

**NUTRIENT NEUTRAL ASSESSMENT****Report Ref: NNAMS/222**

**Southampton Road,
Alderbury,
SP5 3AG**

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Version	Date	Issued to
Revision R1	October 2024	Simply Planning

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Introduction

Nutrient calculations have been commissioned by Simply Planning to undertake an assessment of the nutrients generated by a proposed development (pre-planning stage) and to develop a mitigation strategy for any residual nutrient load. The site is located on the water divide of two catchments: the River Test to the east and the River Avon to the west. Foul water will discharge to Salisbury (Petersfinger) WwTW in the River Avon catchment and will therefore need to demonstrate phosphorus neutrality. The surface water will discharge to the River Test catchment and will need to demonstrate nitrogen neutrality.

To ensure compliance with the requirements of the Habitats Regulation and Water Framework Directive, new development within both catchments must not, alone or in-combination, result in the non-compliance with the River Avon or the River Test catchment water quality targets or compound existing problems of target exceedance in those parts of the catchments already failing standards. Furthermore, new developments must not prejudice achievement of Conservation Objectives for the River Avon or the River Test catchments over the long-term.

The nutrient load generated by the proposed development has been calculated according to the generic nutrient methodology and a mitigation solution developed to ensure the proposed development is neutral.

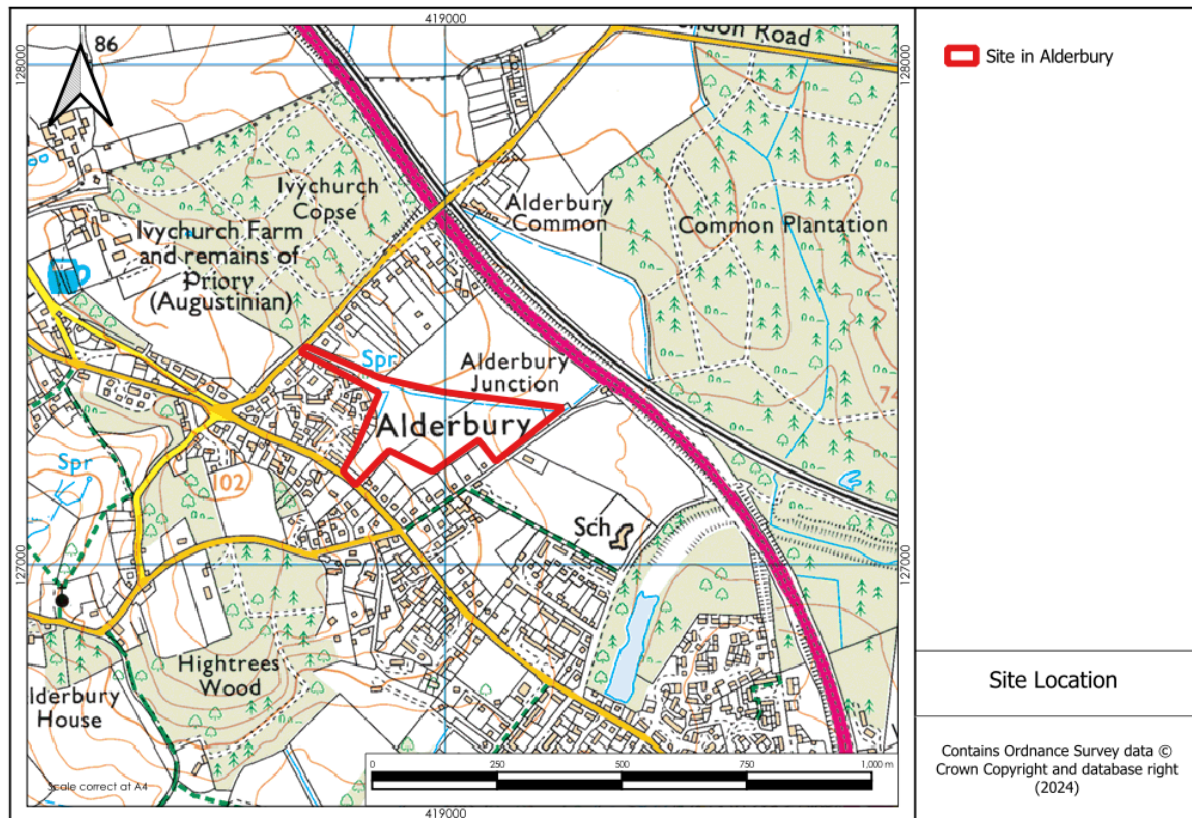
The assessment has been prepared in accordance with the River Avon SAC and the Solent Marine Sites nutrient budget calculators (Natural England and Ricardo).

1 Site characteristics

1.1 Site location

The site is located within the village of Alderbury, some 5.5km south-east of Salisbury. The application area extends to approximately 4.9 hectare (ha). The site currently comprises lowland grazing. (Drawing 1). The proposed development comprises 47 residential dwellings with associated gardens and parking. The site is centred around National Grid Reference (NGR) SU 18976 27270 ([Appendix 1](#)).

Drawing 1: Site location



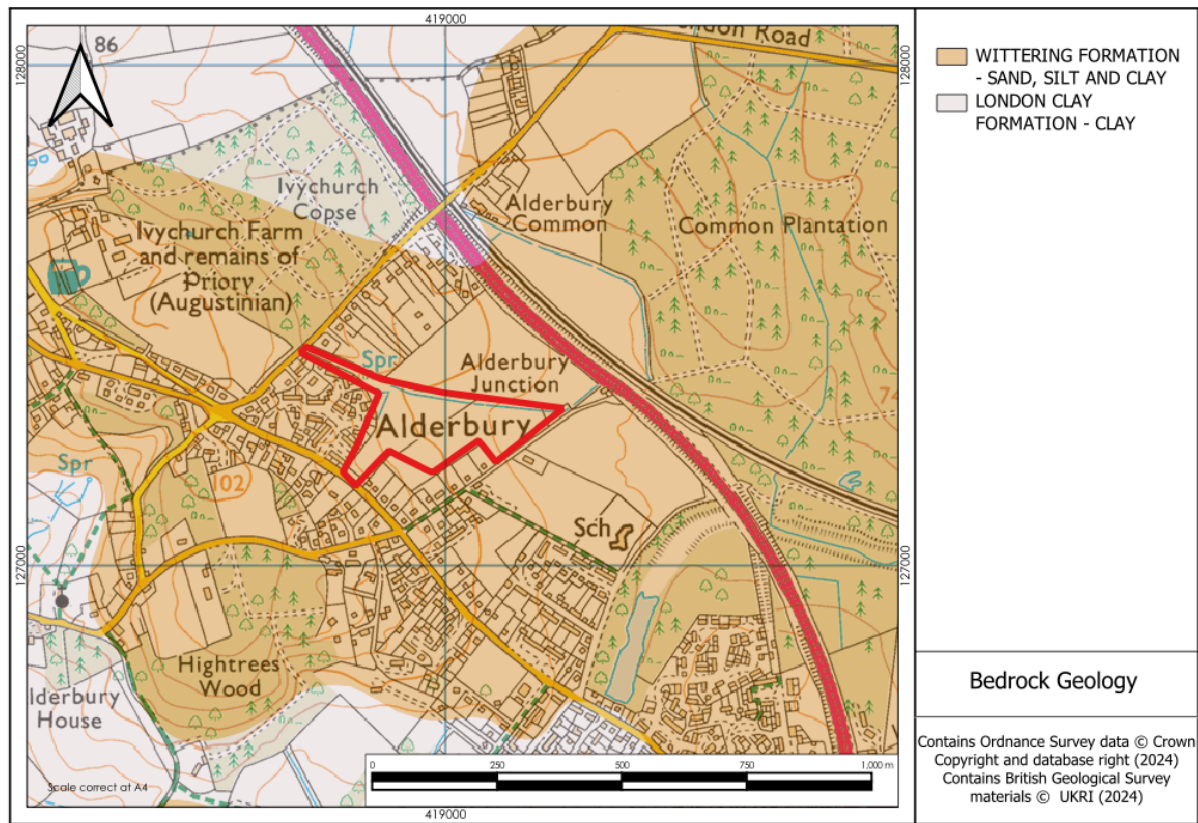
1.2 Topography

The site is located in a gently undulating area. Within the site, elevations decrease gently north-eastwards. Elevations decrease from 80m Above Ordnance Datum (m AOD) in the south-west of the site to 74m AOD in the north-east of the site. Beyond the site, elevations decrease to a local low of 64m AOD some 0.4km north-east of the site. Elevations increase westwards to a local high of 105m AOD some 2.1km west of the site.

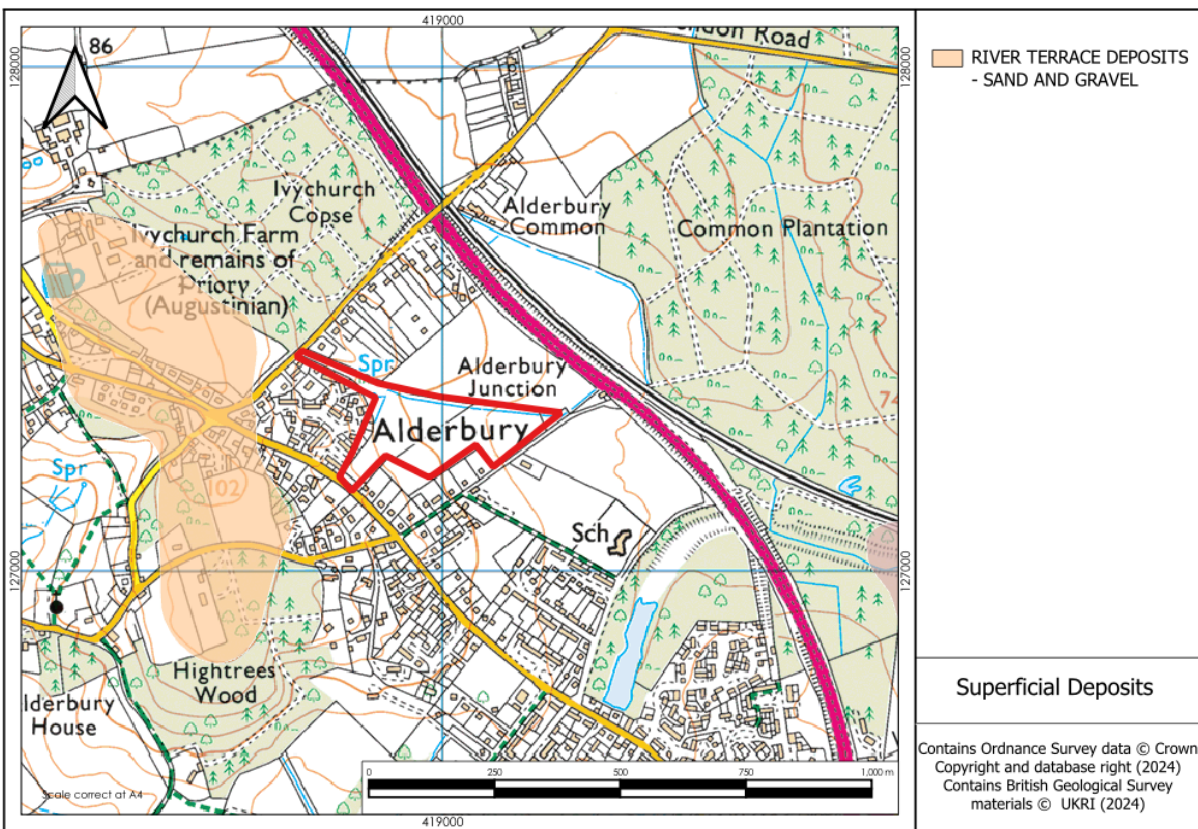
1.3 Geology

The bedrock geology at the site comprises Wittering Formation which is sand, silt and clay. Superficial deposits are absent at the site.

Drawing 2: Bedrock geology



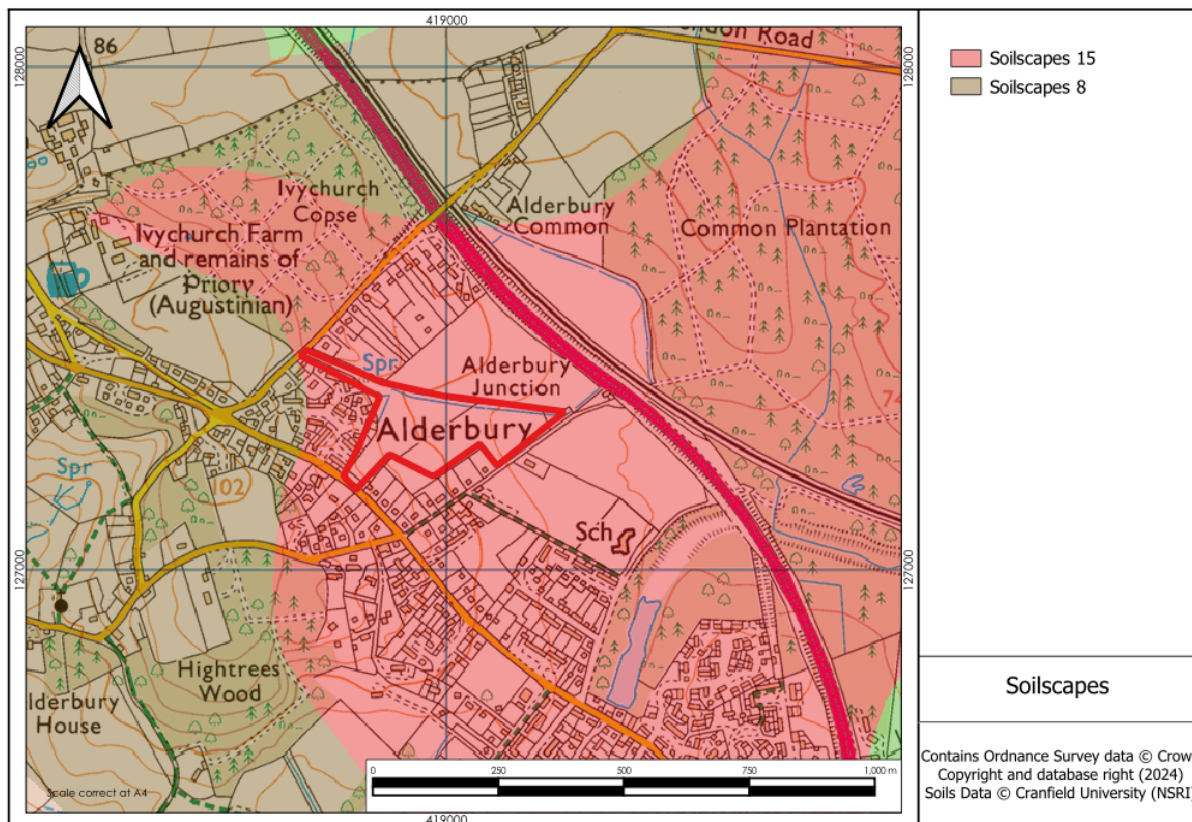
Drawing 3: Superficial deposits



1.4 Soils

Based on the Cranfield University Soilscales webtool (<http://www.landis.org.uk/Soilscales>), the soils at the site are classified as 'Soilscales 15' which are described as naturally wet, very acid, sandy and loamy soils, with impeded drainage.

Drawing 4: Soils at the site



1.5 Hydrology

The site is located on the water divide of two catchments: the River Test to the east and the River Avon to the west. Foul water is discharged to the River Avon. Surface water discharges into the River Test catchment.

The nearest watercourse is located c.450m north-east of the site and is an unnamed tributary of the River Dun. This flows for 1.5km east to its confluence with the River Dun at NGR SU 21179 27130. The River Dun then flows for an additional 12km east and meets its confluence with the River Test at NGR SU 33144 26281.

The site is located in flood zone 1, which means that there is a less than 1 in a 1000-year chance of flooding at the site.

1.6 Hydrogeology

Groundwater vulnerability

The groundwater vulnerability at the site is indicated as high based on local information. This means that this area can easily transmit pollution to groundwater. They are characterised by high-leaching soils and the absence of low-permeability superficial deposits. Sourced by, (<https://magic.defra.gov.uk/magicmap.aspx>).

Source protection zones and nitrate vulnerable zones

The site is not located within a source protection zone or a nitrate vulnerable zone, sourced by (<https://magic.defra.gov.uk/magicmap.aspx>).

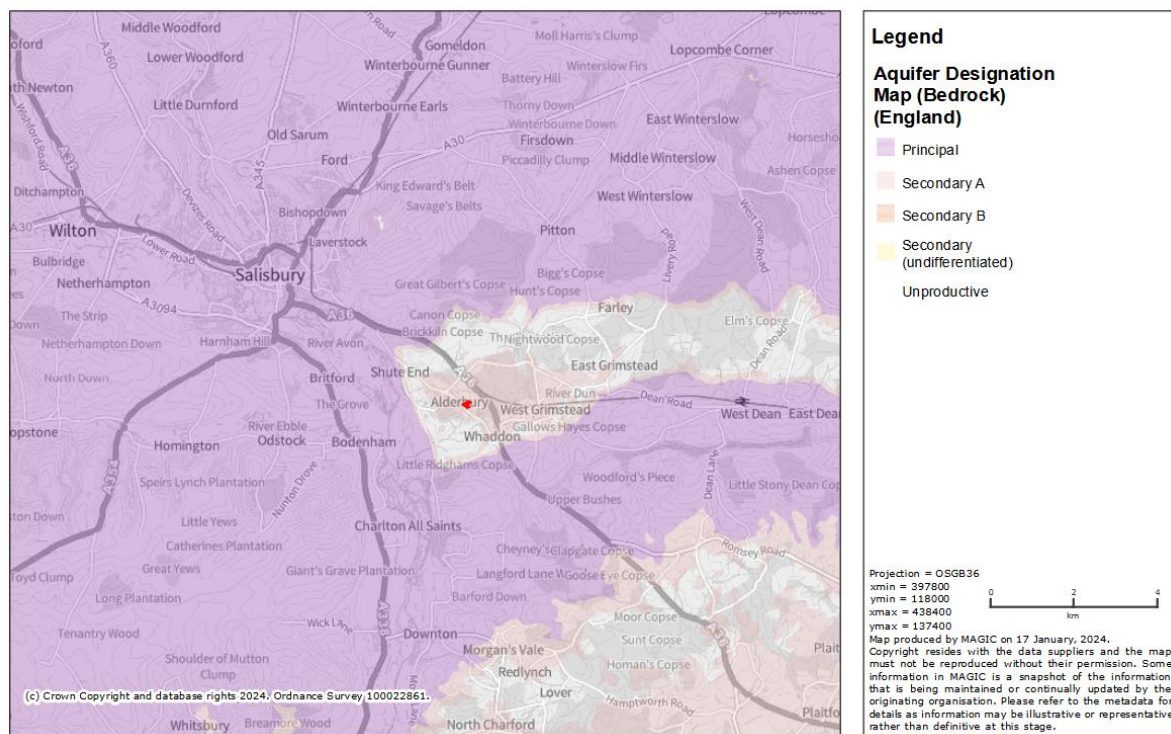
Aquifer Designations

Principal and secondary aquifers provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes, and wetlands. The site is located in a Secondary A aquifer. This comprises permeable layers that can support local water supplies and may form an important source of base flow to rivers. Sourced by, (<https://magic.defra.gov.uk/magicmap.aspx>).

Drawing 5: Aquifer designations

MAGIC

Magic Map



Rainfall

The annual rainfall was sourced from the National River Flow Archive. The site falls in the category of 800.1 – 850 mm/yr. Sourced from (<https://nrfa.ceh.ac.uk/data/search>).

2 Calculation of nutrient export from proposed development

The site is located within the catchment of the River Test, which is nitrogen sensitive. However, wastewater discharges to the catchment of Salisbury (Petersfinger) WwTW, which is located within a phosphorus sensitive area.

Preliminary calculations have been undertaken to assess the likely nutrient export from the site and consider the potential mitigation options.

2.1 Proposed development

The proposed development comprises 47 residential dwellings with associated gardens and parking.

2.2 Calculation of wastewater load

As the site will be discharging to Salisbury (Petersfinger) WwTW, which is in the River Avon catchment, the site will have to mitigate the associated wastewater phosphorus load. This calculation has been undertaken using the River Avon SAC nutrient calculator (Natural England/Ricardo) ([Appendix 2](#)).

The Salisbury (Petersfingers) WwTW currently has a discharge consent limit for phosphorus set at 1 mg/l. The Levelling-Up and Regeneration Act (LURA) requires all sewage treatment works to upgrade to the Technically Achievable Limit (TAL) by 2030. The current phosphorus limit will be reduced to 0.25 mg/l.

Based on an assumed average occupancy rate of 2.4 per dwelling and an average water usage of 120 litres/person/day, the associated annual phosphorus generated by wastewater is **4.45kg TP/yr**.

However, after the TAL upgrade, the associated annual phosphorus generated by wastewater is **1.11 kg TP/yr**.

2.3 Land use change

Calculations regarding land use change have been undertaken as per the Solent Marine Sites nutrient calculator (Natural England/Ricardo) whereby pre- and post-development land use is considered.

The current site comprises approximately 4.9 ha of lowland grazing. This has an associated total nitrogen load of 48.51 kg TN/yr.

The post-development site comprises approximately 4.9 ha residential urban land. This has an associated total nitrogen load of 75.35 kg TN/yr.

Therefore, the total land use net change is **26.84 kg TN/yr**.

3 Summary of nutrient balance for this development

Table 1: Phosphorus budget		
Description	Pre 2030 Value (kg TP/yr)	Post 2030 Value (kg TP/yr)
Wastewater, post-treatment	4.45	1.11
Pre-development land use	-	-
Post-development site loss	-	-
Land use net change	-	-
Nutrient budget	4.45	1.11
20% buffer	1.33	0.22
Nutrient budget + 20% buffer	5.34	1.33

Table 2: Nitrogen budget	
Description	Value (kg TN/yr)
Wastewater, post-treatment	-
Pre-development land use	48.51
Post-development site loss	75.35
Land use net change	26.84
Nutrient budget	26.84
20% buffer	5.37
Nutrient budget + 20% buffer	32.21

The total nutrient budget for the site is **5.34kg TP/yr** pre 2030 and **1.33 kg TP/yr** post 2030, and **32.21 TN/yr**.

4 Mitigation

The proposed mitigation for this site is to upgrade a number of existing septic tanks, which have already been identified by the client, to those with high efficacy nitrogen and phosphorus capture, such as the Graf One2Clean. This is a purely biological system and does not require chemical dosing.

These sewage treatment systems discharge significantly less nutrients into the catchment area than traditional septic tanks. Nutrient credits can be generated through the upgrading of existing septic tank systems. The magnitude of savings per upgrade is calculated and presented in Table 2 below. Full upgrade calculations provided in ([Appendix 3](#)).

Discharge concentrations from the septic tank are based on the default concentrations provided within the generic nutrient budget calculator guidance document (Natural England 2022). The post-upgrade discharge concentrations are based on the Graf manufacturer's certificate ([Appendix 4](#)) which indicates a total phosphorus discharge concentration of 1.6 mg/l and a nitrogen discharge of 7.9 mg/l.

Table 2: Septic tank upgrade benefit		
Item	P Load mg/l	N Load mg/l
Septic Tank	11.6	96.2
Graf One 2 Clean	1.6	7.9
Saving due to upgrade	P export reduction	
Septic tank to Graf One 2 Clean	1.052	9.288

In order to achieve phosphorus neutrality 6 septic tanks would need to be upgraded in the River Avon catchment :

$$6 \times 1.052 = 6.312 \text{ kg TP/yr}$$

In order to achieve nitrogen neutrality 4 septic tanks would need to be upgraded in the River Test Catchment :

$$4 \times 9.288 = 37.152 \text{ kg TN/yr}$$

5 Conclusion

The nutrient budget from the proposed development will be 5.34 kg TP/yr and 32.21 kg TN/yr. This will be mitigated via an upgrade of septic tanks that are within the catchments of the Avon and the River Test.

Upgrading these tanks will provide 6.312 kg TP/yr and 37.152 kg TN/yr. This will provide an additional nutrient credit load of 0.972 kg TP/yr and 4.942 kg TN/yr, which can be used for mitigation in future developments.

Therefore, it can be concluded that this proposed development will not prevent the Conservation Objectives of the River Avon or the River Test.

APPENDIX 222/NNAMS/A1

Site plans and location plans

Notes

To be read in conjunction topographical and arboricultural survey and associated drawings/reports.

KEY

Development boundary

Other land owned by applicant

P5	23-09-2024	Planning issue	SL	SH
P4	16-08-2024	Planning issue	SL	SR
P3	04-07-2024	Red line updated	SL	SH
P2	30-01-2024	Re-issue	SR	SH
P1	08-01-2024	First issue	SL	SH
Rev	Date	notes	Drawn	Chkd

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28 Foundry Street Brighton BN1 4AT
T 01273 645220
www.rhpartnership.co.uk
brighton@rhpartnership.co.uk

Project
Land off Southampton Road
Alderbury

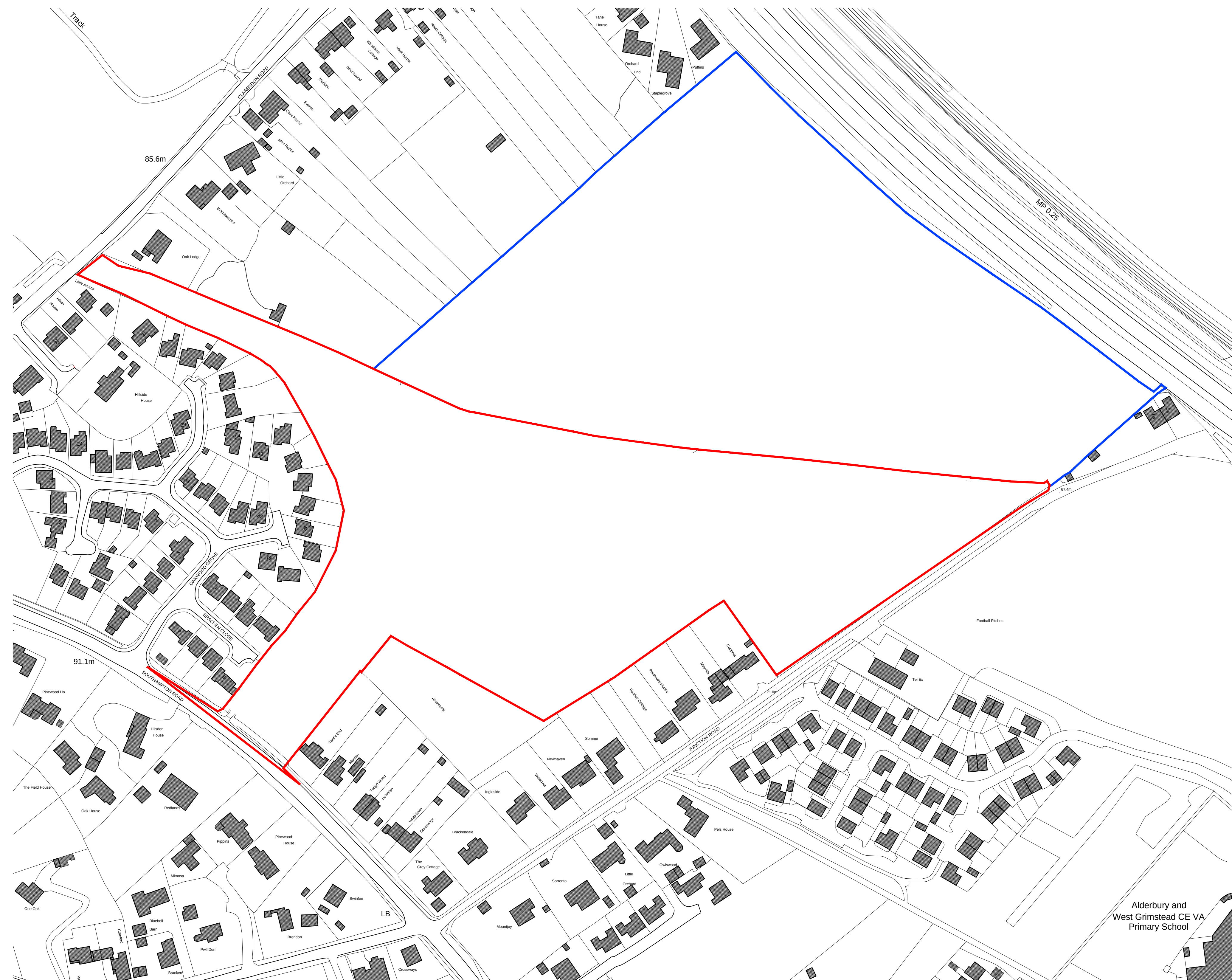
Drawing
Site Location Plan

Project	originator	volume	level	type	role	number	revision
P1365-RHP-ZZ-00-DR-A-1015	P5						
Scale(s) @ A1	RHP Project	Drawn	Chkd				
1:1250	P1365	SR	SH				

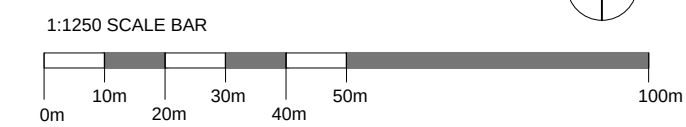
Status
Planning

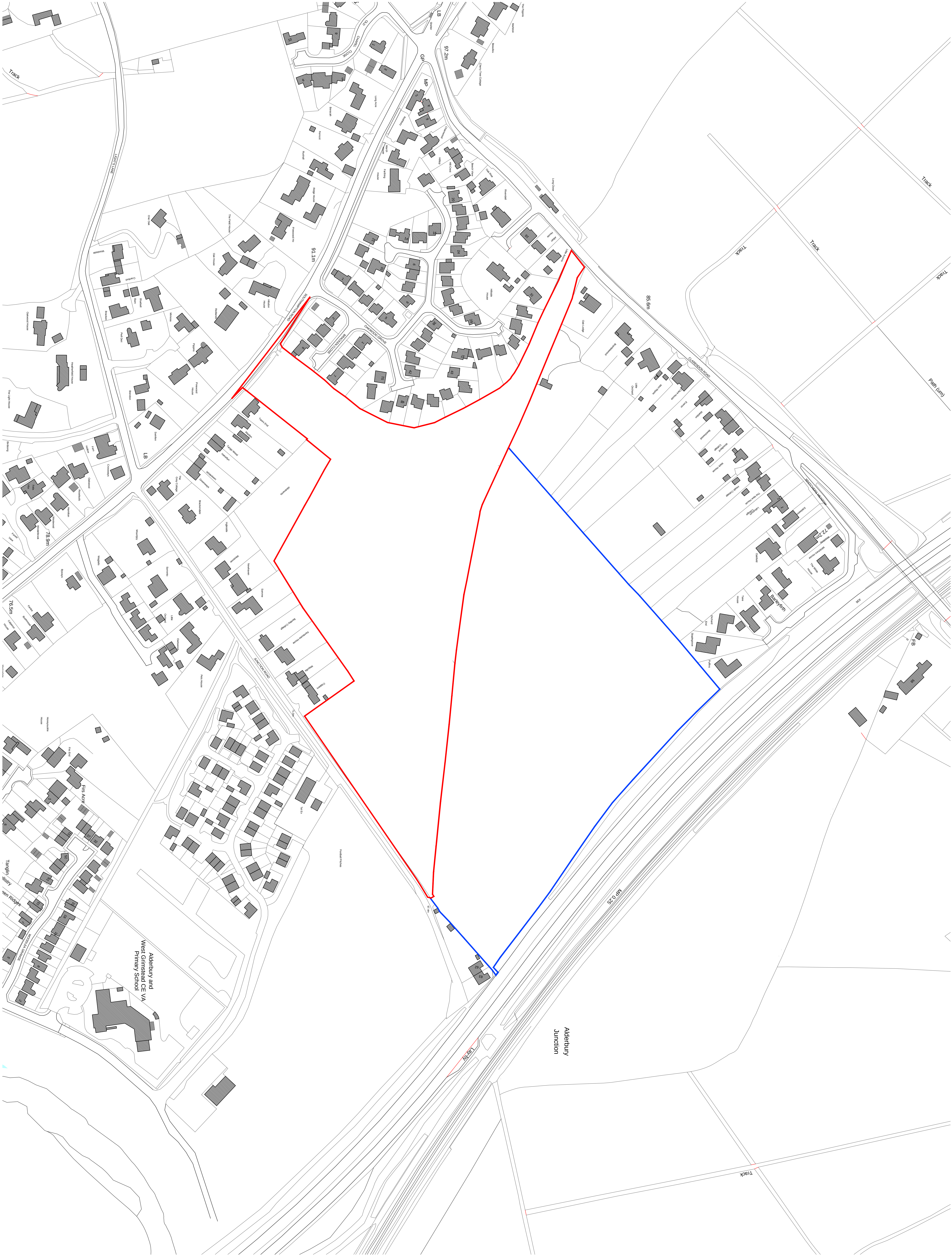
Suitability
S0

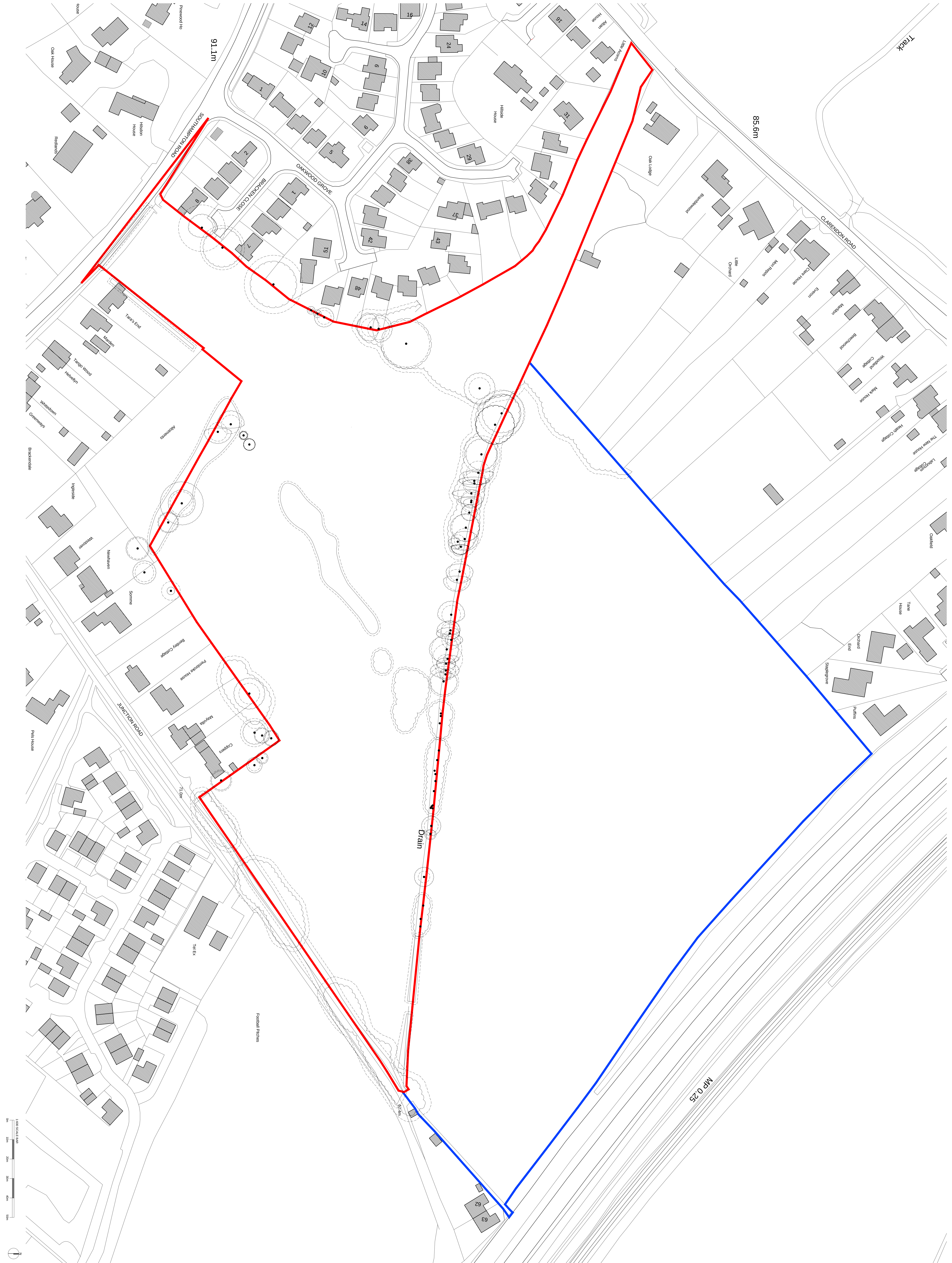
File location: R:\Projects\P1365-P1365 Southampton Road Alderbury\BMA01-WP\Sheet_Plan\1000-1999 Site\drp\P1365-RHP-ZZ-00-DR-A-1015-03 Site Location Plan.dwg Last Plotted: 23/9/2024 12:19PM



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Proposed Dwellings	
25AP Bungalow	4
25AP Dwelling Houses	9
35SP Dwelling Houses	32
45SP Dwelling Houses	2
Total Units	47

P4	24/09/2024	Planning Issue	SL	SH
P3	23/09/2024	Planning Issue	SL	SH
P2	16/08/2024	Planning Issue	SL	SR
P1	08/01/2024	First Issue	SL	SR
Rev		Date + notes	Drawn	Checked

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Project
Land off Southampton Road
Alderbury

Drawing
Indicative Proposed Site Plan

Project	originator	author	level	type	size	number	revision
P1365-RHP-ZZ-00-DR-A-1200	P4						
Scale(s) @ A3	RHP Project		Drawn	Check			
1:500	P1365		SL	SR			
Status	Planning		Suitability		80		

APPENDIX 222/NNAMS/A2**Nutrient calculations****River Avon calculator for wastewater**

Water infrastructure information	
Description of required information	Data entry column - user inputs required
Date of first occupancy (dd/mm/yyyy):	
Average occupancy rate (people/dwelling or people/unit):	2.40
Water usage (litres/person/day):	120
Development proposal (dwellings/units):	47
Wastewater treatment works:	Salisbury (Petersfinger)
Current wastewater treatment works P permit (mg TP/litre):	1.00
Not applicable	Not applicable
Post 2030 WwTW P permit (mg TP/litre):	0.25
Final calculation of nutrient load from wastewater	
Description of values generated	Values generated
Post-2030 wastewater nutrient Loading	
Additional population (people):	112.80
Wastewater by development (litres/day):	13536.00
Annual wastewater TP load (kg TP/yr):	1.11
Pre-2030 wastewater nutrient loading	
Annual wastewater TP load (kg TP/yr):	4.45
Not applicable	
Not applicable	Not applicable

Solent Marine Sites calculator for land use change

APPENDIX 222/NNAMS/A3

Septic Tank Upgrade Calculations

Septic tank current				
Step	Measurement	Value	Unit	Explanation/ info source
Development Proposal	Development Type	1		
Step 1	population	2.4	persons	2.4 CCC
Step 2	Wastewater volume generated	288	litres / day	120 l/p/d
Step 3	Receiving treatment	11.6	mg/l	Septic tank
Step 4	TP discharged after treatment	3340.8	mg/TP/day	Concentration * volume day
Step 5	Convert mg/TP to kg/TP per day	0.003341	kg/TP/day	Divide by 1,000,000
Step 6	\\	1.220227	kg/TP/yr	x 365.25 days
Wastewater total Phosphate load		1.220 kg/TP/yr		

Graf One2Clean				
Step	Measurement	Value	Unit	Explanation/ info source
Development Proposal	Development Type	1		
Step 1	population	2.4	persons	2.4
Step 2	Wastewater volume generated	288	litres / day	120 l/p/d
Step 3	Receiving treatment	1.6	mg/l	One 2 clean
Step 4	TP discharged after treatment	460.8	mg/TP/day	Concentration * volume day
Step 5	Convert mg/TP to kg/TP per day	0.000461	kg/TP/day	Divide by 1,000,000
Step 6	Convert kg/TP per day to kg/ TP per year	0.168307	kg/TP/yr	x 365.25 days
Wastewater total Phosphate load		0.168 kg/TP/yr		
<u>Phosphorus</u>				
ST to Graf one2clean	saving:	1.052		

Nitrogen				
Step	Measurement	Value	Unit	Explanation/ info source
Development Proposal	Development Type	1		
Step 1	population	2.4	persons	2.4 CCC
Step 2	Wastewater volume generated	288	litres / day	120 l/p/d
Step 3	Receiving treatment	96.2	mg/l	Septic tank
Step 4	TN discharged after treatment	27705.6	mg/TN/day	Concentration * volume day
Step 5	Convert mg/TN to kg/TN per day	0.0277056	kg/TN/day	Divide by 1,000,000
Step 6	Convert kg/TN per day to kg/ TN per year	10.1194704	kg/TN/yr	x 365.25 days
Wastewater total Nitrogen load		10.119	kg/TN/yr	

Graf one 2 clean				
Step	Measurement	Value	Unit	Explanation/ info source
Development Proposal	Development Type	1		
Step 1	population	2.4	persons	2.4 CCC
Step 2	Wastewater volume generated	288	litres / day	120 l/p/d
Step 3	Receiving treatment	7.9	mg/l	One 2 clean
Step 4	TN discharged after treatment	2275.2	mg/TN/day	Concentration * volume day
Step 5	Convert mg/TN to kg/TN per day	0.0022752	kg/TN/day	Divide by 1,000,000
Step 6	Convert kg/TN per day to kg/ TN per year	0.8310168	kg/TN/yr	x 365.25 days
Wastewater total Nitrogen load		0.831	kg/TN/yr	
Nitrogen				
ST to Graf one2clean	saving:	9.288		
STD PTP to Grafone2clean	saving:	6.837		

APPENDIX 222/NNAMS/A4

Graf manufacturer's certificate



Prüfinstitut für
Abwassertechnik
GmbH

PERFORMANCE RESULTS

Otto Graf GmbH
 Carl-Zeiss-Str. 2 - 6, 79331 Teningen, Germany
EN 12566-3
 Small wastewater treatment systems for up to 50 PT
Small wastewater treatment system one2clean
 SBR plant in one two-zone polypropylene tank
 Test report PIA2014-216B14.01.e

Nominal organic daily load*	0.27	kg/d	
Nominal hydraulic daily load	0.75	m ³ /d	
Material	polypropylene		
Treatment efficiency (nominal sequences)		Efficiency	Effluent
	COD	94.2 %	43 mg/l
	BOD ₅	98.0 %	7 mg/l
	SS	96.3 %	14 mg/l
	NH ₄ -N**	98.3 %	0.5 mg/l
	N _{tot} **	87.0 %	7.9 mg/l
	P _{tot}	80.2 %	1.6 mg/l
Electrical consumption	0.63	kWh/d	

*at a test influent of ≥ 300 mg/l BOD₅ (mean)
 **determined for temperatures $\geq 12^{\circ}\text{C}$ in the bioreactor

Performance tested by:

PIA – Prüfinstitut für Abwassertechnik GmbH
 (PIA GmbH)
 Hergenrather Weg 30
 52074 Aachen, Germany

This document replaces neither the declaration of performance nor the CE marking.


Notified Body
No.: 1736


Certified according to
ISO 9001:2008


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geprüft - tested - teste
Elmar Lancé November 2014