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# PROPOSED RESIDENTIAL DEVELOPMENT AT GWELLYN AVENUE, KINMEL BAY

## *Flood Consequences Assessment / Proposed Drainage Strategy*



Prepared for:  
**P & W BROILERS**

Report Ref: BEK-RB20009-1  
September 2022 (Revised January 2024)

**NOTE: Changes to this report, since it was submitted in draft to NRW in November 2022 as part of its Discretionary Planning Advice service, are highlighted in YELLOW.**



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## Project Quality Assurance Information Sheet

Site	Gwellyn Avenue Kinmel Bay RHYL LL18 5HR
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Date	September 2022 (Revised January 2024)
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**PROJECT NO:** RB20009

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**DATE:** September 2022 (Revised January 2024)

### **REVISION STATUS / HISTORY**

Rev	Date	Issue / Comment	Prepared	Checked
00	09/05/2022	To Client / Planning Consultant for comment	RCTB	-
01	22/09/2022	Revised draft to Client / Planning Consultant	RCTB	-
01A	30/09/2022	To NRW for comment	RCTB	-
02	29/01/2024	Pre Application Consultation	RCTB	DE

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The report needs to be considered in the light of the BEK proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

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## 1.0 INTRODUCTION

### 1.1 Purpose

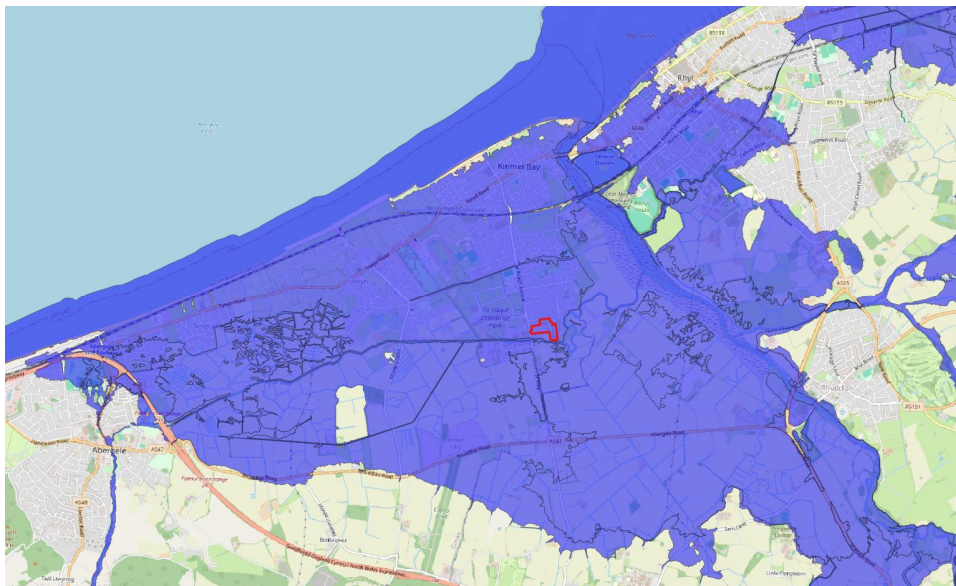
1.1.1 This report records the results of a Flood Consequences Assessment for a proposed residential development on land at Gwellyn Avenue, Kinmel Bay. The proposals are for the erection of **85 houses / bungalows / apartments** and a convenience store (see layout plan **P.1533 / 2G** in **Appendix B**).

1.1.2 The assessment, which has been undertaken at the instruction of the owner of the site, has been prepared in accordance with the Planning Policy Wales Technical Advice Note 15: Development and Flood Risk, which was issued by the Welsh Assembly Government in July 2004. Reference has also been made to the revised Tan 15 and the Flood Map for Planning which was due to come into effect from 01 December 2021 but has now been **suspended until further notice**. Whilst this has no official status for planning purposes, the data is considered to be the 'best available information' on flood risk and has therefore been used to inform this FCA report.

## 2.0 EXISTING SITE USAGE / PROPOSED DEVELOPMENT

### 2.1 Location

2.1.1 Gwellyn Avenue is located to the south of Kinmel Bay centre at OS grid reference SH 99275 78811. The proposed development site is bounded by Gwellyn Avenue to the north, St Asaph Avenue to the west and Afon Gele to the south. The site lies approximately 1km (1,000m) west of the River Clwyd and approximately 2km (2,000m) from the beach at Kinmel Bay. NRW's (**Natural Resources Wales's**) indicative assessment of flooding shows that the site is within Flood Zone 3. See Figure 1 below



**Figure 1: Site Location within Flood Zone 3**

2.1.2 The Flood Zones are defined as follows:

**Flood Zone 1** - low probability and comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3).

**Flood Zone 2** – medium probability and comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%). (Land shown in light blue on the Flood Map).

**Flood Zone 3** – high probability and comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%). (Land shown in dark blue on the Flood Map).

**2.0 EXISTING SITE USAGE / PROPOSED DEVELOPMENT (continued)**

**2.2 Development Advice Map (DAM) Classification)**

2.2.1 **Zone C1:** defined by TAN 15 as “areas of the flood plain which are developed and served by significant infrastructure including flood defences” (land shown in green on the DAM map). See **Figure 2** below.

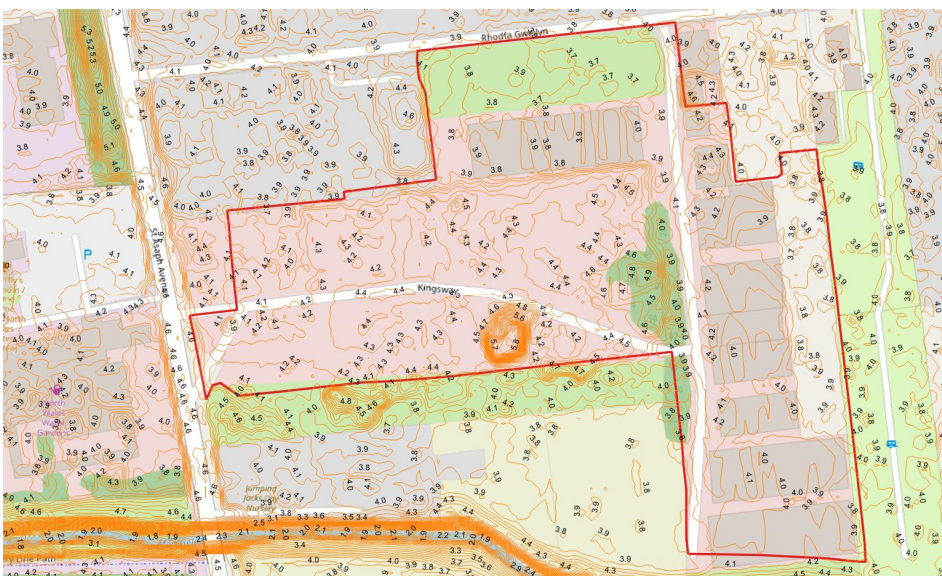


**Figure 2: Site Location within Welsh Government's Development Advice Map**

2.2.2 A small portion of the site at the south east corner, where the River Gele runs parallel to the southern boundary, falls within Zone C2: defined by TAN 15 as “areas of the flood plain without significant flood defence infrastructure.”

**2.3 Existing Site Levels**

2.3.1 Ground levels within the site range from approximately 3.7m AOD to 4.5m AOD with an average of roughly 4.2m AOD. There is a mound near the middle of the site with a maximum level of 6.7m AOD. See **Figure 3** below.



**Figure 3: Existing Ground Levels within the Site (based on LiDAR data)**

## 2.0 EXISTING SITE USAGE / PROPOSED DEVELOPMENT (continued)

### 2.4 Existing Pedestrian / Vehicular Access Routes

2.4.1 Pedestrian and vehicular access onto the site from St Asaph Avenue is currently via an access previously used by Caravan Traders, opposite North Wales Garden World. There is also access leading from Gwellyn Avenue across from property number 25, Gwellyn Avenue.

### 2.5 Estimated Tidal Flood Levels

2.5.1 An Extreme Sea Level dataset released in 2008 adjusted to reflect the current prediction of climate change / sea level rise over the lifetime of the proposed properties. This resulted in the following predictions:

- 0.5% annual probability tide level adjacent to the site (including 95% Confidence Bound) (2022) is 5.92m AOD.
- 0.5% annual probability plus 100 years of climate change tide level adjacent to the site (including 95% Confidence Bound) (2122) is 7.05m AOD.
- 0.1% annual probability tide level adjacent to the site (including 95% Confidence Bound) (2022) is 6.23m AOD.
- 0.1% annual probability plus 100 years of climate change tide level adjacent to the site (including 95% Confidence Bound) (2122) is 7.36m AOD.

See **Calculations** in **Appendix A** (based on information obtained from NRW).

2.5.3 In 2017 a new Extreme Sea Level dataset was released which provides the following predictions:

- 0.5% annual probability tide level adjacent to the site (including 97.5% Confidence Bound) (2022) is 5.65m AOD.
- 0.5% annual probability plus 100 years of climate change tide level adjacent to the site (including 97.5% Confidence Bound) (2122) is 6.79m AOD.
- 0.1% annual probability tide level adjacent to the site (including 97.5% Confidence Bound) (2022) is 5.99m AOD.
- 0.1% annual probability plus 100 years of climate change tide level adjacent to the site (including 97.5% Confidence Bound) (2122) is 7.15m AOD.

See **Calculations** in **Appendix A** (based on information obtained from NRW).

2.5.4 These latest tide levels are between 0.21m and 0.27m **lower** than those derived from the 2008 dataset.

2.5.5 The flood levels which would result from overtopping or breach of the coastal or River Clwyd defences are discussed in Section 4.1 below.

### 2.6 Existing Classification / Use

2.6.1 "Less Vulnerable Development" as defined by Section 5 TAN 15.

2.6.2 The existing site accommodates a variety of commercial uses with associated buildings and access provision. Commercial uses include caravan storage and sales, vehicle repairs, car recovery services, caravan transportation, plant hire depot, fairground equipment storage, builders yard, drainage depot and container hire. Most of the site is hard surfaced and various uses are defined by substantial permanent fencing.

## 2.0 EXISTING SITE USAGE / PROPOSED DEVELOPMENT (continued)

### 2.6 Existing Classification / Use (continued)

2.6.3 The eastern portion of the site accommodates substantial former poultry sheds and ancillary buildings. Those sheds were previously used for intensive poultry rearing industrial in nature, involving regular visits by articulated vehicles for the delivery and collection of poultry, for delivery of poultry feed, for removal of poultry manure and for deliveries of fresh bedding for the poultry sheds. The sheds are now used for occasional storage.

### 2.7 Proposed Classification / Use

2.7.1 “Highly Vulnerable Development” as defined by Section 5 TAN 15.

2.7.2 The proposals involve the demolition of the existing buildings on site, the raising of the land so that it remains flood free over the life time of the development and the erection of 85 dwellings, including 2, 3- & 4-bedroom houses, 2 & 3 bedroom dormer bungalows together with 1 & 2 bedroom apartment blocks and a convenience store, all with associated driveways and parking spaces. See the Architects’ drawing P.1533 / 2G in Appendix B.

## 2.8 LDP27: Coastal and Flood Risk Protocol

2.8.1 The Coastal and Flood Risk Protocol (LDP27) was adopted by Conwy County Borough Council (CCBC) in July 2015 “to inform potential applicants, interested parties and those determining planning applications of the controls on and constraints to development within the coastal flood risk area of the North Wales Coast, from Pensarn to Kinmel Bay with specific reference to tidal flood risk along this part of the coastline”.

2.8.2 Section 5 of the Protocol sets out the Flood Risk Management Strategy for the tidal Clwyd (the most significant flood risk to Towyn and Kinmel Bay) and states that: “..... all properties in this area should be protected to their current standard or better. This should be through a combination of improvements to the existing defences in the short term, and by realigning defences in the medium to long term”.

2.8.3 Section 6 deals with planning applications in the protocol area relating to the following:

- a) Vulnerable and New Development
- b) Replacement and Extensions to Dwellings
- c) Change of Use
- d) Seasonal Occupancy
- e) Existing Park Homes & Mobile Homes/Caravans

2.8.4 Section a) is relevant to the proposed residential development at Gwellyn Avenue which, for ease of reference is reproduced below:

#### **a. Vulnerable and New Developments**

*Within Tidal Flood Zone as designated on the CCBC CTFRA Climate Change Maps*

- *There will be a presumption against granting permission in respect of Highly Vulnerable development and Emergency Services development*
- *Proposals for other forms of development will be evaluated against the requirements of TAN 15 but in the context of identified levels of risk it is highly unlikely that new low vulnerability development will be able to satisfy the requirements of the TAN*

**Reason:** *New development within this area will increase the amount of people and property at risk, increasing the burden on emergency services. Certain uses will also present a greater risk to life than others. Other new development will be assessed on its own merits but is likely to be restricted to ‘water compatible’ development as defined in Para. 5.3 of TAN15.*

2.8.5 The proposal to raise the land will set the development above the predicted 0.5% AEP plus climate change flood level of all scenarios. This will reduce the need for evacuation and therefore not increase the burden on the emergency services. The site will also provide a safe refuge for residents from surrounding areas.



## 2.0 EXISTING SITE USAGE / PROPOSED DEVELOPMENT (continued)

### 2.9 Justification for Proposed Development

2.9.1 The issue of justifying the location of development is dealt with at Section 6 of TAN15 (2004). This section commences by advising that much urban development in Wales has taken place alongside rivers and in the coastal plain. In such context, the note advises that:-

*"It is therefore inevitable, despite the overall aim to avoid flood risk areas, that some existing development will be vulnerable to flooding and fall within Zone C. Some flexibility is necessary to enable risks of flooding to be addressed whilst recognising the negative economic and social consequences if policy were to preclude investment in existing urban areas, and the benefits of reusing previously developed land. Further development in such areas, whilst possibly benefiting from some protection, will not be free from risk and could in some cases exacerbate the consequences of flooding event for existing development and therefore a balanced judgement is required".*

2.9.2 The note goes on to advise that new development should be directed away from Zone C and towards suitable land in Zone A, otherwise to Zone B, where river or coastal flooding will be less of an issue. In Zone C the tests outlined at Section 6 and 7 of the TAN will be applied, recognising however, that highly vulnerable development and emergency services in Zone C2 should not be permitted. All other new development should only be permitted within Zone C1 and C2 if determined by the planning authority to be justified in that location. It is advised that development, including transport infrastructure, will only be justified if it can be demonstrated that:-

- (i) Its location in Zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement, or;
- (ii) Its location in Zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlements or region, and;
- (iii) It concurs with the aims of PPW and meets the definition of previously developed land, and;
- (iv) The potential consequences of a flooding event for that particular type of development have been considered, and in terms of the criteria contained in Sections 5 and 7 and Appendix 1 found to be acceptable.

2.9.3 The note goes on to advise that, if a development proposal in C1, or in C2 if it is defined as being of low vulnerability, meets the tests outlined in Section 6, the justification will be in the knowledge that those developments will flood and will need to be planned accordingly. Whether a development should proceed or not will depend upon whether the consequences of flooding of that development can be managed down to a level which is acceptable for the nature/type of development being proposed, including its effect on existing development.

2.9.4 A revised version of TAN 15 was issued by Welsh Government in December 2021. Although suspended from coming into force until **further notice**, advice contained in the note relating to justifying the location of development is considered here for completeness.

2.9.5 At Section 5 of the revised TAN (Figure 2), areas where flood risk management infrastructure provides a minimum standard of protection against flooding from rivers of 1:100 (plus climate change and freeboard) and from the sea of 1:200 (plus climate change and freeboard) are defined as TAN 15 Defended Zones. With regard to such Defended Zones, the note advises at Section 10 that development will be justified if:-

1. Its location meets the definition of previously developed land, AND;
2. The potential consequences of a flooding event for the particular type of development have been considered, and found to be acceptable in accordance with the criteria contained in Section 11.

**2.0 EXISTING SITE USAGE / PROPOSED DEVELOPMENT (continued)**

**2.8 Justification for Proposed Development (continued)**

- 2.9.6 Requirements for the development to be necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement, or to contribute to key employment objectives supported by the local authority and other key partners, to sustain in existing settlements or region are removed. Similarly, the current requirement for the proposed development to specifically concur with the aims of PPW is also removed.
- 2.9.7 With reference to the above TAN 15 tests, it is considered that location of the proposed development within Zone C is necessary to assist and, to be part of a local authority regeneration initiative and local authority strategy required to sustain an existing settlement. It is also considered that development of the site as proposed concurs with the aims of PPW and meets the definition of previously developed land. Certainly, subject to acceptability of assessment of the consequences of a flooding event, there is no reason to suggest development of the site should not proceed.
- 2.9.8 The development strategy for Conwy County Borough is set out in the Conwy Local Development Plan adopted in 2013. Within the LDP the proposed development site is situated within the settlement boundary of Kinmel Bay and Towyn and within the defined strategic regeneration area. It is stated that a fundamental aim of the plan is to facilitate comprehensive regeneration of the coastal towns, including Towyn and Kinmel Bay. The plan seeks to achieve such regeneration by broadening economic activity, addressing social exclusion and reducing deprivation. This is to be achieved also by developing a diverse supply of housing, including affordable housing for local needs.
- 2.9.9 The strategy seeks to focus future development within the existing urban area for the very purpose of bringing about regeneration, to support existing services, provide affordable housing and to sustain the existing communities. It is a fundamental aim of the stated development and regeneration strategy to create attractive, high quality sustainable places where people wish to live, work, and relax.
- 2.9.10 A further aim is to achieve a broad mix of housing types to cater for the needs of all residents and to contribute to addressing the priority issue of deficiency in affordable housing provision. The strategy set out in the LDP is clear that the range of housing to be secured in achieving such objectives should include windfall developments. A further objective of this stated regeneration strategy is to address the deficiency in open space provision and to so direct housing development to existing settlements in order to address such deficiency.
- 2.9.11 It is now 33 years since the Towyn floods of 1990. For 29 of those 32 years, Towyn and Kinmel Bay have been subject of moratoria upon development for reason of perceived flood risk. In such context, it is hardly surprising that the settlements display obvious signs of deprivation and lack of investment. Nor is it surprising that there is a significant demonstrable need for affordable housing provision and an acknowledged deficiency in open space provision.
- 2.9.12 In securing regeneration and sustainability of existing settlements, the development and regeneration strategy set out in the Authority's Local Development Plan is entirely reliant upon new development coming forward to provide the necessary mix of new housing, both for changing existing households and for new households. It is also reliant upon such new development in order to create the attractive, high quality environments within which people will wish to live and work.
- 2.9.13 Similarly, the strategy also relies upon new development coming forward to provide demand for existing facilities and services and in order to ensure viability of the district centre in the future. There is reliance on new housing development to provide the necessary affordable housing required for local needs and to address the identified deficiency in open space and recreation provision.
- 2.9.14 The whole of the existing settlements of Towyn and Kinmel Bay are located within Zone C flood risk areas. Quite simply, other than allowing development within Zone C, stated regeneration objectives for these particular settlements are not going to be achieved. It is a simple fact that there is no other alternative meaningful strategy by which such objectives could be secured. Clearly location of the proposed development in Zone C is necessary, to assist and to be part of, the Local Authority's regeneration strategy which is required to sustain the existing settlement.

**2.0 EXISTING SITE USAGE / PROPOSED DEVELOPMENT (continued)**

**2.8 Justification for Proposed Development (continued)**

- 2.9.15 It is the stated primary policy objective of PPW to ensure that the planning system contributes towards the delivery of sustainable development and improve the social, economic, environmental and cultural well-being of Wales. The document encourages a wider, sustainable and problem solving outlook which focuses on integrating and addressing multiple issues rather than on an approach which is fragmented, un-coordinated and deals with issues in isolation. PPW advises that key planning principles are to grow the economy in a sustainable manner, to make the best use of resources, to facilitate accessible and healthy environments, to create and sustain healthy communities and to maximise environmental protection and limit environmental impact.
- 2.9.16 PPW advises that the efficient use of resources, including land, underpins sustainable development and that the planning system has a vital role to play in making development resilient to climate change. The policy document advises that previously developed land should be used wherever possible, in preference to greenfield sites, where the land is suitable for development. Within settlements, PPW advises that previously developed land should generally be considered suitable for appropriate development where its re-use will promote sustainability principles and any constraints can be overcome.
- 2.9.17 Development of the application site would clearly assist in regeneration of the existing settlement and assist in enhancing social, economic, environmental and cultural well-being. The development proposals offer a mix of housing types and would secure much-needed affordable housing and open space for local needs. The proposed development would be well integrated within the existing settlement pattern and with surrounding residential development.
- 2.9.18 The development would be sustainably located with easy access to public transport and services and would be located adjacent to the Tir Llwyd Enterprise Park situated on the opposite side of St. Asaph Avenue. Development is clearly needed within Towy and Kimmel Bay in order to sustain existing services and to secure viability of the district centre in the future.
- 2.9.19 The application site is situated within the existing settlement boundary and accommodates a variety of commercial uses with associated buildings and access provision. Commercial uses include caravan storage and sales, vehicle repairs, car recovery services, caravan transportation, plant hire depot, fairground equipment storage, builders yard, drainage depot and container hire. Most of the site is hard surfaced and various uses are defined by substantial permanent fencing.
- 2.9.20 The eastern portion of the site accommodates substantial former poultry sheds and ancillary buildings. Those sheds were previously used for intensive poultry rearing industrial in nature, involving regular visits by articulated vehicles for the delivery and collection of poultry, for delivery of poultry feed, for removal of poultry manure and for deliveries of fresh bedding for the poultry sheds. The sheds are now used for occasional storage. Clearly the site meets the definition of previously developed land, and the proposed development concurs with the aims of PPW.
- 2.9.21 The final element of the justification test set out in TAN 15 is addressed elsewhere in this Flood Consequences Assessment.

### **3.0 EXISTING DEFENCES**

#### **3.1 Type**

3.1.1 The existing defences at the River Clwyd consist predominantly of mud flats and salt marshes leading to a mixture of earth embankments and sloping stone walls.

#### **3.2 Distance from Proposed Development Site**

3.2.1 The site is approximately 1km (1,000m) from the defences along the River Clwyd.

#### **3.3 Potential Methods of Flooding**

- Overtopping of the coastal defences.
- Breach of the coastal defences.
- Overtopping and breach of the River Clwyd defences.
- Increase in sea levels due to global warming / climate change.
- Overloading of the existing highway drainage system.

### **4.0 FLOOD RISK ANALYSIS**

#### **4.1 Coastal Inundation**

4.1.1 The main risk of coastal inundation to the site is from overtopping and / or a breach in the defences along the River Clwyd.

4.1.4 NRW have made available the 2017 JBA Report 2016s4979 (Point of Ayr to Pensarn Tidal Flood Risk Analysis - Final Main Report) which was commissioned by them to “deliver a clearer understanding of tidal flood risk along the North Wales frontage from Point of Ayr to Pensarn”.

4.1.5 This report considers the effects of climate change / sea level rise on the current “defended” scenario over the period to 2117 (report date of 2017 plus 100 years) and records the extent and depth of the flooding that is predicted to occur most of the Towyn and Kinmel Bay area.

4.1.6 The question then arises as to the increase in the predicted flooding when a breach of the defences is also taken into consideration. The 2017 JBA report considers three breach scenarios along the open coast in the Towyn & Kinmel Bay area as follows:

- Breach 1: the funfair Towyn (which replicates the 1990 historical event)
- Breach 2: Kinmel Bay
- Breach 3: Pensarn Railway Embankment

4.1.7 However the report does not consider a breach in the River Clwyd defences and, in order to inform this FCA, JBA were commissioned in 2020 to extend their report to cover this potential mode of failure. As part of their work the Point of Ayr to Pensarn hydraulic model was updated with new boundary and topographic data, and a 50m breach of the River Clwyd embankments at the River Gele outfall was included into the model. This was used to simulate a series of design extreme tidal events for the current defended scenario, and a scenario to consider a breach of the River Clwyd embankments.

4.1.8 JBA were also asked to consider the effect of future improvements to the River Clwyd defences (something that both CCBC & NRW have suggested will take place within the next 50 years). This was achieved by raising the embankments within the model whilst also recognising that even after these improvements there remains a risk that a breach could still occur. JBA also considered the effects of raising the site levels such that the proposed development would remain flood free over its lifetime. These scenarios are included in JBA’s analysis.

**4.0 FLOOD RISK ANALYSIS** (continued)

**4.1 Coastal Inundation** (continued)

4.1.9 A copy of JBA's report, dated May 2020, recording the results of their analysis is included in **Appendix C**.

4.1.10 Maximum flood levels for each modelled scenario and event for the Gwellyn Avenue site are detailed in Table 2-7 of JBA's 2020 report which has been reproduced below for ease of reference. The analysis considers two "confidence intervals" (which take account of the modelling uncertainties) CI1 (50%) which is generally used by NRW for the design of defences and the more onerous CI2 (97.5%) which Welsh Government / NRW require for considering flood risk to buildings etc.

4.1.11 Due to the proximity of the Gwellyn Avenue site to the River Clywd, the site is shown to be at flood risk under all modelled events for the 2120 epoch. Under the defended scenario using the largest modelled event (0.1% AEP CI2) flood depths reach approximately 1.5m, which increase by approximately 0.1m if a breach of the defences at the River Gele outfall was to occur. For comparison, the model assumes that current ground levels across the site range from 3.9-4.5mAOD with an average of roughly 4.2mAOD.

**JBA Table 2-7: Gwellyn Avenue site modelled flood risk results**

Scenario	Event AEP (2120 epoch)	CI1 Flood Level 50% (m AOD)	CI2 Flood Level 97.5% (m AOD)
Defended	0.5%	4.84	5.00
	0.1%	5.07	5.61
Defended with River Gele Breach	0.5%	5.01	5.16
	0.1%	5.22	5.70
Defended raised Clwyd embankments with River Gele Breach	0.5%	4.68	-
	0.1%	5.00	4.94
Defended including Breach 2	0.1%	5.10	5.65
Defended including Breach 3	0.1%	5.07	5.63

**4.2 Impact of Raising the Site Levels**

4.2.1 Based on the modelled results, it is clear that the site is at risk of flooding from the River Clwyd and a breach of the River Gele. Flood risk increases under sea level rise and defence failure scenarios. In order to develop the site it will be necessary to raise the ground levels such that it remains flood free over the lifetime of the development.

4.2.2 For the purpose of this FCA report the proposed development site was raised in the model to a level of 6.00mAOD. This is 300mm above the maximum modelled flood level of 5.70mAOD from all simulated model scenarios; based on the 0.1% AEP 2120 event including a breach of the River Gele.

4.2.3 The results of this analysis are discussed on page 15 of JBA's report in **Appendix C** with Figure 3-1 and Figure 3-2 showing the change in maximum water levels between the current site topography and raising the site above the maximum flood level.

4.2.4 Figure 3-1 shows the modelled water level increases due to the raised site for the defended scenario under the 0.1% AEP 2120 epoch CI2 (97.5%). On the eastern side of the raised site, there is a localised increase in water levels as flood waters travelling west from the River Clywd hit the raised platform. This reaches 10mm for a few metres and then drops down to 5mm covering the neighbouring two roads to the east of the site.

#### **4.0 FLOOD RISK ANALYSIS (continued)**

#### **4.2 Impact of Raising the Site (continued)**

4.2.5 Figure 3-2 shows the modelled water level increases due to the raised site for the defended scenario with a breach of the River Gele under the 0.1% AEP 2120 epoch CI2 (97.5%). The results show a similar impact on water levels as the defended scenario with raised site. There is a similar increase of just over 10mm immediately on the eastern side of the raised site, and an increase of approximately 6mm covering the two roads to the east of the site and a short area to the south.

4.2.6 The results of the modelling show that the raised site would likely have an impact on extreme water levels, but that this is small when considering the accuracy of the modelling and the underlying data. From discussions with JBA it is thought possible that the “star” shaped increase in water depths on the adjacent land may result from the fact that the development plateau was modelled as being raised to 6.0m AOD with a vertical face to the new embankment. This may have resulted in some reflected waves on the eastern boundary of the development as flood water from the breach approaches from the River Clwyd.

4.2.7 In practice the embankment will be graded at a 1 in 3 slope and planted with trees and shrubs which is likely to reduce the increase in water level to below NRW’s criteria of 5mm.

#### **4.3 Flood Water Velocities**

4.3.1 In the event of a breach of the River Clwyd defences, high velocities / flows would be expected to occur in the immediate vicinity of the breach. These effects would dissipate as the flood water spreads out over the wider area with lower velocities near to the proposed development site.

4.3.2 As the proposed site is to be raised such that it will remain flood free over the lifetime of the development the flood water velocities will not affect the new houses other than for emergency access and egress. This matter is discussed in greater detail below.

#### **4.4 Global Warming / Climate Change**

4.4.1 Climate change predictions currently used by NRW are based on the FCDPAG3 scenario.

4.4.2 Welsh Government require proposals to be tested against the 0.1% AEP + climate change tidal event. The results of the latest JBA report incorporate these requirements.

#### **4.5 Overloading of the Existing Highway Drainage System**

4.5.1 Centreline levels along Gwellyn Avenue fall from west to east and centre line levels along St Asaph Avenue fall from south to north. In the event that the existing highway drainage system becomes overloaded during extreme storm events, the proposed development is unlikely to be affected as FFLs and hardstanding areas are to be elevated to ensure that the site remains flood free during the tidal events.

#### **4.6 Proposed Ground Floor Levels for Residential Properties**

4.6.1 The maximum predicted flood level at the development site is 5.7m AOD for an “defended” 0.1% AEP inclusive of 100 years of climate change and a breach of the River Clwyd defences.

4.6.2 For the proposed residential properties, it is considered that the minimum ground floor level should be 5.45m AOD. This sets FFL’s approx. 300mm above the “defended” 0.5% AEP + CC plus a breach of the River Clwyd defences. Properties will remain flood free for all other 0.5% + CC AEP scenarios. In the event of the 0.1% + CC AEP occurring properties could flood internally to a depth of 350mm, which is within criteria set out in TAN 15 A1.15. However, the improvement works to the River Clwyd defences which will be required to comply with the Flood Risk Management Strategy outlined in LPD27, will protect the site from flooding during such a scenario.

#### 4.0 FLOOD RISK ANALYSIS (continued)

#### 4.7 Emergency Access & Egress

4.7.1 Even for the worst-case scenario an emergency access / egress route exists for both vehicles and pedestrians towards Bodelwyddan. It will however be necessary for users of this route to drive / wade through flood water. Once the improvements to the River Clwyd defences are complete the maximum depth of flood water for the 0.1% AEP + CC + breach scenario is predicted to be approximately 800mm. Improvement works to the Clwyd embankments to comply with the Flood Risk Management Strategy outlined in LPD27 will reduce this figure.

#### 4.8 Effect of Development on 3<sup>rd</sup> Party Land

4.8.1 The JBA 2020 Report considers the effects of raising the development site to a level of 6.00m AOD and concludes that this would likely have an impact on extreme water levels, but that this is small when considering the accuracy of the modelling and the underlying data.

4.8.2 In practice, with a proposed FFL of 5.45m AOD, it will only be necessary to raise the general site level to approximately 5.3m AOD – to ensure that it remains flood free over the lifetime of the development. Although the effect of this level has not been modelled, the associated impact on 3<sup>rd</sup> party land is likely to be less than that predicted by the JBA analysis and therefore within the acceptable limits set by NRW.

#### 4.9 Consultation with Natural Resources Wales

4.9.1 As part of the preparation of this FCA a draft copy of this report was submitted to NRW in November 2022 as part of its Discretionary Planning Advice service. NRW's advice is contained in its letter of 16 December 2022 which is included in **Appendix D**.

4.9.2 NRW have raised concerns regarding the adverse impact of increased flooding on 3<sup>rd</sup> party land (which is over 10mm in places rather than NRW's criteria of 5mm) and highlight the need for further evidence if the proposed site levels are expected to be lower than currently modelled. NRW's concerns are summarised in the 5<sup>th</sup> paragraph on page 3 of their letter which is reproduced below for ease of reference:

*"In summary, the modelling shows that the land raising required to comply with A1.14 of TAN15 will unacceptably increase the risk of flooding elsewhere and we would raise concerns if consulted as part of a planning application. If the proposed site levels are expected to be lower than that currently modelled, we would expect evidence to be provided that quantifies the associated changes in flood risk. Consideration should be given to compensatory storage to mitigate any negative impacts which again should be quantified to prove changes to flood levels adjacent to the site are within tolerable limits".*

4.9.3 A decision has been taken NOT to undertake the revised modelling until such time as the results of the Pre Application Consultation exercise are known. If these support the proposed development then it is likely that the model will be adjusted before any planning application is submitted. However NRW's concerns have been discussed with the Modellers (JBA) who have advised that the current resolution of the model (5m grid) may be contributing to the apparent increase in flood level on 3<sup>rd</sup> party land. Using a higher resolution grid of the site area from 5m down to 0.5m or possibly even 0.25m to give a better representation of the site and slope of the embankment would allow the topographical roughness to be altered and may reduce the effect on adjacent land.

4.9.4 It should be pointed out however that even without the proposed development the adjacent land is shown to flood to depths of approximately 1.0m during all scenarios. An increase in depth of 10mm is therefore considered to be insignificant in this context.

## **5.0 PROPOSED DRAINAGE STRATEGY**

### **5.1 Proposed Foul Drainage**

5.1.1 The foul drainage from the proposed development will discharge by gravity at an unrestricted rate into the existing foul sewers in Gwellyn Avenue or St Asaph Avenue, subject to agreement with Dwr Cymru Welsh Water (DCWW).

### **5.2 Proposed Surface Water Drainage**

5.2.1 In accordance with Section 8 of TAN 15 the discharge of surface water should be as high up the discharge hierarchy as possible. The hierarchy is as follows:

1. Surface water runoff is collected for use
2. Surface water runoff is infiltrated to ground
3. Surface water runoff is discharged to a surface water body i.e. watercourse
4. Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system
5. Surface water runoff is discharged to a combined sewer

5.2.2 It is anticipated that some form of SuDS techniques will be incorporated into the design of the proposed development, however the effectiveness of these measures will depend on the permeability of the upper soil layers which will need to be established by further ground investigations once planning permission has been granted.

5.2.3 If the existing ground conditions prove suitable then the proposed surface water drainage strategy will involve the provision of permeable paving to all hardstanding areas. Roof water from the new buildings will discharge to soakaways within the site which will allow subsequent infiltration.

5.2.4 If existing ground conditions prove unsuitable for the use of infiltration (as seem likely), then surface water from roof areas will be attenuated in underground storage tanks within the Public Open Space (POS) before discharging into the River Gele at a rate equivalent to the 1 in 2 year unrestricted rate from the existing site. This will be subject to approval from NRW and CCBC.

5.2.5 Stormwater from up to a 1 in 30-year return period event (including an allowance for climate change) will be contained by using above ground SuDS features or underground storage.

5.2.6 Stormwater from a return period event up to and including 1 in 100 years with an allowance for climate change will be contained within the site boundaries, by above ground SUDS features including temporary ponding in parking areas and other areas not used for emergency access / egress.

5.2.7 These measures will ensure that the development of the site will not increase flood risk elsewhere.



## **6.0 PROPOSED MITIGATION MEASURES**

### **6.1 General**

6.1.1 It is clear from the assessment that the site (as it currently exists) is at risk from flooding during both the 0.5% AEP & 0.1% AEP plus 100 years of climate change events, particularly once a breach in the defences is taken into consideration. The following measures should therefore be incorporated into design of the development to minimise the impact of any future inundation.

### **6.2 Finished Floor Levels**

6.2.1 Floor levels of the residential properties should be raised as high as reasonably practicable but should be no lower than 5.45m AOD. The general site levels should be raised to approximately 5.3m AOD.

### **6.3 Emergency Access / Evacuation Route**

6.3.1 The proposed development site lies within the NRW Flood Warning Area. As the site will remain flood free for the 0.5% AEP scenarios it may be unnecessary for properties to be evacuated. However, in the event of extreme events residents should follow NRW Flood Warning advice.

### **6.4 Substructure Construction**

6.4.1 Any new foundations constructed as part of the proposed development should be designed to ensure that they are not adversely affected by inundation on site for events more severe than the 0.5% AEP + CC scenarios.

### **6.5 Superstructure Construction**

6.5.1 The construction of new buildings should allow for the possible future inundation of the site (under events more severe than 0.5% AEP scenarios).

6.5.2 Techniques recommended by 'Preparing for Floods' issued by the Office of the Deputy Prime Minister in October 2003 should be adopted where applicable.

### **6.6 Services**

6.6.1 Service entries and all electrical distribution boards / sockets etc should be located a minimum height of 1.0m above finished ground floor level.

### **6.7 External Drainage**

6.7.1 Access covers to new manholes within the site should be fitted with locking devices which will prevent the covers being displaced by internal water pressure during flooding events.

**7.0 SUMMARY**

**7.1 General**

- 7.1.1 This Flood Consequences Assessment indicates that the site is within an area which is at risk of flooding during extreme tidal events. However, once developed the site itself **will** only be affected when an extreme tidal event combines with significant breach of the coastal defences.
- 7.1.2 Consideration has been given to the justification for developing the site, in view of the potential flood risk and it has been concluded that the tests set out in Sections 6 and 7 and Appendix 1 of TAN 15 can be satisfied.
- 7.1.3 The consequences of any future flooding have been assessed and mitigation measures incorporated into the development proposals to reduce the impact of any future inundation in the vicinity of the site. The extent of these works is detailed in Section **6.0** of this report.



---

For **BEK LTD**  
**January 2024**

## APPENDIX A

### Tide Level Calculations

# CALCULATION SHEET



GEO-ENVIRONMENTAL CONSULTING ENGINEERS

Client <b>P &amp; W BROILERS</b>			Job Title <b>PROPOSED RESIDENTIAL DEVELOPMENT GWELLYN AVENUE, KINMEL BAY</b>				Job No <b>20009</b>	
By <b>RB</b>	Date <b>05.22</b>	Chkd	Element <b>TIDE LEVELS (2008 Base Year)</b>				Sheet No <b>T/L 1</b>	
DATA		CALCULATIONS					RESULTS	
1	<b><u>EXTREME SEA LEVELS FOR ADJACENT NODES (2008)</u></b>							
	<b>NODE</b>	<b>T25</b>	<b>T50</b>	<b>T75</b>	<b>T100</b>	<b>T200</b>	<b>T1000</b>	
	1132	5.430	5.520	5.580	5.620	5.710	5.920	
	1134	5.460	5.550	5.610	5.640	5.740	5.950	
2	<b><u>EXTREME SEA LEVELS INTERPOLATED BETWEEN NODES</u></b>							
	<b>NODE</b>	<b>T25</b>	<b>T50</b>	<b>T75</b>	<b>T100</b>	<b>T200</b>	<b>T1000</b>	
	SITE	5.393	5.483	5.543	5.595	5.673	5.883	
	95% CB (+/-m)	0.100	0.100	0.100	0.200	0.200	0.300	
3	<b><u>SEA LEVEL RISE (mm PER YEAR)</u></b>							
	As current guidance on climate change from DEFRA (2006):							
	<b>ASSUMED VERTICAL LAND MOVEMENT</b>	<b>1990-2025</b>	<b>2025-2055</b>	<b>2055-2085</b>	<b>2085-2115</b>			
	-0.5	3.5	8.0	11.5	14.5			
4	<b><u>EXTREME SEA LEVELS FOR SITE (INC. 95% CONFIDENCE BOUND)</u></b>							
	<b>YEAR</b>	<b>RISE (m)</b>	<b>EXTREME EVENT SEA LEVEL (mAOD)</b>					
			<b>T25</b>	<b>T50</b>	<b>T75</b>	<b>T100</b>	<b>T200</b>	<b>T1000</b>
	2022	0.049	5.542	5.632	5.692	5.844	5.922	6.232
	2047	0.236	5.728	5.818	5.878	6.031	6.108	6.418
	2072	0.495	5.988	6.078	6.138	6.290	6.368	6.678
	2097	0.819	6.311	6.401	6.461	6.614	6.691	7.001
	2122	1.181	6.674	6.764	6.824	6.976	7.054	7.364

# CALCULATION SHEET

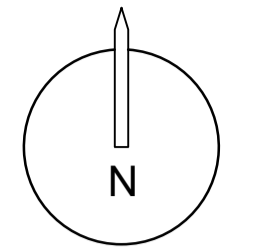


GEO-ENVIRONMENTAL CONSULTING ENGINEERS

Client <b>P &amp; W BROILERS</b>			Job Title <b>PROPOSED RESIDENTIAL DEVELOPMENT GWELLYN AVENUE, KINMEL BAY</b>				Job No <b>20009</b>	
By <b>RB</b>	Date <b>05.22</b>	Chkd	Element <b>TIDE LEVELS (2017 Base Year)</b>				Sheet No <b>T/L 1</b>	
DATA		CALCULATIONS					RESULTS	
1	<b><u>EXTREME SEA LEVELS FOR ADJACENT NODES (2017)</u></b>							
	<b>NODE</b>	<b>T25</b>	<b>T50</b>	<b>T75</b>	<b>T100</b>	<b>T200</b>	<b>T1000</b>	
	1132	5.250	5.330	5.380	5.410	5.500	5.710	
	1134	5.270	5.350	5.400	5.430	5.520	5.730	
2	<b><u>EXTREME SEA LEVELS INTERPOLATED BETWEEN NODES</u></b>							
	<b>NODE</b>	<b>T25</b>	<b>T50</b>	<b>T75</b>	<b>T100</b>	<b>T200</b>	<b>T1000</b>	
	SITE	5.225	5.305	5.355	5.385	5.475	5.685	
	97.5% CB (+/-m)	0.060	0.090	0.100	0.120	0.160	0.290	
	<b><u>SEA LEVEL RISE (mm PER YEAR)</u></b>							
As current guidance on climate change from DEFRA (2006):								
<b>ASSUMED VERTICAL LAND MOVEMENT</b>		<b>1990-2025</b>	<b>2025-2055</b>	<b>2055-2085</b>	<b>2085-2115</b>			
-0.5		3.5	8.0	11.5	14.5			
4	<b><u>EXTREME SEA LEVELS FOR SITE (INC. 97.5% CONFIDENCE BOUND)</u></b>							
	<b>YEAR</b>	<b>RISE (m)</b>	<b>EXTREME EVENT SEA LEVEL (mAOD)</b>					
			<b>T25</b>	<b>T50</b>	<b>T75</b>	<b>T100</b>	<b>T200</b>	<b>T1000</b>
	2022	0.018	5.303	5.413	5.473	5.523	5.653	5.993
	2047	0.204	5.489	5.599	5.659	5.709	5.839	6.179
	2072	0.464	5.749	5.859	5.919	5.969	6.099	6.439
	2097	0.787	6.072	6.182	6.242	6.292	6.422	6.762
	2122	1.150	6.435	6.545	6.605	6.655	6.785	7.125

## APPENDIX B

Proposed layout



A	4 Bedroom (house)	2
B	3 Bedroom (house)	16
C	4 Bedroom (house)	9
D	3 Bedroom (house)	4
E	2 Bedroom (house)	26
F	4 Bedroom (house)	1
G	4 Bedroom (house)	2
H	3 Bedroom (house)	1
I	3 Bed (dormer bungalow)	2
J	1 Bed (first floor flat)	1
K	Convenience Store	1
L	2 Bed (dormer bungalow) (semi-detached)	6
M	1 Bedroom (Apartment)	4
N	3 Bedroom (terrace)	7
O	2 Bedroom (Apartment)	4

Dwellings	85
Convenience Store	1
<b>Total</b>	<b>86</b>

- Refuse bin collection area
- Visitor parking
- Bicycle Store

- REVISIONS:**
- A. 23/02/2023  
Plots 1 and 2 - House type changed to be dormer type bungalows.  
Dwelling on Plot 53 omitted.  
Convenience Store with living accommodation at first floor level shown on Plots 51 and 53.  
Access Road on to St Asaph Avenue added.  
Access Road off Gwellyn Avenue omitted.  
Local Equipped Area for Play (LEAP) added to Open Space Area.
  - B. 28/02/2023  
Dwelling type to Plots 53-58 changed.  
Emergency vehicle road link added.
  - C. 12/06/2023  
Turning head to Road 'E' enlarged.  
Tactile paving & drop kerb crossings added.  
Visibility splays indicated.  
Visitor parking bays added.  
Bicycle storage added to each property.  
Refuse bin collection points added.  
Dwelling parking to properties 41-46 amended.  
Parking bay dimensions amended.
  - D. 03/10/2023  
House Types 'M' 'N' and 'O' introduced.  
House density increased.  
Holding pond omitted.
  - E. 09/10/2023  
House type mix amended.  
House density amended to suit revised site area.
  - F. 18/10/2023  
House type 'N' changed to 3 bed terrace.
  - G. 06/11/2023  
Amended car parking.

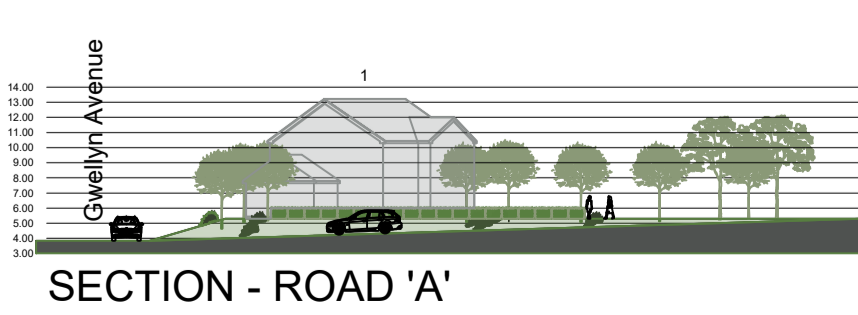
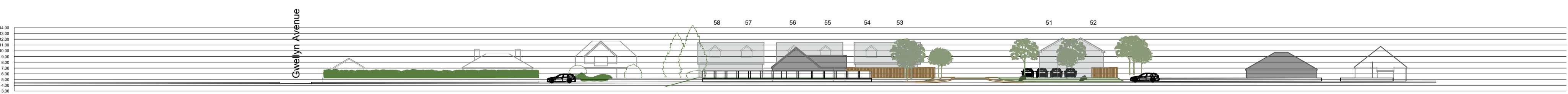
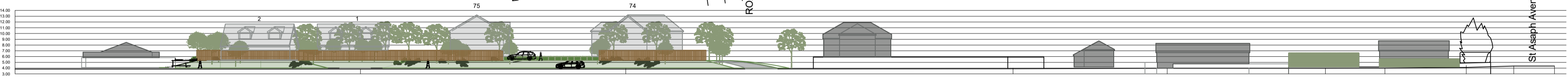
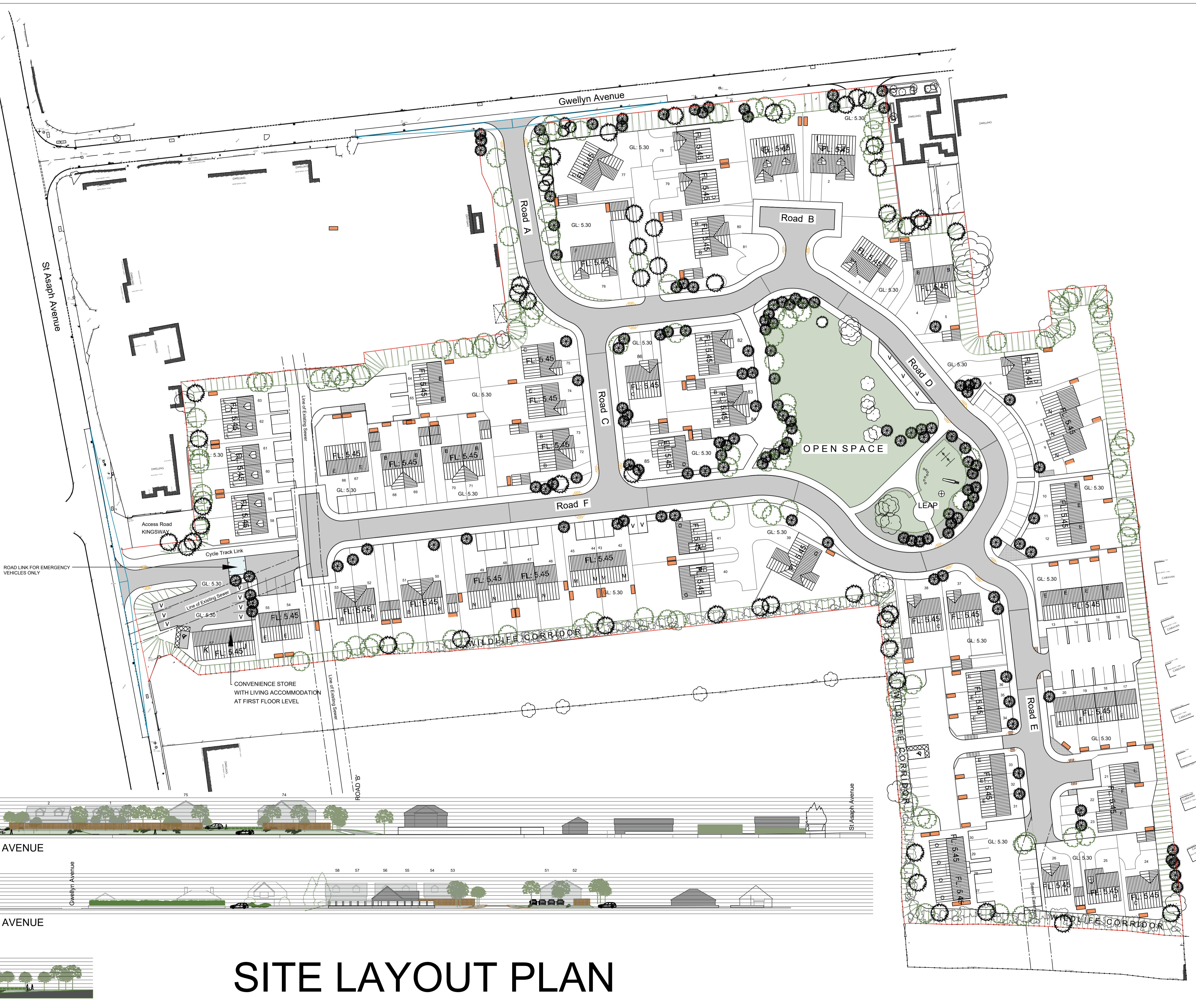


Date: R. D. Proffit  
Job Description: Proposed Residential Development

Client: Land Off Gwellyn Avenue, Kinmel Bay

Scale: 1:500  
Date: 27 June 2022

Drawing Number: P.1533 / 2  
Revision: G



# SITE LAYOUT PLAN

## APPENDIX C

Towyn and Kinmel Bay Flood Consequences Assessment  
JBA May 2020



# Towyn and Kinmel Bay

## Flood Consequence Assessment

**May 2020**

[www.jbaconsulting.com](http://www.jbaconsulting.com)

**Richard Broun**

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## Revision History

Revision Ref/Date	Amendments	Issued to
20/01/2020	Draft Report	Richard Broun
29/05/2020	Final Report	Richard Broun

## Contract

This report describes work commissioned by Richard Broun of Richard Broun Associates Limited, by email dated 09/10/2020. Ian Gaskell of JBA Consulting carried out this work.

Prepared by ..... Ian Gaskell BSc MSc CSci CMarSci MIMarEST  
 Team Leader Marine and Coastal Risk Management

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 Principal Analyst

## Purpose

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## Abbreviations

AEP	Annual Exceedance Probability
CFB	Coastal Flood Boundary
CI	Confidence Interval
DTM	Digital Terrain Model
EA	Environment Agency
ESL	Extreme Sea Level
FCA	Flood Consequence Assessment
HAT	Highest Astronomical Tide
JBA	Jeremy Benn Associates Limited
LIDAR	Light Detection and Ranging
mAODN	Meters Above Ordnance Datum Newlyn
NRW	National Resources Wales
OGL	Open Government Licence
TIN	Triangular Irregular Network
2D	Two-Dimensional

# 1 Background

## 1.1 Terms of reference

JBA Consulting (JBA) was commissioned by Richard Broun of Richard Broun Associates Limited in November 2019 to undertake tidal breach modelling to feed into a Flood Consequence Assessment (FCA) for proposed residential development at two sites in Conwy County Borough, North Wales.

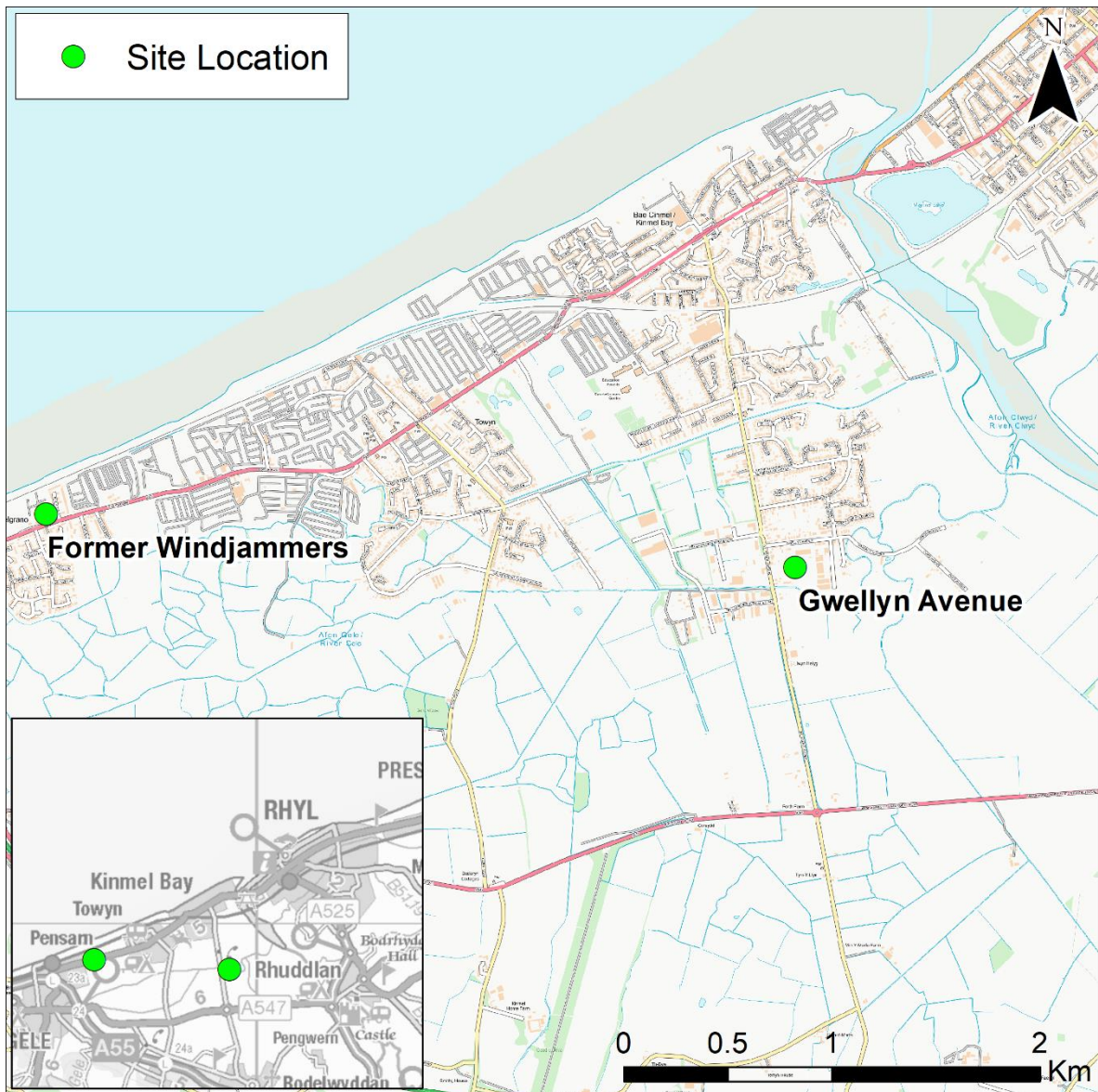
The 2017 Point of Ayr to Pensarn tidal flood risk modelling and mapping study for National Resources Wales (NRW) produced design tidal flood outputs covering the potential development sites. The model outputs included tidal breach scenarios along the open coast. The modelling did not consider a breach of the River Clywd embankments.

Following discussions with NRW, the dominant source of flooding which needs to be considered as part of any development proposal is tidal flood risk from any overtopping, and failure in the Clywd embankments along with consideration of a breach to the sea defences.

To inform this FCA and the tidal flood risk at the two proposed development sites, the 2017 Point of Ayr to Pensarn tidal flood risk model was obtained under the Open Government Licence (OGL). The model was updated with new boundary and topographic data, and a 50m breach of the River Clywd embankments was included into the model. The model was used to simulate a series of design extreme tidal events for the current defended scenario, and a scenario to consider a breach of the River Clywd embankments.

## 1.2 Site location

The two sites where residential development is proposed are at the former Windjammers, Towyn and Gwellyn Avenue, Kinmel Bay (Figure 1-1). The sites are located such that the primary flood risk to the sites are tidal; from wave overtopping along the open coast at the former Windjammers site in Towyn, and from tidal water overwashing the River Clywd embankments at the Gwellyn Avenue site. Both sites benefit from the presence of flood defences with concrete defences along the open coast and earth embankments along the River Clywd; defence failure is therefore a potential source of flood risk to both sites.



**Figure 1-1: Site location**

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## 2 Assessment of tidal flood risk

### 2.1 Overview

Following discussions with NRW, the dominant source of flooding that needs to be considered as part of development proposal at the two sites is tidal flood risk. The tidal flood risk needs to include flood risk from overtopping of coastal defences both along the coast and up the River Clywd Estuary, along with consideration of a breach to the defences. Therefore, only tidal flood risk is considered as part of this FCA.

The 2017 Point of Ayr to Pensarn tidal flood risk model was obtained under the Open Government Licence (OGL) and model updates were made as follows:

- Sea level rise was calculated for present day (2020) and future epoch (2120) using the mean sea level allowances as detailed in the 2017 Adapting to Climate Change guidance for Wales.
- The design tidal boundary conditions were updated using the 2018 Coastal Flood Boundary (CFB) Extreme Sea Levels (ESL) dataset and sea level rise uplifts.
- Topography local to the Gwellyn Avenue site was incorporated into the Two-Dimensional (2D) model topography.
- Design tidal simulations were undertaken for the 0.5 and 0.1% Annual Exceedance Probability (AEP) events for present day (2020) and future climate change (2120) epochs for the maintained defence network scenario.
- A new defence breach in the River Clywd embankment was setup and defence breach model simulations were undertaken for the 0.5 and 0.1% AEP events for present day (2020) and future climate change (2120) epochs.
- Additional model simulations were undertaken to assess the impact of using the Confidence Interval 2 (CI2) 97.5% CFB ESLs.

### 2.2 Tidal flood modelling

The model updates, methodology and results are discussed in further detail in the remainder of this Section.

#### 2.2.1 Boundary conditions

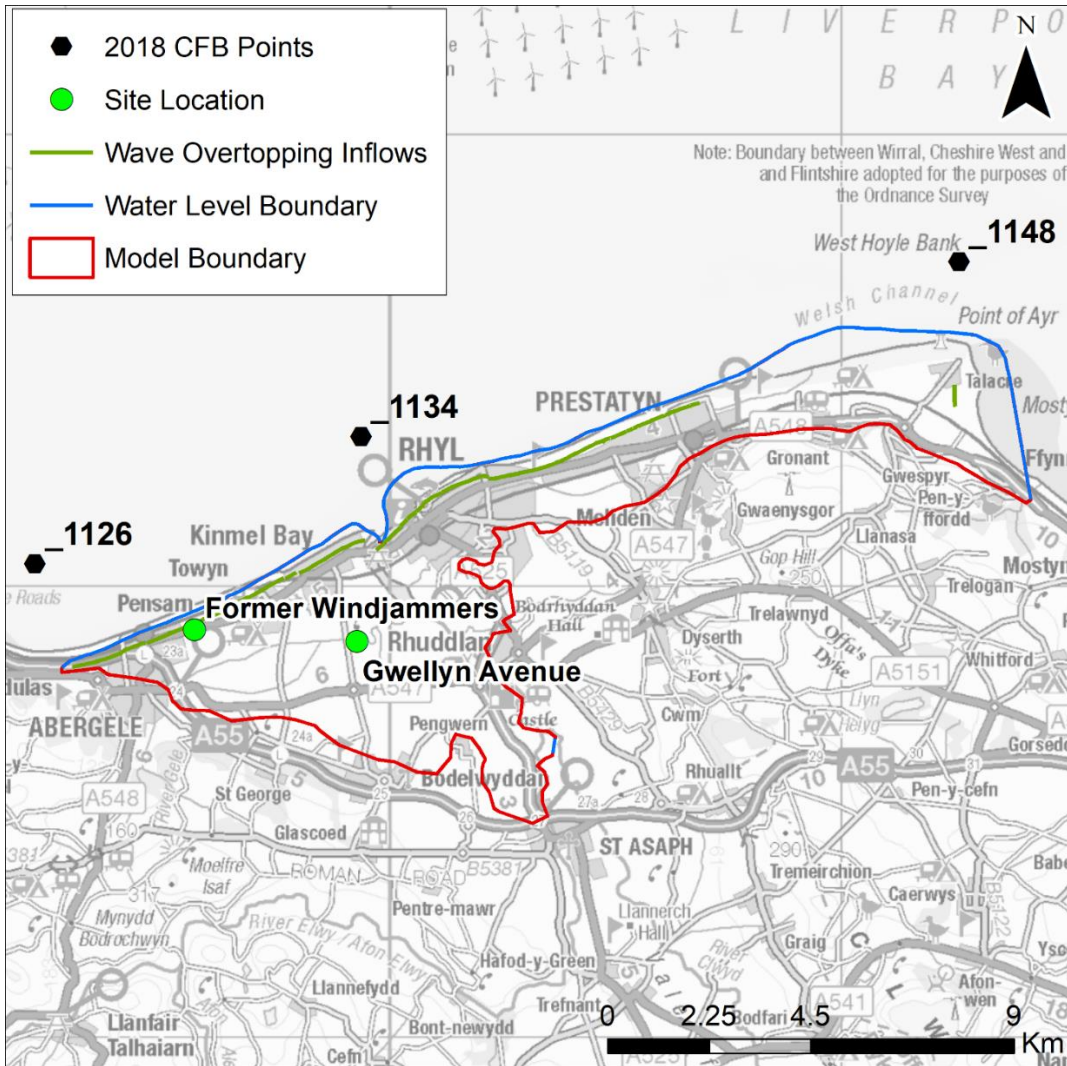
The existing model domain (red) and tidal boundaries (water level in blue and wave overtopping inflows in green) are shown on Figure 2-1. The existing tidal boundary is made up of three design tidal curves that are generated by combining an ESL, base astronomical tide and design surge shape. The model interpolates between the three design tidal curves to represent the spatial change in water levels across the model domain.

The existing design tidal curves were updated using the following data:

- Highest Astronomical Tide (HAT) at Rhyl;
- CFB design surge shape at Llandudno; and
- 2018 CFB ESLs as located on Figure 2-1 (1126, 1134 and 1148).

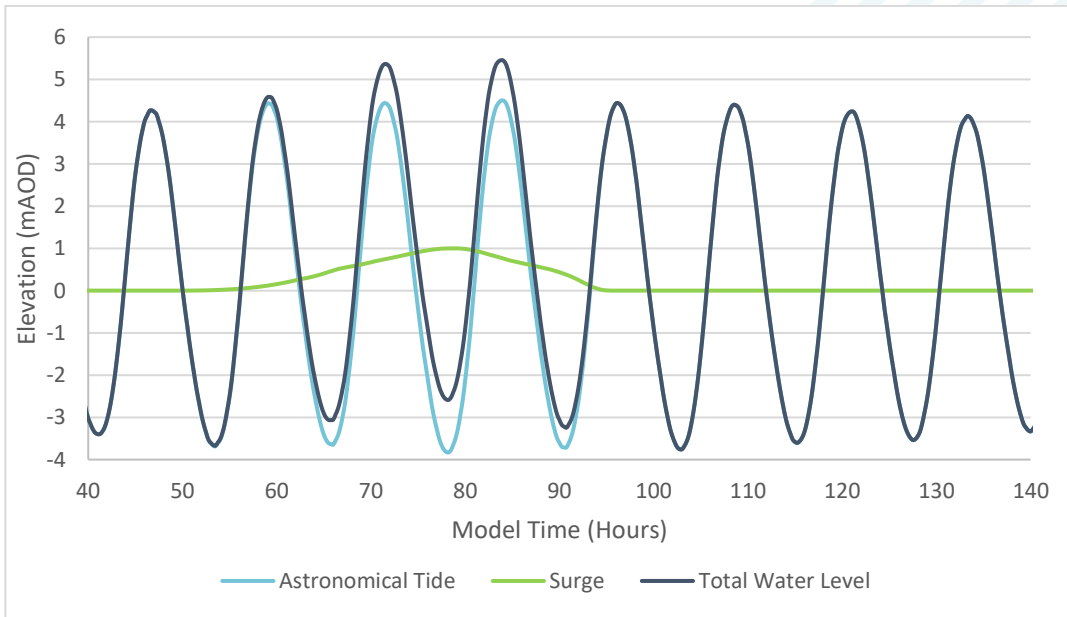
An example of the updated design tidal curve based on ESL chainage point 1126 for the 0.1% AEP 2020 event can be seen in Figure 2-2. The peak of the design surge was aligned with the HAT low water prior to the peak; this gives a more conservative overall volume to the total water level time-series when compared with aligning the HAT and surge peaks.

The underlying data used to update the tide curves is discussed in more detail in the remainder of this section.



**Figure 2-1: Model setup**

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**Figure 2-2: Design tidal curve example - 0.1% AEP 2020 1126 CFB chainage point**



### 2.2.1.1 Highest Astronomical Tide

The HAT at Rhyl was taken from the 2017 Point of Ayr to Pensarn Tidal Flood Risk Analysis; as there was not a local tide gauge for the area of interest this was generated by using a spatial interpolation between gauge locations using the spatial water level variation in the CFB ESL points.

### 2.2.1.2 Design surge shape

The design surge shape at Llandudno was used as this is the closest Class A gauge from where design surge shapes were generated.

### 2.2.1.3 Extreme Sea Levels and climate change uplifts

The 2017 Point of Ayr to Pensarn Tidal model boundaries were generated using the 2011 release of the CFB ESLs (levels are to a 2008 base year). In this FCA, the water level boundaries were updated using the latest 2018 release of the CFB ESL's (levels to a 2017 base year).

The 2018 CFB ESLs were uplifted to present day (2020) and a future epoch (2120) following the mean sea level allowances as detailed in the Adapting to Climate Change guidance for Wales<sup>1</sup> (Table 2-1). This guidance uses the Technical Advice Note (TAN15) sea level rise projections from the Flood and Coastal Defence Project Appraisal Guidance (FCDPAG3).

The base and uplifted ESLs used in the design tidal curve generation are displayed in Table 2-2.

**Table 2-1: Mean sea level allowances**

Years	Sea level rise (m)
2017 to 2020	0.0105
2020 - 2120	1.1100

**Table 2-2: Uplifted 2018 Extreme Sea Levels**

Epoch	Extreme Sea Level (mAOD)					
	1126		1134		1148	
	0.5% AEP	0.1% AEP	0.5% AEP	0.1% AEP	0.5% AEP	0.1% AEP
2017 (base)	5.44	5.65	5.52	5.73	5.81	6.02
2020	5.45	5.66	5.53	5.74	5.82	6.03
2120	6.56	6.77	6.64	6.85	6.93	7.14

### Confidence Interval 2

The 2018 release of the CFB ESLs showed a drop in ESLs compared to the 2011 release along the North Wales coastline by ~0.20m. It was therefore important to assess the ESL confidence intervals. The CFB ESLs provide confidence intervals that take account of the uncertainty associated with the skew surge joint probability statistics used to generate the ESLs. The CFB ESLs are to a median or 50% confidence bound. The CI2 provides an upper 97.5% confidence level bound, and the CI2 values were used in the modelling to

<sup>1</sup> Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales. Welsh Government. December 2017.

undertake additional model simulations to assess the impact of flood levels at the development sites.

The tidal boundaries were also generated using the CI2 ESLs as detailed in Table 2-3 and using the same sea level rise uplifts as detailed in Table 2-1.

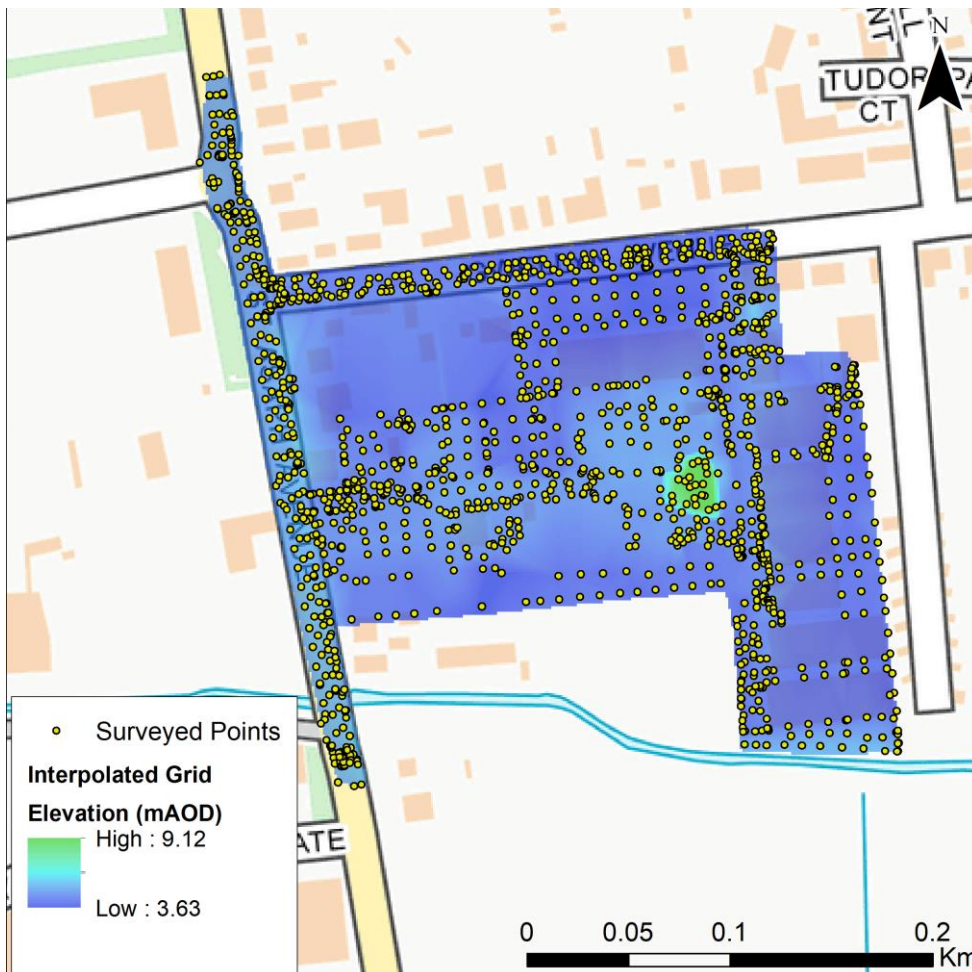
**Table 2-3: Uplifted 2018 Extreme Sea Levels for Confidence Interval 2**

Epoch	Extreme Sea Level (mAOD)					
	1126		1134		1148	
	0.5% AEP	0.1% AEP	0.5% AEP	0.1% AEP	0.5% AEP	0.1% AEP
2017 (base)	5.60	5.93	5.68	6.02	5.98	6.31
2020	5.61	5.94	5.69	6.03	5.99	6.32
2120	6.72	7.05	6.80	7.14	7.10	7.43

## 2.2.2 Topographic updates

### 2.2.2.1 Gwellyn Avenue topographic survey

Topographic survey of the Gwellyn Avenue site was provided in DWG format. The surveyed spot levels were extracted and used to generate a Triangular Irregular Network (TIN) from which an ASCII file was created (Figure 2-3). The ASCII grid was read into the model geometry control file which stamped the grid onto the 2D model grid.



**Figure 2-3: Gwellyn Avenue topographic survey**

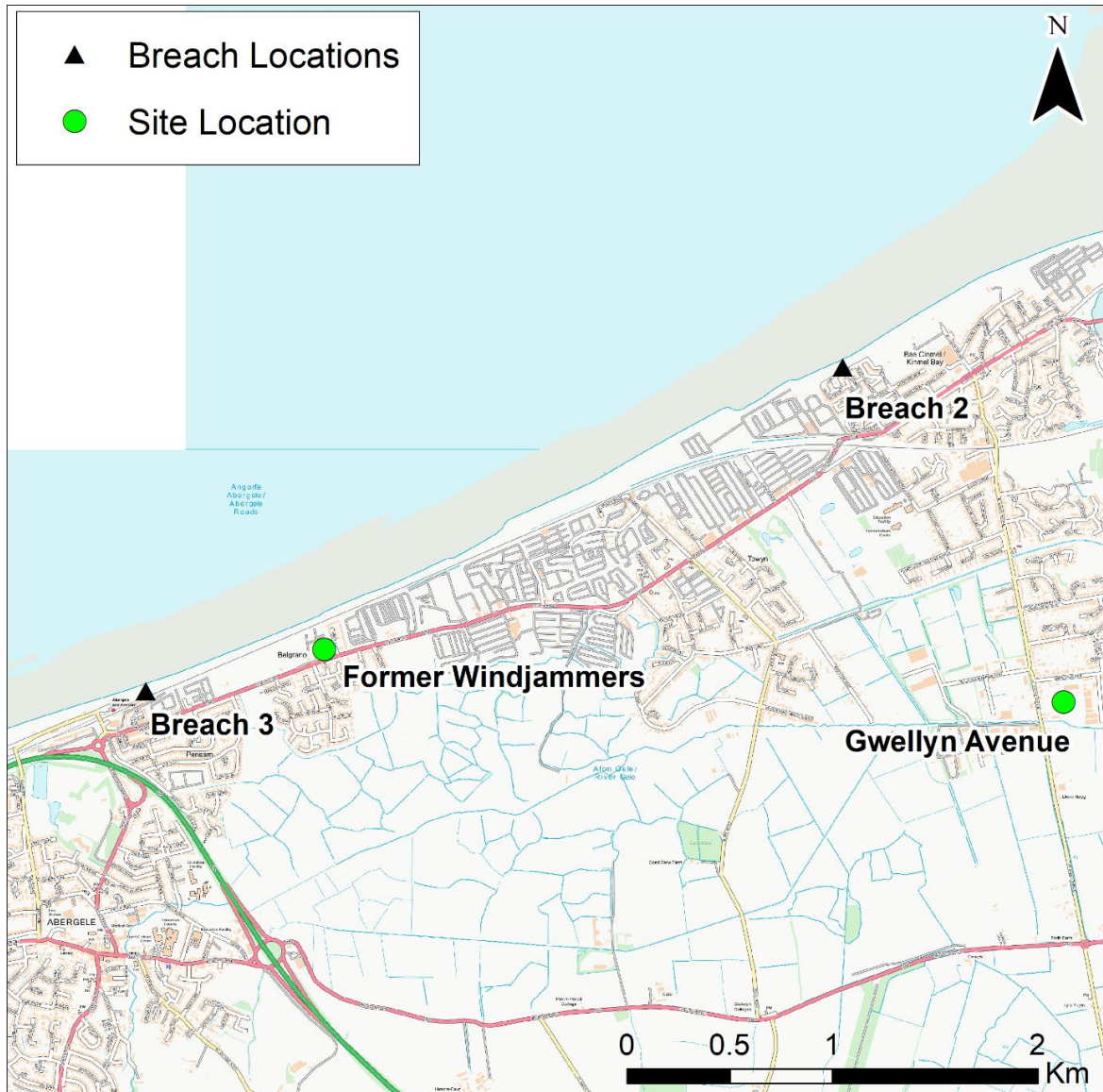
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### 2.2.2.2 Defence breach model setup

The two potential development sites are located such that they benefit from tidal defences and sit on relatively low-lying topography. The vulnerability of these sites to a defence breach or failure was considered.

#### Former Windjammers site

At the former Windjammers site to the north, two open coast breach locations from the 2017 Point of Ayr to Pensarn Tidal model were reused and simulated using the updated tidal water level boundary conditions. The two breach locations are located at Kinmel Bay (Breach 2) and Pensarn Railway Embankment (Breach 3) as shown on Figure 2-4.



**Figure 2-4: Breach locations from 2017 Point of Ayr to Pensarn Tidal model**

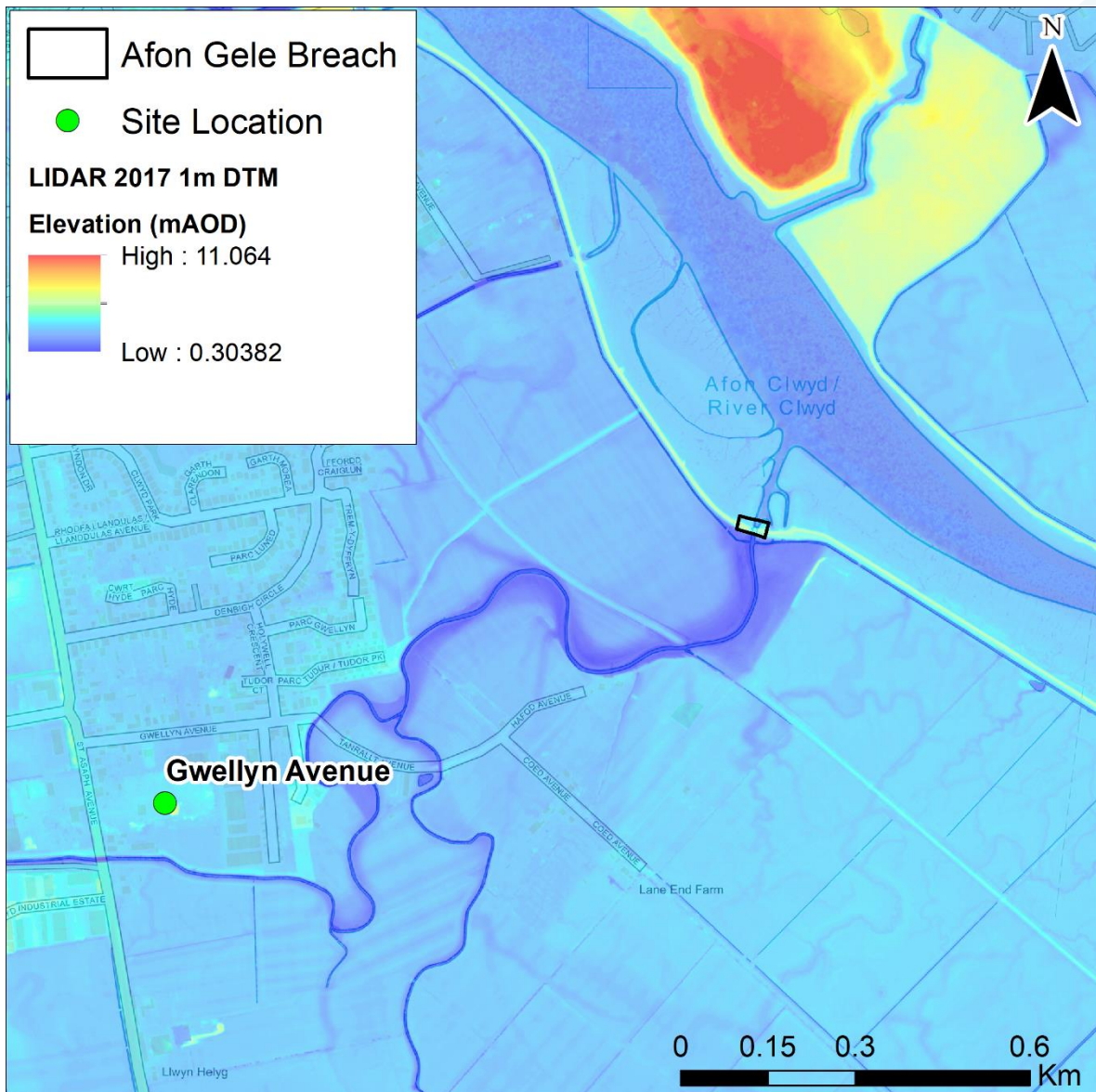
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#### Gwellyn Avenue site

The Gwellyn Avenue site is located closer to the River Clwyd and to fully understand the tidal flood risk to the site a breach of the River Clwyd embankments was modelled. NRW, by letter dated 4<sup>th</sup> October (Appendix A), suggested that an appropriate location would be at the River Gele outfall (3000278, 379245) where crest heights are lowest (5.91m AOD)

and hence overtopping occurs first. NRW also stated that the breach width should be 50m as per the OGN 100 guidance<sup>2</sup>.

Following the OGN100 guidance a new breach at the River Gele outfall was setup as shown on Figure 2-5 and detailed in Table 2-4. The defence failure time was set in-line with the 2017 Point of Ayr to Pensarn Tidal modelling by setting the defence to fail one hour prior to the peak water level.



**Figure 2-5: River Gele breach**

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**Table 2-4: Defence breach parameters**

Parameter	Information
Location	Estuary/tidal river
Defence Type	Earth Bank
Breach Width (m)	50
Toe Level (mAOD)	4.00

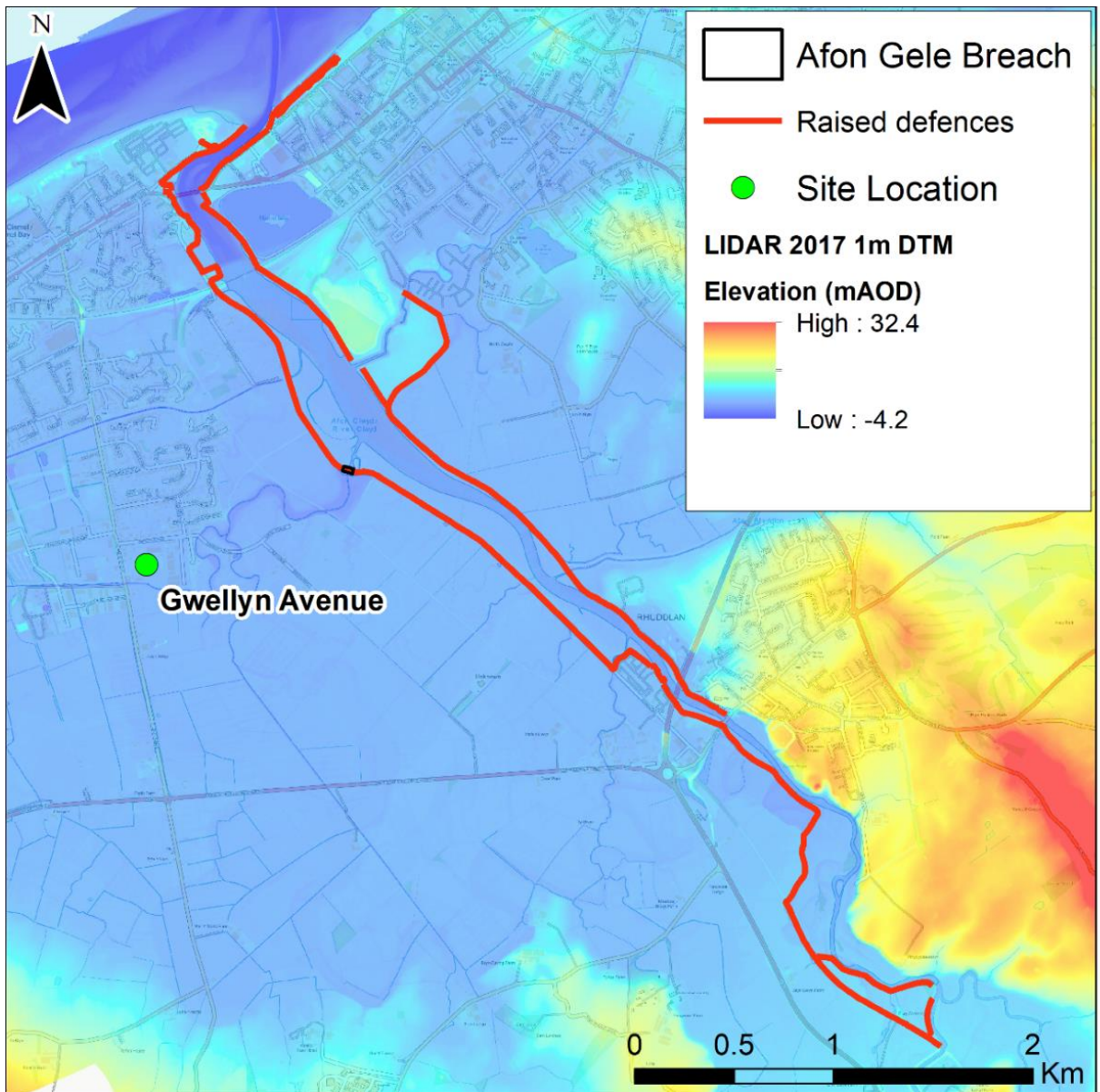
<sup>2</sup> National Resources Wales. Flood Risk Management: Modelling blockage and breach scenarios. OGN100. February 2015.

Parameter	Information
Defence Failure Method	1 hour prior to peak water level
Defence Failure Time (model hours)	83

### 2.2.2.3 River Clywd future embankment raising scenario

A model scenario was setup to consider the raising of the Clywd embankments in the future as a response to climate change and sea level rise. The embankment was raised by an arbitrarily high elevation, to glass wall the model and represent the raising of the bank levels above future extreme event levels. The embankments raised above the extreme flood levels in the model as shown on Figure 2-6.

There would however, remain a risk that the embankment, despite being raised, could fail. Therefore, a model scenario was set up that included the Clywd embankments raised above future extreme flood levels but also included the breach in the defences at the River Gele outfall.



**Figure 2-6: River Clywd future embankment raising scenario**

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### 2.2.3 Model simulations

Following the updates to model topography and boundary conditions, a series of design scenarios and events was simulated as detailed in Table 2-5. All model simulations were undertaken for the 2120 epoch to determine the worst-case flood levels under sea level rise conditions within the proposed development sites.

It should be noted that wave overtopping was not recalculated as part of this modelling but was included. The overtopping inflows for the same event and closest epoch (2117) as calculated as part of the 2017 Point of Ayr to Pensarn Tidal model were used.

**Table 2-5: Model simulations**

Scenario	Events
Defended	0.5 and 0.1% AEP 2120 epoch
Defended with River Gele Breach	0.5 and 0.1% AEP 2120 epoch
Defended raised Clywd embankments with River Gele Breach	0.1% AEP 2120 epoch
Defended including Breach 2	0.1% AEP 2120 epoch
Defended including Breach 3	0.1% AEP 2120 epoch

### 2.2.4 Model Results

#### 2.2.4.1 Tidal flood model extent and flow paths

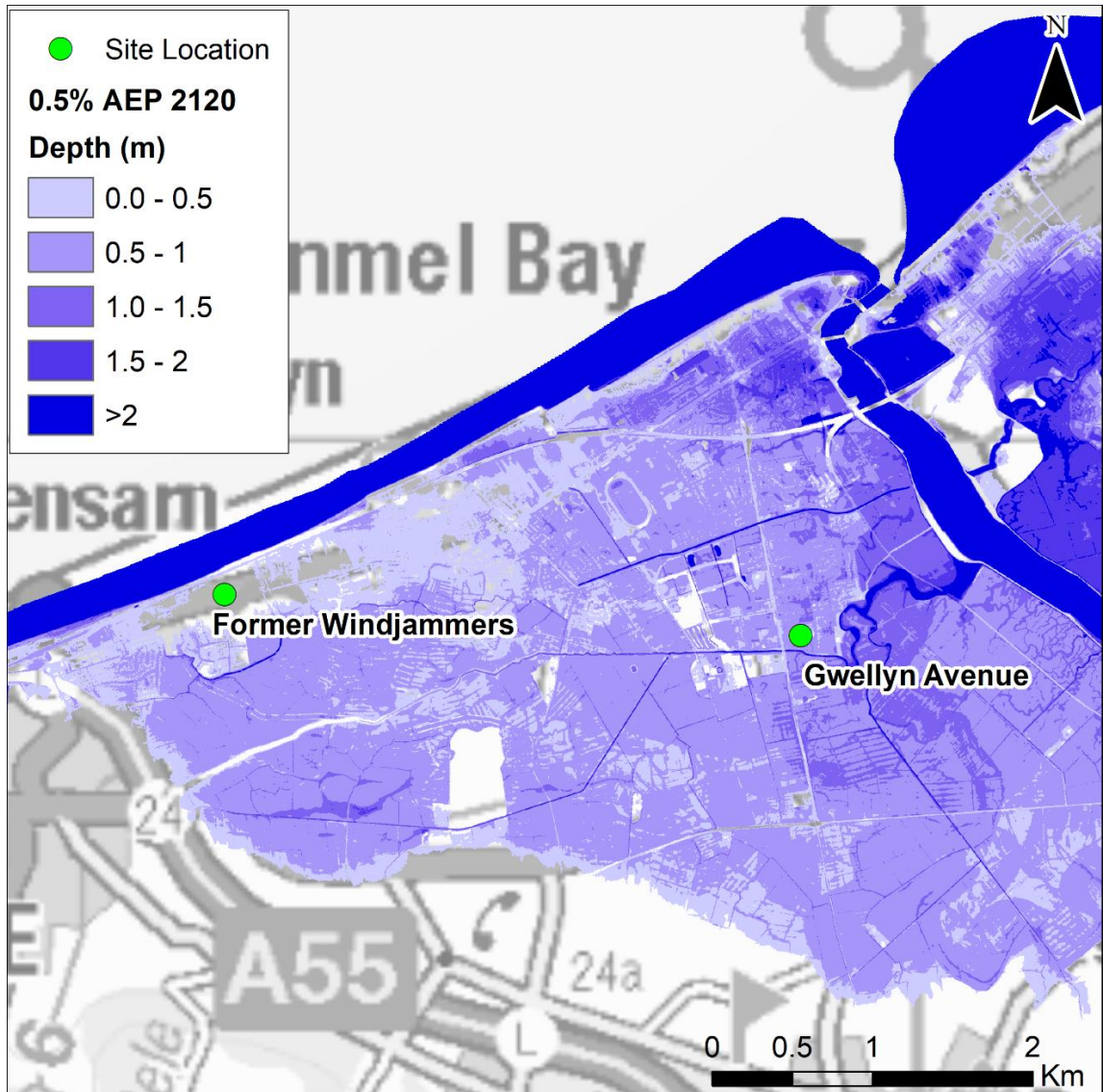
Under future sea level rise conditions tidal floodwaters overtop the existing Clywd embankments. In addition, wave overtopping volumes contribute to flood risk along the open coast, and in some areas the extreme sea level is high enough to weir over the crest of the defence causing still water flooding.

During a 0.5% AEP 2120 tidal event, floodwaters spread significant distances across the low-lying topography of the area, as shown on Figure 2-7. When considering the largest simulated event, the 0.1% AEP 2120 CI2 (Figure 2-8), the flood extent is only marginally larger than the 0.5% AEP 2120 (CFB 50% confidence bound) event as the flood waters are topographically controlled, but flood depths increase across the floodplain.

A breach in the Clwyd embankments, leads to additional floodwater flowing onto the floodplain as tidal water pass through the breach. During the 2120 epoch modelled baseline defended scenario, floodwaters overtop the Clywd embankments. During such extreme events, a breach of the defence in the River Clwyd only contributes a relatively small volume of extra floodwater onto the floodplain. The flood extents and depths are similar to that of the defended baseline, albeit slightly more extensive, and range between 0.1 and 0.2m increase in flood depths between the 0.5 and 0.1% AEP 2120 epoch events respectively.

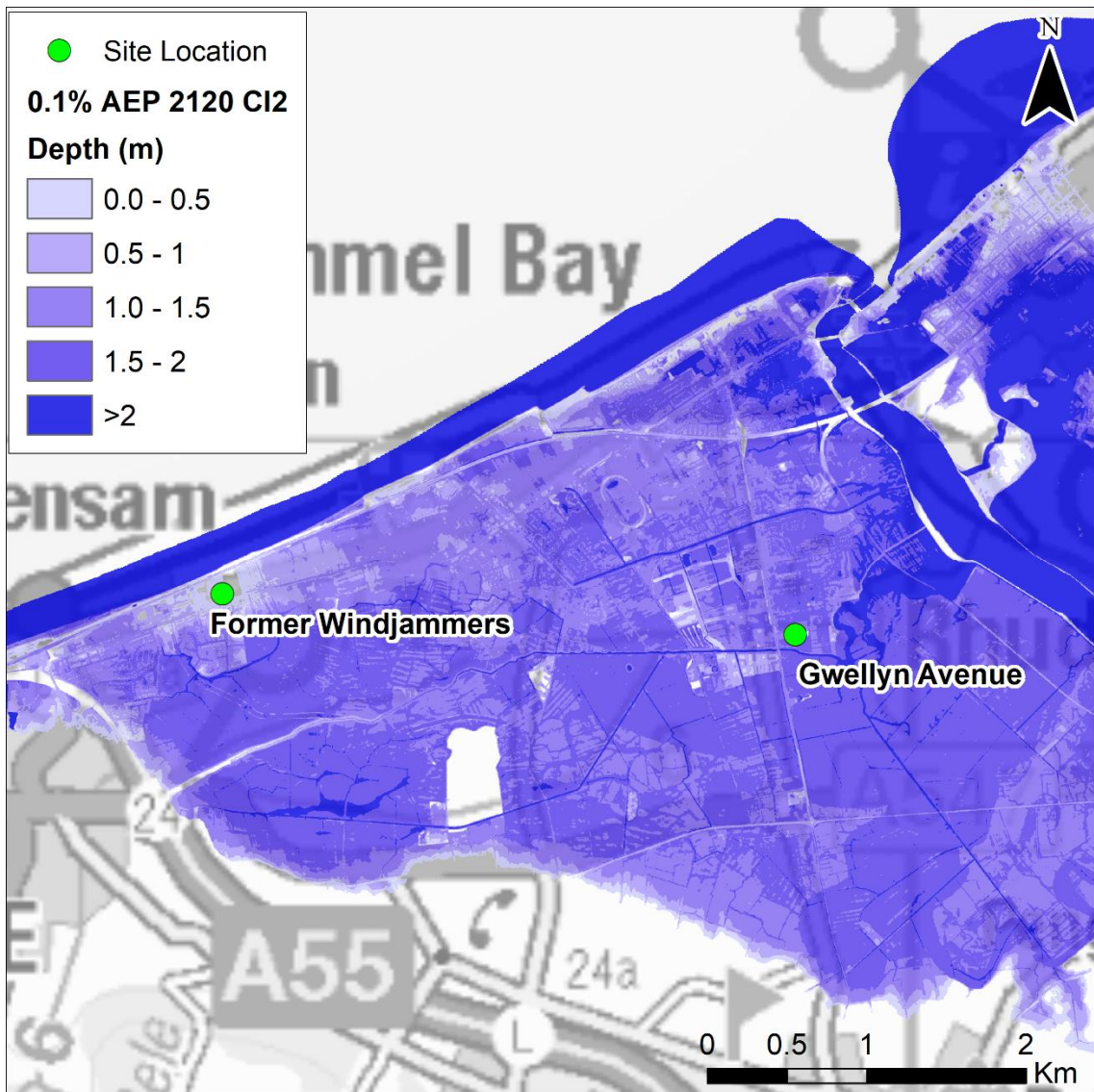
A scenario was setup to test the impact of raising the Clwyd embankments above the future sea level rise predictions based on the assumption that the council will raise defences as part of future flood mitigation works. Under this scenario a defence failure could still occur, and so the River Gele defence breach was included. The flood extent for the 0.1% AEP 2120 CI2 Clywd embankment raising scenario including the defence breach is presented overlain the baseline defended with current embankment levels on Figure 2-9. The flood extent reduces from that of the baseline as would be expected, but not as significantly as might be expected. Part of the reason for this is that still water flooding occurs along the open coast, in particular near the Clywd Estuary mouth. An assessment of the model topography at the Clywd mouth suggests that the existing 2017 Point of Ayr to Pensarn Tidal model may not be representing the correct topographic levels that are there currently, and consequently the model defence levels are lower than reality. It could be expected that if the model topography was updated and correct to the higher defence levels, the flood volumes reaching the floodplain to the south east would be reduced. Further modelling would be required to determine the impact.

Modelled flood levels at the two proposed development sites are detailed in Section 2.2.4.2 and 2.2.4.3.



**Figure 2-7: 0.5% AEP 2120 epoch**

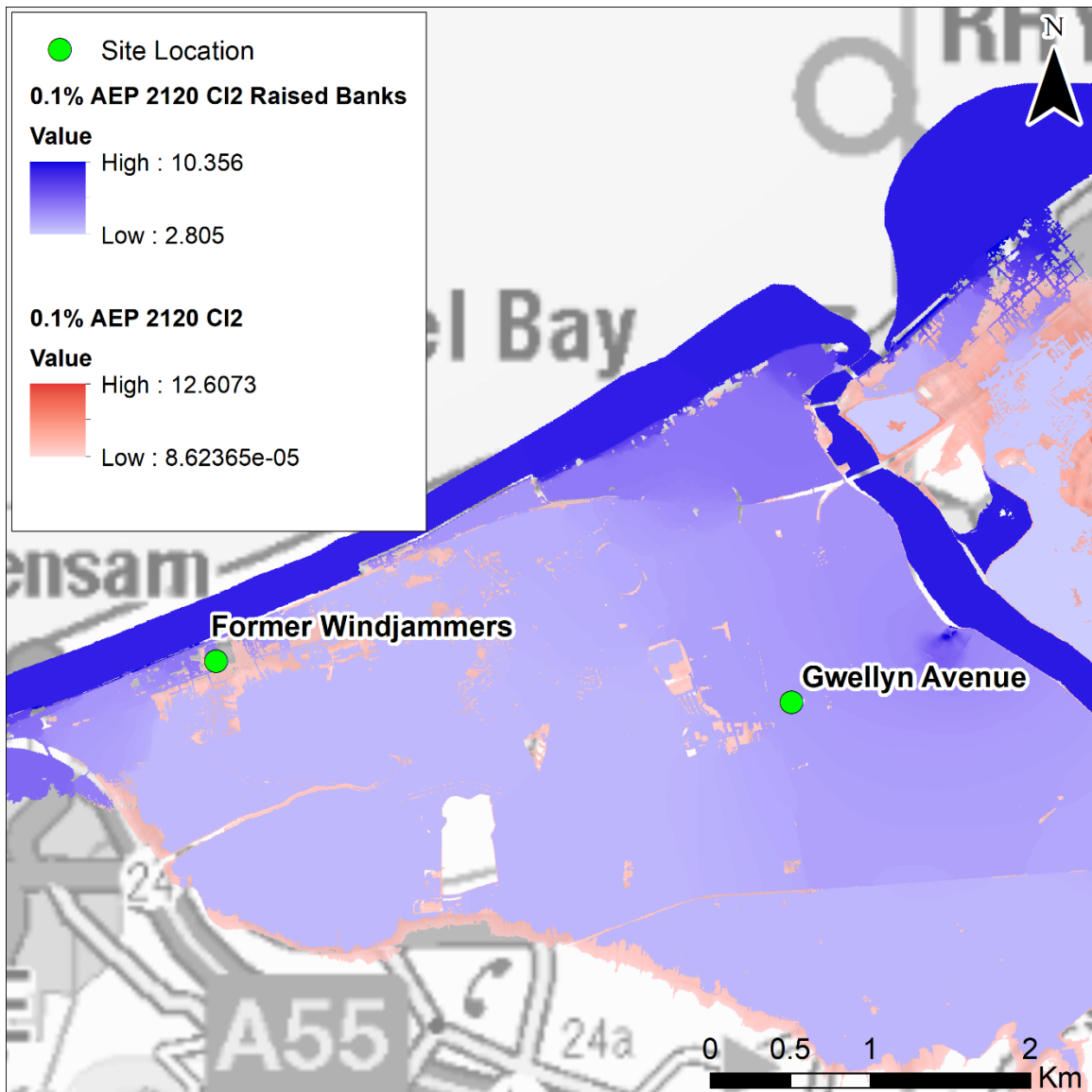
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**Figure 2-8: 0.1% CI2 AEP 2120 epoch**

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**Figure 2-9: 0.1% AEP CI2 2120 epoch with and without Clywd embankments raised**

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#### 2.2.4.2 Former Windjammers site flood levels

Maximum flood levels for each modelled scenario and event for the former Windjammers site are detailed in Table 2-6.

The site remains flood free under all 2120 epoch events based on the 50% CFB ESLs, although access roads are impacted. When considering the CI2 97.5% ESL confidence bound, still water flooding impacts the site under the 0.1% 2120 epoch but depths only reach ~0.1m within the site boundary. For reference, current ground levels across the site range from 5.1-5.9mAOD with an average of roughly 5.5mAOD.

**Table 2-6: Former Windjammer site modelled flood risk results**

Scenario	Event AEP (2120 epoch)	Flood Level ESL 50% (mAOD)	CI2 Flood Level ESL 97.5% (mAOD)
Defended	0.5%	Flood free	Flood free
	0.1%	Flood free	5.55
	0.5%	Flood free	Flood free

Scenario	Event AEP (2120 epoch)	Flood Level ESL 50% (mAOD)	CI2 Flood Level ESL 97.5% (mAOD)
Defended with River Gele Breach	0.1%	Flood free	5.62
Defended raised Clywd embankments with River Gele Breach	0.5%	Flood free	Flood free
	0.1%	Flood free	Flood free
Defended including Breach 2	0.1%	Flood free	5.59
Defended including Breach 3	0.1%	Flood free	5.60

### 2.2.4.3 Gwellyn Avenue site flood levels

Maximum flood levels for each modelled scenario and event for the Gwellyn Avenue site are detailed in Table 2-7.

Due to the proximity of the Gwellyn Avenue site to the River Clywd, the site is shown to be at flood risk under all modelled events for the 2120 epoch. Under the defended scenario using the largest modelled event (0.1% AEP CI2) flood depths reach ~1.5m, which increase by ~0.1m if a breach of the defences at the River Gele outfall was to occur. For reference, current ground levels across the site range from 3.9-4.5mAOD with an average of roughly 4.2mAOD.

**Table 2-7: Gwellyn Avenue site modelled flood risk results**

Scenario	Event AEP (2120 epoch)	Flood Level 50% (mAOD)	CI2 Flood Level 97.5% (mAOD)
Defended	0.5%	4.84	5.00
	0.1%	5.07	5.61
Defended with River Gele Breach	0.5%	5.01	5.16
	0.1%	5.22	5.70
Defended raised Clywd embankments with River Gele Breach	0.5%	4.68	-
	0.1%	5.00	4.94
Defended including Breach 2	0.1%	5.10	5.65
Defended including Breach 3	0.1%	5.07	5.63

### 3 Impact of ground raising at the site

#### 3.1 Overview

Based on the modelled results, the Gwellyn Avenue site is at risk of flooding from the River Clwyd and a breach of the River Gele. Flood risk increases under sea level rise and defence failure scenarios. It was necessary to consider ground raising of the proposed development site, to raise the site above the maximum modelled flood level and assess the impact this might have on flood risk to neighbouring 3<sup>rd</sup> party land.

#### 3.2 Tidal flood modelling

The proposed development site was raised in the model to a level of 6.00mAOD. This was 300mm above the maximum modelled flood level of 5.70mAOD from all simulated model scenarios; this was based on the 0.1% AEP 2120 event including a breach of the River Gele.

The model was simulated for two scenarios for a single event with the proposed development site raised to 6.00mAOD as detailed in Table 3-1. Figure 3-1 and Figure 3-2 show the change in maximum water levels between the current site topography and raising the site above the maximum flood level.

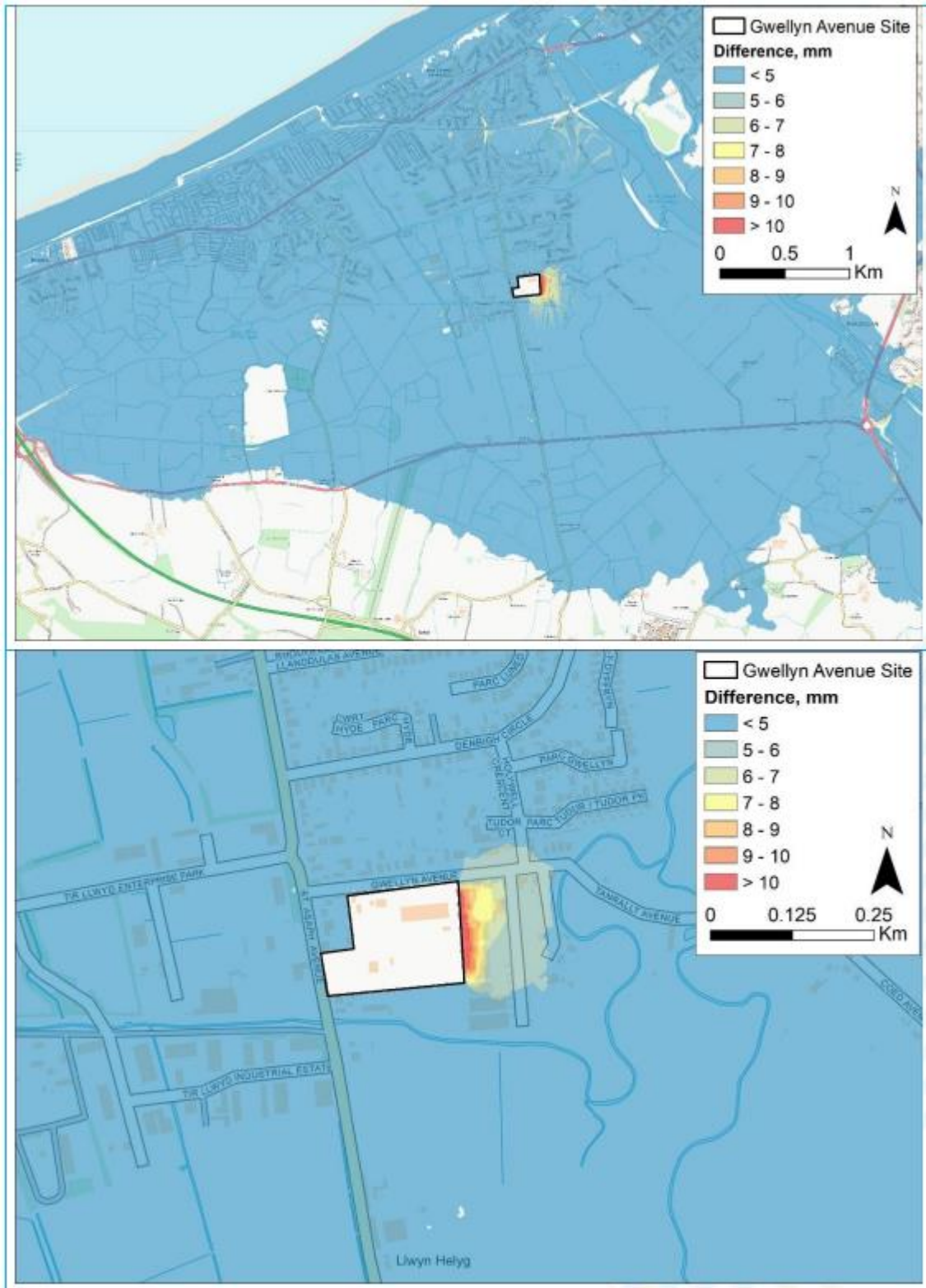
Figure 3-1 shows the modelled water level increase due to the raised site for the defended scenario under the 0.1% AEP 2120 epoch CI2 (97.5%). On the eastern side of the raised site, there is a localised increase in water levels as flood waters travelling west from the River Clywd hit the raised platform. The water level increase immediately on the eastern side reaches 10mm for a few metres and then drops down to 5mm covering the neighbouring two roads to the east of the site.

Figure 3-2 shows the modelled water level increase due to the raised site for the defended scenario with a breach of the River Gele under the 0.1% AEP 2120 epoch CI2 (97.5%). The results show a similar impact on water levels as the defended scenario with raised site. There is a similar increase of just over 10mm immediately on the eastern side of the raised site, and an increase of ~6mm covering the two road to the east of the site and a short area to the south.

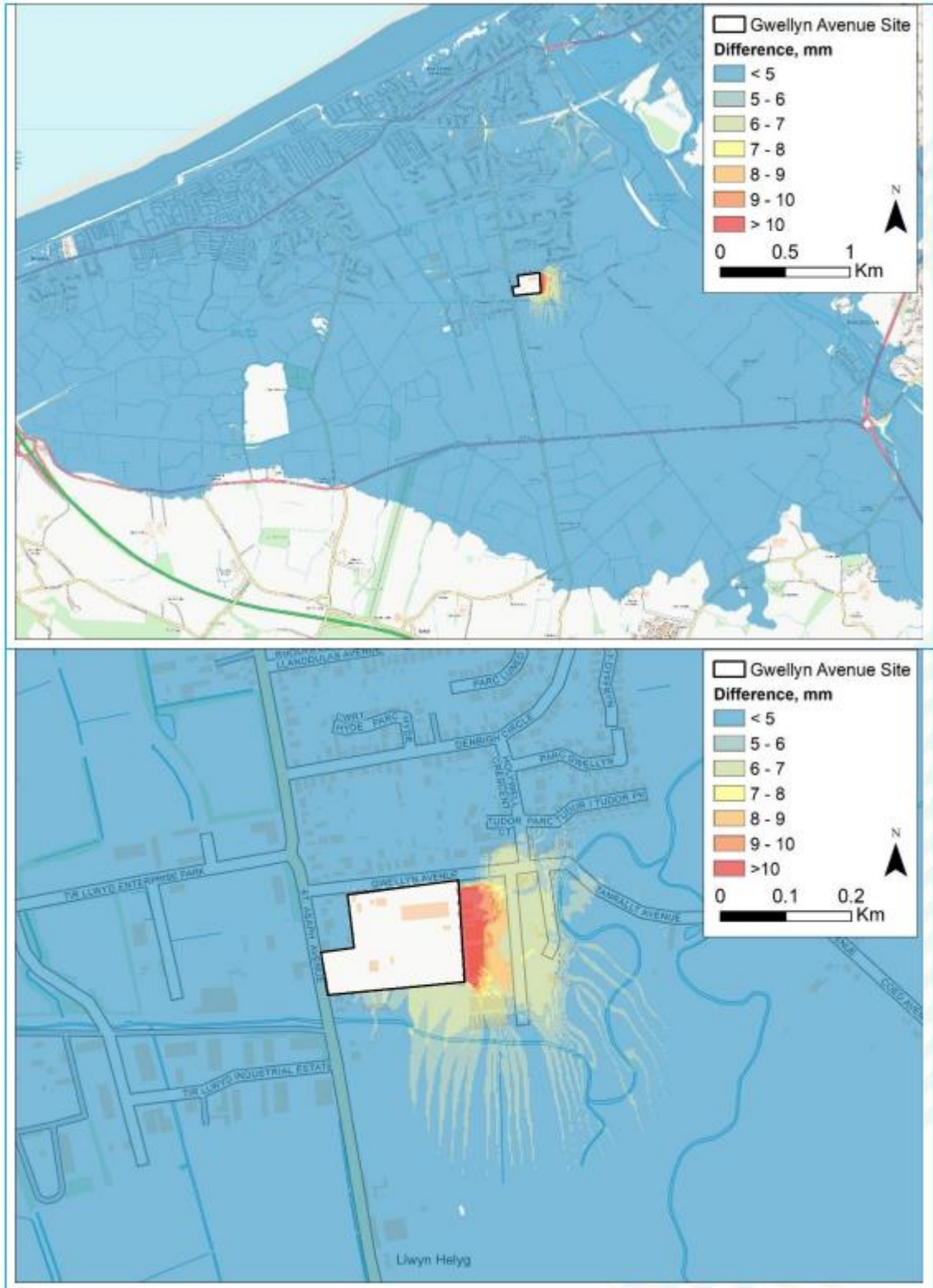
The results of the modelling show that the raised site would likely have an impact on extreme water level but the impact for all modelled scenarios is small when considering the accuracy of the modelling and the underlying data.

**Table 3-1: Events simulated with raised proposed development site**

Scenario	Event AEP
Defended	0.1% AEP 2120 epoch CI2 (97.5%)
Defended with River Gele Breach	0.1% AEP 2120 epoch CI2 (97.5%)



**Figure 3-1: Increase in water levels due to site raising – 0.1% AEP 2120 CI2 Defended**



**Figure 3-2: Increase in water levels due to site raising – 0.1% AEP 2120 CI2 Defended with River Gele breach**

## 4 Findings and conclusions

The 2017 Point of Ayr to Pensarn tidal model was updated with the latest extreme sea level boundary data and site-specific topographic data. The model was used to simulate a series of design extreme tidal events for the current defended scenario, a scenario to consider a 50m breach of the River Clywd embankments, and finally a scenario representing the future raising of the Clwyd embankments with a 50m breach of the River Clywd embankments. The modelled flood risk was assessed at two proposed residential development sites at the former Windjammers, Towyn and Gwellyn Avenue, Kinmel Bay.

At the former Windjammers site, the model results show the site remains flood free under all 2120 epoch events based on the 50% CFB ESLs, although access roads are impacted. When considering the CI2 97.5% ESL confidence bound, still water flooding impacts the site under the 0.1% 2120 epoch with depths reaching ~0.1m within the site boundary.

At the Gwellyn Avenue site, the model results show the site to be at flood risk under all modelled events for the 2120 epoch. The primary reason is the proximity to the River Clywd, where under future sea level rise conditions tidal floodwaters overtop the existing Clywd embankments. Under the defended scenario using the largest modelled event (0.1% AEP CI2) flood depths reach ~1.5m, which increase by ~0.1m if a breach of the defences at the River Gele outfall was to occur.

A scenario was simulated to consider the impact of raising the Clwyd embankments above the future sea level rise predictions based on the assumption that the council will raise defences as part of future flood mitigation works. A defence breach of the River Gele was included as this could still happen in the future. The flood extent reduces from that of the baseline, but the reduction is limited by still water flooding that occurs along the open coast, in particular near the Clywd Estuary mouth. An assessment of the topography of the 2017 Point of Ayr suggest that the current defence levels in this location may be out of date and leading to more flood volume reaching the floodplain to the south east. Further modelling would be required to determine the impact and if this would reduce flood risk at the proposed development sites.

A final scenario was tested, raising the Gwellyn Avenue site above the maximum modelled flood level. The proposed development site was raised to 6.00mAOD, 300mm above the maximum water level. The raising of the site modelling showed that, for the most part, the raised site leads to a very small localised increase in water levels as flood waters travelling west from the Clywd hit the raised platform. The increase is largely limited to the eastern side of the site and generally increases by 5mm across the two neighbouring roads to the east. Further away from the site the impact on water levels from that of the baseline is negligible.

## A Appendix



Ein cyf/Our ref: CAS-100888-X8H0  
Eich cyf/Your ref:5652 & 5511

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03000 85 3787

4<sup>th</sup> October 2019

Dear Mr Broun,

**BWRIAD / PROPOSAL: RESIDENTIAL DEVELOPMENTS AT FORMER#  
WINDJAMMERS TOWYN & GWELLYN AVENUE, KINMEL BAY**

**LLEOLIAD / LOCATION: 5652 WINDJAMMERS, TOWYN, ABERGELE & 5511  
GWELLYN AVENUE, KINMEL BAY**

Thank you for your request for discretionary planning advice we received your signed quotation on 2<sup>nd</sup> October 2019.

We refer to your request for pre-application advice based on the content of your e-mail 13/09/2019 and associated attachments. There are two sites of interest: Former Windjammers, Towyn and Gwellyn Avenue, Kinmel Bay.

In your letter you indicate that NRW "insist" that the 2010 HR Wallingford Report EX6387 should be used to inform any FCA in the Towyn & Kinmel Bay area. As you will be aware from numerous discussions on various sites in the area, the dominant source of flooding which needs to be considered as part of any development proposal is tidal flood risk from any overtopping and failure in the Clwyd embankments along with consideration of a breach to the sea defences (historic flooding). We are unaware of any other studies apart from the 2010 study which has considered a breach/overtopping from the tidal Clwyd embankments (western side of Clwyd). To clarify, NRW are not insisting on the 2010 HR Wallingford model being used but advising that your FCA will need to consider flooding from this source. We note your comments regarding the levels and the methodology used at the time, it is understood that this was a precautionary approach taken and again understood to have been addressed during the updated work for Conwy County Borough Council.

We agree with the content of your second paragraph and confirm that the 2011 JBA Report 2011s4926 does not include a breach scenario along the tidal Clwyd embankments.

---

[www.cyfoethnaturiolcymru.gov.uk](http://www.cyfoethnaturiolcymru.gov.uk)

[www.naturalresourceswales.gov.uk](http://www.naturalresourceswales.gov.uk)

Croesewir goheblaeth yn y Gymraeg a'r Saesneg  
Correspondence welcomed in Welsh and English

The 2017 JBA Report 2016s4979 considers flood risk associated with the sea defences along the frontage from Point of Ayr to Pensarn. The report has not assessed a breach in the tidal Clwyd embankments. We agree that the outputs from this report indicates that the Windjammers site remains flood free from breach locations 1, 2 and 3 whilst the majority of the Gwellyn Avenue site is shown free from flooding from breach 2 and 3.

The 1990 event breach position/length has been used for validation purposes to ensure the modelling work replicates the recorded flood outlines experienced during that event.

We would agree that to fully understand the impacts of a breach in the Clwyd tidal embankments it would be appropriate to modify the 2017 JBA model, to assess the flood risks impacts of such an event on the site and development. Given the low-lying nature of the site, and its proximity to the tidal Clwyd embankments it is likely that the flood risks at this site will be significant.

Whilst the risk from a breach in the Clwyd embankment would be less likely to have an impact on the Windjammers site (than Gwellyn Avenue to its proximity to the estuary), it would be inappropriate to agree that the site is flood free from all breach scenarios until a suitable breach of the tidal Clwyd embankment has been assessed, and all breach parameters agreed.

We would suggest that an appropriate location would be where crest heights are lowest (5.91mAOD) and hence overtopping occurs first. Our topographical survey information would be around the Afon Gele outfall location at 3000278,379245 and should follow our guidance on breach lengths of 50m as per our OGN100.

We trust that the above addresses your e-mail.

Please do not hesitate to contact us if you require further information or clarification of any of the above.

Yours Sincerely,



**Ruth Prichard**  
Development Planning Advisor  
Planning Advisory Service



**JBA**  
consulting

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## APPENDIX D

Letter dated 16/12/2022 from Natural Resources Wales

Maes Y Ffynnon,  
Penrhosgarnedd,  
Bangor,  
Gwynedd  
LL572DW

Richard Broun  
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16/12/2022

Annwyl/ Dear Mr Broun,

**BWRIAD / PROPOSAL: DEMOLITION OF EXISTING BUILDINGS ON SITE AND  
CONSTRUCTION OF 83 DWELLINGS**

**LLEOLIAD / LOCATION: LAND OFF GWELLYN AVENUE, KINMEL BAY, RHYL, LL18  
5HR**

**DISCRETIONARY PLANNING ADVICE SERVICE REVIEW OF A FLOOD  
CONSEQUENCES ASSESSMENT (FCA) FOR PROPOSED RESIDENTIAL  
DEVELOPMENT FOR 83 DWELLINGS AT LAND OFF GWELLYN AVENUE, KINMEL  
BAY, RHYL, LL18 5HR**

Thank you for your request for discretionary planning advice, we received your signed quotation on 01.11.2022. Our advice relating to flood risk is outlined below.

### **Flood Risk**

The site is located within Zone C1 of the Development Advice Map (DAM) as referred to by the Technical Advice Note (TAN) 15: Development and Flood Risk. The site is also shown to lie within the TAN15 Defended Zone according to the Flood Map for Planning (FMfP). As confirmed in the letter from Welsh Government dated 15 December 2021, the FMfP represents better and more up-to-date information on areas at flood risk than the DAM. The dominant source of flooding is tidal flood risk from overtopping and failure in the Clwyd embankments along with a breach to the sea defences. The site has a history of flooding from such a scenario.

It is understood that the site currently accommodates a variety of commercial uses including various storage facilities, vehicle repairs/depots and a builder's yard. The proposal will introduce 83 highly vulnerable development units (houses) to the site, placing additional people at flood risk and changing the development category as per figure 2 in the TAN15. As you will be aware, we have been in correspondence with yourselves correspondence with regards to flood risk at the site since 2019. We feel that the land raising necessary to mitigate the flood risk for the most recently proposed 83 residential dwellings will unacceptably increase flood risk to highly vulnerable dwellings elsewhere. As such we would raise concerns if consulted as part of any formal planning application.

We have reviewed the Flood Consequence Assessment (FCA), undertaken by BEK Enviro Ltd (dated September 2022, reference BEK-RB20009-1). The FCA has utilised and updated the Point of Ayr to Pensarn model (2017). The model updates include calculations of sea level rise using the latest guidance, updates to the tidal boundary conditions, updates to site topography and the inclusion of a breach in the river Clwyd defences. The hydraulic modelling report is relatively comprehensive, and the approach taken is considered to be appropriate for this type of assessment.

Based on the site location and proposed development the FCA should comply with A1.14 of TAN15, by demonstrating that the entire site can be designed to remain flood free during the design event of a 0.5% (1 in 200 year) annual exceedance probability (AEP) with an allowance for climate change (100 years) and taking into consideration an overtopping and/or breach scenario. A 50m breach of the River Clwyd embankments at the River Gele outfall was included into the model as per previous correspondence with NRW and following our Guidance Note 043 (Modelling blockage and breach scenarios). The tidal boundaries appear to have been updated using the latest data and guidance. The model outputs show the site is at significant risk of flooding under all modelled events when an allowance for climate change (to 2120) is considered. In order to demonstrate compliance with A1.14 of TAN15, it is proposed to raise the development site to 300 mm above the predicted maximum modelled flood level (5.70 mAOD) for a defended 0.1% AEP inclusive of 100 years of climate change and a breach of the river Clwyd defences.

As required in A1.12 of TAN15, it should be demonstrated that the proposed development does not increase flood risk elsewhere. The effects of the reduction of existing flood storage volume and/or flood conveyance with the effects elsewhere must be quantified and appropriate compensatory storage provided to mitigate any increases and/or other negative impacts. To represent the proposed development, the site was raised to a level of 6.00 mAOD in the model resulting in increased levels adjacent to the site of over 10mm in places. The FCA fails to show that the impact of the development on flood risk elsewhere can be mitigated, and therefore does not demonstrate compliance with the requirements of A1.12 of TAN15.

The report states that 'In practice the embankment will be graded at a 1 in 3 slope and planted with trees and shrubs which is likely to reduce the increase in water level to below NRW's criteria of 5mm' but since this has not been modelled, there is no evidence that this criteria will be met. It also states that 'In practice, with a proposed FFL of 5.45m AOD, it will only be necessary to raise the general site level to approximately 5.3m AOD – to ensure that it remains flood free over the lifetime of the development. Although the effect of this level

has not been modelled, the associated impact on 3rd party land is likely to be less than that predicted by the JBA analysis and therefore within the acceptable limits set by NRW'. As above, since this has not been modelled, we can't confirm that this will be the case. Since the development site has been raised above the water level for all modelled scenarios, the representation of land use (Manning's) and the representation on buildings is irrelevant. However, if additional runs are completed in the future with lower site levels, the topography of the site should be sufficiently represented.

In respect to access and egress, the extreme 0.1% event including climate change allowance over the lifetime of development and under breach conditions should be assessed against the criteria set out in A1.15. This provides indicative guidance on what is considered tolerable for the proposed development. The FCA provides a predicted flood depth of approximately 800 mm for such a scenario. This is in excess of the 600 mm tolerable allowance included in Table A1.15. Information on predicted, velocities, rate of rise and speed of inundation has not been provided. The FCA refers to the work to improve the Clwyd embankments. Whilst we will continue to review our strategy for the Clwyd embankments no firm commitments have been made or funding allocated. Assumptions should not be made on the deliverability of defence improvements nor their future standard of protection. If undertaken, improvement works will be to protect existing developments and not to facilitate new development proposals.

We recommend you consider consulting other professional advisors on matters such as emergency plans, procedures, and measures to address structural damage that may result from flooding. Please note, we do not normally comment on the adequacy of flood emergency response plans and procedures accompanying development proposals, as we do not carry out these roles during a flood. Our involvement during a flood emergency would be limited to delivering flood warnings to occupants/users.

In summary, the modelling shows that the land raising required to comply with A1.14 of TAN15 will unacceptably increase the risk of flooding elsewhere and we would raise concerns if consulted as part of a planning application. If the proposed site levels are expected to be lower than that currently modelled, we would expect evidence to be provided that quantifies the associated changes in flood risk. Consideration should be given to compensatory storage to mitigate any negative impacts which again should be quantified to prove changes to flood levels adjacent to the site are within tolerable limits.

## **Disclaimer**

The applicant acknowledges that the content of any advice or assistance provided by NRW is advisory only and that it shall not be deemed to bind or in any other way restrict NRW in performing its statutory functions.

In particular the recipient acknowledges that:

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- the final decision as to any representations made by NRW as statutory consultee will be based on all the relevant information available to NRW at the time it makes such representations;
- NRW cannot and does not give any guarantee as to the representations it may make as statutory consultee; and,
- any advice given by NRW may be overtaken by changes in available information, law, policy and guidance relevant to the subject matter of the advice.

If you have any queries on the above, please do not hesitate to contact us.

Yn gywir / Yours faithfully

**Sara Thomas**

Cynghorydd - Cynllunio Datblygu / Advisor - Development Planning  
Cyfoeth Naturiol Cymru / Natural Resources Wales



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