cgs civils
Consulting Civil Engineers

SuDS and Drainage Report

Land Adj The Hollies, Barnham Road, Barnham PO22 0ES

Rev: **P1**

Ref: **C3876**

CGS Civils Ltd
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Lion Street
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West Sussex
[redacted]
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Document Control

Project Number	**C3876**		
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Author	LH	**Signature**	

Revision History

Date	Revision	Author	Approved
05.11.2025	**P**	**LH**	**CS**
13.11.2025	**P1**	**LH**	**CS**

Contents

1 INTRODUCTION 4
2 EXECUTIVE SUMMARY: 5
3 SITE GEOLOGY 6
4 EXISTING DRAINAGE 7
5 PROPOSED DRAINAGE STRATEGY 7
6 SUMMARY AND CONCLUSIONS 10
7 APPENDICES 11

1 Introduction

1.1.1 CGS Civils Ltd has been appointed to undertake a drainage strategy report for a proposed development at Land Adj The Hollies, Barnham Road in Barnham, West Sussex.

1.1.2 The proposed development will consist of the construction of 2 No. dwellings which will be utilised by the adjacent care home. The proposed development is located as OS Grid Reference SU 95757 04556 and has the post code PO22 0ES.

1.1.3 The purpose of this drainage strategy is to demonstrate how the development area can be satisfactorily drained without increasing flood risk onsite and elsewhere. In addition, the report is intended to supply the relevant data:

- The results of an assessment into the potential for disposing of surface water by means of Sustainable Drainage System (SuDS).
- The appropriate design standard for the surface water drainage scheme must be the 1 in 100 year return period with a 45% allowance for climate change.

Fig 1. Site Location

2 Executive Summary:

2.1.1 The discharge of surface water to ground confirmed to not be suitable after infiltration test failed. Winter groundwater monitoring was carried out in late 2022 and early 2023 which recorded a highest groundwater level of 1.0mgbl. Infiltration features are therefore not viable under Arun District Council policy.

2.1.2 It is therefore proposed that surface water runoff is to be discharged into an existing surface water sewer located within Market Close at a restricted rate of 0.5l/s. Storage will be supplied within the sub-base of a tanked permeable parking area and within an attenuation tank.

2.1.3 The proposed network has been designed to cater for 1 in 100-year +45% CCA storm +10% urban creep.

2.1.4 The proposed foul water network is to be connected into the existing foul water system on site via the construction of a new chamber over the existing drain. Remedial works are to be carried out downstream of the proposed connection to ensure the system is in correct working order.

3 Site Geology

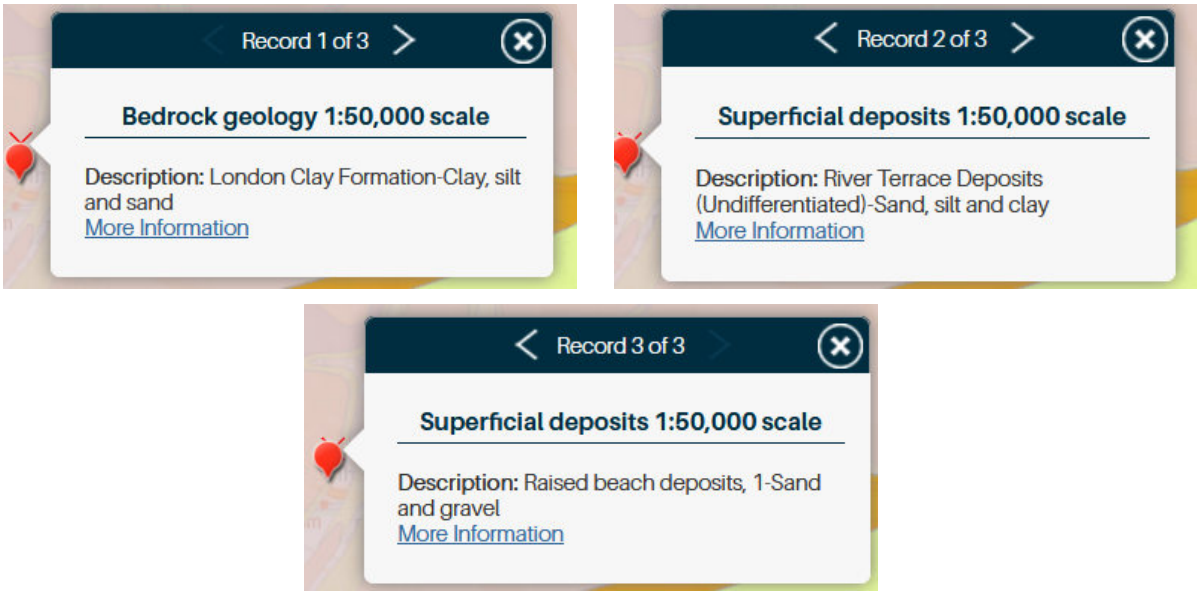
3.1 British Geological Survey information

3.1.1 The British Geological Survey confirms the bedrock geology to be made up of London Clay Formation. The BGS website confirms the superficial deposits on site to be made up of River Terrace Deposits and Raised Beach Deposits. The geology is noted to be comprised of Clay, Silt and Sand.

3.1.2 The British Geological survey also holds records of historical boreholes near the site which give some insight into the ground geology.

- Borehole SU90SE54 (Located approx. 170m Southwest of the site) – Clay and sand

Fig 2. British Geological Survey



3.2 Geological Assessment

3.2.1 A groundwater monitoring well was installed on site in 2022 and monitoring was conducted during the winter period of late 2022 and early 2023. Groundwater was recorded at a depth of 1.0mbgl which rules out the use of infiltration features under Arun District Council policy.

3.2.2 In addition to the ground water monitoring, an infiltration test to BRE365 was conducted on site which failed.

[redacted]

Fig 3. Groundwater Monitoring Well locations

4 Existing Drainage

4.1.1 A CCTV Drainage Survey was conducted on the existing The Hollies. It was confirmed that both the foul and surface water runoff from the property discharges via a combined drain into the foul water sewer within Barnham Road.

5 Proposed Drainage Strategy

5.1 SuDS Hierarchy

5.1.1 All options for the destination of run-off generated on site have been assessed in line with the SuDS hierarchy as set out in Building Regulations Part H document and DEFRA's Draft National Standards for SuDS.

Table 1. SuDS Hierarchy

Discharge Destination	
Rainwater Harvesting	Rainwater harvesting has been designed into drainage network.
Discharge to Ground	No – Infiltration test failed and groundwater was recorded at 1.0mbgl.
Discharge to Watercourse	None nearby
Discharge to Surface Water Sewer	Yes – Discharge into surface water sewer within Market Close adjacent to the site. Discharge rate to be restricted to 0.5l/s.
Discharge to Other Sewer	N/A due to above.

5.2 Proposed Hydraulic Calculation Specifications:

Table 2. SuDS Hierarchy

Hydraulic Calculations Settings:	
Rainfall Methodology	**FEH-22**
Volumetric Run-off Coefficient Cv	**1**
CV Winter and Summer	**1**
Additional Storage (m^3 / ha)	**0.0**
Maximum Rainfall (mm/hr)	**75**
Flow Control	**1.30m Head @ 0.5l/s discharge**
Attenuation Tank Design	Base Coefficient (m/hr): **0.00000**
	Side Coefficient (m/hr): **0.00000**
	Factor of Safety: **2**
	Porosity: **95%**
Carpark Design	Base Coefficient (m/hr): **0.00000**
	Side Coefficient (m/hr): **0.00000**
	Factor of Safety: **2**
	Porosity: **30%**

5.3 Surface Water Drainage

5.3.1 Due to the failure on on-site infiltration testing it is confirmed that the discharge of surface water runoff via infiltration is not viable. It is therefore determined that all surface water runoff from the site is to be discharged into an existing surface water sewer located within Market Close at a restricted discharge rate of 0.5l/s which is the minimum practical rate to ensure self-cleansing velocity within the network and reducing the risks of blocking the orifice within the flow control chamber.

5.3.2 The hard paved areas are to be constructed from a permeable surface with the sub-base wrapped in an impermeable geomembrane which will allow the permeable paved areas to act as a blanket attenuation tank. Distribution tanks are to be located within the sub-base to allow runoff to convey between the sub-base and the remainder of the surface water network.

5.3.3 Rainwater harvesting tanks are to be installed along the drainage network which will allow harvested rainwater to be re-used within the properties.

5.3.4 An attenuation tank is to be installed to provide the additional storage required to cater for the 1 in 100-year +45% storm + 10% Urban Creep.

5.3.5 Greenfield Runoff and Hydraulic calculations have been carried out which can be found at Appendix C. The urban creep has been applied directly to the catchment area on the calculations to accommodate for this increase on roof areas only and not hard paved areas.

Table 3. Greenfield Runoff Calculations

Greenfield Runoff Calculations			
Storm period	**Greenfield runoff rate (l/s)**	**Proposed Discharge Rate (l/s)**	**Difference (l/s)**
Q_{BAR}	0.1	0.5	+ 0.4
1	0.1	0.5	+ 0.4
2	0.1	0.5	+ 0.4
30	0.2	0.5	+ 0.3
100	0.2	0.5	+ 0.3

5.4 Foul water drainage

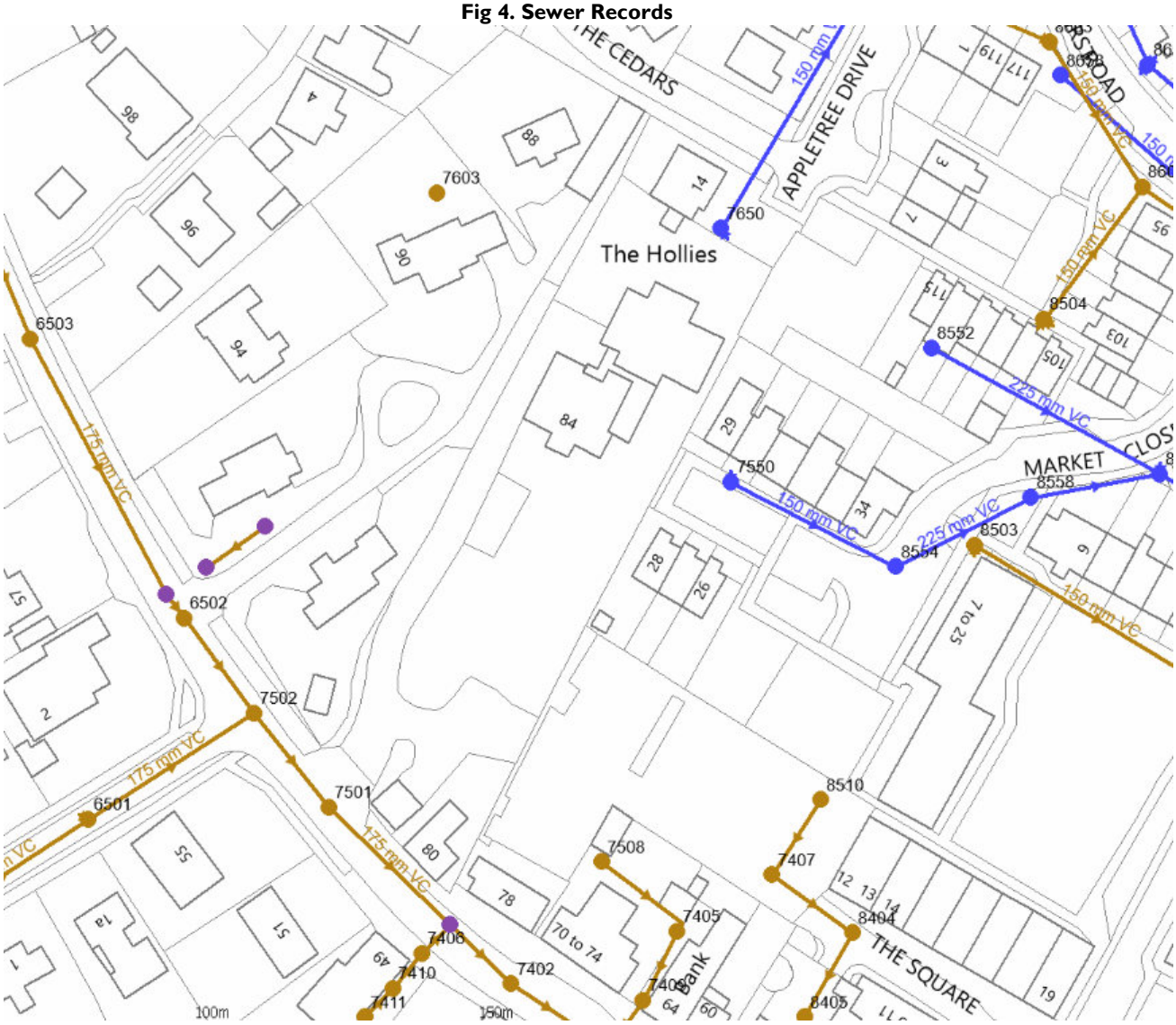
5.4.1 The foul water will discharge into the local foul water sewer via the construction of a new chamber on the existing private foul water drainage on site. The foul water drain discharges into the Southern Water sewer located within Barnham Road.

5.4.2 Due to the location of the site, the foul water sewer discharges into the Lidsey Wastewater Treatment Works (WwTW), which is subject to stricter sewage capacity requirements. It is to be noted that only foul water from the development will discharge into the public foul sewer, ensuring that only domestic wastewater is directed to Lidsey WwTW in accordace with Southern Water's requirements and best practice for sustainable drainage design.

5.4.3 A CCTV drainage survey was carried out on the existing drainage network which recorded a blockage downstream of the proposed connection point. Remedial works are to be undertaken in order to clear the blockage and ensure the drainage is in correct working condition.

5.4.4 A secondary CCTV should be carried out post remedial works to ensure that the foul water system is sealed and that there are no risks of groundwater ingress which may negatively impact the Lidsey WwTW.

Fig 4. Sewer Records



6 Summary and Conclusions

6.1.1 CGS Civils has been instructed to produce a Drainage statement under National Planning Policy Framework (NPPF) to support the Planning Application for the construction of 2 No. dwellings that is to be utilised by the adjacent care home.

6.1.2 The Surface Water will discharge to an existing surface water sewer located within Market close. The surface water discharge rate is to be restricted to 0.5 l/s and will utilise attenuations tanks and a attenuated sub-base of a car park in order to cater for the 1 in 100-year +45% storm +10% urban creep.

6.1.3 The proposed foul water network is to be connected into the existing foul water system on site via the construction of a new chamber over the existing drain. Remedial works are to be carried out downstream of the proposed connection to ensure the system is in correct working order.

6.1.4 The report has demonstrated that the proposed drainage measures ensure that suitable means of surface water drainage can be achieved for the proposed development.

7 Appendices

7.1 Appendix A – Site Plan

Richard Cobden House, Lion Street, Chichester, West Sussex, PO19 1LW
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Site Plan 1:500 @ A3

N

10 0 10 20 30 40 50m

1:500

Notes

1. This drawing is the copyright of MH Architects Ltd
2. Do not scale this drawing except for Local Authority planning purposes
3. All dimensions must be checked on site by the contractor prior to commencement of the works.

Client Approval	
X	A - Approved
X	B - Approved with comments
X	C - Do not use

Rev.	Revision Note/Purpose of Issue	Drw By	Date	Chk By	Date
P01	Preliminary	AE	30/09/25	CP	30/09/25
P02	Site boundary added, units detached	AE	09/10/25	CP	09/10/25
P03	Tree survey added	CP	13/10/25	CP	13/10/25
P04	Hatching	AE	15/10/25	CP	15/10/25

Play Area

THE CEDARS

The Hollies

Existing Access to The Hollies

Existing Access Road

post & rail fence

gate

Parking Court

cycles

cycles

bin store

Existing Access Retained

1

2

84

16

14

7

4

88

96

90

94

29

34

28

26

55

57

49

80

78

70 to 74

64

Car

Client

Elberry Estates Ltd

Job title

Land south of The Hollies, 84 Barnham Road
Barnham
West Sussex P022 0ES

Drawing title

Proposed
Block Plan

Drawn	Date	Checked	Date	Scale at A3
AE	Sep 25	CJP	Sep 25	1:500

Job No.	Pro.	Org.	Zone	Level	Type	Role	No.	Rev.
23-087	BHR	MHA	XX	ZZ	DR	A	0042	P06

Purpose of Issue

PLANNING

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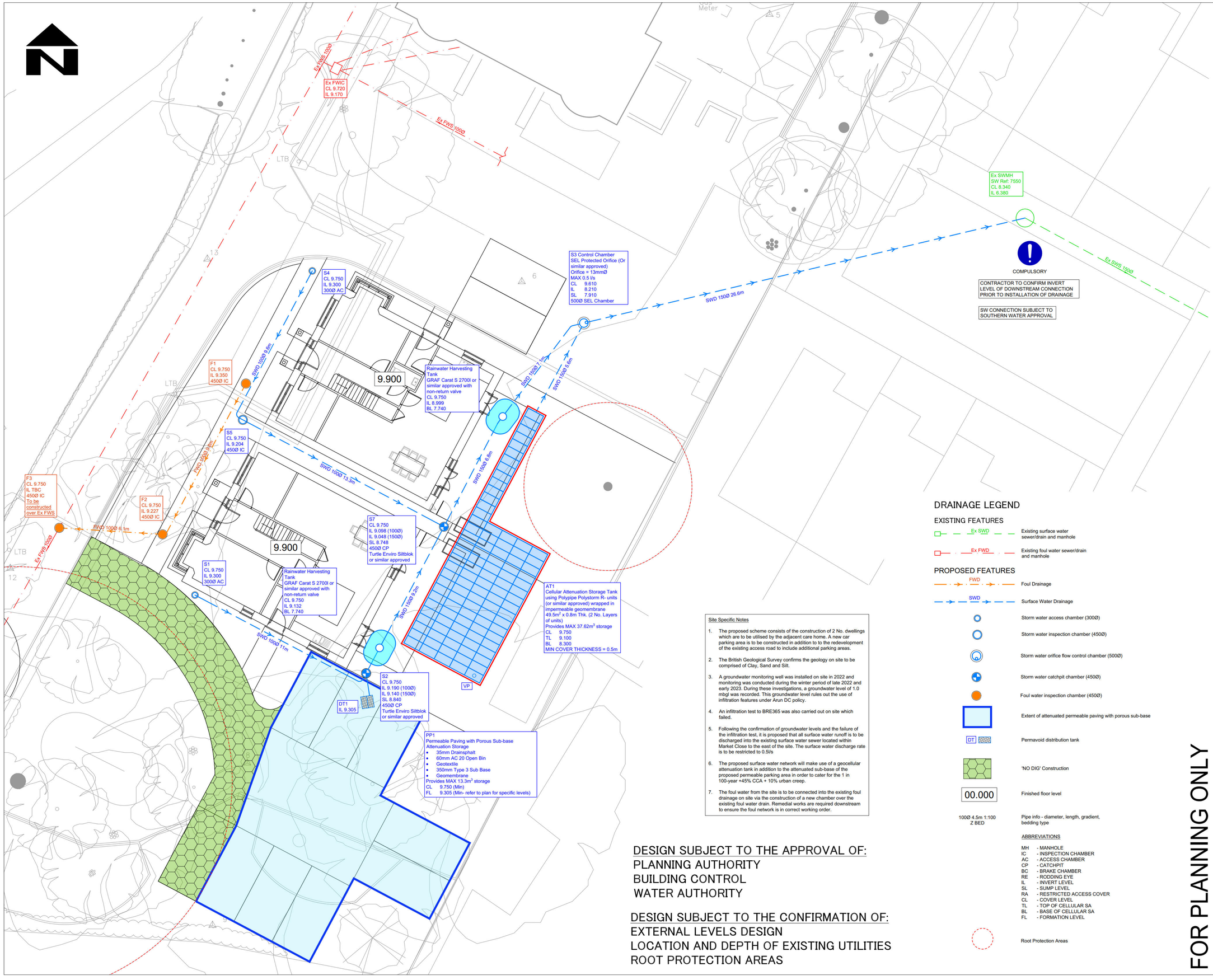
Registered in England No.1994233

ARCHITECTS

7.2 Appendix B – Drainage Layout

[redacted]



Site Specific Notes

1. The proposed scheme consists of the construction of 2 No. dwellings which are to be utilised by the adjacent care home. A new car parking area is to be constructed in addition to to the redevelopment of the existing access road to include additional parking areas.
2. The British Geological Survey confirms the geology on site to be comprised of Clay, Sand and Silt.
3. A groundwater monitoring well was installed on site in 2022 and monitoring was conducted during the winter period of late 2022 and early 2023. During these investigations, a groundwater level of 1.0 mbgl was recorded. This groundwater level rules out the use of infiltration features under Arun DC policy.
4. An infiltration test to BRE365 was also carried out on site which failed.
5. Following the confirmation of groundwater levels and the failure of the infiltration test, it is proposed that all surface water runoff is to be discharged into the existing surface water sewer located within Market Close to the east of the site. The surface water discharge rate is to be restricted to 0.5l/s
6. The proposed surface water network will make use of a geocellular attenuation tank in addition to the attenuated sub-base of the proposed permeable parking area in order to cater for the 1 in 100-year +45% CCA + 10% urban creep.
7. The foul water from the site is to be connected into the existing foul drainage on site via the construction of a new chamber over the existing foul water drain. Remedial works are required downstream to ensure the foul network is in correct working order.

DESIGN SUBJECT TO THE APPROVAL OF:
PLANNING AUTHORITY
BUILDING CONTROL
WATER AUTHORITY

DESIGN SUBJECT TO THE CONFIRMATION OF:
EXTERNAL LEVELS DESIGN
LOCATION AND DEPTH OF EXISTING UTILITIES
ROOT PROTECTION AREAS

DRAINAGE LEGEND

EXISTING FEATURES

- Ex SWD — Existing surface water sewer/drain and manhole
- Ex FWD — Existing foul water sewer/drain and manhole

PROPOSED FEATURES

- FWD — Foul Drainage
- SWD — Surface Water Drainage
- Storm water access chamber (300Ø)
- Storm water inspection chamber (450Ø)
- Storm water orifice flow control chamber (500Ø)
- Storm water catchpit chamber (450Ø)
- Foul water inspection chamber (450Ø)
- Extent of attenuated permeable paving with porous sub-base
- DT — Permavoid distribution tank
- 'NO DIG' Construction
- 00.000 — Finished floor level
- 100Ø 4.5m 1:100 Z BED — Pipe info - diameter, length, gradient, bedding type
- Root Protection Areas

ABBREVIATIONS

MH - MANHOLE
IC - INSPECTION CHAMBER
AC - ACCESS CHAMBER
CP - CATCHPIT
BC - BRAKE CHAMBER
RE - RODDING EYE
IL - INVERT LEVEL
SL - SUMP LEVEL
RA - RESTRICTED ACCESS COVER
CL - COVER LEVEL
TL - TOP OF CELLULAR SA
BL - BASE OF CELLULAR SA
FL - FORMATION LEVEL

STANDARD DRAINAGE NOTES

1. DO NOT SCALE FROM THIS DRAWING, REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
2. ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
4. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY, SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
5. BEFORE COMMENCING CONSTRUCTION THE CONTRACTOR MUST CHECK THE INVERT LEVELS OF EXISTING SEWERS TO WHICH CONNECTIONS ARE MADE. IN ADDITION THE CONTRACTOR MUST LOCATE AND DETERMINE INVERT LEVELS OF THE EXISTING SPURS TO WHICH CONNECTIONS ARE PROPOSED. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER IMMEDIATELY, PRIOR TO CONSTRUCTION.
6. ALL DRAINAGE WORKS SHOULD COMMENCE AT THE PROPOSED DOWNSTREAM CONNECTION POINT, THE WORKS CONTINUING UPSTREAM FOLLOWING CONFIRMATION OF THE TIE-IN INVERT LEVELS TO THE ENGINEER. CONNECTIONS TO MANHOLES OR LARGER SIZED PIPES ETC. SHOULD BE SOFFIT TO SOFFIT UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER, IF THIS IS NOT POSSIBLE INFORM THE ENGINEER IMMEDIATELY.
7. COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
8. ALL UN-REFERENCED PIPES ARE TO BE 100mm DIA
9. ALL PIPES TO BE ADOPTED, OR CONNECTING TO ADOPTED SEWERS, TO BE VITRIFIED CLAY TO BS EN 295 AND BS65 (SWS ONLY), OR CONCRETE PIPES TO BE EN 1916 AND BS5911:PART 1.
10. ROAD GULLY OUTLET PIPES ARE TO BE 150mm DIA. WITH CONCRETE SURROUND AND FLEXIBLE JOINTS. ALL GULLIES SHALL BE FITTED WITH GRADE D400 GRATINGS AND FRAMES TO BS EN124, UNLESS OTHERWISE STATED.
11. ALL ADOPTABLE SEWERS SHALL BE CONSTRUCTED TO THE STANDARDS AND SPECIFICATION LAID DOWN DOWN IN 'SEWERS FOR ADOPTION' 6th EDITION, WITH A VIEW TO ADOPTION UPON COMPLETION OF WORKS.
12. ALL PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT PART-H, AND TO THE SATISFACTION OF THE BUILDING CONTROL INSPECTOR.
13. THE CONTRACTOR IS TO KEEP A RECORD OF ANY VARIATIONS MADE ON SITE, INCLUDING THE RELOCATION OF SEWERS OR DRAINS, SO THAT AN AS CONSTRUCTED DRAWING CAN BE PREPARED UPON COMPLETION OF THE PROJECT.
14. STUB CONNECTIONS TO ADOPTABLE MANHOLES SHALL BE MADE FROM VITRIFIED CLAY AND CONSIST OF TWO ROCKER PIPES LAID AT THE SAME GRADIENT AS THE UP OR DOWNSTREAM PIPE.
15. IF ANY SUB SOIL DRAINAGE SYSTEMS ARE UNCOVERED DURING THE WORKS CONTACT THE ENGINEER FOR INSTRUCTIONS. SUB SOIL DRAINS ARE TO BE DIVERTED AROUND NEW WORKS AND CONNECTED INTO THE SURFACE WATER.
16. NO PRIVATE AREAS ARE TO DRAIN ONTO ADOPTABLE AREAS AND VICE VERSA.
17. ALL EXISTING MANHOLE COVER'S, GULLIES, ETC, ARE TO BE RAISED/LOWERED TO SUIT NEW LEVELS.
18. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT
19. UPON COMPLETION BUT PRIOR TO HANDOVER, CONTRACTOR TO CARRY OUT FULL CCTV SURVEY OF DRAINAGE SYSTEM WHICH IS TO BE REVIEWED BY ENGINEER TO ENSURE SATISFACTORY INSTALLATION
20. PROPRIETARY PRODUCTS TO BE INSTALLED IN FULL ACCORDANCE WITH MANUFACTURER'S GUIDANCE.
21. MANHOLE AND CHAMBER COVER GRADES:
    - 'A15' IN ALL LANDSCAPED AREAS AND ON FOOTPATHS
    - 'B125' IN ALL DRIVEWAYS
    - 'C250' IN PRIVATE PARKING AREAS
    - 'D400' IN CARRIAGEWAY/ACCESS ROAD

Prefixed to drawing numbers shall signify the following:-

PL = PLANNING	**Shall not be used for contract or construction purposes**
P = PRELIMINARY	**Shall not be used for contract or construction purposes**
T = TENDER	**Shall not be used for construction purposes**
C = CONSTRUCTION	These are the only drawings that shall be used for construction purposes
R = RECORD	Record of actual completed work

REV	DATE	DESCRIPTION	BY	CHK	APP
P1	13.11.25	REVISED TO SUIT CLIENTS COMMENTS AND TO INCLUDE FOUL WATER DRAINAGE	LH	CS	CS
P-	11.11.25	PRELIMINARY ISSUE	LH	CS	CS

cgs civils
Consulting Civil Engineers

CLIENT: ELBERRY PROPERTIES LTD

ARCHITECT: MH ARCHITECTS

JOB TITLE: LAND ADJ THE HOLLIES BARNHAM

DRAWING TITLE: DRAINAGE STRATEGY

DRAWN	ENGINEER	CHECKED	APPROVED
LH	C SLADE	CS	CS

DATE	SCALE @ A1
NOV 2025	1:100

JOB No.	STATUS	DRAWING No.	REV.
C3876	P	101	P1

FOR PLANNING ONLY

BLUE ARROWS SHOW ROUTE OF EXCEEDANCE FLOWS FROM PROJECTED POINTS OF EMERGENCE TOWARDS DIRECTION OF FALL.

ALL STRUCTURES DESIGNED TO ACCOMMODATE BELOW GROUND THE CRITICAL 1 IN 100 YEAR STORM EVENT PLUS 45%. EXCEEDANCE WOULD ONLY OCCUR IN STORMS OF GREATER INTENSITY THAN THIS.

DUE TO THE ROUTES OF EXCEEDANCE SHOWN, A SAFETY FACTOR OF 2.0 HAS BEEN SELECTED FOR STORAGE FEATURES.

Prefixed to drawing numbers shall signify the following:-

PL = PLANNING	Shall not be used for contract or construction purposes
P = PRELIMINARY	Shall not be used for contract or construction purposes
T = TENDER	Shall not be used for construction purposes
C = CONSTRUCTION	These are the only drawings that shall be used for construction purposes
R = RECORD	Record of actual completed work

REV	DATE	DESCRIPTION	BY	CHK	APP
P1	13.11.25	REVISED TO SUIT DRAINAGE LAYOUT	LH	CS	CS
P-	11.11.25	PRELIMINARY ISSUE	LH	CS	CS

cgs civils
Consulting Civil Engineers

CLIENT: ELBERRY PROPERTIES LTD

ARCHITECT: MH ARCHITECTS

JOB TITLE: LAND ADJ THE HOLLIES BARNHAM

DRAWING TITLE: IMPERMEABLE AREAS AND OVERLAND FLOW ROUTE PLAN

DRAWN	ENGINEER	CHECKED	APPROVED
LH	C SLADE	CS	CS

DATE	SCALE @ A1
NOV 2025	1:100

JOB No.	STATUS	DRAWING No.	REV.
C3876	P	101	P1

FOR PLANNING ONLY

7.3 Appendix C – Surface Water Calculations

[redacted]

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.350
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	75.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S2	0.033	5.00	9.750	450	495750.094	104541.613	0.610
S3	0.012	5.00	9.750	450	495761.520	104563.110	1.540
ExSWMH	0.000		8.340	1050	495788.529	104568.165	1.960

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S2	S3	24.345	0.600	9.140	8.210	0.930	26.2	150	5.21	55.9
1.001	S3	ExSWMH	27.478	0.600	8.210	6.380	1.830	15.0	150	5.38	55.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.976	34.9	6.7	0.460	1.390	0.033	0.0	44	1.526
1.001	2.613	46.2	9.0	1.390	1.810	0.045	0.0	45	2.033

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	24.345	26.2	150	Circular	9.750	9.140	0.460	9.750	8.210	1.390
1.001	27.478	15.0	150	Circular	9.750	8.210	1.390	8.340	6.380	1.810

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S2	450	Manhole	Adoptable	S3	450	Manhole	Adoptable
1.001	S3	450	Manhole	Adoptable	ExSWMH	1050	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S2	495750.094	104541.613	9.750	0.610	450				
						0	1.000	9.140	150
S3	495761.520	104563.110	9.750	1.540	450	1	1.000	8.210	150
									
						0	1.001	8.210	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
ExSWMH	495788.529	104568.165	8.340	1.960	1050	1	1.001	6.380	150
									

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	1 year (l/s)	0.1
Rainfall Events	Singular	Drain Down Time (mins)	240	10 year (l/s)	0.3
Summer CV	1.000	Additional Storage (m³/ha)	0.0	30 year (l/s)	0.3
Winter CV	1.000	Starting Level (m)		100 year (l/s)	0.4
Analysis Speed	Normal	Check Discharge Rate(s)	✓	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	45	0	0
10	45	0	0
30	45	0	0
100	45	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	FEH	Growth Factor 100 year	2.48
Positively Drained Area (ha)	0.136	Betterment (%)	0
SAAR (mm)	762	QMed	0.2
Host	7	QBar	0.2
BFIHost	0.790	Q 1 year (l/s)	0.1
Region	1	Q 10 year (l/s)	0.3
QBar/QMed conversion factor	1.111	Q 30 year (l/s)	0.3
Growth Factor 1 year	0.85	Q 100 year (l/s)	0.4
Growth Factor 10 year	1.45		

Node S3 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.300	Discharge Coefficient	0.650
Replaces Downstream Link	x	Design Flow (l/s)	0.5		
Invert Level (m)	8.210	Diameter (m)	0.013		

Node S3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	8.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	49.5	49.5	0.800	49.5	69.5	0.801	0.0	69.5

Results for 1 year +45% CC Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S2	10	9.182	0.042	6.0	0.0067	0.0000	OK
480 minute winter	S3	456	8.521	0.311	1.2	10.4742	0.0000	SURCHARGED
480 minute winter	ExSWMH	456	6.387	0.007	0.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S2	1.000	S3	5.9	0.625	0.170	0.2484	
480 minute winter	S3	1.001	ExSWMH	0.2	0.658	0.005	0.0088	7.4

Results for 10 year +45% CC Critical Storm Duration. Lowest mass balance: 98.86%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S2	10	9.215	0.075	17.4	0.0119	0.0000	OK
360 minute winter	S3	352	8.807	0.597	3.4	23.9768	0.0000	SURCHARGED
360 minute winter	ExSWMH	352	6.389	0.009	0.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S2	1.000	S3	17.4	1.151	0.498	0.3213	
360 minute winter	S3	1.001	ExSWMH	0.3	0.725	0.006	0.0111	8.5

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 98.77%

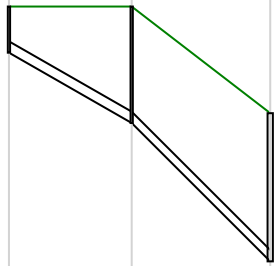
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S2	10	9.228	0.088	22.5	0.0139	0.0000	OK
480 minute winter	S3	472	8.948	0.738	3.3	30.6272	0.0000	SURCHARGED
480 minute winter	ExSWMH	472	6.389	0.009	0.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S2	1.000	S3	22.5	1.419	0.643	0.3443	
480 minute winter	S3	1.001	ExSWMH	0.3	0.750	0.007	0.0120	11.1

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.71%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	S2	570	9.689	0.549	2.5	0.0873	0.0000	FLOOD RISK
600 minute winter	S3	570	9.689	1.479	3.4	37.9022	0.0000	FLOOD RISK
600 minute winter	ExSWMH	570	6.391	0.011	0.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	S2	1.000	S3	2.5	0.210	0.072	0.4286	
600 minute winter	S3	1.001	ExSWMH	0.5	0.835	0.010	0.0152	14.7

Node Name		S2	S3	ExSWMH
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 2.000				
Link Name		1.000	1.001	
Section Type		150mm	150mm	
Slope (1:X)		26.2	15.0	
Cover Level (m)		9.750	9.750	8.340
Invert Level (m)		9.140 / 8.210	8.210 / 6.380	
Length (m)		24.345	27.478	

7.4 Appendix D – Borehole Logs

[redacted]

CLIENT	JOB NO	LOCATION	BOREHOLE NO
SCOTTISH POWER TECHNOLOGY	C9984	BARNHAM STATION, BOGNOR REGIS	BH1
DATE: FEBRUARY 1999 — SCALE: 1 to 50	BORING METHOD: DYNAMIC SAMPLING		Sheet: 1

Drilling & Casing Progress	SAMPLE/TEST Type & No.	SAMPLE/TEST Depth(M)	SPT N – value or COHESION	DESCRIPTION	O D LEVEL	LEGEND	DEPTH
19TH							0.0
				MADE GROUND – Concrete.			0.20
				MADE GROUND – Medium dense, fine to coarse sand and gravel.			0.40
							0.60
				MADE GROUND – Black sandy "soily" clay with some fine to coarse gravel and traces of crushed brick and ash.			0.90
				Stiff light to medium brown/orange sandy CLAY with some fine to coarse gravel and occasional fragments of flint.			
				Generally medium dense, moist, orange clayey/silty SAND with occasional fine gravel and occasional fragments/nodules of flint/chert.			
							4.75
19TH	U	5.00	>240.00	Very stiff, moist, dark grey silty CLAY.			5.00

DUNELM DRILLING CO
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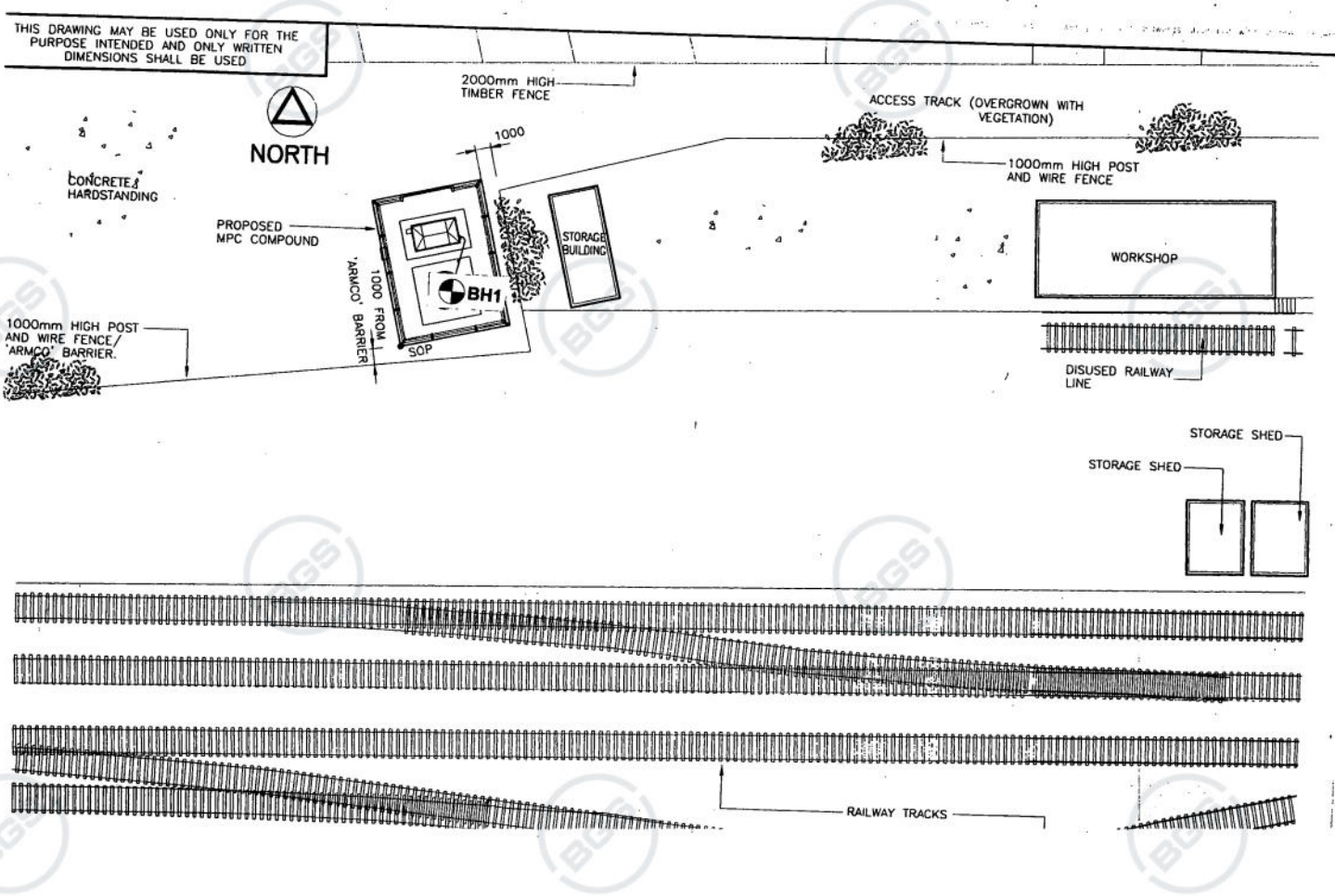
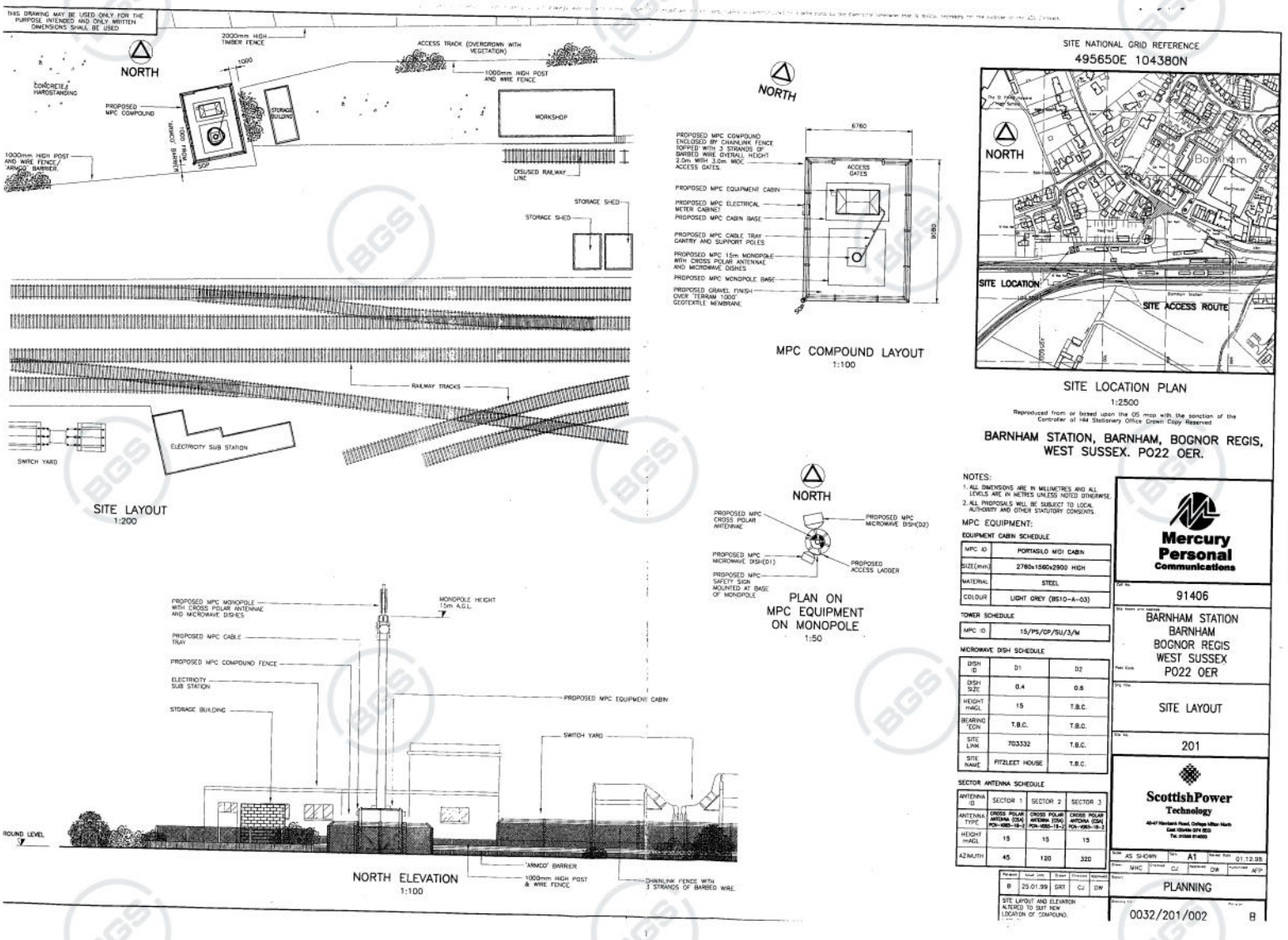
BOREHOLE LOGSHEET

Water Observations, Remarks, Etc
Water ingress noted at 1.00m.
Standing level recorded at 1.20m after 40mins.
Borehole backfilled to within 3.40m.


THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED
2000mm HIGH TIMBER FENCE
NORTH
1000
ACCESS TRACK (OVERGROWN WITH VEGETATION)
1000mm HIGH POST AND WIRE FENCE
CONCRETE HARDSTANDING
PROPOSED MPC COMPOUND
STORAGE BUILDING
WORKSHOP
BH1
1000mm HIGH POST AND WIRE FENCE/ 'ARMCO' BARRIER.
1000 FROM 'ARMCO' BARRIER
SOP
DISUSED RAILWAY LINE
STORAGE SHED
STORAGE SHED
RAILWAY TRACKS


THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED
NORTH
2000mm HIGH TIMBER FENCE
ACCESS TRACK (OVERGROWN WITH VEGETATION)
1000mm HIGH POST AND WIRE FENCE
CONCRETE HARDSTANDING
PROPOSED MPC COMPOUND
STORAGE BUILDING
WORKSHOP
1000mm HIGH POST AND WIRE FENCE / 'ARMCO' BARRIER
DISUSED RAILWAY LINE
STORAGE SHED
STORAGE SHED
RAILWAY TRACKS
SWITCH YARD
ELECTRICITY SUB STATION
SITE LAYOUT
1:200
NORTH
PROPOSED MPC COMPOUND ENCLOSED BY CHAINLINK FENCE TOPPED WITH 3 STRANDS OF BARBED WIRE OVERALL HEIGHT 2.0m WITH 3.0m WIDE ACCESS GATES.
6760
ACCESS GATES
6080
PROPOSED MPC EQUIPMENT CABIN
PROPOSED MPC ELECTRICAL METER CABINET
PROPOSED MPC CABIN BASE
PROPOSED MPC CABLE TRAY GANTRY AND SUPPORT POLES
PROPOSED MPC 15m MONOPOLE WITH CROSS POLAR ANTENNAE AND MICROWAVE DISHES
PROPOSED MPC MONOPOLE BASE
PROPOSED GRAVEL FINISH OVER 'TERRAM 1000' GEOTEXTILE MEMBRANE
MPC COMPOUND LAYOUT
1:100
SITE NATIONAL GRID REFERENCE
495650E 104380N
NORTH
Barnham
SITE LOCATION
SITE ACCESS ROUTE
SITE LOCATION PLAN
1:2500
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BARNHAM STATION, BARNHAM, BOGNOR REGIS, WEST SUSSEX. PO22 0ER.
NORTH
PROPOSED MPC CROSS POLAR ANTENNAE
PROPOSED MPC MICROWAVE DISH(D1)
PROPOSED MPC MICROWAVE DISH(D2)
PROPOSED ACCESS LADDER
PROPOSED MPC SAFETY SIGN MOUNTED AT BASE OF MONOPOLE
PLAN ON MPC EQUIPMENT ON MONOPOLE
1:50
PROPOSED MPC MONOPOLE WITH CROSS POLAR ANTENNAE AND MICROWAVE DISHES
MONOPOLE HEIGHT 15m A.G.L.
PROPOSED MPC CABLE TRAY
PROPOSED MPC COMPOUND FENCE
ELECTRICITY SUB STATION
STORAGE BUILDING
PROPOSED MPC EQUIPMENT CABIN
SWITCH YARD
GROUND LEVEL
'ARMCO' BARRIER
1000mm HIGH POST & WIRE FENCE
CHAINLINK FENCE WITH 3 STRANDS OF BARBED WIRE
NORTH ELEVATION
1:100
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRICS AND ALL LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ALL PROPOSALS WILL BE SUBJECT TO LOCAL AUTHORITY AND OTHER STATUTORY CONSENTS.
MPC EQUIPMENT:
EQUIPMENT CABIN SCHEDULE
MPC ID: PORTAGLO MOI CABIN
SIZE(mm): 2780x1560x2900 HIGH
MATERIAL: STEEL
COLOUR: LIGHT GREY (BS10-A-03)
TOWER SCHEDULE
MPC ID: 15/PS/DP/SU/3/M
MICROWAVE DISH SCHEDULE
DISH ID: D1 | D2
DISH SIZE: 0.4 | 0.6
HEIGHT mAGL: 15 | T.B.C.
BEARING °EON: T.B.C. | T.B.C.
SITE LINK: 703332 | T.B.C.
SITE NAME: FITZLEET HOUSE | T.B.C.
SECTOR ANTENNA SCHEDULE
ANTENNA ID: SECTOR 1 | SECTOR 2 | SECTOR 3
ANTENNA TYPE: CROSS POLAR ANTENNA (CDA) PCN-K065-18-2 | CROSS POLAR ANTENNA (CDA) PCN-K065-18-2 | CROSS POLAR ANTENNA (CDA) PCN-K065-18-2
HEIGHT mAGL: 15 | 15 | 15
AZIMUTH: 45 | 120 | 320
Mercury Personal Communications
91406
BARNHAM STATION
BARNHAM
BOGNOR REGIS
WEST SUSSEX
PO22 0ER
SITE LAYOUT
201
ScottishPower Technology
AS SHOWN | A1 | 01.12.98
MHC | CJ | DW | AFP
PLANNING
0032/201/002 B
B 25.01.99 GRT CJ DW
SITE LAYOUT AND ELEVATION ALTERED TO SUIT NEW LOCATION OF COMPOUND.