Keystone
Design Associates Ltd.

DRAINAGE STRATEGY

LAND ADJACENT MARSH VIEW, SHARD LANE, HAMBLETON

August 2023

Development House
261 Church Street
Blackpool
FY1 3PB
Tel: 01253 649040
Fax: 01253 752901
Email: info@keystonedesign.co.uk

DOCUMENT ISSUE RECORD

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Full	August 2023	Issued for action

LAND ADJACENT MARSH VIEW, SHARD LANE, HAMBLETON

Report Approved by D.W.Hadwin B.Eng(Hons) C.Eng MICE
For Keystone Design Associates

Signature.....

Date.....24th August 2023.....

CONTENTS

1.0 INTRODUCTION

1.01 It is proposed to develop the existing site to accommodate six glamping pods with car parking.

1.02 The works for the development would comprise of the erection of the glamping pods and installation of the new infrastructure, including landscaping, of which the drainage would be material. This report discusses the proposed strategy for the disposal of both foul and surface water.

1.03 This report is intended to provide supporting information for the consent of planning permission.

2.0 DESCRIPTION OF DEVELOPMENT

2.01 The site is currently vacant land adjacent to Marsh View, Shard Lane, Hambleton. The proposed glamping pods are to be constructed across the east of site.

2.02 The proposal is for the development of the site to provide six glamping pods with car parking and landscaping.

2.03 The necessary infrastructure to cater for the glamping pods will need to be installed, this being drainage.

2.04 The drawing attached to appendix C as supplied by ourselves illustrates the proposed scheme.

3.0 LOCATION OF SITE

3.01 The site is located off Shard Lane to the rear of Marsh View. The site is located between Shard Lane and Bull Park Lane. The site is identified on the location plan at as appendix A.

3.02 The proposed site is surrounded mainly by agricultural land & agricultural buildings. The site currently houses a large two storey dwelling.

3.03 The site is located in a flood zone 3.

3.03 The ordnance survey grid reference is SD N441905 E337126.

3.04 The site is 0.50Ha area.

4.0 EXISTING DRAINAGE

4.01 No drainage was found on site. There is a dyke located to the east of the site. For the purpose of surface water drainage calculations the site will be treated as greenfield.

4.02 It is proposed to discharge into the dyke located to the east of the site via a water treatment plant and new infrastructure as shown on the drawing attached to appendix C.

5.0 SURFACE WATER DRAINAGE STRATEGY

5.01 The primary flood risk generated by a development is the surface water runoff. The site is currently a Greenfield site. The proposed development will have 25% impermeability which will increase the amount of surface water discharge; to comply with the planning condition the surface water will be attenuated within the site boundary.

5.02 The surface water drainage for any development site should be designed so that that the volumes and peak flow rates of surface water leaving the site are no limited to the original greenfield rates.

5.03 In order to comply with not increasing volume of discharge as a consequence of the development it will be necessary to provide surface water storage and/or infiltration to limit and reduce both the peak rate of discharge from the site.

5.04 The Environment Agency require that, for the range of annual flow rate probabilities, up to and including the 1% annual probability (1 in 100 year event) the developed rate of run-off into a watercourse should be no greater than the undeveloped rate of run-off for the same event. Water Authorities take a similar approach to that of the Environment Agency, however they ask that flows be restricted to include up to the 3.33% annual probability (1 in 30 year event), whilst demonstrating that the 1 in 100 year event does not pose a threat to the locality (known as designing for exceedance).

5.05 Climate change (CC) will be taken into account by increasing the rainfall intensity by 40% in compliance with DEFRA technical standards.

6.0 SUSTAINABLE DRAINAGE

6.01 The Technical Guidance for the National Planning Policy Framework requires that a develop exceeding 0.4Ha or more than 4 dwellings requires that the management of the surface water runoff utilises Sustainable Urban Drainage (SUDS) and considers the hierarchy of provision which are as follows

- Infiltration to ground - soakaways and permeable surfacing.
- Discharge to local watercourse.
- Discharge to public sewer.
- Discharge to adjacent land drains and ponds.

6.02 The first option to be considered for surface water disposal for all proposed development must be infiltration into the ground. Even when there are alternative sewer connections or watercourses available infiltration must still be utilised unless it is proved unfeasible. The suitability for infiltration is determined by a percolation test. Where the underlying soil conditions are relatively impermeable, or the water table is high the site would not be suitable for ground infiltration and discharge to a water course or sewer may be considered.

6.03 The sub soil in this area is firm to stiff clay close to the surface. The water table is also close to the ground surface. These ground conditions are not suitable for ground infiltration.

6.04 As discharge to the ground is not appropriate, the next level of SuDs is to be considered. The dyke to the east of the site is a watercourse as defined in the SuDs Manual 2015. It is proposed to discharge surface water to the watercourse.

6.05 In order to prevent an increase in flood risk to adjacent land and downstream of the site it will be necessary to restrict the surface water discharge from the development to the equivalent QBAR greenfield run-off rate from the site (mean annual greenfield peak flow). The SuDS Manual recommends the use of Report No.124 ‘Flood estimation for small catchments’, Institute of Hydrology for catchments smaller than 50 hectares. The total site area of the development site 0.50 ha.

6.06 The Environment Agency standard advice is to calculate the existing greenfield run-off from the entire developable site. The calculated QBAR rate is 3.38 l/s, which is the maximum final discharge rate that should not be exceeded.

6.07 When calculating the final allowable discharge rate only the impermeable areas are considered. The other areas of the site which include landscaping and porous pavement will not contribute to the surface water run-off. The total area of impermeable surfacing is calculated at 25% of the total site area. Existing greenfield run-off rates are calculated at 2.94l/s and the 1 in 30 year event at 5.74l/s and the 1 in 100 year event at 7.03l/s.

6.08 Surface water flows from the site are to be restricted to the equivalent QBAR rate of 5.0l/s. This is greater than the calculated 3.38l/s as a practicable minimum limit on the discharge rate from a flow attenuation device is often a compromise between attenuating to a satisfactorily low flow rate while keeping the risk of blockage to an acceptable level. This limit is therefore set at 5 litres per second.

6.09 The Draft National Standards for Sustainable drainage systems covers the whole range of sustainable approaches to surface water drainage management including:

- source control measures including rainwater recycling and drainage.
- infiltration devices to allow water to soak into ground, that can include individual soakaways and communal facilities.
- filter strips and swales, which are vegetated features that hold and drain water downhill mimicking natural drainage patterns.
- filter drains and porous pavements to allow rainwater and run-off to infiltrate into permeable material below ground and provide storage if needed.
- basins and ponds to hold excess water after rain and allow controlled discharge that avoids flooding, and
- Underground storage to hold excess water after rain and allow controlled discharge that avoids flooding.

6.10 These SuDS solutions are considered below with reference to their suitability for the proposed development.

SuDS Group	Technique	Likely to be suitable?	Notes
Source Control	Rainwater Harvesting	Yes	Would not feasibly accommodate the full increase of volume of runoff created by the proposed development but would work alongside any attenuated system Rainwater butts can also be used to reduce run-off and water use.
Infiltration Devices	Permeable Paving	No	The ground sub striate is not suitable for infiltration
	Infiltration trenches and basins	No	Could be used to slow the movement of water down, but not as an effective means of dealing with run-off and The ground sub striate is not suitable for infiltration
Filtration	Soakaways	No	Clay substrate and highway table not suitable for surface water disposal
	Open Swales	No	Use for attenuation, evaporation, water quality and slowing water movement down and will fit with nature of site. Insufficient space to accommodate pond Hazardous to site users
	Filter Strips	No	Could be used to slow the movement of water down, but not as an effective means of directly dealing with run-off
Retention/ Detention	Basin / Ponds	No	Suitable for controlling discharge to watercourse via a piped outfall, evaporation and treatment of run-off. Insufficient space to accommodate pond
Underground Storage	Culverts / Tanks / Oversized Pipes	Yes	Suitable for controlling discharge to watercourse or sewer via a piped outfall No land take required to accommodate

7.0 PROPOSED DRAINAGE STRATEGY - SURFACE WATER

7.01 It is proposed that surface water drainage from the proposed development will be discharged into the water course located to the east of the site via a new drainage system constructed on site.

7.02 It is important when designing drainage systems for new developments that a scheme be considered to deal with the first 5mm of rainfall to hit the site. Around 50% of rainfall events are less than 5mm and cause no measurable runoff from greenfield areas into receiving waters. In contrast, runoff from a development takes place for virtually every rainfall event. This difference means that watercourses receive frequent discharges with polluted washoff from urban surfaces (hydrocarbons, suspended solids, metals etc). Replication of the greenfield runoff from small events will result in many fewer polluted discharges so limiting the potentially damaging impact on the receiving environment. This concept is known as interception and the volume of rainfall required to replicate the event known as Interception Storage.

7.03 The concept of Interception storage to prevent any runoff from rainfall depths up to 5mm, should therefore be provided. Certain SuDS features such as Swales and Pervious Pavements provide runoff characteristics that reflect this behaviour depending on their design. These will be considered and designed in to the proposed layout at detailed design stage once final volumes are calculated. An estimation of the Interception storage requirements for the outline proposal is included within the calculations below.

7.04 Above and beyond the Interception Storage requirements there are the more intense storms to consider. Attenuation will be required within the system to accommodate the volume of surface water created by restricting the outfall rates to the existing 5.0l/s equivalent.

7.05 There are a number of options available for attenuating the proposed flows from the development, however it is considered that the storage would be to utilise a traditional piped system. This solution allows for large quantities of storage at relatively shallow depths.

7.06 In calculating the surface water run off the following assumptions have been made:-

- **No infiltration –** Due to the ground conditions no infiltration is assumed,

  however if any could be achieved the volume discharged would be reduced.
- **No Rainwater Harvesting / Water Butts –** Suitably designed rainwater harvesting tanks can significantly reduce the volume of run-off and form an integral part of the attenuated system. United Utilities usually accept that such techniques are suitable for collecting water up to and including the 1 in 1 year event.
- **No storage within swales –** Swales have a combined advantage of providing a volume of storage, slowing the rate at which water enters the downstream system and providing a certain amount of infiltration into the ground.
- Within the analysis it has also been assumed that 100% of the rainwater falling on the proposed impermeable areas enters the system. It is therefore considered that the analysis undertaken is robust.

7.07 In order to comply with Environment Agency peak rates of run-off will be restricted to the existing greenfield run-off rate and storage will be provided up to and including the 1 in 100yr storm event plus an allowance of 40% increase for climatic change. This is above and beyond the requirements of a United Utilities adopted drainage system which requires storage up to and including the 1 in 30yr storm event. Flows would be restricted by the hydro brake which will limit discharge to 5.0l/s.

7.08 It is generally accepted that surface water systems are designed to accommodate the 1 in 30yr plus climatic change event and anything above and beyond that could be allowed to flood the system. This is known as designing for exceedance. It is not achievable to accommodate exceedance due to the topography therefore the system has been designed to full accommodate the full exceedance within the drainage network.

7.09 It is also important to note that this system takes no account of the peripheral storage that will be available within the remainder of the proposed drainage network and therefore, notwithstanding the techniques outlined in para 6.9, the storage attenuation requirements will be less.

MAINTENANCE OF PROPOSED SUDS SYSTEMS.

7.10 It is important during any development process to consider the long term maintenance of the proposed drainage system. The more traditional non-SuDS route would be to have the system offered up for adoption though United Utilities, where they would take on responsibility for the maintenance of the drainage network. However, this is not the case with SuDS.

7.11 With the emerging Flood and Water Management Act 2010 (although it is noted that Schedule 3 relating to SuDS has not yet come into force), the SuDS Approving Body (SAB), would be obliged to adopt sustainable drainage solutions which comply with National Standards. Consequently, the system would have to be reviewed and approved by the SAB to ensure it meets these relevant standards.

7.12 Until such a time as Schedule 3 of the Act comes into force, the SuDS system (although approved by both the LPA and the SAB) would remain private and be maintained and managed by a private management company. This maintenance would be secured through ownership of the property. The system has been designed to require minimum maintenance and, the inspection and upkeep of the drainage system can be maintained in perpetuity.

8.0 PROPOSED DRAINAGE STRATEGY – FOUL WATER

8.01 No foul sewers are recorded on site. It is proposed to connect to the water treatment plant via new manholes that are to be installed.

8.02 The development is to accommodate six glamping pods. This comprises of 1 bed, 2 person glamping pods. The drainage has been designed to accommodate 12 persons. From British Water Code of Practice – Flow loads – 3 the predicted flow rate is 180 x 12 = 2160 l/day or 0.025 l/s. The calculated foul discharge from the site in compliance with Approved Document part H of the Building Regulations Table A1 would be 5.4l/s.

9.0 CONCLUSIONS

9.01 Run-off from the proposed development will be restricted to existing greenfield run-off rates. Storage up to and including the 1 in 100yr + climatic change event will be provided within the boundary of the site; the attenuation will be in the form of oversized pipes.

9.02 The developer is committed to delivering a sustainable development and the drainage proposals will be designed in accordance with the techniques set out within the SuDS Manual. Future maintenance of the system will be secured in perpetuity, through the use of a planning condition.

9.03 Foul drainage will be discharged into a water treatment plant before discharging to the dyke located to the east of the site via new manholes installed on site.

9.04 The strategy outlined above shows a viable sustainable drainage solution is achievable within the constraints of the site. The delivery of a SuDS surface water system together with an appropriately designed foul network and connection can be secured through planning condition.

10.0 APPENCIES

Appendix A Location plan

Appendix B Environment Agency Flood Map

Appendix C Proposed Scheme Drawing

Appendix D Drainage Calculations

Appendix A
Location plan

Appendix B
Environment Agency Flood Map

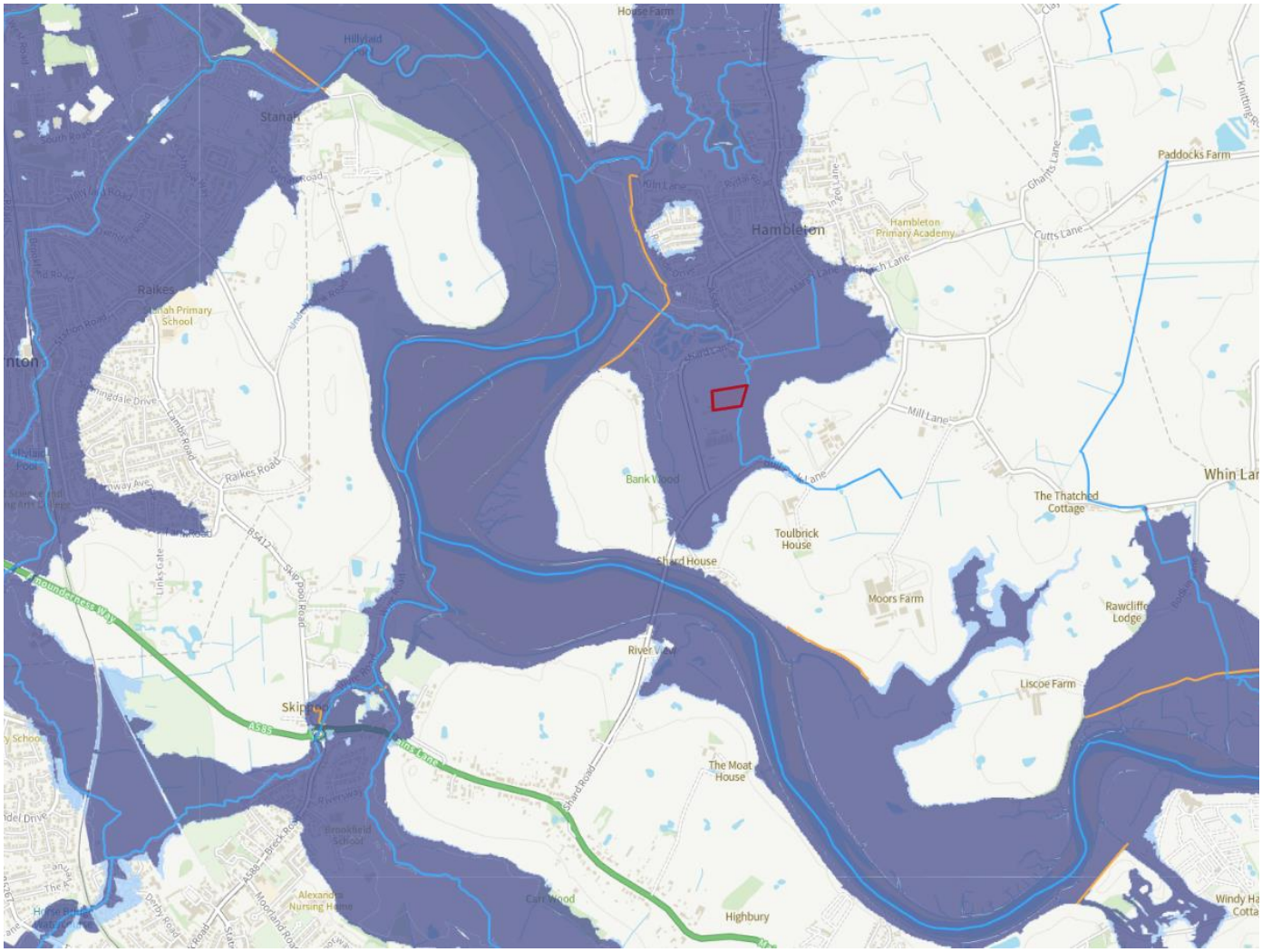


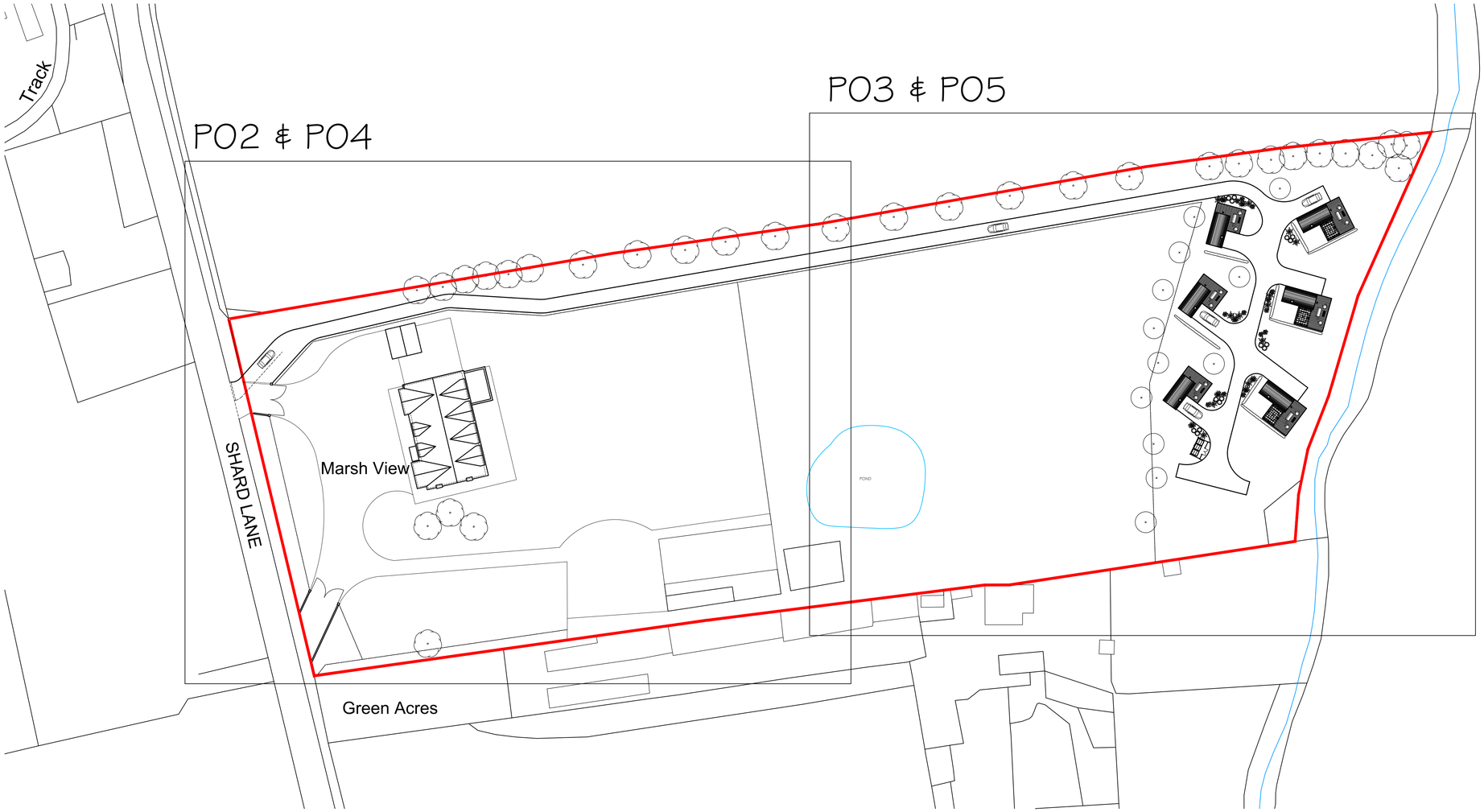
Fig 1 Extract from Environment Agency Flood Map

Appendix C
Proposed Scheme Drawing

DO NOT SCALE DIMENSIONS FROM DRAWING

Revision A

DRAWING No. A021/289/P/01



N

0m 5m 10m 15m 20m 25m 30m
1:500 SCALE BAR

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DO NOT SCALE FROM THIS DRAWING.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELATED DRAWINGS AND DOCUMENTS. THE USER SHOULD CONSULT THE DRAWING ISSUE REGISTER FOR DETAILS.
4. THE CONTRACTOR IS TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS.
5. THE ENGINEER/ARCHITECT SHOULD BE CONTACTED IMMEDIATELY IF THE ASSUMPTIONS USED IN THE DESIGN DIFFER TO THAT FOUND ON SITE.

Rev.	Amendments	Date	By
A	Client Amendments	06/04/22	JG

Keystone Design Associates Ltd.

Registered Office
Development House
261 Church Street
Blackpool
FY1 3PB
Tel. No. 01253 649040
Fax. No. 01253 752901
Email : info@keystonedesign.co.uk

PROJECT ADDRESS
FAIRHOLME, SHARD LANE,
HAMBLETON, LANCASHIRE, FY6 9BX

PROJECT TITLE
GLAMPING PODS

DRAWING TITLE
PROPOSED SITE GA
DRAWING KEY

Client	Scales@A1
MR D BAILEY	1:500 @A1

Drawn	Checked	Date
JG		05/04/22

DRAWING No.	Revision
A021/289/P/01	A

H:\Documents\Drawings\2022\2021\Fairholme Shard Lane

DO NOT SCALE DIMENSIONS FROM DRAWING

0m 2m 4m 6m 8m 10m 12m
1:200 SCALE BAR

NOTES

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PROJECT TITLE
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DRAWING TITLE
PROPOSED SITE GA
2 OF 2

Client	Scales@A1
MR D BAILEY	1:200 @A1

Drawn	Checked	Date
JG		05/04/22

DRAWING No. A021/289/P/03 — Revision

DO NOT SCALE DIMENSIONS FROM DRAWING

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1:200 SCALE BAR

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DRAWING KEY

- ..... DENOTES NEW COMBINED DRAIN
- ..... DENOTES SURFACE WATER SEWER
- ..... DENOTES FOUL SEWER
- ..... DENOTES EXISTING SURFACE WATER SEWER
- ..... DENOTES EASEMENT
- ..... DENOTES SW MANHOLE
- ..... DENOTES FOUL MANHOLE
- ..... DENOTES COMBINED MANHOLE
- IC ..... DENOTES INSPECTION CHAMBER
- RE ..... DENOTES RODDING EYE
- RWP ..... DENOTES RAINWATER PIPE CONNECTION
- SVP ..... DENOTES SOIL VENT PIPE CONNECTION
- BIG ..... DENOTES BACK INLET GULLY
- G ..... DENOTES ROAD GULLEY

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DRAWING TITLE
PROPOSED SITE DRAINAGE

Client	Scales@A1
MR D BAILEY	1:200 @A1

Drawn	Checked	Date
JG		05/04/22

DRAWING No.	Revision
A021/289/P/06	

A B C D E F G H I J K L M N

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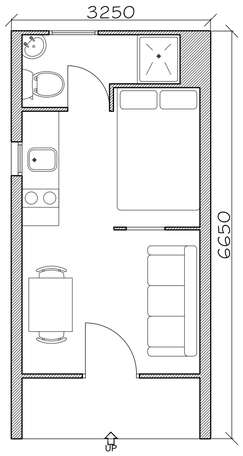
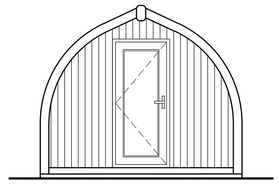
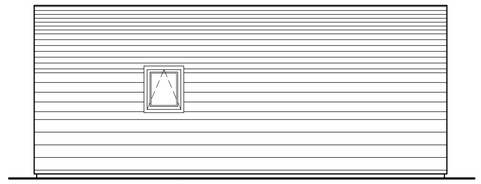


FLOOR PLAN

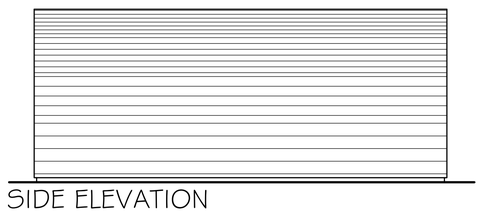


FRONT ELEVATION



SIDE ELEVATION

REAR ELEVATION



SIDE ELEVATION

0m 1m 2m 3m
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NOTES

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HAMBLETON, LANCASHIRE, FY6 9BX

PROJECT TITLE
GLAMPING PODS

DRAWING TITLE
PROPOSED GLAMPING POD PLAN & ELEVATIONS

Client	Scales@A1
MR D BAILEY	1:50 @A1

Drawn	Checked	Date
JG		05/04/22

DRAWING No. A021/289/P/07 — Revision

Appendix D
Drainage Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Amy Southern
Site name:	Marsh View
Site location:	Hambleton

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.86942° N
Longitude:	2.95753° W
Reference:	1484770341
Date:	Oct 10 2023 11:59

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.50

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	933	933
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):	3.38	3.38
1 in 1 year (l/s):	2.94	2.94
1 in 30 years (l/s):	5.74	5.74
1 in 100 year (l/s):	7.03	7.03
1 in 200 years (l/s):	8.01	8.01