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# Flood Consequence Assessment

For

New Brighton Road

Mold

Flintshire, CH7 6QQ

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**Client Name: Stewart Milne**

**Our ref: LRD29949**

**Date: August 2020**

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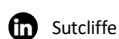
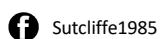
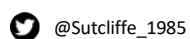
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## Flood Consequence Assessment

### DOCUMENT VERIFICATION

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## 1. Introduction

- 1.1. As part of the development process it is necessary to prepare a flood consequence assessment for the proposed development off New Brighton Road, Mold in accordance with the requirements of Technical Advice Note 15 (TAN 15).
- 1.2. The site area is approximately 33,768m<sup>2</sup> (3.37ha).
- 1.3. TAN 15 recognises that the detail and technical complexity of the flood consequence assessment should reflect the scale and significance of the development.
- 1.4. The site is situated Flood Zone A as identified on the TAN 15 Development Advice Map (DAM) (<https://naturalresources.wales/our-evidence-and-reports/maps/flood-risk-map?lang=en>).
- 1.5. TAN 15 seeks to:
  - 1.5.1. Promote development in areas at low risk of flooding and to reduce the flood risk resulting from development.
  - 1.5.2. Operate a precautionary framework governed by a DAM.
  - 1.5.3. Utilise definitions of vulnerable development and advice on permissible uses in locating developments and identifying the consequences of flooding.
- 1.6. The purpose of this site-specific flood consequence assessment is to demonstrate that the site falls within an area of low annual probability of flooding, assess the risk posed to the site from all sources of flooding, and assess the consequence of the development on flood risk.
- 1.7. Appendix 1 of TAN 15 provided a framework for assessing flood consequences, these requirements form the basis of this report.

## 2. Development description and location

- 2.1. The site is located off New Brighton Road, Mold, see figure 1. The location data for the site is:  
  

Post Code:	CH7 6RB
Grid Reference:	SJ 25229 65543
Coordinates:	X: 325229      Y: 365543
Latitude: 53.181713	Longitude: -3.1476340
- 2.2. The site is a greenfield site that has not been previously developed.
- 2.3. The proposed development involves the construction of 84 dwellings, associated parking and estate roads. The proposed site layout is included in Appendix 9.1.
- 2.4. According to TAN 15, Section 5 Figure 2, the development falls within the 'highly vulnerable' development category. The 'highly vulnerable' classification covers all residential property, public buildings, especially vulnerable industrial buildings and waste disposal sites.

- 2.5. The site is in Flood Zone A and according to TAN 15 Section 4 Figure 1 the site is considered to be at little or no risk of fluvial or tidal/coastal flooding. The justification test is not applicable and there is no need to consider flood risk further other than to avoid increasing flood risk elsewhere.



Figure 1: Site location plan [Source: Google Maps (<https://www.google.co.uk/maps/place>)]



Figure 2: Current land use [Source: Google Maps (<https://www.google.co.uk/maps/place/sat-image>)]

- 2.6. The proposed development is consistent with Local Development Documents and TAN 15. It is in a Zone A flood risk area and therefore satisfies the precautionary framework as it is in a zone with little to no risk of fluvial or tidal flooding.
- 2.7. TAN 15 sets out a summary of the policy requirements for Flood Zone A in Section 9, Table 1. The information pertaining to Zone A is presented below:
- 2.8. The site is situated in an area that is at low risk of flooding and it does not benefit from any existing flood defences.
- 2.9. A topographical survey of the site is included within Appendix 9.3 showing the current topographical relief of the site.

D A M	Development Type (Section 5)	Planning Requirements (Section 4)	Acceptability Criteria (Section 1 & Appendix 1)	Development Advice (Section 5,6,7 & Appendix 1)
A	Emergency Services, Highly vulnerable development, Less vulnerable development, Other	<ul style="list-style-type: none"> <li>▪ Justification test not applicable</li> <li>▪ Refer to surface water requirements</li> </ul>	<ul style="list-style-type: none"> <li>▪ No increase in flooding elsewhere</li> </ul>	<ul style="list-style-type: none"> <li>▪ No Constraints relating to river or coastal flooding, other than to avoid increasing risk elsewhere.</li> </ul>

**Table 1: Summary of TAN 15 Policy Requirements [Source: TAN 15 Section 9]**

- 2.10. The topographical survey and location plan show that the site is bounded to the north by New Brighton Road, to the east by an existing residential development, to the south by the A5119 and to the west by Argoed Close.
- 2.11. The Natural Resources Wales development advice maps have been consulted with regards to flood risk affecting the site. The site is not at risk of river or sea flooding but the development advice maps indicate that there is a risk of surface water flooding.

### 3. Objectives of the Assessment

- 3.1. The objective of the assessment is to:
- 3.1.1. Gain an appreciation of the consequences of all flooding on the proposed development.
- 3.1.2. Understand the consequences elsewhere within the catchment for a range of scenarios up to the 1% probability.
- 3.1.3. Establish appropriate mitigation measures that can be incorporated in to the design of the site to minimise risk to life, property and disruption to people living on the site and elsewhere within the catchment.
- 3.2. These objectives are discussed in Sections 4-7.

### 4. Assessing flooding consequences

- 4.1. The site is remote from main rivers and areas of coastal flooding. The mechanisms of flooding that may affect the site are:

- 4.1.1. Surface water runoff.
- 4.1.2. Groundwater emergence.
- 4.2. Surface water runoff leading to flooding could occur in areas where runoff rates are increased due to the introduction of impermeable areas. Surface water flooding on the developed site would generally occur if the inlets to the conveyance system are temporarily exceeded due to rainfall intensity or blockage.
  - 4.2.1. A review of the development advice maps suggests the eastern area of the site is susceptible to surface water flooding. The topographic survey of the site confirms that this is the low point of the site and the wider catchment.
  - 4.2.2. Using OS Maps the catchment draining through the low point is approximately 17.62 ha. The green shaded area in Figure 3 represent the upstream catchment that potentially contributes to the on-site surface water flooding.



**Figure 3: Upstream Catchment Contributing to Surface Water Flooding.**

- 4.2.3. Runoff volumes have been assessed using ReFH2 Methodology, for the 17.62 ha catchment, the results are summarised in Table 2.



Return period (yrs)	Urbanised peak flow (m <sup>3</sup> /s)	As-rural peak flow (m <sup>3</sup> /s)	As-rural direct runoff (m <sup>3</sup> )	Drainage Removal Volume (m <sup>3</sup> )	Net Runoff (m <sup>3</sup> )
1	0.124	0.121	911.896	2027.000	-1115.104
2	0.142	0.139	1056.372	2027.000	-970.628
5	0.204	0.200	1541.608	2027.000	-485.392
10	0.253	0.249	1937.481	2027.000	-89.519
15	0.286	0.281	2196.120	2027.000	169.120
30	0.351	0.346	2734.410	2027.000	707.410
100	0.489	0.483	3846.127	2027.000	1819.127

**Table 2: ReFH2 Runoff Volumes**

- 4.2.4. Table 2 includes a removal rate of 12mm/hr for the upstream catchment based on Environment Agency Guidance as the upstream catchment is urbanised and served by a drainage network. When the removal rate is considered against the runoff the potential for surface water flooding addressed, only the 1% AEP event suggests that runoff from the upstream catchment would lead to surface water flooding on site.
- 4.2.5. Table 2 represents the runoff volumes related to the 17.62 ha catchment identified in Figure 3. This catchment can be broken down in to two sub-catchments: a) the development site (3.37 ha) and b) the catchment external to the development site (14.25 ha).
- 4.2.6. To mitigate the risk posed by the potential for offsite surface water runoff contributing to flooding on site the proposed design should seek to incorporate an element of storage solely for managing surface water flood risk emanating off site.
- 4.2.7. As the development site runoff will be managed separately the runoff figures from Table 2 can be refined to only reflect the offsite catchment area that contributes to surface water flooding on the site. Table 3 reflects this breakdown with the Net Storage Deficit indicating the minimum storage volume required to manage off site runoff that may affect the site.

Return period (yrs)	As-rural direct runoff (17.62 ha) (m <sup>3</sup> )	External Catchment Runoff (14.25 ha) (m <sup>3</sup> )	Development Site Runoff (3.37 ha) (m <sup>3</sup> )	Drainage Removal Volume (m <sup>3</sup> )	Net Runoff = External Catchment- Drainage Removal (m <sup>3</sup> )	Net Storage Deficit (m <sup>3</sup> )
1	911.896	737.487	174.409	2027.000	-1289.513	No Deficit
2	1056.372	854.330	202.042	2027.000	-1172.670	No Deficit
5	1541.608	1246.760	294.848	2027.000	-780.240	No Deficit
10	1937.481	1566.919	370.562	2027.000	-460.082	No Deficit
15	2196.120	1776.090	420.030	2027.000	-250.910	No Deficit
30	2734.410	2211.427	522.983	2027.000	184.427	No Deficit
100	3846.127	3110.517	735.610	2027.000	1083.517	No Deficit

**Table 3: Catchment Runoff Breakdown**

The residual volume of the detention basin, following management of the 100-year plus climate change event, should be approximately 1083m<sup>3</sup> to provide storage for the surface water emanating offsite.

- 4.2.8. Surface water runoff resulting from the development should be managed by the provision of drainage network to capture and manage rainfall and runoff. The drainage design will mitigate the risk posed by surface water flooding within the site.
- 4.2.9. The proposed site levels must ensure that topographical relief directs surface water flooding away from buildings and access and egress routes.
- 4.2.10. Managing runoff on site will mitigate the offsite impacts of surface water runoff.
- 4.3. Groundwater emergence could cause flooding if groundwater broke surface in low lying areas of the site.
  - 4.3.1. The Flintshire Local Flood Risk Management Strategy notes that in Flintshire it is difficult to attribute flooding to groundwater as it generally occurs in combination with pluvial and/or fluvial flooding.
  - 4.3.2. As the site is not at risk of pluvial or fluvial flooding the risk from groundwater flooding can be considered low.
  - 4.3.3. The proposed development will not adversely affect groundwater levels.
- 4.4. In general, the development can be considered to be at low risk of flooding and the inclusion of mitigation measures (such as raising finished floor levels above the surround ground and providing storage for surface water originating offsite) and a drainage network incorporating SuDS and flow controls will mitigate risk both on and off site.

## **5. Acceptability criteria for flooding consequences**

- 5.1. Although the site is not in a flood plain it can be assessed against the acceptability criteria to confirm the conditions are not required or can be deemed satisfied:
  - 5.1.1. If flood defences are present they must be proved to be structurally adequate during overtopping conditions. No defences are present the condition can be deemed satisfied.
  - 5.1.2. Future maintenance costs for mitigation measures is not a factor as no structural mitigation measures are being proposed to defend against or alleviate flooding. The proposed drainage network will be offered to LLFA for adoption.
  - 5.1.3. Flood warnings are not required for the proposed development.
  - 5.1.4. The site is at low risk of flooding, escape/evacuation routes are not required.
  - 5.1.5. Through the management of runoff there is no increased flood risk elsewhere as consequence of the development.

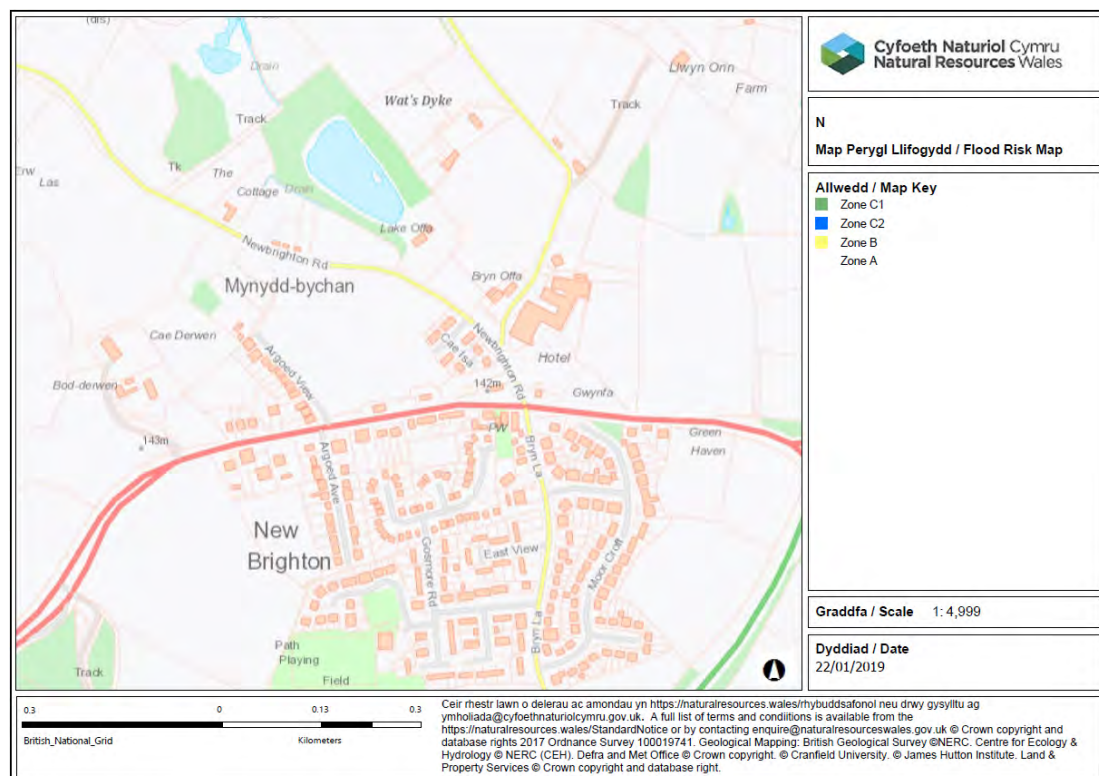
## **6. Awareness of flooding consequences**

- 6.1. The site is not in a flood risk area according to the Development Advice Map. The planning authority is not required to impose conditions that draw attention to flood risk.

## 7. Technical assessment of flooding consequences

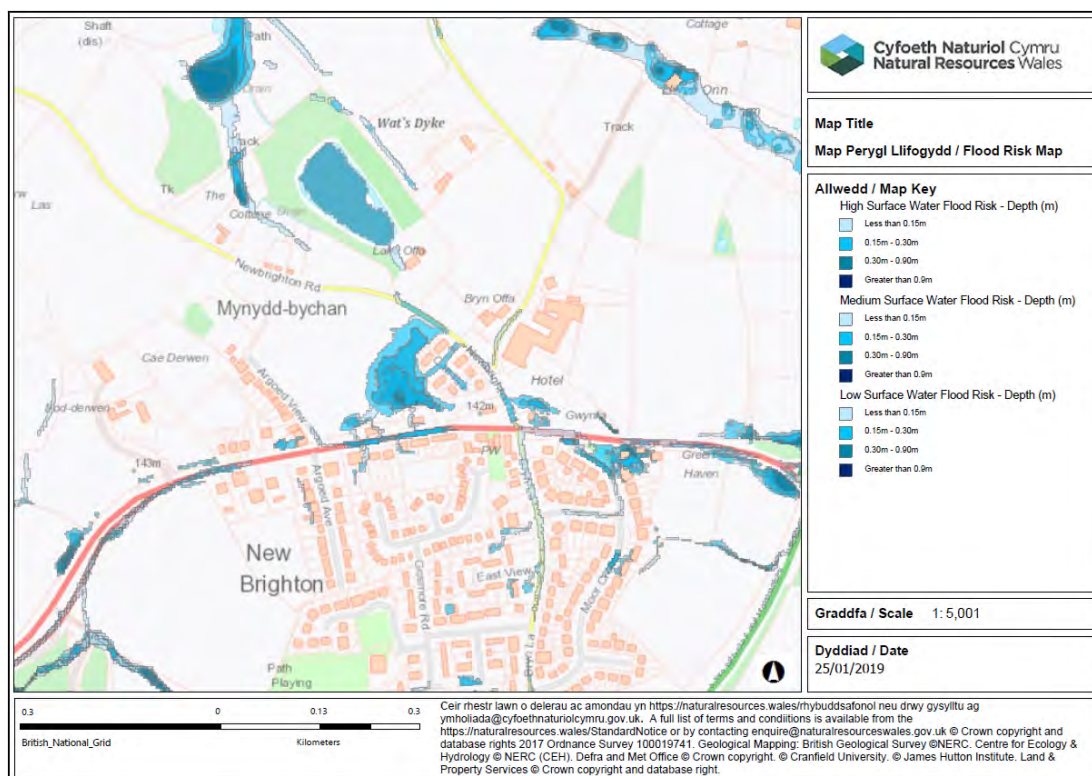
- 7.1. TAN 15 notes that the detail and complexity of the flood consequence assessment should be related to the scale and significance of the development. Although the development is a major development it is situated outside the river and sea flood zones identified on the Development Advice Maps, as such the detail and technical complexity of the assessment will be limited to the minimum requirements set out in Appendix A1.E of TAN15.
- 7.2. A location plan is provided in Appendix 9.2 showing the site location and all possible sources of flooding that affect the site.
- 7.3. The existing topographical survey is provided Appendix 9.3. All levels are to related to Ordnance Datum.
- 7.4. The NRW development advice maps confirm that the site is not in a flood zone.

The portal linked to the Development Advice Maps which displayed flood outlines relating to rivers, sea, reservoir and surface water flood risk. The full set of development advice maps, from high to low risk scenarios, are included in Appendix 9.5; summary plans of the risk from river, seas and ground water are presented in Figures 3 and 4.



**Figure 4: DAM Flooding from the River and Sea [Source: Natural Resources Wales]**

Figure 4 confirms that the site is not at risk of flooding from rivers or the sea. As the site is not at risk from these sources they will not be discussed further.



**Figure 5: DAM Surface Water Flood Risk [Source: Natural Resources Wales]**

Figure 5 shows the overall surface water flood risk affecting the site. Individual maps for the high, medium and low risk scenarios are provided in Appendix.

The development advice maps for the high, medium and low risk scenarios provide information on depth, velocity and hazard for scenario which is summarised in Table 3. The information is taken from the maps that can be seen in Appendix 9.5.

Scenario	Depth	Velocity	Hazard
High Risk	150-300mm	<0.25m/s	Danger for Some
Medium Risk	150-300mm	<0.25m/s	Danger for Some
Low Risk	300-900mm	>0.25m/s	Danger for Some -Danger for Most

**Table 4: Summary of Surface Water Flood Risk**

With the exception of the low risk the surface water flooding depths remain between 150-300mm. The low risk hazard results from rainfall with a return period between 1 in 1000 and 1 in 100 chance of occurring in any given year, this is generally above the required design parameters but the potential for flooding should be considered in the site design.

Despite the low risk mitigation measures, such as raised finished floor levels and storage for surface water flooding, should be introduced to ensure that properties are not flooded and access/egress is maintained.

- 7.5. Greenfield and post-development runoff rates and volumes have been determined using catchment parameters from the FEH web service and ReFH2. The results are tabulated in Table 5.

The calculations were performed following the guidance in the ReFH2 Technical Guidance Document for plot-scale applications. Using this approach, the greenfield rates are obtained from the following equation:

$$\text{Greenfield runoff rate} = \frac{10 \times \text{Peak flow}}{\text{Area}}$$

The peak flow figure for the design return period is read from the ReFH2 output the resultant greenfield rates are presented in table 4.

	<b>Catchment Area (km<sup>2</sup>)</b>	<b>Peak Flow (m<sup>3</sup>/s)</b>	<b>Greenfield Runoff Rate (l/s/ha)</b>	<b>Greenfield Runoff Volume (m<sup>3</sup>)</b>
<b>Q<sub>1</sub></b>	0.0337	0.025	7.41	163
<b>Q<sub>2</sub></b>	0.0337	0.029	8.60	191
<b>Q<sub>30</sub></b>	0.0337	0.075	22.25	503
<b>Q<sub>100</sub></b>	0.0337	0.107	31.75	709

**Table 5: Greenfield Runoff Rates and Volumes**

The ReFH2 methodology allows for the post-development scenario to be analysed by making allowance for urbanisation in the catchment. Detail design is being undertaken and once the post-development impermeable areas are known the pre- and post-development runoff rates and volumes should be analysed with any increase in runoff managed in accordance the the Welsh National Standards and The SuDS Manual (Ciria C753).

The proposed drainage system for the development should seek to reduce the rate and volumes of runoff to pre-development/greenfield rates. As the detailed plans of the development are progressed the proposed drainage must seek satisfy the greenfield rates and volumes as closely as reasonably practical.

The Welsh Government has issued advice relating to climate change allowances for flood consequence assessments. This guidance suggests climate change factors for the main river basin districts in Wales and recommends the central change factor is used for the assessment of flood consequences. The site falls within the Dee river basin district and the climate change factors for the design epochs are provided in Table 5.

<b>Dee Basin</b>	<b>Total Potential Change by 2020s</b>	<b>Total Potential Change by 2050s</b>	<b>Total Potential Change by 2080s</b>
<b>Upper</b>	20%	30%	45%
<b>Central</b>	10%	15%	20%
<b>Lower</b>	5%	5%	5%

**Table 6: Climate Change Factors**

The central estimate should be used to evaluate the post-development runoff to ensure that climate change is adequately addressed within the design.

Adhering to greenfield rates and volumes and providing long term storage to mitigate the increased volume, due to increased impermeable area and climate change, and managing discharge will ensure that the development does not contribute or exacerbate the flood risk on or offsite.

- 7.6. Due to the inclusion of long-term storage and flow control within the proposed development drainage the likely impact on neighbouring or other locations is minimal.

7.7. No defenses are required to mitigate the flooding to or caused by the development.

## 8. Proposed

8.1. The proposed drainage strategy must comply with the requirements of the FCA identified in the preceding sections and be implemented through the adoption of the Statutory Standards for Sustainable Drainage Systems (Wales, 2018).

8.2. The National Standards are broken down to six standards:

8.2.1. Standard S1 – Surface water runoff destination

8.2.2. Standard S2 – Surface water runoff hydraulic control

8.2.3. Standard S3 – Water quality

8.2.4. Standard S4 – Amenity

8.2.5. Standard S5 – Biodiversity

8.2.6. Standard S6 – Design of drainage for construction, operation and maintenance.

### 8.3. Standard S1

8.3.1. Standard S1 seeks to manage surface water discharge in accordance with the following hierarchy:

8.3.1.1. Collect for reuse;

8.3.1.2. Infiltrate to ground;

8.3.1.3. Discharge to a surface water body;

8.3.1.4. Discharge to a surface water sewer or another drainage system;

8.3.1.5. Discharge to a combined sewer.

8.3.2. Although there is no foreseeable demand for non-potable water throughout the design life of the site it is necessary to consider the collection of surface water runoff for reuse.

8.3.3. For this development it is proposed that water butts be used to collect rainwater from the roofs to make it available, for example, for irrigation or car washing.

8.3.4. As this approach, like rainwater harvesting tanks, in most cases is not adequate to deal with site drainage an overflow to a lower priority destination will be required.

8.3.5. The second priority level is infiltration. Infiltration testing carried out by Brownfield Solutions Ltd confirms that infiltration is not viable on this site. The BRE365 test results are summarised in Table 6.

Location	Infiltration Rate (m/s)
SA01	6.31x10 <sup>-8</sup>
SA02	2.18x10 <sup>-6</sup>
SA03	1.90x10 <sup>-6</sup>
SA04	6.94x10 <sup>-7</sup>
SA05	6.09x10 <sup>-8</sup>
SA06	1.12x10 <sup>-6</sup>
SA07	3.19x10 <sup>-7</sup>
SA08	1.11x10 <sup>-6</sup>

Table 7: Brownfield Solutions BRE365 Test Results

The reported rates are less than the recommend  $1 \times 10^{-5}$  m/s and as such soakaways receiving point discharges would not comply with half drain time requirements.

The guidance notes for Standard S2 suggest that permeable surfaces are deemed compliant for all soil types provided no additional drained area is routed through the permeable surface. Adopting this advice for the surface water strategy means that permeable surfaces can be utilised for private driveways and access roads. The local highways authority does not adopt permeable carriageways, these will be drained using traditional methods.

Surface water runoff not captured (roof runoff not stored in the water butt and adopted highway) by interception methods will overflow to a lower priority destination.

- 8.3.6. The third level of surface water management is to discharge to surface water body. The nearest water body to the site is Lake Offa. There is no watercourse between the site and Lake Offa to which surface water can be discharged.

Surface water runoff from the previous levels will need to be managed by a lower priority level.

- 8.3.7. Level 4 is the discharge of surface water to a surface water sewer or other surface water drain. Statutory records and site investigations confirm there is a surface water sewer that runs through the north eastern boundary of the development site. This surface water sewer discharges to a ditch on the northern side of New Brighton Road prior to discharging to Lake Offa.

In accordance with the hierarchy this is where surface water not managed by the preceding levels will be managed.

- 8.3.8. The final level of the hierarchy is not required for this development site.

#### 8.4. **Standard S2**

- 8.4.1. Standard S2 seeks to address the hydraulic control (rate and volume of runoff) from the development site.

- 8.4.2. Interception methods that can be considered compliant are: green roofs, rainwater harvesting systems, soakaways, permeable surfaces, swales, infiltration trenches, detention basins, bioretention areas and ponds.

- 8.4.3. Several interception methods are reliant on infiltration to function, the poor infiltration rates reported by Brownfield Solutions indicate these (soakaways, swales, infiltration trenches) are not viable.

- 8.4.4. The proposed development seeks to manage the rate and volume of runoff through the inclusion of:

- 8.4.4.1. Water butts;
- 8.4.4.2. Permeable paving;
- 8.4.4.3. A detention basin;
- 8.4.4.4. Long-term storage; and

- 8.4.4.5. Flow controls.
- 8.4.5. The discharge rate from the site, for runoff not fully managed at source, is limited to the  $Q_{Bar}$  rate of 8.3 l/s.
- 8.4.6. Restricting the surface water runoff rate to  $Q_{Bar}$  requires the introduction of long-term storage within the proposed drainage network.
- 8.4.7. The long-term storage is provided in two forms: a traditional piped network and a detention basin. The detention basin is primarily for the interception of the offsite surface water flooding noted in Section 4.
- 8.4.8. The proposed drainage network is designed for all return periods up to and including the 100-year plus climate change event.
- 8.4.9. A drainage strategy plan and supporting calculations are included in the appendix for reference.
- 8.4.10. The exceedance and failure of the system are able to be managed on-site as the site levels direct any exceedance flows (from storms in excess of the design standard or system failure) to the detention basin thus helping to mitigate any offsite impacts,

#### 8.5. **Standard S3**

- 8.5.1. Standard S3 seeks to ensure that surface water runoff being discharge from site does not contribute to the contamination of the downstream receiving watercourse.
- 8.5.2. According to the SuDS Manual (Ciria C753), the pollution hazard levels for the land uses found within a residential estate are very low (i.e. roofs) and low (driveways, low traffic roads etc).
- 8.5.3. With the pollution hazard identified it is possible to identify the SuDS mitigation measures that meet or exceed the pollution index.
- 8.5.4. The proposed surface water management system includes permeable surfaces and a detention basin. Table 26.3 from Ciria C753 confirms that the mitigation indices of these SuDS meets or exceeds the pollution indices for very low and low classification.
- 8.5.5. With the proposed mitigation measures in place the scheme will satisfy the water quality criteria of the National Standards.

#### 8.6. **Standard S4**

- 8.6.1. The purpose of Standard 4 is to demonstrate how SuDS within the proposed scheme contribute towards:
  - 8.6.1.1. Making sites pleasant places to live;
  - 8.6.1.2. Reduce hazards from climate change;
  - 8.6.1.3. Create amenity space; and
  - 8.6.1.4. Promote the wellbeing of site users.



- 8.6.2. The proposed development achieves these aims by providing aesthetically pleasing public open space i.e. the detention basin which is dry between events, that softens the impact of the development while introducing landscaped areas which provides the opportunity for increased biodiversity.
- 8.6.3. The inclusion of public open space and the detention basin satisfies the amenity requirements of the National Standard.
- 8.7. **Standard S5**
- 8.7.1. Standard S5 seeks to maintain or improve biodiversity within the development site.
- 8.7.2. Biodiversity opportunities are best satisfied through the provision of visible surface SuDS features. The proposed drainage system consists of traditional components and surface SuDS (the detention basin).
- 8.7.3. The detention basin and other public open spaces within the site provide the opportunity to support the local ecosystem through the provision of natural local habitat that will encourage native species.
- 8.7.4. A landscaping plan will need to be developed to support the requirements of this element.
- 8.7.5. Together, the SuDS combined with a suitable landscaping plan will address the biodiversity requirement of the National Standard.
- 8.8. **Standard S6**
- 8.8.1. Standard S6 takes into account the design, construction, operation and maintenance of the SuDS system.
- 8.8.2. The proposed drainage system is a mixture of private and adopted features. The land/property owner will be responsible for the management and maintenance of the private elements i.e. the permeable pavements, with the Lead Local Flood Authority in its capacity as SAB adopting the communal aspects of the proposed system.
- 8.8.3. Following construction there will be a 12-month defects/maintenance period during which the principal contractor will retain responsibility.
- 8.8.4. Table 8 identifies the key management and maintenance requirements for the SuDS components shown on the drainage strategy. The maintenance requirements can be grouped in to three categories: regular maintenance, occasional maintenance, and remedial maintenance.
- 8.8.5. Regular maintenance consists of the basic tasks that are carried out frequently and on a predictable schedule.
- 8.8.6. Occasional maintenance consists of tasks that are predictable but are not required a frequently as those falling under the regular maintenance.

Operation and Maintenance Activity	SuDS Component		
	Permeable Pavement	Detention Basin	Flow Control
<b>Regular Maintenance</b>			
Inspection	■	■	■
Litter and Debris Removal	□	-	□
<b>Occasional Maintenance</b>			
Sediment Management <sup>1</sup>	■	■	■
<b>Remedial Maintenance</b>			
Structure rehabilitation/repair	□	□	□
Infiltration surface reconditioning	□	□	-

**Table 8: SuDS Maintenance Activities**

■ will be required □ may be required

<sup>1</sup> sediment should be collected and managed upstream of the main device.

- 8.8.7. Remedial maintenance is only required to rehabilitate the system when faults are identified during regular or occasional maintenance or pollution leads to contamination of the system. After the initial hand-over inspection confirms the system has been constructed and installed as designed inspections should take place monthly for 12-months. The frequent initial inspections will help determine the optimum maintenance routine as well as identify performance issues such as silt build-up and poorer infiltration than expected.
- 8.8.8. The inspection checklist should cover the typical actions noted in Table 9.
- 8.8.9. At a minimum, the maintenance regime will require the following:
- 8.8.9.1. An annual inspection of the drainage network to ensure that gullies, gutters and other inlets to the drainage system are not blocked.
- 8.8.9.2. An annual inspection of the flow control chamber to ensure that the control is in full working order and free from blockages.
- 8.8.9.3. Any deficiencies identified during the annual inspections must be rectified immediately to ensure the continued function of the system.

<b>Inspection Date:</b>				
	Details	Y/N	Action Required	Date Completed
<b>General Inspection Items</b>				
Is there evidence of poor hydraulic performance (i.e. standing water)?				
Is there any evidence of accidental spillages (oils etc.)?				
Have any H&S risks been identified?				
Is there any deterioration of permeable paving surface?				
<b>Silt/Sediment Accumulation</b>				
Is there any sediment accumulation in the catch-pits? (If yes remove)				
Does the permeable paving need sweeping to remove silt?				
<b>System Blockages</b>				
Is there any evidence of litter within the system? Can it cause blockages?				
Is there any evidence of blockages in gullies and gutters?				
<b>Infrastructure</b>				
Is there any evidence of accidental damage (i.e. broken or misplaced covers, settlement in vicinity of the cellular storage?)				
Is there any evidence of cross connections or other contamination (i.e. oils)				
<b>Other observations</b>				
Appended information (i.e. photos)				
<b>Suitability of current maintenance regime</b>				
Continue as current?				
Increase maintenance?				
Decrease maintenance?				
<b>Next inspection</b>				
Proposed date for next inspection				

*Table 9: Inspection checklist*

## 9. Foul Water

- 9.1. Foul water from the development will be design on a separate system as required by LLFA, Welsh Water and current regulations.
- 9.2. The foul water system will be designed in accordance with the Approved Document H and the Design and Construction Guide (formerly Sewers for Adoption 7th Edition).
- 9.3. The proposed foul system will connect to the public sewer network and will be offered for adoption under a Section 104 Agreement.
- 9.4. Natural Resource Wales (NRW) interim advice note for planning applications recommends developments should be screened to determine whether they may increase phosphate concentrations in river Special Areas of Conservation.

- 9.4.1. Flintshire held a public examination on the Flintshire Local Development Plan 2015-2030 on Tuesday 13<sup>th</sup> April 2021 in which a question was raised in relation to the Habitats Regulation Assessment (HRA) and whether it has taken the NRW interim advice regarding phosphate levels in to account.
- 9.4.2. Flintshire's response notes that developments which are proposed to connect to the mains wastewater treatment works with capacity to accommodate the additional wastewater and any additional phosphate are unlikely to increase phosphate levels in the SAC.
- 9.4.3. Furthermore, the Council notes that the River Dee within the County is tidal and that tidal sections of rivers have been excluded from the SAC's as the evidence base underpinning the phosphate targets relates to freshwater only.
- 9.4.4. The Council received advice from Dwr Cymru Welsh Water (DCWW) regarding housing allocations in the Local Development Plan. The application site is identified in the Local Development Plan as site HN1.10 New Brighton, Cae Issa and DCWW have noted that it is served by the Mold Wastewater Treatment Works which has both capacity to treat phosphate and have the necessary phosphate permit in place.
- 9.5. From this review the proposed development is unlikely to have a significant impact on the receiving river SAC as the foul water is discharge to the public main sewer and treated in the Mold WWTW works which has capacity to treat phosphates.

## 10. Summary

- 10.1. The potential sources of flooding (river, surface water runoff, and groundwater) have been assessed:
  - 10.1.1. River and Sea – the site is not at risk of flooding from these sources.
  - 10.1.2. Surface Water Runoff – the site is risk of surface water flooding; the risk can be mitigated through the provision of flood storage and careful consideration of the proposed levels.
  - 10.1.3. Groundwater – the site is not at risk of flooding.
- 10.2. Surface relief of the proposed topography will direct water away from the proposed buildings.
- 10.3. No special access/egress measures are required as the site is not deemed to be at risk of river or sea flooding.
- 10.4. In line with current guidance the site must be developed so as not to increase flood risk elsewhere. This is to be achieved through the provision of long-term storage and the management of discharge rate to those of the greenfield site.
- 10.5. The development drainage strategy incorporates current best practices as outlined in:
  - 10.5.1. The Statutory Standards for Sustainable Drainage in Wales – designing, constructing, operating and maintaining surface water drainage systems.

- 10.5.2. CIRIA C753 – The SuDS Manual.
- 10.5.3. Flintshire County Council’s guidance – Management of Surface Water for New Development.
- 10.6. Sustainable urban drainage systems should be included in the drainage design to comply with current guidance. Surface water has been designed to be discharged in line with the accepted hierarchy:
  - 10.6.1. Reuse;
  - 10.6.2. Infiltrate;
  - 10.6.3. Discharge to watercourse;
  - 10.6.4. Discharge to surface water sewer;
  - 10.6.5. Discharge to combined sewer.
- 10.7. The site, following mitigation of surface water flooding, can be considered to be at low risk of flooding from all sources. There is no requirement to impose planning conditions on the development to ensure no additional risk to life and minimal damage and disruption to people and property and the natural environment.
- 10.8. The proposed drainage strategy adopts the principles of the National Standards and implements the sustainable drainage systems in accordance with the SuDS Manual guidance.
- 10.9. The interim advice from NRW in relation to phosphates has been considered along with Council’s response and the site has been identified as discharging foul water to the public sewer and treated in a WWTW with capacity to treat the additional phosphate load.

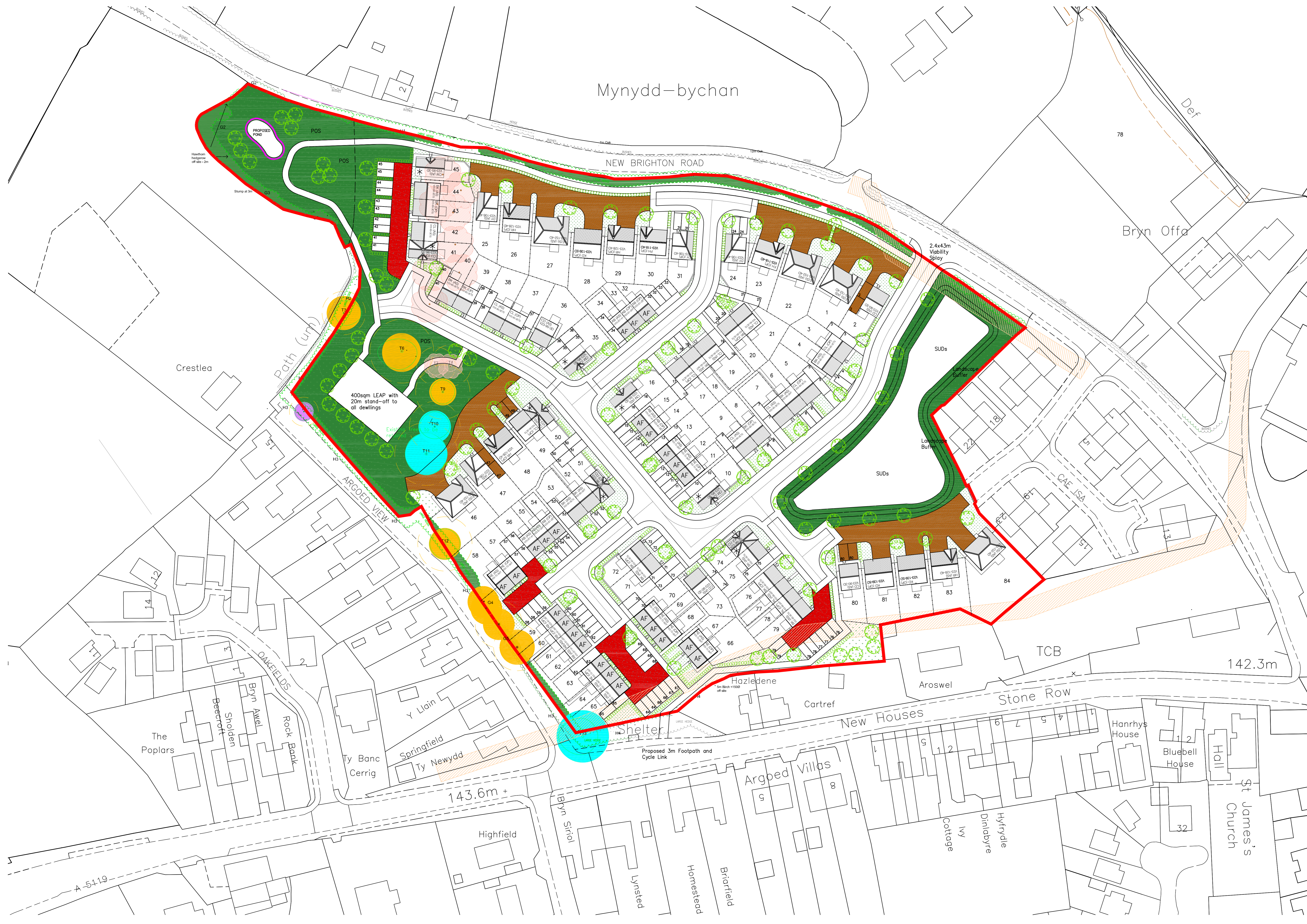
## 11. Appendix

11.1. Proposed Site Plan

# Argoed View, Nr Mold Proposed Sketch Layout - 1:500

Planning Layout Legend

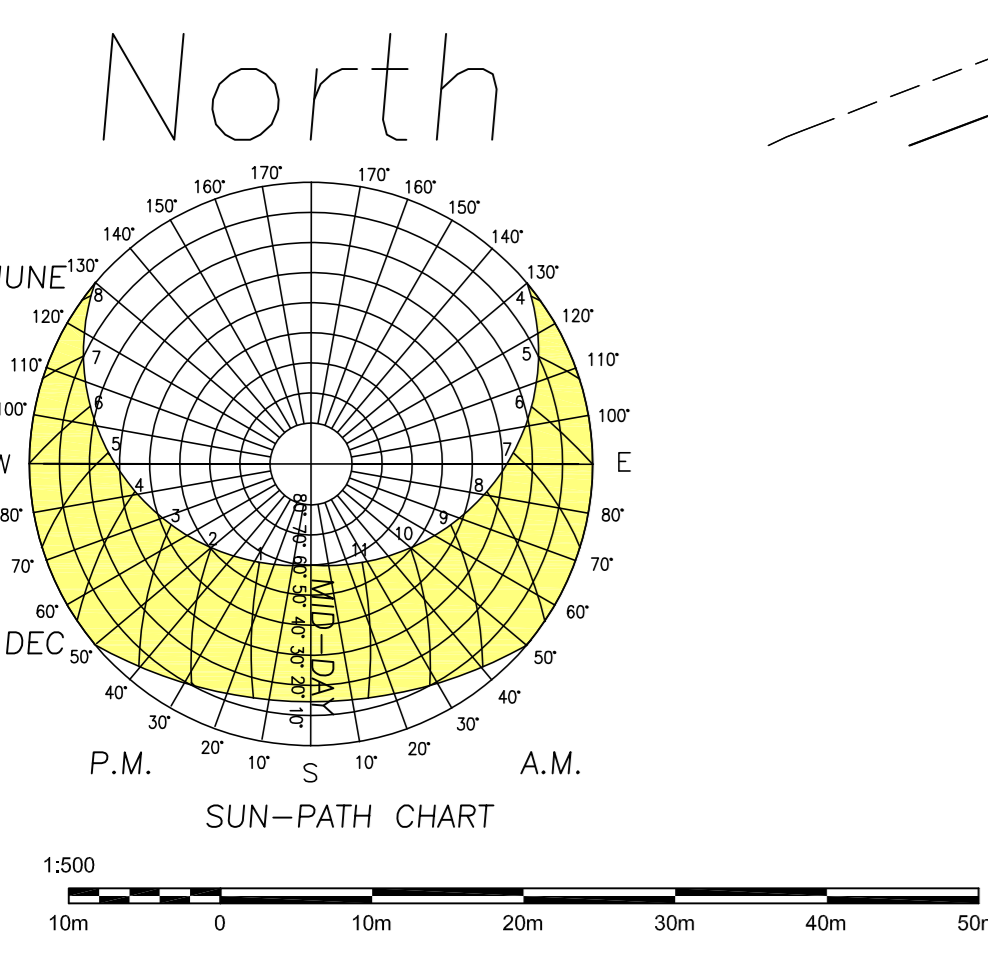
- Proposed dwelling and Dwelling type.
- Proposed dwelling handling.
- Plot numbers.
- Affordable Dwellings.
- Proposed dual aspect units.
- Proposed SUDS pond.
- Proposed indicative tree position. (refer to landscaping layout for detail)
- Existing Category A trees to be retained. (refer to tree report for detail)
- Existing Category B trees to be retained. (refer to tree report for detail)
- Existing Category C trees to be retained. (refer to tree report for detail)
- Trees to be removed. (refer to tree report for detail)
- Hard landscaping Treatment A. Alternative surface material.
- Hard landscaping Treatment B. Block Paving, Terrazzo, gravel to shared surface, road joints and private driveway. (refer to tree report for detail)
- Soft Landscaping. Soft Landscaping. Refer to landscaping plans for schedule and detail.
- Boundary Treatment A. 1000mm high brick screen wall.
- Boundary Treatment B. 1800mm high stone screened fence.
- Boundary Treatment C. 1200mm high 'lock proof' post and wire fence.
- Application Site boundary.
- Existing Easement.



STEWART  
**Milne**  
HOMES

Schedule of Accommodation

Mixed Dwelling Types AFFORDABLE		SOFT	No	Total Soft	
AB	5%	Aberlady Mid	654	4	2616
AB	10%	Aberlady End	657	8	5236
AE	4%	Aulemore Mid	770	3	2310
AE	12%	Aulemore End	770	10	7700
<b>Total dwellings and soft</b>				<b>25</b>	<b>17,882</b>
2/3 Bed Mixed Dwelling Types		SOFT	No	Total Soft	
AL	3%	Alrick Mid	733	2	1426
BK	5%	Berwick Mid	866	3	2598
BK	22%	Berwick End	869	13	11297
CL	19%	Cairnhill	972	11	10692
CL	7%	Colross	1033	4	4124
3 Bed Detached Dwellings		SOFT	No	Total Soft	
CD	7%	Castelford	963	4	3952
CM	5%	Corrinhom	1026	4	4104
4 Bed Semi Detached Dwellings		SOFT	No	Total Soft	
DY	7%	Dewsbury	1141	4	4564
4 Bed Detached Dwellings		SOFT	No	Total Soft	
EH	3%	Farnham	1366	2	2532
HR	7%	Harris	1382	4	5528
KD	4%	Kendal	1493	3	4479
5 Bed Detached Dwellings		SOFT	No	Total Soft	
LE	8%	Leven	1630	5	8150
<b>Total dwellings and soft - OMS</b>				<b>59</b>	<b>63,344</b>
<b>Total dwellings and soft - including Affordable</b>				<b>84</b>	<b>81,238</b>
Gross Site Area in Acres				8.344	
POS				1.118	
SUDS				0.706	
Single Sided Road				0.268	
Undevelopable				0.507	
Net Site Area in Acres				5.75	
Density (units per acre)				15	
Density (units per hectare)				36	
Nett Square foot / Acre				14,139	



Rev	Details	Date	By	Chk
DATE	03.2021	DRAWN	DJM	
SCALE	1:500	CHK		
<b>Argoed View, Nr Mold</b>				
<b>Proposed Planning Layout</b>				
Dwg No	SK296/NBM/PL50	Rev		
<b>STEWART Milne HOMES</b>		Stewart Milne Homes Harrier House 2 Lumsdale Road Cobra Business Park Trafford Park Manchester Telephone (0161) 866 6900 fax (0161) 866 6909		






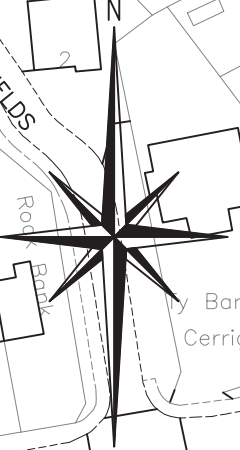
11.2. Existing Topographical Survey



11.3. Existing Areas Plan



EXISTING AREAS :		
	PERVIOUS: LANDSCAPING	33770m <sup>2</sup>
	IMPERVIOUS : TARMAC/PAVING:	0m <sup>2</sup>
	ROOF:	0m <sup>2</sup>
TOTAL SITE AREA:		33770m <sup>2</sup>



P2	17.05.19	SB	SITE PLAN UPDATED	CR
P1	24.01.19	SB	PRELIMINARY DRAWING	AJB
Rev	Date	Checked	Description	By

**PRELIMINARY DRAWING**



18-20 Harrington Street, Liverpool L2 9QA  
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 e: sutcliffe@sutcliffe.co.uk w: www.sutcliffe.co.uk

Client: **STEWART MILNE HOMES**

Project: **NEW BRIGHTON ROAD MOLD**

Drawing title: **EXISTING SITE AREAS**

Scale at A3	1:1000	Manhole Reference	29949-6001
Drawn by	AJB	Revision suffix	P2
Date	JAN. 2019		

11.4. Proposed Areas Plan



PROPOSED PERVIOUS AREAS:	
<span style="color: green;">■</span>	LANDSCAPING: 17978 SQ. m
<span style="color: red;">■</span>	PERMEABLE DRIVEWAYS: 4806 SQ. m
<hr/>	
	TOTAL PERVIOUS: 22,784? SQ. m
PROPOSED IMPERVIOUS AREAS:	
<span style="color: magenta;">■</span>	ROOF: 4772 SQ. m
<span style="color: orange;">■</span>	PRIVATE PAVED AREAS: 1725 SQ. m
<span style="color: cyan;">■</span>	ROADS AND FOOTPATHS: 4489 SQ. m
<hr/>	
	TOTAL PERVIOUS: 12120 SQ. m
<hr/>	
	TOTAL SITE AREA: 33770 SQ. m

Rev	Date	Checked	Description	By
P4	30.04.21	SB	SITE PLAN UPDATED	MG
P3	20.08.20	SB	SITE PLAN UPDATED	MG
P2	17.05.19	SB	SITE PLAN UPDATED	CR
P1	24.01.19	SB	PRELIMINARY DRAWING	AJB

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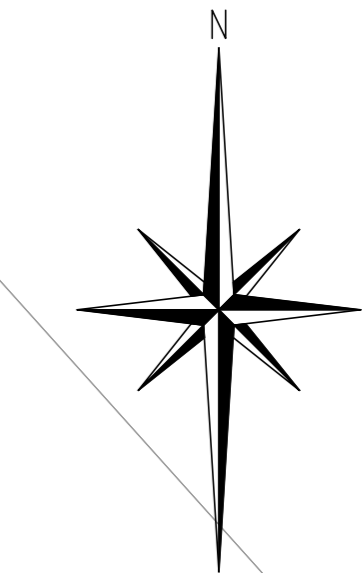
Client: **STEWART MILNE HOMES**

Project: **NEW BRIGHTON ROAD MOLD**

Drawing title: **PROPOSED SITE AREAS**

Scale at A3	1:1000	Manhole Reference	29949-6000
Drawn by	AJB	Revision suffix	P4
Date	JAN. 2019		

11.5. Drainage Strategy Plan



HYDROBRAKE DETAILS	
MANHOLE REFERENCE	S18
MANHOLE SIZE	2700mm DIA
HYDROBRAKE TYPE	OPTIMUM
HYDROBRAKE REFERENCE	MD-SHE-0122-8300-1834-8300
DISCHARGE RATE	8.3 l/sec
DESIGN HEAD	1.834m
ORIFICE SIZE (mm)	122
WEIR DETAILS	
INVERT LEVEL (m)	139.030m
WEIR LEVEL (m)	N/A

**GENERAL NOTES**

DO NOT SCALE OFF THIS DRAWING

This drawing to read in conjunction with all relevant structural and architectural drawings and specifications.

All dimensions to be checked on site by the contractor / fabricator prior to commencement of works.

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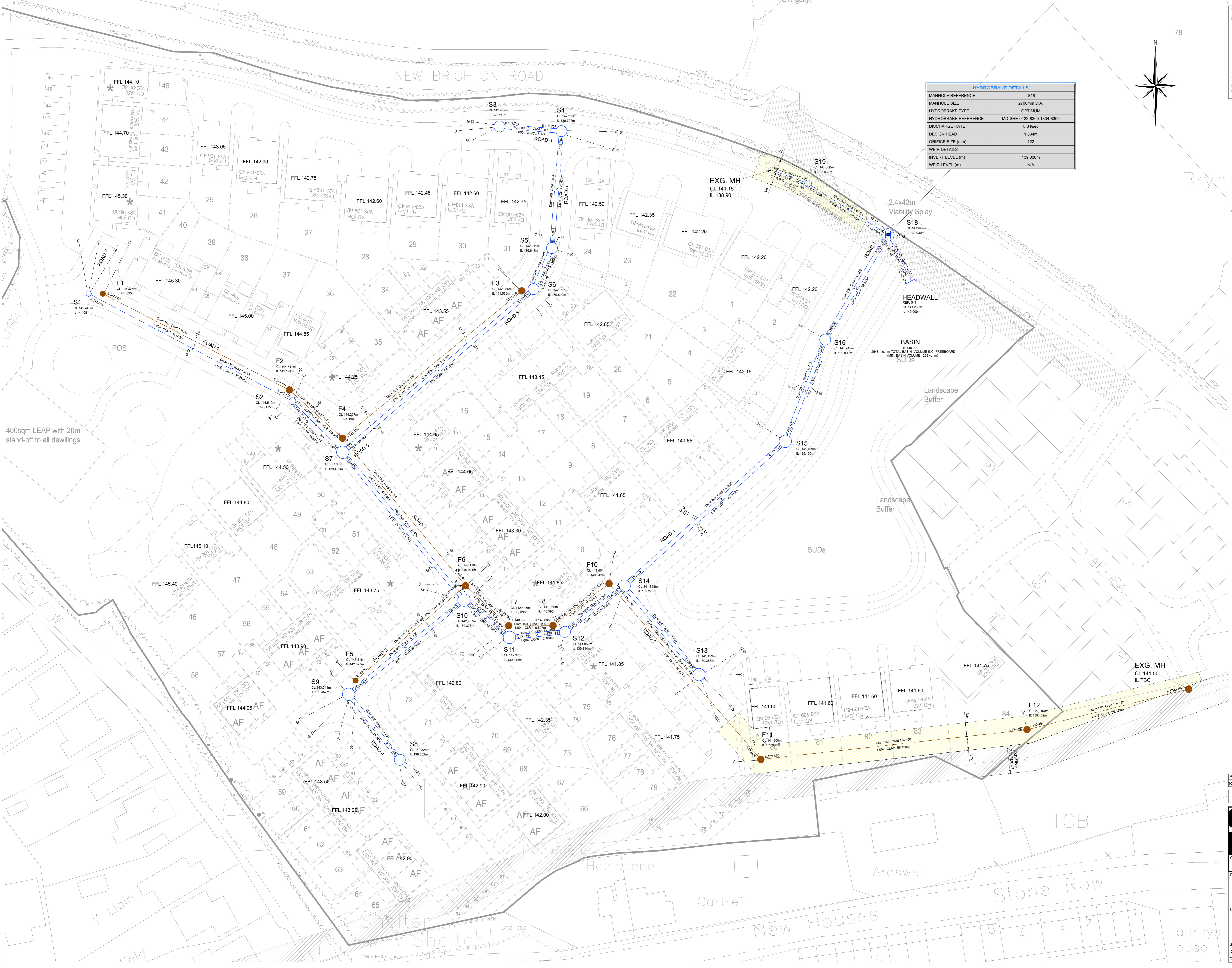
For final setting out information relating to grid lines and wall positions refer to the architect's drawings.

**KEY**

- SITE BOUNDARY
- F1 MANHOLE REF  
CL 144.00m COVER LEVEL  
IL 139.00m INVERT LEVEL
- FOUL SEWER
- S1 MANHOLE REF  
CL 144.00m COVER LEVEL  
IL 139.00m INVERT LEVEL
- SURFACE WATER SEWER
- SW STORAGE >375mm DIA
- (H) FLOW CONTROL MANHOLE

**PIPE DETAILS**

DIAMETER	GRADIENT	PIPE
Diam 750	Grad 1 in 400	PRIVATE SURFACE WATER CHAMBER
2000	CONC	PRIVATE FOUL CHAMBER
1000	CONC	ROAD GULLY
1000	CONC	EXISTING FOUL SEWER
1000	CONC	EXISTING SURFACE WATER SEWER
1000	CONC	EXISTING FOUL RISING MAIN
1000	CONC	SEWER EASEMENT



400sqm LEAP with 20m stand-off to all dwellings

P1	30.04.21	SB	ISSUED FOR COMMENT	MG
Rev	Date	Checked	Description	By

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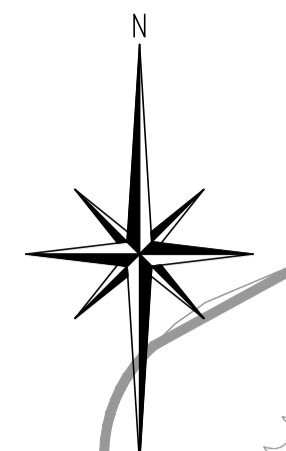
Client: **STEWART MILNE HOMES**

Project: **NEW BRIGHTON ROAD MOLD**

Drawing title: **PRELIMINARY DRAINAGE LAYOUT OVERALL SITE**

Scale at A0	1:250	Drawing number	29949-659
Drawn by	MG	Revision	suffix
Date	APR 21		P1





Mynydd - by

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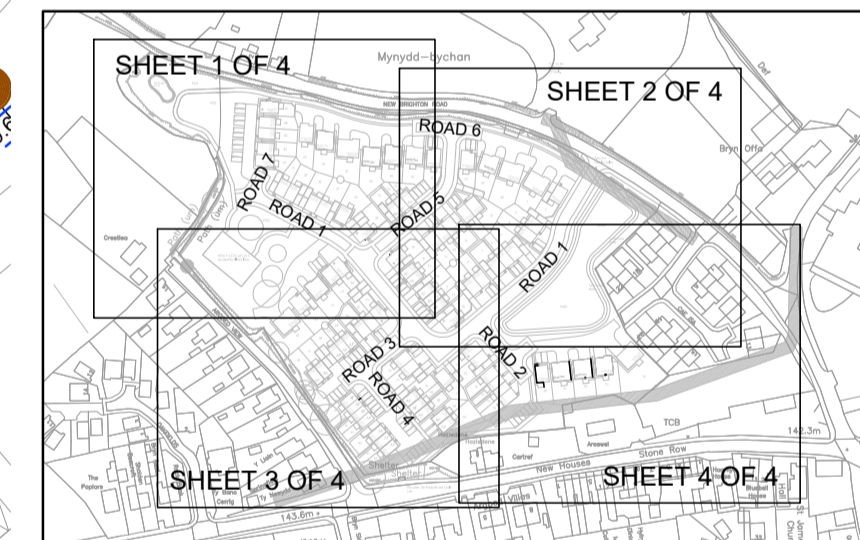
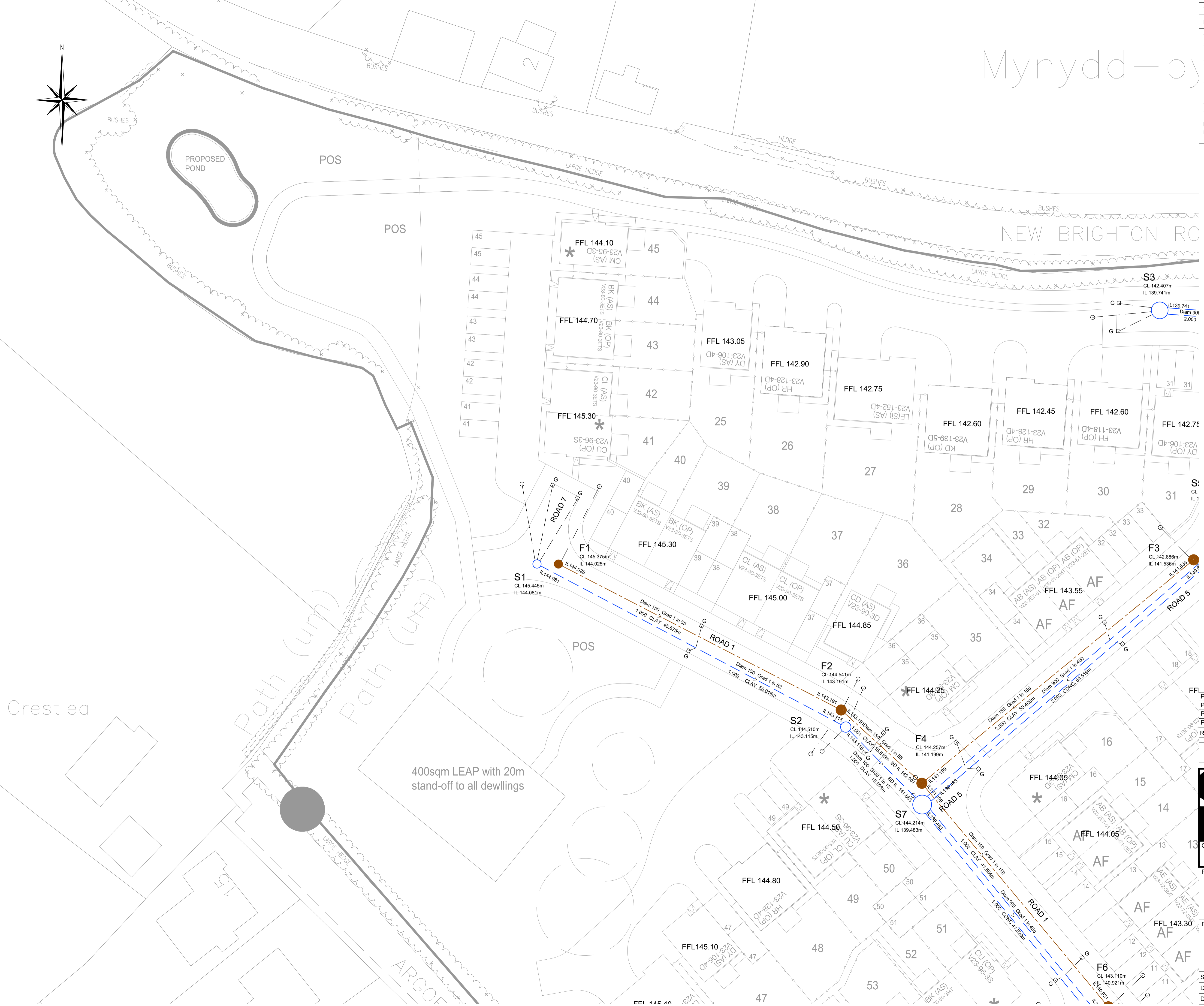
**KEY**

- SITE BOUNDARY
- F1 — MANHOLE REF  
CL 140.00 — COVER LEVEL  
IL 138.00 — INVERT LEVEL
- FOUL SEWER
- S1 — MANHOLE REF  
CL 140.00 — COVER LEVEL  
IL 138.00 — INVERT LEVEL
- SURFACE WATER SEWER
- SW STORAGE >375mm DIA.
- (H) — FLOW CONTROL MANHOLE

**PIPE DETAILS**

DIAMETER	GRADIENT	PIPE DETAILS
2,000	Grad 1 in 400	CONC. 25.645m LENGTH

- — PRIVATE SURFACE WATER CHAMBER
- — PRIVATE FOUL CHAMBER
- G □ — ROAD GULLEY
- EXISTING FOUL SEWER
- EXISTING SURFACE WATER SEWER
- EXISTING FOUL RISING MAIN
- SEWER EASEMENT



LOCATION PLAN

Rev	Date	Checked	Description	By
P4	29.04.21	SB	AMENDED TO LATEST LAYOUT	MG
P3	20.08.20	SB	SITE PLAN REVISED	MG
P2	17.05.19	SB	SITE PLAN REVISED	CAD
P1	04.10.18	SB	ISSUED FOR COMMENT	MG

PRELIMINARY DRAWING

**Sutcliffe**

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 e: sutcliffe@sutcliffe.co.uk w: www.sutcliffe.co.uk

Client **STEWART MILNE HOMES**

Project **NEW BRIGHTON ROAD MOLD**

Drawing title **PRELIMINARY DRAINAGE LAYOUT SHEET 1 OF 4**

Scale at A1	1:250	Drawing number	29949-655
Drawn by	MG	Revision suffix	P4
Date	OCT 18		

Crestlea

400sqm LEAP with 20m stand-off to all dwellings



**GENERAL NOTES**

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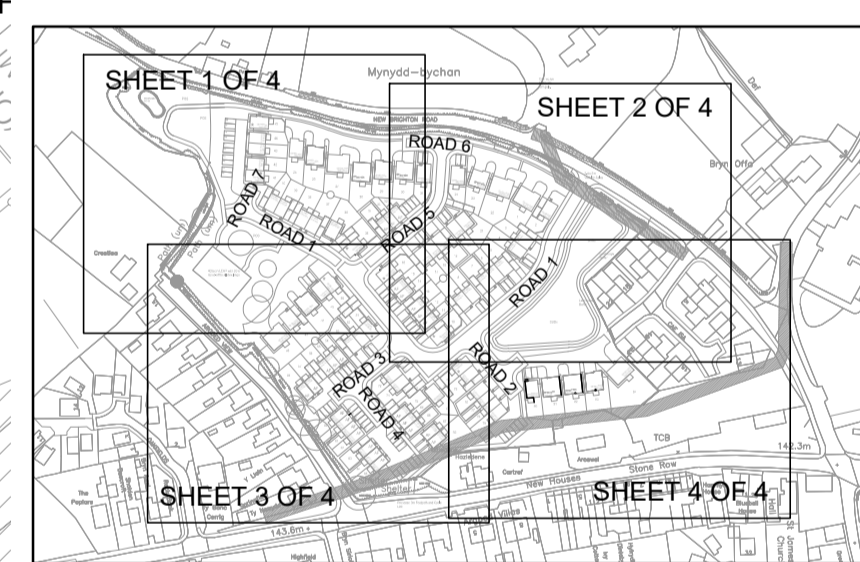
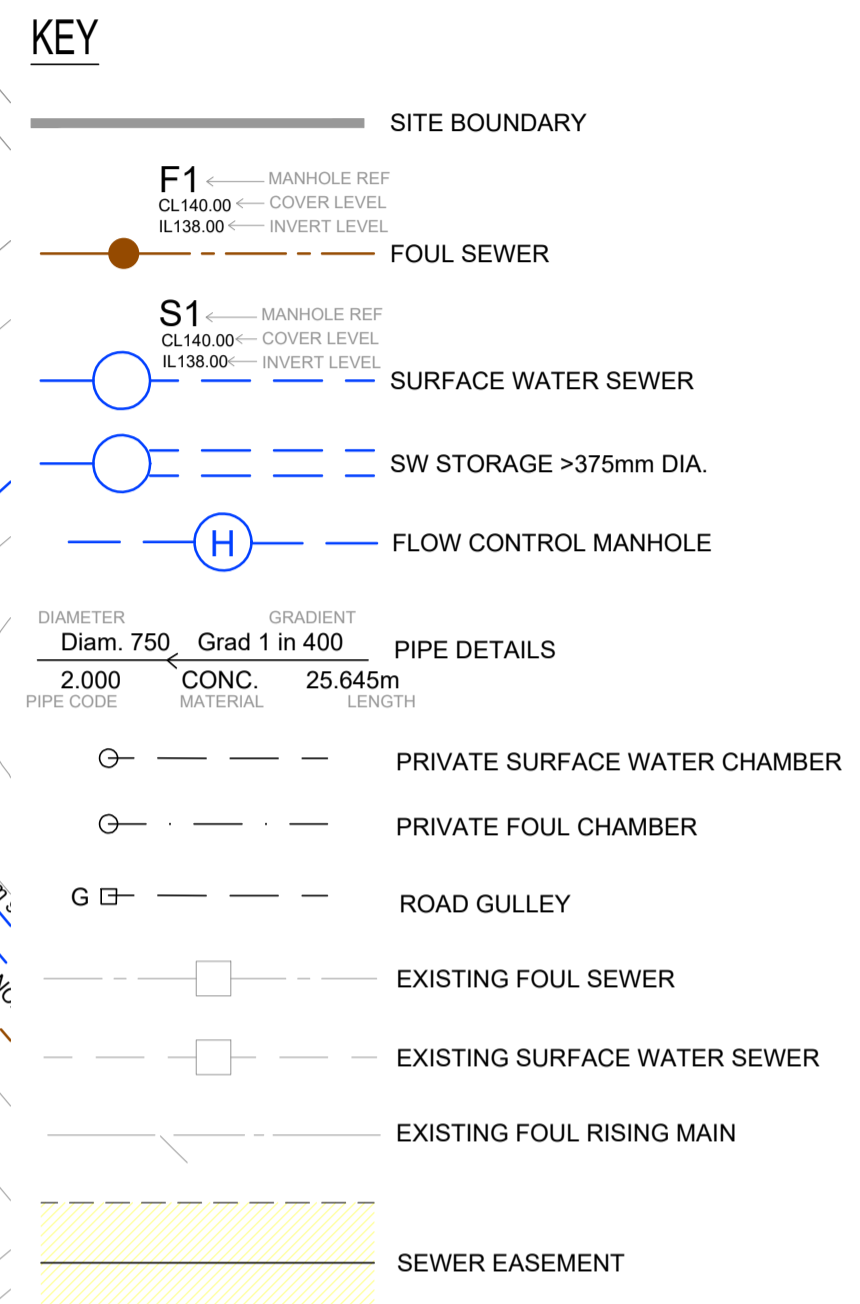
This drawing to read in conjunction with all relevant structural and architectural drawings and specifications.

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For final setting out information relating to grid lines and wall positions refer to the architect's drawings.



P4	29.04.21	SB	AMENDED TO LATEST LAYOUT	MG
P3	20.08.20	SB	SITE PLAN REVISED	MG
P2	17.05.19	SB	SITE PLAN REVISED	CAD
P1	04.10.18	SB	ISSUED FOR COMMENT	MG
Rev	Date	Checked	Description	By

**PRELIMINARY DRAWING**

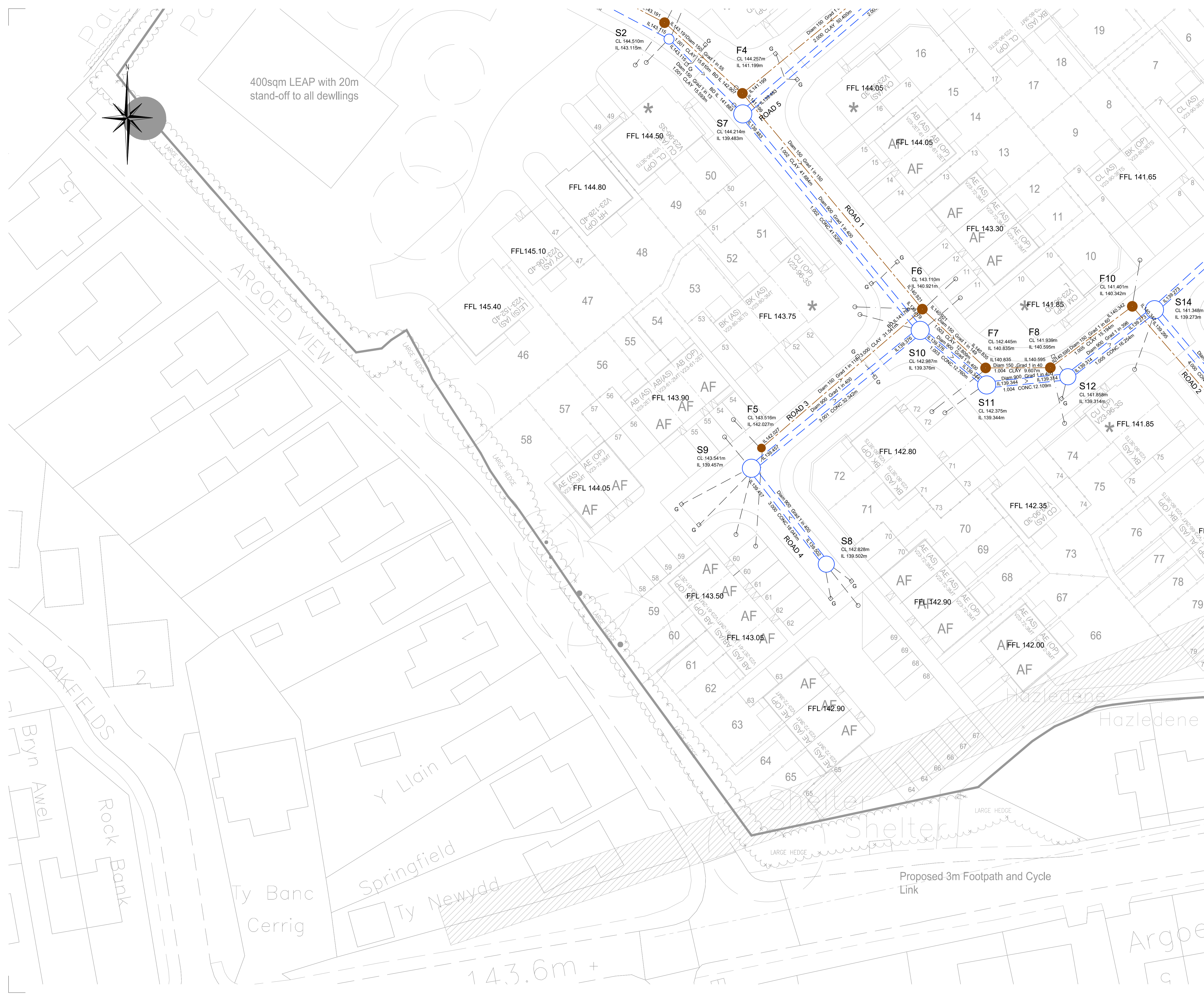
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e: sutcliffe@sutcliffe.co.uk w: www.sutcliffe.co.uk

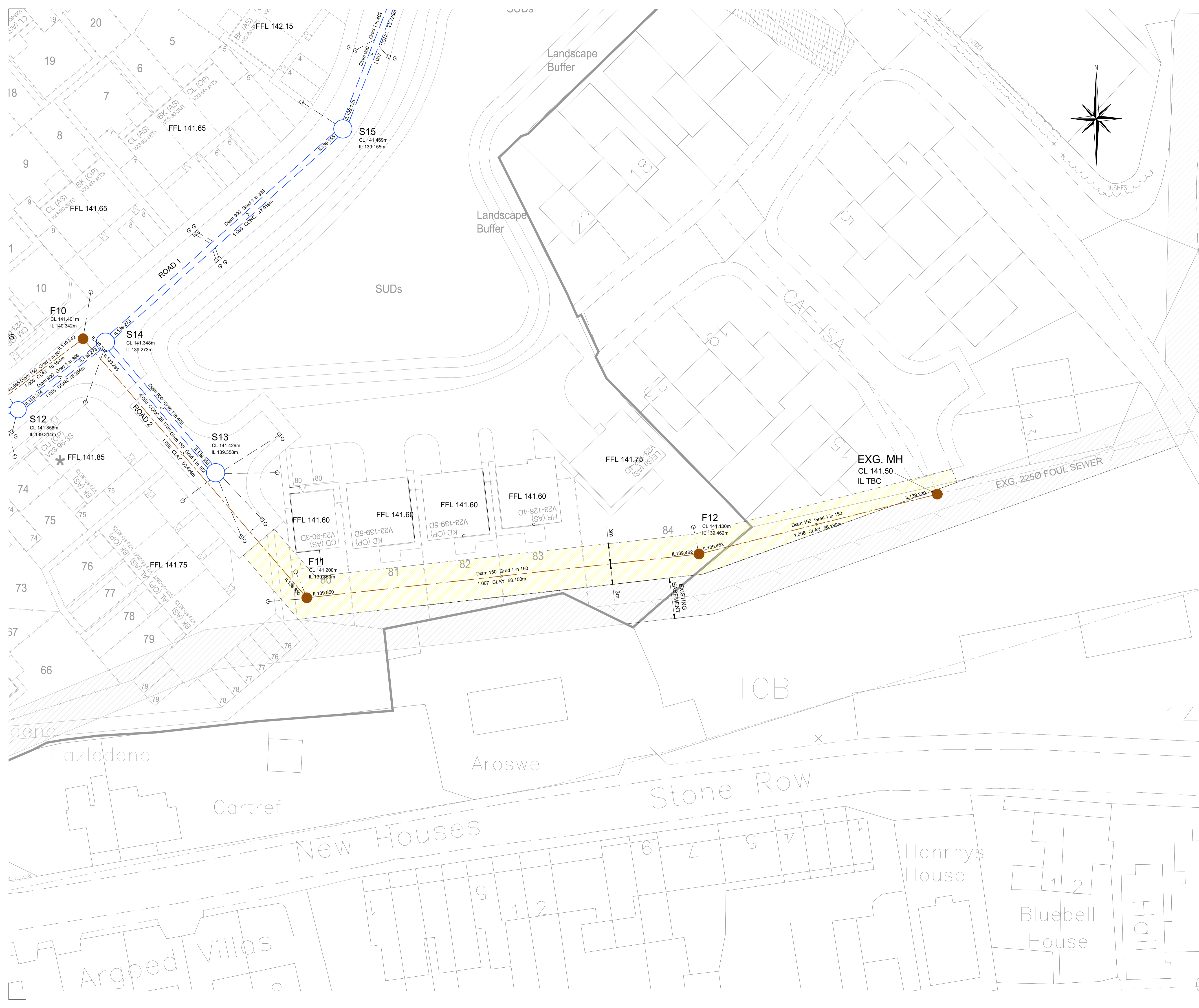
Client **STEWART MILNE HOMES**

Project **NEW BRIGHTON ROAD MOLD**

Drawing title **PRELIMINARY DRAINAGE LAYOUT SHEET 3 OF 4**

Scale at A1	1:250	Drawing number	29949-657
Drawn by	MG	Revision suffix	P4
Date	OCT 18		





**GENERAL NOTES**

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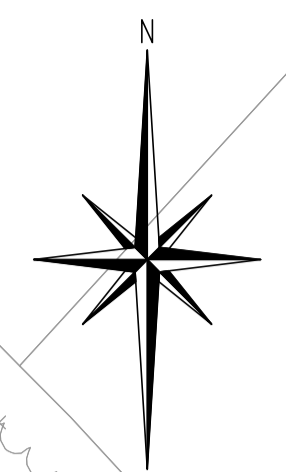
This drawing to read in conjunction with all relevant structural and architectural drawings and specifications.

All dimensions to be checked on site by the contractor / fabricator prior to commencement of works.

All dimensions are in millimetres unless stated otherwise.

All works to be carried out in strict accordance with the engineer's specifications, relevant British Standards and where applicable Local Authorities requirements.

For final setting out information relating to grid lines and wall positions refer to the architect's drawings.

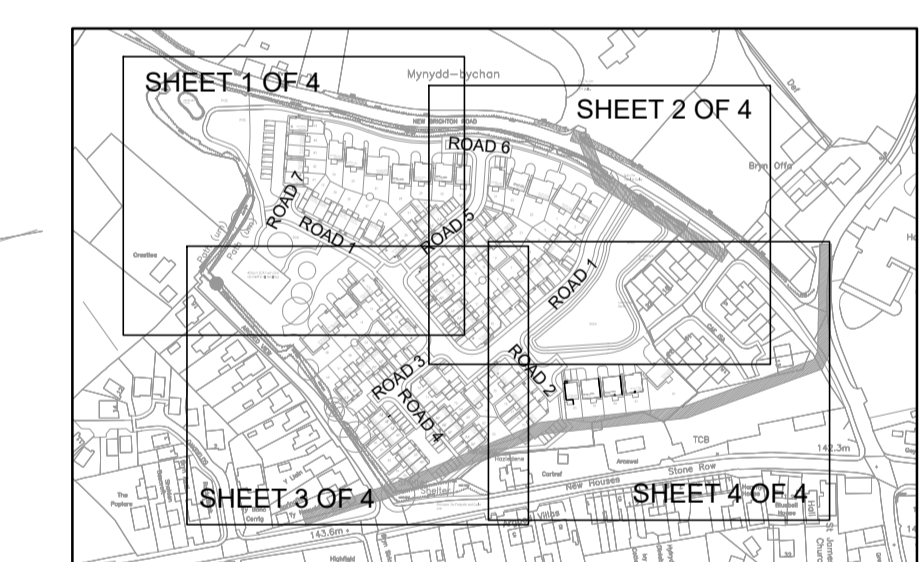


**KEY**

- SITE BOUNDARY
- F1 MANHOLE REF  
CL 140.00 COVER LEVEL  
IL 138.00 INVERT LEVEL
- FOUL SEWER
- S1 MANHOLE REF  
CL 140.00 COVER LEVEL  
IL 138.00 INVERT LEVEL
- SURFACE WATER SEWER
- SW STORAGE >375mm DIA.
- FLOW CONTROL MANHOLE

**PIPE DETAILS**

DIAMETER	GRADIENT	PIPE DETAILS
2,000	1 in 400	25.645m
PIPE CODE	CONC. MATERIAL	LENGTH
	---	PRIVATE SURFACE WATER CHAMBER
	---	PRIVATE FOUL CHAMBER
	---	ROAD GULLY
	---	EXISTING FOUL SEWER
	---	EXISTING SURFACE WATER SEWER
	---	EXISTING FOUL RISING MAIN
	---	SEWER EASEMENT



**LOCATION PLAN**

P4	29.04.21	SB	AMENDED TO LATEST LAYOUT	MG
P3	20.08.20	SB	SITE PLAN REVISED	MG
P2	17.05.19	SB	SITE PLAN REVISED	CAD
P1	04.10.18	SB	ISSUED FOR COMMENT	MG
Rev	Date	Checked	Description	By

**PRELIMINARY DRAWING**

Client: **STEWART MILNE HOMES**

Project: **NEW BRIGHTON ROAD MOLD**

Drawing title: **PRELIMINARY DRAINAGE LAYOUT SHEET 4 OF 4**

Scale at A1	1:250	Drawing number	29949-658
Drawn by	MG	Revision suffix	P4
Date	OCT 18		

11.6. Indicative Flood Routing Plan



Rev	Date	Checked	Description	By
P4	30.04.21	SB	SITE PLAN UPDATED	MG
P3	20.08.20	SB	SITE PLAN UPDATED	MG
P2	17.05.19	SB	SITE PLAN UPDATED	CR
P1	24.01.19	SB	PRELIMINARY DRAWING	AJB

PRELIMINARY DRAWING

18-20 Harrington Street, Liverpool L2 9QA  
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Client: STEWART MILNE HOMES

Project: NEW BRIGHTON ROAD MOLD

Drawing title: FLOOD FLOW ROUTE

Scale at A3	1:1000	Manhole Reference	29949-6002
Drawn by	AJB	Revision suffix	P4
Date	JAN. 2019		

11.7. Calculations

**Design Settings**

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.700
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

**Simulation Settings**

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	17.000	Additional Storage (m <sup>3</sup> /ha)	20.0
Ratio-R	0.300	Check Discharge Rate(s)	✓
Summer CV	0.750	Check Discharge Volume	✓
Winter CV	0.840	100 year 360 minute (m <sup>3</sup> )	
Analysis Speed	Normal		

**Storm Durations**

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
5	0	0	0
15	0	0	0
30	0	0	0
100	30	0	0

**Pre-development Discharge Rate**

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

**Pre-development Discharge Volume**

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m <sup>3</sup> )	



**Node 18 Online Hydro-Brake® Control**

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	139.030	Product Number	CTL-SHE-0122-8300-1834-8300
Design Depth (m)	1.834	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	8.3	Min Node Diameter (mm)	1200

**Node 17 Depth/Area Storage Structure**

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	140.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	729.9	0.0	2.314	1546.1	0.0

**Results for 1 year Critical Storm Duration. Lowest mass balance: 99.57%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	1	10	144.128	0.047	5.4	0.0876	0.0000	OK
15 minute winter	2	11	143.215	0.099	16.4	0.3227	0.0000	OK
15 minute winter	3	10	139.801	0.060	8.8	0.3094	0.0000	OK
15 minute winter	4	11	139.776	0.069	12.8	0.3347	0.0000	OK
15 minute winter	5	11	139.728	0.085	16.3	0.4060	0.0000	OK
15 minute winter	6	12	139.707	0.088	21.9	0.4327	0.0000	OK
15 minute winter	7	12	139.600	0.117	39.0	0.6813	0.0000	OK
120 minute winter	8	98	139.579	0.077	2.7	0.3811	0.0000	OK
120 minute winter	9	98	139.579	0.122	4.2	0.7217	0.0000	OK
120 minute winter	10	98	139.579	0.203	23.3	1.2565	0.0000	OK
120 minute winter	11	98	139.579	0.235	22.6	1.3531	0.0000	OK
120 minute winter	12	98	139.579	0.265	22.5	1.2651	0.0000	OK
120 minute winter	13	98	139.579	0.221	4.0	1.4739	0.0000	OK
120 minute winter	14	98	139.579	0.306	27.4	2.0171	0.0000	OK
120 minute winter	15	98	139.579	0.424	25.7	2.5544	0.0000	OK
120 minute winter	16	100	139.579	0.483	19.1	2.3739	0.0000	OK
15 minute summer	17	1	140.000	0.000	0.0	0.0000	0.0000	OK
120 minute winter	18	100	139.579	0.549	12.3	3.1424	0.0000	SURCHARGED
60 minute winter	19	51	139.004	0.066	8.2	0.1164	0.0000	OK
60 minute winter	20	51	138.962	0.062	8.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	1	1.000	2	5.3	0.625	0.212	0.4266	
15 minute winter	2	1.001	7	16.0	1.339	0.707	0.1861	
15 minute winter	3	2.000	4	8.6	0.431	0.009	0.2695	
15 minute winter	4	2.001	5	12.6	0.486	0.013	0.6691	
15 minute winter	5	2.002	6	15.9	0.515	0.016	0.3020	
15 minute winter	6	2.003	7	21.1	0.532	0.021	2.1825	
15 minute winter	7	1.002	10	38.0	0.653	0.038	2.4268	
120 minute winter	8	3.000	9	2.7	0.304	0.003	0.6990	
120 minute winter	9	3.001	10	4.2	0.183	0.004	2.5587	
120 minute winter	10	1.003	11	22.4	0.582	0.023	1.5206	
120 minute winter	11	1.004	12	21.2	0.571	0.021	1.7379	
120 minute winter	12	1.005	14	20.4	0.556	0.020	2.8079	
120 minute winter	13	4.000	14	3.6	0.366	0.004	3.6725	
120 minute winter	14	1.006	15	24.4	0.540	0.025	11.3611	
120 minute winter	15	1.007	16	17.1	0.432	0.017	7.5915	
120 minute winter	16	1.008	18	12.3	0.303	0.012	9.9587	
15 minute summer	17	5.000	18	0.0	0.000	0.000	0.0000	
120 minute winter	18	Hydro-Brake®	19	8.2				
60 minute winter	19	1.010	20	8.2	0.656	0.061	0.1056	80.4

**Results for 2 year Critical Storm Duration. Lowest mass balance: 99.57%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	1	10	144.135	0.054	7.0	0.1005	0.0000	OK
15 minute winter	2	11	143.239	0.123	21.3	0.4004	0.0000	OK
15 minute winter	3	10	139.810	0.069	11.4	0.3530	0.0000	OK
15 minute winter	4	11	139.786	0.079	16.6	0.3794	0.0000	OK
15 minute winter	5	11	139.741	0.098	21.2	0.4690	0.0000	OK
15 minute winter	6	12	139.720	0.101	28.6	0.4919	0.0000	OK
180 minute winter	7	144	139.662	0.179	15.4	1.0446	0.0000	OK
180 minute winter	8	148	139.662	0.160	2.6	0.7872	0.0000	OK
180 minute winter	9	144	139.662	0.205	4.1	1.2093	0.0000	OK
180 minute winter	10	144	139.662	0.286	22.0	1.7717	0.0000	OK
180 minute winter	11	144	139.662	0.318	19.6	1.8322	0.0000	OK
180 minute winter	12	144	139.662	0.348	19.1	1.6621	0.0000	OK
180 minute winter	13	140	139.662	0.304	3.8	2.0302	0.0000	OK
180 minute winter	14	140	139.662	0.389	22.7	2.5647	0.0000	OK
180 minute winter	15	144	139.662	0.507	20.8	3.0548	0.0000	OK
180 minute winter	16	140	139.662	0.566	16.2	2.7819	0.0000	OK
15 minute summer	17	1	140.000	0.000	0.0	0.0000	0.0000	OK
180 minute winter	18	140	139.662	0.632	11.2	3.6177	0.0000	SURCHARGED
30 minute winter	19	23	139.004	0.066	8.2	0.1164	0.0000	OK
30 minute winter	20	23	138.962	0.062	8.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	1	1.000	2	6.8	0.654	0.276	0.5281	
15 minute winter	2	1.001	7	20.6	1.388	0.912	0.2311	
15 minute winter	3	2.000	4	11.1	0.457	0.011	0.3265	
15 minute winter	4	2.001	5	16.5	0.517	0.017	0.8157	
15 minute winter	5	2.002	6	20.8	0.552	0.021	0.3695	
15 minute winter	6	2.003	7	27.6	0.572	0.028	2.6779	
180 minute winter	7	1.002	10	15.4	0.481	0.015	5.3997	
180 minute winter	8	3.000	9	2.6	0.297	0.003	1.6590	
180 minute winter	9	3.001	10	3.8	0.177	0.004	4.5499	
180 minute winter	10	1.003	11	19.4	0.555	0.020	2.3828	
180 minute winter	11	1.004	12	18.0	0.537	0.018	2.5823	
180 minute winter	12	1.005	14	17.2	0.526	0.017	3.9706	
180 minute winter	13	4.000	14	3.1	0.349	0.003	5.4286	
180 minute winter	14	1.006	15	19.8	0.509	0.020	14.8125	
180 minute winter	15	1.007	16	14.6	0.422	0.015	9.3443	
180 minute winter	16	1.008	18	11.2	0.276	0.011	11.8687	
15 minute summer	17	5.000	18	0.0	0.000	0.000	0.0000	
180 minute winter	18	Hydro-Brake®	19	8.2				
30 minute winter	19	1.010	20	8.2	0.656	0.061	0.1056	78.5

**Results for 5 year Critical Storm Duration. Lowest mass balance: 99.57%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	1	10	144.143	0.062	9.1	0.1160	0.0000	OK
15 minute winter	2	12	143.345	0.229	27.7	0.7439	0.0000	SURCHARGED
15 minute winter	3	10	139.820	0.079	14.8	0.4059	0.0000	OK
15 minute winter	4	11	139.797	0.090	21.5	0.4353	0.0000	OK
180 minute winter	5	172	139.760	0.117	7.7	0.5554	0.0000	OK
180 minute winter	6	148	139.760	0.140	10.6	0.6872	0.0000	OK
180 minute winter	7	156	139.760	0.277	19.4	1.6141	0.0000	OK
180 minute winter	8	160	139.760	0.258	3.3	1.2718	0.0000	OK
180 minute winter	9	160	139.760	0.303	5.0	1.7901	0.0000	OK
180 minute winter	10	168	139.760	0.384	24.6	2.3757	0.0000	OK
180 minute winter	11	168	139.760	0.416	20.9	2.3949	0.0000	OK
180 minute winter	12	168	139.760	0.446	20.7	2.1295	0.0000	OK
180 minute winter	13	168	139.760	0.402	4.8	2.6846	0.0000	OK
180 minute winter	14	168	139.760	0.487	23.4	3.2113	0.0000	OK
180 minute winter	15	156	139.760	0.605	19.4	3.6466	0.0000	OK
180 minute winter	16	156	139.760	0.664	15.4	3.2656	0.0000	OK
15 minute summer	17	1	140.000	0.000	0.0	0.0000	0.0000	OK
180 minute winter	18	156	139.760	0.730	10.8	4.1812	0.0000	SURCHARGED
15 minute winter	19	14	139.004	0.066	8.2	0.1164	0.0000	OK
60 minute summer	20	35	138.962	0.062	8.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	1	1.000	2	8.9	0.670	0.360	0.6129	
15 minute winter	2	1.001	7	24.2	1.403	1.072	0.2693	
15 minute winter	3	2.000	4	14.5	0.486	0.015	0.4013	
15 minute winter	4	2.001	5	21.4	0.547	0.022	1.0030	
180 minute winter	5	2.002	6	7.7	0.413	0.008	0.5417	
180 minute winter	6	2.003	7	10.6	0.423	0.011	6.2183	
180 minute winter	7	1.002	10	18.6	0.487	0.019	8.7274	
180 minute winter	8	3.000	9	3.2	0.315	0.003	3.0439	
180 minute winter	9	3.001	10	4.4	0.179	0.004	7.1969	
180 minute winter	10	1.003	11	20.7	0.561	0.021	3.4706	
180 minute winter	11	1.004	12	19.4	0.548	0.020	3.6300	
180 minute winter	12	1.005	14	18.4	0.516	0.018	5.3923	
180 minute winter	13	4.000	14	3.0	0.371	0.003	7.6109	
180 minute winter	14	1.006	15	18.4	0.485	0.019	18.8798	
180 minute winter	15	1.007	16	13.9	0.444	0.014	11.3318	
180 minute winter	16	1.008	18	10.8	0.283	0.011	13.9554	
15 minute summer	17	5.000	18	0.0	0.000	0.000	0.0000	
180 minute winter	18	Hydro-Brake®	19	8.2				
15 minute winter	19	1.010	20	8.2	0.656	0.061	0.1056	75.6

**Results for 15 year Critical Storm Duration. Lowest mass balance: 99.57%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	1	10	144.152	0.071	11.4	0.1319	0.0000	OK
15 minute winter	2	12	143.521	0.405	34.6	1.3148	0.0000	SURCHARGED
180 minute winter	3	176	139.899	0.158	5.1	0.8129	0.0000	OK
180 minute winter	4	176	139.899	0.192	7.6	0.9278	0.0000	OK
180 minute winter	5	176	139.899	0.256	9.9	1.2206	0.0000	OK
180 minute winter	6	176	139.899	0.280	13.6	1.3700	0.0000	OK
180 minute winter	7	176	139.899	0.416	24.9	2.4259	0.0000	OK
180 minute winter	8	172	139.899	0.397	4.2	1.9549	0.0000	OK
180 minute winter	9	172	139.899	0.442	5.3	2.6095	0.0000	OK
180 minute winter	10	172	139.899	0.523	26.5	3.2363	0.0000	OK
180 minute winter	11	172	139.899	0.555	21.4	3.1953	0.0000	OK
180 minute winter	12	172	139.899	0.585	20.7	2.7930	0.0000	OK
180 minute winter	13	172	139.899	0.541	6.2	3.6102	0.0000	OK
180 minute winter	14	172	139.899	0.626	24.3	4.1270	0.0000	OK
180 minute winter	15	176	139.899	0.744	18.7	4.4853	0.0000	OK
180 minute winter	16	176	139.899	0.803	15.6	3.9496	0.0000	OK
15 minute summer	17	1	140.000	0.000	0.0	0.0000	0.0000	OK
180 minute winter	18	176	139.899	0.869	11.1	4.9776	0.0000	SURCHARGED
15 minute summer	19	13	139.004	0.066	8.2	0.1164	0.0000	OK
15 minute summer	20	13	138.962	0.062	8.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	1	1.000	2	11.2	0.754	0.452	0.6445	
15 minute winter	2	1.001	7	29.6	1.681	1.309	0.2717	
180 minute winter	3	2.000	4	5.1	0.369	0.005	1.1714	
180 minute winter	4	2.001	5	7.6	0.415	0.008	3.1510	
180 minute winter	5	2.002	6	9.9	0.442	0.010	1.5468	
180 minute winter	6	2.003	7	13.6	0.441	0.014	12.3894	
180 minute winter	7	1.002	10	20.6	0.489	0.021	13.8211	
180 minute winter	8	3.000	9	3.4	0.317	0.003	5.2214	
180 minute winter	9	3.001	10	4.6	0.180	0.005	11.1812	
180 minute winter	10	1.003	11	21.2	0.558	0.021	5.0535	
180 minute winter	11	1.004	12	19.3	0.537	0.019	5.1237	
180 minute winter	12	1.005	14	18.3	0.499	0.018	7.3710	
180 minute winter	13	4.000	14	3.9	0.374	0.004	10.7039	
180 minute winter	14	1.006	15	17.1	0.499	0.017	24.2385	
180 minute winter	15	1.007	16	13.0	0.462	0.013	13.7423	
180 minute winter	16	1.008	18	11.1	0.295	0.011	16.2354	
15 minute summer	17	5.000	18	0.0	0.000	0.000	0.0000	
180 minute winter	18	Hydro-Brake®	19	8.2				
15 minute summer	19	1.010	20	8.2	0.656	0.061	0.1056	84.2

**Results for 30 year Critical Storm Duration. Lowest mass balance: 99.57%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	1	10	144.158	0.077	13.2	0.1436	0.0000	OK
15 minute winter	2	12	143.666	0.550	40.1	1.7843	0.0000	SURCHARGED
240 minute winter	3	228	140.020	0.279	4.9	1.4305	0.0000	OK
240 minute winter	4	228	140.020	0.313	7.3	1.5086	0.0000	OK
240 minute winter	5	228	140.020	0.377	9.5	1.7969	0.0000	OK
240 minute winter	6	228	140.020	0.401	12.7	1.9618	0.0000	OK
240 minute winter	7	232	140.020	0.537	22.5	3.1292	0.0000	OK
240 minute winter	8	232	140.020	0.518	4.1	2.5530	0.0000	OK
240 minute winter	9	232	140.020	0.563	5.1	3.3264	0.0000	OK
240 minute winter	10	232	140.020	0.644	23.1	3.9867	0.0000	OK
240 minute winter	11	232	140.020	0.676	18.3	3.8929	0.0000	OK
240 minute winter	12	232	140.020	0.706	17.9	3.3710	0.0000	OK
240 minute winter	13	232	140.020	0.662	6.0	4.4166	0.0000	OK
240 minute winter	14	232	140.020	0.747	21.8	4.9249	0.0000	OK
240 minute winter	15	232	140.020	0.865	17.2	5.2152	0.0000	OK
240 minute winter	16	232	140.020	0.924	14.7	4.5443	0.0000	SURCHARGED
240 minute winter	17	252	140.003	0.003	1.2	2.1850	0.0000	OK
240 minute winter	18	232	140.020	0.990	10.7	5.6699	0.0000	SURCHARGED
30 minute summer	19	18	139.004	0.066	8.2	0.1164	0.0000	OK
120 minute winter	20	54	138.962	0.062	8.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	1	1.000	2	13.0	0.851	0.523	0.6681	
15 minute winter	2	1.001	7	33.5	1.902	1.481	0.2717	
240 minute winter	3	2.000	4	4.9	0.366	0.005	2.4434	
240 minute winter	4	2.001	5	7.3	0.409	0.007	5.6987	
240 minute winter	5	2.002	6	9.2	0.431	0.009	2.5654	
240 minute winter	6	2.003	7	12.2	0.418	0.012	18.1849	
240 minute winter	7	1.002	10	18.0	0.463	0.018	18.2161	
240 minute winter	8	3.000	9	2.9	0.299	0.003	7.1736	
240 minute winter	9	3.001	10	3.6	0.173	0.004	14.5999	
240 minute winter	10	1.003	11	18.1	0.533	0.018	6.3570	
240 minute winter	11	1.004	12	16.6	0.513	0.017	6.3235	
240 minute winter	12	1.005	14	15.9	0.470	0.016	8.9093	
240 minute winter	13	4.000	14	3.9	0.371	0.004	13.1801	
240 minute winter	14	1.006	15	15.8	0.490	0.016	27.9395	
240 minute winter	15	1.007	16	12.2	0.464	0.012	14.9491	
240 minute winter	16	1.008	18	10.7	0.284	0.011	16.8039	
240 minute winter	17	5.000	18	-1.2	-0.129	-0.063	0.1100	
240 minute winter	18	Hydro-Brake®	19	8.2				
30 minute summer	19	1.010	20	8.2	0.656	0.061	0.1056	125.6

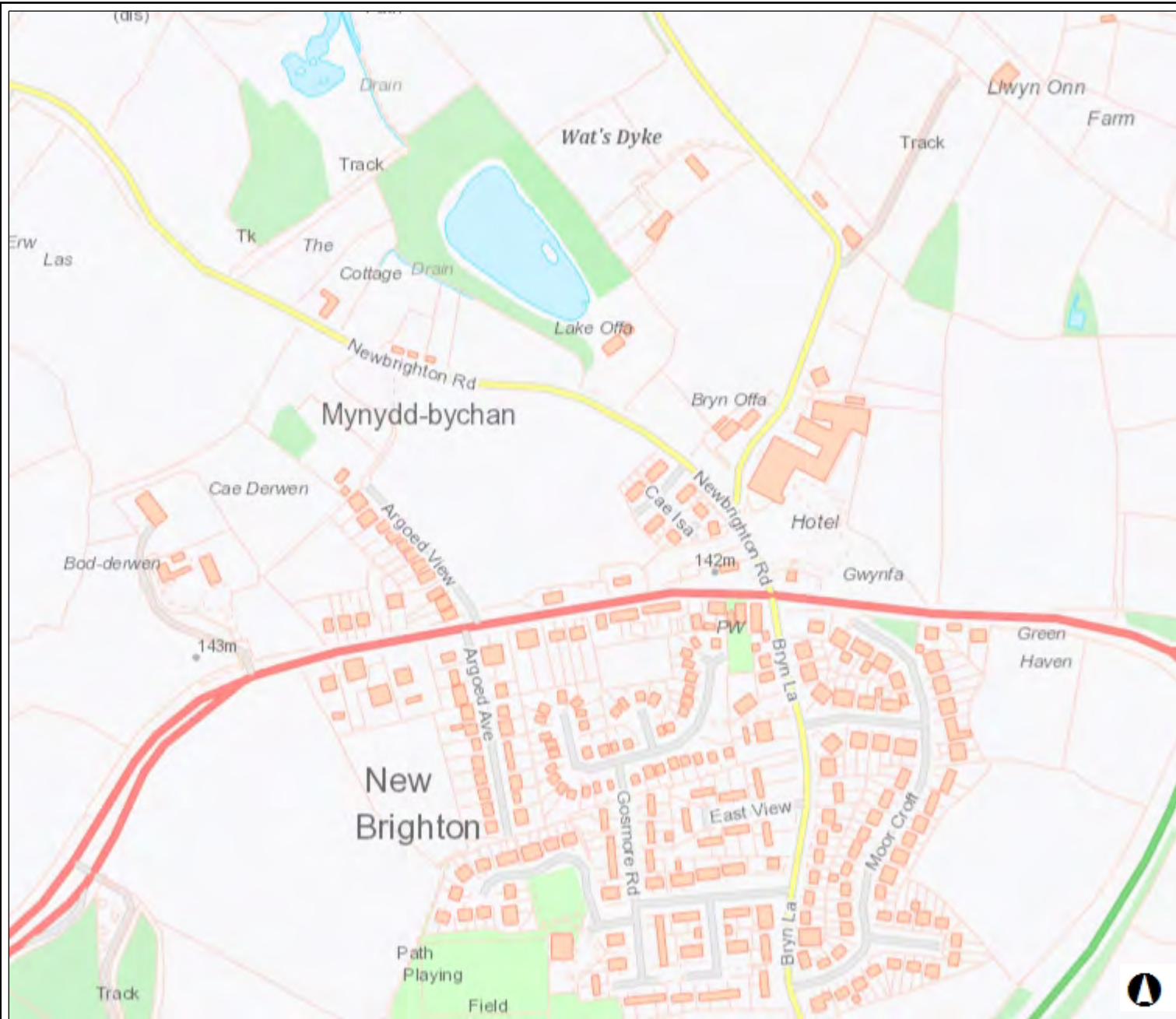
**Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 99.57%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	1	12	144.853	0.772	22.0	1.4387	0.0000	SURCHARGED
15 minute winter	2	12	144.446	1.331	58.9	4.3174	0.0000	FLOOD RISK
180 minute winter	3	132	140.880	1.139	10.2	5.8458	0.0000	SURCHARGED
180 minute winter	4	132	140.880	1.173	12.6	5.6568	0.0000	SURCHARGED
180 minute winter	5	132	140.879	1.236	14.9	5.8914	0.0000	SURCHARGED
180 minute winter	6	132	140.879	1.260	20.1	6.1627	0.0000	SURCHARGED
180 minute winter	7	132	140.876	1.393	30.4	8.1242	0.0000	SURCHARGED
180 minute winter	8	132	140.875	1.373	8.4	6.7624	0.0000	SURCHARGED
180 minute winter	9	132	140.875	1.417	9.9	8.3731	0.0000	SURCHARGED
180 minute winter	10	132	140.875	1.498	30.1	9.2769	0.0000	SURCHARGED
240 minute winter	11	168	140.874	1.530	25.3	8.8126	0.0000	SURCHARGED
240 minute winter	12	168	140.874	1.560	27.6	7.4506	0.0000	SURCHARGED
240 minute winter	13	168	140.874	1.516	10.2	10.1166	0.0000	SURCHARGED
240 minute winter	14	168	140.874	1.601	36.0	10.5582	0.0000	SURCHARGED
240 minute winter	15	168	140.875	1.720	38.6	10.3671	0.0000	SURCHARGED
240 minute winter	16	168	140.875	1.779	41.5	8.7466	0.0000	SURCHARGED
480 minute winter	17	464	140.226	0.226	30.9	174.7651	0.0000	SURCHARGED
240 minute winter	18	168	140.875	1.845	42.5	10.5632	0.0000	SURCHARGED
240 minute winter	19	168	139.005	0.067	8.3	0.1176	0.0000	OK
240 minute winter	20	168	138.963	0.063	8.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	1	1.000	2	16.2	1.002	0.655	0.8805	
15 minute winter	2	1.001	7	49.4	2.809	2.187	0.2717	
180 minute winter	3	2.000	4	8.3	0.421	0.008	8.5401	
180 minute winter	4	2.001	5	11.2	0.454	0.011	16.1435	
180 minute winter	5	2.002	6	13.5	0.468	0.014	6.1964	
180 minute winter	6	2.003	7	16.3	0.440	0.016	34.5521	
180 minute winter	7	1.002	10	22.4	0.455	0.023	26.3200	
180 minute winter	8	3.000	9	5.2	0.304	0.005	11.4345	
180 minute winter	9	3.001	10	5.8	0.175	0.006	20.4975	
180 minute winter	10	1.003	11	27.0	0.526	0.027	8.0870	
240 minute winter	11	1.004	12	26.7	0.497	0.027	7.6737	
240 minute winter	12	1.005	14	28.8	0.486	0.029	10.3020	
240 minute winter	13	4.000	14	7.3	0.375	0.007	15.9527	
240 minute winter	14	1.006	15	37.6	0.562	0.038	29.7994	
240 minute winter	15	1.007	16	39.9	0.486	0.040	15.0433	
240 minute winter	16	1.008	18	42.5	0.328	0.043	16.8039	
480 minute winter	17	5.000	18	-30.9	-2.029	-1.556	0.2190	
240 minute winter	18	Hydro-Brake®	19	8.3				
240 minute winter	19	1.010	20	8.3	0.660	0.062	0.1071	196.1

11.8. Development Advice Maps



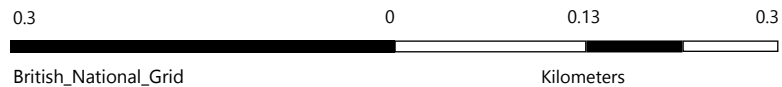


Allwedd / Map Key

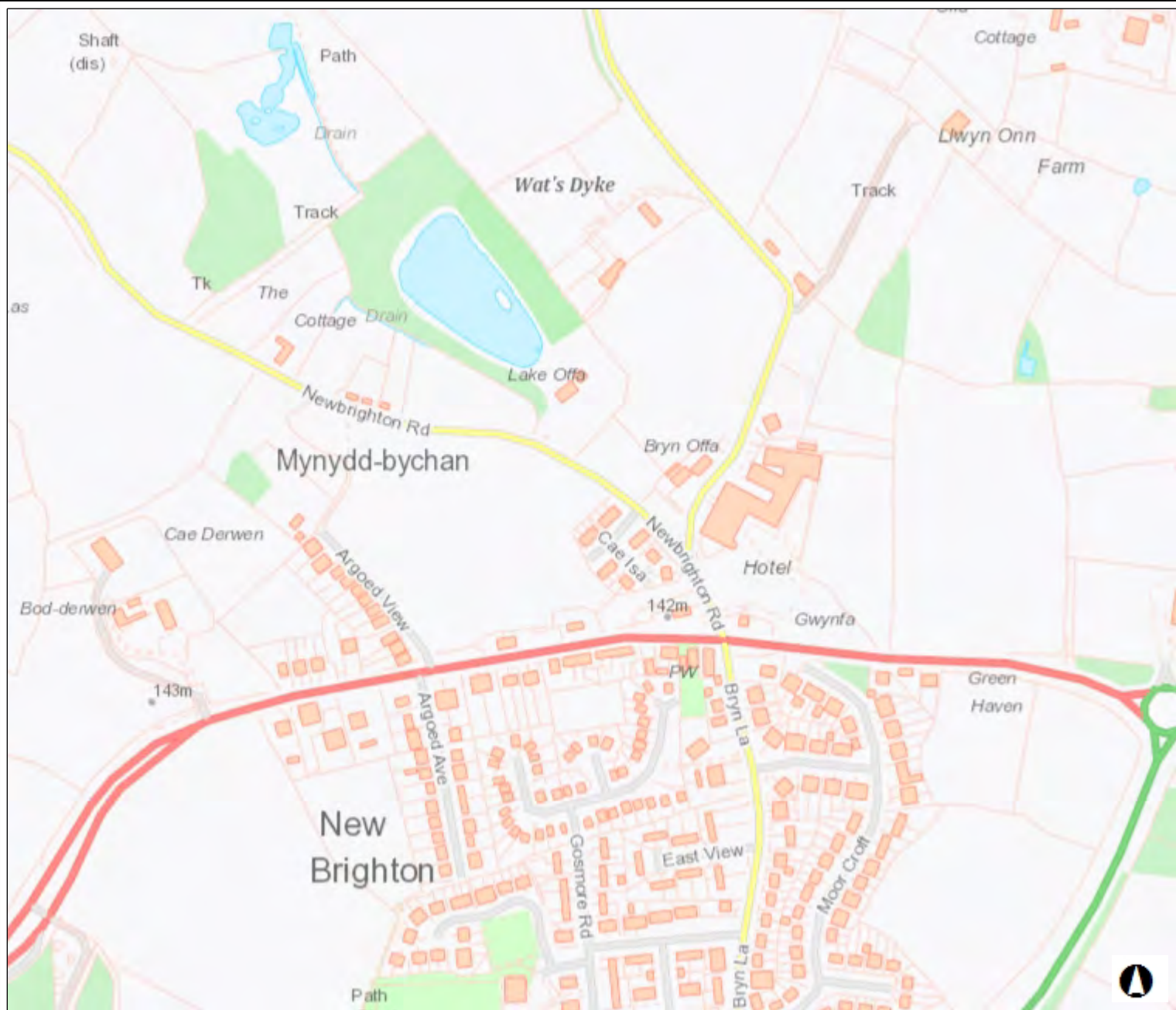
- Zone C1
- Zone C2
- Zone B
- Zone A

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**Cyfoeth Naturiol Cymru**  
**Natural Resources Wales**

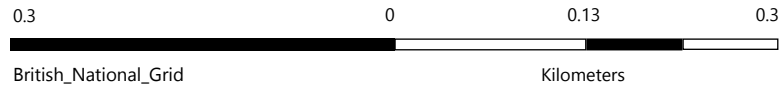
**Map Perygl Llifogydd / Flood Risk Map**

**Allwedd / Map Key**

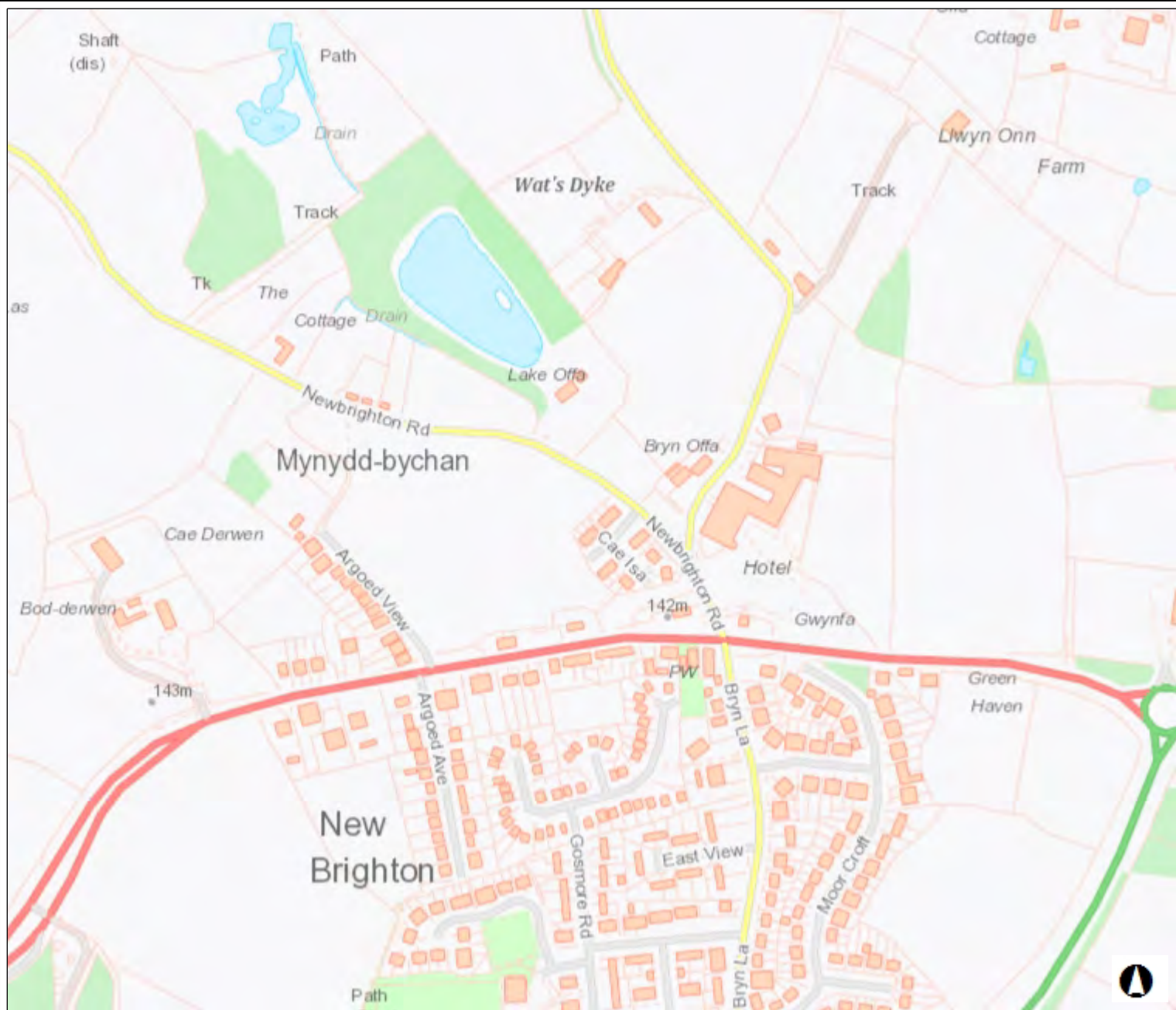
- Reservoir Extents
- Reservoir Depths
  - 0 - 0.3m
  - 0.3 - 2.0m
  - Greater than 2.0m
- Reservoir Velocities
  - 0 - 0.5m/s
  - 0.5 - 2.0m/s
  - Greater than 2.0m/s

Graddfa / Scale 1: 4,999














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**R**  
**Map Perygl Llifogydd / Flood Risk Map**

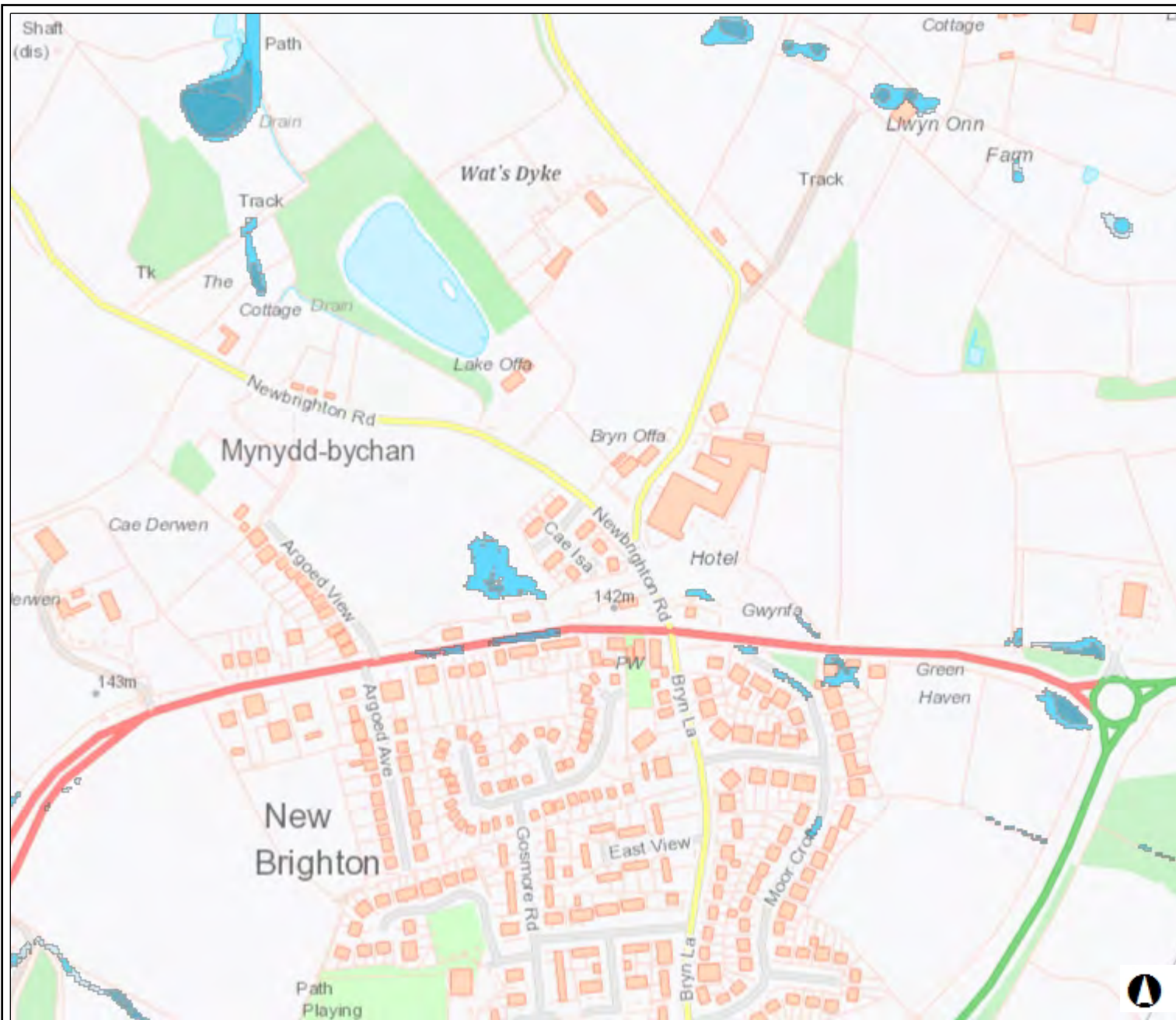
- Allwedd / Map Key**
-  Main Rivers
  -  Flood Defences
  -  Areas Benefiting from Flood Defences
  -  Flood Storage Areas
- Risk of Flooding from Rivers & Sea**
-  High
  -  Medium
  -  Low
  -  Very Low
-  Historic Flood Map
  -  Floodmap Flood Zone 3
  -  Floodmap Flood Zone 2
  -  Flood Warning Area
  -  Flood Alert Area

**Graddfa / Scale** 1: 4,999

**Dyddiad / Date**  
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Map Perygl Llifogydd / Flood Risk Map

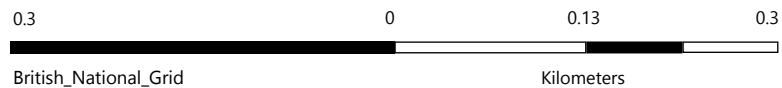
Allwedd / Map Key

High Surface Water Flood Risk - Depth (m)

-  Less than 0.15m
-  0.15m - 0.30m
-  0.30m - 0.90m
-  Greater than 0.9m

Graddfa / Scale 1: 4,999

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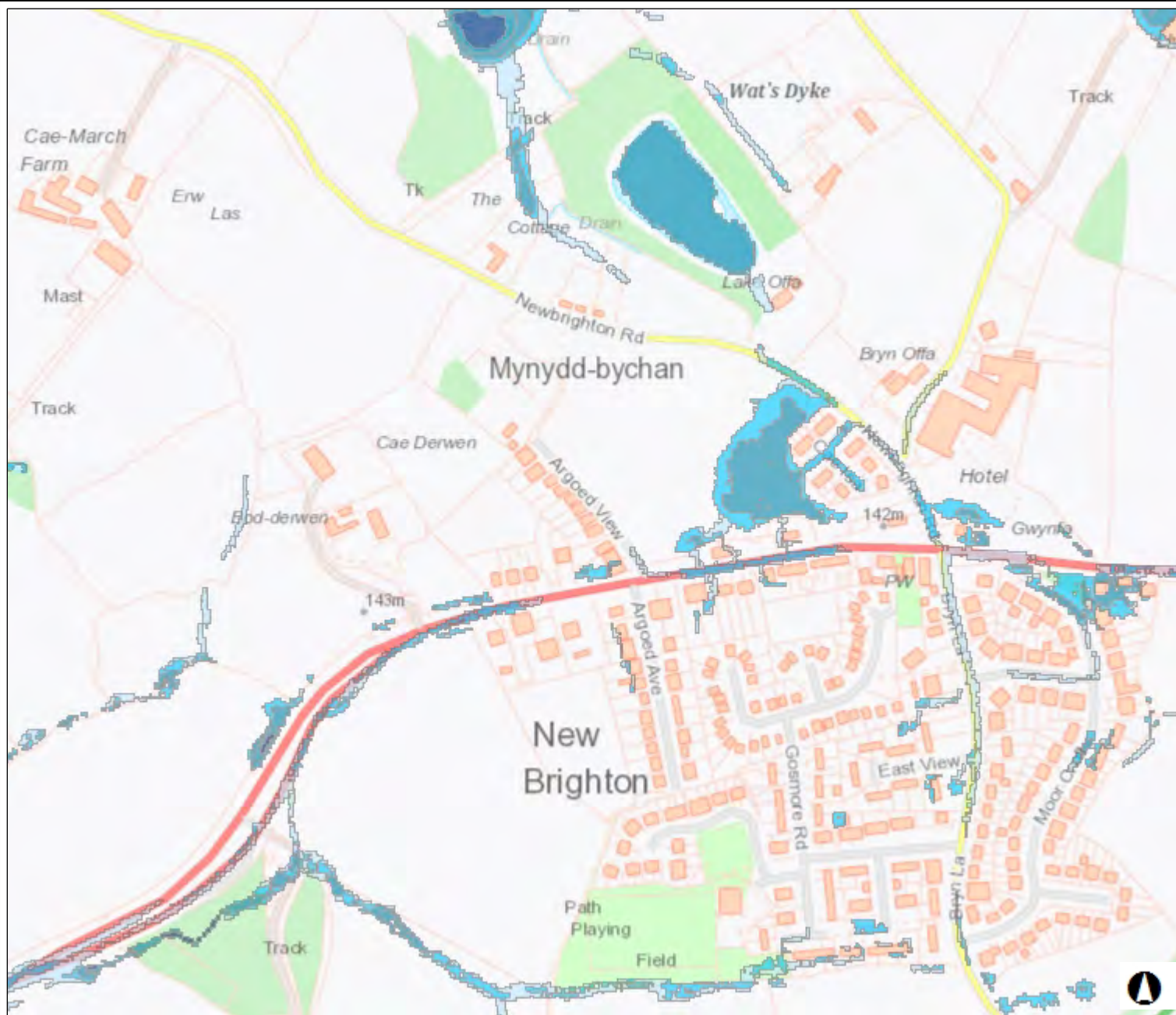
Map Title

Map Perygl Llifogydd / Flood Risk Map

Allwedd / Map Key

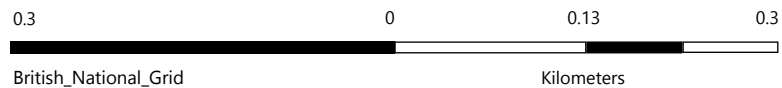
Low Surface Water Flood Risk - Depth (m)

-  Less than 0.15m
-  0.15m - 0.30m
-  0.30m - 0.90m
-  Greater than 0.9m

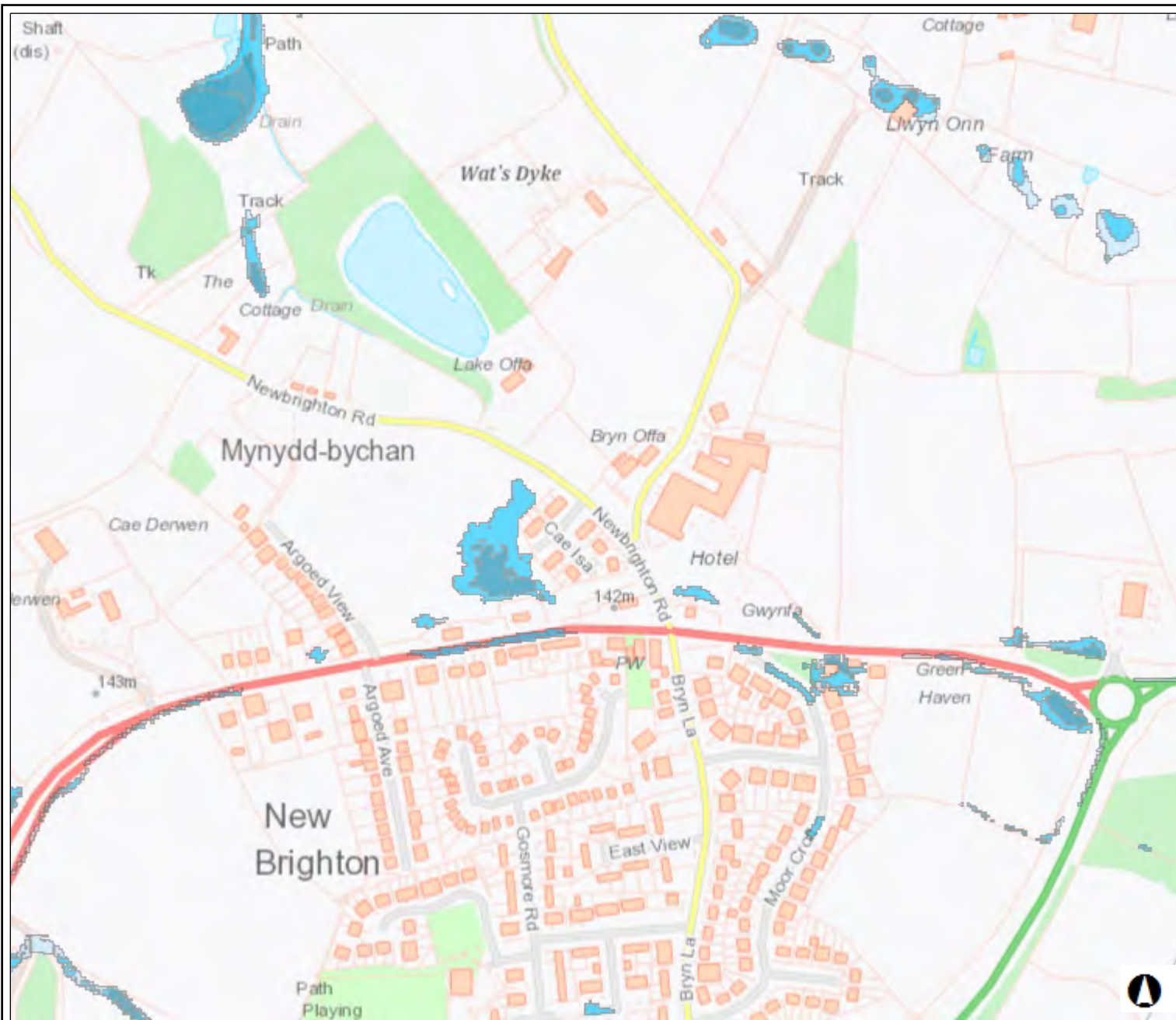


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Map Perygl Llifogydd / Flood Risk Map

Allwedd / Map Key

Medium Surface Water Flood Risk - Depth (m)

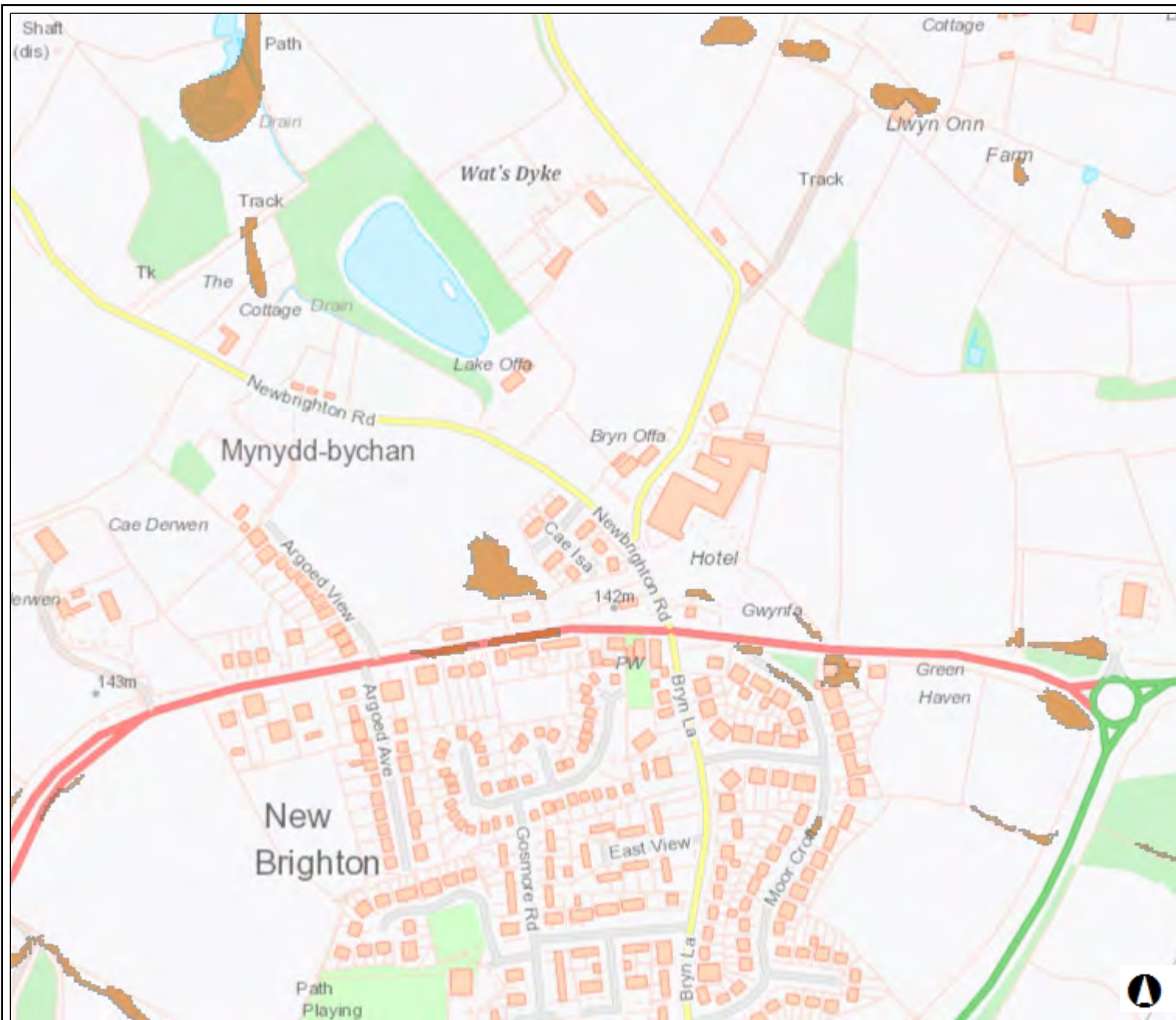
-  Less than 0.15m
-  0.15m - 0.30m
-  0.30m - 0.90m
-  Greater than 0.9m

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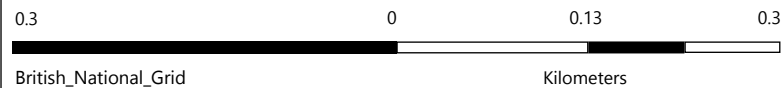


Map Perygl Llifogydd / Flood Risk Map

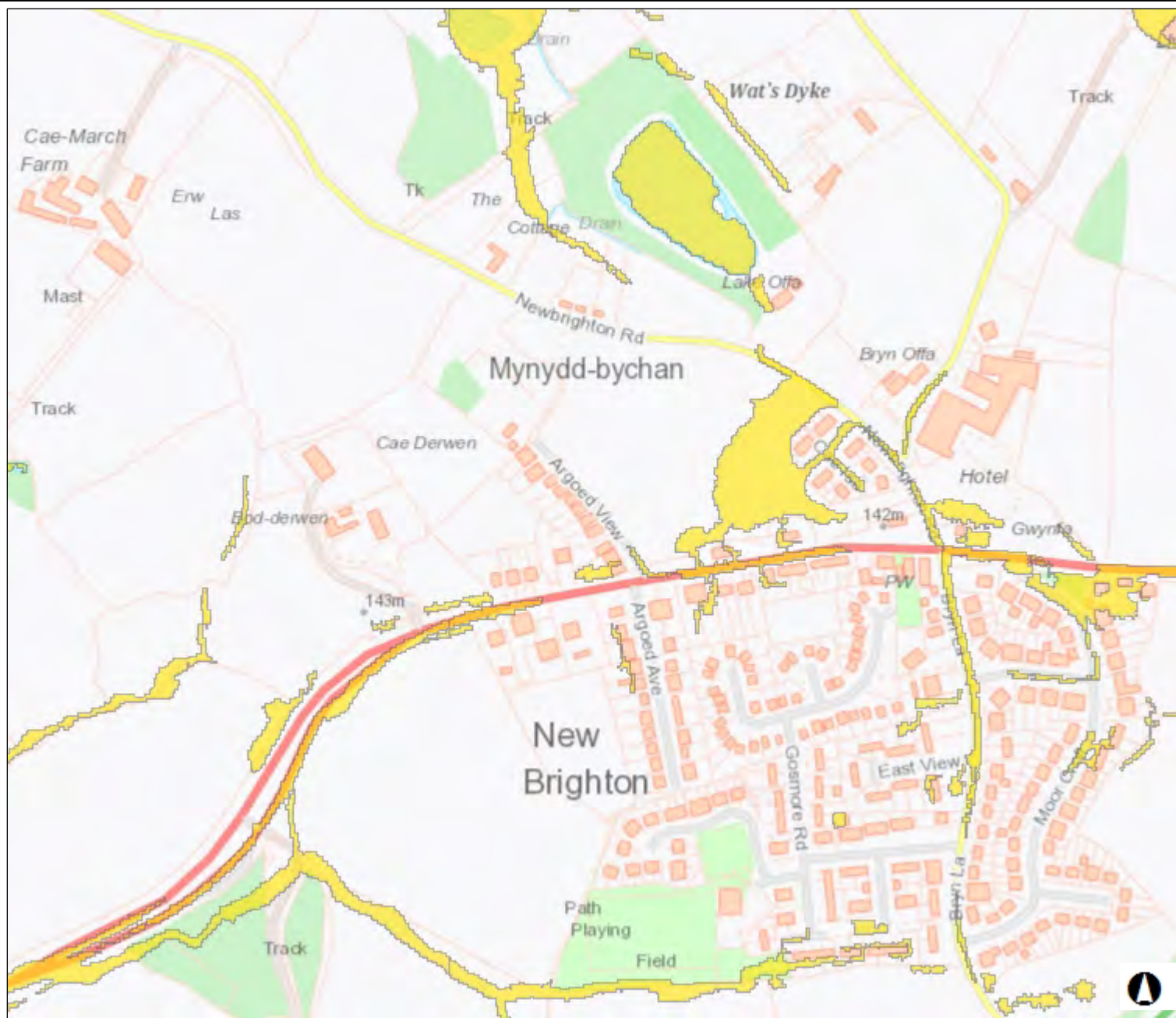
Allwedd / Map Key

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Map Title

Map Perygl Llifogydd / Flood Risk Map

Allwedd / Map Key

 Low Surface Water Flood Risk - Extent

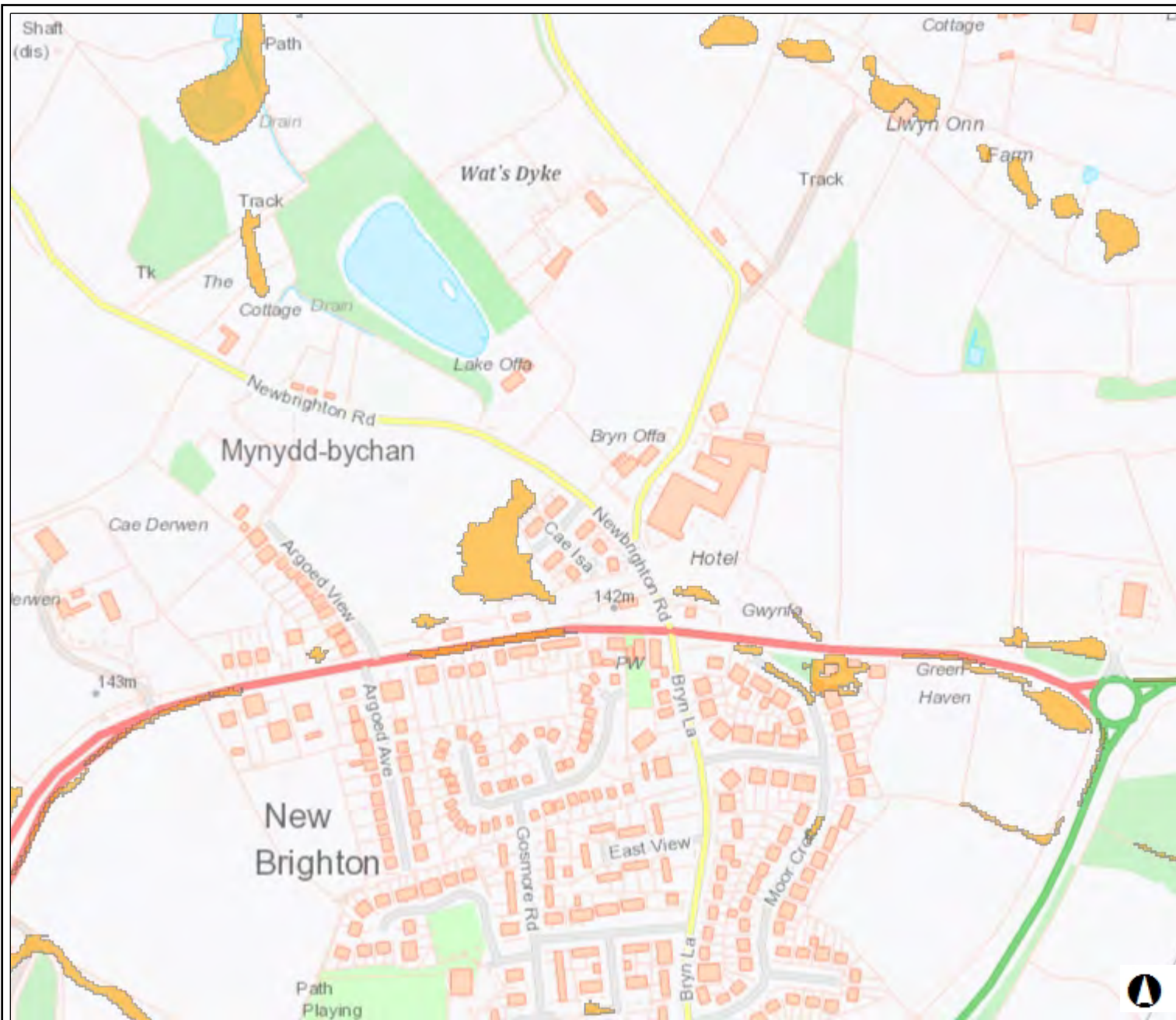
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Map Perygl Llifogydd / Flood Risk Map

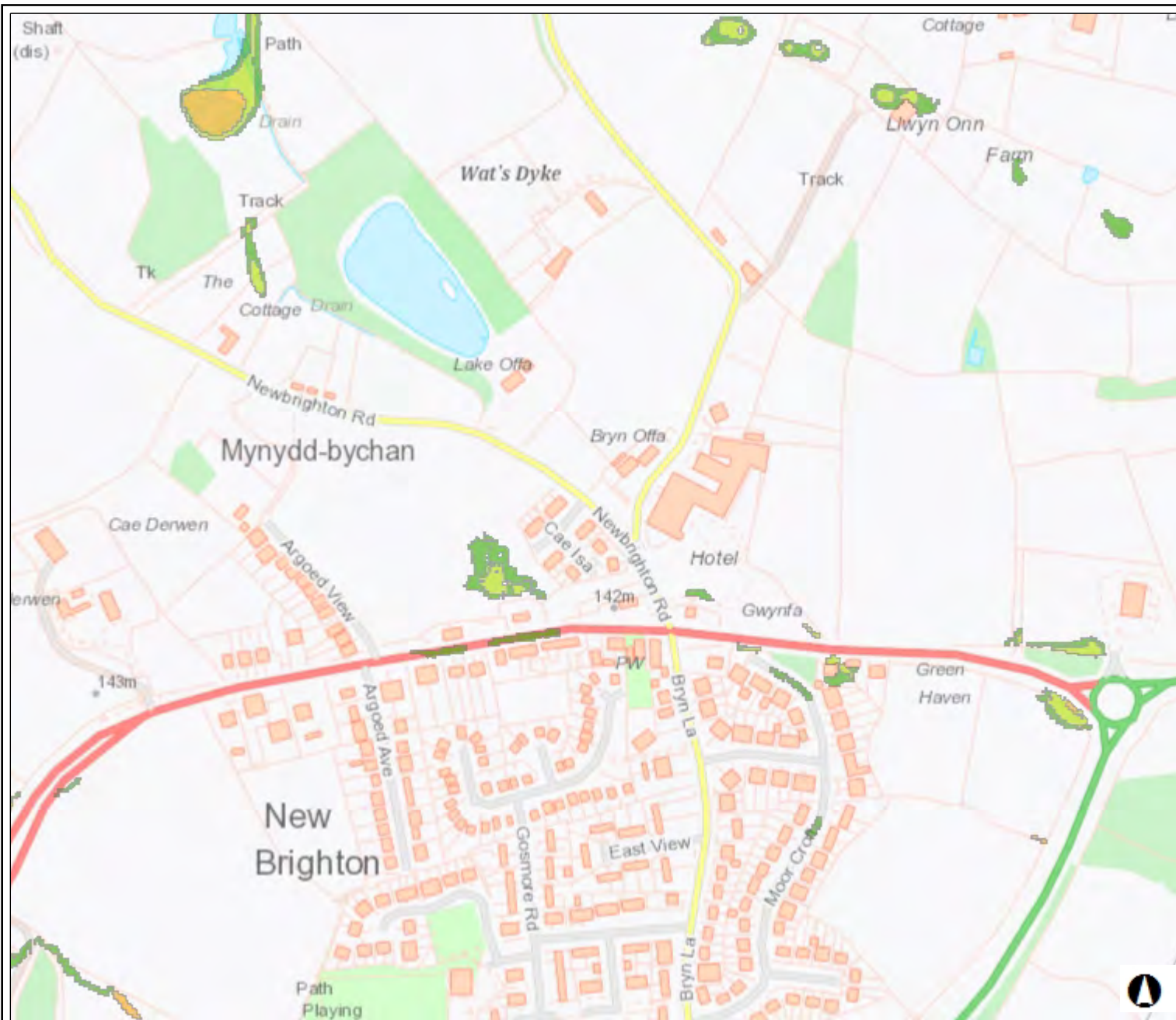
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Map Perygl Llifogydd / Flood Risk Map

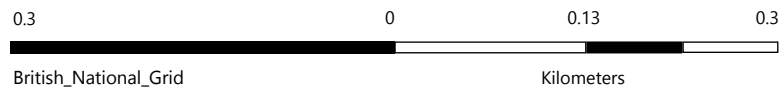
Allwedd / Map Key

High Surface Water Flood Risk - Hazard

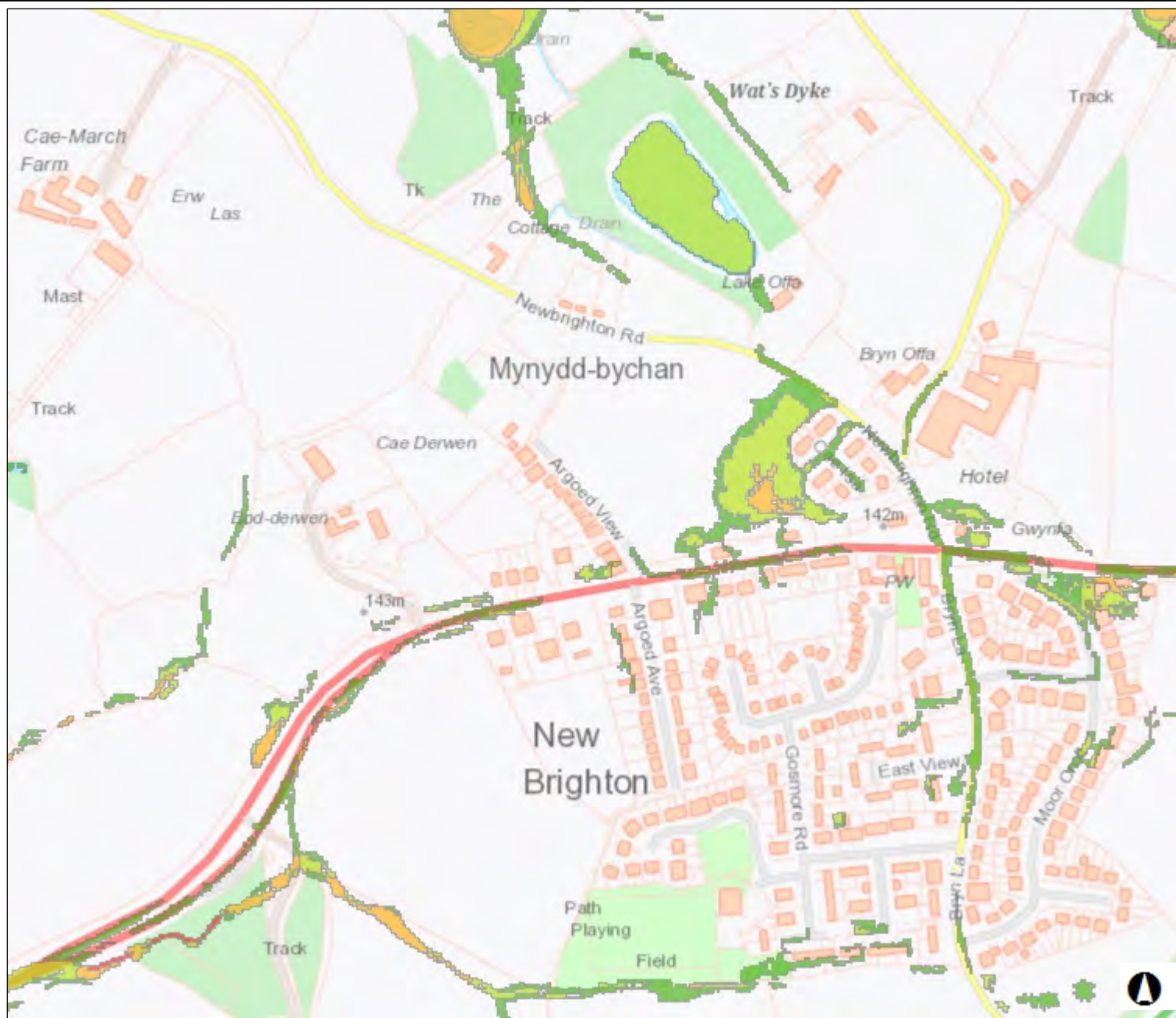
-  Low
-  Danger for Some
-  Danger for Most
-  Danger for All

Graddfa / Scale 1: 4,999

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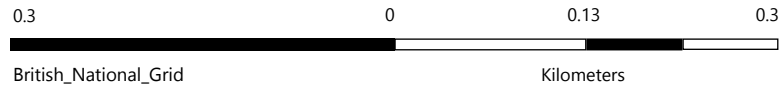
Map Title  
 Map Perygl Llifogydd / Flood Risk Map

Allwedd / Map Key  
**Low Surface Water Flood Risk - Hazard**

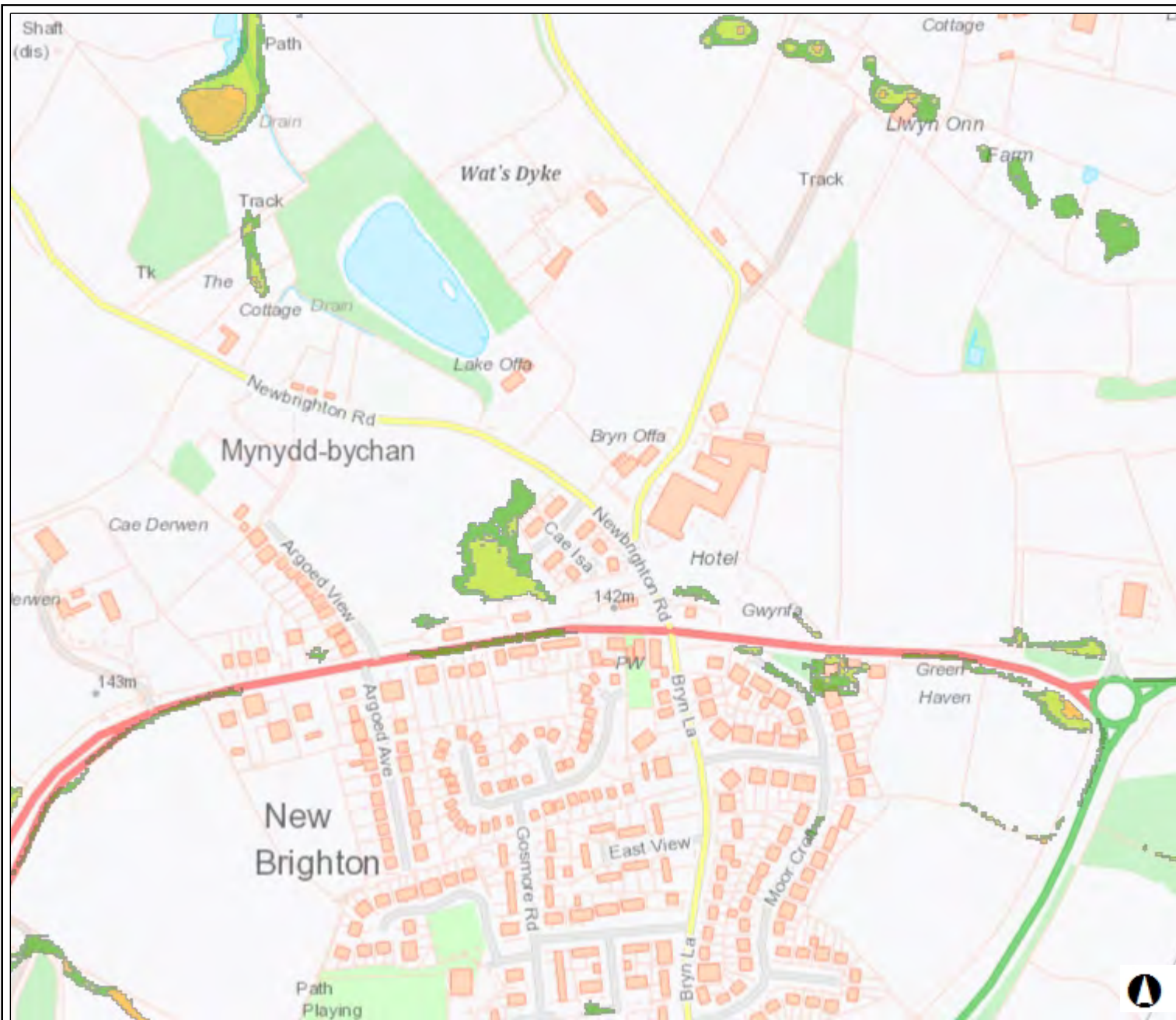
- Low
- Danger for Some
- Danger for Most
- Danger for All

Graddfa / Scale 1: 4,999

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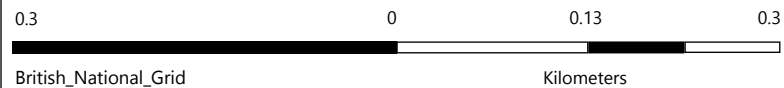
Allwedd / Map Key

Medium Surface Water Flood Risk - Hazard

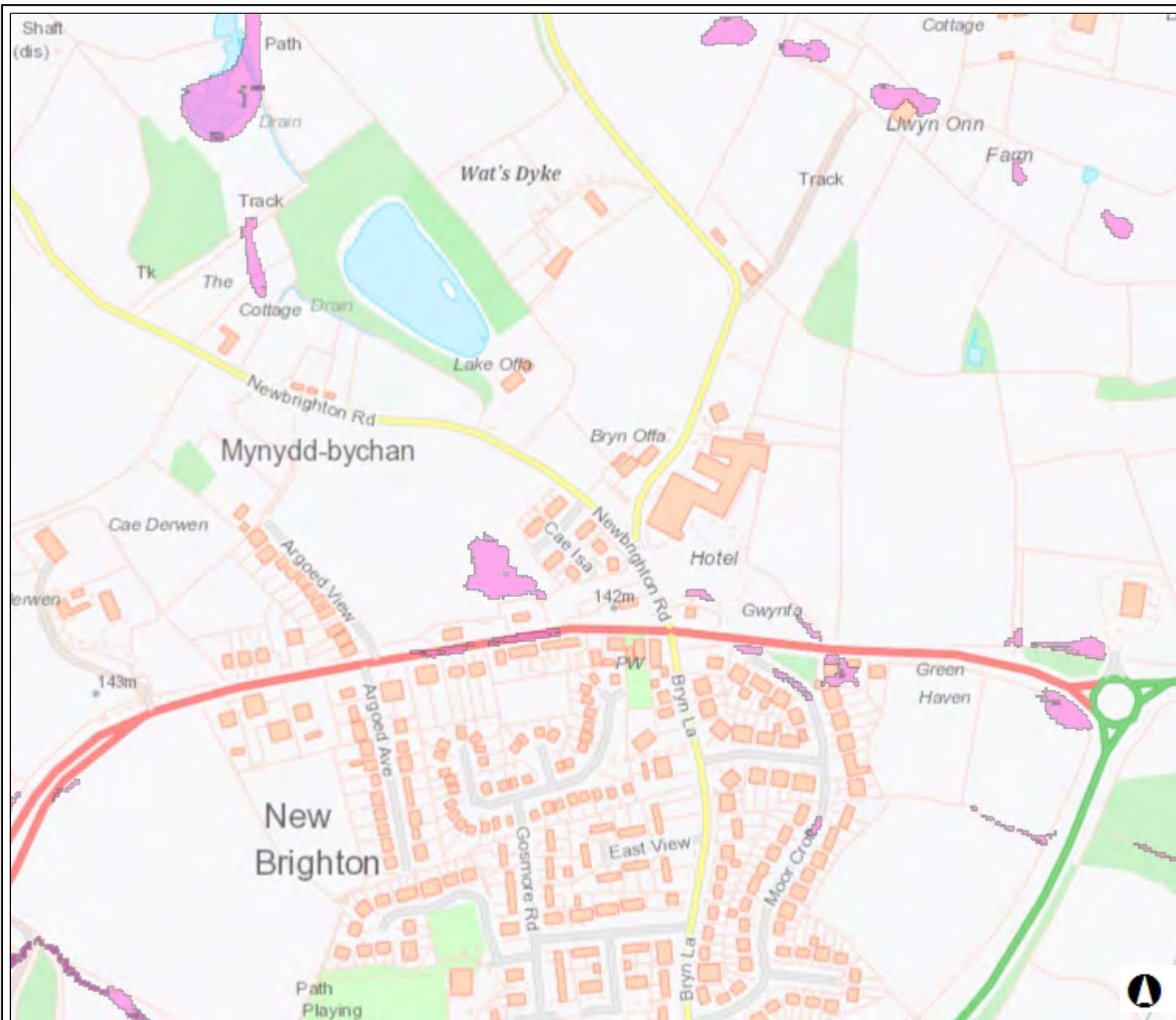
-  Low
-  Danger for Some
-  Danger for Most
-  Danger for All

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Map Perygl Llifogydd / Flood Risk Map

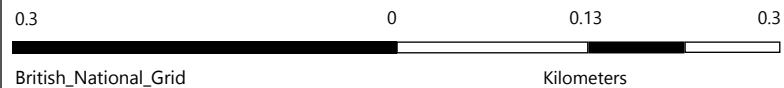
Allwedd / Map Key

High Surface Water Flood Risk - Velocity (m/s)

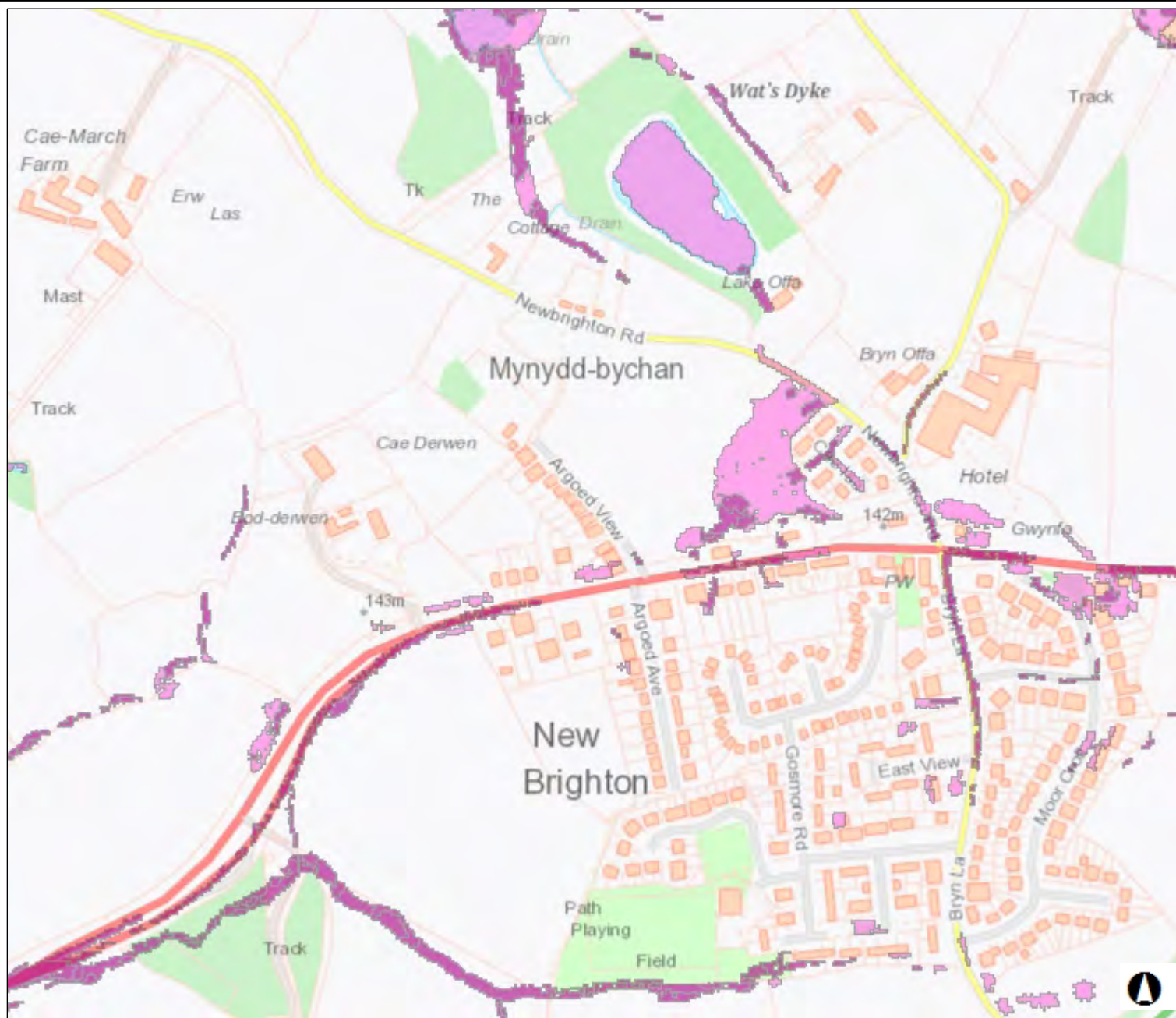
-  Less than 0.25m/s
-  Greater than 0.25m/s

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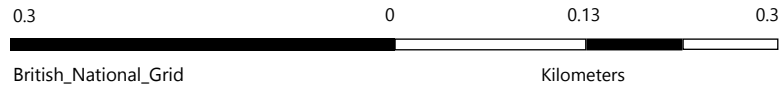
Map Title  
 Map Perygl Llifogydd / Flood Risk Map

Allwedd / Map Key  
 Low Surface Water Flood Risk - Velocity (m/s)

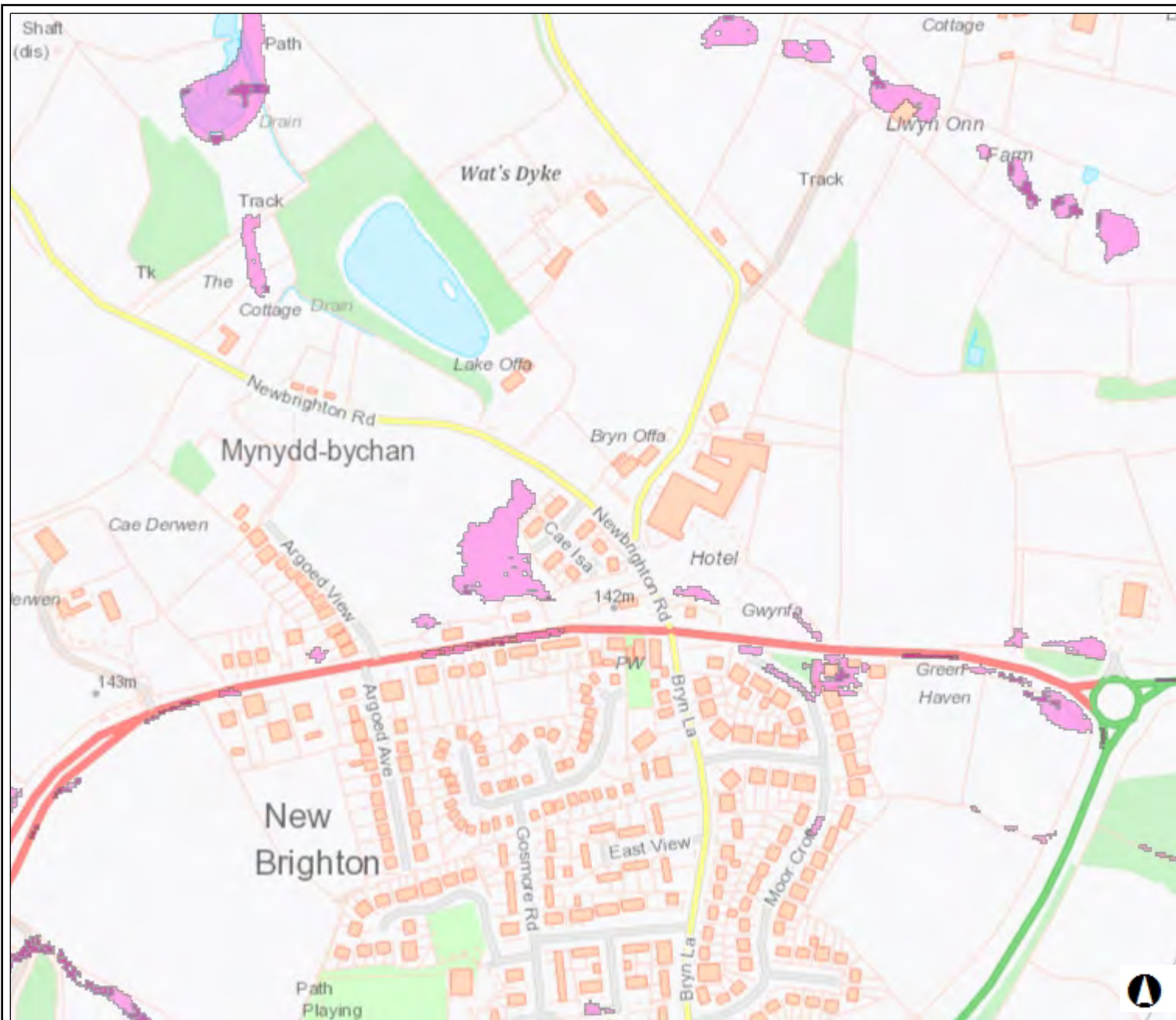
- Less than 0,25m/s
- Greater than 0,25m/s

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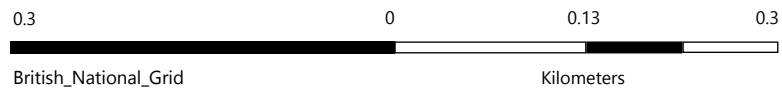
Allwedd / Map Key

Medium Surface Water Flood Risk - Velocity (m/s)

-  Less than 0.25m/s
-  Greater than 0.25m/s

Graddfa / Scale 1: 4,999

Dyddiad / Date  
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Map Title





Map Perygl Llifogydd / Flood Risk Map

Allwedd / Map Key





High Surface Water Flood Risk - Depth (m)

-  Less than 0.15m
-  0.15m - 0.30m
-  0.30m - 0.90m
-  Greater than 0.9m

Medium Surface Water Flood Risk - Depth (m)

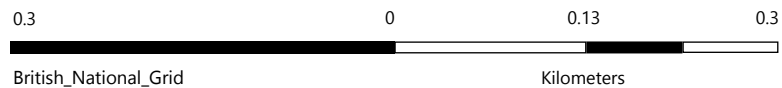
-  Less than 0.15m
-  0.15m - 0.30m
-  0.30m - 0.90m
-  Greater than 0.9m

Low Surface Water Flood Risk - Depth (m)

-  Less than 0.15m
-  0.15m - 0.30m
-  0.30m - 0.90m
-  Greater than 0.9m

Graddfa / Scale 1:5,001

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