

Project Name : Land at Hanlye Lane, Cuckfield

Job No : 23-148

Note Title : Flood Risk Assessment and Drainage Strategy Addendum No. 1

Author : NM

Checked : SW

Approved : SW

Date : October 2024

1.0 INTRODUCTION

1.1 *Background*

1.1.1 Odyssey was commissioned by Sigma Homes Ltd. To undertake a Flood Risk Assessment (FRA), incorporating a surface water and foul drainage strategy, to be submitted in association with a full planning application for proposed residential development at Hanlye Lane in Cuckfield.

1.1.2 A planning application was submitted to Mid-Sussex District Council (MSDC) in October 2023 (planning application reference DM/23/2610), and the proposed drainage strategy was included in the submission (report reference 23-148-01B).

1.1.3 Since the submission of the planning application, there have been discussions with MSDC regarding four trees located across the centre of the site, through the central boundary separating the northern and southern parcels of land. Following these discussions, the site layout has been amended to remove all development from the root protection areas (RPAs) and extended buffer zones of the four trees. As such, the revised development proposal comprises 50 dwellings. The site layout is presented in **Appendix A**.

1.1.4 This technical note sets out the drainage strategy for the updated site layout, and should be read in conjunction with the submitted FRA.



2.0 PROPOSED DRAINAGE STRATEGY

2.1 *Proposed Surface Water Drainage Strategy*

2.1.1 The proposed surface water drainage strategy described below is outlined in **Drawing 23-148-001K**. It builds upon the principles of the previously submitted drainage strategy.

2.1.2 Owing to the poor infiltration properties of the underlying geology, it is proposed that surface water generated by the development would be attenuated on site using a series of basins, before being discharged to the watercourse located along the western site boundary. A swale would also be incorporated within the centre of the site for surface water conveyance, owing to the topography.

2.1.3 The attenuation basins have been designed, based on a Quick Storage Estimate, to accommodate flows for all rainfall events up to and including the 1 in 100 year plus 45% climate change storm. An additional 10% of the proposed roof area has been incorporated to account for urban creep. Flows would be restricted to the QBAR greenfield runoff rate, which mimics the existing scenario, as set out in **Table 2.1**

Table 2.1: Existing and Proposed Surface Water Runoff Rates

Return Period	Existing Greenfield Runoff Rate (litres per second (l/s))	Proposed Runoff Rate (l/s)
QBAR	6.3	6.3
Q1	5.3	5.3
Q30	14.2	6.3
Q100	20.1	6.3
Q100 + 45% Climate Change	-	6.3

2.1.4 The Micro Drainage calculations are provided in **Appendix B**.

Water Quality

2.1.5 The “pollution hazard indices for different land use classifications” table has been extracted from CIRIA C753 The SuDS Manual, and applied to the development proposals, as shown in **Table 2.2**.

**Table 2.2: Pollution Hazard Indices**

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. less than 300 traffic movements per day	Low	0.5	0.4	0.4

2.1.6 The attenuation basins would provide treatment for all surface water runoff generated by the development. The runoff conveyed through the swale would also receive additional treatment. The SuDS mitigation indices have been calculated in **Table 2.3**, in accordance with the guidance contained in The SuDS Manual.

Table 2.3: SuDS Mitigation Indices

Land Use	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Attenuation Basin	0.5	0.5	0.6

2.1.7 **Table 2.3** demonstrates one basin alone would provide sufficient treatment for surface water on site. Further treatment would be provided as the surface water is conveyed through a series of basins prior to being discharged to the watercourse.

SuDS Maintenance Requirements

2.1.8 Maintenance of the drainage system and SuDS features would be carried out in accordance with the manufacturer guidance and through an approved maintenance management plan to minimise the residual flood risk of drainage system blockage.

2.1.9 Maintenance would be the responsibility of the developer to assign, however the “*operation and maintenance requirements for detention basins*” and “*operation and maintenance requirements for swales*” tables have been extracted from The SuDS Manual and are presented in **Appendix C**.



2.2 Proposed Foul Drainage Strategy

2.2.1 The proposed foul drainage strategy is presented in **Drawing 23-148-001K** and builds upon the principles of the previously submitted drainage strategy.

2.2.2 It is proposed that foul flows from the majority of the site would be conveyed by gravity to the public Southern Water foul sewer located to the west of the site.

2.2.3 Foul flows from the south-east of the site would drain to a package pumping station owing to the topography of the site. Flows would be pumped in a northern direction and connect into the foul gravity system serving the rest of the site.

2.2.4 A foul capacity check was undertaken with Southern Water in August 2020, and it was confirmed that the local foul network did not have capacity to accommodate flows from the proposed development at that time.

2.2.5 Southern Water has a duty to improve its network to cater for proposed developments. This is funded via increased infrastructure charges to developers. Should there be a requirement for offsite improvement works, Southern Water would programme these works with due regard to the proposed build programme of the development.

3.0 SUMMARY AND CONCLUSIONS

3.1.1 Odyssey was commissioned by Sigma Homes Ltd. To undertake an FRA, incorporating a surface water and foul drainage strategy, to be submitted in association with a planning application for residential development at Hanlye Lane in Cuckfield.

3.1.2 Since the submission of the planning application, the development proposals have been amended owing to the removal of development within the RPAs of four trees on site, and now comprise 50 dwellings. The drainage strategy has been updated to suit the revised layout.

3.1.3 It is proposed that surface water generated by the development would be attenuated on site using a series of attenuation basins, prior to being discharged to the watercourse located along the western site boundary.

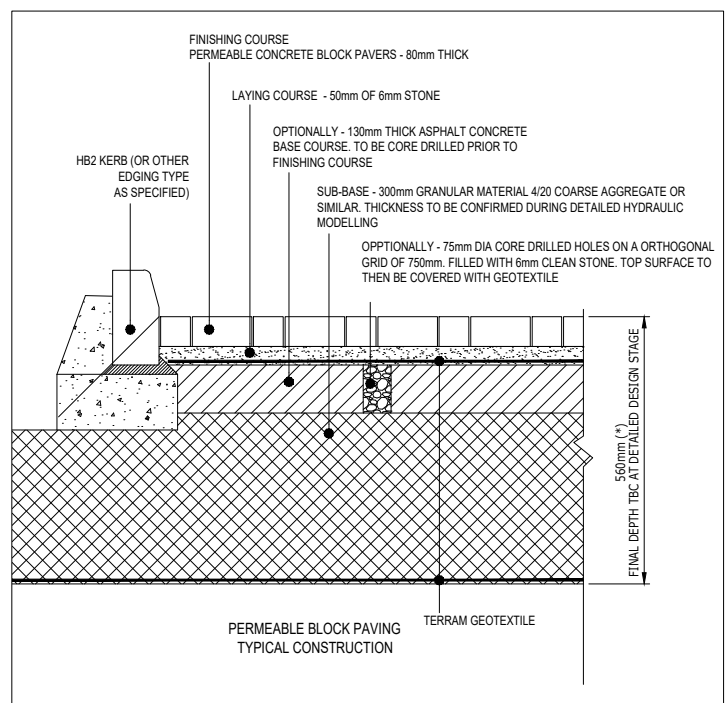
3.1.4 Foul flows generated by the majority of the site would be conveyed by gravity to the public Southern Water foul sewer to the west of the site. Owing to the topography, foul flows from the south-east of the site would drain to a package pumping station. Flows would be pumped in a northern direction and connect into the foul gravity system serving the rest of the site.

DRAWINGS



- NOTES**
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELATED DRAWINGS ISSUED BY THE DESIGN TEAM.
 2. DRAINAGE AND LEVELS STRATEGIES PROVIDED FOR PLANNING AND NOT TO BE USED FOR CONSTRUCTION.
 3. ALL WORKS SUBJECT TO DETAILED DESIGN.
 4. GREENFIELD RUNOFF RATE = 6.3 l/s.
 5. PROPOSED SURFACE WATER NETWORK TO MIMIC GREENFIELD RUNOFF RATE OF 6.3 l/s FOR ALL STORM EVENTS UP TO AND INCLUDING 100yr EVENT INCLUDING ADDITIONAL 45% FOR CLIMATE CHANGE ALONG WITH 10% FOR URBAN CREEP.
 6. PROPOSED SURFACE WATER NETWORK TO DISCHARGE INTO EXISTING WATER COURSE LEADING TO SCASE STREAM MIMICKING EXISTING SCENARIO.
 7. SURFACE WATER ATTENUATION VOLUME REQUIRED = 125m³ - 209m³ BASED ON MICRO-DRAINAGE QUICK STORAGE ESTIMATE.
 8. SURFACE WATER TREATMENT PROVIDED VIA 3NO. OPEN SuDS DEVICES (PONDS) TREATING ALL RUNOFF PRIOR TO DISCHARGE TO EXISTING DITCH. ADDITIONAL PRE-TREATMENT PROVIDED BY SWALE LOCATED IN THE CENTRAL GREEN CORRIDOR.

- LEGEND:**
- PROPOSED SURFACE WATER DRAINAGE
 - PROPOSED FOUL WATER DRAINAGE
 - INDICATIVE PRIVATE FOUL WATER PACKAGE PUMP STATION
 - INDICATIVE PRIVATE FOUL WATER RISING MAIN
 - EXISTING GROUND LEVEL
 - PROPOSED LEVEL
 - PROPOSED GRADIENT
 - REGRAVING / SLOPE 1:3 GRADIENT
 - SITE BOUNDARY
 - PERMEABLE PAVING
 - LAP - BENCH / STREET FURNITURE
 - LEAP TOTAL AREA - 450 sqm
 - PLAY EQUIPMENT AREA - 280 sqm
 - EQUIPMENT ZONE



K	PLAY AREAS OMITTED FROM GREEN LUNG SPACE.	LG	SW	SW	14/10/24
J	UPDATED TO SUIT LATEST ARCHITECT LAYOUT	RMLLG	SW	SW	11/10/24
I	OPTION 1 OUTLET MOVED TO FALL WITHIN SITE BOUNDARY LINE	AK	SW	SW	16/09/24
H	LAYOUT AMENDED TO REFLECT THE REVISED PLANNING LAYOUT	LG	SW	SW	17/06/24
G	DRAINAGE LAYOUT FURTHER UPDATED TO CLIENT'S COMMENTS	LG	SW	SW	29/04/24
F	DRAINAGE LAYOUT FURTHER UPDATED TO CLIENT'S COMMENTS	AK	SW	SW	26/04/24
E	DRAINAGE LAYOUT UPDATED TO CLIENT'S COMMENTS	AK	SW	SW	25/04/24
D	UPDATED TO SUIT REVISED PLANNING LAYOUT	JK	SW	SW	09/02/24
C	EXISTING POND AND POND OUTFALL NOTES ADDED TO CLIENT REQUEST. POND OUTFALL ROUTE ADDED INDICATIVELY. LAYOUT UPDATED TO LATEST ARCHITECT CHANGES RECEIVED 04-10-2023	SW	SW	SW	04/10/23
B	DRAWING TITLE AMENDED. MINOR DRAINAGE CHANGES TO CLIENT COMMENTS. LAYOUT UPDATED TO ECE ARCHITECTURE DRAWING 7343 PL-04 REV E.	SW	SW	BAC	12/09/23
A	EASTERN MOST POND SIZE INCREASED.	SW	SW	BAC	05/09/23
Rev	Amendments	Dm	CHK	App	Date

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Job Title
LAND AT HANLYE LANE, CUCKFIELD WEST SUSSEX

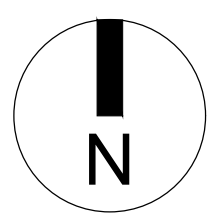
Drawing Title
DRAINAGE STRATEGY

Client
SIGMA HOMES

Scale	Date	Designed
1:500	AUGUST 23	SCW
Drawn	Checked	Approved
SCW	AK	BAC
Job No	Drawing No	Rev
23-148	23-148-001	K

APPENDIX A

Proposed Site Layout



Play Space Areas	
KEY	
	LAP - bench / street furniture
	LEAP Total Area - 450 sqm
	Play Equipment Area - 280 sqm
	Equipment Zone

Play Equipment Examples

LAP - Bandrake Bench and Slatted Litter Bin



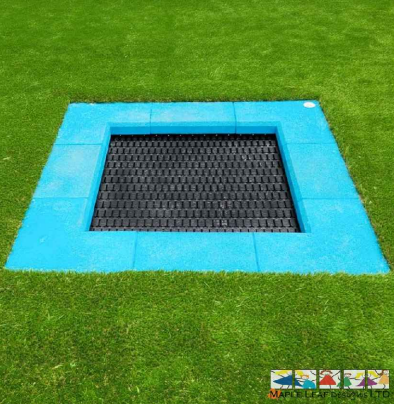
Location 4 - Timber low level beams and steps



Location 5 - Ladder walk



Location 1 - In-ground trampoline



Location 6 - Trim trail



Location 3 - Accessible roundabout



A	03.10.24	LEAP and LAP updated	JY	AK
Rev	Date	Revision Details	Dr	Ch



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Client's Name
Sigma Homes

Job Title
Land South of Hanlye Lane Cuckfield

Drawing Title
Play Space Area Calculations

Scale 1:500 @ A0 / 1:1000 @ A2			
metres	10	20	30
Drawn	LP	Checked	JY
Date			21.08.24
Job No	7343	Drawing No	SK-12
Rev			A

Status
INFORMATION

APPENDIX B

Micro Drainage Calculations

23-148 – Land South of Hanlye Lane, Cuckfield, West Sussex

Quick Storage Estimate

The screenshot shows the 'Quick Storage Estimate' window with the 'Variables' tab selected. The left sidebar contains buttons for Variables, Results, Design, Overview 2D, Overview 3D, and Vt. The main area contains the following fields:

Variable	Value
FEH Rainfall	FEH Rainfall
Return Period (years)	100
Version	2013
Point	Point
Site	GB 531085 125619 TQ 31085 25619
Cv (Summer)	1.000
Cv (Winter)	1.000
Impermeable Area (ha)	1.119
Maximum Allowable Discharge (l/s)	6.3
Infiltration Coefficient (m/hr)	0.00000
Safety Factor	2.0
Climate Change (%)	45

Buttons at the bottom: Analyse, OK, Cancel, Help.

Footer: Enter Climate Change between -100 and 600

The screenshot shows the 'Quick Storage Estimate' window with the 'Results' tab selected. The left sidebar contains buttons for Variables, Results, Design, Overview 2D, Overview 3D, and Vt. The main area displays the following results:

Global Variables require approximate storage of between 1044 m³ and 1759 m³.

These values are estimates only and should not be used for design purposes.

Buttons at the bottom: Analyse, OK, Cancel, Help.

Footer: Enter Climate Change between -100 and 600

Creep – 10% added to the total roof area

Footpaths around houses – taken as 7% of total roof area

Total roof area - 0.367ha

Hardstanding area – 0.726ha

APPENDIX C

SuDS Operation and Maintenance Requirements

TABLE 22.1 Operation and maintenance requirements for detention basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

22.13 REFERENCE

KENNARD, M F, HOSKINS, C G and FLETCHER, M (1996) *Small embankment reservoirs*, R161, CIRIA, London, UK (ISBN: 978-0-86017-461-5). Go to: www.ciria.org

Statutes

Reservoir Act 1975 (c.23)

Health and Safety at Work (etc) Act 1974 (c.37)

Building Act 1984 (c.55)

Flood and Water Management Act 2010 (c.29)

Construction (Design and Management) Regulations (CDM) 2015

TABLE 17.1 Operation and maintenance requirements for swales

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required