

Haresfield Farms

Land Adjacent to Pool Farm, Pool Farm, Haresfield, Stonehouse, GL10 3EJ

Flood Risk Assessment and Drainage Strategy

Clive Onions Ltd is complying with Government guidance and continuing to work and support UK business during the Covid-19 crisis and to help enable a speedy return to normal business, when safe to do so. We are working from home and will not visit site, but we are using video conferencing etc to keep in touch and share information.

17th February 2021 V2

This report is based on the instructions given by our client. It is not intended for use by a third party, and no responsibility will be given to any third party.

The consultant has followed accepted procedure in providing the services, but given the residual risk associated with any prediction and the variability which can be experienced in flood conditions, the consultant takes no liability for and gives no warranty against actual flooding of any property (client's or third party) or the consequences of flooding in relation to the performance of the services.

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V1	15.02.21	Haresfield Farms	Email pdf
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1.0 Introduction

1.1.1 Works are proposed at Pool Farm in Haresfield. These works include:

- a) Relocation, reconfiguration and erection of new farm buildings to include the creation of a new farm office, grain stores, agricultural deadstock building and workshop. Alterations to existing vehicular access road and forecourt, the installation of a weighbridge and associated drainage and landscaping
- b) Extension of existing outside storage of unoccupied caravans and motor homes including partial removal of existing landscape bund, the construction of hard-standing and associated drainage and landscaping.

1.1.2 This report describes the works in relation to the relocation of the farm buildings (from Colethrop Farm). A separate report is submitted for the caravan store.

1.1.3 The Environment Agency's (EA) Flood Map for Planning shows the site to be in Flood Zone 1 at low risk of flooding. The EA Surface Water Flooding Map also shows the site to be at very low risk, but the access is shown to experience some surface water flooding, so this risk has been assessed.

1.1.4 This report considers the flood risk impact on the buildings and shows that they will be safe for their 60 year lifetime and do not increase flood risk off site. A sustainable drainage strategy has been described, which meets the highest target in the SuDS hierarchy, relevant for the site.

2.0 Site Location and Setting

2.1.1 The site is located south of Quedgeley at postcode Pool Farm, Haresfield, Stonehouse, Gloucester GL10 3EJ.

2.1.2 The image below shows the area within the farm area which is of interest as the setting for the proposed relocated barns and yard.

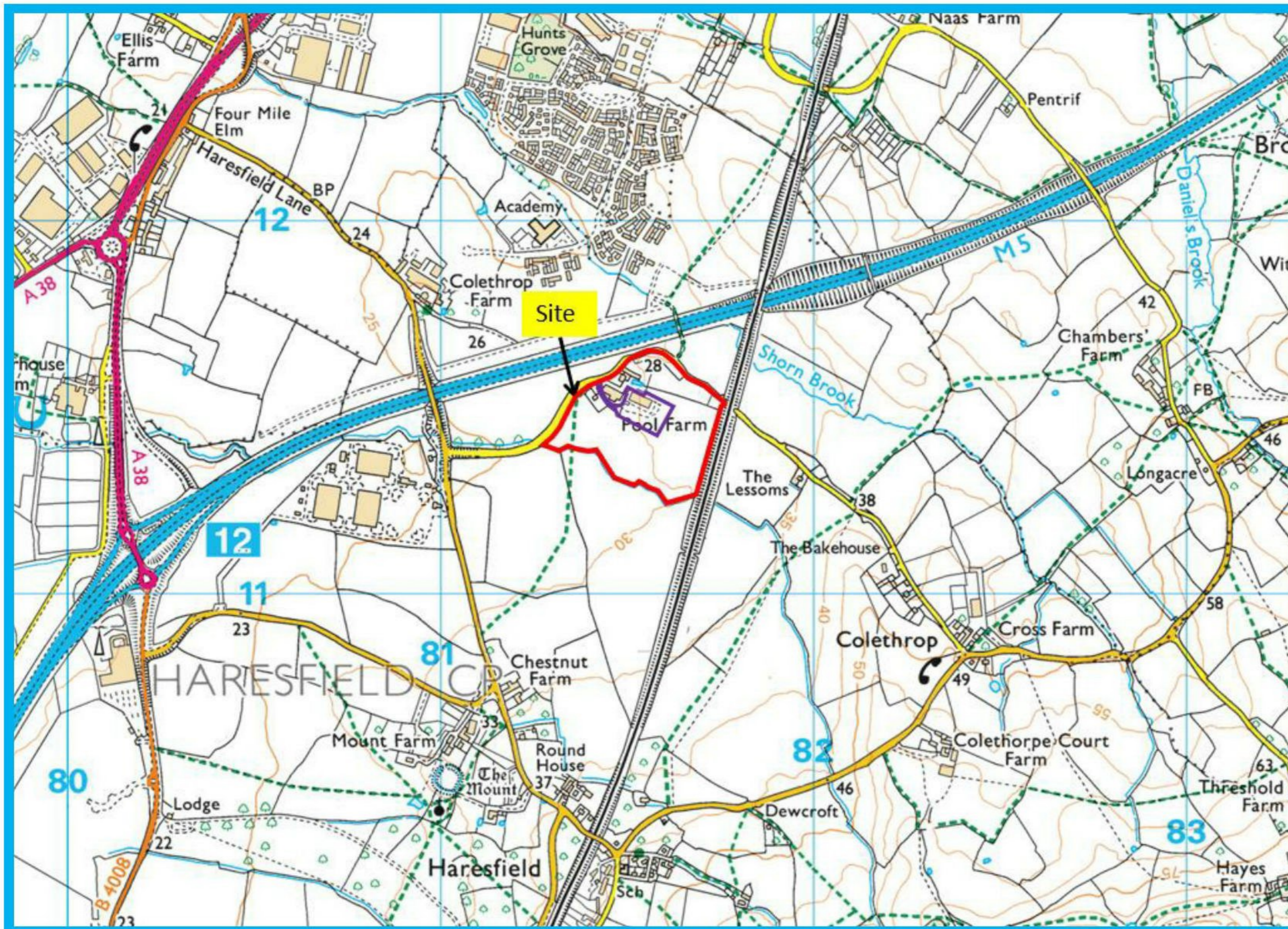


Fig 1 Site location with proposed barn area in purple outline within wider farm area (Streetmap).

2.1.3 The site is located in the following setting:

- Immediately north of the site is Colethrop Lane, beyond which is a field and the M5. Ditches run along both sides of Colethrop Lane, starting just west of the Pool Farm buildings. Northeast of the site is Shorn Brook.
- The eastern edge of the site is bound by the railway line, beyond which is farmland. A watercourse runs along the southern half of the eastern boundary. This continues along the southern boundary of the site leading westwards.
- The watercourse flows east to west along the southern boundary of the site into the ditch along Colethrop Lane to the west of the site and then under the M5 in the vicinity of Junction 12. The predominant land use east and south of the site is farmland.

2.1.4 The site can therefore be described as being situated in a rural area on land falling to the west.



Fig 2 Satellite view of site and surrounding area (Google Earth).

3.0 Existing Development and Ground Conditions

- 3.1.1 The site is irregular in shape and is approximately 400m north-south and 410m east-west with a total approximate area of 11.23ha.
- 3.1.2 The land is shown to have a generally uniform fall of about 1 in 90 from northeast to southwest according to the Ordnance Survey map and Google maps.
- 3.1.3 In the northwest of the site are existing farm buildings used for storage and an office for managing the farm. The northern area of the farm, and south of an area of woodland, is used for caravan storage (which post-dates the Google image).



Fig 3 Satellite view of site (Google Earth).

- 3.1.4 The existing site drains into the watercourse south of the site. The buildings and hardstanding area drains into a 300mm diameter underground pipe which flows unattenuated to the watercourse.
- 3.1.5 The existing caravan store drains into a pond north of the buildings which discharges into a roadside pipe and along Colethrop Lane via roadside pipes and open roadside ditches, and also flows into the watercourse south of the site. This is independent of the farm buildings drainage.
- 3.1.6 The watercourse dimensions have been given generally as 1.5m deep, 1m wide at the base and 2m wide at the top of the bank.

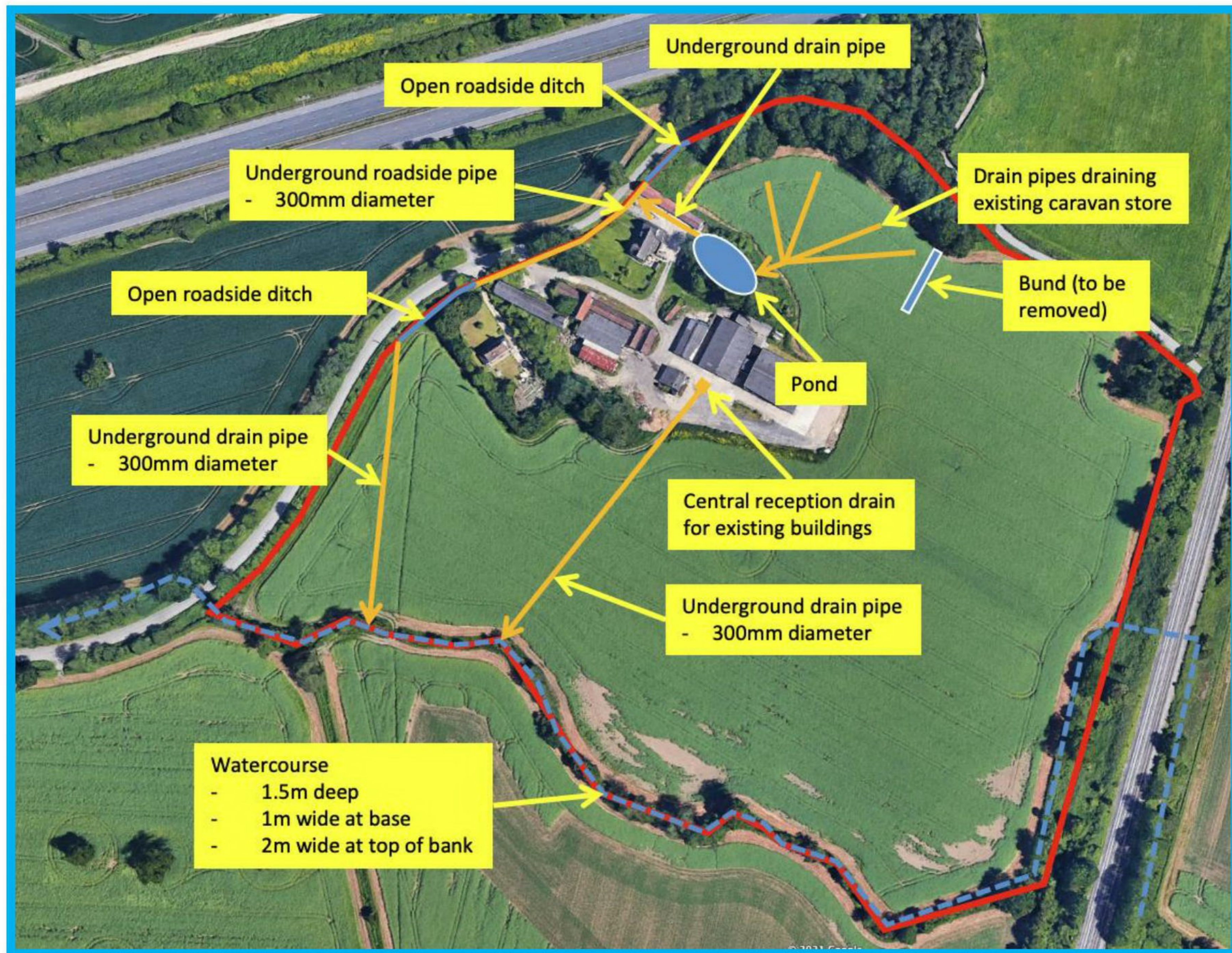


Fig 4 Existing site drainage annotated on Google Earth satellite image.

3.1.7 The British Geology Survey shows the geology to be mudstone bedrock. The Cranfield Soilscape Viewer shows the soils to be clayey and some loamy with slightly impeded drainage.

4.0 Proposed Development

4.1.1 The project involves the relocation, reconfiguration and erection of new farm buildings to include the creation of a new farm office, grain stores, agricultural deadstock building and workshop. Alterations to existing vehicular access road and forecourt, the installation of a weighbridge and associated drainage and landscaping are also included. The farm buildings will be relocated from Colethrop Farm.

4.1.2 The works will be integrated into the existing farmyard to create a well organised and comprehensive facility.

4.1.3 The proposals include an attenuation pond which will manage the existing and proposed runoff in a comprehensive and sustainable solution.

4.1.4 The proposed site is Less Vulnerable as the site is for agricultural buildings.

4.1.5 The proposed comprehensive site has a measured impermeable area of 13,608m².

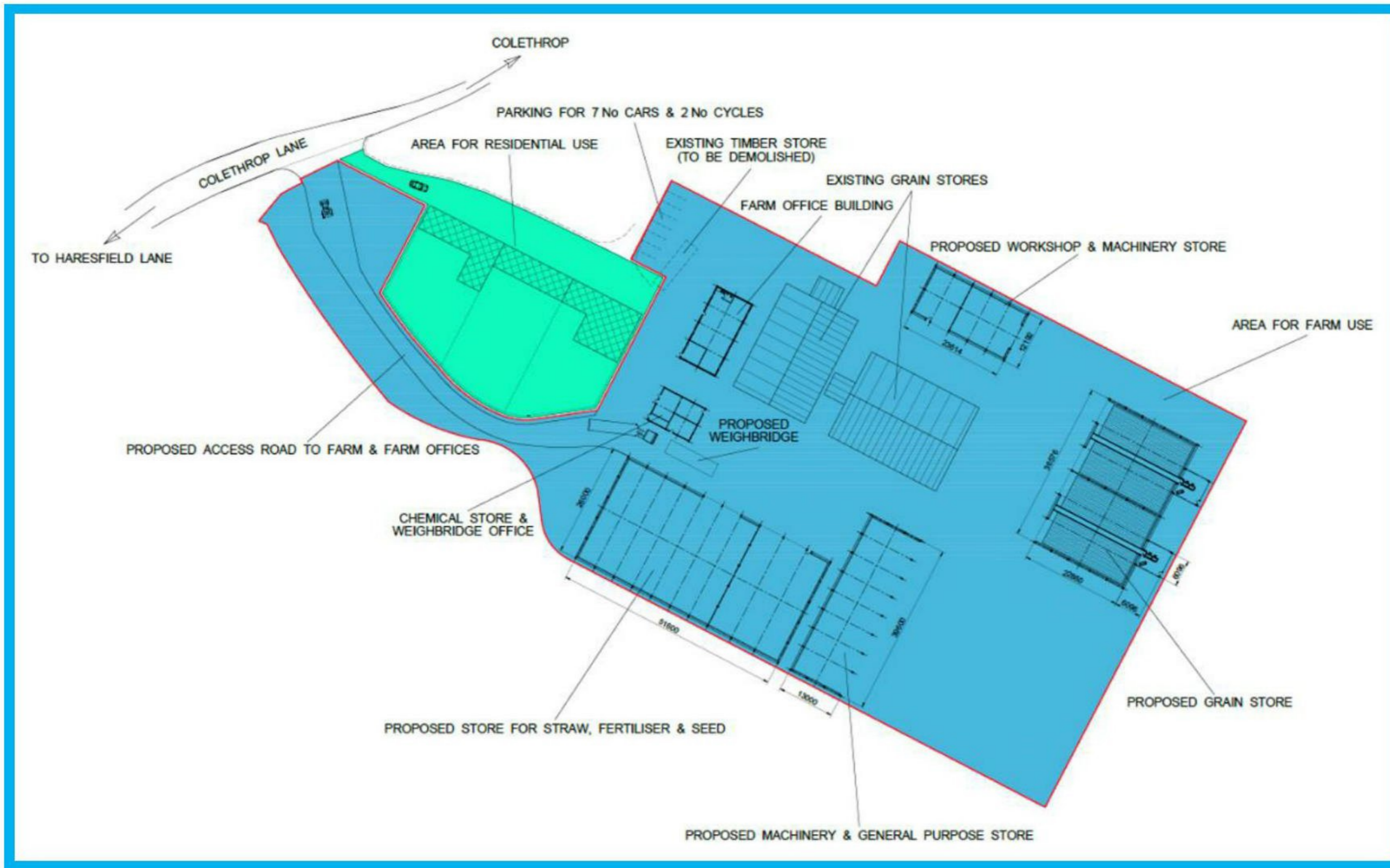


Fig 5 Proposed site plan.

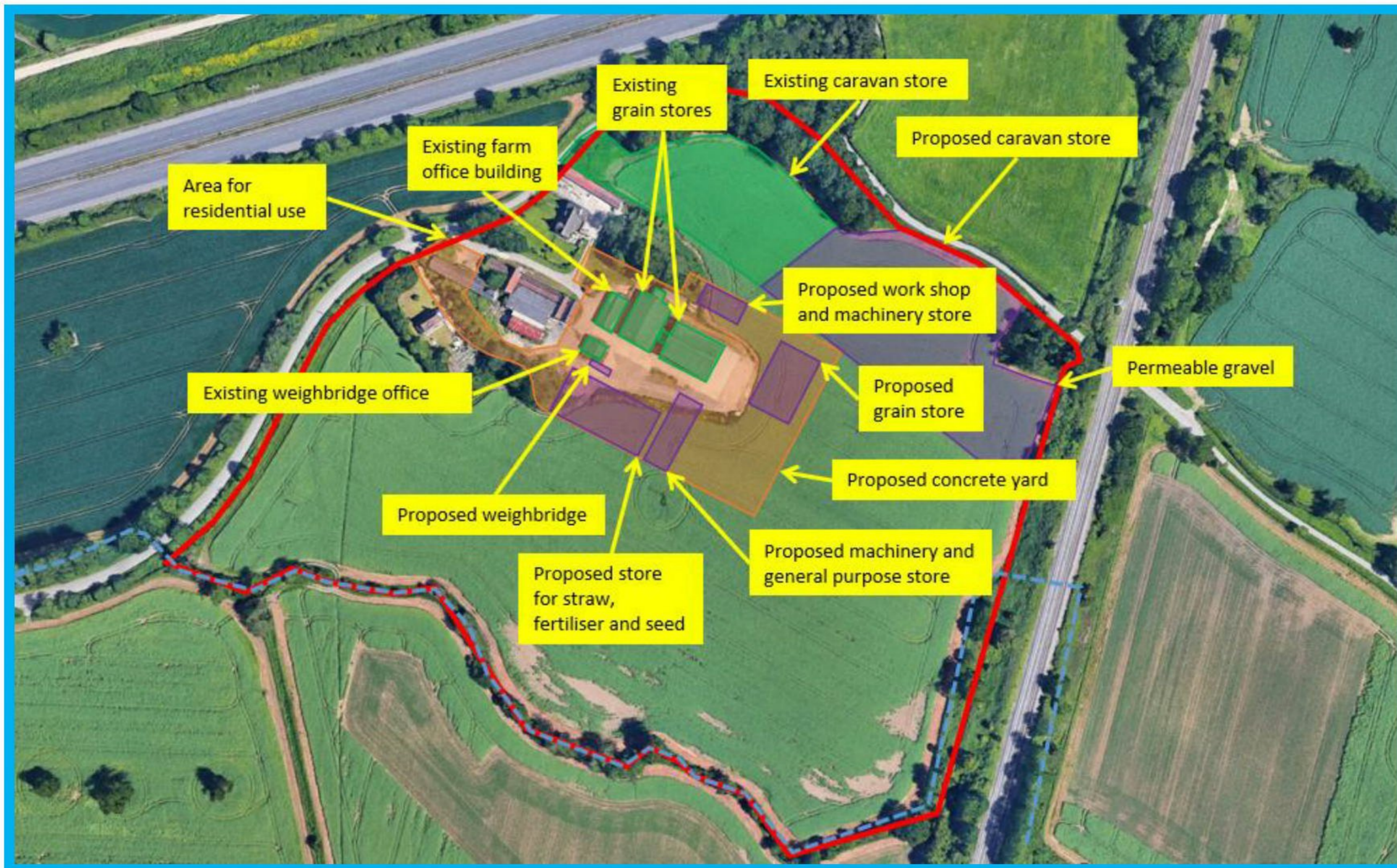


Fig 6 Proposed site plan superimposed on Google Earth satellite image.

5.0 Flood Risk

5.1 Fluvial/Tidal Flooding

- 5.1.1 The EA Flood Map for Planning shows the site to be in Flood Zone 1 at low risk of flooding (land having less than 0.1% annual exceedance probability of river or sea flooding).

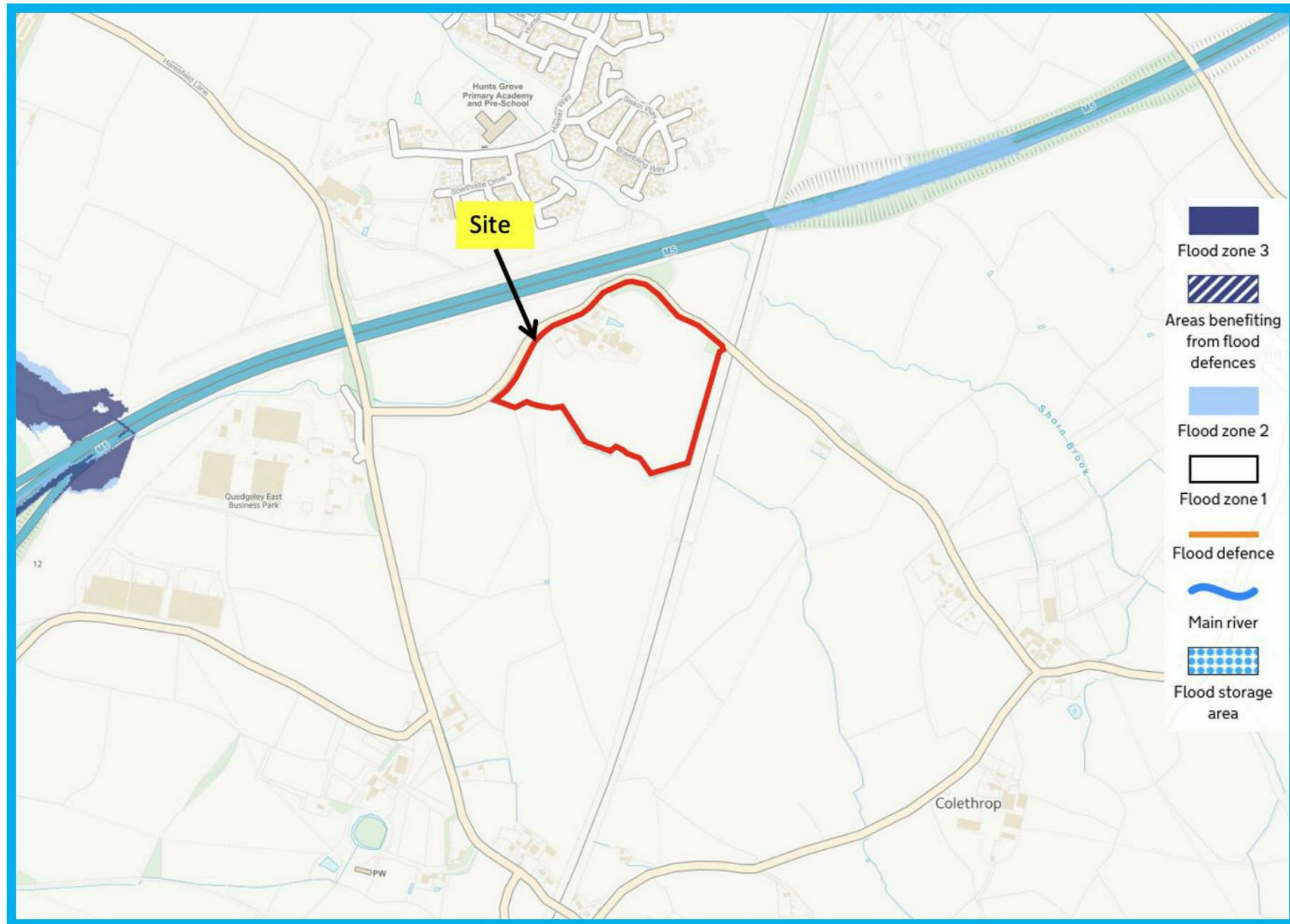


Fig 7 EA Flood Map for Planning.

- 5.1.2 All development is considered appropriate in Flood Zone 1.

5.2 Surface Water Flooding

- 5.2.1 The EA Surface Water Flooding Map shows the farm buildings site to be at very low risk of flooding. The farm pond is shown on the maps.
- 5.2.2 Flooding is shown along the watercourse corridor, but this will not affect the farm buildings which are on land significantly higher, with a small area along the eastern boundary at low risk and the southern boundary along the watercourse to be at low to high risk of surface water flooding. The area of proposed development is at very low risk.



Fig 8 EA Surface Water Flooding Map.



Fig 9 EA Surface Water Flooding Map – Medium Risk Scenario (1 in 100 year event).

5.3 Other Sources of Flooding

5.3.1 The EA Reservoir Flooding Map shows the site to not be at risk of flooding from reservoirs.



Fig 10 EA Reservoir Flooding Map.

5.3.2 No other sources of flood risk have been identified.

6.0 Policy

6.1.1 Flood Policy relates to the protection of people and property. The National Planning Policy Framework (NPPF) and its Planning Practice Guidance (PPG) give guidance on flood risk and steer development away from areas at risk of flooding.

6.1.2 The site is in EA Flood Zone 1 according to the EA Flood Map for Planning. All development is considered appropriate in Flood Zone 1.

6.1.3 The proposal therefore complies with the guidance in the NPPF.

7.0 Surface Water Drainage

7.1.1 The existing drainage system will be traced, surveyed, cleaned and recorded.

7.1.2 The parts of the existing system which can be retained and utilised will be adapted to a new system, to produce a sustainable and efficient gravity system designed for the flows.

- 7.1.3 The rainwater pipes and gulleys serving the yard and entrance road will include traps for easy inspection and removal of debris.
- 7.1.4 The runoff will be directed into a vegetated attenuation pond which will also provide an amenity for the farm in terms of planting and its shape – it is not anticipated as a ‘wet’ pond, but could have damp areas in the base to enhance biodiversity.
- 7.1.5 For the existing impermeable area of Pool Farm (4,737m²) the 1 in 2 year runoff in a 15 minute storm is 35 l/s (see Appendix 1). The proposed outflow will be 60% of this, to allow for 40% climate change. The proposed design outflow will therefore be 21 l/s.
- 7.1.6 The yard, barns and access road will have an impermeable area of 13,608m². This will be managed by the reduced existing runoff rate of 21 l/s, thus making a net zero change in runoff rate from the new impermeable areas.
- 7.1.7 This represents significant betterment over the existing runoff rate, and zero runoff rate from the proposed development.
- 7.1.8 Based on the full impermeable area and a 1 in 100 year event with 40% increase in runoff due to climate change allowance, the required storage has been calculated at 877m³ (see Appendix 2).
- 7.1.9 The attenuation pond is proposed with 1 in 3 side slopes for safety and will have a function depth of 1m, plus 300mm freeboard. The estimated pond measurements are:
- Base = 37 x 19m
 - Mid = 40m x 22m
 - Top water level (TWL) = 43m x 25m
 - TWL + 300mm freeboard = 44m x 26m
 - **Storage provided = 880m³**
- 7.1.10 The pond will be surveyed upon completion to ensure the necessary volume is provided.
- 7.1.11 There will be a fall from the base of the pond to the inlet into the watercourse, which in turn will be above the normal water level of the watercourse.

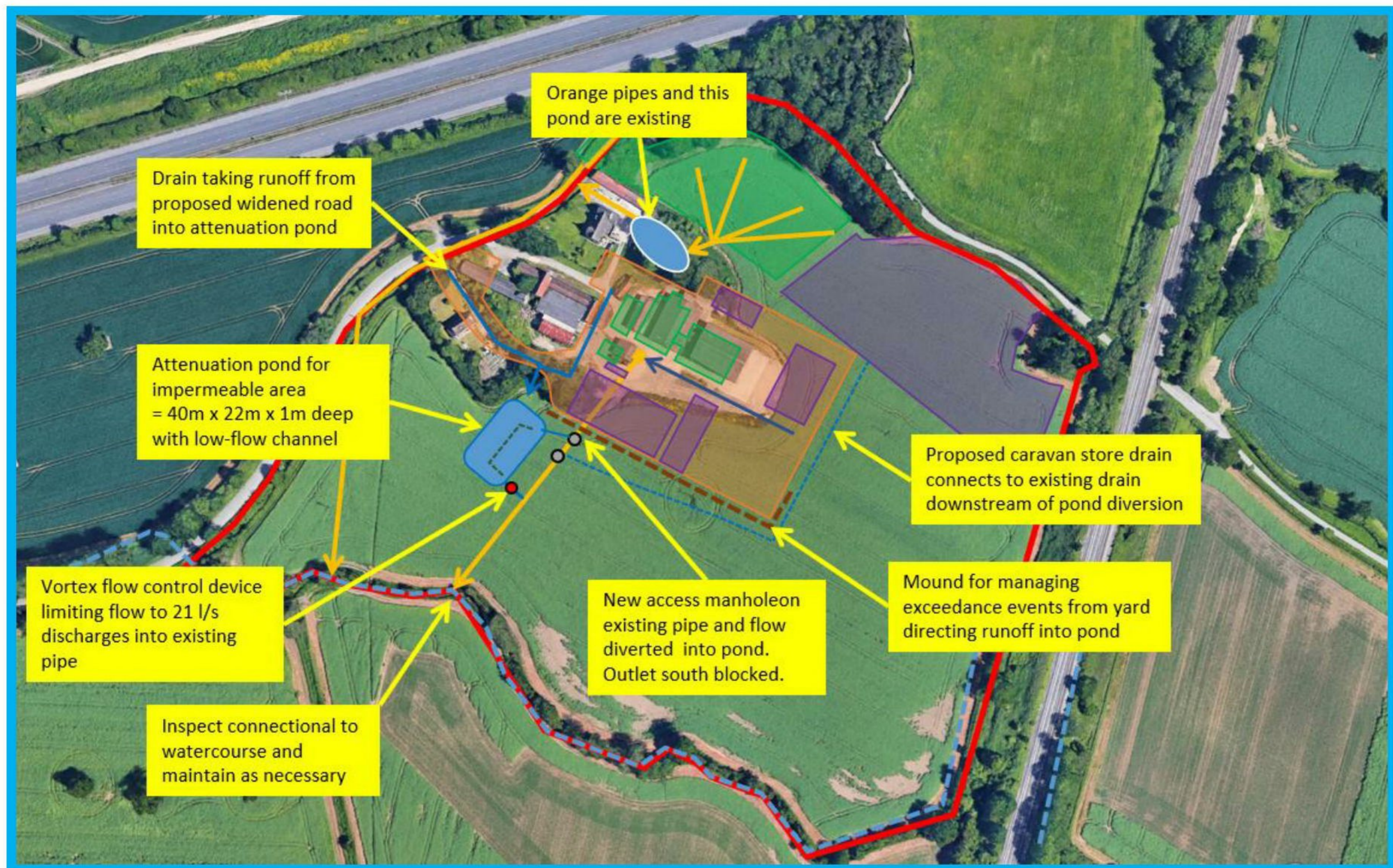


Fig 11 Proposed indicative drainage layout.

- 7.1.12 The pond will incorporate allow-flow channel to improve runoff quality and the pond will encourage infiltration and evapotranspiration in addition to improving biodiversity.
- 7.1.13 A shallow mound is proposed south of the yard to channel exceedance events (i.e. if the yard floods) directly into the attenuation pond. This will use some of the earth removed during the construction of the pond and yard, so reduces the transportation.
- 7.1.14 The pond will be designed to integrate with the landscape and constraints (to be less 'engineered') and be planted appropriately.

8.0 Safe Escape

- 8.1.1 Site access and egress is not inhibited by fluvial or tidal flooding.
- 8.1.2 Colethrop Lane east of the site is shown to experience a short area of shallow flooding, less than 300mm deep, in the Medium Risk Scenario, adjacent the railway. This provides a safe route to and from the site during times of local heavy rainfall.
- 8.1.3 It is unlikely that this will affect farm machinery access to the site, if they are to be travelling during periods of intense rainfall.

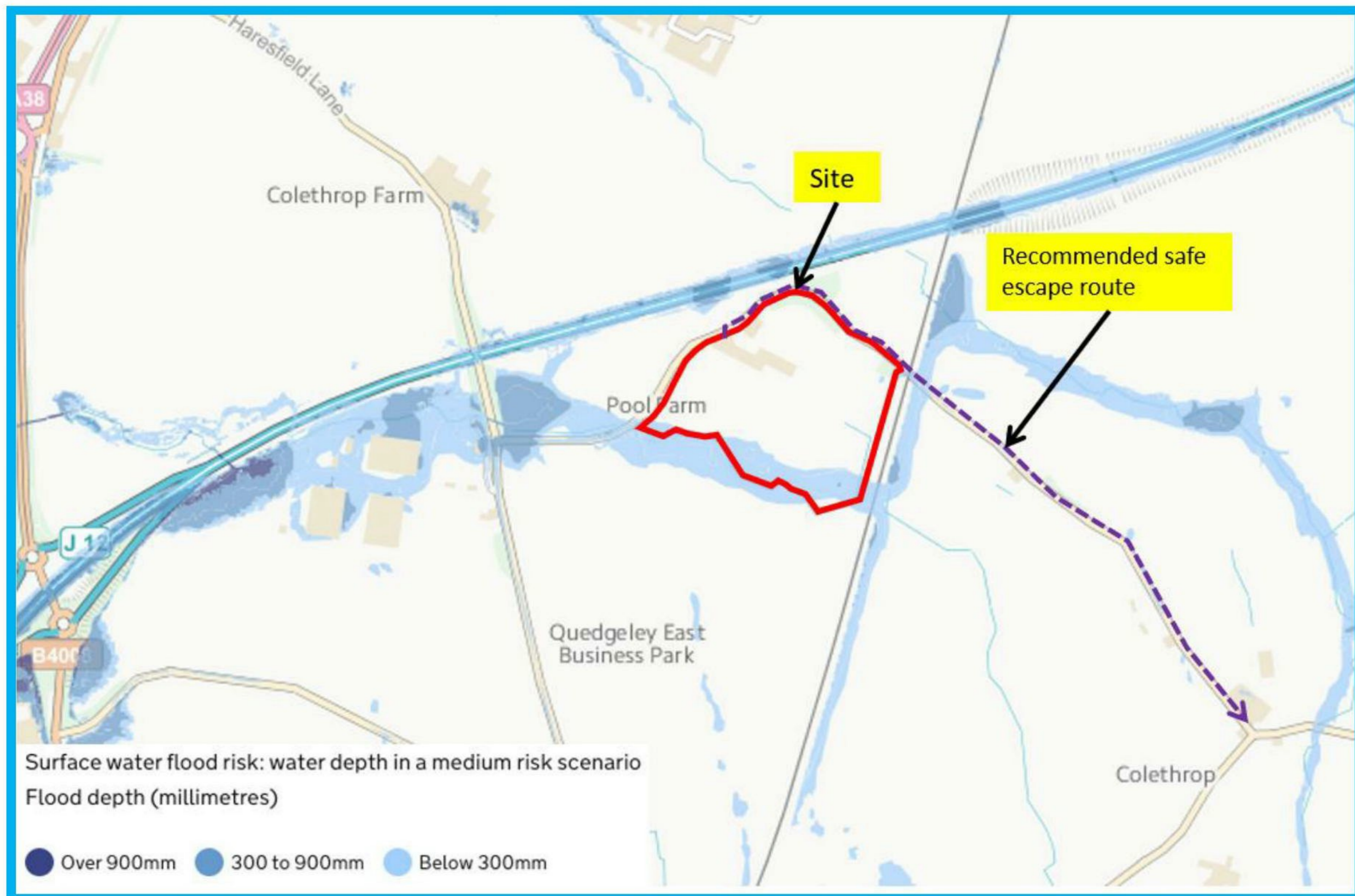


Fig 12 Safe escape annotated on EA Surface Water Flooding Map – Medium Risk Scenario (1 in 100 year event).

8.1.4 However, most of the site is shown to not be at risk of surface water flooding, so safe escape is unlikely to be needed.

9.0 Management and Maintenance

9.1.1 The farm Estate Manger will be responsible for the maintenance of the drainage and other common areas of the proposed development.

9.1.2 The farm yard should be kept free of general debris including wind blown debris and kept tidy.

9.1.3 Gratings and gulleys should be inspected routinely to ensure they are not blocked.

9.1.4 Traps and catchpits should be inspected annually and as necessary and cleared of debris.

9.1.5 The attenuation pond should be inspected in the spring and autumn to ensure the inlet and outlet areas are visible and clear of debris, and that the pond vegetation is managed and is not hindering the intended operation of the pond.

9.1.6 The low flow channel should be inspected and debris removed to ensure it operates as intended and at low risk of causing blockage in the flow control device and offsite pipe.

10.0 Conclusions and Recommendations

- 10.1.1 It is proposed to relocate, reconfigure and erect new farm buildings to include the creation of a new farm office, grain stores, agricultural deadstock building and workshop. Alterations to existing vehicular access road and forecourt, the installation of a weighbridge and associated drainage and landscaping are also included.
- 10.1.2 The site is shown to be in Flood Zone 1 according to the EA Flood Map for Planning. All forms of development are considered appropriate in Flood Zone 1.
- 10.1.3 The EA Surface Water Flooding Map shows the site to be at very low risk of surface water flooding.
- 10.1.4 It is proposed to clean and record the existing drainage system and utilise where practical in combination with new drainage to deliver a sustainable and efficient gravity system.
- 10.1.5 The system will include traps to allow easy inspection and debris removal.
- 10.1.6 A sustainable drainage strategy is proposed to manage runoff from the site comprising an attenuation pond discharging into the existing system at a controlled rate.
- 10.1.7 The controlled rate reduces the existing runoff to compensate for climate change and there will be zero increase in rate due to the increased impermeable area (ie less than greenfield runoff).
- 10.1.8 This system will provide a sustainable system, with less risk of flooding downstream and will enhance biodiversity and amenity.
- 10.1.9 The management and maintenance is described to ensure that the site can be operated safely for its lifetime.
- 10.1.10 A detailed inspection and design will be required to meet the relevant regulations etc.
- 10.1.11 Land Drainage Consent is not expected to be required because there is no new works within 8m of existing watercourses.
- 10.1.12 The proposed development will therefore meet the guidance in the NPPF and PPG.

Appendix 1 Existing Runoff Calculation Sheet

Project Title		Pool Farm, Haresfield		clive onions consulting civil engineer			
Project Number		20235					
Previous Site Runoff Rates							
Impermeable Area Draining to System		4737 m ²					
Runoff Coefficient		0.9					
Duration (hrs)	100 year depth (mm)	100 year runoff (l/s)	30 year depth (mm)	30 year runoff (l/s)	2 year depth (mm)	2 year runoff (l/s)	
0.25	26.25	124.3	19.5	92.18	7.4	35.05	
0.5	35.25	83.49	25.9	68.16	9.7	22.97	
0.75	41.07	64.85	30.0	52.58	11.1	17.53	
1	45.37	53.7	33.1	43.49	12.2	14.45	
2	54.60	32.33	40.1	26.37	16.4	9.71	
3	60.62	23.93	44.8	19.64	19.1	7.56	
4	65.15	19.29	48.4	15.91	21.2	6.28	
6	71.77	14.2	53.8	11.81	24.4	4.81	
8	76.61	11.34	57.9	9.53	26.7	3.95	
10	80.41	9.52	61.2	8.05	28.5	3.38	
12	83.52	8.24	63.9	7.01	30.1	2.97	
16	88.40	6.54	68.3	5.62	32.7	2.42	
20	92.08	5.45	71.7	4.72	34.8	2.06	
24	95.01	4.69	74.4	4.08	36.6	1.80	
32	99.55	3.68	78.8	3.24	39.5	1.46	
40	103.04	3.05	82.2	2.70	42.0	1.24	
48	105.89	2.61	85.1	2.33	44.3	1.09	
96	116.94	1.44	97.0	1.33	54.6	0.67	
FEH EXPORT DATA							
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Design rainfall	Calculation type=	For a point					
For a point	Calculation mode=	Point					
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Version :	V1	Created :	HB	Checked :	CO		
Comments :	-	Date :	11.02.21	Date :	11.02.21		

Appendix 2 Storage Calculation Sheet

Project Title		Pool Farm, Haresfield		clive onions consulting civil engineer			
Project Number		20235					
Required Volume Calculation							
Assumed outflow		21 l/s					
Impemeable Area Draining to System		13608 m ²					
Climate Change Factor		40 %					
Runoff Coefficient		0.95					
Duration (hrs)	100 year depth (mm)	100 year + 40% (mm)	Intensity (mm/h)	Inflow (l/s)	Outflow (l/s)	Balance	
						Flow (l/s)	Storage (m ³)
0.25	26.25	36.8	147.0	527.9	21	506.9	456.19
0.5	35.25	49.4	98.7	354.4	21	333.4	600.18
0.75	41.07	57.5	76.7	275.3	21	254.3	686.61
1	45.37	63.5	63.5	228.1	21	207.1	745.54
2	54.60	76.4	38.2	137.2	21	116.2	836.99
3	60.62	84.9	28.3	101.6	21.0	80.6	870.34
4	65.15	91.2	22.8	81.9	21	60.9	876.73
6	71.77	100.5	16.7	60.1	21	39.1	845.34
8	76.61	107.3	13.4	48.1	21	27.1	781.74
10	80.41	112.6	11.3	40.4	21	19.4	699.31
12	83.52	116.9	9.7	35.0	21	14.0	604.40
15	88.40	123.8	7.7	27.8	21	6.8	390.32
20	92.08	128.9	6.4	23.1	21	2.1	154.52
24	95.01	133.0	5.5	19.9	21	-1.1	None
32	99.55	139.4	4.4	15.6	21	-5.4	None
40	103.04	144.3	3.6	13.0	21	-8.0	None
48	105.89	148.2	3.1	11.1	21	-9.9	None
96	116.94	163.7	1.7	6.1	21	-14.9	None
FEH EXPORT DATA							
FEH Web Service (2.0.0.0)	VERSION	Version	1.0.0				
FEH 2013	Parameters		FEH 2013				
Design rainfall	Rainfall model=		Design rainfall				
For a point	Calculation type=		For a point				
Point	Calculation mode=		Point				
	Calculation location=		North Bristol				
Version :	V1	Created :	HB	Checked :	CO		
Comments :	-	Date :	10.02.21	Date :	10.02.21		