

**Gordon Mytton Developments
Ltd**

**16 Dee Court, Bangor-on-Dee,
Wrexham**

Flood Consequences Assessment

146521/01

December 2021



FAIRHURST

CONTROL SHEET

CLIENT: Gordon Mytton Developments Ltd

PROJECT TITLE: 16 Dee Court, Bangor-on-Dee, Wrexham

REPORT TITLE: Flood Consequences Assessment

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1.0 Introduction

- 1.1 Fairhurst have been appointed by the client, Gordon Mytton Developments Ltd, to prepare a Flood Consequences Assessment for a proposed change of use from offices to a 2 no. bedroom dwelling located at 16 Dee Court in Bangor-on-Dee, Wrexham at Grid Reference 339010, 345480.
- 1.2 This report has been prepared in compliance with Planning Policy Wales Technical Advice Note (TAN) 15: Development and Flood Risk (Ref. 1) and Natural Resources Wales (NRW).

2.0 Site Location and Description

- 2.1 The site is located at 16 Dee Court in Bangor-on-Dee, Wrexham at Grid Reference 339010, 345480, as shown on Figure 1 below and on the site location plan included in **Appendix A**.
- 2.2 The site comprises an existing two storey building, formerly in use as a dwelling and now in use as offices. The site is bound by an access road and car park (Dee Court) to the north, dwellings to the east, Whitchurch Road to the south, and a gravel driveway to an adjacent dwelling to the west.
- 2.3 Based on a review of the surrounding levels shown on Figure 1, the site is estimated to sit at an elevation of at or around 14.6mAOD.

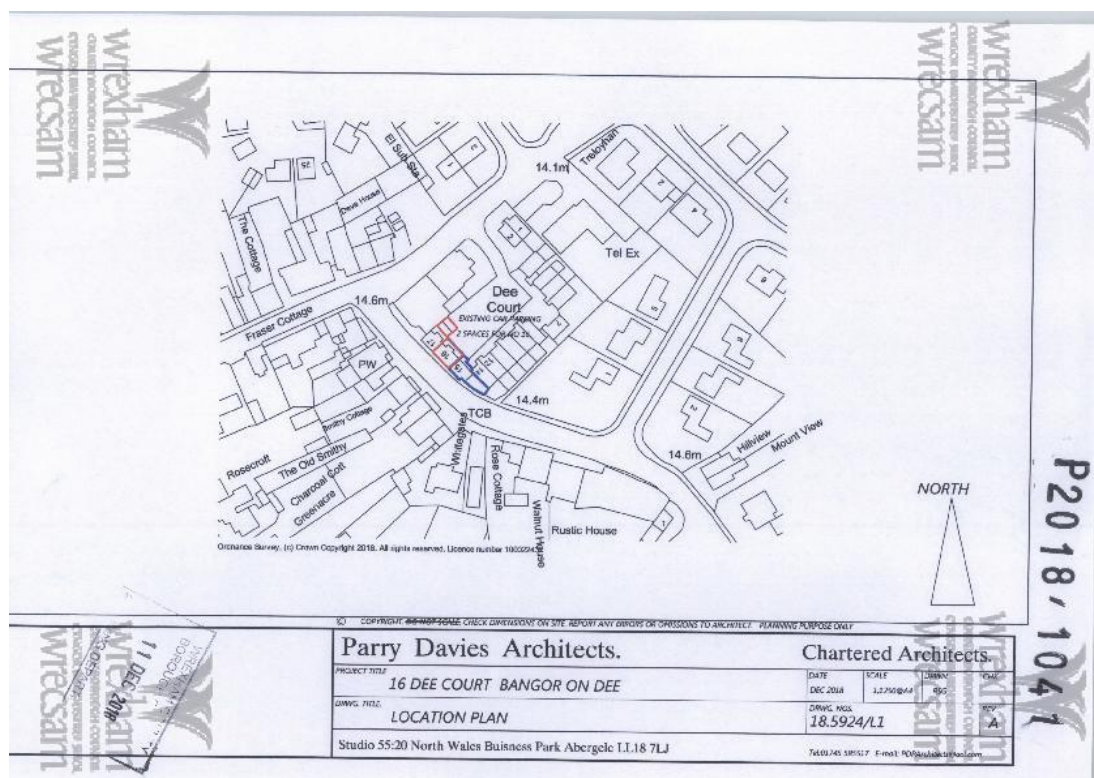


Figure 1 – Site Location Plan

3.0 Development Proposals

- 3.1 The client is proposing to change the existing offices back into a 2 no. bedroom dwelling, as shown on the existing and proposed floor plans included in **Appendix A**. This will include internal modifications only such as blocking up the door opening to the adjoining property (15 Dee Court) and installing a kitchen to the ground floor.

4.0 Geology

- 4.1 British Geological Survey (BGS) 1:50,000 maps (**Appendix B**) indicate the site is expected to be underlain by alluvium deposits (clays, silts, sands and gravels), underlain by Sandstone of the Kinnerton Sandstone Formation.
- 4.2 A nearby BGS borehole record located approximately 20m to the north west of the site (**Appendix B**) indicates the area is expected to be underlain by the following general ground profile:

- Made Ground as clay and stone fill to 1.4m bgl

- GRAVEL to 2.6m bgl
- Dense SAND to 4.1m bgl
- SAND with some gravel to 4.8m bgl (end of borehole)

5.0 Hydrology

- 5.1 The site is located approximately 190m to the north east of the River Dee which is the nearest major watercourse to the site.
- 5.2 There are no other surface water features or watercourses located on or in the local vicinity of the site.
- 5.3 The NRW Development Advice Map shown on Figure 2 below and included in **Appendix B** indicates the site is in Flood Zone C1, 'areas of the floodplain which are developed and served by significant infrastructure, including flood defences'. Flood Zone C is based on the Environment Agency extreme flood outline where the annual probability of flooding is equal to or greater than 0.1% (1 in 1000 year).

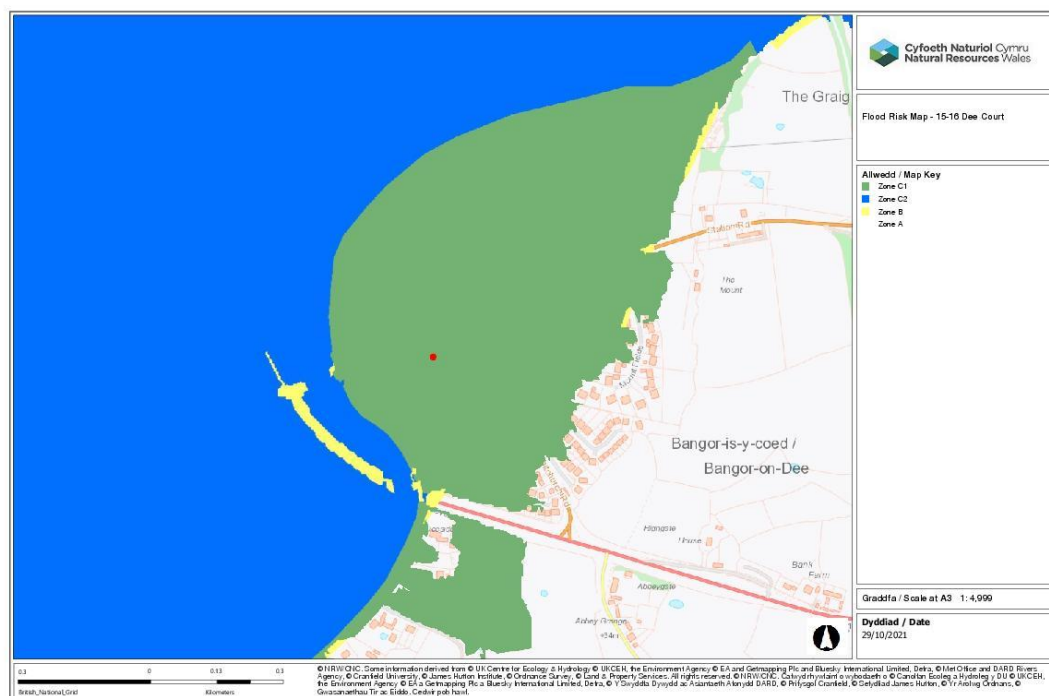


Figure 2. NRW Development Advice Map – Flood Zones

- 5.4 Planning Policy Wales TAN 15 (Ref. 1) indicates development can take place in Flood Zone C1 subject to the application of the Justification Test, including acceptability of consequences. The Justification Test has been undertaken for the site and this is discussed in Section 8.0 of this report.
- 5.5 The Flood Risk Assessment Wales Map shown on Figures 3, 4 and 5 below and included in **Appendix B** indicates the site is in an area benefitting from flood defences and warnings and is at low risk of fluvial flooding. The site is not at risk of coastal or surface water flooding. There is an area of medium surface water flood risk immediately to the south of the site associated with Whitchurch Road.

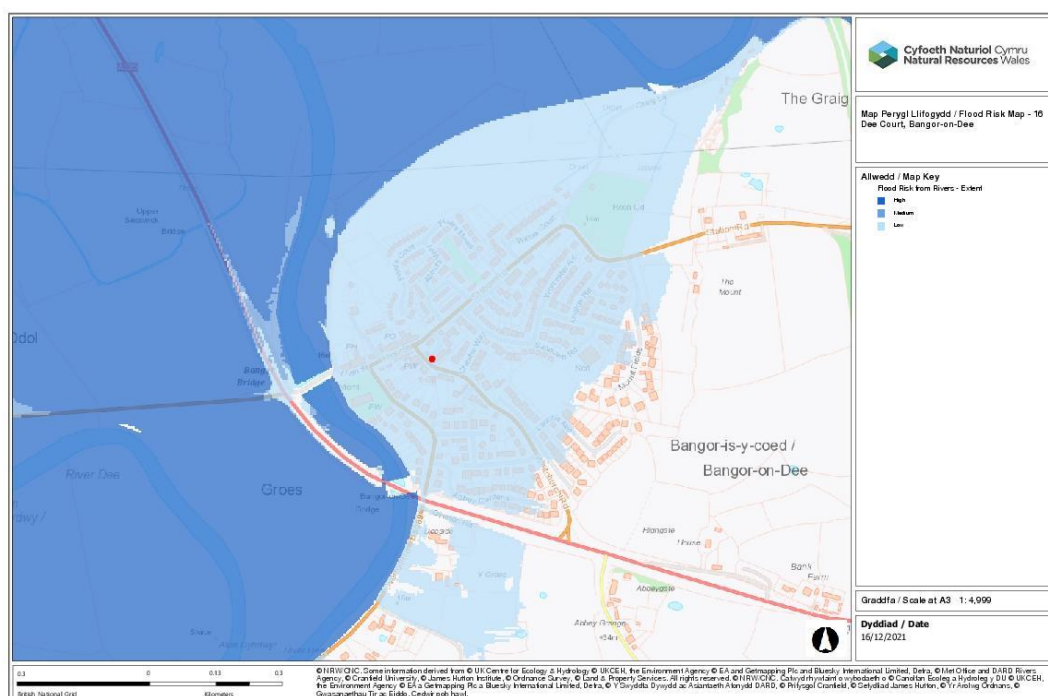


Figure 3. Fluvial Flood Risk

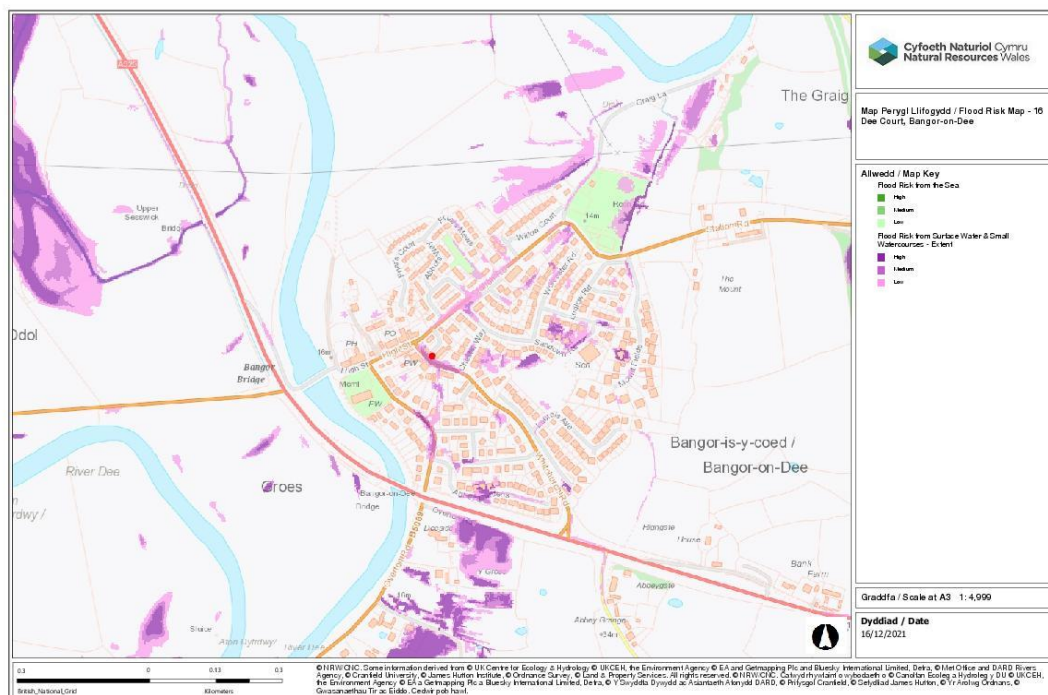


Figure 4. Coastal and Surface Water Flood Risk

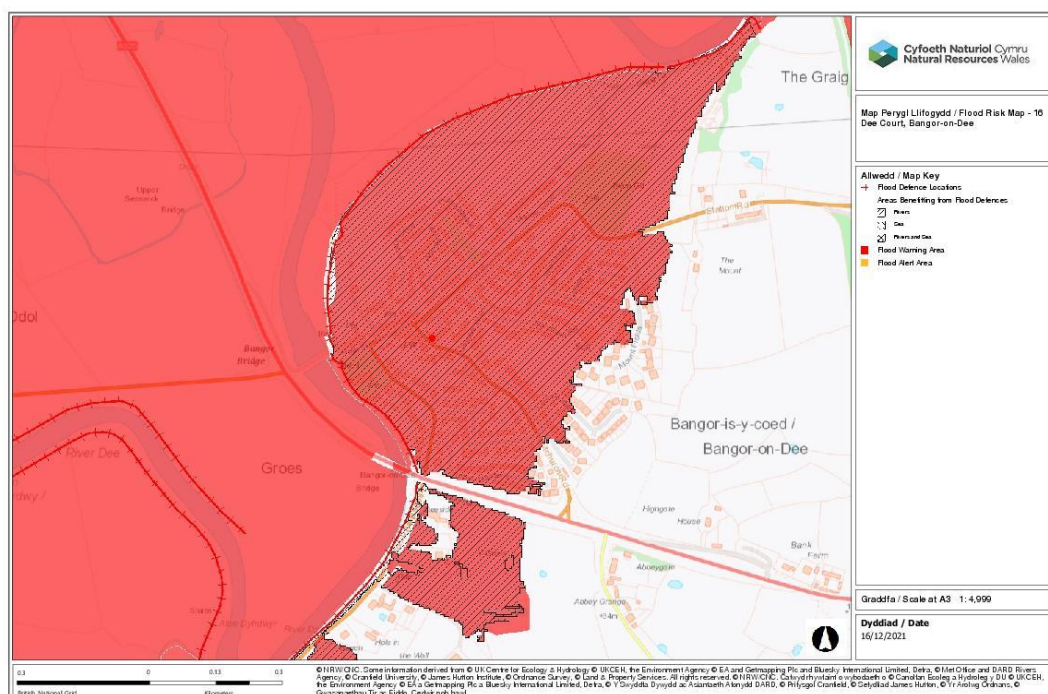


Figure 5. Flood Defences and Warnings

- 5.6 An enquiry was made to NRW to obtain the modelled flood levels and extents for a range of events up to and including the extreme 1 in 1000 year flood event. The model extracts are included in **Appendix D** and indicate the site is outside the 1 in 100 (1%) and 1 in 1000 (0.1%) year defended flood extents.
- 5.7 However, the model extracts (**Appendix D**) indicate the site is impacted in an undefended scenario with flooding expected to a depth of 0.97m during the 1 in 100 year flood event and 1.44m during the 1 in 1000 year flood event.
- 5.8 NRW have also provided flood levels to the river nodes along the River Dee. The nearest node to the site is 'DEE03_22126u' and this indicates a 1 in 100 flood level of 15.57mAOD. Based on a review of the existing site levels (14.6mAOD), the site is expected to flood to a depth of 0.97m during the 1 in 100 year undefended flood event and 1.44m during the 1 in 1000 year undefended flood event. The Flood Screening Report (**Appendix C**) indicates the site is expected to flood to a depth of 0.3-1.0m during the 1 in 100 year undefended flood event. This closely corresponds to the NRW modelled flood levels and node point data.
- 5.9 A review of the Bangor on Dee Flood Risk Mapping Study 2012 (Ref. 2) indicates the site is protected by raised flood defences that provide a 100 year standard of protection. Figures 4-3 and 4-8 included in the Study show these defences are sufficiently high enough to contain a climate change enhanced 1 in 100 year flood event and 1 in 1000 year flood event with no flooding to the site predicted.
- 5.10 A review of the NRW online spatial data indicates the defences consist of embankments and reinforced concrete in Good (2) to Fair (3) condition. The embankments are clay and piled with a geotextile layer. The defences are maintained by NRW.

6.0 Hydrogeology

- 6.1 The superficial deposits underlying the site are designated as a 'Secondary A' aquifer with medium vulnerability. The solid Sandstone bedrock geology underlying the site is designated as a 'Principle' aquifer with medium vulnerability.
- 6.2 The BGS flood data contained in the Flood Screening Report (**Appendix C**) indicates there is potential for groundwater flooding to occur at the surface.

7.0 Flood History and Records

- 7.1 The Flood Risk Assessment Wales Map shown on Figure 6 below and included in **Appendix B** indicates the site has been impacted by historical flooding.

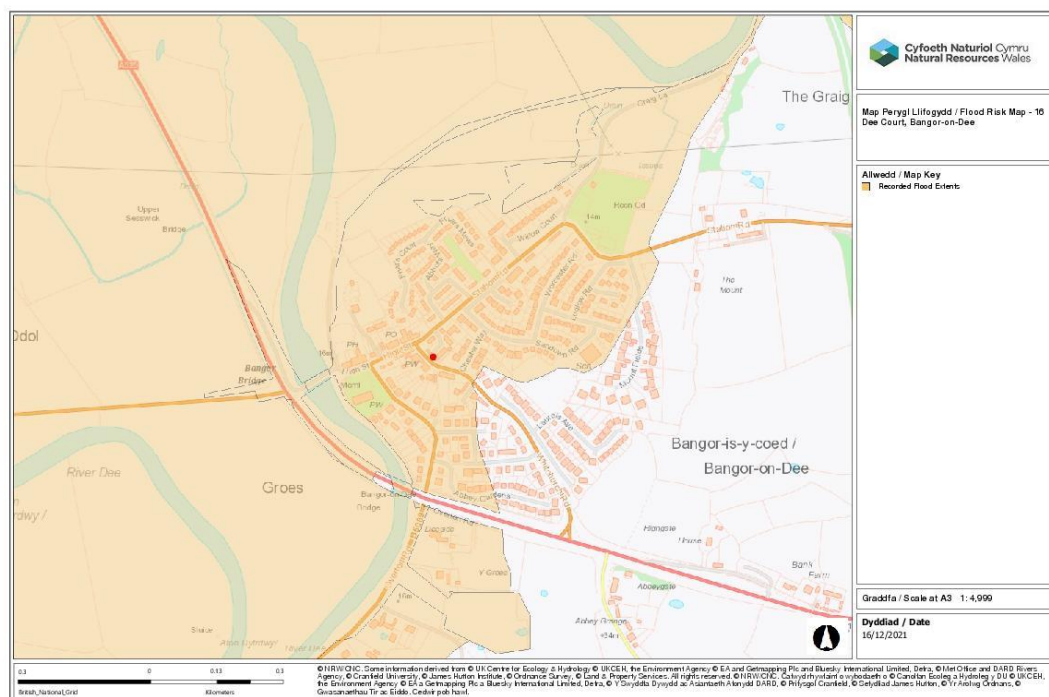


Figure 6 – Recorded Flood Extents

- 7.2 A review of the EA/NRW Historic Flood Map contained in the Flood Screening Report (**Appendix C**) indicates the site flooded in 1964 due to overtopping of defences.
- 7.3 A review of the Flood Risk Mapping Study 2012 (Ref. 1) indicates flooding occurred in the late 1940's and in 1964 following which raised defences were built to protect the town. There is no evidence of the site being impacted by flooding after this period.

8.0 Justification Test

- 8.1 Planning Policy Wales TAN 15 (Ref. 1) indicates development can take place in Flood Zone C1 subject to the application of the Justification Test, including acceptability of consequences.
- 8.2 The client is proposing to change the existing offices back into a 2 no. bedroom dwelling, as shown on the existing and proposed floor plans included in **Appendix A**. This will include

internal modifications only such as blocking up the door opening to the adjoining property (15 Dee Court) and installing a kitchen to the ground floor.

- 8.3 The proposal is classed as 'highly vulnerable development' and should only be permitted in Flood Zone C1 if determined by the planning authority to be justified in that location.
- 8.4 The proposed change of use should be considered justified as the following criteria has been met:

Justification Criteria

- **Should be located only in an area of flood risk which is developed and served by significant infrastructure, including flood defences (Zone C1 of DAM).**

The NRW DAM (**Appendix B**) indicates the site is in Flood Zone C1, 'areas of the floodplain which are developed and served by significant infrastructure, including flood defences'.

The site is currently protected by raised flood defences that provide a 100 year standard of protection. Figures 4-3 and 4-8 included in the Flood Risk Mapping Study 2012 (Ref. 2) show the defences are sufficiently high enough to contain a climate change enhanced 1 in 100 year flood event and 1 in 1000 year flood event with no flooding to the site predicted.

A review of the NRW online spatial data indicates the defences consist of embankments and reinforced concrete in Good (2) to Fair (3) condition. The embankments are clay and piled with a geotextile layer. The defences are maintained by NRW.

A review of the model extracts (**Appendix D**) indicates the site is outside the 1 in 100 and 1 in 1000 year defended flood extents.

- **Its location is necessary to assist a local authority regeneration initiative or strategy, or contribute to key employment objectives, necessary to sustain an existing settlement or region.**

This is not applicable to the proposal as the site is already developed. The offices at this location are no longer viable and the client is proposing to change these back into a 2 no. bedroom dwelling to suit the increasing and already high demand for housing in the town.

- **The site meets the definition of previously developed land (i.e. it is not a Greenfield site) and concurs with the aims of Planning Policy Wales (i.e. the presumption in favour of sustainable development).**

The site comprises an existing two storey building, formerly in use as a dwelling and now in use as offices, and therefore meets the definition of previously developed land concurring with the aims of Planning Policy Wales.

- **A Flood Consequences Assessment has been produced to demonstrate that the potential consequences of a flood event up to the extreme flood event (1 in 1000 chance of occurring in any year) have been considered and meet the criteria below in order to be considered acceptable.**

This report provides the Flood Consequences Assessment for the site and proposed change of use.

The Flood Risk Assessment Wales Map (**Appendix B**) indicates the site is in an area benefitting from flood defences and warnings and is at low risk of fluvial flooding. The site is not at risk of coastal or surface water flooding. There is an area of medium surface water flood risk immediately to the south of the site associated with Whitchurch Road.

An enquiry was made to NRW to obtain the modelled flood levels and extents for a range of events up to and including the extreme 1 in 1000 year flood event. The model extracts are included in **Appendix D** and indicate the site is outside the 1 in 100 (1%) and 1 in 1000 (0.1%) year defended flood extents.

A review of the NRW online spatial data indicates the defences consist of embankments and reinforced concrete in Good (2) to Fair (3) condition. The embankments are clay and piled with a geotextile layer. The defences are maintained by NRW.

Based on a review of the above, fluvial flooding is not expected to be an issue to the property.

Acceptability Criteria

- **Flood defences must be shown by the developer to be structurally adequate particularly under extreme overtopping conditions (i.e. that flood with a 1 in 1000 chance of occurring in any year).**

The site is currently protected by raised flood defences that provide a 100 year standard of protection. Figures 4-3 and 4-8 included in the Flood Risk Mapping Study 2012 (Ref. 2) show the defences are sufficiently high enough to contain a climate change enhanced 1 in 100 year flood event and 1 in 1000 year flood event with no flooding to the site predicted.

- **The cost of future maintenance for all new/approved flood mitigation measures, including defences must be accepted by the developer and agreed with the Environment Agency (now Natural Resources Wales).**

A review of the NRW online spatial data indicates the defences consist of embankments and reinforced concrete in Good (2) to Fair (3) condition. The embankments are clay and piled with a geotextile layer. The defences are maintained by NRW.

A review of the model extracts (**Appendix D**) indicates the site is outside the 1 in 100 and 1 in 1000 year defended flood extents.

- **The developer must ensure than future occupiers of the development are aware of the flooding risks and consequences.**

The occupiers of the development will be made aware of the flooding risks and consequences through implementation of a Flood Risk Management Plan.

- **Effective flood warnings are provided at the site.**

The Flood Risk Assessment Wales Map (**Appendix B**) indicates the site is in a Flood Warning Area.

- **Escape/evacuation routes are shown by the developer to be operational under all conditions.**

An escape/evacuation route has been provided for the site and this is discussed in Section 10.0 of this report.

- **Flood emergency plans and procedures produced by the developer must be in place.**

A Flood Risk Management Plan should be prepared for the proposed change of use and this should include details of flood emergency plans and procedures. An escape/evacuation route has been provided for the site and this is discussed in Section 10.0 of this report.

- **Development is designed to minimise structural damage during a flooding event and is flood proofed to enable it to be returned to its prime use quickly in the aftermath of the flood.**

The site is outside the 1 in 100 and 1 in 1000 year defended flood extents.

The site is shown to be impacted in an undefended scenario with flooding expected to a depth of 0.97m during the 1 in 100 year flood event and 1.44m during the 1 in 1000 year flood event.

As such, flood proofing measures should be implemented as set out in Section 10.0 of this report.

- **No flooding elsewhere.**

The client is proposing to change the existing offices back into a 2 no. bedroom dwelling which will include internal modifications only. In the absence of new development the proposal offers no loss in flood storage capacity which could increase flooding elsewhere.

- **Developer is required to demonstrate that the site is designed to be flood free for the lifetime (A1.5) of development for either a 1 in 100 chance (fluvial) flood event, or a 1 in 200 chance (tidal) flood event including an allowance for climate change (depending on the type of flood risk present) in accordance with table A1.14.**

The site is currently protected by raised flood defences that provide a 100 year standard of protection. Figures 4-3 and 4-8 included in the Flood Risk Mapping Study 2012 (Ref. 2) show the defences are sufficiently high enough to contain a climate change enhanced 1 in 100 year flood event and 1 in 1000 year flood event with no flooding to the site predicted.

- **In respect of the residual risk to the development it should be designed so that over its lifetime (A1.5) in an extreme (1 in 1000 chance) event there would be less than 600mm of water on access roads and within properties, the velocity of any water flowing across the development would be less than 0.3m/second on access roads and 0.15m/second in properties, and the maximum rate of rise of floodwater would not exceed 0.1m/hour (see table A1.15).**

This is not applicable to the site as the site is currently protected by raised flood defences that provide a 100 year standard of protection and are sufficiently high enough

to contain a climate change enhanced 1 in 100 year flood event and 1 in 1000 year flood event with no flooding to the site predicted.

9.0 Forms of Flooding

9.1 Flooding can originate from a number of different sources and CIRIA C624 Development and flood risk – guidance for the construction industry (Ref. 3) provides a list of these. Forms of flooding are summarised in Table 1 below.

Table 1. Forms of Flooding

Source	Requires Considering for the Site?
Fluvial	Yes
Coastal and Tidal	No
Estuarine and Tidal Affected Watercourses	No
Groundwater	Yes
Overland Flow and Surface Water Flooding	Yes
Artificial Drainage Systems (e.g. Reservoirs)	Yes
Infrastructure Failure	Yes

9.2 The following forms of flooding require considering for the site:

Fluvial

- The site is in Flood Zone C1. Flood Zone C is based on the Environment Agency extreme flood outline where the annual probability of flooding is equal to or greater than a 0.1%.
- The site is in an area benefitting from flood defences and warnings and is at low risk of fluvial flooding.
- The site is outside the 1 in 100 and 1 in 1000 year defended flood extents.
- The site is shown to be impacted in an undefended scenario with flooding expected to a depth of 0.97m during the 1 in 100 year flood event and 1.44m during the 1 in 1000 year flood event.

Groundwater

- There is potential for groundwater flooding to occur at the surface.

- However, as no new or below ground structures are proposed on site groundwater flooding is not expected to be an issue to the property.

Overland Flow and Surface Water Flooding

- The site is not at risk of surface water flooding.
- There is an area of medium surface water flood risk immediately to the south of the site associated with Whitchurch Road.
- Any overland flow generated from this source would be expected to be intercepted by the adjacent highway drainage network.
- The onsite drainage system should be subject to a programme of ongoing inspection and maintenance to ensure blockage and overloading of sewers and drains does not occur.

Artificial Drainage Systems

- Artificial drainage systems are man-made structures, such as reservoirs, designed to hold water. If these structures were to fail then they would cause catastrophic flooding to downstream areas.
- The site is not in a mapped area of reservoir flooding.

Infrastructure Failure

E.g. a high pressure water main bursts. Whilst these types of events occur they are very uncommon and are therefore not expected to be an issue to the property.

10.0 Flood Risk, Mitigation and Compensation

- 10.1 The site is in Flood Zone C1, 'areas of the floodplain which are developed and served by significant infrastructure, including flood defences'. Flood Zone C is based on the Environment Agency extreme flood outline where the annual probability of flooding is equal to or greater than 0.1% (1 in 1000 year).
- 10.2 The site is in an area benefitting from flood defences and warnings and is at low risk of fluvial flooding. The site is not at risk of coastal or surface water flooding. There is an area of medium surface water flood risk immediately to the south of the site associated with Whitchurch Road.

- 10.3 The site is currently protected by raised flood defences that provide a 100 year standard of protection. Figures 4-3 and 4-8 included in the Flood Risk Mapping Study 2012 (Ref. 2) show the defences are sufficiently high enough to contain a climate change enhanced 1 in 100 year flood event and 1 in 1000 year flood event with no flooding to the site predicted.
- 10.4 A review of the NRW online spatial data indicates the defences consist of embankments and reinforced concrete in Good (2) to Fair (3) condition. The embankments are clay and piled with a geotextile layer. The defences are maintained by NRW.
- 10.5 An enquiry was made to NRW to obtain the modelled flood levels and extents for a range of events up to and including the extreme 1 in 1000 year flood event. The model extracts are included in **Appendix D** and indicate the site is outside the 1 in 100 (1%) and 1 in 1000 (0.1%) year defended flood extents.
- 10.6 However, the model extracts (**Appendix D**) indicate the site is impacted in an undefended scenario with flooding expected to a depth of 0.97m during the 1 in 100 year flood event and 1.44m during the 1 in 1000 year flood event.
- 10.7 The client is proposing to change the existing offices back into a 2 no. bedroom dwelling, as shown on the existing and proposed floor plans included in **Appendix A**. This will include internal modifications only such as blocking up the door opening to the adjoining property (15 Dee Court) and installing a kitchen to the ground floor.
- 10.8 In the absence of any new development or raising levels the proposal offers no loss in flood storage capacity which could increase flooding elsewhere. As such, compensatory storage will not be required.
- 10.9 A Flood Risk Management Plan should be prepared for the proposed change of use and this should include details of flood emergency plans and procedures.
- 10.10 An escape/evacuation route is shown on Figure 6 below. In the event of flooding due to overtopping of defences residents of the property should evacuate via Whitchurch Road, west along Whitchurch Road to the A525 and west along the A525 to safe areas with no risk of flooding.
- 10.11 Consideration should be given to the following flood proofing measures, where possible:
- Electrical circuits at ground floor should be set to a minimum of 600mm above the finished floor level of the property in accordance with Part M of the Building Regulations 2006. These should be run to sockets and switched from the ceiling cavity above to enable simpler replacement in the event of flood damage.

- All sleeping accommodation should be contained at first floor or above. This removes the risk of any flooding occurring through the night affecting residents that may be asleep and not aware of the flood warnings.
- All hardstanding areas to the immediate outside of the property should fall away from the entrance points, where possible, with a minimum gradient of 1 in 100. If this is not possible then the introduction of linear drainage to the entrance points should be considered. This will provide an extra level of protection to the property in the event of extreme rainfall.
- The replacement of any chipboard / reconstituted wood fixtures and fittings with plastic or steel fittings should be considered. This will decrease the need for replacement in the event of flood damage.

11.0 Climate Change

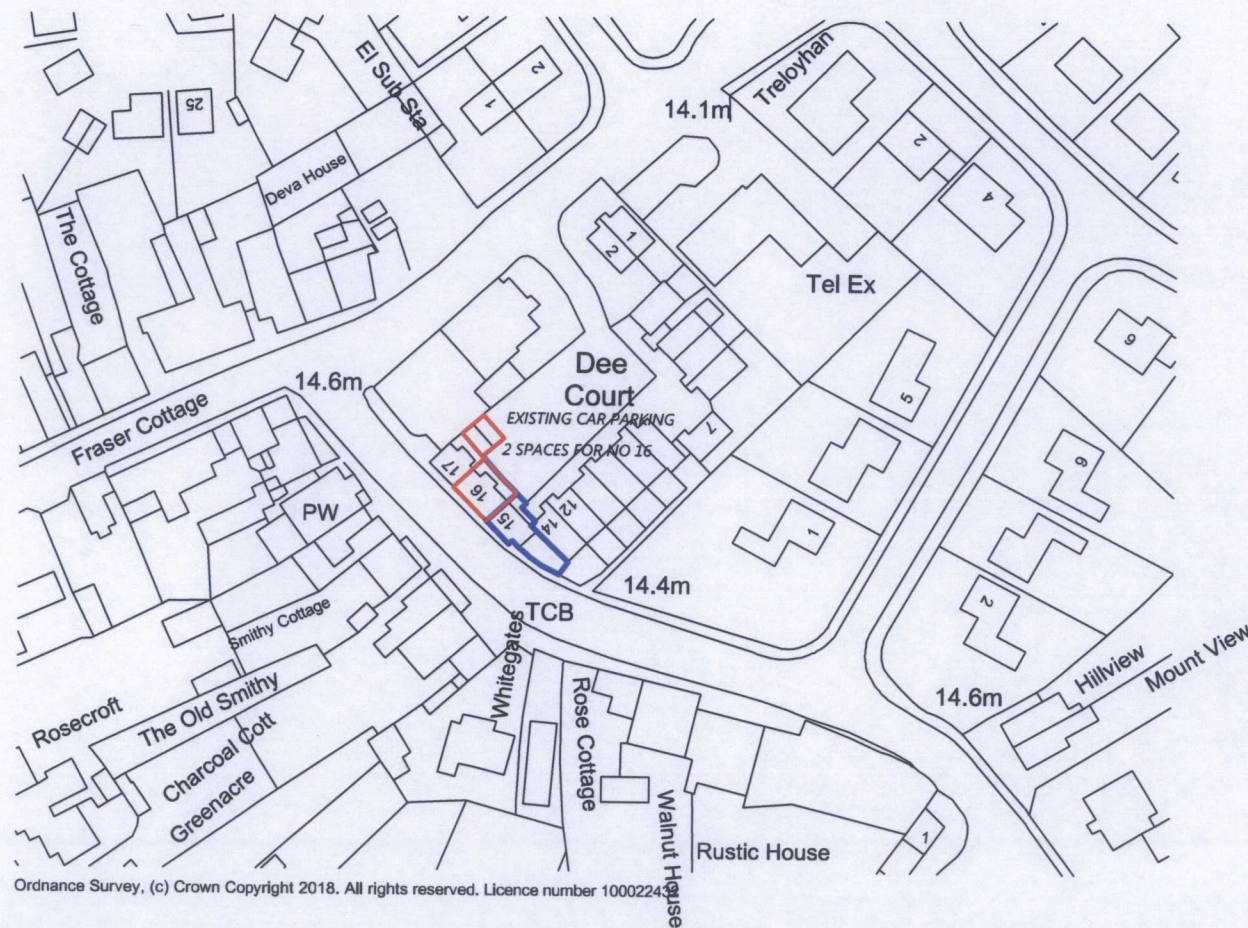
- 11.1 As the site is shown to be outside the 1 in 100 year + climate change defended flood extent the effects of climate change with regard to fluvial flood risk are not expected to be an issue to the property.

REFERENCES

1. Planning Policy Wales, Technical Advice Note (TAN) 15: Development and Flood Risk (2004)
 2. JBA Consulting, Bangor on Dee Flood Risk Mapping Study (2012)
 3. CIRIA C624, Development and flood risk – guidance for the construction industry (2004)
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APPENDIX A

Drawings



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Parry Davies Architects.

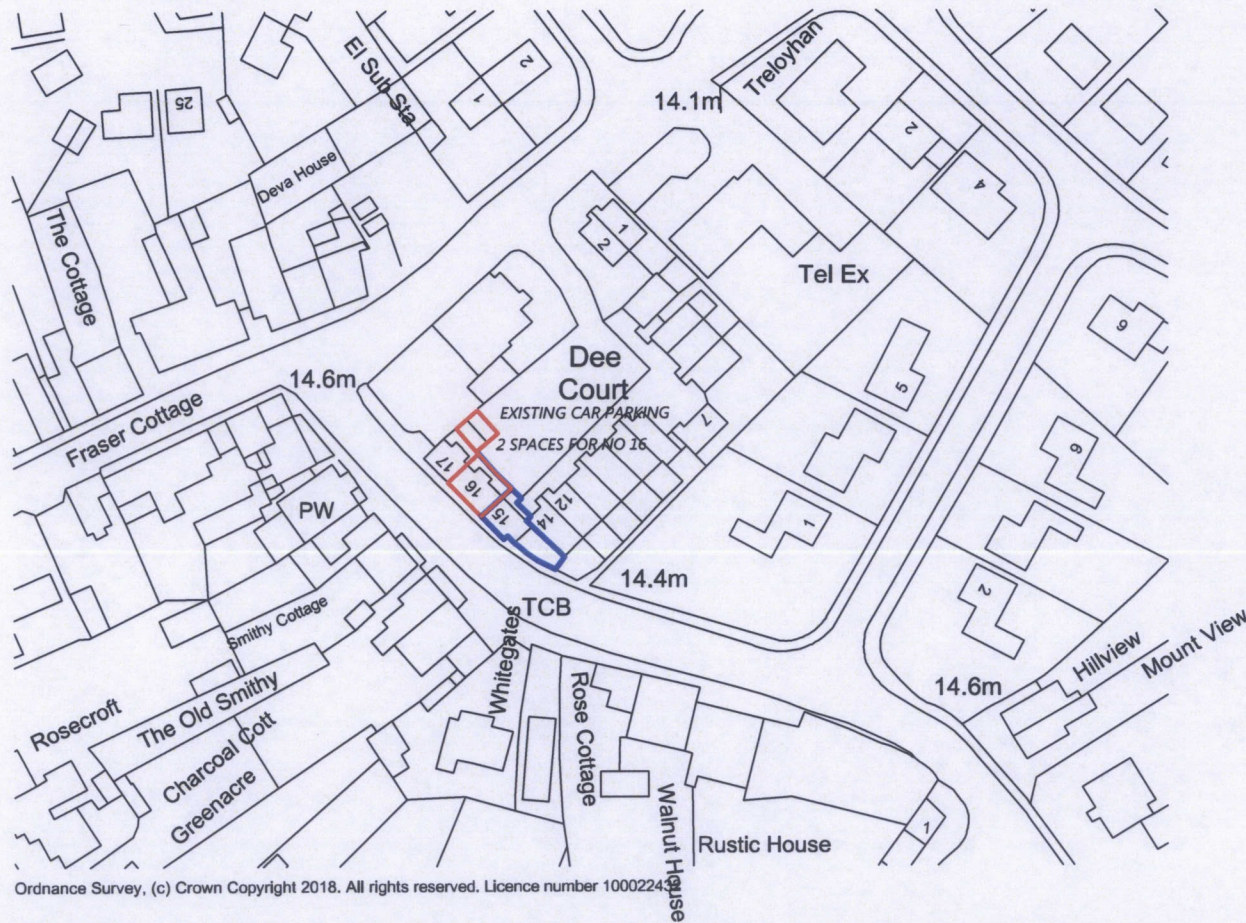
Chartered Architects.

PROJECT TITLE	16 DEE COURT BANGOR ON DEE	DATE	DEC 2018	SCALE	1:1250@A4	DRWN	RSG	CHK	
DRWG. TITLE	LOCATION PLAN	DRWG. NOS.	18.5924/L1	REV	A				

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PROJECT TITLE

16 DEE COURT BANGOR ON DEE

DATE

DEC 2018

SCALE

1:1250@A4

DRWN

RSG

CHK

DRWG. TITLE

LOCATION PLAN

DRWG. NOS.

18.5924/L1

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PLANNING DEPARTMENT
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