

DRAINAGE STRATEGY

Proposed Housing Development

Northfield Property Developments Ltd Oak Drive, Colwyn Bay

Plots 1 to 3

○ INTRODUCTION

○ Background

- The site is located at grid reference SH841790 (E284123 , N379023). The site is both 'brown and greenfield' – currently tennis courts (hard surface) and wood land. The site location is shown in figure 1 below:



Figure 1: Site Location Plan

○ Existing Site Features

- The site has a plan area of 9250m². A topographical survey of the site has been undertaken.
- Hard surfaced tennis courts and woodland.

- **Topography and Flood Risk**

- The site falls from South (45.0m AOD) to North (34.0m AOD) across the site.
- The nearest watercourse is Ganol East, which runs approximately 2.0 km to the West of the site.
- The river and sea flood map available on the Natural Resources Wales (NRW) web site (see Appendix 2) shows the site within Zone A. This means the annual risk of flooding is Low, this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 200 (0.5%). This considers the effect of any flood defences that may be in this area. Flood defences reduce, but do not completely stop the chance of flooding as they can be overtopped or fail.
- The flood map available on the NRW web site (see Appendix 2) shows that during extreme events there is the potential for some surface water to run onto the site. The potential for this event to occur is indicated as being low. Low means that each year, this area has a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%). This type of flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm. This is based on the best information NRW have available, such as ground levels and drainage.

- **Proposed Development**

- It is proposed to construct three detached houses. The approximate areas of the various features forming the proposed development are summarised in the table below:

Table 1: Proposed Areas (this inc. the full development, Plots 1 - 14)

Proposed Use	Envisaged Area
Houses	1070
Drives	570
Shared Access	950
TOTAL	2590

- **FOUL DRAINAGE**

- **Location of Public Sewer Network**

- Information provided by Dwr Cymru Welsh Water (DCWW) (Appendix 5) confirms that the PSN (Public Sewer Network) exists in the vicinity of the site.
- Pre-planning advice PPA0005456 confirms a suitable connection point as Combined Water Manhole 'SHS84790002'
- It is envisaged that a gravity sewer connection can be made from the proposed new properties to the public sewer network – no existing inlet inverts provided (to be confirmed).

- **Surface Water Drainage**

- **Project Approach to Sustainable Drainage**

- The objective of this section of the report is to summarise the outline design for the disposal of surface water from the site. The approach outlined in the CIRIA SuDS manual seeks to manage the quality and quantity of rainwater runoff close to where it falls and to allow its use in a manner which provides amenity benefits to site users and encourages biodiversity.
- SuDS design should, wherever possible be based around the following principles:
 - I. Use surface water as a resource
 - II. Manage rainwater close to where it falls
 - III. Manage runoff on the surface
 - IV. Allow rainwater to soak into the ground
 - V. Promote evapotranspiration
 - VI. Slow and store runoff to mimic natural runoff characteristics
 - VII. Reduce contamination of runoff through pollution prevention and controlling the runoff at source
 - VIII. Treat runoff to reduce the risk of urban contaminants causing environmental pollution

The subsequent paragraphs of this section of the report outline how these objectives can be achieved within the outline drainage design for the Oak Drive, Colwyn Bay site.

- **Surface Water as a Resource**

- A drainage design which follows SuDS principles will initially seek to manage surface water at source, with the objective of delaying both the timing and magnitude of peak surface water run-off from urban areas entering any watercourse.
- Due to the type of development re-use of rainwater would be limited.
- **Managing Rainwater at Source**
 - Each plot has its own private drive, it is proposed to construct these as porous surfaces with a course graded stone sub-base beneath. This SuDS element will serve the dual function of providing some filtration before it passes further down the SuDS system and will also provide some attenuation volume. Furthermore, it will facilitate the potential for slow percolation of low intensity rainfall into the ground.
- **Ground Conditions**
 - Soft to Firm Clay - refer to Ground Solve Site Investigation Report.
- **Disposal to Water Course**
 - As noted, the nearest watercourse is Ganol East, approximately 2.0km to the West of the site.
- **Pollution Prevention**
 - A summary of the quality of water to be discharged from the site is included in Appendix 3. The sources of rainwater to be discharged from the site and their potential for contamination have been assessed using the simple index approach as described in section 26.7.1 of the SuDS manual.
- **Exceedance Routing**
 - Due to the site topography exceedance flows from the site would fall towards soft landscaping/playing fields to the site boundary, North.
 - No exceedance route path expected up to and including the 1:100 year storm (50% climate change).
- **Lifetime Management**
 - The client for the development is Northfield Property Developments Ltd who will remain responsible of the maintenance of the on-site surface water drainage system.
 - Including but not exhaustive, silt removal from sumps.
- **Surface Water Drainage Design**

- The rationale taken for the disposal of surface water is that run off water from the houses and shared access will be disposed of, to Welsh Water surface water sewer, manhole reference SH83799104, via a flow restrictor and attenuation storage (underground tank/pipe/permeable paving). The sources of the risk have been assessed as low for the roofs and shared access.
 - Design surface water storage up to 1:100 year storm plus 40% climate change.
 - Soakaway drainage not suitable – refer to Ground Solve Site Investigation Report.
 - Surface water runoff restricted to 2l/s (Greenfield Runoff Rate).
- **FLOOD RISK**
 - **Flood Risk Assessment**
 - The site is in zone A on the Development Advice Map and none of the maps on the Natural Resources Wales (NRW) online flood risk maps show any risk of flooding. Copies of the maps downloaded from the NRW website are enclosed in Appendix 2.
 - The NRW mapping shows that there is a low risk of surface water flooding.
 - **CONCLUSION**
 - **Foul Drainage**
 - It is proposed to discharge to the PSN within Kings Road (B5113)
 - A new adopted sewer will link the proposed site with the PSN via combined manhole reference 'SHS84790002'.
 - **Surface Water Sustainable Drainage**
 - The nearest watercourse is Ganol East, approximately 2.0km to the West of the site.
 - A ground investigation has established that the underlying ground is formed of soft to firm clay and consequently the use of infiltration devices is unlikely to be practical for the disposal of concentrated volumes of roof/surface water. However, it is proposed that permeable paving with open graded sub-base beneath will be used to facilitate the possibility of low intensity rainfall to infiltrating into the ground, and provide attenuation storage volume and cleansing of runoff.
 - Design surface water storage up to 1:100 year storm plus 50% climate change.
 - Storage – Underground Attenuation Pipe/Tanks/Permeable Paving
 - Surface water runoff restricted to 2l/s (Greenfield Runoff Rate).

Return period (years)	Storage Type	Information
100+50%CC	Attenuation Pipe, Paving and Tank	1:30 Year Storm Welsh Water and 1:100 Year Storm Private Storage

- During exceedance events water will discharge to the North of the site.
 - The pollution hazard from the proposed roof/shared drive area is low.
- **Flood Risk**
- The site is not located in any flood risk zones, but the NRW flood maps show a low risk of surface water flooding.

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Appendices

1. Existing Runoff Rate
2. NRW Flood Mapping
3. Water Quality
4. Attenuation Design
5. Welsh Water Information

APPENDIX 1
Greenfield Runoff Rate

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

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.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

SOIL type:

Default	Edited
2	4

HOST class:

N/A	N/A
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SPR/SPRHOST:

0.3	0.47
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Hydrological characteristics

SAAR (mm):

Default	Edited
806	806

Hydrological region:

9	9
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Growth curve factor 1 year:

0.88	0.88
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Growth curve factor 30 years:

1.78	1.78
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Growth curve factor 100 years:

2.18	2.18
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Growth curve factor 200 years:

2.46	2.46
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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 $SPR/SPRHOST \leq 0.3$?

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):	1.99	5.27
1 in 1 year (l/s):	1.75	4.63
1 in 30 years (l/s):	3.54	9.37
1 in 100 year (l/s):	4.33	11.48
1 in 200 years (l/s):	4.89	12.96

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and license agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrocolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

APPENDIX 2
NRW Flood Mapping



Development Advice Map

- Zone C1
- Zone C2
- Zone B
- Zone A

Oak Drive – Colwyn Bay = Zone A

Development Advice Flood Map – River and Sea



- Flood Risk from Surface Water & Small Watercourses - Extent
- High
- Medium
- Low

Oak Drive – Colwyn Bay = Low
NRW Flood Map – Surface Water

APPENDIX 3
Water Quality

Water quality assessed using Simple Index Approach as described in Section 26.7.1 of the SuDS Manual.

Land Use Type	Roof	Shared Surface
Pollution Hazard Level	Low	Low
Pollution Hazard Indices		
TSS	0.3	0.5
Metals	0.2	0.4
Hydrocarbons	0.05	0.4
SuDS components proposed		
Permeable Paving	No	Yes
Treatment System	No	No
SuDS Pollution Mitigation Indices		
TSS	0.7	0.7
Metals	0.7	0.6
Hydrocarbons	0.5	0.7
Groundwater Protection Type	N/A	N/A
GW protection Pollution Mitigation Indices		
TSS	N/A	N/A
Metals	N/A	N/A
Hydrocarbons	N/A	N/A
Combined Pollution Mitigation Indices		
TSS	0.3	-
Metals	0.2	-
Hydrocarbons	0.05	-
Acceptability of Pollution Mitigation		
TSS	Sufficient	Sufficient
Metals	Sufficient	Sufficient
Hydrocarbons	Sufficient	Sufficient

APPENDIX 4
Attenuation Design

Plots 1-14 and Shared Surface (overall development must be designed)

Input

Input Type

Area (ha)

Volumetric Runoff Coefficient

Discharge Rate (L/s)

Infiltration Rate (m/hr)

Safety Factor

Create New From Library

All

FSR

Method FSR

Number of Storms 48

Max. Run Time (mins) 2880

Parameters

Region Storm Profile

M5-60 (mm) Summer

Ratio R Winter

Storm Durations

Use	Duration (mins)	Run Time (mins)
<input checked="" type="checkbox"/>	15	30
<input checked="" type="checkbox"/>	30	60
<input checked="" type="checkbox"/>	60	120
<input checked="" type="checkbox"/>	120	240
<input checked="" type="checkbox"/>	180	360
<input checked="" type="checkbox"/>	240	480
<input checked="" type="checkbox"/>	360	720
<input checked="" type="checkbox"/>	480	960
<input checked="" type="checkbox"/>	600	1200
<input checked="" type="checkbox"/>	720	1440
<input checked="" type="checkbox"/>	960	1920
<input checked="" type="checkbox"/>	1440	2880

Return Periods

Use	Return Period (years)	Increase Rainfall (%)
<input checked="" type="checkbox"/>	30	0
<input checked="" type="checkbox"/>	100	50

Results

Quick Storage Estimate variables require approximate storage of between 191m³ - 270m³.

- **1:30 Year Storm (Welsh Water) – 65m³**
- **1:100 Year Storm (Private) – 125m³**

APPENDIX 5
Welsh Water Information

