



Civil Engineers & Transport Planners

Land at Heathlands Road

Drainage Strategy & Flood Risk Assessment

March 2023

231636/DS/MS/KBL/01

Rev A



Civil Engineers & Transport Planners

LANMOR Consulting Ltd,
Thorogood House, 34 Tolworth Close
Surbiton, Surrey, KT6 7EW

Tel: 0208 339 7899 Fax: 0208 339 7898

E-mail: info@lanmor.co.uk

Internet: www.lanmor.co.uk

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1 INTRODUCTION

1.1 Scope

1.1.1 Lanmor Consulting has been appointed to assess the flood risk and to prepare a Drainage Strategy for the proposed redevelopment of the site at land at Heathlands, Heathlands Road, Wokingham, Berkshire. This report has been commissioned to advise on the flood risk and technical feasibility of providing drainage for the proposed development. Figure 1.1 below shows the location of the site.

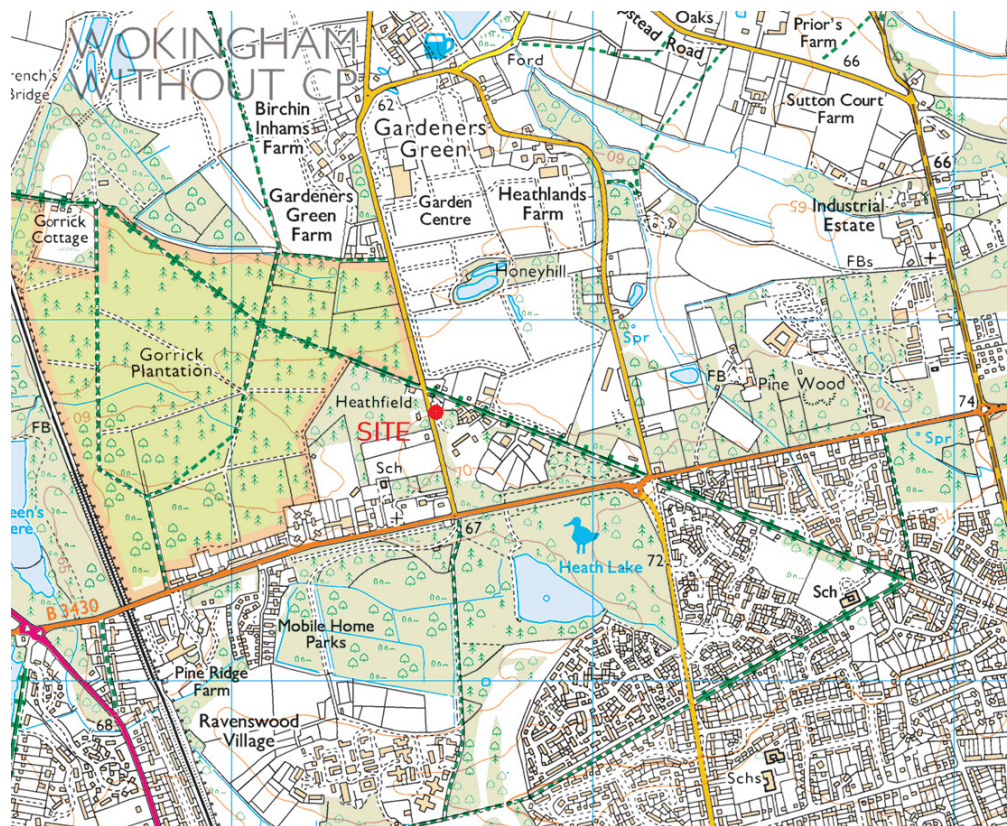


Figure 1.1 – Site Location

1.1.2 This report will consider the proposed drainage strategy for the site and flood risk, it will assess the site's current Greenfield and Brownfield runoff rates, suitable methods of discharging the runoff from the development and set the drainage strategy for the proposed development, including discharge rates and any requirements for attenuation.

1.1.3 The information and details within this report will be refined, modified and updated as the detailed design is progressed, post planning. The scope of works for this drainage strategy report is outlined below:

- Review available data relating to existing on-site drainage and other drainage networks in the vicinity of the site.
- Review of the site's ground conditions for suitability of SuDS.
- Consider the use of Sustainable Drainage Systems as an option for disposal of surface water runoff from the proposed development.
- Undertake drainage assessments of proposed buildings to establish discharge rates and attenuation requirements to deal with any increased surface water runoff.

2 SITE LOCATION AND DESCRIPTION

2.1 Location

2.1.1 The site is in a rural area surrounded by framed fields with a mix of residential and other community uses. The site is currently occupied a number of vehicle garages used for parking cars. It is located in Wokingham Borough Council and accessed from Heathlands Road. The existing site plan is included within Appendix A as drawing 01.

2.1.2 The site covers an area of 0.195 hectares and is currently unoccupied, there are no watercourses or rivers in the vicinity of the site. The proposed application seeks approval for the construction of 8 terraced houses.

2.2 Proposed Development

2.2.1 The proposals will seek approval for the construction of 2 bed bungalow with parking for 2 cars. The proposed site plan is included in Appendix A as drawings 02.

2.3 Regional Geology

2.3.1 The British Geological Survey indicates that the site has an underlying bedrock of Bagshot Formation - Sand. Sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period..

2.3.2 Superficial deposits of River Terrace Deposits, sand and gravel, sedimentary superficial deposit formed between 2.588 million years ago and the present during the Quaternary period are recorded overlying the bedrock.

2.3.3 The nearest historic borehole logs to the site indicated made ground to 0.5m with river terrace deposits to a depth of 2m and then bagshot formation to 4m, bottom of the borehole.

3 EXISTING DRAINAGE

- 3.1.1 The survey of the site establish a surface water culvert running to the front of the site manhole on the culvert are clearly visible to the north and south of the site. The existing garages have no foul or surface water connections and no other sewers have been recorded or discovered during the site investigations.

4 PROPOSED DRAINAGE REGIME

4.1 Proposed Surface Water Drainage

4.1.1 Sustainable Drainage Systems (SuDS) were considered as part of this assessment for disposal of surface water runoff from the development. The residential unit will have a pitched roof so not suitable for a greenroof.

4.1.2 Next on the Sustainable Drainage Hierarchy is the use of ground infiltration techniques such as soakaways and infiltration basins etc. The underlaying ground is sand and gravels so infiltration will be possible, however the constraints on site means there is limited opportunities for the use of infiltration. The tree protection fencing takes up most of the site and there are also additional areas where no dig construction is required. The limited space means the use of soakaways and permeable paving has been discounted as the available space is not sufficient to cater for the runoff from the development.

4.1.3 There are no water courses near the site that could receive the runoff from the site and has therefore been discounted. There is a surface water sewer running through the site so the proposed strategy will be to attenuate the runoff from the development and discharge to the sewer.

4.1.4 To accommodate the required storage for a 1.0% event with an allowance for climate change a tank of 9m x 2m x 0.8m deep will be required.

4.1.5 Full calculations for the permeable paving have been calculated using MicroDrainage and are provided in Appendix C.

4.1.6 Drawing 231636/SD/01 included in Appendix B, shows an indicative drainage layout for the development.

4.2 Exceedance Flows

4.2.1 The natural fall across the site is from west to east towards Heathlands Road, therefore any exceedance of a storm event with a 1 in 100 year probability plus 40% allowance for climate change will be directed away from the property and down Heathlands Road.

5 SUDS MAINTENANCE

- 5.1.1 Regular inspection of the surface water drainage network for blockages and clearing unwanted debris/silt from the system should improve the performance of the surface water network and decrease the need for future repairs. In the event of blockages, high pressure water jets can be used to clear the gullies and pipes to ensure they are functioning correctly, this should be undertaken by certified trained professionals.
- 5.1.2 The level and frequency of maintenance required on site is dependent on the type of facility. The type of maintenance will fall into one of three categories “regular maintenance”, “occasional maintenance”, and “remedial maintenance”.
- 5.1.3 Regular Maintenance of the drainage and SuDS features will include, inspections, removal of litter/debris and sweeping of the surfaces. Occasional maintenance will include removal of sediment etc. and remedial maintenance may include structural repairs and infiltration reconditioning if required.
- 5.1.4 The drainage and SuDS elements after an initial inspection following construction should be inspected on a monthly basis for the first 12 months and after large storms, thereafter the following maintenance regime should be applied and adjusted if the 12-month monitoring process has identified any issues.
- 5.1.5 Following completion of the development, a Management Company will be set up to maintain all the communal areas, including the drainage. It will be their responsibility to maintain the drainage network, including the SuDS elements.

Attenuation Tanks

5.1.1 For the attenuation tanks, the following maintenance will be required.

Attenuation Tank Maintenance Schedule		
	Required Action	Typical Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Annually
	Remove debris from the catchment surface (where it may cause risk to performance).	Monthly
	For systems where rainfall infiltrates in the tank from above, check surface of filter for blockage by sediment, algae or other matter, remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures.	Annually or as required
Remedial Actions	Repair/rehabilitate inlets/outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tanks for sediment build-up and remove if necessary	Every 5 years or as required

Table 5.1 – Attenuation Tank Maintenance

6 FLOOD RISK ASSESSMENT

6.1 Flood Risk to Site

6.1.1 The proposed site is within Flood Zone 1, this is defined as land assessed as having a less than 0.1% probability of river or sea flooding in any year. Figure 6.1 below shows the EA flood map.

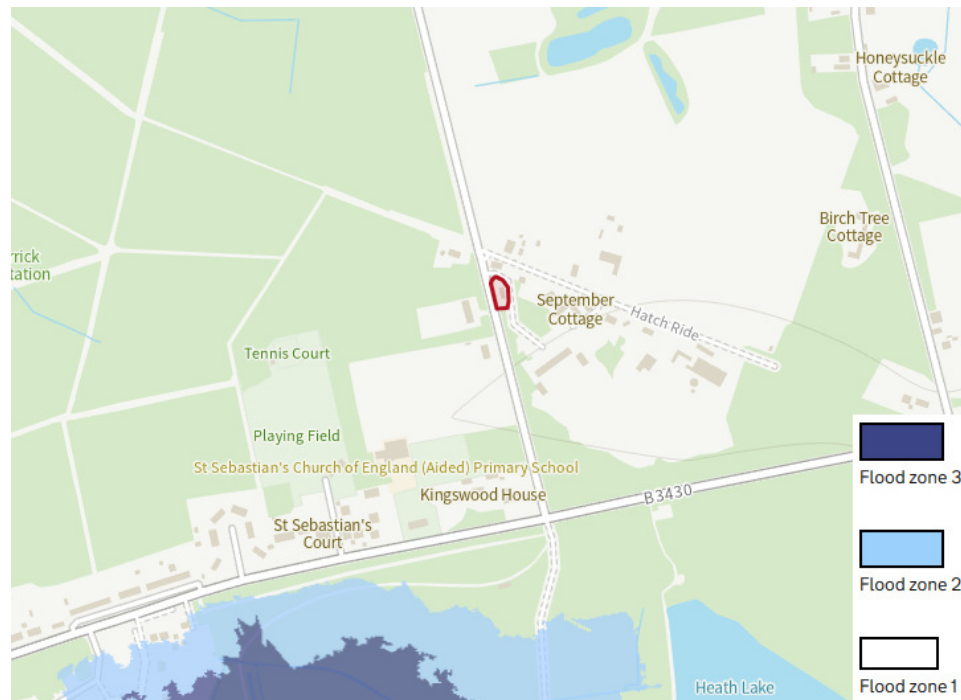


Figure 6.1 – EA Flood Map

6.1.2 The flood information on the Environment Agency's website indicates that the site is not in an area at risk of fluvial flooding with a probability of 0.1% or greater. Figure 6.1 clearly shows the site is located in Flood Zone 1.

6.1.3 Surface water flood risk information is provided on the EA website, this gives an indication if an area is likely to be affected by flooding. The EA accept that the data is not suitable to confirm if an individual property has or could be subject to flooding.

6.1.4 The surface water flood maps are the best available data. They indicate the site should not be subject to flooding with a probability of 1.0%. Figure 6.2 below shows the depth of surface water flooding that might occur from an event with a probability of 1.0% or greater.

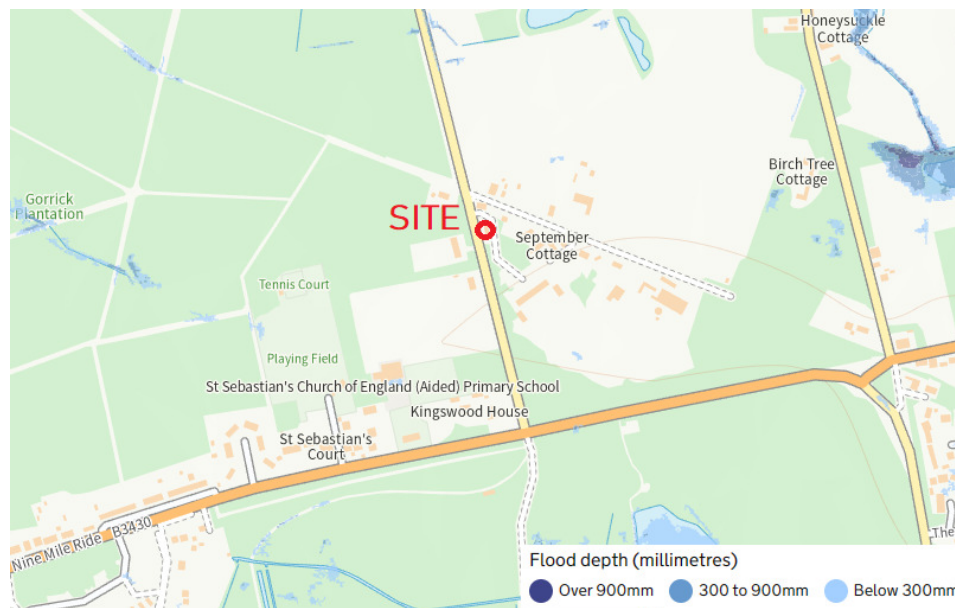


Figure 6.2 – EA Surface Water Flood Map

- 6.1.5 The site is indicated on the flood map above to be some distance from the nearest surface water flooding, therefore a safe dry access to and from the site during an extreme flooding event can be provided at all times.

6.2 Flood Probability and Climate Change

- 6.2.1 Past, present and future emissions of greenhouse gases are expected to cause significant global climate change during this century – the nature of climate change at regional level will vary. The NPPF recommends that FRA's should consider the future flood levels and the impact climate change may have on rising sea levels, increased rainfall etc.
- 6.2.2 The NPPF and its guidance sets out the climate change allowance to be applied to peak river flows based the site flood risk, its vulnerability and its location (river catchment area). For sites in Flood Zone 1 no climate change allowance needs to be considered. This FRA has considered changes in flood water levels due to climate change in line the NPPF and when this is factored in the site is still some distance from Zones 2 & 3. The increase in flood levels, resulting from climate change, will have no impact of the proposed development.

6.3 Impacts of Flooding

- 6.3.1 The site is situated in a Flood Zone 1 area, which is a significant distance from Flood Zones 2 and 3. The site has a probability of flooding of less than 0.1% (1 in 1000 years) and there is no history of the site being subject to fluvial flooding or from any other source.
- 6.3.2 The proposed development is located above the flood level for an event with a probability of 1.0% plus CC or greater. Given the site is above the flood level, it will not affect the flow of flood waters or displace any food volumes associated with an event of 1.0% AEP +CC or greater.
- 6.3.3 According to EA Flood Maps, the site is assessed as having a less than 0.1% probability of flooding. The site is a significant distance from the nearest fluvial flooding sources and hasn't been affected by flooding in the past. Therefore, a flood event will have no impact on the proposed development and will not cause any damage to the buildings or present a risk to residents in the development.
- 6.3.4 Since the site is not in Flood Zones 2 and 3, the proposed development is not prone to flooding with a probability of 1.0% or greater, thus, a safe access can always be provided to and from the site. Overall, the residual risk is considered minimal as the site is located within Flood Zone 1.

6.4 Sequential Test

- 6.4.1 The principal of the sequential test is to assess locations and prioritise developments to areas at less risk of flooding. National Planning Policy Framework suggests that Regional Planning Bodies and Local Planning Authorities should ensure their regional spatial strategies include a broad consideration of flood risk.
- 6.4.2 Within the Technical Guidance to the National Planning Policy Framework, Table 6.1 categorises each type of development into a flood risk vulnerability. The proposed development is considered 'More Vulnerable' and located in Flood Zone 1 so meets the sequential test to allocate developments to low risk flood areas and does not require the application of the exception test.

Flood Risk Vulnerability classification (see Table D2)		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table D.1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b 'Functional Floodplain'	Exception Test required	✓	✗	✗	✗

Key:

✓ Development is appropriate

✗ Development should not be permitted

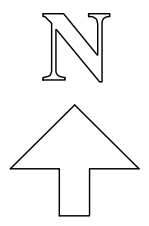
Table 6.1 – Flood Risk Vulnerability and Flood Zone 'Compatibility'

7 SUMMARY AND CONCLUSION

- 7.1.1 This Drainage Strategy & Flood Risk Assessment has been prepared to identify how the proposed development will discharge surface water runoff from the proposed development, and the associated flood risk.
- 7.1.2 The proposed application site is located off Heathlands Road. The proposed application seeks approval for construction of a bungalow and associated parking.
- 7.1.3 The proposed development will not be subject to flooding as it is in a very low flood risk area from all sources of flooding. The extent of fluvial flooding in the area has been assessed and allowances for climate change factored in and the site is still in a very low flood risk area (Zone 1). It is therefore considered that the site will be safe and free from flood waters for all events with a probability of 1.0% or greater.
- 7.1.4 As part of the assessment, SuDS were considered for the discharge of surface water runoff from the proposed buildings and parking areas. The lack of space and tree protection measures means there was no opportunity to implement soakaways or permeable paving, so an attenuation and restricted discharge to the sewer will be employed.
- 7.1.5 This has been designed to cater for all storm events up to and including the 1 in 100 year storm plus 40% climate change allowance.
- 7.1.6 This statement clearly demonstrates that the proposed development can be adequately served in terms of discharge of foul and surface water runoff from the site without increasing the risk of flooding in the area. Given the above we can see no reason to preclude development on this site on the grounds of flooding or there being insufficient capacity to deal with the runoff from the proposed development.

APPENDIX A

Drawing 01 – Existing Site Layout



LEGEND

FEATURE STYLES	FEATURE ABBREVIATIONS
SURVEY CONTROL	AV Air Valve
FENCE	BS Bus Stop
HEDGE	BT British Telecom
FWS	BW Brick Wall
SWS	CB Conc Bollard
WATER	CL Cover Level
POWER LINE (OVERHEAD)	CTO cable TV outlet
TELECOM LINE (OVERHEAD)	EB Electric Box
ELECTRIC MAIN	EC Electric Cover
GAS MAIN	EP Electricity Pole
EMBANKMENT	EP Electricity Pole
	FL Fire Hydrant
	FL Floor level
	C Gully
	GM Gas Meter
	GV Gas Valve
	IL Invert Level
	IC Inspection Chamber
	KLS Keep Left Sign
	KO Kerb Offset
	LB Letter Box
	LP Lamp Post
	MKR Marker
	MP Metal Post
	MH Manhole
	MB Metal Bollard
	P Post
	PI Petrol Interceptor
	RG Road Gully
	RNB Road Name Board
	RS Road Sign
	RW Retaining Wall
	SA Soakaway
	SC Stopcock
	SV Sluice Valve
	TP Telegraph Pole
	TCB Telephone Box
	TJB Tel-Junc.Box
	TL Traffic Light
	V Valve
	VP Vent Pipe
	WL Water Level
	WM Water Meter
	WO Water Outlet
	WV Water Valve

DATUM
GRID - ORDNANCE SURVEY NATIONAL GRID (OSTN02)
LEVELS - ORDNANCE SURVEY (OSGM02)

STN	E	N	Z
1	482562.245	165755.944	69.128
2	482643.430	165769.665	69.438
3	482545.752	165792.444	68.405
4	482554.270	165806.544	68.236
5	482597.153	165792.347	68.777
6	482588.098	165745.209	69.477
7	482551.958	165737.683	69.147
8	482573.539	165750.705	69.295
9	482597.961	165739.811	69.614
10	482570.268	165768.388	69.309
11	482560.228	165768.258	69.305

NOTES

Surveyed boundaries are not necessarily the site legal boundaries.
Client should refer to the relevant Land Registry document for confirmation of title.
Drainage and service covers that were buried, obscured or not visible at the time of the survey cannot be shown. Sewer connections between manholes are assumed to be straight and only pipes visible from the cover are shown.
Tree canopy measured values are written as maximum spreads.
Tree species and condition to be confirmed by an arboriculturist

SURVEYED BY

groundsurveys ltd

land & engineering surveyors

units 9&10
woodlands farm
spring lane
cookham dean
berkshire
SL6 9PN

t: 01628 485200
f: 01628 485300
e:office@groundsurveys.com
www.groundsurveys.com

CLIENT

THE EDWARDS IRISH PARTNERSHIP

SITE

HEATHLANDS ROAD
WOKINGHAM
RG40 3AY

TITLE

SITE SURVEY

AS EXISTING

SCALE	1/200 (A1)	DATE	AUG 2013
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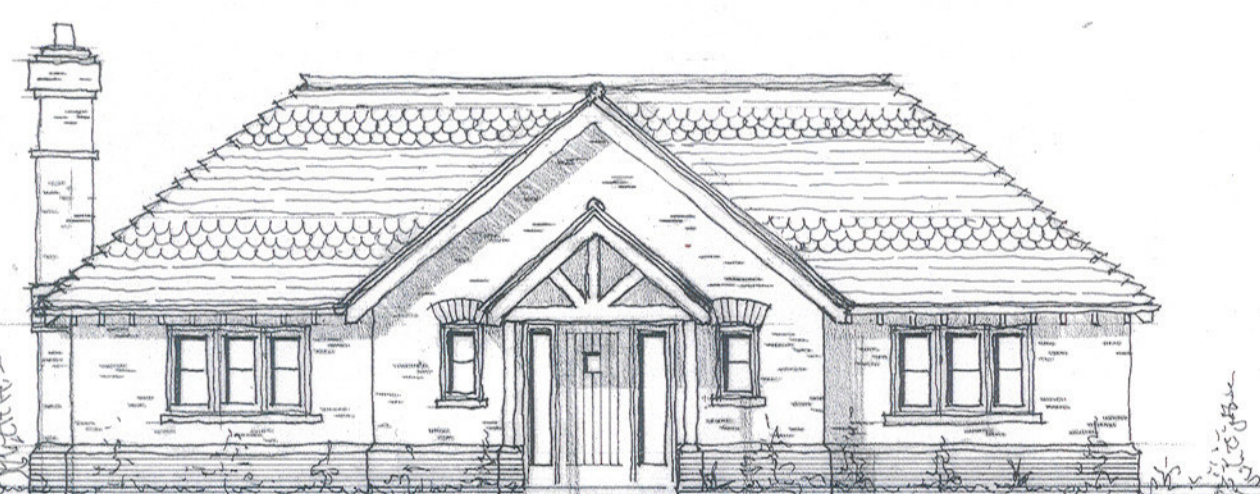
Drawing 02 – Proposed Site Plan

Notes

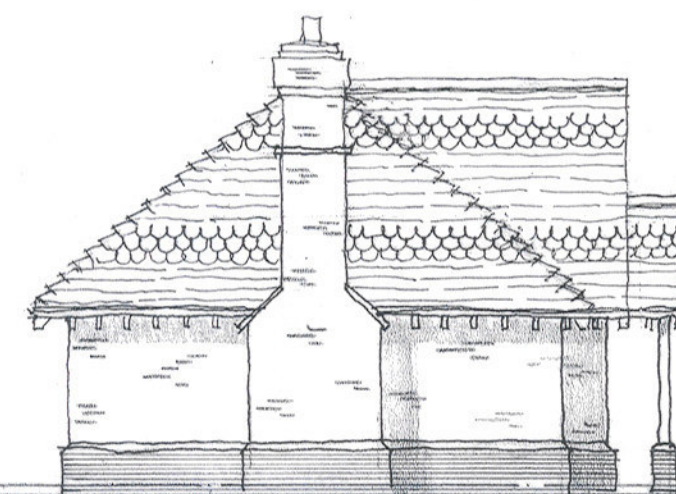
All dimensions and levels on site are to be checked prior to commencement of work.

This drawing is the copyright of The Edwards Irish Partnership LLP

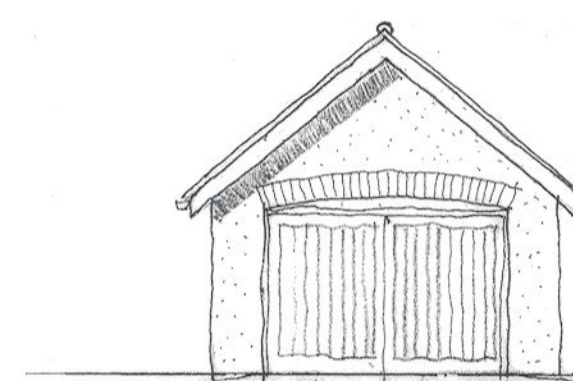
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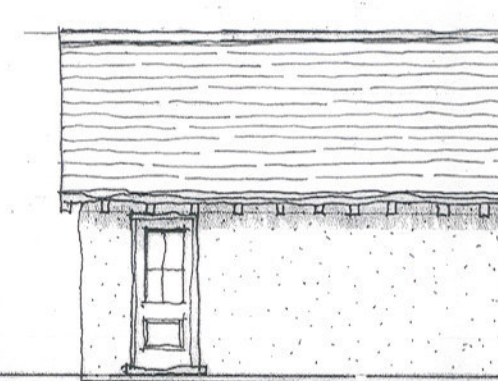
FRONT ELEVATION



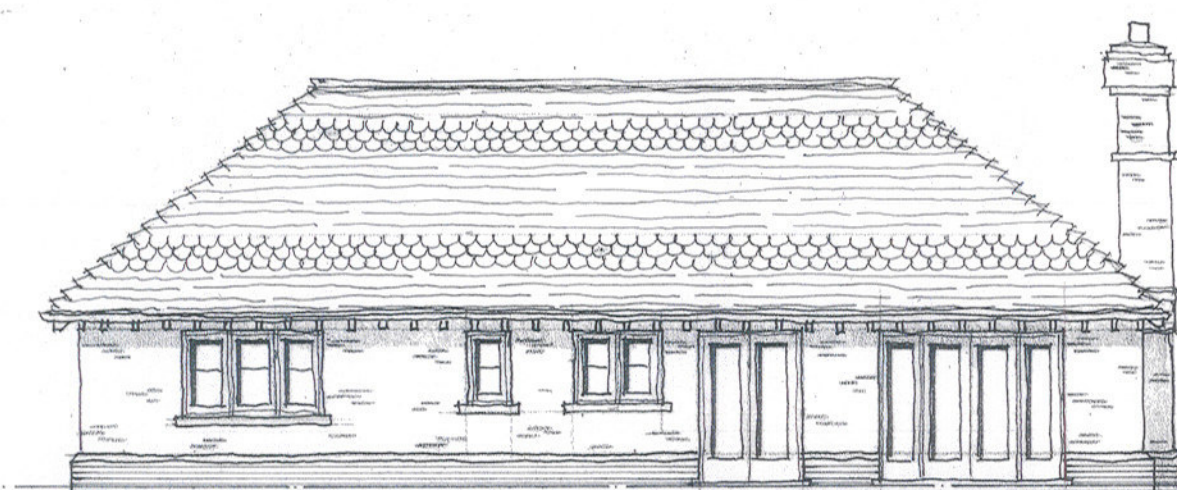
SIDE ELEVATION



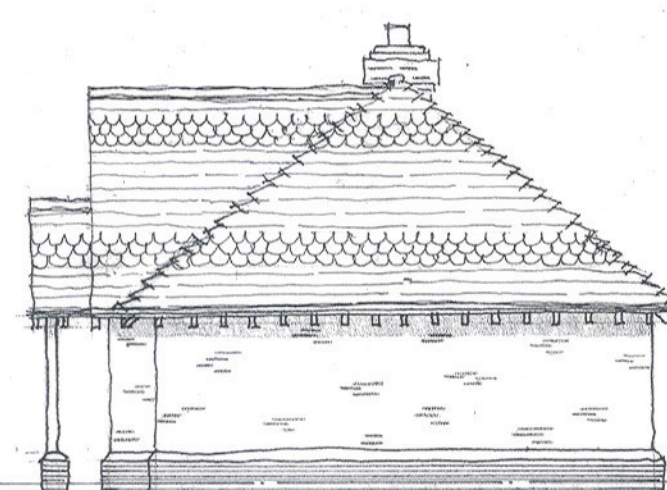
FRONT



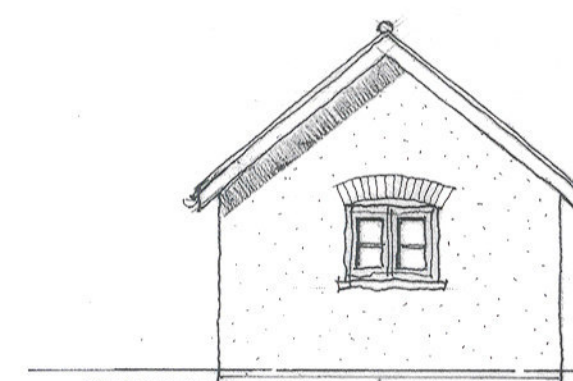
SIDE



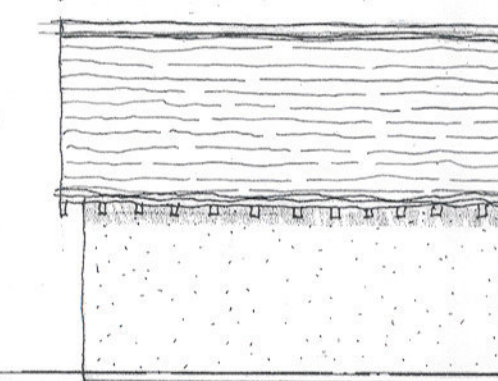
REAR ELEVATION



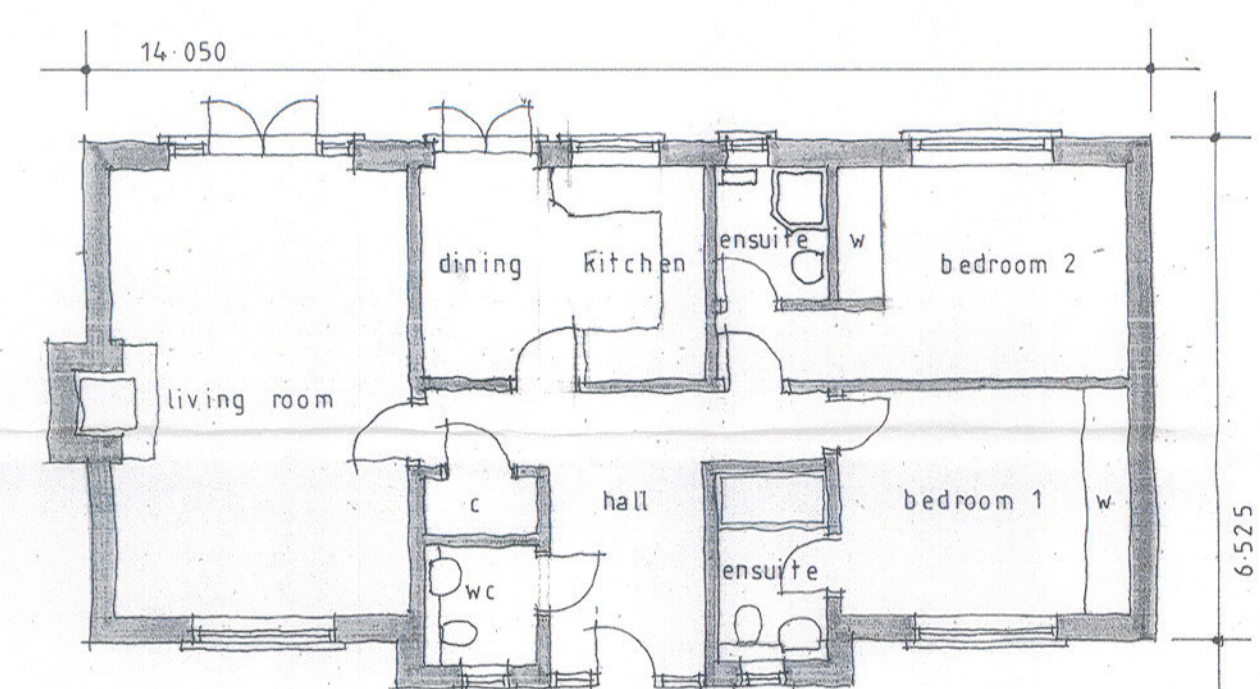
SIDE ELEVATION



REAR



SIDE



FLOOR PLAN

MATERIALS

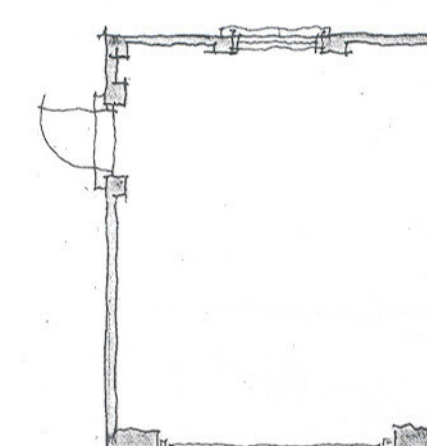
ROOF : PLAIN CLAY TILES WITH CLAY CLUB TILE BANDING AND BONNET HIP TILES

WALLS : RED MULTI-STOCK FACE BRICKWORK WITH GREY MULTI-STOCK DETAIL FACE BRICK PLINTH AND RECESSED LINTOLS

WINDOWS : CREAM UPVC COTTAGE STYLE WINDOWS

EAVES : GREEN STAINED BLASED RAFTER FELT WITH BARGEBOARDS

GROSS EXTERNAL FLOOR AREA :
EXISTING GARAGES = 96.00m² = 1033 ft²
PROPOSED DWELLING = 96.00m² = 1033 ft²



PLAN

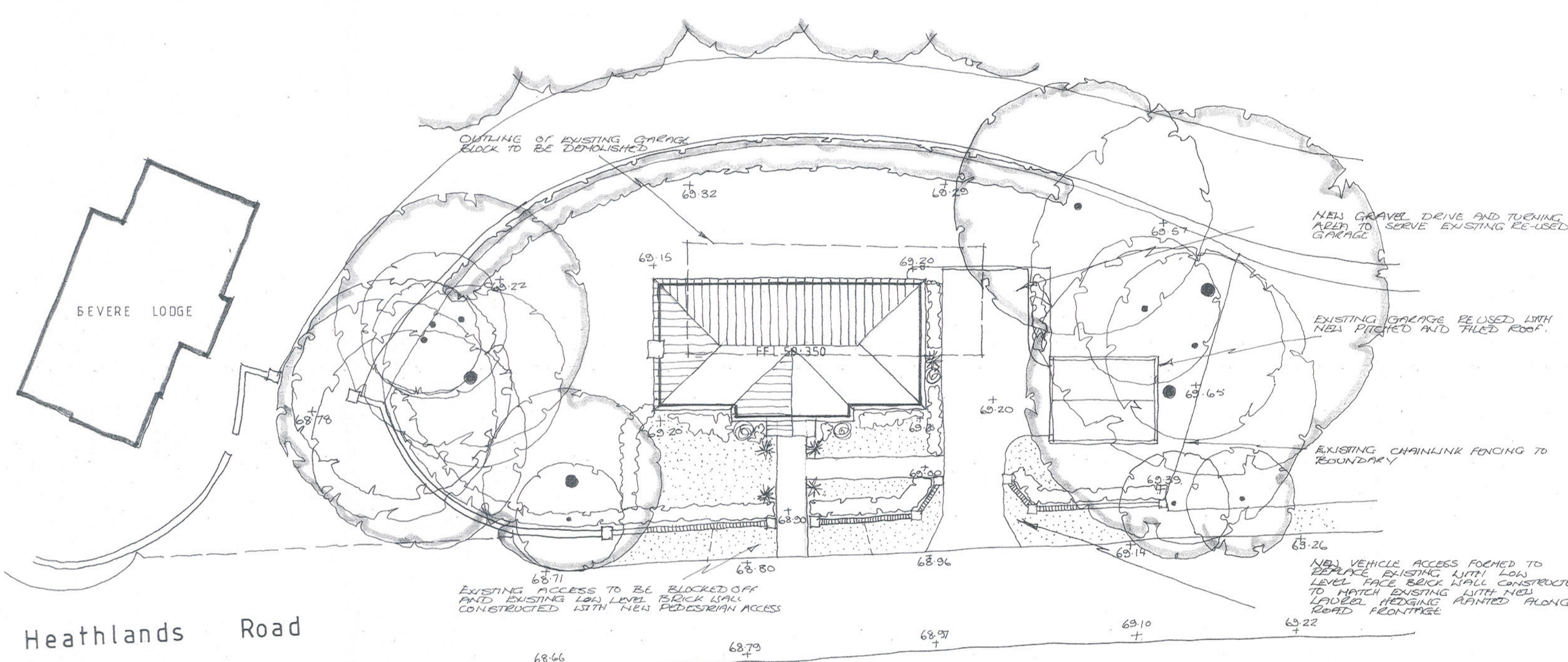
EXISTING GARAGE PLANS and ELEVATIONS

MATERIALS

WALLS : EXISTING, RENDERED WALLS TO BE PAINTED.

ROOF : EXISTING FLAT ROOF TO BE REMOVED AND PLAIN CLAY TILES TO MATCH HOUSE LAID ON PITCHED ROOF CONSTRUCTION WITH EXPOSED RAFTER FELT.

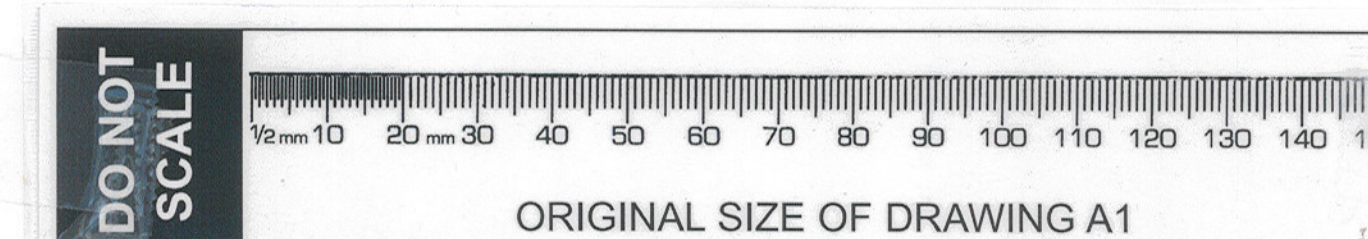
2865 24 DEC 14



SITE PLAN 1:200



LOCATION PLAN 1:1250



B : ROOF PITCH AMENDED TO DWELLING 3/12/2014 AND GARAGE AND LODGE HEIGHT REDUCED ACCORDINGLY
A : CONSTRUCTION NOTES ON GARAGE 21/3/2014 ROOF REDUCED

Project
Proposed dwelling
Heathlands
Heathlands Road
WOKINGHAM
Berks
Client
Mr J Brant

Drawing
PLANS and ELEVATIONS

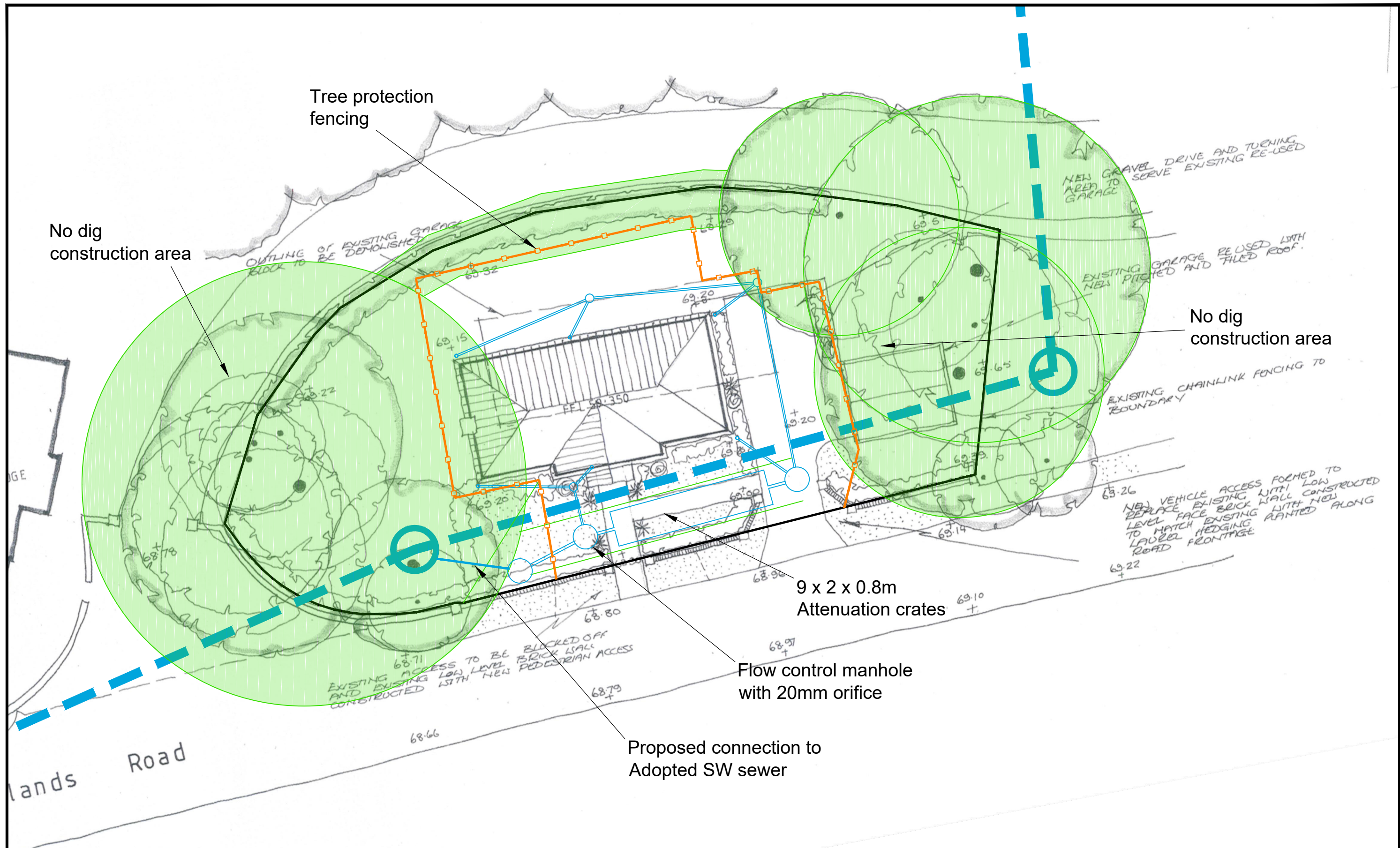
Scale
1:100 at A1
Date
January 2014

The Edwards Irish Partnership LLP
Architects & Surveyors
Suite 8, Market House, 19-21 Market Place, Wokingham, Berks. RG40 1AP
Tel: 0118-989-4403 Fax: 0118-989-4383
E-mail: email@edwardsirish.com

Job 2163 Dwg. 02 B

APPENDIX B

Drawing 231636/DS/01 – Proposed Drainage Strategy



Mr J Brant

Land at Heathlands
Heathlands Road
Proposed Drainage
Strategy

LANMOR Consulting
Civil Engineers & Transport Planning

Thorogood House, 34 Tolworth Close, Surbiton, Surrey, KT6 7EW
Telephone: 0208 339 7899 Fax: 0208 339 7898
E-mail: info@lanmor.co.uk
www.lanmor.co.uk

SCALE 1:200	DRAWN BY KBL	PRJ No. 231636	DWG No. 231636/DS/01 Rev A
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APPENDIX C

MicroDrainage – Calculations

Lanmor Consulting Ltd

Thorogood House
34 Tolworth Close
Surbition Surrey KT6 7EW

Date 22/12/2024 19:08
File Tank.srcx

XP Solutions

Designed by Kunal
Checked by

Source Control 2015.1

Page 1



Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 178 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	67.739	0.439	0.0	0.5	0.5	7.5	O K
30 min Summer	67.861	0.561	0.0	0.6	0.6	9.6	O K
60 min Summer	67.965	0.665	0.0	0.7	0.7	11.4	O K
120 min Summer	68.023	0.723	0.0	0.7	0.7	12.4	O K
180 min Summer	68.029	0.729	0.0	0.7	0.7	12.5	O K
240 min Summer	68.024	0.724	0.0	0.7	0.7	12.4	O K
360 min Summer	68.005	0.705	0.0	0.7	0.7	12.0	O K
480 min Summer	67.979	0.679	0.0	0.7	0.7	11.6	O K
600 min Summer	67.951	0.651	0.0	0.7	0.7	11.1	O K
720 min Summer	67.923	0.623	0.0	0.7	0.7	10.7	O K
960 min Summer	67.871	0.571	0.0	0.6	0.6	9.8	O K
1440 min Summer	67.782	0.482	0.0	0.6	0.6	8.2	O K
2160 min Summer	67.684	0.384	0.0	0.5	0.5	6.6	O K
2880 min Summer	67.614	0.314	0.0	0.5	0.5	5.4	O K
4320 min Summer	67.523	0.223	0.0	0.4	0.4	3.8	O K
5760 min Summer	67.467	0.167	0.0	0.3	0.3	2.9	O K
7200 min Summer	67.431	0.131	0.0	0.3	0.3	2.2	O K
8640 min Summer	67.406	0.106	0.0	0.3	0.3	1.8	O K
10080 min Summer	67.388	0.088	0.0	0.2	0.2	1.5	O K
15 min Winter	67.740	0.440	0.0	0.5	0.5	7.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	138.153	0.0	7.9	18
30 min Summer	90.705	0.0	10.3	33
60 min Summer	56.713	0.0	12.9	62
120 min Summer	34.246	0.0	15.6	120
180 min Summer	25.149	0.0	17.2	148
240 min Summer	20.078	0.0	18.3	180
360 min Summer	14.585	0.0	19.9	246
480 min Summer	11.622	0.0	21.2	316
600 min Summer	9.738	0.0	22.2	384
720 min Summer	8.424	0.0	23.0	452
960 min Summer	6.697	0.0	24.4	586
1440 min Summer	4.839	0.0	26.5	848
2160 min Summer	3.490	0.0	28.6	1216
2880 min Summer	2.766	0.0	30.3	1584
4320 min Summer	1.989	0.0	32.6	2292
5760 min Summer	1.573	0.0	34.4	3008
7200 min Summer	1.311	0.0	35.8	3744
8640 min Summer	1.129	0.0	37.0	4416
10080 min Summer	0.994	0.0	38.1	5144
15 min Winter	138.153	0.0	7.9	18

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.950
Region	England and Wales	Cv (Winter)	0.950
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.024

Time (mins)		Area
From:	To:	(ha)
0	4	0.024

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Model Details Storage is Online Cover Level (m) 69.100 Cellular Storage Structure Invert Level (m) 67.300 Safety Factor 1.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>18.0</td><td>18.0</td><td>0.801</td><td>0.0</td><td>35.6</td></tr><tr><td>0.800</td><td>18.0</td><td>35.6</td><td></td><td></td><td></td></tr></tbody></table> Orifice Outflow Control Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 67.300			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	18.0	18.0	0.801	0.0	35.6	0.800	18.0	35.6			
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)															
0.000	18.0	18.0	0.801	0.0	35.6															
0.800	18.0	35.6																		
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Event: 180 min Winter

