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REFERENCES

Conwy FRA Stage1 Report EX4667 - HRWallingford May 2008

Conwy FRA Towyn Drawings MCR3844 - HRWallingford September 2009

Conwy FRA Towyn Inundation Modelling EX4916 (2) HRWallingford September 2009

Conwy FRA_Towyn Inundation Modelling cc100 EX6387 (2) HRWallingford November 2010

Supplementary Planning Guidance LDP27: Coastal Flood Risk Protocol – Conwy CBC July 2015

Tidal Clwyd Draft Flood Risk Management Strategy – Conwy CBC Summary Document

APPENDICES

- Appendix 1 Letter from Colwyn BC to Mrs M.A. Brogden, dated 5th October 193 ref: JAH/M/1/11488.
Letter from Conwy CBC to B. Killingworth, dated 9th September 2014 ref: DC/ENQ/24363
Planning Consent for Application Nos 1/11488, 1/15733 and 1/16320
S.106 Agreement between Colwyn BC and Mrs M.A. Brogden dated 18th October 1995 – prepared in conjunction with Application No 1/16320
- Appendix 2 Letter from Conwy CBC to B. Killingworth dated 20th August 2014 ref: DC/ENQ/24363
Planning Consent for Sewer Construction Application No 0/41464 dated 31st March 2015
- Appendix 3 Letter from NRA to Colwyn BC dated 10th November 1995 ref:SH9778/950485/3
- Appendix 4 Original layout for Application No 1/16320
Proposed layout 2017
- Appendix 5 Flood defence infrastructure
- Appendix 6 Photograph of repaired Towyn coastal defence – source Kinmel Bay FRA 2005
- Appendix 7 Photographs of Clwyd PS and Clwyd Embankment – source Kinmel Bay FRA 2005
- Appendix 8 Development Advice Map (DAM)
- Appendix 9 Drg no 012 from HRW Report EX4667 - HRWallingford May 2008
2056 Overtopping and Breach Scenarios from HRW Report EX 4916 – Dec 2009
Overtopping – Towyn Way East, Point 6, Point 8
Breach Scenarios for R. Clwyd Embankment - Towyn Way East, Point 6, Point 8
Breach Scenarios for Coastal Defences - Towyn Way East, Point 6, Point 8
2116 Overtopping and Breach Scenarios from HRW Report EX 6387 – Nov 2010
Overtopping – Towyn Way East, Point 6, Point 8
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Breach Scenarios for Coastal Defences - Towyn Way East, Point 6, Point 8
- Appendix 10 NRW Tidal Data based on JBA Report November 2011
- Appendix 11 Letter from WG to all Chief Planning Officers of Local Planning Authorities dated 9th January 2014 ref: WG0701-14
- Appendix 12 Table 2.2 from HRW Report EX4667 – HRW May 2008
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ABBREVIATIONS

AOD	Above Ordnance Datum
BC	Borough Council
BK	Brian Killingworth
CBC	County Borough Council
CTFRA	Conwy Tidal Flood Risk Assessment
DAM	Development Advice Maps (part of TAN15)
DCWW	Dwr Cymru Welsh Water
EFO	Extreme Flood Outline (map of the 1 in 1000 flood event)
FCA	Flood Consequence Assessment
HRW	Hydraulics Research Wallingford (Contractors to Conwy CBC)
LPA	Local Planning Authority (in this case Conwy CBC)
NRA	National Rivers Authority (a predecessor authority of EAW)
NRW	Natural Resources Wales (statutory consultee of LPA on Flood Risk)
SMP	Shoreline Management Plan
SWL	still water level
TAN	Technical Advice Note
TAN15	Technical Advice Note – Development & Flood Risk
TCFRMS	Tidal Clwyd Flood Risk Management Study
TFRA	Tidal Flood Risk Area
WG	Welsh Government

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EXECUTIVE SUMMARY

- Gors Farm at Gors Road, Towyn has an extant permission under Application No 1/16320 for the re-development of the existing derelict farmhouse to a 5 Bedroom Hotel, a new 18 Bedroom Motel and 20 new Lodges containing a total of 48 Bedrooms, in total, 71 bedrooms capable of accommodating an estimated 142 people; together with a Tea Room and Motor Museum to be converted from existing derelict farm outbuildings. This development, which was a revision of a former Application No 1/11488, received consent on 31st October 1995.
- Conwy CBC accepts the extant status of Application No 1/16320 and will consider an alternative proposal for the development of the site from the new owner. This Flood Consequence Assessment (FCA) has been prepared to assess the flood risk associated with this alternative proposal.
- The alternative proposal comprises a facility within North Wales for use by local Travelling Showmen's Guild members. It will comprise 1 no detached house for the Site Manager and his family; 13 no Units containing a concrete base for a Park Home and hard standing for 2 cars; a secure compound providing hard standing for 13 touring caravans and a dry barn/workshop for storage and maintenance of equipment. The Units will be used by permanent and seasonal employees of the site owner, who also owns and operates the Tir Prince Amusement Park and Raceway in Towyn and other members of the Showmen's Guild operating within the area. The site will become a base in North Wales for local members of the Showmen's Guild to utilise for accommodation and storage and maintenance of their equipment. As such the site will satisfy a requirement which at present is unfulfilled within North Wales. As well as being the permanent home of the site owner, the dwelling on the site will also provide a security presence.
- Gors Farm is situated within a defended Tidal Flood Risk Area (TFRA) and is designated as a C1 site within the Development Advice Map (DAM) which forms part of Technical Advice Note (TAN) 15.
- In February 1990, a major breach of the coastal defences occurred in Towyn which led to the flooding of 2,800 properties and the evacuation of more than 5,000 people. In total, some 6.5 km² were flooded, affecting the whole of Towyn and parts of Kinmel Bay. Flood waters flowed up to 2km inland and at Gors Farm, there was a recorded flood level of 5.24m AOD.
- As a result of this severe event a Sea Defence Survey was carried out covering all defences in England and Wales and Conwy CBC employed Hydraulics Research Wallingford (HRW) to prepare a FCA for the entire Conwy CBC area. The HRW FCA has now been adopted as the definitive FCA for the Conwy CBC area, including this TFRA, which is defended by the coastal defences along the Towyn frontage and the tidal embankment along the left (western) bank of the River Clwyd.
- The outputs from the HRW FCA and the topographical information contained within the Sea Defence Survey revealed an inadequate level of flood protection and a susceptibility to breaching by some sections of the defences, particularly the River Clwyd.
- Accordingly, Conwy CBC together with National Resources Wales (NRW), the body with permissive powers to carry out works on the River Clwyd, have developed strategies and policies to programme any necessary improvements and assist developers in the formulation of planning applications for sites within the TFRA.
- These strategies, (the Tidal Clwyd Flood Risk Management Strategy (TCFRMS) and LDP27: Coastal Flood Risk Protocol (CFRP)), provide guidance outside the rigidity of TAN 15 to better manage flood risk through the design of appropriate new development and the replacement of existing buildings by new-builds incorporating flood resilience. At the same time, the strategies recognise that the impact of climate change on sea level rise may be lesser or greater than is believed at present and therefore recommend the programming of improvements to the defences in response to actual climate change, at a rate which is affordable.
- In terms of this FCA for Gors Farm, neither the site nor access to the site will be flood free over the entire 100 year life of the property as required by TAN 15. The reason for this is the relatively low ground levels within the site and its surrounds compared with the predicted sea levels attributed to climate change towards the end of the anticipated 100 year life of the

development. In fact, both the site and access to the site will be flood free for the first 50 years and indeed may remain so if the rise in the level of the sea does not attain its predicted level. Using increments of 50 years is in keeping with the TCFRMS, which also uses this time span as a break point in improvements to the River Clwyd defences. If sea level rise due to climate change were to accelerate over this period, then it can be assumed that this rise would have been allowed for in the improvements already carried out and future improvements would then be programmed to maintain the level of protection.

- Flood risk over the final 50 year life of the development would be mitigated somewhat by localised defences taking the form of walls around the perimeter of the site and landscaping within the site which would contain a continuous minimum ground level of 6.0m AOD. In addition, as Gors Farm is one of the highest points within the TFRA, it will be one of the last sites to be flooded. There will be at least 24 hours available to take appropriate action if a severe event occurs. This action might include the mounting of additional flood defences or even evacuation if necessary. As access to and from the site is likely to be affected for extreme emergencies the provision of a helicopter landing pad is being considered within the landscaping to the site.
- The proposed development offers a considerable amount of betterment in terms of flood risk over the original proposal - the estimated maximum number of people on site will reduce by some 55%; the FFL of the proposed properties will be 5.65m instead of 5.2m AOD and both the design and the fabric of the proposal will be flood resistant and resilient.
- NRW operate a Tidal Flood Warning service for Pensarn, Towyn and Kinmel Bay. Owners of the site should be encouraged to sign up for free flood warnings which can be sent direct by telephone, mobile or e-mail. Further information is available on the NRW web-site.
- Tidal Warnings are given up to 36 hours in advance of a tidal event occurring. This period provides sufficient time for both occupants of properties and the local services to take appropriate action if required. It is also recommended that the owners of the property prepare a Flood Plan to ensure that in the unlikely event of a flood occurring, that they will be in a state of readiness to cope with the situation. In this instance a Flood Plan is important as access around the site cannot be guaranteed to be flood free throughout the lifetime of the development.
- This FCA has demonstrated that while neither the site nor access to the site will be flood free over the final 50 years of the life of the development, it can be safely developed given the short, medium and long term commitment to programmed improvements in the coastal defences by Conwy CBC and NRW. The improvement works within this ongoing commitment will be subject to the effect of climate change which may or may not be forthcoming to a greater or lesser extent than is presently thought.

1.0 INTRODUCTION AND PLANNING HISTORY

1.1 This Flood Consequences Assessment (FCA) has been produced in accordance with the advice and requirements contained within Technical Advice Note (TAN) 15, on behalf of Charles Holden, in relation to a proposal for the re-development of Gors Farm, Gors Road, Towyn.

1.2 The prime objective of an FCA, as defined by the TAN is to develop a full appreciation of

- The consequences of flooding on the development, and
- The consequences (i.e. the overall impacts) of the development on flood risk elsewhere within the fluvial catchment, or coastal floodplain.

Assessment is required for a range of potential flooding scenarios up to that flood having an annual probability of 0.1% (i.e. a 1 in 1000 year chance of flooding at that location in any given year). This is also referred to as a flood with a 1 in 1000 year ‘return period’. In addition, in the case of tidal flooding, sea level rise over the lifetime of the development is to be taken into account. The latest Welsh Government (WG) advice has extended the anticipated lifetime of a property from 70 to 100 years.

1.3 The FCA can also be used to establish whether appropriate mitigation measures can be incorporated within the design of the development to ensure that the development minimises risk to life, damage to property and disruption to people living and working on the site or elsewhere in the floodplain.

1.4 With regard to this site, there is an extant planning consent for development dating back to a letter dated 5th October 1993 from Colwyn Borough Council (BC) to the then owner Mrs M. A. Brogden, ref: JAH/M/1/11488. For various reasons described in the following paragraphs, the development commenced but was not completed at this time. The extant status of the site has recently been confirmed by Conwy County Borough Council (CBC), successors to Colwyn BC, in their letter to Brian Killingworth dated 9th September 2014, ref: DC/ENQ/24363. Copies of both the above letters are provided within Appendix 1 of this FCA.

1.5 The penultimate paragraph of the Conwy CBC letter states that if an alternative application on the basis of a fallback permission were to be submitted for the site, then a comparative assessment of the impacts of both the original and intended proposals would need to be undertaken. On 6th September 2016, following representations from the new owner of the site, Conwy CBC invited the submission of an alternative proposal for its re-development. The comparative assessment of this alternative proposal and the original application will include the issue of flood risk and hence this FCA has been prepared in support of the alternative proposal.

1.6 On 24th November 1988 Planning Permission was granted by Colwyn BC for the ***“Conversion of a Farmhouse and Outbuilding and Erection of Motel Lodges to provide 100 Bedroom Motel and Craft Centre, Conversion of Outbuilding to Restaurant and Tea Room and Use of Farm Outbuilding as Car Museum”***. ***Application No 1/11488***.

1.7 This application was subsequently amended by ***Application No 1/15733 – Change of Use from Dwelling and Extension to form Restaurant and Construction of Means of Access (Amended Scheme to that approved under Code Ref: 1/11488)***. This application received consent on 11th May 1994 and was further amended by ***Application No 1/16320 – Conversion of Farmhouse, Erection of Motel Rooms and Lodges to form 18 Bed Hotel/Motel, Conversion of Granary to Restaurant, Landscaping including Lake, Means***

- of Access (Amendment to Scheme approved under Ref 1/11488)*, which received consent on 31st October 1995.
- 1.8 To obtain the extant status as demonstrated by the letter dated 5th October 1993, the inspected work must have been carried out under Application No 1/11488 as this was the only consented application at this time. . The position regarding Application No 1/15733 is unclear, but work was ongoing under consented.
- 1.9 Copies of the planning consents for the above applications are also provided within Appendix 1 of this FCA.
- 1.10 As the letter confirming the extant status of the site clearly states that this status is only relevant to Application No 1/11488, in 2014 Conwy CBC were requested by a prospective buyer of the site to provide details of the actual development proposed under this Application. In addition, if no details were available, the Council were asked to provide their interpretation of the legal position as to how development of the site might proceed without making a further application.
- 1.11 A further search of Council Archives carried out by Council staff unfortunately failed to uncover planning files for either Application No 1/11488 or Application No 1/15733. The only files available were for Application No 1/16320 and a further Application 1/20324, which was solely concerned with Landscaping on the site and was not approved
- 1.12 The Planning File for Application No 1/16320 was inspected by Brian Killingworth on behalf of the prospective owner in the hope of finding any details of the content of the missing files. The attached correspondence regarding the extant status was uncovered within the file but the only other items which may be of relevance were drawings marked as “CANCELLED”, which might have related to the earlier applications, but unfortunately did not contain any references providing a positive linkage. The file search did however turn up a copy of a S.106 Agreement between Colwyn B.C. and Millicent Ann Brogden, the then owner, dated 18th October 1995 which was prepared in conjunction with Application No 1/16320, which it states was “(amendment to scheme approved under ref: 1/11488)”. A copy of this document is also within Appendix 1 of this FCA.
- 1.13 Conwy CBC responded to the request for their interpretation of the legal position in a letter to BK dated 20th August 2014, ref: DC/ENQ/24363. Initially they considered that they could only support Application No 1/11488, even though this presented no way forward as the details relating to the application were missing. Subsequently however, in a further letter dated 9th September 1994, they agreed to support Application No 1/16320, providing that the outstanding condition concerning foul drainage, which had been the reason in part for the Termination Notice, was resolved. The letter continued: “*If your (BK’s) clients would like to submit an alternative application on the basis of a fallback permission, we (the Council) would need to be satisfied that there is a reasonable prospect of the implementation of the fallback position, and would need to undertake a comparative assessment of the impacts of both proposals (including that of flood risk).*”
- 1.14 Accordingly, following consultation and approvals from both Dwr Cymru Welsh Water (DCWW) and Conwy CBC Highways, a suitable design was prepared to provide the necessary sewerage to service the site and connect to the end of the existing public foul sewerage discharging to Kinnel Bay STW at the junction of Gors Road and Towyn Way West. On 31st March 2015, planning permission was granted for the construction of the foul sewer, thereby satisfying the outstanding condition, and removing the final barrier to enable the re-development of the Gors Farm site to proceed. Details of the correspondence between BK and Conwy CBC, together with the layout for Application No 1/16320, (retrieved from the Planning File), are within Appendix 2 to this FCA.
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- 1.15 The new owner, Mr Charles Holden, was notified by Conwy CBC on 6th September 2016, that they would welcome the submission of an alternative proposal for the site's re-development. This FCA will form part of this submission.
- 1.16 Flood risk warrants a special mention within the Conwy CBC letter dated 9th September 2014, as Gors Farm was within the area which suffered extensive flooding in February 1990 when a breach occurred in the sea wall along the Towyn frontage. The breach in the sea defences resulted in 2,800 properties being flooded and more than 5,000 people were evacuated. In total, approximately 6.5 km² were flooded affecting the whole of Towyn and parts of Kinmel Bay. Flood waters flowed up to 2km inland and at Gors Farm, there was a recorded flood level of 5.24m AOD.
- 1.17 Technical Advice Note (TAN) 15 provides the guidance necessary for the preparation of an FCA. The TAN is designed to provide technical guidance and supplement the policy set out in Planning Policy Wales 2002 (PPW) in relation to development and flooding. It provides a framework within which risks arising from both river and coastal flooding can be assessed. The general approach of PPW, supported by the TAN, is to advise caution in respect of new development in areas at high risk of flooding by setting out a precautionary framework to guide planning decisions. Both PPW and the TAN are advisory documents which contain policies approved at a national level which may be material to the assessment of individual applications
- 1.18 The operation of the precautionary framework is governed by a Development Advice Map (DAM) containing three zones A, B and C, with Zone C sub-divided further into C1 and C2 as shown on the following Table taken from the TAN.

Zone Descriptions and Uses within the Precautionary Framework (TAN 15 Figure 1)

Description of Zone		Use within the precautionary framework
Considered to be at little or no risk of fluvial or tidal/coastal flooding	A	Used to indicate that justification test is not applicable and no need to consider flood risk further
Areas known to have been flooded in the past evidenced by sedimentary deposits.	B	Used as part of a precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further.
Based on Environment Agency extreme flood outline, equal to or greater than 0.1% - 1 in 1000 year (river, tidal or coastal)	C	Used to indicate that flooding issues should be considered as an integral part of decision making by the application of the justification test, including assessment of consequences.
Areas of the floodplain which are developed and served by significant infrastructure including flood defences .	C1	Used to indicate that development can take place subject to application of justification test, including acceptability of consequences.
Areas of the floodplain without significant flood defence infrastructure .	C2	Used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

- 1.19 The DAM for Towyn classifies Gors Farm as being within Zone C1. As TAN 15 Figure 1 above indicates, this classification indicates that development (or re-development) can take place subject to application of a justification test, including acceptability of consequences.
- 1.20 In this instance, the site has been shown to have an extant permission under Application No 1/16320 for the re-development of the existing derelict farmhouse to a 5 Bedroom Hotel, a new 18 Bedroom Motel and 20 new Lodges containing a total of a further 48 Bedrooms, (a total of 71 bedrooms capable of accommodating 142 people), together with a Tea Room and Motor Museum to be converted from existing derelict farm outbuildings.
- 1.21 This form of development is not considered to be suitable by the new owner who wishes to develop the site as a base for himself and fellow members of the Travelling Showmen's Guild. The alternative proposal comprises 1 no detached house, 13 no concrete bases for Park Homes, a storage compound for up to 12 touring caravans and a maintenance facility for storing and repairing equipment. The house and Park Homes will be for family members, permanent and seasonal employees of the site owner and other members of the Travelling Showmen's Guild wishing to take advantage of the facility while they are operating in North Wales. The site will become a base in North Wales for both local and visiting members of the Showmen's Guild, for them to utilise for accommodation and storage and maintenance of their equipment. As such the site will satisfy a requirement which at present is unfulfilled in North Wales. As well as being the permanent home of the site owner, the dwelling on the site will provide a security presence.
- 1.22 The proposed family dwelling and the bases for the Park Homes are to be sited on higher ground to the south and east of the existing, derelict farmhouse, and a storage yard and workshop will be where the existing derelict farmhouse and outbuildings are situated. In terms of justification, development of the site will satisfy a need within North Wales for a facility for the use of members of the Showmen's Guild based locally, to store and maintain their equipment when not in use at the various sites visited in North Wales.
- 1.23 The change in land usage from the original extant content, also provides considerable betterment in terms of flood risk. The extant planning consent has the potential to have an occupation within the site of 142 people sharing the 71 bedrooms provided by the hotel, motel and 20 no lodges. The alternative proposal comprising 1 no 4 bedroom family home and some 15 Park Homes will have a maximum occupancy of 64 people based on households of 4 people within the house and each Park Home. Maximum occupancy is only likely to be attained within the summer season with lesser numbers outside this period.
- 1.24 In summary therefore, the site benefits from an extant planning consent for 22 properties containing 71 bedrooms and potentially 142 people, dating back to 1988. There are no longer any detailed drawings available for this original submission (Application No 1/11488) nor any details of consultation regarding flooding issues, however details of a consultation with National Rivers Authority (NRA) for the subsequent application no 1/16320, the planning consent which Conwy CBC are prepared to accept as extant, are available in the form of a letter dated 10th November 1995 ref: SH9778/950485/3. This letter strangely appears to ignore the flooding caused by a breach in the Towyn Sea Wall in February 1990, but agrees Finished Floor Levels (FFLs) of 5.20m AOD for the proposed buildings based on the fact that the northern (left) embankment along the River Gele has a design level of 4.60m AOD. In addition, the letter details other drainage works requiring consent before work commences on the site, many of which items are now largely irrelevant due to the proposed change in site layout. A copy of this letter is provided as Appendix 3 to this FCA.
- 1.25 This FCA has been prepared in support of the proposed changes to the extant layout for the site. An extract from the original site layout drawing and the new layout are provided as Appendix 4.
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- 1.26 In terms of flood risk, the reduction in the number of buildings and the consequential reduction in the number of bedrooms and people occupying those rooms, is considered to provide considerable betterment. In addition, the raising of the FFLs of the detached house and Park Homes to 5.65m AOD provides an improved level of flood protection compared with the previously agreed floor level of 5.20m AOD. The maximum flood level measured at Gors Farm following the February 1990 tidal flood was 5.24m AOD.

2.0 FLOOD DEFENCE INFRASTRUCTURE AND MANAGEMENT POLICIES

- 2.1 The coastline between Pensarn and Kinmel Bay has the typical profile of a relatively narrow belt of elevated land, presumably the remnants of a storm beach or dune system, immediately fronting the coast, behind which the land falls away to areas below high tide level. The higher land along the coastline was utilised by the early railway engineers as a site for the main line railway. The presence of the railway then led to the construction of defences to provide

- protection to the railway from flooding. Ownership of substantial lengths of the coastal defences continues to rest with Network Rail to the present day.
- 2.2 The general direction of drainage of the low-lying area to the rear of the defences is west to east towards the River Clwyd. The River Gele acts as an upland carrier of water from the high ground to the west and south across this coastal plain. This river is floodbanked in part and discharges to the River Clwyd through a tidal door in the Clwyd embankment. The northern boundary of Gors Farm is formed by the River Gele. The Ffynnon y Ddol, is the principal lowland drain, evacuating drainage from the coastal plain to the Clwyd Estuary, via the Clwyd Pumping Station. A drawing showing the flood defence infrastructure serving the area is provided as Appendix 5.
 - 2.3 On 26th February 1990 a breach some 480m in length occurred in the sea defence protecting the low-lying coastal plain which contains the towns of Pensarn, Towyn and Kinnel Bay. The area affected eventually extended to some 10 km² flooding some 2,681 properties. Gors Farm is within the area which was affected and this FCA contains anecdotal evidence of the impact of this event on the site.
 - 2.4 Following this severe event, which was subsequently analysed to have a nearshore joint probability of wave heights and water levels in excess of 1,000 years, sea defences along the entire Pensarn, Towyn, Kinnel Bay frontage have been extensively improved. Tidal Flood Risk Assessments commissioned by Conwy County Borough Council (CCBC) and carried out by HR Wallingford (HRW) ref: EX 4667, 4916 and 6387, have identified tidal flood risk in the county. These documents include the Pensarn to Kinnel Bay frontage and provide a scientific appraisal of the extreme loading on the defences and their likely response in terms of overtopping and breaching. Information gathered from the 1990 event was used in calibrating the numerical modelling of the flood inundation assessments carried out by HRW.
 - 2.5 In the case of the sea defences protecting the frontage, those sections damaged or lost in the 1990 storm event have been repaired, raised and strengthened as required, to provide a consistent level of protection. As all improvement work has been carried out within the last 10 to 15 years, then all defences along the frontage can be assumed to be in good condition.
 - 2.6 Pictures of the repaired Towyn defence are provided as Appendix 6. The new defence is a massive rock armour structure with a crest level of 8.5m AOD built around the temporary defence formed from concrete and rock which was used to seal the breach immediately following the event.
 - 2.7 Tidal defence of the area is completed by the left bank of the River Clwyd. The River Clwyd embankments are earth embankments with a clay core. Appendix 7 contains pictures of the Clwyd PS and the Clwyd Embankment. The embankments have a close grass sward to resist erosion from wave action. They have a minimum crest width of 3.5m and are in good condition although, as reported in the following para 2.8, recent surveys have demonstrated that they need to be increased in height to combat the rise in sea level attributable to climate change. Both sets of pictures within Appendix 7 were taken as part of a previous FCA for the Kinnel Bay area prepared in 2005.
 - 2.8 Following the 1990 extreme event, a survey of all sea defences was commissioned by the National Rivers Authority (NRA), predecessors of the EAW. In the case of the River Clwyd, a specific study was requested to ensure that flood protection was consistent for this coastal area. In the course of this work, lengths of the Clwyd embankments were found to be low and subsequently raised in isolated areas to increase the level of available freeboard against overtopping. HRW Report EX6387 contains the most up to date survey information available for the Clwyd Embankments.

- 2.9 The HRW reports identified an unacceptable degree of Tidal flood risk to parts of the Conwy County including Towyn and Kinnel Bay. This fact has been addressed within the Conwy Tidal Flood Risk Assessment (CTFRA) – November 2010. In summary, the CTFRA concludes that some defences in their present form, in particular the earth banks along the River Clwyd, are not considered to provide the level of protection necessary for new developments (particularly residential) over the 100 year anticipated lifetime of the development.
- 2.10 This situation has led to the production of a number of high level plans and strategies by both NRW and CCBC to better understand how flood risk needs to be managed in the future.
- A Shoreline Management Plan (SMP) has been prepared covering the next 100 years.
 - A draft Tidal Clwyd Flood Risk Management Strategy (TCFRMS) has been produced to look at future management of the River Clwyd defences.
 - A protocol to advise developers within the area reliant on the current flood defences about the current and future constraints on development.
- 2.11 These documents have been used for reference purposes in the preparation of this FCA to ensure that wherever it is possible, the proposed re-development of the Gors Farm site will conform to the policies developed to satisfy the long term aims of the area.
- 2.12 Conwy CBC, Network Rail, NRW and their predecessors, have demonstrated the significance of the existing coastal defences by virtue of the actions taken in the repairs to the defences following the 1990 breach, their continual monitoring work and their ongoing involvement in maintenance and improvement. The most recent works to the Clwyd embankment are a further demonstration of that commitment as is the development of new strategies to address flood risk to the existing developed areas and facilitate new, appropriate development.

3.0 DETERMINATION OF FLOOD RISK

- 3.1 The predominant flood risk associated with the Gors Farm site is from tidal flooding caused by either overtopping or a breach in the coastal defences containing the Tidal Flood Risk Area. As Gors Farm lies within a defended Tidal Flood Risk Area, it is classified as Zone C1 as defined by the DAM.

Description of Zone		Use within the precautionary framework
Based on Environment Agency extreme flood outline, equal to or greater than 0.1% - 1 in 1000 year (river, tidal or coastal)	C	Used to indicate that flooding issues should be considered as an integral part of decision making by the application of the justification test, including assessment of consequences.
Areas of the floodplain which are developed and served by significant infrastructure including flood defences .	C1	Used to indicate that development can take place subject to application of justification test, including acceptability of consequences.
Areas of the floodplain without significant flood defence infrastructure .	C2	Used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

A copy of the appropriate section of the DAM covering Gors Farm is included as Appendix 8. The Extreme Flood Outline (EFO) shown is based on the contour representing the present day 1 in 1000 year Extreme Water Level of 6.2m AOD.

- 3.2 The basic requirement for residential development as stated in para A1.5 of TAN 15 is that it should be flood free from a 1 in 200 year Extreme Tidal event over the predicted 100 year lifetime of the property. The lifetime of the property is taken to be 100 years in accordance with a letter from Welsh Government to all Chief Planning Officers dated 9th January 2014 ref: WG0701-14.
- 3.3 As the Tidal Flood Risk Area (TFRA) is protected by defences, to establish the actual flood level arising from a 1:200 year Extreme Tidal event it is necessary to simulate either overtopping and/or a breach in the defences surrounding the area. This process formed part of the modelling work undertaken by HRW on behalf of Conwy CBC - the outputs from the modelling providing the necessary flood levels.
- 3.4 The most likely sites for breaches to occur were chosen in both the Coastal Defences and the Clwyd Floodbanks and flood levels were assessed at 10 points within the TFRA. HRW Drg No 012 shows the location of these points. Surrounding Gors Farm were 3 no points referred to as Point 6, Point 8 and Towyn Way East. The flood level outputs for these 3 no points are provided in the following Table. Gors Farm lies between the above 3 no Measuring Points. The values shown will be typical of Gors Farm also. It is also worth mentioning that Gors Farm is one of the highest points within the TFRA and as such, will be one of the last sites to be directly affected. Time is therefore available for flood defences to be erected or even evacuation to take place if it is ever considered necessary. A copy of HRW Drg No 012 plus the actual outputs for each measuring point are provided as Appendix 9. For convenience, the levels taken from the outputs are provided below.

Gors Farm Extreme Water Levels – Overtopping and Breach Scenarios

2056	Maximum Flood Level m AOD					
	Point 6 G.L. 3.945m AOD		Point 8 G.L. 3.983m AOD		Towyn Way East G.L. 3.987m AOD	
Return Period	200 yrs	1000 yrs	200 yrs	1000 yrs	200yrs	1000 yrs
Overtopping	3.95	3.95	4.00	4.00	4.00	4.40
<i>Time to Peak hrs</i>	-	-	-	5	-	5
Breach R. Clwyd 5D1	4.00	4.5	4.0	4.6	4.0	4.60
<i>Time to Peak hrs</i>	9	19	9	25	9	25
Coastal Defence Breach	4.0	4.5	4.0	4.6	4.0	4.6
<i>Time to Peak hrs</i>	9	9	9	25	9	25

The above Table is populated with data extracted from HRW Report EX4916 and contains 50 years of climate change from a baseline of 2006 tidal data.

2106	Maximum Flood Level m AOD					
	Point 6 G.L. 3.945m AOD		Point 8 G.L. 3.983m AOD		Towyn Way East G.L. 3.987m AOD	
Return Period		100 yrs		100 yrs		100 yrs
Overtopping		6.3		6.2		6.2
<i>Time to Peak hrs</i>		2.5		2.5		2.5
Breach R. Clwyd 5D1		6.6		6.5		6.5
<i>Time to Peak hrs</i>		24		24		24
Breach Coast 4I		7.3*		7.3		7.3
<i>Time to Peak hrs</i>		24		24		24
Combined Breach 5D1/4I		7.3*		7.3		7.3
<i>Time to Peak hrs</i>		24		24		24

* These levels have been reduced to match the predicted 1:1000 year SWL predicted for 2116 based on JBA Report, November 2011. Levels throughout this Table are likely to be slightly high based on the need to reduce the two highest levels from 7.5 to 7.3m AOD, the 1 in 1000 year 2116 predicted level. Flood levels resulting from a breach or overtopping cannot exceed open sea (SWL) levels. NRW tidal data based on the JBA Report (Nov 2011) is given as Appendix 10.

The above Table is populated with data extracted from HRW Report EX6387 and contains 100 years of climate change from a baseline of 2006 tidal data.

In the 1990 breach, floodwater reached a level of 5.24m at Gors Farm, more than 1.0m above the modelled outputs shown above for the predicted flood levels for 2056. This is probably explained by the actual length of the breach (480m) which occurred in 1990 compared with the length considered within the HRW model. Breach lengths and invert levels following the breach varied within the modelling dependent upon the form of construction and the geometry but nowhere was a length as great as 480m considered.

With regard to the 2106 predicted levels, which are well in excess of the actual 1990 flood level, this can only be attributable to the predicted sea level rise due to climate change built into the models over 100 as opposed to 50 years. It should be noted that while these extreme levels are well above the FFL of properties on the site, there is a comparatively long time to reach a flood peak which would provide time for appropriate action even evacuation if it was considered necessary.

- 3.6 Site levels at Gors Farm vary between 4.0m AOD where the present derelict house and yard are situated and 6.0m AOD. Gors Road at the entrance to the Farm is at 4.08m AOD rising in a southerly direction towards the A55.
- 3.7 There is a potential anomaly between the advice provided in the letter from Welsh Government (WG) to all Chief Planning Officers, which was referred to previously in para 3.1.2 above and the more recent strategy documents prepared jointly by Conwy CBC and NRW – i.e. the Tidal Clwyd Draft Flood Management Strategy and LDP 27: Coastal Flood Risk Protocol.
- 3.8 A copy of the WG letter is provided as Appendix 11. Within the letter, the section on page 3 headed “*Climate Change and the Lifetime of Development*” contains the rigid advice that climate change must be considered over the 100 year life of the development under 1 in 1000 year conditions, whereas the local documents advocate a more flexible and indeed practical approach to resolving the issue of providing sustainable defences for the benefit of existing and appropriate, new development, in recognition of the need for improvements, but at a suitable and affordable pace, particularly as the impact of climate change and sea level rise remains an inexact science.
- 3.9 As an example, the Tidal Clwyd Management Strategy (TCMS) advocates a short, medium and long term solution to the problem of the Clwyd defences which will enable a programme of necessary improvements to be reactive to climate change (if necessary) and affordable since its implementation will be over a long period. In addition, LDP 27: Coastal Flood Risk Protocol (CFRP)’s Section on “*Replacement and Extensions to Dwellings*” contains the following paragraph: “*Current levels of flood risk and uncertainties in future funding for additional flood defence works mean that all opportunities should be taken to improve the flood resistance and resilience of properties. The replacement of a dwelling and extensions that require planning permission give the only real opportunity to ensure that all appropriate mitigation can be incorporated into the buildings fabric to minimise the impacts and risk to the future users of the site*”.
- 3.10 In the case of Gors Farm, since the site enjoys an extant planning consent, the re-development of the site can be considered as the replacement of an existing dwelling. The re-development will contain as much mitigation as possible to reduce flood risk and in acknowledgement of the fact that the 1:1000 year Maximum Flood Level as determined by the HRW modelling cannot practically be achieved at this site due to its topography, the materials and design of the new buildings will be carefully selected in terms of their resilience to flooding.
- 3.11 The proposed FFL of 5.65m AOD is well in excess of all predicted 2056 flood levels in the previous Table which arise from overtopping or breaches in defences. The modelling which produced these results was however based on predicted sea levels which only contained 50 years of sea level rise. However, from the TCMS, 50 years of climate change would be in keeping with the progress of works required to effect the necessary improvements to the River Clwyd defences. If sea level rise due to climate change were to accelerate over this period, then it can be assumed that this rise would have been allowed for in the improvements carried out. If however, sea level rise was less than predicted then the FFL may prove to be sufficient to combat flood risk to the property over its entire predicted 100 year life. A similar situation would probably be apparent for the coastal defences also, although less improvement work is likely to be necessary to these defences given the improvements carried out following the 1990 breach which achieved a crest level of 8.2m AOD for the repaired
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sections. Table A2.2 from the HRW Reports to Conwy CBC provides Defence Details. An extract from this Table covering Pensarn, Towyn, Kinnel Bay and the R. Clwyd, is included as Appendix 12.

- 3.12 In terms of mitigation to conform with the policies within LPD 27: CFRP, there is an overall reduction in flood risk when comparing the proposed re-development with the original proposal due to a 61% reduction of people on site (maximum 56 compared with 142); the floor levels of the new house and Park Homes have been raised from 5.2m AOD to 5.65m AOD; the materials used throughout the construction will be flood resistant; services entering the properties will be at a minimum level of 6.5m AOD; within the landscaping surrounding the properties there will be a continuous line of defence to a minimum level of 6.0m AOD. This mounding will combine with perimeter walls to extend the line of defence to the perimeter of the site. These perimeter defences will provide the time necessary to react appropriately to the threat of flooding should extreme events occur. One action which would be necessary during this period would be the placement of stop logs within the grooves provided at each entrance to the site.
- 3.13 As access to and from the site on foot or by vehicle may be impossible in the course of a severe event, while the permanent 4 bedroom dwelling on the site will comprise 2 storeys and therefore a safe haven above flood level for all occupants of the site, to deal with medical emergencies, a helicopter landing pad can also be incorporated within the landscaping. This facility could also be made available to the emergency services for transporting personnel, equipment and materials into the area should the need ever arise.
- 3.14 The surface water Drainage Strategy for the site proposes following the natural north to south topography of the majority of the site and outfalling to the Bodoryn Marsh Drain which forms the southern boundary of the site. However, the northern area of the site around the derelict farmhouse and yard is considerably flatter and traditionally has drained to the River Gele along the northern boundary of the site. To avoid having to raise this area to achieve drainage to the Bodoryn Marsh Drain in common with the remainder of the site, it has been decided to retain the present drainage practice and discharge surface water from this northern area of the site to the River Gele. Since the River Gele is an upland carrier of drainage from high ground to the south and west of the site, high water levels can be experienced at times which would prevent gravity drainage. To combat this condition, a small pumping station has been incorporated within the drainage designed to serve this northern area which will enable the discharge of surface water to be guaranteed at all times.
- 3.15 In the unlikely event of a tidal flood occurring and overtopping the perimeter defences to the site, the presence of this pumping station will enable flood waters to be promptly and effectively evacuated from the site, providing a further means of flood protection within the site.

4.0 OTHER POTENTIAL SOURCES OF FLOODING

- 4.1 The right bank of the Afon Gele forms the northern boundary to the Gors Farm site. This river is an upland carrier, conveying water through the coastal plain from high ground to the west and south and discharging via tidal doors through the River Clwyd embankment. The northern (left) embankment of the Afon Gele embankments has been deliberately constructed at a higher crest level than that of the southern (right) embankment to provide additional protection to the portion of the coastal plain to the north, if an embankment were to fail on the upstream length of the River Clwyd or the left bank of the Afon Elwy. The original design capacity of the Afon Gele was 1 in 100 years although the present condition of the channel which is choked with weed and over-hanging branches from trees, suggests that this is no longer the case.
- 4.2 The letter from the NRA to Colwyn BC dated 10th November 1995 ref: SH9778/950485 (Appendix 3) contains the following paragraph *“The design level of the embankment on the north side of River Gele is set at 4.600m AOD Newlyn. Therefore the new floor levels(at 5.20m AOD) would seem to be acceptable, based on the design figure. (The NRA would however question the figure of the existing GROUND LEVELS of 5.000m AOD as stated on the plan).”*
- 4.3 The latest topographic survey of the Gors Farm site was extended to include the embankment on the left bank of the Afon Gele. This survey shows that at present, there is little difference in level between the embankment along the left bank of the river and the access track into Gors Farm along the right bank. Cross sections 3 and 4 illustrate this point and are included as Appendix 13.
- 4.4 However, as stated within the previous section on tidal flooding, it is intended to surround the site with defences comprising stone walls around the perimeter to a height of 6.0m AOD. The section of wall along the access track will provide more than adequate defence from flooding from the Afon Gele. The stop logs prepared for use in a tidal flood could if necessary close off the rear entrance to the site from this access track.
- 4.5 As previously mentioned in para 3.14 above, the pumping station incorporated within the drainage design for this northern area of the site will enable discharge of surface water from the site regardless of the water level in the River Gele.
- 4.6 There are no further fluvial flood risks to Gors Farm.

5.0 FLOOD WARNING

- 5.1 NRW operate a Tidal Flood Warning service for Pensarn, Towyn and Kinmel Bay. The owner of the site should be encouraged to sign up for free flood warnings which can be sent direct by telephone, mobile or e-mail. Further information is available on the NRW web-site.
- 5.2 Tidal Warnings are given up to 36 hours in advance of a tidal event occurring. This period provides sufficient time for both occupants of properties and the local services to take appropriate action if required. It is also recommended that the owner of the site prepares a Flood Plan to ensure that in the unlikely event of a flood occurring, occupants of the site will be in a state of readiness to cope with the situation. Again guidance is available on the NRW web-site and a Template for a Flood Plan is provided as Appendix 14. In this instance a Flood Plan is particularly important as flood free access around the site cannot be guaranteed over the full lifetime of the development.

6.0 SURFACE WATER DRAINAGE OF THE SITE

- 6.1 The Surface Water Drainage Strategy for the site contains full details of the preferred method of surface water drainage proposed for the site. Drg No 016 within this strategy provides details of both the foul and surface water drainage to service the site. A copy of this drawing is provided within Appendix 15 Drainage Details.
- 6.2 Surface water drainage within the site relies to a large extent on its natural topography, falling from north to south. However, the site flattens out at its northern end, the site of the original farmhouse and yard, which traditionally have drained to the Afon Gele which forms the northern boundary of the site. To maintain the overall pattern of drainage from north to south would require the raising of the site by approximately 1.0m which would be expensive to achieve, as a retaining wall or some other form of revetment would be required along the right bank of the Afon Gele. It has therefore been decided to allow this upper portion of the site to continue to drain to the Afon Gele.
- 6.3 There is however an added complication to utilising the Afon Gele as a point of discharge. As stated previously in para 2.2 above, the Afon Gele acts as an upland carrier of flows from the higher land to the south and west across the lower Rhuddlan marshlands to the River Clwyd. As such, high water levels can occur within the watercourse under wet conditions, which would prevent the discharge of surface water from the site. It is therefore intended to provide a small pumping station within this upper portion of the site as a safeguard against this loss of outfall.
- 6.4 It is anticipated that pumped discharge will be required on very few occasions and that gravity discharge will be possible for the vast majority of the time, however, the pumping facility will be available if required. Furthermore, in the unlikely event of a severe tidal occurrence and floodwater overtopping the defences around the site, the pumping facility will provide a ready-made sump from which to evacuate flood water.
- 6.5 As this northern end of the site will be dedicated to the storage and maintenance of Showmen's equipment, it will be necessary to incorporate a petrol/oil separator within the drainage network upstream of the outfall to the Afon Gele. From the Separator, clean water will be drained to the outfall structure on the left bank of the watercourse which will incorporate both gravity and pumped discharge pipes.
- 6.6 The remaining surface water drainage comprises roof water from the Workshop at the northern end of the site; highway drainage from the access roads and areas of hard-standing around the Park Homes within the site and roof water from the Manager's House. This drainage will all be combined as shown on Drg No 016 before flowing by gravity to an outfall into the Bodoryn Marsh Drain.
- 6.7 In accordance with NRW policy, 33% of the difference in flow between the present and the re-developed site will be retained within the system and released at the present rate of flow. This retention figure has been calculated as 160m³. Copies of the calculations are provided within Appendix 16. The retention is likely to take the form of a pond within the southern area of the site as shown on Drg 016 within Appendix 16.
- 6.8 Both the Afon Gele and the Bodoryn Marsh Drain are within the main river network which is administered and maintained on a regular basis by NRW. Together with the Permit for the discharge of the effluent from the STP to the Bodoryn Marsh Drain, Permits will also be required for the new surface water outfalls to the Bodoryn Marsh Drain and the Afon Gele.
- 6.9 Maintenance of these two watercourses is predominantly carried out by hydraulic excavator fitted with either a Bradshaw or desilting bucket. The NRW have supplied details of the routes used by this NRW plant to gain access to the watercourses. With regard to the Afon Gele, access for maintenance is via the opposite, left bank of the watercourse, however, access is required within the site to maintain the Bodoryn Marsh Drain. This maintenance strip will be kept clear of obstructions – fences, buildings etc – to avoid impeding the maintenance operation. A copy of the NRW information is provided as Appendix 17.
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6.0 CONCLUSIONS

- 6.1 The proposed re-development of the site offers an opportunity for considerable betterment in terms of flood risk over the original development proposal.
- 6.2 This FCA has demonstrated that the re-development proposed for this brownfield site will remain flood free for the next 50 years at least, even under the most extreme 1 in 200 or 1 in 1000 year tidal events, causing overtopping or breaching of the coastal defences.
- 6.3 With regard to extreme flood conditions which may occur over the full 100 year lifetime of the re-development, the impact of the predicted flood levels will be mitigated by a combination of local, perimeter defences around the site in the form of stone walls and landscaping incorporating a minimum flood threshold, plus the use of flood resistant materials and resilient design and the provision of services above flood level - all of which actions are in keeping with LDP27: Coastal Flood Defence Protocol for Replacement of Existing Property. If overtopping of the perimeter defences were to occur over the second 50 year period of the anticipated 100 year lifetime of the site there will already be in place a pumping facility from which evacuation of floodwater could occur.
- 6.4 The Gors Farm site is one of the highest points within the Tidal Defence Flood Risk Area (TDFRA). As such it will be one of the last places to flood under extreme conditions taking over a day for floodwaters to peak. This fact provides adequate time for appropriate action to be taken to mount flood defences or even evacuation of the site depending upon the severity of the event. The proposed dwelling within the site will comprise 2 storeys and therefore provide a safe haven against flooding for the second 50 years of its predicted lifetime. Since access to and from the site is likely to be impossible on foot or by vehicle in a severe future event, to cater for medical emergencies, there is sufficient clear space available to construct a helicopter landing pad within the site landscaping. Access to this facility could also be made available to the Emergency Services.
- 6.4 The above approach complements the statements on “Technical Options” for the improvement of flood defences contained in the Tidal Clwyd Draft Flood Risk Management Strategy. The Strategy states that a recommended solution needs to be
- Flexible enough to deal with changes in our knowledge (e.g. the effect of climate change could be greater or less than we currently think)
 - Robust enough to give confidence that it will work (i.e. tried and tested solutions)
 - Value for Money (i.e. cheap is often false economy but we don't have the money for a Rolls Royce solution)
 - Able to balance the risk of flooding against potential damages (i.e. some areas can cope with shallow depths of flood water as long as property damage is limited).

These principles could equally apply to the proposed development within the TDFRA provided that there is no risk to life by preparation and operation of a suitable Flood Plan for the site.

- 6.5 Conwy CBC and NRW are committed to monitoring and reactive work to maintain and improve the defences in response to climate change. This action effectively means that there will be no reduction in the standard of flood protection resulting from sea level rise over the life of these assets. While there can be no guarantee that sufficient funding will be made available to improve the present defences it is inconceivable that Towyn and Kinmel Bay will not continue to be defended into the future and that there is an overwhelming economic case for maintaining a 1 in 200 year standard of protection with climate change.

- 6.6 NRW operate a Tidal Flood Warning service for Pensarn, Towyn and Kimmel Bay. Owners of the site should be encouraged to sign up for free flood warnings which can be sent direct by telephone, mobile or e-mail. Further information is available on the NRW web-site.
- 6.7 Tidal Warnings are given up to 36 hours in advance of a tidal event occurring. This period provides sufficient time for both occupants of properties and the local services to take appropriate action if required. It is also recommended that the owners of the site prepare a Flood Plan to ensure that in the unlikely event of a flood occurring, that they will be in a state of readiness to cope with the situation.
- 6.8 This FCA has demonstrated that while neither the site nor access to the site will be flood free over the final 50 years of the life of the development, it can be safely developed given the short, medium and long term commitment to programmed improvements in the coastal defences by Conwy CBC and NRW. This ongoing commitment is subject to the effect of climate change which may or may not be forthcoming to a greater or lesser extent than presently thought.

