

Llanmaes Flood Alleviation Scheme

Design and Planning Statement

Vale of Glamorgan Council

Project number: 60160078

July 2021

Quality information

Prepared by

Athan Tzovaras
Senior Engineer

Checked by

Athan Tzovaras
Senior Engineer

Verified by

Rhys Mander
Regional Director

Approved by

Rhys Mander
Regional Director

Revision History

Revision	Revision date	Details	Authorized	Name	Position
01	08/07/2021	Original issue	RM	Rhys Mander	Regional Director
02	19/07/2021	Updated Issue VoGC Comments	RM	Rhys Mander	Regional Director

Distribution List

# Hard Copies	PDF Required	Association / Company Name
N/A	Yes	Vale of Glamorgan Council

Prepared for:

Vale of Glamorgan Council

Prepared by:

Athan Tzouvaras

Senior Engineer

E: athan.tzouvaras@aecom.com

AECOM Limited

1 Callaghan Square

Cardiff CF10 5BT

United Kingdom

T: +44 29 2067 4600

aecom.com

© 2021 AECOM Limited. All Rights Reserved.

This document has been prepared by AECOM Limited ("AECOM") for sole use of our client (the "Client") in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

Table of Contents

1. Introduction	6
Purpose of the report	6
The proposed development	6
The application site	7
Pre-application consultation	7
Requirements for the design statement	8
Environmental Impact assessment	8
2. The Site as existing	9
Location	9
Land Ownership	9
Current land uses	9
Physical Factors	10
Geology	10
Ground Investigation	10
Hydrology	10
Flood Risk	11
Ground Conditions	14
General	14
Ground Parameters	15
Land Contamination	15
Topography	16
Environmental factors	16
Statutory and non-statutory designations	16
Cultural heritage and archaeology	16
Ecology	17
Landscape and trees	17
Visual amenity	18
Infrastructure	18
Utilities	18
3. Planning Policy Framework	19
The adopted development plan	19
National planning policy guidance	21
Supplementary planning guidance	21
Other relevant status	21
4. The proposal	22
Historic background information	22
Consideration of options	23
Proposed Development	24
Public rights of way	25
Landscape	25
Visual Amenity	26
Ecology	26
Noise and vibration	26
Drainage Strategy	27
Flood consequence assessment	31

Utilities	32
Diversionsary works.....	32
Phasing and delivery.....	33
Phasing.....	33
Delivery.....	34
5. The case of granting planning permission.....	36
The need of the proposed development.....	36
The benefits of the proposed development	36
The impacts of the development	37
Conclusion	37
Appendix A Drawings list.....	38
Appendix B List of reports accompanying the planning application	44
Appendix C Ecology PEA	46
Appendix D Geotechnical Information.....	47
Appendix E Archaeological Watching Brief	48
Appendix F FCA	49
Appendix G :Land Contamination Assessment	50

Figures

Figure 1: Red Line Planning boundary Plan.....	7
Figure 2: Site Location	9
Figure 2: DAM Zones Map	11
Figure 3: NRW's Surface Water Risk Map.....	12
Figure 3: NRW flood risk map	13
Figure 4: Llanmaes Brook Catchment topography	16
Figure 5: Llanmaes overview map (© Crown copyright 2021. All rights received. Licence No. 0100031673 2019).....	22
Figure 6: Proposed Development Plan.....	25
Figure 7: Flood Storage Areas	27
Figure 8: Extract from Detailed Design drawings Illustrating Proposed Drainage at Sigingstone Lane	29
Figure 9: Road Reprofiting with New Gullies and Carrier Pipe Discharging to Ditch 3	30
Figure 10: Proposed Design, Village Green/West Road	31
Figure 11: Proposed works plan view.....	33
Figure 12: Option 1 indicative programme.....	34
Figure 13: Option 2 indicative programme.....	34
Figure 14: Option 3 indicative programme.....	35

Tables

Table 1: Summary of Geology in Llanmaes	14
Table 2: Summary of Geology in the wider catchment area.....	14
Table 3: Option Development.....	23
Table 4: Maximum storage and water depth.....	28

1. Introduction

Purpose of the report

This report, which comprises a design and planning statement, accompanies an application for full planning permission to construct a new flood alleviation scheme, called the Llanmaes Flood Alleviation Scheme in the Vale of Glamorgan. Reference should be made to Figure 1 for a location plan.

The purpose of the scheme is to provide flood protection to Llanmaes village, by capturing and controlling rainwater, and reducing the volume of rainwater reaching the village. Some residual flooding will remain but it will be significantly reduced with significant betterments to the village.

Subject to planning permission being granted, the Vale of Glamorgan Council intends to construct the scheme by spring 2022.

The proposed development

The planning application has been prepared by AECOM, acting as agent on behalf of the Vale of Glamorgan Council Environmental and Highway Department. The application seeks planning permission for the following development proposals:

- Construction of new ditches and flood bunds within private land
- Installation of new agricultural crossings within private and public land
- Road re-profiling within Llanmaes Village to alter the cross falls and redirect water run-off
- Road resurfacing and footway reconstruction
- Targeted landscaping

The development is illustrated on a series of drawings, a full list of which is included as Appendix A to this report. The application is also accompanied by suite of reports, a list of which is included as Appendix B to this report.

The application site

The application site is shown edged in red on Figure 1.

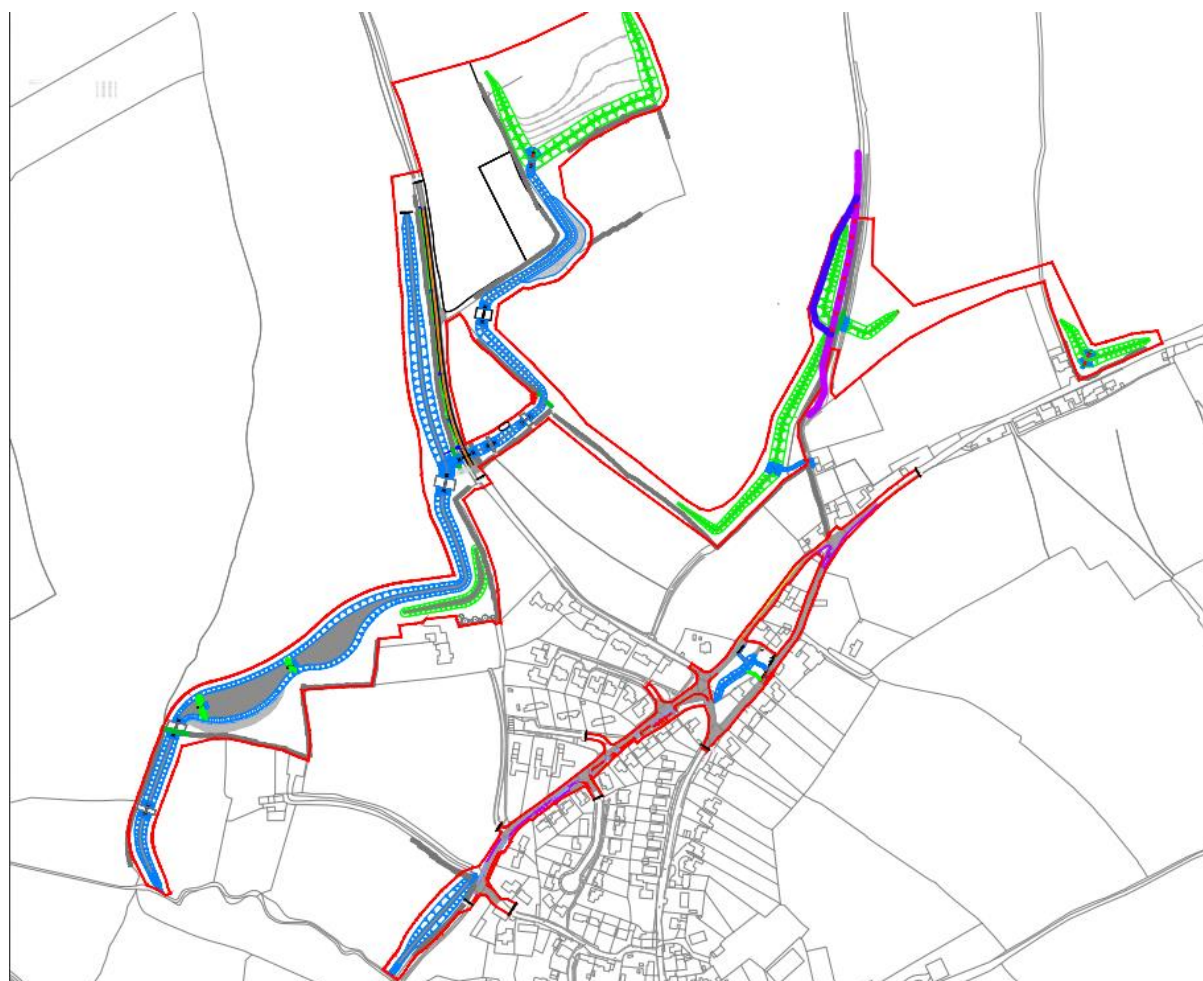


Figure 1: Red Line Planning boundary Plan

Pre-application consultation

The application seeks permission for development on a site having an area of 1 hectare or more and is therefore classified as “major development” under article 2 of the Town and Country Planning (Development Management Procedure) (Wales) Order 2012 (2012 Order), as amended. The application has therefore been subject to statutory pre-application consultation in accordance with section 17 of the Planning (Wales) Act 2015. Further details are provided in the Pre-Application Consultation (PAC) Report which accompanies the planning application.

As well as the required statutory consultation, the Vale of Glamorgan Council has undertaken additional consultation. A range of bodies and interested parties have been consulted on the proposal. These include:

- Vale of Glamorgan Council:
 - Drainage authority
 - Highway authority
 - Planning authority.

- Community councils:
 - Llanmaes Community Council
- Other statutory consultees:
 - Glamorgan Gwent Archaeological Trust
 - Natural Resources Wales.
- Local landowners.

Public consultation was held virtually, through a consultation website, where all scheme drawings and engineering details were made publicly accessible. A letter drop exercise was also implemented to inform all interested parties and public notices were displayed on local notice boards.

Requirements for the design statement

Article 7 of the Article 2 of the Town and Country Planning (Development Management Procedure) (Wales) 2012 Order (DMPWO) (as amended) sets out those classes of development for which planning applications are required to be accompanied by a design and access statement. As the proposal comprises “major development”, a design and access statement is a statutory requirement for this application.

The requirements for a compliant design statement are set out in article 7(4) of the amended Order, namely to:

- explain the design principles and concepts that have been applied to the development.
- demonstrate the steps that have been taken to appraise the context of the development and how the design of the development takes that context into account.
- explain how any specific issues which might affect access to the development have been addressed.

In preparing this statement, regard has been had to the advice provided in the following documents:

- Article 2 of the Town and Country Planning (Development Management Procedure) (Wales) 2012 Order (DMPWO)
- Planning Policy Wales, Welsh Government, edition 9
- Technical Note 12. Design, Welsh Government, March 2016

Environmental Impact assessment

An Environmental Impact Assessment is not required for the proposed development as the proposed development will not have significant effects on the environment because of the nature, size or location (in accordance with NRW guidance and advice on EIA implementation for developers) and is not classed under Schedule 1 of the *Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017*. However a Preliminary Ecological Appraisal was implemented in March 2021, screening the environmental impact and identifying mitigation measures to be implemented during construction. A copy of the Preliminary Ecological Appraisal is provided within the suite of supporting documents provided in Appendix C.

2. The Site as existing

Location

The regional location of the site is shown on Figure 2



Figure 2: Site Location

The site lies within the Vale of Glamorgan, an area primarily rural in character, with the majority of the population living in the towns of Barry and Penarth, and the smaller settlements of Dinas Powys, Rhoose, Cowbridge and Llantwit Major. Scattered around the attractive countryside between these places are small villages and hamlets. Llanmaes Village is located about a one mile east of Llantwit Major, and about four miles south of Cowbridge. There is a small connector road linking Llanmaes with Sigingstone to the north east and B4265 linking Llanmaes with Cowbridge, Llantwit Major and Barry.

The application site for the scheme is approximately 12.8 hectares in area. This includes land required for flood risk mitigation, drainage, construction access, construction compounds and landscaping.

Land Ownership

The land that is required to implement the proposed development is a combination of private land and public highway. Agreements will be implemented between the landowners and Vale of Glamorgan Council through the Council Estates Department, to enable the scheme construction. At this stage preliminary agreements have been reached with the majority of the affected landowners.

Current land uses

The application site is predominantly in agricultural use. Parts of the site comprise existing highway land.

Physical Factors

Geology

Reference should be made to AECOM's Flood Bund technical note, December 2020, where the geological parameters and ground conditions were established following a series of ground investigations. A copy of the full report can be found in Appendix D.

The geological makeup of the site has been obtained from the BGS Geological Map. Reference has also been made to the PSSR prepared for the St. Athan Northern Access Road (NAR) (also referred to as Ffordd Bro Tathan), which is located 2km to the southeast of Llanmaes. Ground conditions at Llanmaes were found to be similar to the St. Athan NAR site and hence it has been agreed that similar geotechnical parameters would be used for Llanmaes given the close proximity of the sites and morphological similarities.

The solid geology underlying the site comprises Jurassic Porthkerry Member - Blue Lias Formation. It consists of interbedded limestone and calcareous mudstone or siltstone. No superficial deposits are shown on the BGS map directly underneath the proposed flood bunds.

There are localised Head deposits within 600m of the site which were predominantly mapped along Llanmaes Brook.

Ground Investigation

A limited ground investigation was undertaken between 8th and 10th September 2020 to facilitate the design of the flood bunds and ditches within the site. This investigation comprised 24 no. trial pits. A plan showing the trial pit locations and exploratory hole logs are included in Appendix D.

The following laboratory testing has been undertaken by Professional Soils Laboratory (PSL) on selected representative samples obtained during the investigation:

- 3 no. Classification testing
- 3 no. Particle Size Distribution (PSD)
- 3 no. Compaction
- 15 no. California Bearing Ratio (CBR)
- 3 no. Moisture Condition Value (MCV)

Hydrology

Llanmaes is located within a shallow valley that falls from northeast to southwest towards Llanmaes Brook. The catchment rises to a maximum elevation of 90m Above Ordnance Datum (AOD) to the north of the village and 58m AOD to the east of the village. The ground elevations fall from approximately 60m AOD at the northern end of the village to 45m AOD at Llanmaes Brook. The shallow valley broadly follows Gadlys Lane, West Road and Tyle House Close before intersecting Low Road near Plaisted House towards Llanmaes Brook.

Discussions with VoGC and previous project reports have shown that Llanmaes has a long history of flooding. Under storm conditions, the watercourse through the village does not have capacity to convey water away from the village and this, combined with potential blockages of the watercourse, exacerbate flooding in Llanmaes.

Flood Risk

TAN 15: Development and Flood Risk requires that all potential flood sources that could affect the proposed development be considered. TAN 15 sets out a precautionary framework to direct new development away from those areas that have a high risk of flooding; and development will only be justified in these areas if it meets the criteria and tests specified in this guidance.

The proposed Llanmaes FAS is located primarily within Development Advice Map (DAM) Zone A and is a water compatible development. Under TAN 15 the Justification Test is not applied, and the development is considered appropriate under the requirements of national policy. The DAM Zone designation is only applied to Main River watercourses and therefore the flood risk from the unnamed tributary, as ordinary watercourse, is not represented within the DAM Zones.



Figure 3: DAM Zones Map

The following provides an overview of the existing flood risk.

Surface Water: Overland flow routes are primarily created from rainfall that fails to infiltrate the surface and travels over ground; this is exacerbated where the permeability of the ground is low due to the type of soil/geology (such as clayey soils) or urban development. Surface water is also promoted in areas of steep topography which can rapidly convey water that has failed to penetrate the surface. NRW’s surface water flood risk maps indicate that areas around the Village Green and Low Road within Llanmaes are located within a high risk area of surface water flooding.

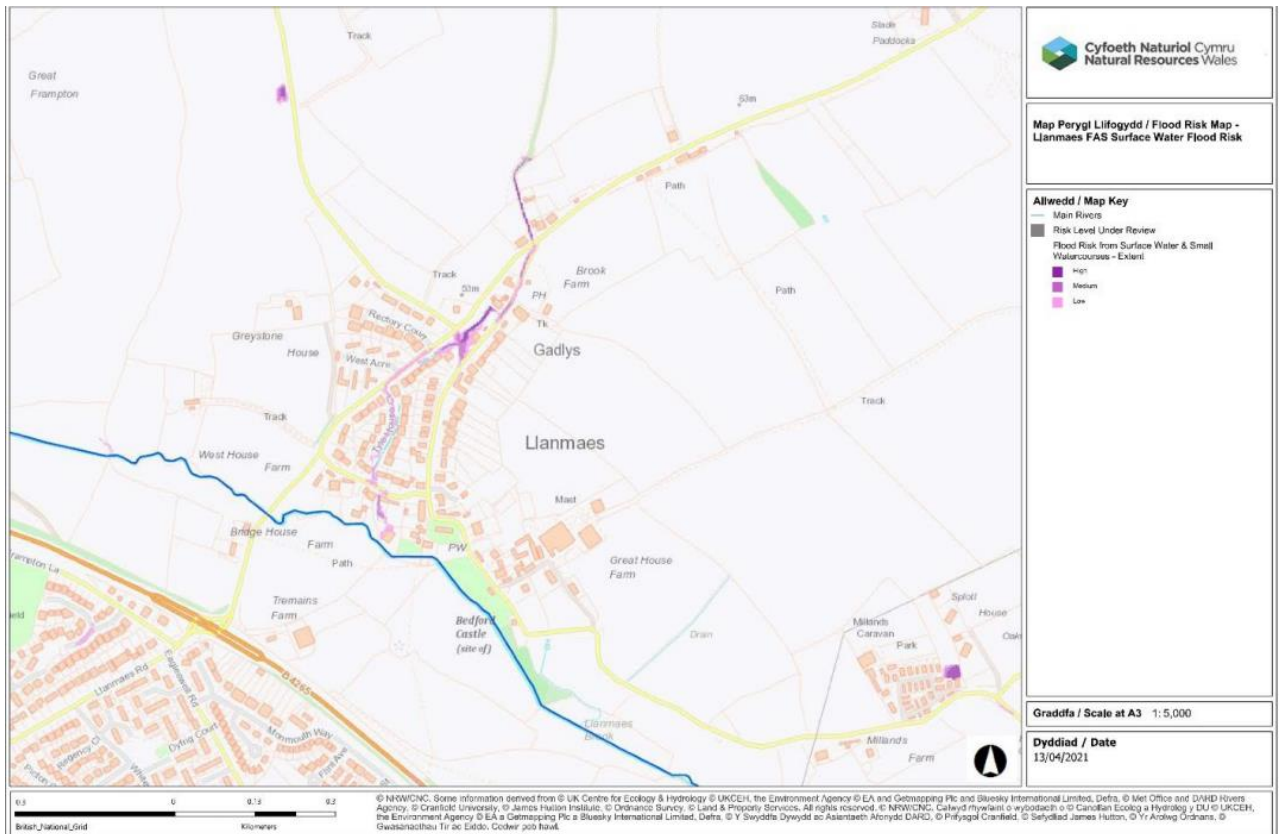


Figure 4: NRW's Surface Water Risk Map

Fluvial and Tidal: The majority of Llanmaes is located within DAM Zone A, which are areas classified as having little or no risk of tidal/fluvial flooding. The southwestern boundary of Llanmaes is classified as being in DAM Zone C, an area which has been assessed as having a high risk of fluvial/tidal flooding. Figure 3 shows the NRW flood risk map which identifies one property at low risk of flooding from main river within Llanmaes. The NRW flood risk maps do not identify fluvial flood risk from ordinary watercourses. The fluvial flood risk in Llanmaes is primarily from the unnamed ordinary watercourse that flows through the centre of the village and this has a strong interdependency with surface water flooding sources which are conveyed to the village through the surrounding landscape.

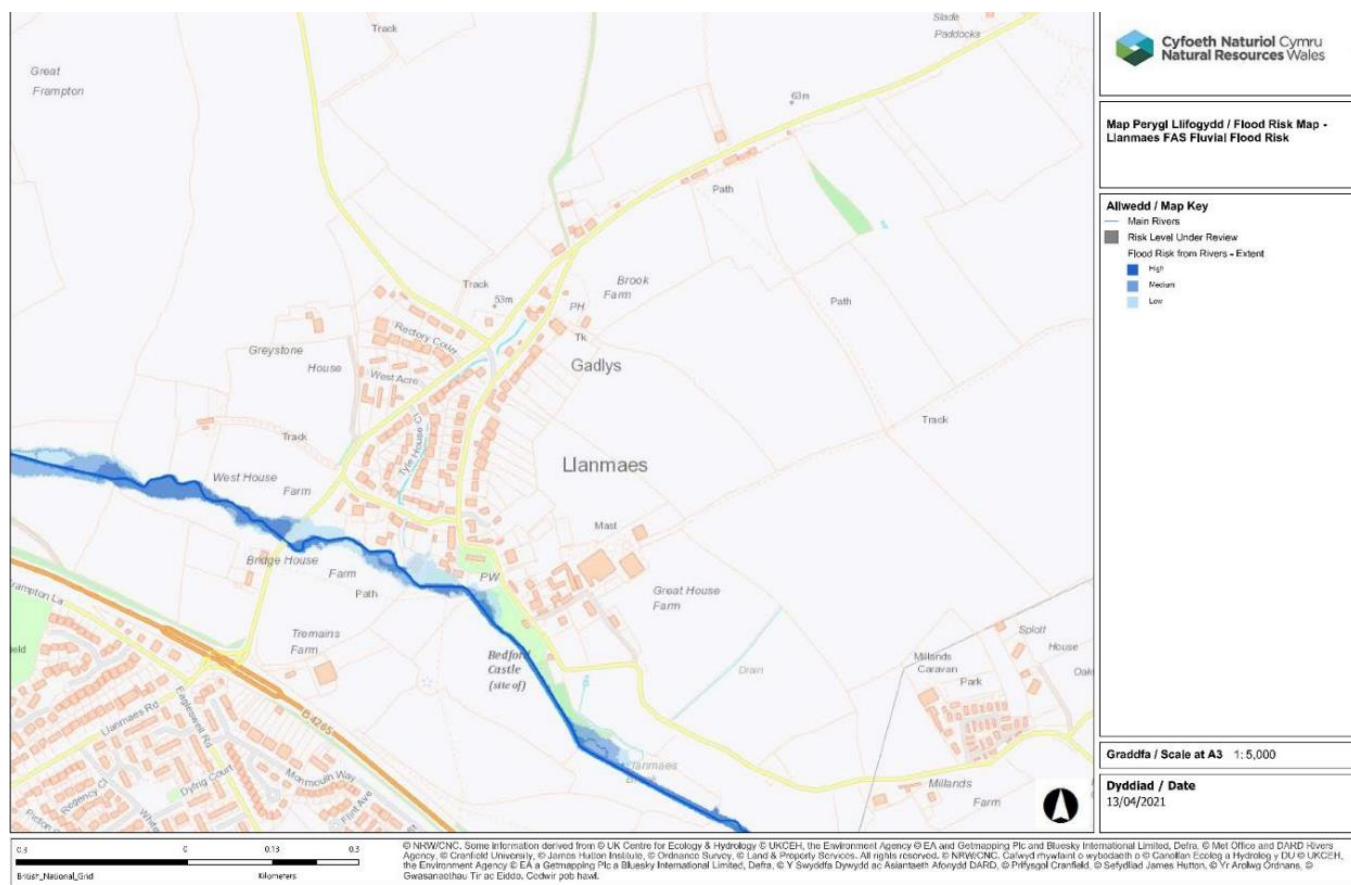


Figure 5: NRW flood risk map

There is no flood risk from tidal sources, given the relative elevation of Llanmaes and distance from the Bristol Channel.

Sewer: Anecdotal evidence suggests that the surface water sewer network can become overwhelmed and manholes near Pond Villa are known to have surcharged during high rainfall events. The surface water sewer network in Llanmaes partly drains into the unnamed tributary and ultimately outfalls into Llanmaes Brook. During flood events this outfall may become impeded due to high river levels. Based on this assessment the flood risk from sewer sources is considered medium risk.

The capacity of the surface water sewer network is unknown and therefore to assess the surface water flood risk it has been assumed that the network is at capacity. To this end, the flood risk from sewer sources is considered as part of the surface water flood risk assessment and is not considered further, i.e. it has been assumed that the existing sewers have no capacity to take surface water run-off during flood events. This is a conservative assumption.

Groundwater: Groundwater flooding occurs where groundwater levels rise above ground surface levels. The geology and topography have a major influence on where this type of flooding takes place; where it is most likely to occur in low-lying areas underlain by permeable rocks. Very little historic evidence of this type of flooding is available and the predicted future impacts are primarily based on generic national geological mapping.

The risk of groundwater for the site is considered to be 'low'.

Artificial sources: Artificial flood sources include raised channels such as canals or storage features such as ponds and reservoirs. There is no risk of flooding from artificial sources in Llanmaes .

Ground Conditions

General

The British Geological Society map data indicates that the Llanmaes site is underlain by Porthkerry Member Limestone and Mudstone Formation and were formed approximately 190 – 200 million years ago in the Jurassic period. This geology is overlain with alluvium around the Llanmaes Brook and Boverton Brook river valleys.

24 trial pits were undertaken in September 2020 within the fields to the north west of Llanmaes to determine the suitable depth of proposed ditches and suitability of use of the site-won material to construct the proposed bunds.

The trial pits were undertaken close to the proposed bund locations and have been assessed to estimate the underlying stratigraphy below each bund location. All trial pits have been referred to in order to obtain the embankment fill properties, on the basis that the fill material used to construct the bunds may be sourced from any of the ditches on site.

The ground conditions encountered within the trial pits are summarised in the table below:

Table 1: Summary of Geology in Llanmaes

Strata	Description	Depth From, m	Depth To, m
Topsoil	Dark Brown clayey topsoil	0	0.25
Weathered Blue Lias (Subsoil)	Brown Slightly gravelly, slightly sandy clay	0.15	1.55
Porthkerry Member (Blue Lias)	Limestone with Clay	0.55	Unconfirmed

In addition to the above, a detailed ground investigation was carried out as part of the St. Athan NAR scheme, located downstream of Llanmaes. A series of trial pits and boreholes were undertaken between November 2016 and January 2017 as part of the ground investigation. The table below shows the expected geology within the vicinity of Llanmaes and in the wider catchment area. The strata thicknesses are based on data from the four rotary boreholes and groundwater was discovered at 0.7 – 1.3m below ground level (bgl).

Table 2: Summary of Geology in the wider catchment area

Strata	Depth to Strata	Geological Map Description/ anticipated Presence	Thickness (m)
Made ground	Ground level	Soft slightly gravelly silty clay	0.20-0.65
Probable Alluvium	0.2-0.45	Silty/gravelly/sandy Clay. Appears to be only present in	0.10-2.20

		proximity to the watercourses area	
Distinctly Weathered Porthkerry Member	0.35-1.30	Interbedded limestone with clay bands	0.01-1.7
Partially Weathered Porthkerry Member	0.70-2.40	Interbedded limestone with clay bands	0.10-7.8

Ground Parameters

The design parameters used in the ground model and characteristic parameters adopted in the analysis for the proposed flood bunds and ditches are summarised in the table below:

Strata	Thickness of Strata, m	Bulk Unit Weight, γ (kN/m ³)	Cohesion, c' (kN/m ³)	Friction Angle ϕ' , (o)
Embankment Fill (Site won)	1.5	18	2	22.5
Weathered Blue Lias (Subsoil)	1.55	17	2	22.5
Porthkerry Member (Blue Lias)	>1.0	15	0	35

Land Contamination

A phase 1 Geo-environmental Desk Study has been prepared by AECOM. The report considers the potential implications of Part 2A of the Environmental Protection Act 1990 and the associated Contaminated Land (Wales) Regulations 2006 and Contaminated Land Statutory Guidance for Wales (2012). The report was prepared in general accordance with the technical guidance and procedures described in the UK Government guidance Land Contamination: Risk Management (2020), and BS 10175:2017 (as amended) Investigation of Potentially Contaminated Sites – Code of Practice (BSI).

Based on a review of historical maps, the site has primarily been used as agricultural land since the first published mapping in 1877, with the only notable industry being adjacent to the site, a blacksmith which has been present since 1879. Potential heavy metal contamination associated with the land use maybe present in the immediate surrounding soils. The risk of encountering ground contamination at the site is considered to be low and is anticipated to be limited to localised spillages associated with road / farms use and potential pesticides/herbicides used for agricultural use.

A Preliminary Unexploded Ordnance (UXO) Threat Assessment was undertaken for the site by 6 Alpha Associates. Llanmaes Village was subjected to bomb-strikes, and it was noted to be likely that some bomb strikes impacted on or in close proximity to the site. Therefore, the potential for a UXO hazard to occur at the site was assessed as being likely.

A copy of the Land Contamination assessment can be found in Appendix G.

Topography

Llanmaes is located within a shallow valley that falls from northeast to southwest towards Llanmaes Brook (Figure 4). The catchment rises to a maximum elevation of 90m AOD to the north of the village and 58m AOD to the east of the village. The ground elevations fall from approximately 60m AOD at the northern end of the village to 45m AOD at Llanmaes Brook.

The shallow valley broadly follows Gadlys Lane, West Road and Tyle House Close before intersecting Low Road near Plaisted House towards Llanmaes Brook.

Agricultural fields and highways form overland flow routes for surface water to pass into the village. A public footpath to the north of the village forms the bed of the primary flow route to the unnamed tributary before it enters the village. This footpath is located within a cutting between agricultural fields, which accumulates field runoff during heavy rainfall events.

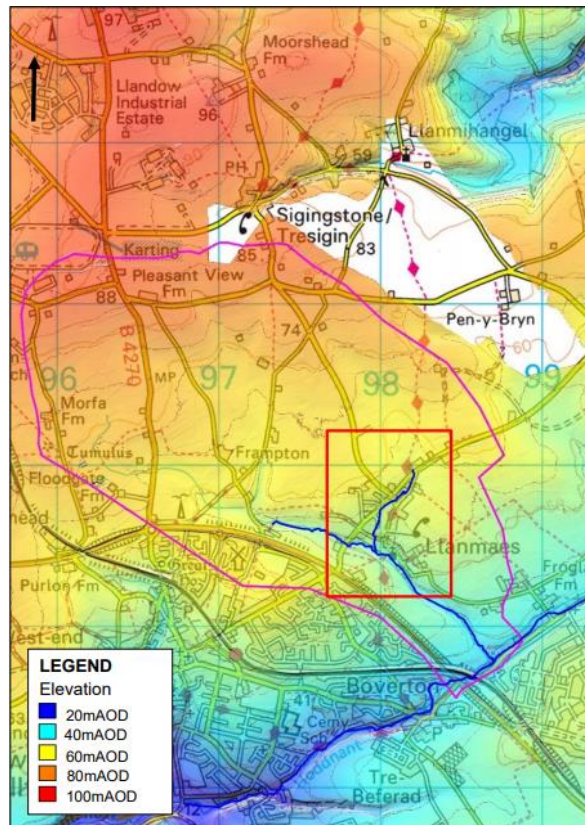


Figure 6: Llanmaes Brook Catchment topography

Environmental factors

Statutory and non-statutory designations

The application site is not subject to statutory and non-statutory environmental designations.

Cultural heritage and archaeology

An historic environment desk-based assessment has been undertaken to examine heritage assets at the site, including archaeological sites, the built heritage and historic landscapes, as well as considering the potential for previously unrecorded archaeological remains. Reference should be made to the Vale of Glamorgan's Archaeological watching brief, listed in Appendix E.

The aim of the assessment was to identify potential constraints within the site and assess the potential effects of the development. The assessment examined heritage assets as well as considering the potential findings from the trial pits investigations, previous archaeological investigations and findings from previous archaeological work near the B4265.

There have been a number of small finds recorded from the fields in which the proposed works are located. Within the main field of the proposed ditches finds include a prehistoric arrowhead, a 14th-17th century copper alloy book-clasp and an 18th century Silver spoon. Within adjacent fields, mostly to the northeast of the main field, finds recorded by the National Museum of Wales and the Portable Antiquities Scheme include Roman coins and brooches, Medieval coins and a thimble, Post Medieval trade weights, silver finger ring and coins.

Analysis of aerial photographs and LiDAR (Baron *forthcoming*) have revealed the survival of historical field boundaries seen on 1843 mapping of the parish in the form of cropmarks. Analysis also identified ridge and furrow and enclosure-type features which do not marry up with historical or modern mapping, and may either indicate they were of lesser importance to the surveyor or, more likely, that they are of earlier date.

Ecology

The site does not contain any statutory or non-statutory designated sites for nature conservation.

An ecological appraisal study and site survey was conducted in 2019 and revisited in 2021. This study comprised a phase 1 habitat survey and protected species surveys (including badger, bat, great crested newt, reptile, otter, dormice, and breeding bird surveys).

The site is dominated by agricultural land with arable and improved grassland fields bordered by hedgerows including species rich hedgerows, hedgerows with trees and species poor hedgerows. Llanmaes Brook runs adjacent to the south of the site and a culvert runs through the village green. Additional habitats include scrub, marshy grassland, amenity grassland, poor semi-improved grassland, rows of trees and standalone trees.

The site has potential to support reptiles, great crested newt *Triturus cristatus*, breeding birds, dormouse *Muscardinus avellanarius*, commuting and foraging bats, roosting bats, commuting and foraging otter *Lutra lutra* and commuting and foraging badger *Meles meles*. Hedgerows provide wildlife corridors across the site and connect it to the wider landscape. Invasive Non-Native Species (INNS) Japanese knotweed *Reynoutria japonica* and montbretia *Crocsmia x crocosmiiflora* are present but isolated to two locations within site boundary.

Based on the sub optimal nature of habitat on the site, the localised nature of the works and that habitat will be reinstated following works, it is considered that potential impacts on great crested newt and dormouse can be managed through precautionary working and that an European Protected Species license is not required. This has been discussed and agreed with the County Ecologist. An Ecological Method Statement will be prepared. A Tool Box Talk will be given to all contractors and works supervised by an ecologist.

Landscape and trees

The development site contains no landscape features which are considered to be important at a local, district/county or national scale other than the loss of a relatively low number of trees and hedgerows. Any hedgerow removal completed for the proposed ditches construction will be mitigated with hedgerow replantation once the works are completed.

Although a proposed swale/ ditch is located adjacent to a TPO designated woodland to the south (outside of the planning boundary), there will be no direct loss of trees. Tracking of

vehicles and machinery, storage of material and ground-breaking works within the Root Protection Zone will be avoided as it has potential to damage retained trees.

A preliminary landscape study identified local areas that can be utilised following construction completion to enhance biodiversity. Localised improvements include hedgerow, tree plantations and grass seeding.

Visual amenity

Llanmaes is predominately a residential village surrounded by agricultural fields to the north and east. The village is bounded by Llanmaes Brook to the south west. A Village Green at the north east of Llanmaes is bounded on two sides by West Road and Gadlys Lane and forms a focal point for highways in the village. Sigingstone Lane rises steeply to the north west from the junction at the Village Green. Views towards the northside of the site tend to be rural in nature, in majority in agricultural fields, whereas the views looking south and south east tend to be less rural due to residencies.

Infrastructure

Existing infrastructure includes the roads and footways which pass through the village to provide access to residential dwellings and farm premises. Temporary accesses will need to be formed to provide access during construction and these will be returned to their original state on completion of the works. Existing drainage infrastructure includes a series of field drainage systems as well as the surface water sewers within the public highway.

Utilities

Preliminary enquiries have been made with the statutory undertakers to identify existing utilities infrastructure that may be affected by the works.

Electricity: Plans received from Western Power Distribution indicates the presence of electricity infrastructure at the north and south end of the Village, running along West Road, Gadlys Lane. These will not be affected by the proposed works.

Gas: Plans received from Wales and West Utilities indicate the presence of gas mains from the north to the south end of West Road and Gadlys Lane. These will not be affected by the proposed works.

Telecommunications: Plans received from BT indicate the presence of services at south side of Gadlys Lane. Additionally, the south part of West Road contains services at either side. These services will not be affected by the proposed works.

Sewage and Water: Plans received from Dŵr Cymru Welsh Water indicate the presence of potable water supplies crossing West Road and Gadlys Road, as well as within the footway at West Road and within Sigingstone Lane. The water main within Sigingstone Lane may be affected by the proposed works and enquiries are ongoing with Dŵr Cymru Welsh Water in that respect.

3. Planning Policy Framework

The adopted development plan

The adopted development plan for the area in which the application site is located is the Vale of Glamorgan Local Development Plan (LDP) 2021-2036. The proposed development falls under Policy SP1 - Delivering the Strategy, Policy MD 4 - Community Infrastructure and Planning Obligations, MD 5 - Development within Settlement Boundaries and MD 7- Environmental Protection.

Policy SP1: Delivering the Strategy states *“The strategy will seek to improve the living and working environment, promote enjoyment of the countryside and coast and manage important environmental assets. This will be achieved by:*

1. *Providing a range and choice of housing to meet the needs of all sectors of the community;*
2. *Promoting a range of employment sites intended to meet the needs of the Vale of Glamorgan and the wider capital region;*
3. *Reinforcing the role of Barry, service centre settlements and primary settlements as providers of cultural, commercial and community services;*
4. *Promoting sustainable transport;*
5. *Delivering key infrastructure linked to the impacts of development;*
6. *Protecting and enhancing the built, natural and coastal environment;*
7. *Promoting opportunities for sustainable tourism and recreation; and*
8. *Favouring development that promotes healthy living.”*

The proposed development is targeting protecting and enhancing the built environment and therefore is qualified under this strategic policy.

Policy MD 4: Community Infrastructure and Planning Obligations states *“Where appropriate and having regard to development viability, the Council will seek to secure new and improved community infrastructure, facilities and services appropriate to the scale, type and location of proposed developments through the use of planning obligations. Community infrastructure may include the provision or improvement of:*

(8) Environmental protection and enhancement such as nature conservation, flood prevention, town centre regeneration, pollution management or historic renovation;”

The proposed development is targeting flood mitigation and prevention improvements and therefore is qualified under this policy.

Policy MD 5: Development within Settlement Boundaries states *“Settlement boundaries have been defined around all the settlements within the LDP settlement hierarchy. New development within these settlements will be permitted where the proposed development,*

1. *Makes efficient use of land or buildings;*
2. *Would not prejudice the delivery of an allocated development site;*
3. *Is of a scale, form, layout and character that is sympathetic to and respects its immediate setting and the wider surroundings and does not unacceptably impact upon the character and appearance of the locality;*
4. *The proposal would not result in the loss of natural or built features that individually or cumulatively contribute to the character of the settlement or its setting;*
5. *Would not result in the unacceptable loss of public open space, community or tourism buildings or facilities;*
6. *Has no unacceptable impact on the amenity and character of the locality by way of noise, traffic congestion and parking; and*

7. *Makes appropriate provision for community infrastructure to meet the needs of future occupiers”*

The proposed development satisfies and meets the above requirements and therefore is qualified under this policy.

Policy MD 7: Environmental Protection states *“Development proposals will be required to demonstrate they will not result in an unacceptable impact on people, residential amenity, property and / or the natural environment from either:*

1. *Pollution of land, surface water, ground water and the air;*
2. *Land contamination;*
3. *Hazardous substances;*
4. *Noise, vibration, odour nuisance and light pollution;*
5. *Flood risk and consequences;*
6. *Coastal erosion or land stability;*
7. *The loss of the best and most versatile agricultural land; or*
8. *Any other identified risk to public health and safety.*

Where impacts are identified the Council will require applicants to demonstrate that appropriate measures can be taken to minimise the impact identified to an acceptable level. Planning conditions may be imposed or legal obligation entered into, to secure any necessary mitigation and monitoring processes.

In respect of flood risk, new developments will be expected to avoid unnecessary flood risk and meet the requirements of TAN15. No highly vulnerable development will be permitted within Development Advice Map (DAM) zone C2. Development will only be permitted in areas at risk of flooding where it can be demonstrated that the site can comply with the justification and assessment requirements set out in TAN15”

The proposed development satisfies and meets the above requirements, including the TAN 15 and therefore is qualified under this policy.

Other relevant LDP policies include:

Policy	Topic	Comment
SP7	Transportation	Proposed development qualified as is considered to have a positive effect to road safety by introducing traffic calming measures and also reducing flooding within existing road network..
MD1	Location of New Development	The proposals include modification of existing fields and the public highway, with no dwellings proposed.
MD 8	Historic Environment	Proposed development qualified under points (1)
MD 9	Promoting Biodiversity	Proposed development qualified under point (2)
MG21	Sites of importance for Nature conservation, regionally important	Proposed development qualified under point (3) and (4). However, the proposed

	geological and geomorphological sites and priority habitats and species	development will not have an adverse impact to any site of importance.
MG22	Development in Mineral Safeguarding areas	Proposed development qualified under point (1), (3), (4)

National planning policy guidance

National planning policy guidance is contained in PWW and in the series of accompanying Technical Advice Notes (TANs). Guidance relating to Water Quality and Surface Water Flooding and Development and Flood Risk is provided under paragraphs 6.6.14 to 6.6.21 and 6.6.22 to 6.6.29 respectively. The proposed development embraces this guidance and a Flood Consequence Assessment and Flood Modelling were implemented to demonstrate the suitability of the proposed development.

An integral part of the planning policy guidance are the TANs and in particular TAN 15: Development and Flood Risk. The proposed development adheres to TAN 15.

Supplementary planning guidance

VoGC has produced a range of supplementary planning guidance (SPG) documents. The following SPGs documents are relevant and were considered while developing the proposed development:

- Biodiversity and Development SPG 2018
- Trees, Woodlands, Hedgerows and Development SPG 2018
- Design Landscape SPG, DG11
- Minerals Safeguarding SPG

Other relevant status

In addition to the planning acts, the following Wales statutes are relevant and have been considered:

- The **Active Travel (Wales) Act 2013** requires the Welsh Ministers and local authorities to take reasonable steps to enhance the provision made for, and to have regard to the needs of, walkers and cyclists; to promote active travel journeys and secure new and improved travel routes and related facilities; and to produce approved maps of active travel routes.
- The **Well-being of Future Generations (Wales) Act 2015** requires public bodies *"...to do things in pursuit of the economic, social, environmental and cultural well-being of Wales in a way that accords with the sustainable development principle."* The Act defines what is meant by the 'sustainable development principle' and by 'sustainable development', which is defined as *"..the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals"*. Section 4, Table 1, of the Act defines the well-being goals of the National Assembly for Wales: a prosperous Wales; a resilient Wales; a healthier Wales; a more equal Wales; a Wales of cohesive communities; a Wales of vibrant culture and thriving Welsh language; and a globally responsive Wales.

- The **Environment (Wales) Act 2016**, among other things, promotes the sustainable management of natural resources and requires public authorities to take account of the resilience of ecosystems.

4. The proposal

Historic background information

The village of Llanmaes is situated on the eastern bank of Llanmaes Brook, approximately 1km north-east of Llantwit Major, Vale of Glamorgan, South Wales (Figure 2-1). A small, heavily modified unnamed watercourse, forming a tributary of Llanmaes Brook, flows from northeast to southwest through Llanmaes and provides the primary conveyance route for the residential area and surrounding agricultural land.

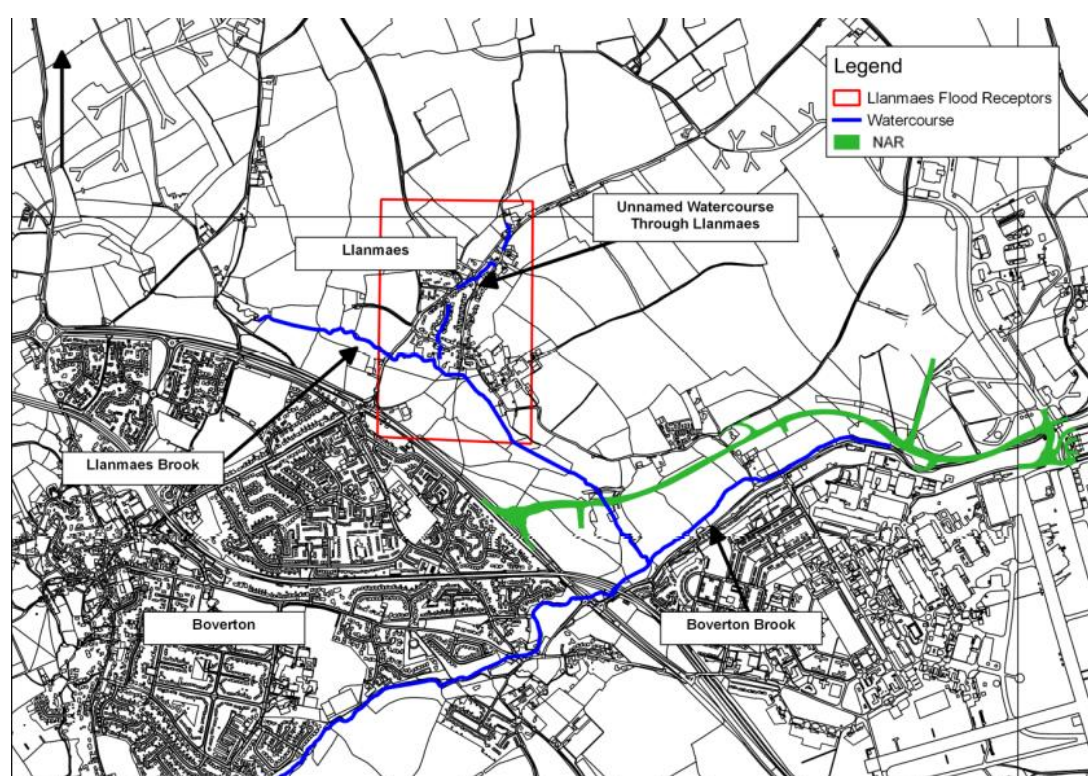


Figure 7: Llanmaes overview map © Crown copyright 2021. All rights reserved. Licence No. 0100031673 2019)

Llanmaes has a history of flood events caused by surface water runoff from the surrounding fields. Once surface runoff reaches Llanmaes, the unnamed watercourse does not have capacity to convey the water away resulting in flooding to highways and properties.

Since 2004, VoGC has explored a number of options for the Llanmaes FAS through the production of a Pre-feasibility Study¹, Project Appraisal Report (PAR)² and Options Appraisal Report (OAR)³. The aim of the process between the three studies was to develop a feasible and technically suitable option to take forward for construction which reduces flood risk to properties in Llanmaes, whilst providing no detriment with respect to flooding downstream in Boverton via Boverton Brook.

¹ Vale of Glamorgan (2004) Pre-Feasibility Study – Llanmaes

² Vale of Glamorgan Council (2009) Project Appraisal Report – Llanmaes Flood Alleviation Scheme

³ Vale of Glamorgan Council (2014) Option Appraisal report – Llanmaes Flood Management Scheme

Since production of the OAR, a potential preferred solution was identified but had not been proven through appraising positive and negative impacts using a hydraulic model or subsequent presentation within an FCA.

In order to progress the work completed during 2004-2014 by VoGC, AECOM was appointed by the Welsh Government and subsequently by VoGC to appraise the solution determined in 2014 by the OAR, taking forward the most appropriate elements of this scheme and to develop a Proposed Option for the Llanmaes FAS. A Proposed Option has been developed through consultation with Natural Resources Wales (NRW), VoGC and local landowners.

Consideration of options

The table below summarises AECOM's iterative process to first explore the 2014 OAR solution and then develop the current proposal:

Table 3: Option Development

Option	Description	Comment
1. OAR (2014) Solution	Large 900mm diameter flood relief culvert beneath and along West Road from The Pump to Llanmaes Brook, downstream attenuation storage, improved highways drainage and flood bund in field to the east of Llanmaes.	Does not provide satisfactory flood risk reduction within Llanmaes, exceptionally high construction cost, large degree of disruption to community of Llanmaes and has unviable downstream storage area.
2. Upstream Storage (interception)	Flood storage intercepting primary overland flow paths upstream of Llanmaes. It was determined that only storage areas which collected greater than 1000m ³ would be taken forward for consideration. The total number of storage areas to be taken forward is four.	Provides a significant reduction in flood risk to Llanmaes. However, this would not solve flooding in isolation but would prove to be effective as part of a combination with other mitigation measures
3. Refinement of Option #2 and Highway Reprofilng	Option #2 in conjunction with reprofiling of West Road, making more effective use of existing conveyance routes through the village.	Further reduces flood risk throughout Llanmaes. Increased residual risk recorded at properties at Low Road and Tara House, which need to be protected against.
4. Combination of Option 3 and flood walls at Low Road and Tara House	As per Option #3 with the inclusion of 0.7m flood walls on Low Road and 1.6m along Llanmaes Brook near Tara House	Provides significant reduction in flood risk throughout Llanmaes with no residual impact of flooding compared to the baseline design event. Not all properties could be mitigated against for the design event.
5. Refinement of flood walls, attenuation storage	Utilises flood storage areas within agricultural fields to the north and up-catchment of Llanmaes in conjunction with a series of minimally disruptive highway	Provides significant reduction in flood risk throughout Llanmaes with no residual impact of flooding compared to the baseline design

areas (Option #4), and road profiling	improvements within the village and additional conveyance measures on Llanmaes Brook	event. Hydraulic model reviewed by NRW (08/01/19).
6. Refinement of attenuation storage areas (Option #5), refinement of West Road re-profiling, addition of interception ditches north of Llanmaes, Village Green swale improvements and removal of flood walls	Similar to Option #5 with the inclusion of an interception ditch and storage to the north of the Village. Improved conveyance into Village Green from the surrounding roads, ditch outfall into Llanmaes Brook from West Road.	Provides significant reduction in flood risk throughout Llanmaes with no residual impact of flooding compared to the baseline design event. Submitted to VoGC for detailed design review December 2019.
7. Detailed Design refinement of location of attenuation storage areas and cut off ditches following discussions with VOGC and landowners	Similar to Option #6 with improved conveyance and storage through cut off ditches and configuration of Village Green.	Provides significant reduction in flood risk throughout Llanmaes with no residual impact of flooding compared to the baseline design event.

Proposed Development

The proposed development consists of:

1. Four upstream flood storage areas including a series of bunds to retain the surface water run-off
2. A series of ditches and swales to manage surface water flows, including check dams for storage, outfalling to Llanmaes Brook
3. Agricultural crossings to provide access to fields across the new ditches and swales
4. Road re-profiling along West Road to the Village Green
5. Road re-profiling along West Road from Tyle House Close to Franklin Court
6. Road re-profiling and raised road junction at the entrance to Tyle House Close
7. Road re-profiling and raised road junction across Gadlys Lane (Village Green Road) and West Road junction
8. Road re-profiling and raised road junction at Low Road and West Road junction
9. General resurfacing works within Gadlys Lane (Village Green Road), West Road and Sigingstone Lane
10. Kerb re-profiling and footway renewal along the southern side of West Road
11. Re-profiling of the grass area within the Village Green and re-profiling of Gadlys Lane (Village Green Road), north of The Croft

12. Two swales connecting West Road and Gadlys Lane (Village Green Road) to the Village Green watercourse

13. Upgrading and installing a new drainage system on West Road, downstream of the Village Green until the southern end of the village

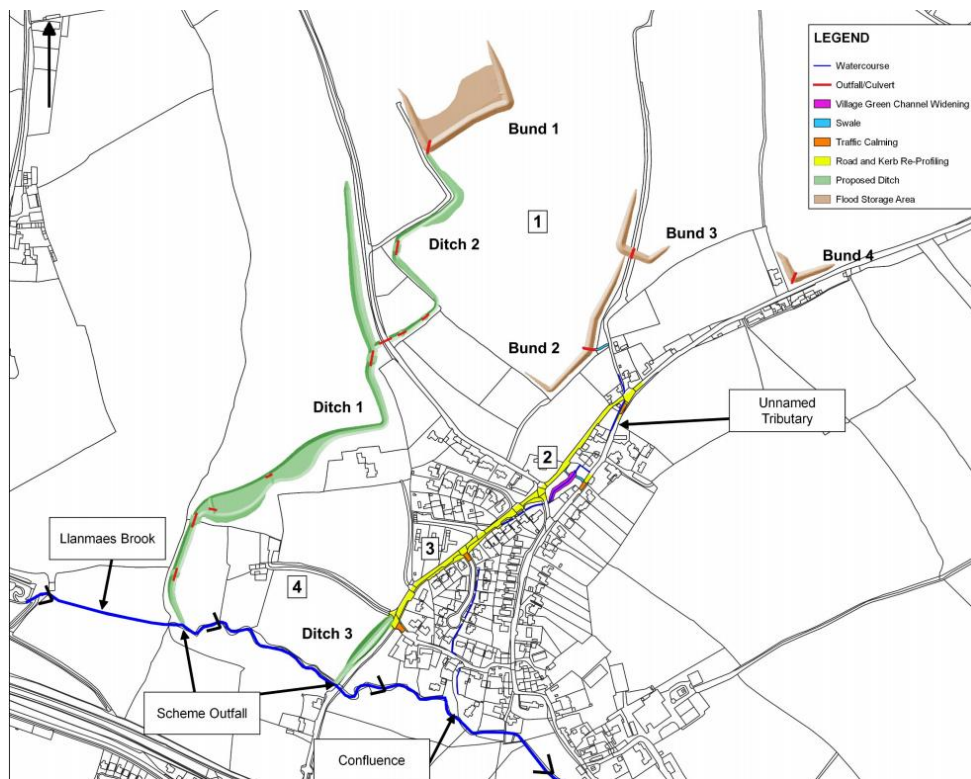


Figure 8: Proposed Development Plan

Public rights of way

The proposed development crosses two existing public rights of way. It is proposed that only one public right of way needed to be permanently diverted (refer to drawings 60160078-ACM-SHT-30-0100-CT-0107, part of this application). The second public right of way will require a temporary diversion during the works, as a crossing culvert will be constructed to accommodate public right of way on its existing route.

Where the proposed development meets existing agricultural accesses, concrete culverts will be provided to accommodate access reinstatement and proposed works construction.

Landscape

The proposed development is a Low-impact 'soft' engineering solution. The scheme promotes the use of soft features such as flood bunds, ditches and swales to better manage the water flows naturally.

In terms of materials management, all materials that will be excavated from the ditches and swales will be re-used on site to construct the flood bunds.

The effect on landscape character will be very limited due to:

- The works within the village will match existing conditions
- The works within land, ditches, swales and flood bunds will be topsoiled and re-seeded to ensure minimum landscape impact.

Visual Amenity

Llanmaes is predominately a residential village surrounded by agricultural fields to the north and east. The village is bounded by Llanmaes Brook to the south west. A Village Green at the north east of Llanmaes is bounded on two sides by West Road and Gadlys Lane and forms a focal point for highways in the village. Sigingstone Lane rises steeply to the north west from the junction at the Village Green. Views towards the northside of the site tend to be rural in nature, in majority in agricultural fields, whereas the views looking south and south east tend to be less rural due to residencies.

The proposed development will seek to ensure the current visual amenity is maintained and where possible enhanced, particularly within the vicinity of the Village Green.

Ecology

The results of the surveys have informed the design of the development, which has focused on the retention, enhancement and protection of important habitats as far as possible and the maintenance of habitat connectivity through and around the site. The ecological assessment can be found in the Preliminary Ecological Appraisal report, as summarised in Section 3 above.

The development will require the partial removal of hedgerows, scrub, arable, improved grassland, poor semi-improved, amenity grassland and marshy grassland. Mitigation measures are in place to minimise impact.

Habitat removal will be limited to the amount required to facilitate works. Bunds and swales/ ditches will be off-set by at least 2m from hedgerows. Root Protection Zones will be applied within which tracking of vehicles, storage of materials and ground-breaking works will be avoided. Access points and designated routes will be established with the ecologist. Pollution prevention guidelines will be followed. Vegetation clearance will be timed, and methods followed to reduce risk to great crested newt, reptiles, breeding birds, and dormouse.

Following completion of works where possible habitat will be reinstated and hedgerow gaps will be replanted with locally native species in whip and occasional feather stock. Enhancement planting of a diverse grass mix is proposed along hedgerows, swales/ ditches and bunds. The swales/ ditches and bunds will be managed to increase diversity and to benefit biodiversity.

Noise and vibration

The proposals are not expected to have any detrimental impact from a noise and vibration perspective once they have been implemented, given the works within the village itself, where residential receptors are closest, will generally replicate the current situation. The only alterations that could have an impact from a noise and vibration perspective are the raised road tables that will be used to direct surface water run-off at certain locations. To avoid potential negative impacts, these features will be designed in accordance with current standards to ensure appropriate ramp gradients and heights to avoid excessive noise and vibration caused by vehicles travelling across the road tables.

The greater impact in terms of noise and vibration will be during the construction phase where there will inevitably be a degree of localised disruption and temporary adverse effects to nearby receptors from construction noise and construction vibrations. The contractor will be required to adhere to current guidelines and restrictions, and there will be limitations placed on the working hours to minimise disturbance to the public. The risk of construction vibration induced building damage due to such works is considered to be very low.

Drainage Strategy

CCTV drainage surveys, together with local knowledge from VoGC, were utilised to review the existing drainage network and identify issues and limitations. AECOM then assessed and developed an upgraded drainage system, compliant with current design standards and sufficient to accommodate the required surface water runoff. Reference should be made to AECOM's FCA report, a copy of which is provided in Appendix F, where the drainage strategy is explained in more detail, but in summary the drainage proposals include:

- **Land drainage:** The north and northwest area of the proposed development, that includes the flood bunds and ditches, is predominantly greenfield and as such a restricted discharge rate was designed for. The flood bunds (SuDS assets) will utilise a 300mm low flow pipe with a secondary 300mm pipe, 1000mm higher from invert level, with a 300mm freeboard. The secondary 300mm pipe will act as relief measure to accommodate potential blockages of the low flow pipe, mitigating potential overflow.

The design proposals also restrict the discharge rates to the watercourse (Llanmaes Brook) from Ditches 1 and 3 (SuDS assets) through the use of engineered longitudinal falls within the ditches (averaging 0.5%) and use of control dams/bunds and temporary attenuation area with a 500mm freeboard.

The engineered flow control measures are designed to ensure no detriment to the downstream watercourses.

- **Attenuation Storage and Ditches:** The flood storage areas have been designed to attenuate flood flows up to the 1% AEP + 30% climate change scenario inclusive of at least a 0.3m freeboard in accordance with NRW guidance. The below figure illustrates the flood storage areas and the table below illustrates the maximum storage and water depth capacity.

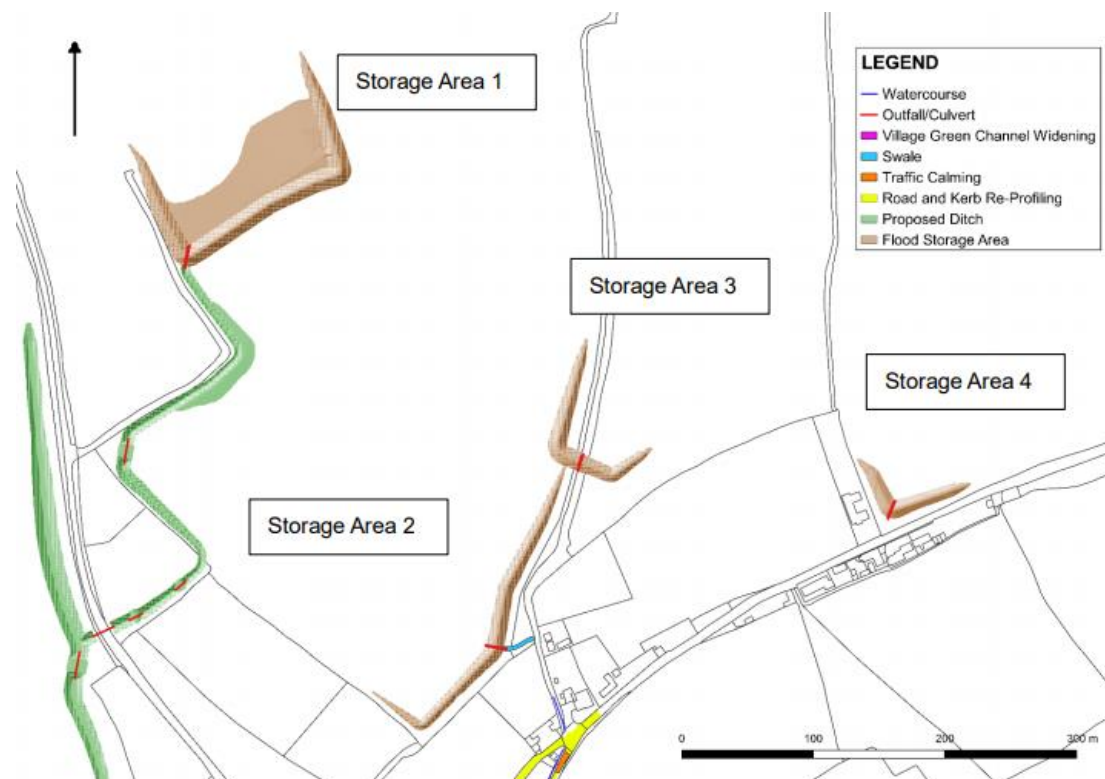


Figure 9: Flood Storage Areas

Table 4: Maximum storage and water depth

Storage Area	Attribute	20%AEP	1%AEP+30%CC	0.1%AEP
1	Maximum Storage	1100 m ³	4700 m ³	6700m ³
	Maximum Depth	0.60m	1.10m	1.30m
2	Maximum Storage	550 m ³	2600 m ³	3800 m ³
	Maximum Depth	0.50 m	0.95 m	1.05 m
3	Maximum Storage	300 m ³	1000 m ³	1400 m ³
	Maximum Depth	0.60 m	1.20 m	1.40 m
4	Maximum Storage	50 m ³	150 m ³	200 m ³
	Maximum Depth	0.25 m	0.55 m	0.65 m

- Groundwater flooding:** Groundwater flood events in Wales are rare according to the Western Wales PFRA. Generally, the geology and steep topography in Wales mean that groundwater flooding is unlikely to occur. Flooding recorded as groundwater may actually be from disused mine workings. Whilst this remains a concern for some LLFAs, it still remains a very low likelihood. Since 2011, there have been no recorded events of groundwater flooding within the Western Wales River Basin District. Given the current available data within the LFRMS, it is unlikely that flooding would occur solely from groundwater sources however, periods of high groundwater may increase flow from the groundwater issues located throughout the village and contribute to the overall volume of water entering Llanmaes. To allow for difficulties in quantifying groundwater contributions within Llanmaes, sensitivity analysis has been carried out on the baseline hydraulic model to assess uncertainty in the surface water volumes reaching Llanmaes.
- Sigingstone Lane:** The road will be reprofiled to provide standard crossfalls which will direct runoff into a new filter drain located in the western verge (Figure 7). The runoff will drain 'over the edge' into the filter drain where it will be collected and discharged to the new ditch located beyond the hedge line. This helps remove surface water flows from the lane thus minimising runoff from the lane into the Village during a storm event.

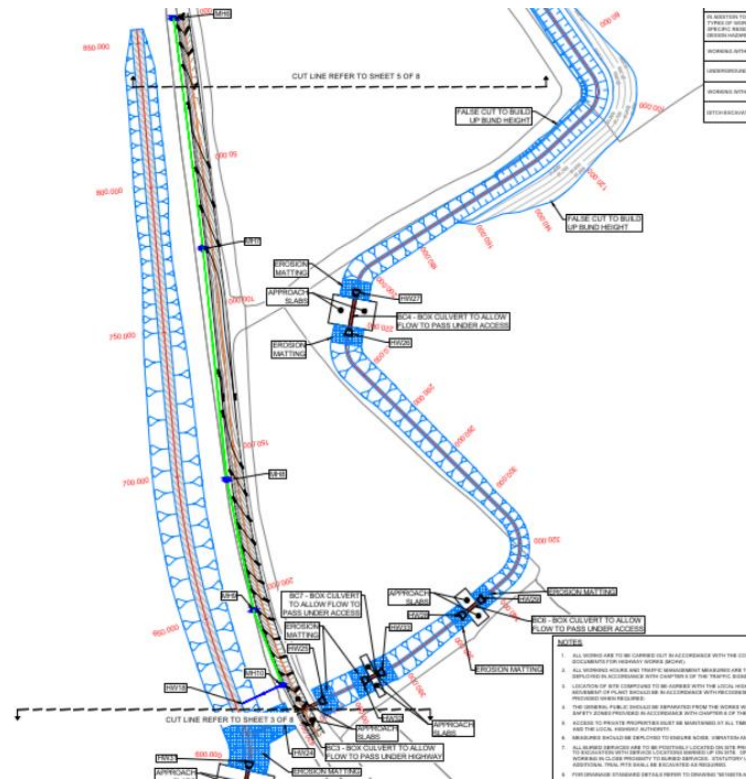


Figure 10: Extract from Detailed Design drawings Illustrating Proposed Drainage at Singingstone Lane

- West Road:** At the north of the village the carriageway will be reprofiled and raised to channel the runoff away from properties (Figure 8). New gullies are provided which will help to drain the runoff and existing gullies are repositioned to align with the new road alignment.

From the Village Green southwards, a new surface water carrier drain is proposed to increase capacity of the road drainage system. Increased numbers of gullies will also be provided to improve the collection of runoff from the road surface. This new sewer will discharge flows into the new ditch located to the west of the road. This ditch will attenuate and treat the runoff prior to discharge to Llanmaes brook.

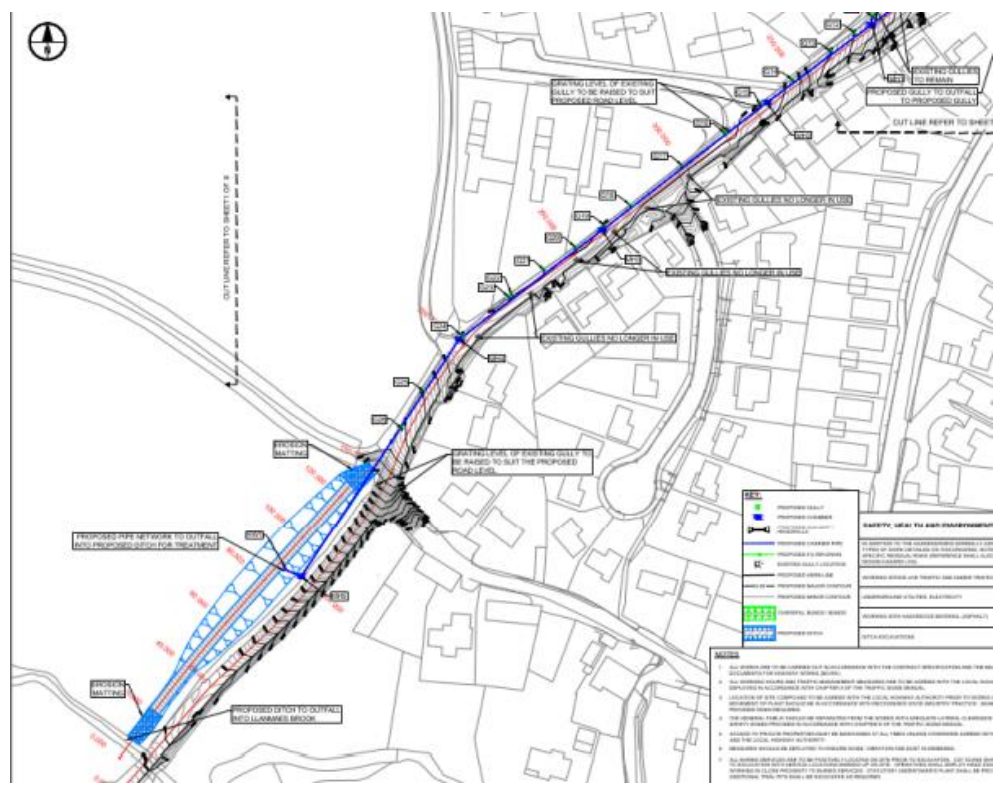


Figure 11: Road Repaving with New Gullies and Carrier Pipe Discharging to Ditch 3

- West Road Junction with Village Green Road:** At the north of Village Green road there are existing gullies which collect and discharge runoff (Figure 9). Moving south and past The Croft, gullies with blockages and capacity issues are located in both sides of the road. The proposed drainage will see this network being extended and redirected to discharge into the existing drainage network at the west end of the Village Green which ultimately outfalls into the unnamed tributary.

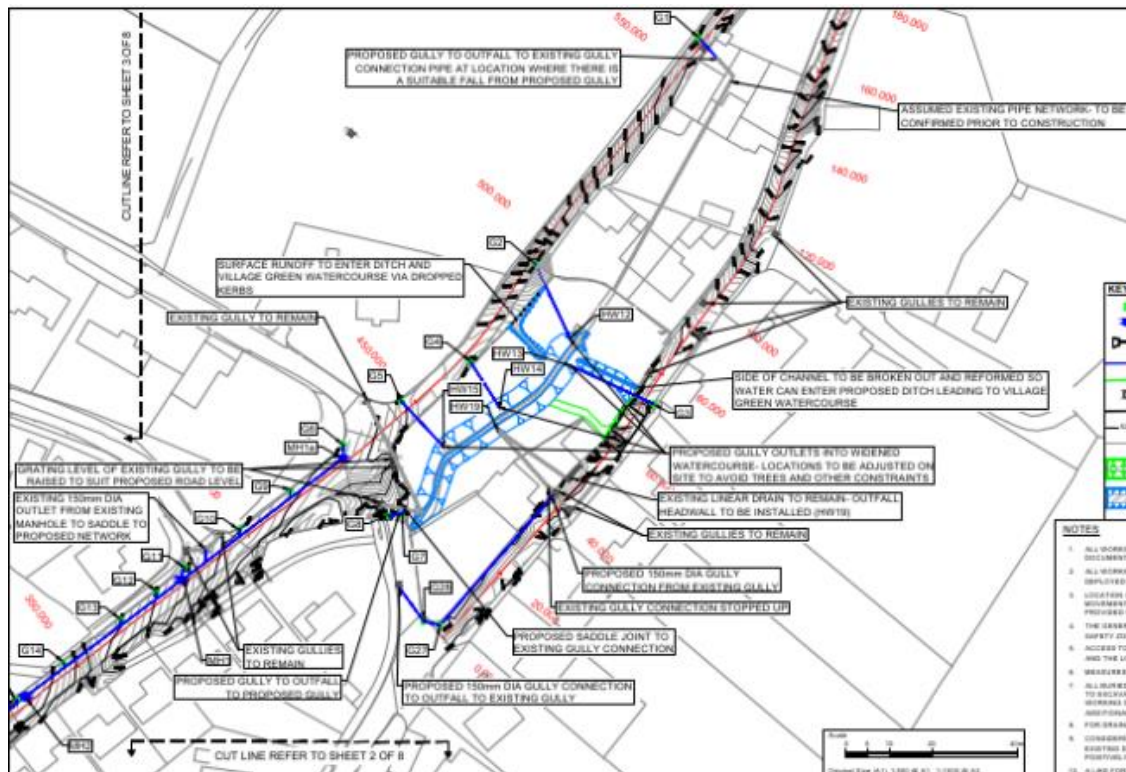


Figure 12: Proposed Design, Village Green/West Road

The existing road drainage system, including the gullies and carrier pipe, have not been taken into consideration in the flood modelling simulations. This is a conservative assumption, as with the inclusion of the new road drainage system there will be increased flood resilience beyond that shown in the modelling, with the road drainage system collecting and safely discharging a portion of the surface flows.

The proposed drainage systems are in accordance with the following design standards:

- CG 501: Design of Highway drainage systems
- CD 526: Spacing of Road Gullies. In addition to Vale of Glamorgan Drainage department advice.
- CD 529: Design of Outfall and culvert details

Flood consequence assessment

An FCA has been prepared for the proposed development in accordance with **TAN 15**. A copy of the FCA is provided in Appendix F.

In order to prepare the FCA the following was undertaken:

- Collect and review available flood risk data including NRW information and previous reports including the 2017 St. Athan Northern Access Road (NAR) FCA and 2017 VoGC Preliminary Flood Risk Assessment (PFRA);
- Update and extend the existing hydraulic model for the NAR from the previous 2017 FCA completed by AECOM, to include the village of Llanmaes and the proposed FAS;
- Assess the flood risk to and from the proposed development;
- Summarise the information obtained to confirm that the proposal appears suitable to counteract the existing flooding in Llanmaes and not cause any detrimental effects downstream to the proposed NAR and to Boverton; and,

- Produce an FCA report in full accordance with TAN 15 to accompany the planning application.

The main findings of the FCA are summarised below.

The development is designed to reduce the existing flood risk to Llanmaes. It is apparent from anecdotal evidence that surface water flooding poses the largest flood risk to the village and therefore pluvial hydraulic modelling was agreed with NRW to provide the most robust assessment of flood risk for the catchment. The initial assessment of flood risk to Llanmaes, prior to hydraulic modelling is:

- Surface water - High risk
- Fluvial - High risk
- Sewer flooding - Medium risk
- Groundwater - Low risk
- Artificial Sources - No risk
- Tidal - No risk

A Baseline pluvial hydraulic model was created using the 2016 NAR FCA model to assess the existing surface water flood risk to Llanmaes. Model results corroborate anecdotal evidence of the key mechanisms of flooding through Llanmaes, namely that a series of overland flow paths contribute to flooding within Llanmaes where the watercourse and culvert network is not capable of conveying such high flows. Flooding is prevalent around the Village Green and Low Road in all simulated baseline events.

The proposed development is a combination of upstream storage, ditches and highway improvements. The hydraulic model results show that there is a significant decrease in maximum flood depths within Llanmaes across all simulated events as a result of the proposed development.

Due to the volume of water entering Llanmaes from many discreet locations, in conjunction with the limited capacity of the existing watercourse, it was not possible to completely eliminate flooding within the village to the design event standard. During the 1% AEP + 30% climate change event, the proposal produces a reduction of properties affected by flooding from 61 to 26. Those properties which could not be completely removed from the flood extents have been identified as those which may be managed through the implementation of targeted Property Level Resilience measures.

The proposed development reduces the level of flooding through Llanmaes and provides no increase to flood risk downstream through controlling the overland flow route of water in and around Llanmaes. As a consequence of formalising two overland flow paths, hydraulic modelling results show that there is a small increase in the depths of flooding within the Llanmaes Brook floodplain for a 500m reach of Llanmaes Brook upstream of Tara House. The increase in flood depths within the Llanmaes Brook floodplain is in conflict to the requirement of TAN15, however detailed justification is provided within the FCA, in Appendix F.

Utilities

Diversions works

There is only one potential requirement for diversion works, of a Dwr Cymru Welsh Water main within the Sigingstone lane, where a proposed road culvert is located. It is proposed that where necessary this will be diverted in liaison with the statutory undertakers in accordance

with the New Roads and Street Works Act 1991 and the Diversionary Works Code of Practice.⁴

Phasing and delivery

Phasing

It is recognised that the proposed works will cause disruption within the village of Llanmaes and this will need to be carefully planned and implemented. A number of options for how the works could be phased have been developed, as outlined below. It should be noted that it has been assumed that planning permission will be granted in September 2021, with construction therefore expected to take place within the winter period 2021 into 2022.

Firstly, in order to identify the most efficient delivery of the construction works, the proposed development has been segregated into Zone A and Zone B areas of works, as per the figure below:

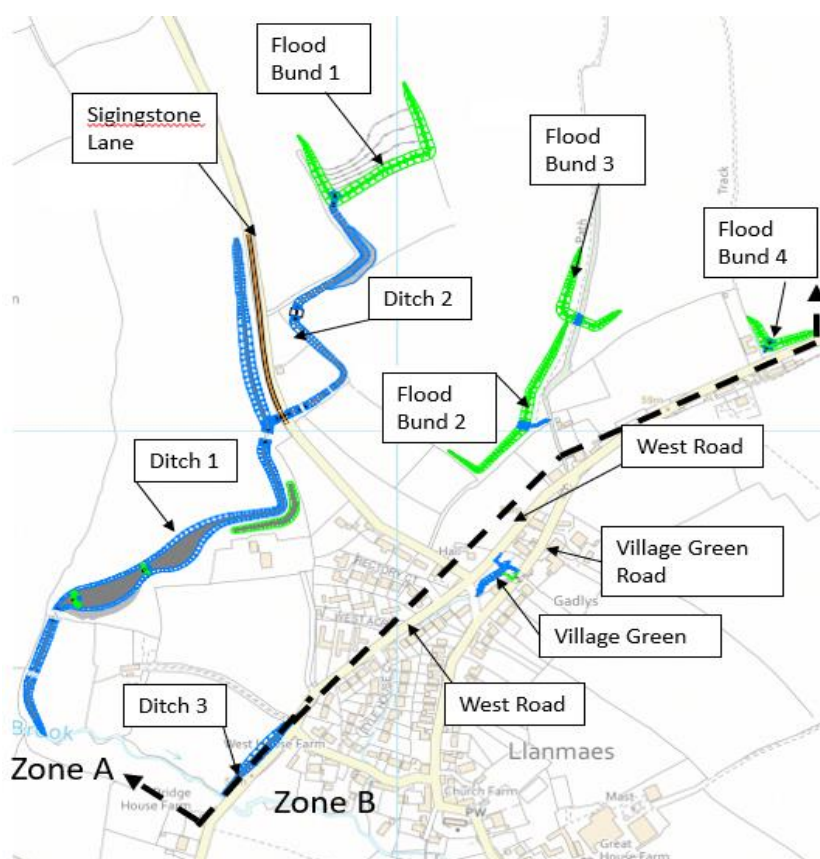


Figure 13: Proposed works plan view

Zone A includes the works to the northwest of West Road whereas Zone B includes the works to the southeast of West Road, including West Road.

From the above it can be derived that the construction works can be divided into seven phases:

- Phase 1: Mobilisation and establishment of the site compound, ecological pre-works surveys
- Phase 2: Construction of Ditches 1 & 3 and Bund 1

⁴ Measures Necessary Where Apparatus is Affected By Major Works (Diversionary Works): A Code of Practice, HMSO, London, June 1992.

- Phase 3: Construction of Ditch 2 and Bunds 2, 3 & 4
- Phase 4: Road works within Sigingstone Lane and Village Green
- Phase 5: Road works at north of West Road and construction of the Village Green swales
- Phase 6: Road works at the southern end of West Road
- Phase 7: Reinstatement and demobilisation

Delivery

Combining these seven phases, three main delivery options have been considered. The timescales provided are an estimate only and a more detailed programme of works will be required from the Contractor to inform the completion date of the works.

Option 1: Zones A and B concurrently. This option considers commencing works within Zone A and Zone B at the same time, with an approximate duration of works to be 4 months.

Construction (Option 1a - Zones A & B Concurrently)	95 days	Fri 17/09/21	Thu 27/01/22
Phase 1: Mobilisation and establish site compound	5 days	Fri 17/09/21	Thu 23/09/21
Phase 2: Ditches 1 & 3; and Bund 1	45 days	Fri 24/09/21	Thu 25/11/21
Phase 3: Ditch 2 and Bunds 2, 3 & 4	25 days	Fri 26/11/21	Thu 30/12/21
Phase 4: Sigingstone Lane; Village Green (road works)	15 days	Fri 24/09/21	Thu 14/10/21
Phase 5: West Road (north); Village Green (ditch)	25 days	Fri 15/10/21	Thu 18/11/21
Phase 6: West Road (south)	35 days	Fri 19/11/21	Thu 06/01/22
Phase 7: Reinstatement and demobilisation	15 days	Fri 07/01/22	Thu 27/01/22

Figure 14: Option 1 indicative programme

Option 2: Zone B and then Zone A. This option considers commencing works within the public highway first, followed by the works within the adjacent fields. The approximate duration of works is anticipated to be 6 to 7 months.

Construction (Option 2 - Zone B, then Zone A)	145 days	Fri 17/09/21	Thu 07/04/22
Phase 1a: Mobilisation and establish temporary site compound	5 days	Fri 17/09/21	Thu 23/09/21
Phase 2: Sigingstone Lane; Village Green	15 days	Fri 24/09/21	Thu 14/10/21
Phase 3: West Road (north)	25 days	Fri 15/10/21	Thu 18/11/21
Phase 4: West Road (south)	35 days	Fri 19/11/21	Thu 06/01/22
Phase 1b: Mobilisation and establish permanent site compound	5 days	Fri 07/01/22	Thu 13/01/22
Phase 5: Ditches 1 & 3; Bund 1	45 days	Fri 14/01/22	Thu 17/03/22
Phase 6: Ditch 2 and Bunds 2, 3 & 4; Village Green	25 days	Fri 11/02/22	Thu 17/03/22
Phase 7: Reinstatement and demobilisation	15 days	Fri 18/03/22	Thu 07/04/22

Figure 15: Option 2 indicative programme

Option 3: Zone A and then Zone B. This option considers commencing works within the fields and then continuing with works within the village. The approximate duration of works is anticipated to be 6 to 7 months.

Construction (Option 3 - Zone A, then Zone B)	140 days	Fri 17/09/21	Thu 31/03/22
Phase 1: Mobilisation and establish site compound	5 days	Fri 17/09/21	Thu 23/09/21
Phase 2: Ditches 1 & 3; and Bund 1	45 days	Fri 24/09/21	Thu 25/11/21
Phase 3: Ditch 2 and Bunds 2, 3 & 4	25 days	Fri 22/10/21	Thu 25/11/21
Phase 4: Sigingstone Lane; Village Green	15 days	Fri 26/11/21	Thu 16/12/21
Phase 5: West Road (north)	25 days	Fri 17/12/21	Thu 20/01/22
Phase 6: West Road (south)	35 days	Fri 21/01/22	Thu 10/03/22
Phase 7: Reinstatement and demobilisation	15 days	Fri 11/03/22	Thu 31/03/22

Figure 16: Option 3 indicative programme

The recommended approach would be Option 1, as it is the most efficient in terms of overall delivery timescales. However, it is recognised that this approach would involve construction activities ongoing within multiple locations simultaneously and could give rise to increased disruption unless appropriately planned and managed. It should be noted also that the indicative programmes provided above form only the basis of a programme of works and a more detailed programme will be required from the appointed contractor in order to confirm the most efficient delivery option. Consideration will need to be given to surface water management during the construction period to accommodate flood events should they occur during the works. By appropriately phasing the works, for example working logically from downstream to upstream for each feature, it is expected that this risk can be managed appropriately.

5. The case of granting planning permission

The need of the proposed development

Llanmaes village has a long history of flooding. Under storm conditions, the watercourse through the village does not have capacity to convey water away from the village and this, combined with potential blockages of the watercourse, exacerbate flooding in Llanmaes.

Discussions with VoGC indicate that Llanmaes has suffered property flooding approximately every five years. Examples of recent flood events include: October 1998, November 2007, December 2012, November 2016, January 2018, November 2019, February 2020, =October 2020 and December 2020. As a consequence of historic flooding in Llanmaes nine properties have been installed with some form of Property Level Protection (PLP).

The proposed development evidently offers flood relief benefits across the whole village and will reduce the volume of water reaching Llanmaes, reducing the intensity of the flood events with only some residual effects.

The benefits of the proposed development

The proposed scheme will intercept the water flows within the upper catchment to the north/northwest of the village before the water reaches the village. The flows will then be rerouted using a series of ditches, swales and flood bunds as well as road reprofiling and amendments to the village green.

The flood alleviation scheme relies on the SuDS principles of and provides an environmentally friendly solution to the problem. The main benefits are outlined below:

- **Low-impact 'soft' engineering:** The scheme promotes the use of soft features such as flood bunds, ditches and swales to better manage the water flows naturally.
- **Contribution to sustainable development:** Through the use of these SuDS features, the scheme provides a holistic approach to managing surface water, taking account of flooding, water quality, biodiversity (wildlife and plants) and amenity.
- **Mimicking nature:** The SuDS features will better manage the conveyance of surface water, slowing down the runoff and attenuating the flows before they enter Llanmaes Brook. Rainfall will be managed at the point where it hits the ground by capturing the water and allowing it to either soak away and infiltrate into the ground, evaporate or be lost through vegetation (evapotranspiration).
- **Environmentally beneficial, with minimal long-term impacts:** The SuDS features will efficiently and sustainably manage the water whilst providing pollution control and improving water quality in Llanmaes Brook.
- **Future-proofing:** The scheme is designed to cater for a 1 in 100 year storm plus a 30% safety factor to allow for climate change. The flood bunds have been geotechnically assessed and designed to withstand the anticipated water levels. Other long-term benefits include future developments within Llanmaes, as the village will acquire a flood protection mechanism that will offer the certainty to a future development within the areas.
- **Materials management:** All material that will be excavated from the ditches and swales will be re-used on site to construct the flood bunds.

Flood Modelling: Across all event simulations there is clear illustration of improvements over the existing condition. The bunds to the north of the village will intercept the majority of overland flows and direct the runoff towards the ditches. The interventions through the village are also shown to be effective in reducing the potential depth of flooding through Llanmaes. There is minor detriment at Llanmaes Brook, as stated earlier in this report. This is to be expected and the area already suffers from inundation and is well away from any residential properties and hence does not pose a risk. Effectively, the land adjacent to the brook would be utilised temporarily as a flood plain during extreme events.

- **Localised benefits:** West Road and Village Green Road will be resurfaced; and drainage improvements and footpath reconstruction will offer localised betterments to the village.

The impacts of the development

The planning application is accompanied by a full suite of reports which assess the overall impact of the proposed development. These impacts have been outlined in this report and in summary there are not considered to be any significant detrimental impacts associated with the proposed development.

Conclusion

The proposed Llanmaes Flood Alleviation Scheme is considered to be strategically important, essential for flood protection of over 150 residencies and vital for the future safeguarding of Llanmaes Village. Public consultation has indicated local support for the scheme and the proposals are in line with local, regional and national planning policies.

The proposal is supported by a full suite of reports which present the benefits and impacts of the scheme. There are not considered to be any significant negative impacts and where necessary, appropriate mitigation measures have been incorporated into the scheme design.

Overall, the Llanmaes Flood Alleviation Scheme will bring significant benefit to the village and there is considered to be a strong case for granting planning permission.

Appendix A Drawings list

Drawing No.	Title
60160078-ACM-SHT-30-0000-CT-0000	COVER SHEET & DRAWING LIST
60160078-ACM-SHT-30-0000-CT-0001	LOCATION PLAN
60160078-ACM-SHT-30-0100-CT-0101	GENERAL ARRANGEMENT PLAN - SHEET 1 OF 8
60160078-ACM-SHT-30-0100-CT-0102	GENERAL ARRANGEMENT PLAN - SHEET 2 OF 8
60160078-ACM-SHT-30-0100-CT-0103	GENERAL ARRANGEMENT PLAN - SHEET 3 OF 8
60160078-ACM-SHT-30-0100-CT-0104	GENERAL ARRANGEMENT PLAN - SHEET 4 OF 8
60160078-ACM-SHT-30-0100-CT-0105	GENERAL ARRANGEMENT PLAN - SHEET 5 OF 8
60160078-ACM-SHT-30-0100-CT-0106	GENERAL ARRANGEMENT PLAN - SHEET 6 OF 8
60160078-ACM-SHT-30-0100-CT-0107	GENERAL ARRANGEMENT PLAN - SHEET 7 OF 8
60160078-ACM-SHT-30-0100-CT-0108	GENERAL ARRANGEMENT PLAN - SHEET 8 OF 8
60160078-ACM-SHT-30-0120-CT-0120	SECTIONS REFERENCE PLAN - SHEET 1 OF 1
60160078-ACM-SHT-30-0120-CT-0121	TYPICAL CROSS SECTION - SHEET 1 OF 8
60160078-ACM-SHT-30-0120-CT-0122	TYPICAL CROSS SECTION - SHEET 2 OF 8
60160078-ACM-SHT-30-0120-CT-0123	TYPICAL CROSS SECTION - SHEET 3 OF 8
60160078-ACM-SHT-30-0120-CT-0124	TYPICAL CROSS SECTION - SHEET 4 OF 8
60160078-ACM-SHT-30-0120-CT-0125	TYPICAL CROSS SECTION - SHEET 5 OF 8
60160078-ACM-SHT-30-0120-CT-0126	TYPICAL CROSS SECTION - SHEET 6 OF 8
60160078-ACM-SHT-30-0120-CT-0127	TYPICAL CROSS SECTION - SHEET 7 OF 8
60160078-ACM-SHT-30-0120-CT-0128	TYPICAL CROSS SECTION - SHEET 8 OF 8
60160078-ACM-SHT-30-0150-CT-0151	BUND 1 CROSS SECTION SHEET 1 OF 3
60160078-ACM-SHT-30-0150-CT-0152	BUND 1 CROSS SECTION SHEET 2 OF 3
60160078-ACM-SHT-30-0150-CT-0153	BUND 1 CROSS SECTION SHEET 3 OF 3
60160078-ACM-SHT-30-0150-CT-0154	BUND 2 CROSS SECTION SHEET 1 OF 5
60160078-ACM-SHT-30-0150-CT-0155	BUND 2 CROSS SECTION SHEET 2 OF 5
60160078-ACM-SHT-30-0150-CT-0156	BUND 2 CROSS SECTION SHEET 3 OF 5
60160078-ACM-SHT-30-0150-CT-0157	BUND 2 CROSS SECTION SHEET 4 OF 5
60160078-ACM-SHT-30-0150-CT-0158	BUND 2 CROSS SECTION SHEET 5 OF 5
60160078-ACM-SHT-30-0150-CT-0159	BUND 3 CROSS SECTION SHEET 1 OF 4
60160078-ACM-SHT-30-0150-CT-0160	BUND 3 CROSS SECTION SHEET 2 OF 4
60160078-ACM-SHT-30-0150-CT-0161	BUND 3 CROSS SECTION SHEET 3 OF 4
60160078-ACM-SHT-30-0150-CT-0162	BUND 3 CROSS SECTION SHEET 4 OF 4
60160078-ACM-SHT-30-0150-CT-0163	BUND 4 CROSS SECTION SHEET 1 OF 3
60160078-ACM-SHT-30-0150-CT-0164	BUND 4 CROSS SECTION SHEET 2 OF 3
60160078-ACM-SHT-30-0150-CT-0165	BUND 4 CROSS SECTION SHEET 3 OF 3
60160078-ACM-SHT-30-0150-CT-0166	DITCH 1 CROSS SECTION SHEET 1 OF 15
60160078-ACM-SHT-30-0150-CT-0167	DITCH 1 CROSS SECTION SHEET 2 OF 15
60160078-ACM-SHT-30-0150-CT-0168	DITCH 1 CROSS SECTION SHEET 3 OF 15
60160078-ACM-SHT-30-0150-CT-0169	DITCH 1 CROSS SECTION SHEET 4 OF 15
60160078-ACM-SHT-30-0150-CT-0170	DITCH 1 CROSS SECTION SHEET 5 OF 15

Drawing No.	Title
60160078-ACM-SHT-30-0150-CT-0171	DITCH 1 CROSS SECTION SHEET 6 OF 15
60160078-ACM-SHT-30-0150-CT-0172	DITCH 1 CROSS SECTION SHEET 7 OF 15
60160078-ACM-SHT-30-0150-CT-0173	DITCH 1 CROSS SECTION SHEET 8 OF 15
60160078-ACM-SHT-30-0150-CT-0174	DITCH 1 CROSS SECTION SHEET 9 OF 15
60160078-ACM-SHT-30-0150-CT-0175	DITCH 1 CROSS SECTION SHEET 10 OF 15
60160078-ACM-SHT-30-0150-CT-0176	DITCH 1 CROSS SECTION SHEET 11 OF 15
60160078-ACM-SHT-30-0150-CT-0177	DITCH 1 CROSS SECTION SHEET 12 OF 15
60160078-ACM-SHT-30-0150-CT-0178	DITCH 1 CROSS SECTION SHEET 13 OF 15
60160078-ACM-SHT-30-0150-CT-0179	DITCH 1 CROSS SECTION SHEET 14 OF 15
60160078-ACM-SHT-30-0150-CT-0180	DITCH 1 CROSS SECTION SHEET 15 OF 15
60160078-ACM-SHT-30-0150-CT-0181	DITCH 2 CROSS SECTION SHEET 1 OF 6
60160078-ACM-SHT-30-0150-CT-0182	DITCH 2 CROSS SECTION SHEET 2 OF 6
60160078-ACM-SHT-30-0150-CT-0183	DITCH 2 CROSS SECTION SHEET 3 OF 6
60160078-ACM-SHT-30-0150-CT-0184	DITCH 2 CROSS SECTION SHEET 4 OF 6
60160078-ACM-SHT-30-0150-CT-0185	DITCH 2 CROSS SECTION SHEET 5 OF 6
60160078-ACM-SHT-30-0150-CT-0186	DITCH 2 CROSS SECTION SHEET 6 OF 6
60160078-ACM-SHT-30-0150-CT-0187	DITCH 3 CROSS SECTION SHEET 1 OF 2
60160078-ACM-SHT-30-0150-CT-0188	DITCH 3 CROSS SECTION SHEET 2 OF 2
60160078-ACM-SHT-30-0150-CT-0189	OVERSPILL B1 CROSS SECTIONS SHEET 1 OF 4
60160078-ACM-SHT-30-0150-CT-0190	OVERSPILL B1 CROSS SECTIONS SHEET 2 OF 4
60160078-ACM-SHT-30-0150-CT-0191	OVERSPILL B1 CROSS SECTIONS SHEET 3 OF 4
60160078-ACM-SHT-30-0150-CT-0192	OVERSPILL B1 CROSS SECTIONS SHEET 4 OF 4
60160078-ACM-SHT-30-0150-CT-0193	OVERSPILL B2 CROSS SECTIONS SHEET 1 OF 2
60160078-ACM-SHT-30-0150-CT-0194	OVERSPILL B2 CROSS SECTIONS SHEET 2 OF 2
60160078-ACM-SHT-30-0150-CT-0195	GREYSTONE HOUSE ACCESS CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0196	RECTORY COURT JUNCTION CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0197	SIGGINSTON LANE JUNCTION CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0198	SOUTHERN FARM ACCESS NORTH JUNCTION CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0199	TYLE HOUSE CLOSE SOUTH JUNCTION CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0200	WEST ACRE JUNCTION CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0200	SOUTHERN JUNCTION LONGITUDINAL SECTIONS

Drawing No.	Title
60160078-ACM-SHT-30-0150-CT-0201	MIDDLE JUNCTION LONGITUDINAL SECTIONS
60160078-ACM-SHT-30-0150-CT-0202	NORTHEN JUNCTION LONGITUDINAL SECTIONS
60160078-ACM-SHT-30-0150-CT-0203	VILLAGE GREEN NORTH JUNCTION LONGITUDINAL SECTIONS
60160078-ACM-SHT-30-0150-CT-0204	VILLAGE GREEN CROSS SECTIONS 1 OF 4
60160078-ACM-SHT-30-0150-CT-0205	VILLAGE GREEN CROSS SECTIONS 2 OF 4
60160078-ACM-SHT-30-0150-CT-0206	VILLAGE GREEN CROSS SECTIONS 3 OF 4
60160078-ACM-SHT-30-0150-CT-0207	VILLAGE GREEN CROSS SECTIONS 4 OF 4
60160078-ACM-SHT-30-0150-CT-0194	OVERSPILL B2 CROSS SECTIONS SHEET 2 OF 2
60160078-ACM-SHT-30-0150-CT-0195	GREYSTONE HOUSE ACCESS CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0196	RECTORY COURT JUNCTION CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0197	SIGGINSTON LANE JUNCTION CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0198	SOUTHERN FARM ACCESS NORTH JUNCTION CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0199	TYLE HOUSE CLOSE SOUTH JUNCTION CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0200	WEST ACRE JUNCTION CROSS SECTIONS
60160078-ACM-SHT-30-0150-CT-0200	SOUTHERN JUNCTION LONGITUDINAL SECTIONS
60160078-ACM-SHT-30-0150-CT-0201	MIDDLE JUNCTION LONGITUDINAL SECTIONS
60160078-ACM-SHT-30-0150-CT-0202	NORTHEN JUNCTION LONGITUDINAL SECTIONS
60160078-ACM-SHT-30-0150-CT-0203	VILLAGE GREEN NORTH JUNCTION LONGITUDINAL SECTIONS
60160078-ACM-SHT-30-0150-CT-0204	VILLAGE GREEN CROSS SECTIONS 1 OF 4
60160078-ACM-SHT-30-0150-CT-0205	VILLAGE GREEN CROSS SECTIONS 2 OF 4
60160078-ACM-SHT-30-0150-CT-0206	VILLAGE GREEN CROSS SECTIONS 3 OF 4
60160078-ACM-SHT-30-0150-CT-0207	VILLAGE GREEN CROSS SECTIONS 4 OF 4
60160078-ACM-SHT-30-0150-CT-0001	LONGITUDINAL SECTION - SHEET 1 OF 4
60160078-ACM-SHT-30-0150-CT-0002	LONGITUDINAL SECTION - SHEET 2 OF 4
60160078-ACM-SHT-30-0150-CT-0003	LONGITUDINAL SECTION - SHEET 3 OF 5
60160078-ACM-SHT-30-0150-CT-0004	LONGITUDINAL SECTION - SHEET 4 OF 5
60160078-ACM-SHT-30-0150-CT-0005	LONGITUDINAL SECTION - SHEET 5 OF 5
60160078-ACM-SHT-30-0140-CT-0140	NOT USED
60160078-ACM-SHT-30-0140-CT-0141	UTILITIES PLAN - SHEET 2 OF 8
60160078-ACM-SHT-30-0140-CT-0142	UTILITIES PLAN - SHEET 3 OF 8

Drawing No.	Title
60160078-ACM-SHT-30-0140-CT-0143	NOT USED
60160078-ACM-SHT-30-0140-CT-0144	NOT USED
60160078-ACM-SHT-30-0140-CT-0145	UTILITIES PLAN - SHEET 6 OF 8
60160078-ACM-SHT-30-0140-CT-0146	NOT USED
60160078-ACM-SHT-30-0140-CT-0147	NOT USED
60160078-ACM-SHT-30-0200-CT-0201	SITE CLEARANCE PLAN - SHEET 1 OF 8
60160078-ACM-SHT-30-0200-CT-0202	SITE CLEARANCE PLAN - SHEET 2 OF 8
60160078-ACM-SHT-30-0200-CT-0203	SITE CLEARANCE PLAN - SHEET 3 OF 8
60160078-ACM-SHT-30-0200-CT-0204	SITE CLEARANCE PLAN - SHEET 4 OF 8
60160078-ACM-SHT-30-0200-CT-0205	SITE CLEARANCE PLAN - SHEET 5 OF 8
60160078-ACM-SHT-30-0200-CT-0206	SITE CLEARANCE PLAN - SHEET 6 OF 8
60160078-ACM-SHT-30-0200-CT-0207	SITE CLEARANCE PLAN - SHEET 7 OF 8
60160078-ACM-SHT-30-0200-CT-0208	SITE CLEARANCE PLAN - SHEET 8 OF 8
60160078-ACM-SHT-30-0500-CT-0501	DRAINAGE NETWORK PLAN - SHEET 1 OF 8
60160078-ACM-SHT-30-0500-CT-0502	DRAINAGE NETWORK PLAN - SHEET 2 OF 8
60160078-ACM-SHT-30-0500-CT-0503	DRAINAGE NETWORK PLAN - SHEET 3 OF 8
60160078-ACM-SHT-30-0500-CT-0504	DRAINAGE NETWORK PLAN - SHEET 4 OF 8
60160078-ACM-SHT-30-0500-CT-0505	DRAINAGE NETWORK PLAN - SHEET 5 OF 8
60160078-ACM-SHT-30-0500-CT-0506	DRAINAGE NETWORK PLAN - SHEET 6 OF 8
60160078-ACM-SHT-30-0500-CT-0507	DRAINAGE NETWORK PLAN - SHEET 7 OF 8
60160078-ACM-SHT-30-0500-CT-0508	DRAINAGE NETWORK PLAN - SHEET 8 OF 8
60509148-ACM-SHT-30-0500-CT-0510	CULVERT CROSSING SECTIONS SHEET 1 OF 7
60509148-ACM-SHT-30-0500-CT-0511	CULVERT CROSSING SECTIONS SHEET 2 OF 7
60509148-ACM-SHT-30-0500-CT-0512	CULVERT CROSSING SECTIONS SHEET 3 OF 7
60509148-ACM-SHT-30-0500-CT-0513	CULVERT CROSSING SECTIONS SHEET 4 OF 7
60509148-ACM-SHT-30-0500-CT-0514	CULVERT CROSSING SECTIONS SHEET 5 OF 7
60509148-ACM-SHT-30-0500-CT-0515	CULVERT CROSSING SECTIONS SHEET 6 OF 7
60509148-ACM-SHT-30-0500-CT-0516	CULVERT CROSSING SECTIONS SHEET 7 OF 7
60160078-ACM-SHT-30-0700-CT-0701	NOT USED
60160078-ACM-SHT-30-0700-CT-0702	PAVEMENT LAYOUT - SHEET 2 OF 8
60160078-ACM-SHT-30-0700-CT-0703	PAVEMENT LAYOUT - SHEET 3 OF 8
60160078-ACM-SHT-30-0700-CT-0704	PAVEMENT LAYOUT - SHEET 4 OF 8
60160078-ACM-SHT-30-0700-CT-0705	NOT USED

Drawing No.	Title
60160078-ACM-SHT-30-0700-CT-0706	PAVEMENT LAYOUT - SHEET 6 OF 8
60160078-ACM-SHT-30-0700-CT-0707	NOT USED
60160078-ACM-SHT-30-0700-CT-0708	NOT USED
60160078-ACM-SHT-30-01100-CT-1101	NOT USED
60160078-ACM-SHT-30-01100-CT-1102	KERBS LAYOUT - SHEET 2 OF 8
60160078-ACM-SHT-30-01100-CT-1103	NOT USED
60160078-ACM-SHT-30-01100-CT-1104	NOT USED
60160078-ACM-SHT-30-01100-CT-1105	NOT USED
60160078-ACM-SHT-30-01100-CT-1106	KERBS LAYOUT - SHEET 6 OF 8
60160078-ACM-SHT-30-01100-CT-1107	NOT USED
60160078-ACM-SHT-30-01100-CT-1108	NOT USED
60160078-ACM-SHT-30-9000-CT-9000	STANDARD DETAILS - SHEET 1 OF 7
60160078-ACM-SHT-30-9000-CT-9001	STANDARD DETAILS - SHEET 2 OF 7
60160078-ACM-SHT-30-9000-CT-9002	STANDARD DETAILS - SHEET 3 OF 7
60160078-ACM-SHT-30-9000-CT-9003	STANDARD DETAILS - SHEET 4 OF 7
60160078-ACM-SHT-30-9000-CT-9004	STANDARD DETAILS - SHEET 5 OF 7
60160078-ACM-SHT-30-9000-CT-9005	STANDARD DETAILS - SHEET 6 OF 7
60160078-ACM-SHT-30-9000-CT-9006	STANDARD DETAILS - SHEET 7 OF 7

Appendix B List of reports accompanying the planning application

List of Reports

Report Title	Originator
--------------	------------

Llanmaes Flood Alleviation	AECOM
----------------------------	-------

Preliminary Ecological Appraisal

Llanmaes Flood Risk Mitigation Scheme Archaeological watching brief	VoGC
---	------

Llanmaes Village Flood Bund Technical Note	AECOM
--	-------

Llanmaes Flood Alleviation Flood Consequence Assessment	AECOM
---	-------

Llanmaes Flood Alleviation Scheme Phase 1 Geo-environmental Desk Study	AECOM
--	-------

St Athan NAR PSSR	AECOM
-------------------	-------

Appendix C Ecology PEA

Appendix D Geotechnical Information

Appendix E Archaeological Watching Brief

Appendix F FCA

Appendix G :Geo-Environmental Desk study

