



Flood Risk and Drainage Assessment

Outline Planning Application for
Residential Development on
Land off Ellesmere Lane,
Penley. LL13 0LP.

Statement prepared for:
Mr Peter Groom

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By
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1. Introduction

Woodsyde Developments have been instructed to submit this statement in support of an outline application for 9 residential dwellings on Land off Ellesmere Lane, Penley. LL13 0LP.

This report considers the drainage and flood risk issues surrounding the development proposals. Consideration is given to how the site will be drained in terms of surface water and foul water and a resume of the Flood Risk of the site.

This Drainage and Flood Risk Report is prepared in accordance with the requirements of the Natural Resources Wales and TAN 15, the guidelines indicating the necessity to produce such an assessment in areas which are in part or in whole potentially liable to the effects of a 1% (1 in 100 year) flood event.

2.0. The Proposals.

An indicative Layout has been provided in Appendix 1 to indicate how the proposals may be laid out. The plan shows a schematic drainage layout which depicts a series of attenuation systems for the surface water drainage from the dwellings and access and details of mitigation to potential flooding from surface water run-off. However as this is an outline planning application the layout is not fixed and may or may not be amended for a reserved matters application. The site surface water drainage will discharge to the existing ditchcourse at restricted Greenfield rates on not more than 5 l/s.

Foul water drainage will discharge to the existing foul water sewer which runs along Ellesmere Lane opposite the site road frontage.

Currently the site is farmland and is primarily used for grazing sheep and cattle. The site has only a slight fall from north to south and from inspection has no identifiable drainage provision, save an existing ditchcourse along the site road frontage.

The site application area for the proposed development is approximately 0.34 hectares and has residential development to the northern, western and southern boundaries and open fields to the east. A publically maintained highway known as Ellesmere Lane runs along the length of the western boundary.

Access to the site will be gained from a new central access driveway on to Ellesmere Lane at a central location that affords the maximum junction visibility. The existing ditchcourse will be culverted under the access.

The flood risk map produced by the Natural Resources Wales (see 4.0 below) indicates the site to be located within Flood Zone A, although the surface water maps show that the site may be prone to potential flood risk surface water run-off. However in speaking to local residents the field has not been the subject of flooding and that only during intense rainfall pockets of standing water occur on the field and on the highway carriageway, due to a lack of road gullies to collect to collect dissipate the run-off and the development land being relatively flat.

3.0. Drainage Proposals.

3.1. Surface Water Drainage

It is proposed to maintain the existing surface water run-off from the site in accordance with the Technical Guidance provided in TAN 15 and good practices. The surface water from the proposed development will increase run-off by an increase in impermeable areas. However I understand that existing development in the area drains in by a positive drainage system. The adjacent development to the north which has just commenced building and the surface water drains to the existing culvert crossing Ellesmere Lane. From here it discharges along a series of ditches and watercourses. Woodsyde Developments prepared and designed the drainage proposals for the site to the north. On that site the ground make up was solid clays which were borne out by undertaking porosity tests in accordance with BRE365, but given the ground conditions soakaways were not possible. Trial pits have been taken on this site and the ground remains clay, such that soakaways will not be possible. In this regard surface water from the dwellings will be collected in piped systems and will drain primarily to an attenuation pond system located within the applicants' landholding, before discharging via a suitable flow vortex to the watercourse to the northern boundary. Such a discharge will be limited to 5 litres per second to permit a suitably sized orifice for the flow control vortex.

The site drainage will be designed to allow for a worst event 1 in 100 year event plus 30% climate change. Exceedence flows will be captured in French drains and then directed to the attenuation system. As indicated on the indicative drainage arrangements as suitable system can be provided to serve the development. From calculation of the impermeable areas shown on the indicative layout, attenuation will be required in the order of 163.3m³ for the worst event 1 in 100 year storm including an allowance for 30% climate change. This assumes areas of roofs, driveways and access to be impermeable and takes no account of the use of the grassed permeable surfaces, which will slow and delay run-off. The details of the drainage arrangements are indicated on drawing 6245/47631/P-03 – Conceptual Plan with Indicative Drainage Arrangements Plan attached in Appendix 2. A copy of the relevant attenuation calculations are attached in Appendix 3.

The proposed access road and driveways will be provided with positive piped drainage systems and will be connected to the drainage system and attenuation pond feature.

Exceedence flows will considered to boundaries and any additional necessary cut-off drains will be provided, with directed towards the proposed access roads and driveways within the development.

As a part of the development the applicant is willing to provide betterment to the existing surface water drainage to the highway carriageway in the form of additional strategically positioned grips and or road gullies along Ellesmere Lane, with a discharge to the ditchcourse along the site road frontage or to the existing highway drainage, particularly located to the northern boundary where the potential flood risk is shown. Moreover the ditchcourse along the site road frontage will be suitable cleaned and regraded to improve capacity and flows.

As the use of permeable surfaces are likely to be used for this development, appropriate Suds techniques will be applied to the development, which will delay and slow surface water run-off, with collection at a lower level before being directed to the

proposed attenuation. In addition the use of water butts and the potential for rainwater harvesting tanks will be considered to assist in the sustainable re-use of rain water.

As the surface water drainage will be restricted to effective Greenfield run-off and the potential introduction of permeable surfaces will slow and delay surface water run-off. It is considered that there will be no adverse effects on the receiving downstream watercourse or outfall thereafter.

It is considered that these proposals to provide adequate attenuation will mitigate any potential pluvial flooding of the development site and will not result in any demonstrable flood risk elsewhere.

As the proposals for attenuation will be based on a worst event 1 in 100 year storm plus 30% climate change there is no risk of flooding on-site or elsewhere as a result of the development.

An appropriate approval for the discharge to watercourse will be obtained at the appropriate time, should this be required.

3.2 Foul Water Drainage

It is proposed that the new development will connect into the existing foul sewer that is located within Ellesmere Lane and fronting the site, subject to confirmation from Welsh Water Ltd.

All sewers will be designed in accordance with Sewers for Adoption 7th Edition.

4.0. Flood Risk.

4.1 Introduction

Flood Risk Assessment is normally carried out in line with TAN 15 for proposed sites that exceeds 0.5 ha or that have 10 or more properties. For any site larger than one hectare the Natural Resources Wales' policy states that an assessment must be undertaken. In addition to assessing external risk of flooding to the site, an assessment must demonstrate that the proposed development would not exacerbate flooding elsewhere. On Brownfield sites it is also necessary to demonstrate that peak rates of flow would be reduced back towards the levels that would be expected from a Greenfield site.

4.2 Development and Associated Flood Risk

The site is located in flood zone A according to the Planning Maps. No part of the site is at risk from flooding from ground sources, fluvial or pluvial sources.

From site inspection and review of levels from Google earth the site has a gradual fall from south to north. The site is fairly contiguous to Ellesmere Lane along its western boundary.

French drains will be provided to the site boundaries where appropriate to ensure that proper drainage is available within the site and will also assist to capture any potential exceedance flows and mitigate any possible surface waters and run-off dispersing over any properties or lands outside of the development site.

It is considered that the above proposals as well as a suitably designed drainage system, including an attenuation system for the dwellings and access will mitigate any potential flooding to the site.

It is considered that the flood risk to this proposed development will be minimal. Appropriate measures to capture pluvial run-off will be provided. The use of French drains, additional drainage to the highway carriageway will also assist in collecting surface water run-off and directing it to suitable outfalls. As a result of the mitigation it is considered that there will be no flood risks to the development and no additional flood risk effects elsewhere.

There will be no risk to flooding elsewhere downstream from these proposals, with the control of surface water by means of the use of an attenuation system and restricted outfall to the watercourse to the development. There will be no increase in surface water run-off from the site. All surface water will be suitably attenuated in a piped system and pond, with the outfall restricted to Greenfield run-off.

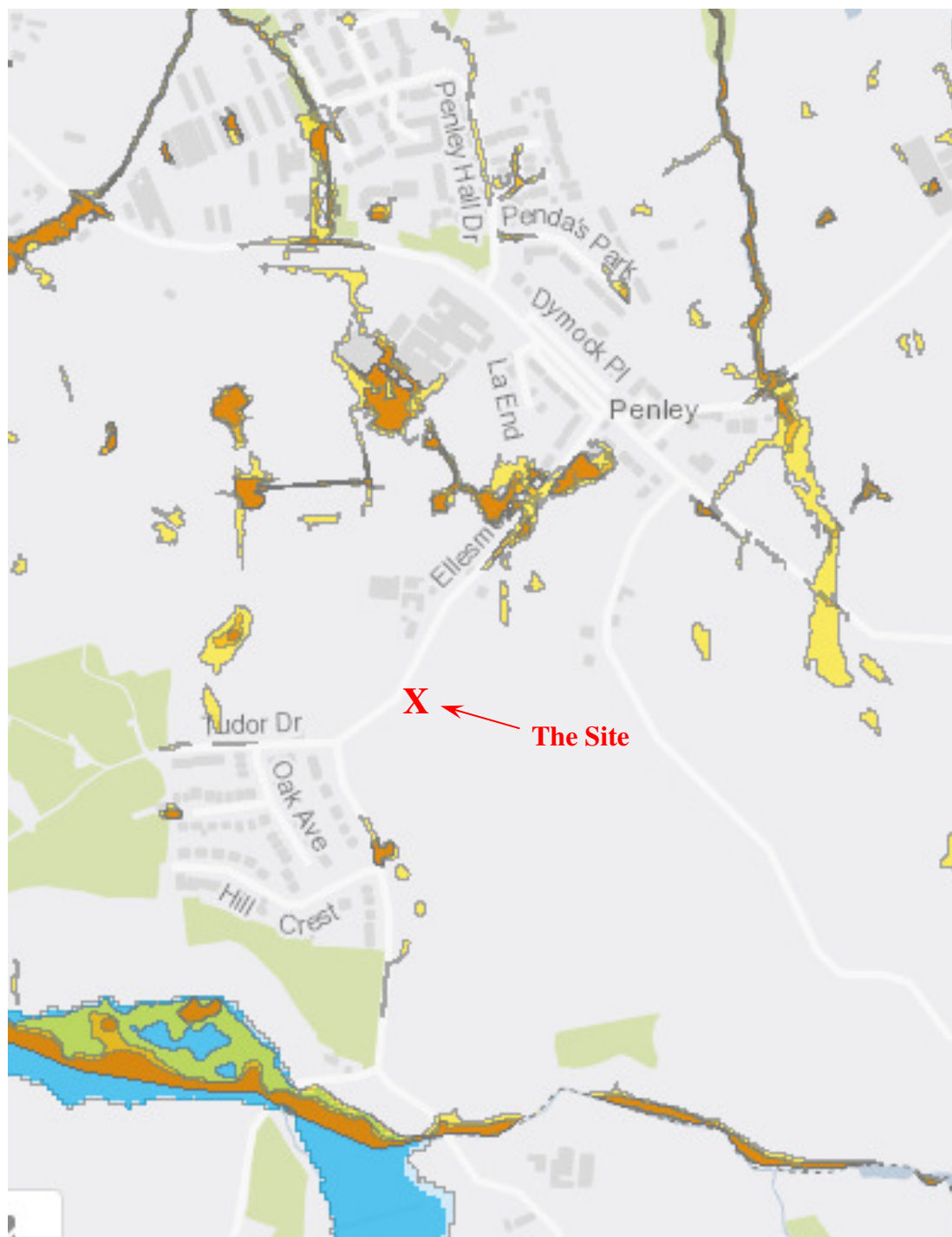
No part of either the proposed development or the area in the immediate vicinity is at risk from flooding due to a 1% flood occurrence or from any other occurrence.



In common with the above comments there is nothing in these proposals which will either affect or alter any flood flows or flood storage capabilities of the land.

The site will be designed in accordance with good practice, common and recognised standards which are accepted by Natural Resources Wales, Water Authority and Local Authority standards, where applicable.

In summary therefore, there is no risk to flood flow or flood storage from these proposals.



It can be seen that the site is not affected by either flood risk from rivers/watercourses or surface water run-off. It is considered that the proposed site drainage and improvements for capturing surface water run-off will mitigate any potential surface water flood risk.

4.3 Storm Water Management

Greater detailed drainage designs and calculations will be provided at reserved matters stage in accordance with the principles of the proposed site drainage

identified in 4.2 above. However from initial calculation the attenuation for the worst event 1 in 100 year event plus 30% climate change will typically require 163.3m³ storage, based on a discharge rate of 5l/s. Discharge will be at typical Greenfield rates only to the watercourse to the northern boundary of the development, which is understood to discharge a culvert under Ellesmere Lane and then discharges to further watercourses to the west.

Additional Sud's techniques using water butts and permeable paving will allow surface water run-off to be slowed and delayed before entering either the drainage system or attenuation system. Based on the indicative layout submitted with the application, the drainage proposals show worst case.

4.4 Potential Risk of Flooding to the Proposed Development

Within TAN 15 it is recommended that a Flood Risk Assessment should consider all possible sources of flooding for a given site. The following sources of flooding are summarised in Table 4.1;

Table 4.1 - Summary of potential flood source

Flood Type	Source	Potential Pathway
Fluvial	Watercourse/ditchcourse	Flows in excess of channel capacity
	Ponds and Drains on site	Blockage and exceedence of channel/retention area
	Ponds and drains off site	Blockage and exceedence of channel/retention area
Tidal	None	None
Drainage	Mains Supply	Supply Pipe burst and overland flow
	Surface drains and sewers	Blockage and surcharge followed by overland flow
	Foul sewers	Blockage and surcharge followed by overland flow
Pluvial - Overland flow – surface water run-off	Land topography	Surface water run-off at Ground Level
Groundwater	Poor ground	Groundwater levels expressed at surface

4.5 Risk Assessment

The risk assessment methodology used is set out above and is based on guidance provided in TAN 15. The guidance recommends that flood risk is assessed through consideration of both the magnitude of potential impacts and the probability of occurrence. The magnitude of impact is dependent on two factors; the sensitivity of potential receptors and the severity of the flooding. There are therefore three criteria on which flood risk is assessed. These are:

- Sensitivity of the receptor
- Severity of the flooding; and
- Probability of occurrence.

4.6 Sensitivity of Receptors

The proposed development is for residential development, thus, under the sequential test the development would be classified as a “highly vulnerable development”.

Development in general has the potential to impact the flood risk posed to off-site receptors. All off-site development is considered to have a very high sensitivity to any increase in flood risk and therefore, it is important that any adverse off-site impacts on flood severity or frequency are avoided.

4.7 Severity and Probability of Flooding

The severity and probability of flooding are both fully defined above and the classification of these criteria is discussed in the following sections.

Fluvial

Adjacent watercourse/ditchcourse

The fluvial source in this area is the existing watercourse along the northern boundary. The existing ground level of the site is similar to that of the highway carriageway. From discussion with local residents the watercourse has not flooded over the recent past and is downhill of the site. Nonetheless to ensure that there is no risk to the proposed dwellings the finished floor levels will be raised typically minimum 150mm above the existing ground levels. A series of French drains will be installed to the site boundaries to capture any potential surface water run-off and direct it to the attenuation pond. It is considered that even in extreme rainfall the site would not be effected by flooding from the watercourse. From the Flood Maps it is shown that no part of the site may be liable to any potential surface water run-off flooding.

Drains on-site (Pluvial)

The site is bounded to the north by a watercourse. This will be retained with no alterations. The site proposals will include an attenuation system and hydrobrake control to limit discharge. This is shown to be in the form of a pond located within the retained land to the north of the site and will typically have a capacity of 163.3m³ which will accommodate the worst case event 1 in 100 year storm plus 30% climate change.

Drains and Ponds off Site (Pluvial)

An examination of the drainage in the vicinity of the site identifies the presence of the existing watercourse along northern boundary of the site and a series of highway drainage to Ellesmere Lane. These would appear to discharge to ditches along the highway and watercourse downstream to the north of the site. It is considered that the likelihood and impact of flooding from this source is low as the site finished floor levels will be suitably raised.

Drainage & Mains Supply (Pluvial)

The mains water supply is within the footway on the adjacent site of the highway from the site. In the event of a system collapse the total volume of flood waters is not expected to be large enough to cause a flooding event at the site.

Overland Flow

The site has a fairly uniform fall from north to south and west to east. Any exceedance flows from the site will be directed towards proposed land drainage and French drainage on the site boundary and the proposed highway access where surface waters will drain to the road gullies.

It is considered that there will be no potential pathways identified for flooding from overland flows.

Groundwater

The topsoil across the site is underlain by what is believed to be impermeable clay soils. There is therefore a low risk for flooding to occur from groundwater seepage. The site is partially underlain by a major aquifer; however this is understood to be at a depth where there is no likely risk as a result of the development on it or the aquifer on the development.

4.8 Summary of Residual Risks

It is considered that there will be no residual risk as a result of the proposed development.

4.9 Flood Risk Mitigation

Site Drainage Systems

The proposals will result in typically 40- 45% of the site area being converted to an impermeable surface (hardstanding and roofs). The increase in impermeable surface area could have an impact on receptors downstream of the site and mitigation is required.

Tan 15 and Natural Resources Wales policy for site developments is that runoff from a site should not be increased. Drainage systems for the site should be designed based on the 1% annual probability design event. Additionally, potential increases in storm severity associated with climate change need to be considered (30% increase in rainfall depths).

Site drainage will be designed based on sustainable drainage principles as laid out in guidance documents TAN 15. It is believed from the Natural Resources Wales Maps that the site is not at risk from flooding from surface water run-off. The attached drawing– Indicative Drainage Arrangements Plan shows how the surface water drainage can be arranged, with storage in a pond system, with a typical capacity of 163.3m³. The drainage will outfall to the existing watercourse and will provide a suitable method for dealing with any potential flood risk from surface water run-off.

French drains will be provided to capture surface water run-off at boundaries and this will be directed to the attenuation. Permeable paving will be used where possible to the access road and parking areas to slow and delay run-off, with sub-grade drainage provided where necessary to capture any residual run-off.

Sustainable Drainage System

TAN 15 guidance advises that run-off from a site should not be increased and that a decrease of site runoff towards Greenfield levels is desirable. Where possible, this

should be done using Sustainable Drainage Systems (SuDS). Permeable paving will be provided where appropriate, together with consideration for the use of water butts and rainwater harvesting if suitable.

Design Standards

The surface water drainage run-off will be limited to the greenfield) run-off rate for all events up to the 1 in 100 year storm (including additional 30% climate change) or that a reduction to the existing surface water runoff is achieved.

Designs shall assess the anticipated increase in run-off and balance these against the existing Greenfield peak run-off rates. The volumes of storage required to limit predicted runoff rates to original Greenfield rates will then be calculated.

4.10 Assessment of Residual Impact Significance

Although no additional significant flood risks have been identified, appropriate SuDS will be deployed to ensure the development does not contribute to flooding of downstream receptors. With regards to flood risk, the application of SuDS will ensure run-off from the site will remain at Greenfield levels, resulting in no impact on flood risk.

5.0 Conclusions

The proposed development has been assessed with regards to flood risk and flood consequences and it is considered that the site will not be subject to any flooding.

It is considered that the proposed methods for surface water drainage of the site are appropriate and the proposals for surface water run-off flood risk has been managed and mitigated.

From anecdotal evidence there has not been any flooding in the field, nonetheless measures are proposed to address any potential risks, with the introduction of appropriate measures mentioned above.

It is considered that the site and location for the dwellings will be flood free, subject to satisfactory surface water drainage, which is typically shown on drawing– Indicative Drainage Arrangements Plan Appendix 2. The proposals will include cut-off drainage and collection and storage from all surfaces, such that there will be no residual flood risk to the proposed properties or elsewhere as a result of the development.

Appropriate attenuation will be provided within the development, with the discharge reduced to typical Greenfield run-off rates. The proposals indicated on the indicate scheme will include a detailed designed storage facilities, using a pond system for a 1 in 100 year event + 30% climate change and discharge via a flow control vortex to the watercourse. The initial calculations from the prospective impermeable areas will be in the region of 163.3m³, which are indicated within the micro drainage source control calculations attached.

It is considered that all potential flood risks have been assessed and suitable mitigation has been indicated to the schematic site plan. The proposals are considered appropriate and show how the site may drain and how potential flood risks may be mitigated.

A suitable means of foul water drainage is available to the existing sewers located within Ellesmere Lane, subject to a sewer connection approval from the Water Authority