80	0
1.85	0
1.90	0
1.95	0
2.00	0

Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

ASHDOWN SITE INVESTIGATION LTD

TRL Dynamic Cone Penetrometer Record

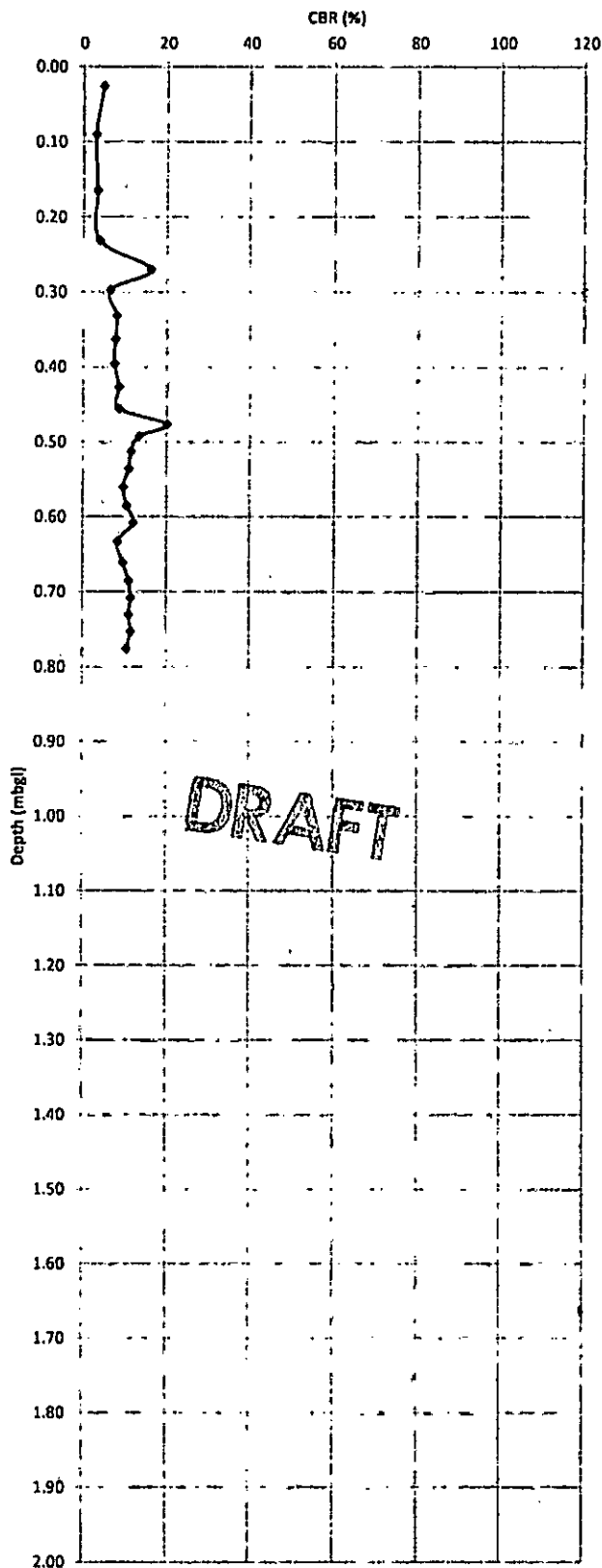
SITE Laburnam Grove Junior School, Bognor Regis, West Sussex

Report Ref.

LW23300

Test Location/Reference	TP8
Depth of Start of Test (mbgl)	0.00

No. Blows	Total No. Blows	Reading (mm)	Depth (mbgl)	CBR%
DCP Zero Reading		127	0.00	
1	1	178	0.05	5
1	2	256	0.13	3
1	3	327	0.20	3
1	4	389	0.26	4
1	5	405	0.28	16
1	6	443	0.32	6
1	7	474	0.35	8
1	8	506	0.38	8
1	9	539	0.41	7
1	10	568	0.44	9
1	11	597	0.47	9
1	12	610	0.48	20
1	13	629	0.50	13
1	14	651	0.52	12
1	15	674	0.55	11
1	16	700	0.57	10
1	17	724	0.60	10
1	18	745	0.62	12
1	19	775	0.65	8
1	20	801	0.67	10
1	21	824	0.70	11
1	22	846	0.72	12
1	23	869	0.74	11
1	24	891	0.76	12
1	25	915	0.79	10



Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

SEWER RECORDS PAGE 1 OF 2

100916



100339

492685

O.S. REF.

SU9300NW

Title: 143772_Laburnum Grove Junior S

Drawn by: sahasud

Scale: 1:2500

Date: 18/10/2012

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy.

The actual positions should be determined on site.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

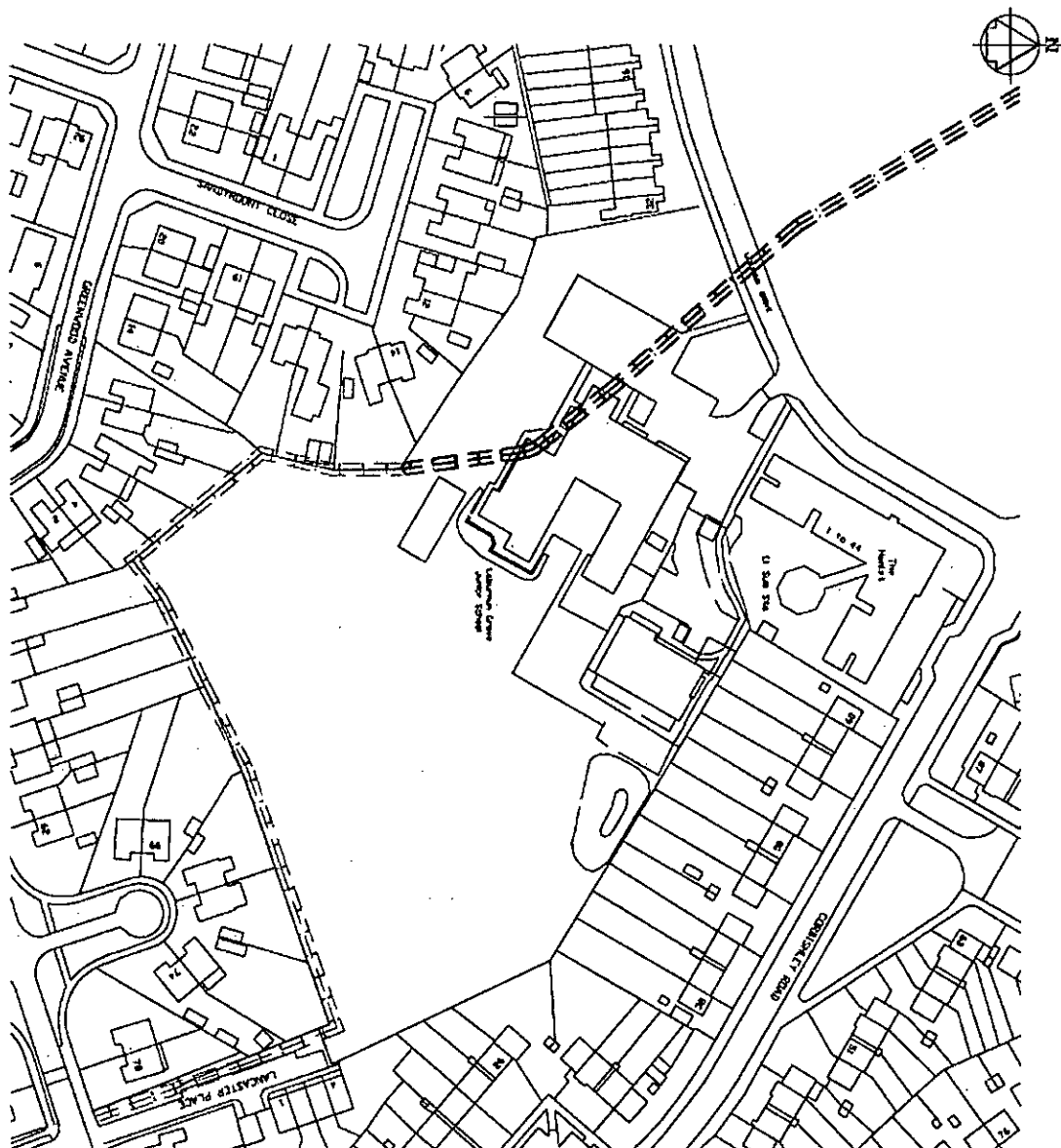
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**Southern
Water**

493628

Appendix E – Historical Mapping and Southern Water asset map



- Key:
- Information from Ordnance Survey
 - Location of watercourse shown on 1983 Ordnance Survey Map
 - Proposed extension of school

REV. ESTIMATES DATE

Archibald Shaw

Consulting Civil & Structural Engineers
One Little London Churchyard West Tower 1001 100
Tel: 01243 788471 Fax: 01243 778444
e: info@archibaldshaw.co.uk w: www.archibaldshaw.co.uk

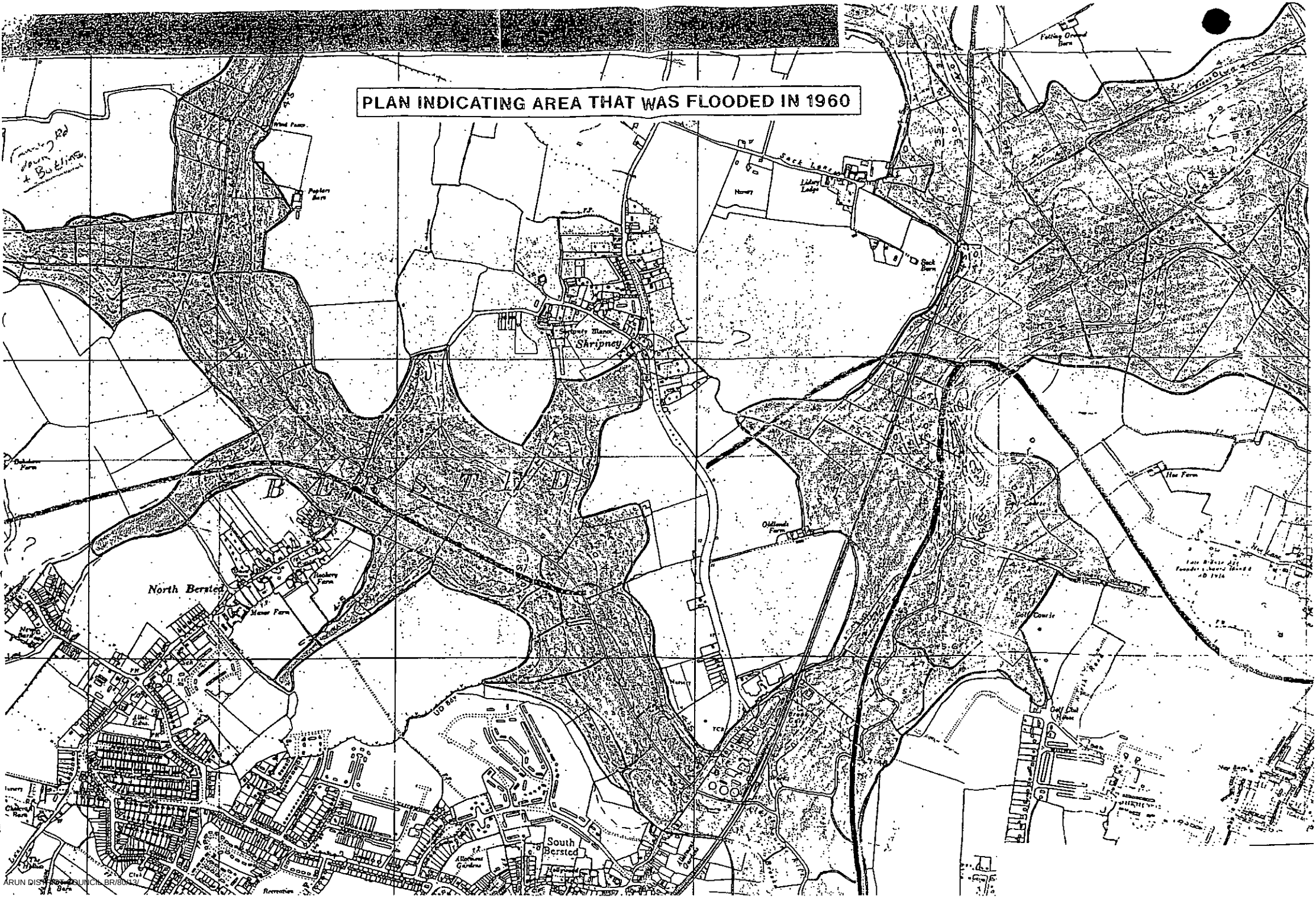
PROJECT Laburnum Grove School

DESCRIPTION Watercourse and Probable Ditch Positions

DRAWN BY	CHECKED BY	DESIGNED BY
PF	VC	PF
SCALE 0.5	DATE	STATUS
1:1000	Dec 2012	Report
JOB NO.	DRAWING NO.	REVISION
25427	03	R1

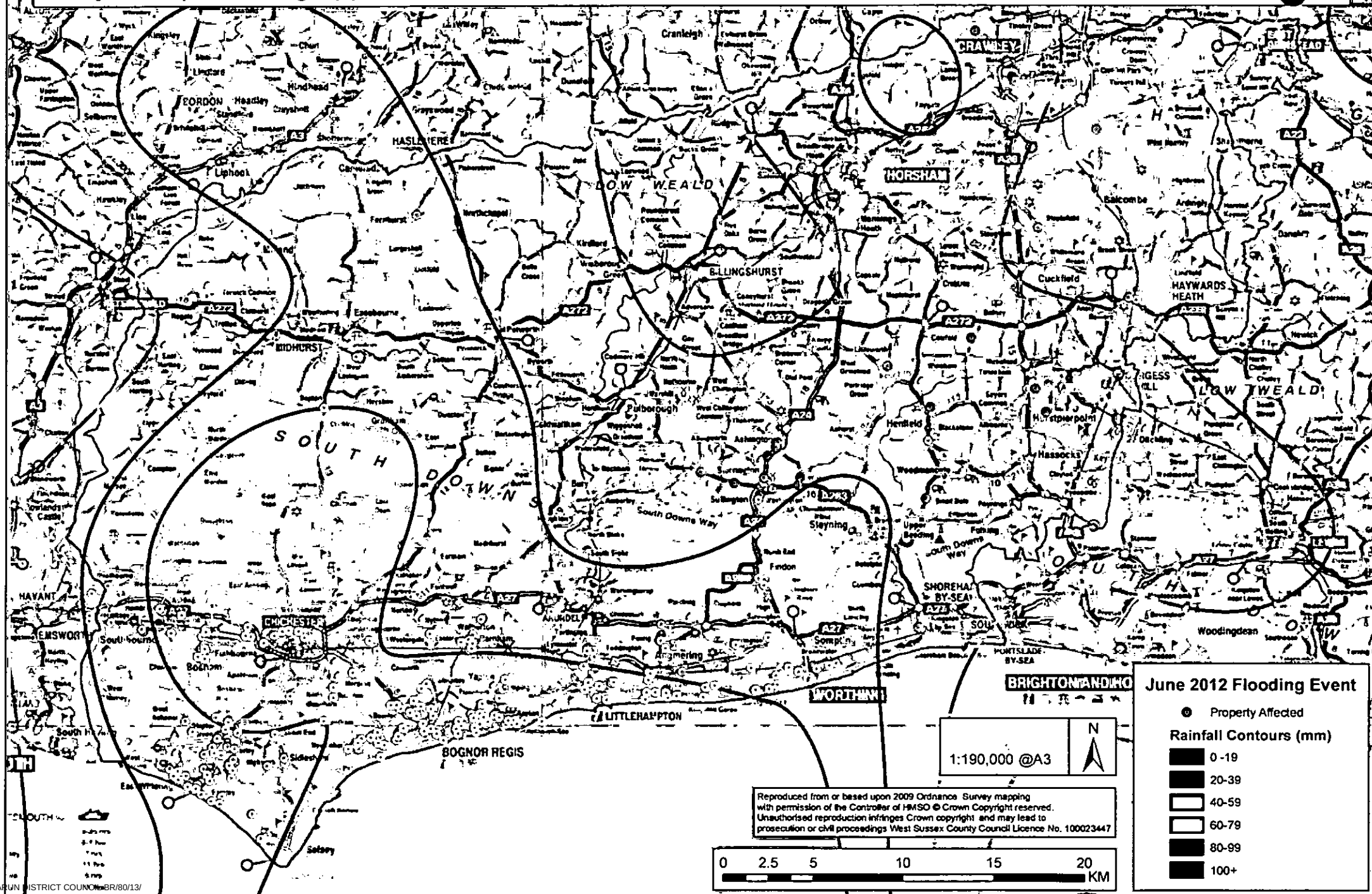
Appendix F – Historic Flooding (1960)

PLAN INDICATING AREA THAT WAS FLOODED IN 1960



Appendix G – Isohyet map for June 2012

Isohyet map showing approximate rainfall coverage and properties affected during June 2012 flooding



Appendix H – Meteorological Report for June 2012

BOGNOR REGIS
METEOROLOGICAL OBSERVATIONS
JUNE 2012

RAINFALL

248.2mm (9.77 ins) on 17 days.

Greatest fall in 24 hours 09-09h	170.9 mm (6.73 ins) on 11th
June 2011 total rainfall	58.6 mm (2.31ins) on 22 days
January to June 2011	281.4 mm (11.09 ins)
January to June 2012	469.7mm (16.18ins)

TEMPERATURES

Highest Maximum	-	21.5°C (70.7°F) on 29th
Lowest Maximum	-	14.0°C (57.2°F) on 12th
Highest Minimum	-	15.6°C (60.1°F) on 28th
Lowest Minimum	-	9.3°C (48.7°F) on 4th
Lowest Grass	-	6.3°C (43.34°F) on 10th

SUNSHINE

June 2012	-	162.2 hours on 26 days
June 2011	-	223 hours on 24 days
Maximum sunshine in 24 hours	-	13.6 hours on 21st
January to June 2011	-	995.3 hours
January to June 2012	-	872.2 hours

SUMMARY for June 2012

The weather was dominated by low pressure over or close to the UK, with associated weather fronts. These brought rather cool days, some very large rainfall totals and also some strong winds early in the month. There was an almost complete absence of warm, settled spells.

The UK mean temperature was 0.3 °C below the 1971-2000 average and it was the coolest June since 1991. Daily maximum temperatures were well below normal, particularly in many central and eastern areas, with few warm days. Almost all areas were much wetter than normal, especially across much of England and Wales, southern and eastern Scotland and Northern Ireland. It was the wettest June across the UK in the series from 1910 (wetter than June 2007), and the equal-wettest June in the England and Wales series from 1766 (shared with June 1860). Only the far north-west of Scotland was drier than normal. Almost all areas were duller than usual, and it was provisionally the second dullest June in the series from 1929. The far north-west of Scotland was the sunnier exception.

The weather records for the month of June in Bognor Regis will be remembered historically as the wettest on record. The average rainfall for the month is approx. 47.5 mm and yet almost 178 mm of rain fell in the torrential deluge on just one day, 11 June this year. This was the effect of a crescent of prolonged heavy rain along the south coast that day which then moved away northwards throughout the UK. Sunshine hours were a third down from the June average. The mean maximum temperature of 16.8 deg. C. was lower than the average mean max. of 18.04 deg .C. but the mean minimum temperature of 12.3 deg. C. was slightly higher than the average of 11.31 deg. C.

DHR 05.07.2012

Appendix J – Illustrative Drainage Design Drawing (R.J509876.003)