Cork County Council

Amenity Improvement Works at Mallow Town Park - Planning Application

Flood Risk Assessment

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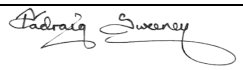
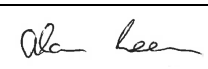
		Signature			
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General Arrangement Plan

1 Introduction

1.1 Project Background

Arup was commissioned by the Cork County Council to prepare a site-specific Flood Risk Assessment (FRA) to support the planning application for the proposed amenity improvement works at Mallow Town Park, Mallow, Co. Cork.

The FRA has been undertaken in accordance with the 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' published in November 2009, jointly by the Office of Public Works (OPW) and the then Department of Environment, Heritage and Local Government (DoEHLG), herein referred to as 'The Guidelines'.

1.2 Summary of Data Used

Data relating to flood risk relevant to the proposed development and surrounding area has been obtained from the following sources:

- Review of the Kanturk Mallow Municipal District Local Plan and Strategic Flood Risk Assessment (http://corklocalareaplans.com/kanturk-mallow-municipal-district/).
- Catchment-based Flood Risk Assessment and Management (CFRAM) Hydrology and Hydraulics Reports and predictive flood mapping (http://www.floodinfo.ie/map/general_map_user_guidance_notes/)
- OPW National Flood Hazard Mapping Website (www.floodmaps.ie).
- Cork County Development Plan 2014.
- Topographical survey of the site.
- Proposed development planning application drawings.

All Ordnance Datum (OD) levels referred to in this report are to Malin Head Ordnance Datum, unless otherwise noted.

1.3 Site Location

The proposed development is located at Mallow Town Park, Mallow at approximate Irish Transverse Mercator reference E: 524232, N: 5776023. The location of the proposed site is shown in Figure 1.

Figure 1: Site location (© Open Street Map (and) contributors)

The site is located on the north bank of the River Blackwater in Mallow. The site is bounded by Park Road to the North and River Blackwater to the South. The River Blackwater flows in an easterly direction. Existing ground levels on site typically range around 44.95mOD.

1.4 Proposed Development

Cork County Council intends to apply to An Bord Pleanála for permission on a site of 15.52ha bounded by Park Road and the River Blackwater.

The proposal works in the proposed site include:

- New and improved access points into the park.
- Surfaced parking to the northwest of the park.
- Reinforced grass event parking.
- Reinforced grass multi-use events area (for events, circuses, etc. during the summer months).
- Reconfigured GAA pitch (moving north removing existing spectator mounds) and development of training area.
- Removal of former entrance gate to GAA grounds.
- Retention of existing soccer pitch and rugby training area.
- New footpaths, including access to ‘Blueway’ trail head at Mallow Bridge.
- Widening of the existing riverside footpath from 2m to 3m wide.
- Widening of 1no. pedestrian bridge at Spa Glen River to the east of Mallow Bridge.
- Construction of 1no. accessible fishing stand immediately downstream of the Ten Arch (N20) Bridge and 4no. fishing stands along the river bank in Castlepark, east of Mallow Bridge.
- Construction of multi-use pumptrack (for kids scooters, rollerskaters, skateboards and bmx/mtb bikes).

- Upgrade of the existing town playground with skatepark and new play equipment.
- Drainage, changes to localised topography (provision of drainage retention basin).
- Landscape works (topsoiling, trees, seeding etc.).

A site plan and typical sections of the proposed development are included in the planning application. A copy of the landscape layout is also contained in Appendix C of this report.

2 Planning Context

2.1 Introduction

The following policy documents are relevant to the assessment of the proposed development:

- The National Planning Guidelines published by the OPW and the Department of the Environment, Heritage and Local Government in November 2009 entitled 'The Planning System and Flood Risk Management: Guidelines for Planning Authorities' are particularly pertinent and are discussed in section 2.2.
- In terms of planning policy context, the provisions contained in the Cork County Development Plan 2014-2022 along with the Kanturk Mallow Municipal District Local Plan and Strategic Flood Risk Assessment were also examined.

2.2 The Planning System and Flood Risk Management

In November 2009, the Department of Environment, Heritage and Local Government and the Office of Public Works jointly published a Guidance Document for Planning Authorities entitled 'The Planning System and Flood Risk Management'.

The guidelines are issued under Section 28 of the Planning and Development Act 2000; and Planning Authorities and An Bord Pleanála are therefore required to implement these Guidelines in carrying out their functions under the Planning Acts.

The aim of the guidelines is to ensure that flood risk is neither created nor increased by inappropriate development.

The guidelines require the planning system to avoid development in areas at risk of flooding, unless they can be justified on wider sustainability grounds, where the risk can be reduced or managed to an acceptable level.

They require the adoption of a Sequential Approach (to Flood Risk Management) of Avoidance, Reduction, Justification and Mitigation and they require the

incorporation of a Flood Risk Assessment into the process of making decisions on planning applications and planning appeals.

Fundamental to the guidelines is the introduction of flood risk zoning and the classification of different types of development having regard to their vulnerability.

The management of flood risk is now a key element of any development proposal in an area of potential flood risk and should therefore be addressed as early as possible in the site master planning stage.

2.2.1 Definition of Flood Zones

Flood zones are geographical areas within which the likelihood of flooding is in a particular range.

There are three types of flood zones defined in The Guidelines as follows:

Table 1: Flood zone categories

Zone category	Description
Flood Zone A	Probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
Flood Zone B	Probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 year and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding).
Flood Zone C	Probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

2.2.2 Definition of Vulnerability Classes

The following table summarises the Vulnerability Classes defined in the Guidelines and provides a sample of the most common type of development applicable to each.

Table 2: Vulnerability classes

Vulnerability Class	**Land Uses and Types of Development which include;**
Highly Vulnerable Development	Includes Garda, ambulance and fire stations, hospitals, schools, residential dwellings, residential institutions, essential infrastructure, such as primary transport and utilities distribution and SEVESO and IPPC sites, etc.
Less Vulnerable Development	Includes retail, leisure, warehousing, commercial, industrial and non-residential institutions, etc.
Water Compatible Development	Includes Flood Control Infrastructure, docks, marinas, wharves, navigation facilities, water based recreation facilities, amenity open spaces and outdoor sport and recreation facilities.

2.2.3 Sequential Approach and Justification Test

The Guidelines outline the sequential approach that is to be applied to all levels of the planning process. This approach should also be used in the design and layout of a development and the broad philosophy is shown in Figure 2. In general, development in areas with a high risk of flooding should be avoided as per the sequential approach.

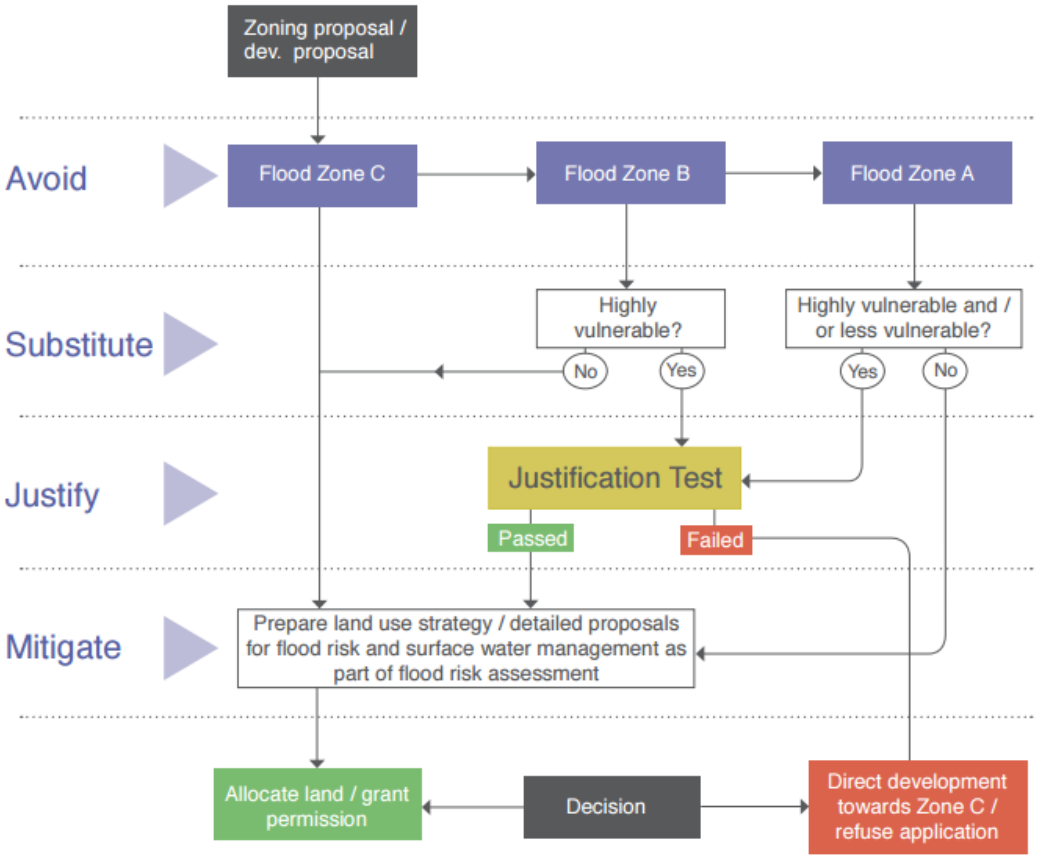


Figure 2: Sequential approach (reproduced from The Guidelines)

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of developments that are being considered in areas of moderate or high flood risk. The test comprises the following two processes.

- The first is the Plan-making Justification Test and is used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding.
- The second is the Development Management Justification Test and is used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land.

Table 3 illustrates the different types of Vulnerability Class appropriate to each zone and indicates where the Justification Test is required.

Table 3: Vulnerability classes

	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable	Justification Test	Justification Test	Appropriate
Less Vulnerable	Justification Test	Appropriate	Appropriate
Water Compatible	Appropriate	Appropriate	Appropriate

2.3 Cork County Development Plan 2014

The Cork County Development Plan (2014) outlines the planning policy set out by the Cork County Council up to the year 2020. The Cork County Development Plan also sets out the overall planning and sustainable development strategy for the county.

Chapter 11 of the Development Plan addresses water services, including drinking water, foul drainage and wastewater treatment, surface water and flood risk management. Section 11.6 summarises the objectives in relation to flood risk management:

WS 6-1: Flood Risk – Overall Approach

The Cork County Development Plan states that the following approach is implemented to reduce the risk of new development being affected by possible future flooding:

- Avoid development in areas at risk of flooding; and
- Where development in floodplains cannot be avoided, to take a sequential approach to flood risk management based on avoidance, reduction and mitigation of risk;
- Implement the recommendations of the South West CFRAM study.

If the development is in 'Zone A' – an area with a high probability of flooding:

"An objective of this plan is to avoid development other than 'water compatible development' as described in Section 3 of The Planning System and Flood Risk Management Guidelines for Planning Authorities issued in November 2009 by DoEHLG".

If the development is in 'Zone B' – an area where there is a moderate probability of flooding:

"An objective of this Plan is to avoid 'highly vulnerable development' described in Section 3 of 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' issued in November 2009 by DoEHLG".

WS 6-2: Development in Flood Risk Areas

The Plan states:

"Proposals for development identified as being at risk from flooding will need to be supported by a site-specific flood risk assessment. All proposals for development falling within flood zones 'A' or 'B' are consistent with the Ministerial Guidelines – 'The Planning System and Flood Risk Management".

Consequently, Cork County Council has provided specific information in the Kanturk Mallow Local Area Plan.

2.4 Kanturk Mallow - Local Area Plan 2017

The current version of the Kanturk Mallow Local Area Plan (LAP) was published in August 2017. The Plan highlights the Strategic Employment Area of Mallow and sets out the planning proposals for these key villages in the Municipal District.

The Plan outlines some of the development areas that would require a site-specific Flood Risk Assessment. The types of areas are defined as follows:

- On land subject to a specific zoning objective;
- Lands within the "existing built up area" of a town;
- Within a development boundary of a village;
- Or the open countryside.

If a development is proposed within an area at risk of flooding that is highlighted in one of the specific land areas above, intending applicants need to comply with the provisions of Chapter 11 of the Cork County Development Plan and Objectives WS 6-1 and WS 6-2, as appropriate, and with the provisions of the Ministerial Guidelines – 'The Planning System and Flood Risk Management'.

2.5 Kanturk Mallow Municipal District LAP– Strategic Environmental Assessment

The Strategic Environmental Assessment (SEA 2017) Statement, included within the Kanturk Mallow LAP, is described as a statutory requirement and should be made available with the adopted LAP. The statement is required to be issued to the environmental authorities that were previously consulted, with a view to presenting a record of the key elements of the SEA process and illustrating how environmental considerations have been integrated into the plan and the key decisions taken in the plan as a consequence of the SEA.

Environmental Protection Objective 11 (EPO 11) of the SRA relates to flooding and states the following:

EPO 11: Flooding (F)

"*Protect Flood Plains and Areas at Risk of Flooding from Inappropriate Development*"

Table 4.6 of the SEA Statement provides associated targets and indicators for EPO 11. These are listed as follows:

Targets:

- "*No inappropriate development permitted in areas at risk of flooding;*
- *All applications in areas at risk to be accompanied by detailed flood risk assessment*".

Indicator

- *"Number and nature of developments permitted in areas at risk".*

Based on the targets and indicator listed above, it is necessary to undertake a site specific Flood Risk Assessment for the proposed Mallow Town Park development.

3 Flood Mechanisms and Historic Flooding at the Site

3.1 Potential Flood Mechanisms at the Site

The following potential sources of flood risk have been assessed:

- Fluvial flooding (river, stream or mill race) – There is a risk of fluvial flooding during high flows in the River Blackwater and its tributaries. Namely, Spa Glen stream, Hospital stream, Bearforest stream and the Gooldshill stream. The main source of flood risk at the site is from fluvial flooding.
- Tidal flooding – As Mallow is located approximately 45m above sea level, the risk of flooding due to tidal events is extremely low. Flood levels at the location of the site are fluvially dominated.
- Pluvial flooding/urban drainage – Pluvial flooding may occur when the capacity of the local surface water drainage network is exceeded during periods of intense rainfall.
- Groundwater flooding – Groundwater flooding can occur during lengthy periods of heavy rainfall, typically during late winter/early spring when the groundwater table is already high. If the groundwater level rises above ground level, it can pond at local low points and cause periods of flooding.

3.2 Historic Flood Data

The proposed development lies within the floodplain of the River Blackwater, and therefore floods on an annual basis.

Records of historic flooding were obtained from the OPW National Flood Data Archive (www.floodinfo.ie). An extract from the National Flood Data Archive website report summary, indicating the locations of recorded flood events, is include in Figure 3. Refer to Appendix A for the full report.

Figure 4 below is an aerial photo taken above Mallow Town Park during the November 2000 flood event. It shows the extent of flooding in the park and along the boundary with Park road.

There are no records for pluvial or groundwater flooding available from the above source.

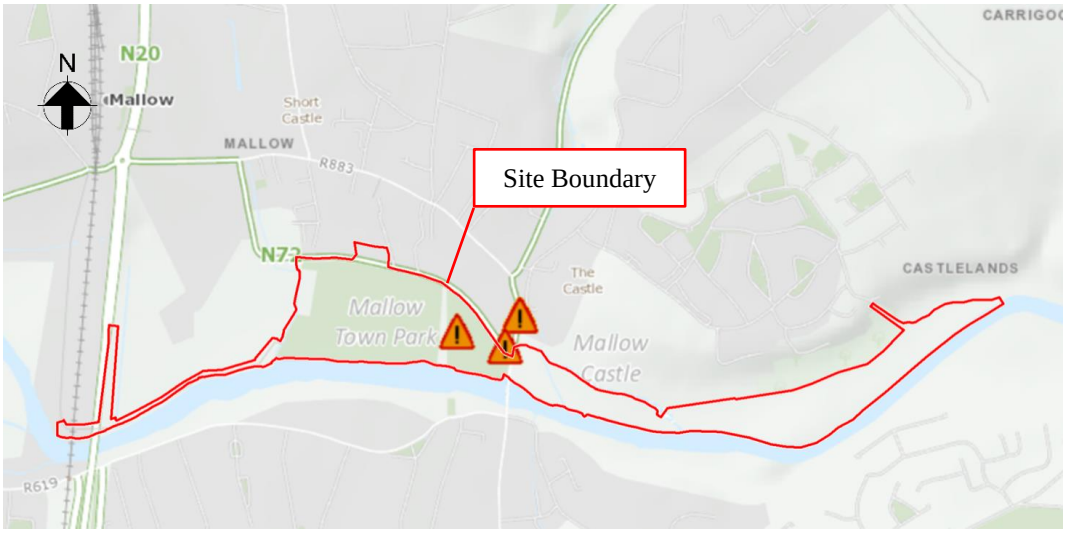


Figure 3: Extract from floodinfo.ie Mapping website

Figure 4: Flooding in Mallow Town Park 01/11/2000 (source: floodinfo.ie)

4 Existing Flood Risk

4.1 Fluvial Flood Risk

As previously outlined, the primary source of flooding at the site location is fluvial flooding from the Blackwater and its tributaries. The most current source of fluvial flood risk information in Mallow is the South Western CFRAM study. A review of the relevant outputs of the study is outlined in Section 4.1.1 below.

4.1.1 South Western CFRAM Study

An extract from the South Western CFRAMS fluvial flood extent map is presented in Figure 5, with predicted levels at selected nodes in **Table 4** below.

The predicted extent for three separate return period events are shown: the 1 in 10, 100 and 1000 year fluvial flood events. Refer to Appendix B for further details of the flood extent map.

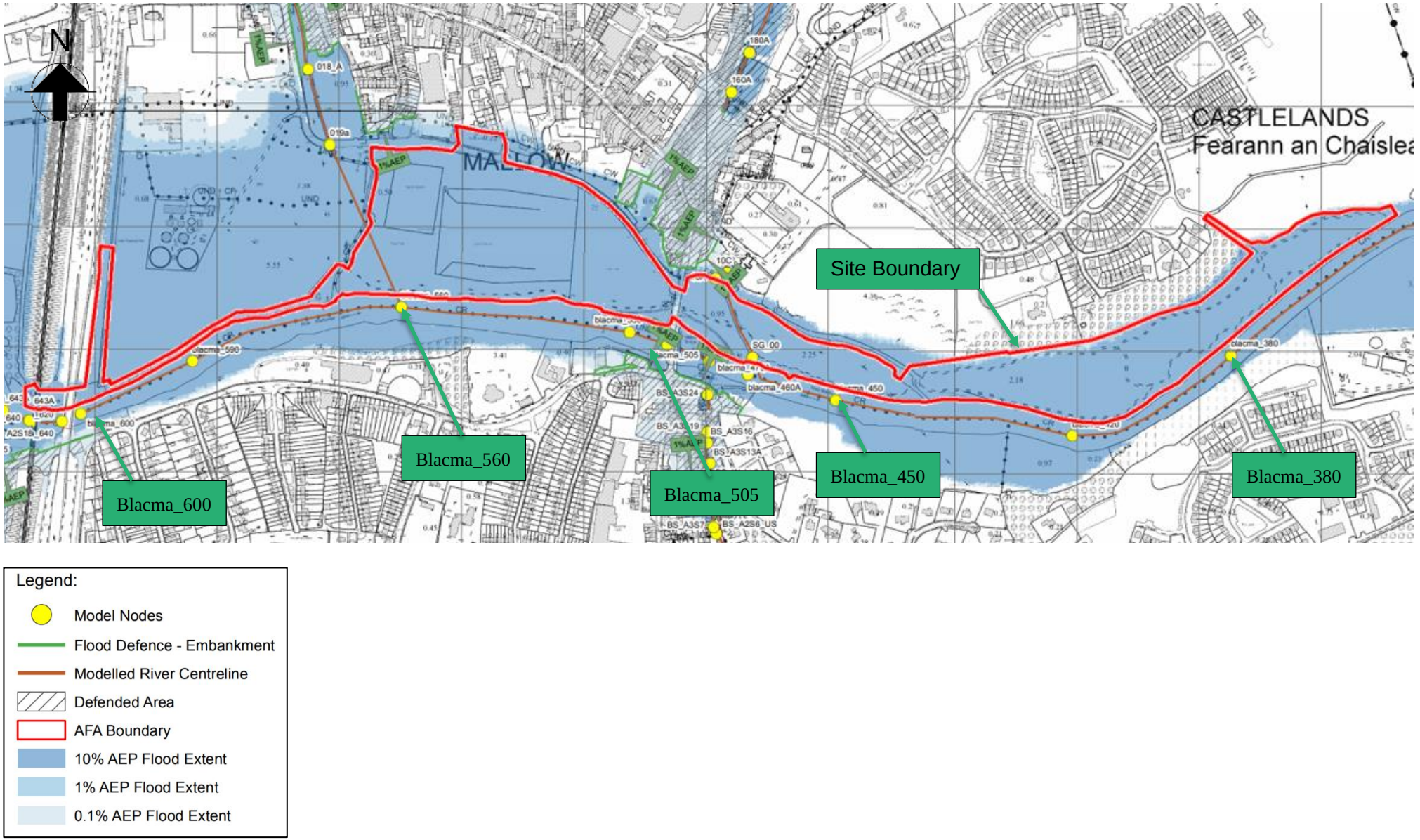
It can be seen from the flood map that the entire extent of the site is within Flood Zone A (1 in 100 year fluvial flood extent).

Table 4: Fluvial Flood Levels (source: South Western CFRAMS)

	Current Scenario Flood Level (mOD Malin)		
Node[1]	10% AEP	1% AEP	0.1% AEP
blacma_600	46.97	48.15	49.08
blacma_560	46.91	47.87	48.68
blacma_505	46.70	47.77	48.66
blacma_450	45.64	46.31	46.97
blacma_380	45.05	45.73	46.37

[1] Refer to **Figure 5** for location

Figure 5: Extract from CFRAMS fluvial flood extent map, current scenario



4.2 Pluvial Flooding

Pluvial flooding typically occurs when extreme rainfall overwhelms drainage systems or soil infiltration capacity, causing excess rainwater to pond above ground at low points in the topography.

The Town Park itself is understood to primarily drain by infiltration and due to its proximity to the River Blackwater, can be frequently waterlogged for extended periods before and after fluvial flood events.

The Town Park also receives surface water drainage from existing road drainage on Park Road. This drainage generally discharges directly to Mallow Town Park above ground, and can contribute to the waterlogging noted above.

Therefore, the risk of pluvial flooding at the site is considered to be high.

4.3 Groundwater flood risk

Groundwater flooding can occur during lengthy periods of heavy rainfall, typically, during late winter/early spring when the groundwater table is already high. If groundwater levels rise above existing ground level, it can pond at low points and cause periods of flooding.

Similar to a pluvial flooding, the risk of groundwater flooding is exacerbated during prolonged periods of high water levels as a result of fluvial flooding from the Blackwater and its tributaries.

No evidence of historic groundwater flood risk at the site was found.

The Geological Survey of Ireland (GSI) “GWFlood” project predictive flood mapping[2] did not indicate a risk of groundwater flooding at the site.

The GSI groundwater vulnerability mapping for the site is presented in Figure 6 with the subject site outlined in red. The map indicates the groundwater table has a moderate-high level of vulnerability as the overburden soils are likely to be permeable (Figure 6). However, this mapping does not give a clear indication of the potential for groundwater flood risk at the site.

[2] https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/groundwater-flooding/gwflood-project-2016-2019/Pages/default.aspx

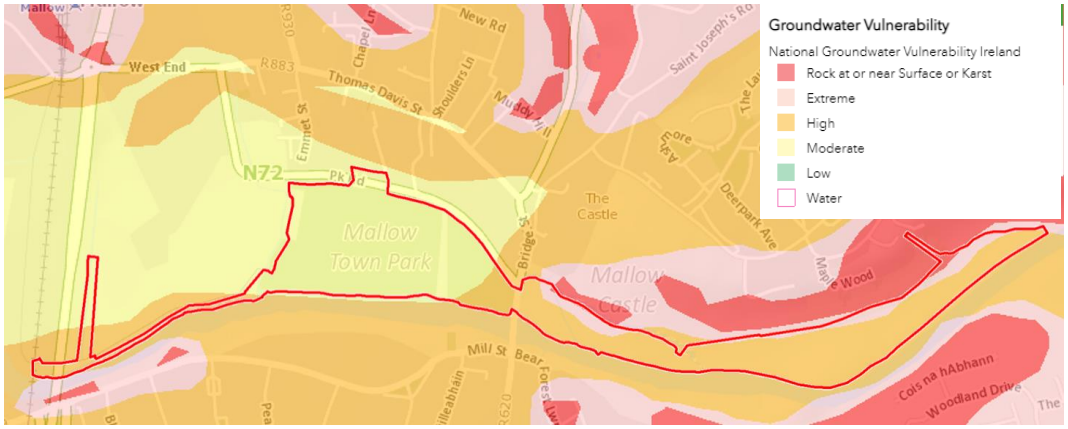


Figure 6: Extract from GSI Groundwater Vulnerability mapping (www.gsi.ie)

Therefore, based on the lack of evidence, groundwater it is considered unlikely to be a significant flooding risk at the site. It is considered possible that the groundwater table may have potential to rise to the surface, but only in conjunction with fluvial flooding. Therefore groundwater is not considered to be a dominant flood risk at the site.

4.4 Summary of Existing Flood Risk

The risk of flooding to the existing site from fluvial, tidal, pluvial and groundwater sources has been assessed and is summarised as follows:

- The site is located within Flood Zone A, as it is located in the 100 year fluvial flood extent.
- The site is at risk of fluvial and from the River Blackwater. The respective water levels indicate that fluvial flooding will be critical in the assessment.
- The risk of Tidal flooding is considered to be negligible
- The risk of pluvial flooding to the site is considered high
- Groundwater flooding is not considered to be a dominant flood risk at the site

5 Application of The Planning Guidelines

5.1 Flood Zones

As outline in Section 4.1, the entire extent of the proposed site is located entirely within Flood Zone A, i.e. within the 1 in 100 year fluvial flood extents.

5.2 Vulnerability Classification

The proposed development includes amenity open spaces and outdoor sport and recreation facilities and is therefore classified as 'Water Compatible Development'.

5.3 Sequential Approach and Justification Test

As the site lies within Flood Zone A and is classified as 'Water Compatible Development', a Justification Test is not required in accordance with The Guidelines.

6 Flood Mitigation Measures

6.1 Interaction with Mallow Flood Defence Scheme

As part of the Mallow Flood Defence Scheme, the existing masonry wall along the Park Road and Town Park boundary was modified and adopted as a "partial" flood defence wall to prevent flooding of Park Road during minor flood events. The most significant interaction the proposed scheme has with the existing flood defences is along this boundary wall. As part of the proposed development to enhance the use of the park, existing entrances are to be modified along with the construction of additional access/egress routes. These developments have proposed to match the existing ground levels along the Park Road boundary, approx. 45.22mOD, by ramping up and down into the park. This is shown in Figure 7 below and will allow the existing flood defence wall to maintain its function.

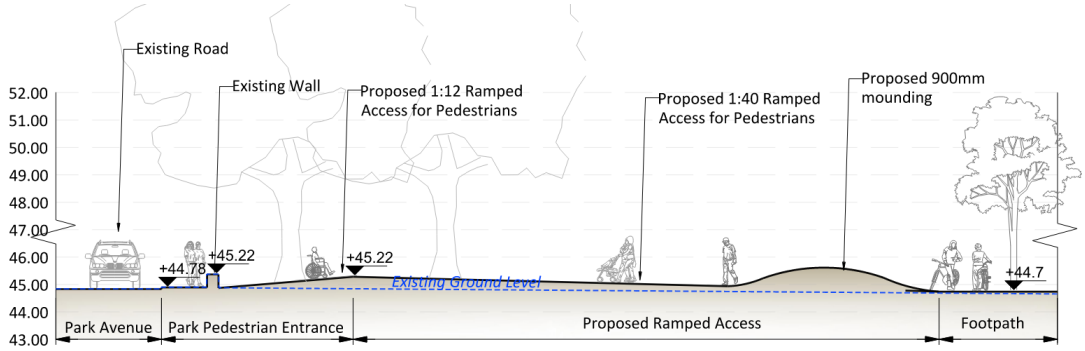


Figure 7: Proposed ramp arrangement at new Park entrances

The proposed scheme will have no other substantial interaction with or impact on the functioning of the Mallow Flood Defence Scheme.

The project team has consulted with the Office of Public Works during the design development, including a consultation meeting with OPW held in January 2021.

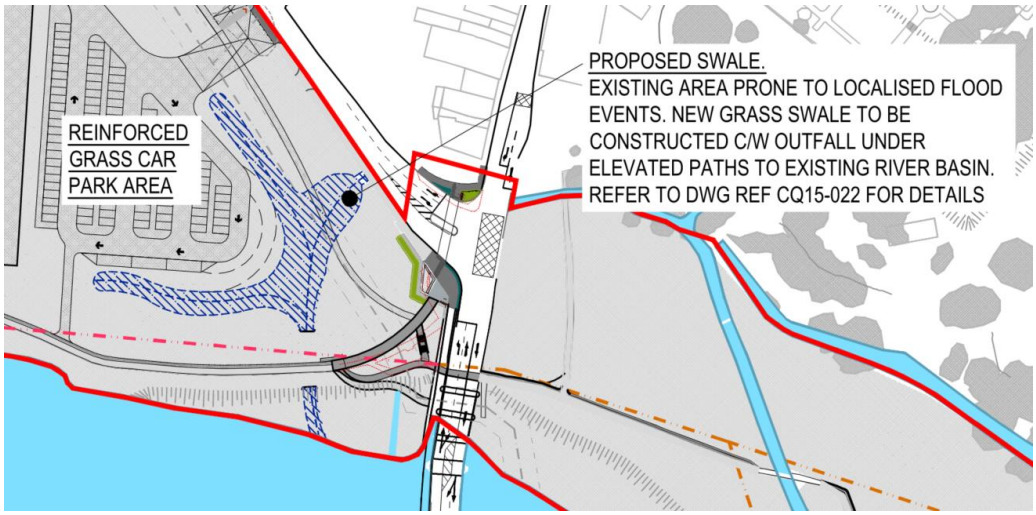
The proposed works at the Park Road access points may require a separate consent from OPW under Section 9 of the Arterial Drainage Act. If required, it is intended to advance this in parallel to the planning application.

6.2 Proposed Drainage Swale

Between the proposed car park area and Mallow Bridge there is an existing low point in the topography, where ponded water is often unable to drain following fluvial flood events. This appears to occur due to high water levels in the nearby Spa Glen stream, which prevents drainage through an existing trash screen and surface water pipes under Park Road.

As part of the proposed development, it is proposed to construct a new swale feature which will allow ponded water to discharge directly to the River Blackwater as shown in Figure 8 below. This will reduce the duration that water will be held on the site following a fluvial flood.

Figure 8: Integration with existing Mallow Flood Defence Scheme



7 Off-site impacts

7.1 Floodplain Storage

Ground levels are proposed to be raised locally adjacent to the access points to the park from Park Road (see Figure 7). However the level increases will be very modest (>1m high) and the raised ground will therefore continue to be subject to flooding in events greater than the 1 in 10 year fluvial flood. Therefore there will be no impact on flood storage which could affect extreme flood levels in the town.

7.2 Runoff

The proposed development includes a number of drainage measures designed to ensure that runoff from the site will not be increased compared to the existing situation:

- All proposed parking surfaces will be permeable and designed to infiltrate to ground, mimicking the existing natural drainage process.
- All proposed concrete footpaths and the macadam surfaced pump track will drain locally to grass margins
- The proposed skate park will be drained to a soakaway and the proposed playground will drain by direct infiltration to ground.
- The remainder of the site will remain grassed as per existing and surface water will infiltrate naturally to ground.

Therefore there will be no significant increase in runoff as a result of the proposed development.

7.3 Conveyance

The following elements of the proposed scheme were identified as having the potential to impact the conveyance of flood water through Mallow:

- Proposed landscaping at Mallow Bridge
- Proposed tree planting within the Town Park
- Proposed angling stands on the bank of the Blackwater River.
- Proposed pedestrian bridge widening east of Mallow Bridge

These elements are assessed in turn below.

Landscaping at Mallow Bridge

The proposed landscaping at Mallow town bridge has been designed to ensure that any changes in ground elevation will not impinge on the bank regrading work undertaken as part of the OPW flood relief scheme. Therefore, conveyance of flood water through the “dry” arches of the bridge will not be impacted.

Tree Planting in Town Park

The density of the proposed tree planting within the park will not be significantly different to that which pre-existed. Therefore floodplain conveyance will not be negatively impacted by this measure.

Angling Stands

The proposed angling stands will be constructed into the riverbank so that their profile will not project into the river channel and will not result in the building up of debris. Therefore the proposed fishing stands will not impact conveyance.

Pedestrian Bridge Widening

The existing pedestrian bridge proposed to be widened is located 390m downstream of Mallow Bridge. The bridge crosses the Spa Glen stream, but lies within the River Blackwater flood extent. While the existing bridge is only circa 1.7m wide, due to the skew of the bridge, the existing parapet railings present a circa 9m "face" to the Blackwater floodplain flow. This will be increased to circa 10m following the extension of the bridge. The overall width of the floodplain at this point is circa 200m. It is acknowledged that the proposed bridge widening has a marginally increased risk of trapping flood-borne debris and therefore may impact floodplain conveyance in that scenario. However, given the relatively small size of the bridge and large distance from any vulnerable risk receptors, the potential impact is considered to be very low.

The proposed pedestrian bridge widening will require a separate consent from OPW under Section 50 of the Arterial Drainage Act, which is intended to be advanced in parallel with the planning application.

8 Residual Risks

8.1 Flood Warning

As indicated above, the site will continue to be located in Flood Zone A post-construction and flooding of the site will continue to occur on a regular basis. The residual risk to users of the park was therefore reviewed.

As part of the Mallow Flood Defence works, the OPW developed a flood forecasting and warning system to predict peak flood levels in both Mallow and Fermoy.

As part of the system, the model utilises live rainfall and level telemetry data to produce forecasts for several locations within the catchment. The forecasted levels and the measured rainfall totals are then analysed to determine if pre-defined thresholds have been met. Once these thresholds are met, warning alerts are triggered automatically as necessary.

The system is monitored primarily by Cork County Council staff, with technical backup provided by OPW. Predicted flood events are routinely advertised by CCC through a variety of local media outlets well in advance of an incoming flood.

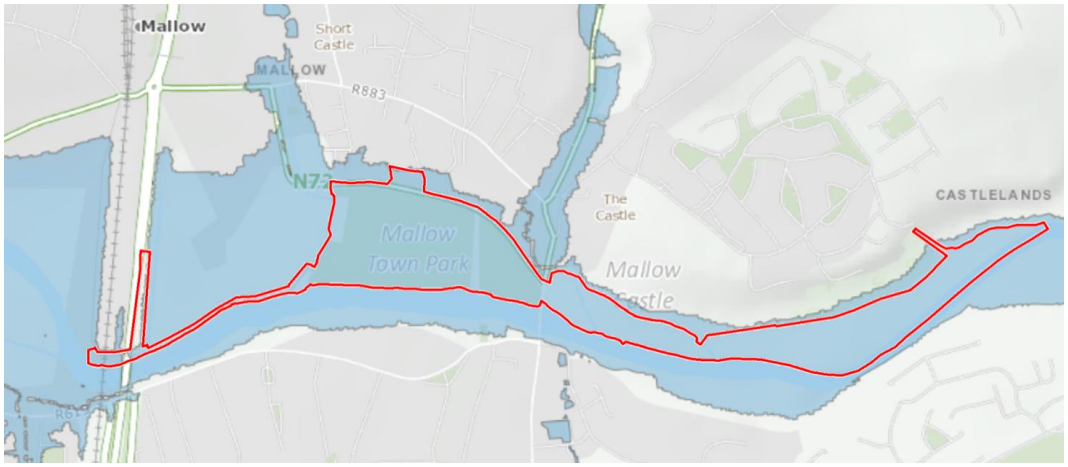
Therefore, given the existing flood forecasting system that is currently in place, the general public will have adequate time to vacate the site in advance of a flood. The residual risk as a result of the expected recurring flooding is therefore considered to be low.

8.2 Climate Change

The potential impact of climate change on the development was reviewed. A screenshot showing the predicted 1%AEP mid-range future scenario fluvial flood extent is shown in Figure 9 below. This indicates that the entirety of the park will continue to be located in Flood Zone A as per existing, albeit flood depths and frequency may increase.

However, as the proposed development is considered to be water compatible, the effect of any change in the pattern of flooding is considered to be negligible.

Figure 9: Mid-Range Future Scenario Fluvial Flood Extent (source: floodinfo.ie)



9 Conclusion

Arup was commissioned by the Cork County Council to prepare a site-specific Flood Risk Assessment (FRA) to support the Planning Application for a proposed development at Mallow Town Park, Mallow, Co. Cork.

Given that the site has a long history of flooding, it is necessary to undertake a site specific FRA for the development as part of the planning application to An Bord Pleanála.

The proposed site lies within Flood Zone A, with the main source of risk being fluvial flooding from the River Blackwater.

As outlined in Section 5.3, despite being located withing Flood Zone A, a Justification Test is not required for this development as it is classified as “Water Compatible” in accordance with the OPW Planning Guidelines.

Careful consideration has been given to the design of the proposed works to ensure they do not compromise the existing Mallow Flood Defence Scheme. Entrances to the park from Park Road will be ramped to maintain the “partial” flood defence provided under the flood relief scheme.

Drainage measures such as permeable pavements and soakaways are being incorporated into the design to mitigate any increase in surface runoff.

A number of measures proposed as part of the development were assessed in the context of potential impact on conveyance, including tree planting, landscaping adjacent to Mallow Bridge, proposed angling stands and proposed pedestrian bridge widening. The impact of such measures is considered to be negligible.

The residual risk to users of the park was reviewed and found to be manageable under the existing flood forecasting and warning system in operation in Mallow.

The impact of future climate change was also assessed. Given the water-compatible nature of the development, the potential impact was found to be negligible.

This FRA has demonstrated that the risks relating to flooding can be managed and mitigated to acceptable levels and therefore comply with DoEHLG / OPW and Cork County Council planning guidance.

Appendix A

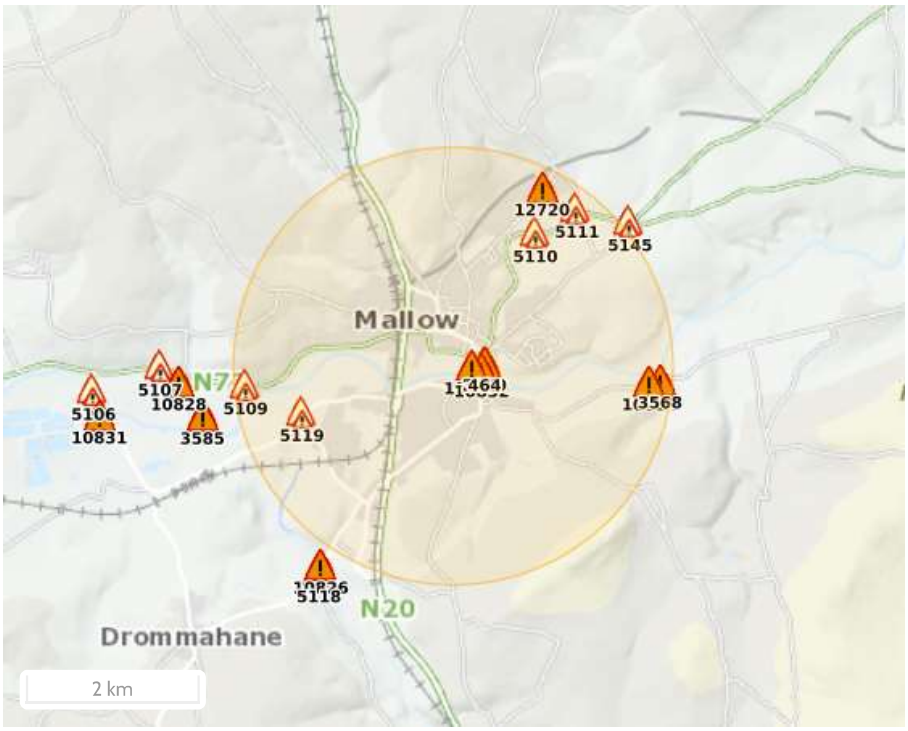
National Flood Hazard Mapping Website Report

A1

Past Flood Event Local Area Summary Report

Report Produced: **8/2/2021 19:54**

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

20 Results

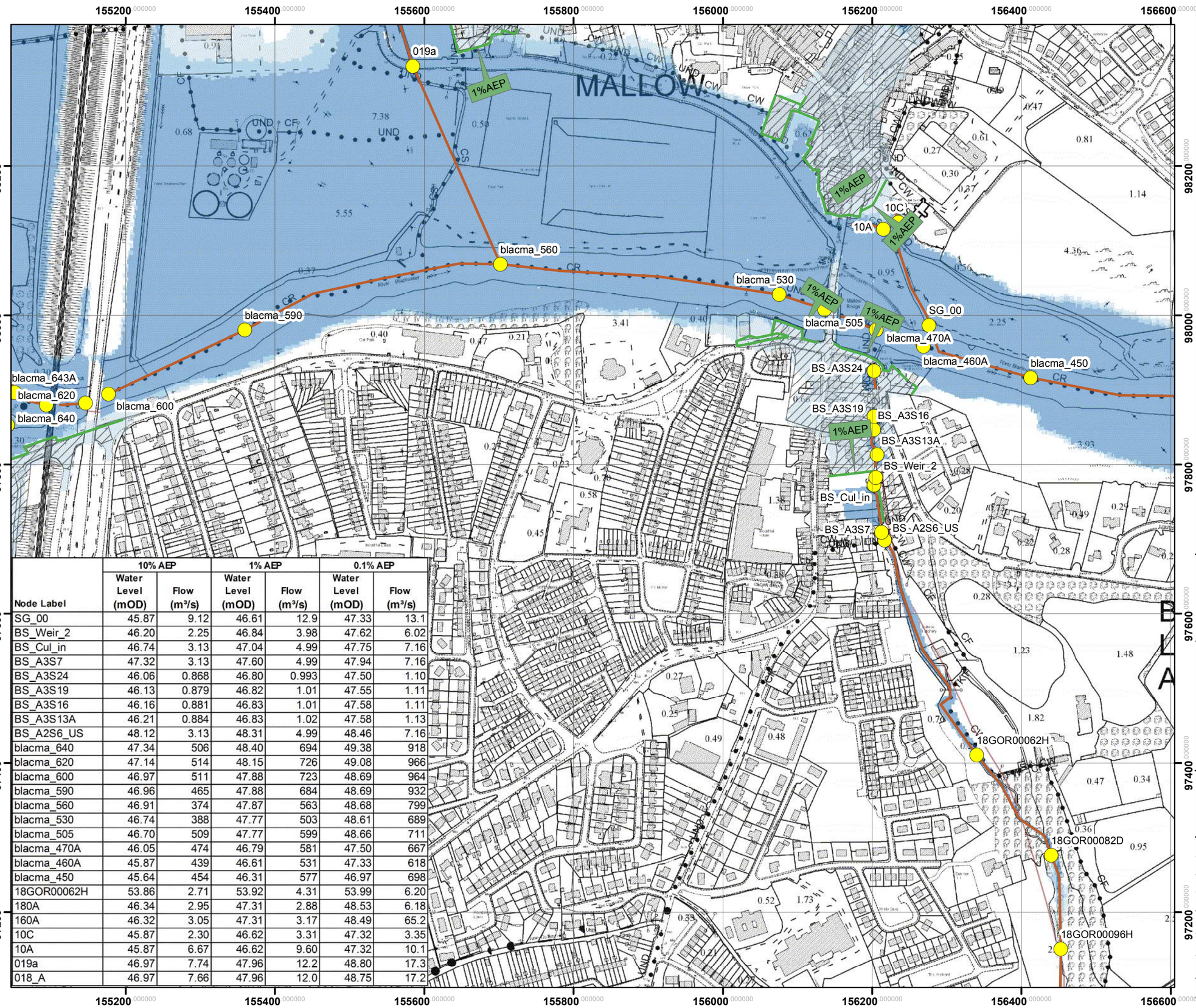
	Name (Flood_ID)	Start Date	Event Location
1.	Clonmore Estate, Mallow Co. Cork on 28th.June 2012 (ID-12720)	28/06/2012	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
2.	Blackwater Mallow, 30 Dec, 1998 (ID-464)	30/12/1998	Approximate Point
	Additional Information: Reports (6) Press Archive (0)		
3.	Blackwater Mallow August 1946 (ID-465)	12/08/1946	Approximate Point
	Additional Information: Reports (4) Press Archive (1)		
4.	Blackwater Mallow Dec 1948 (ID-467)	02/12/1948	Approximate Point
	Additional Information: Reports (4) Press Archive (0)		
5.	Blackwater Mallow Nov 1980 (ID-468)	02/11/1980	Approximate Point
	Additional Information: Reports (4) Press Archive (0)		
6.	Blackwater Mallow 6 August, 1986 (ID-469)	06/08/1986	Approximate Point
	Additional Information: Reports (6) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Blackwater Mallow Oct, 1988 (ID-470)	11/10/1988	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		
8.	Blackwater Mallow Feb 1990 (ID-472)	05/02/1990	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		
9.	Blackwater Mallow Nov 1853 (ID-2379)	02/11/1853	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		
10.	Blackwater Mallow Sept 1875 (ID-2380)	26/09/1875	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		
11.	Blackwater Mallow Nov 1916 (ID-2382)	17/11/1916	Approximate Point
	Additional Information: Reports (3) Press Archive (5)		
12.	Munster Blackwater Mallow Nov 2000 (ID-3559)	01/11/2000	Exact Point
	Additional Information: Reports (5) Press Archive (14)		
13.	Munster Blackwater Ballygarrett Nov 2000 (ID-3568)	01/11/2000	Exact Point
	Additional Information: Reports (2) Press Archive (0)		
14.	Blackwater at Killetra near racecourse recurring (ID-5109)	n/a	Approximate Point
	Additional Information: Reports (5) Press Archive (0)		
15.	Spa Stream N72 Keatleys Close recurring (ID-5110)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
16.	Spa Stream N72 Parkadallane junct Mallow recurring (ID-5111)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
17.	Clyda River Clyda Bridge Lower recurring (ID-5119)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (1)		
18.	Flooding at Ballyellis, Co Cork November 2009 (ID-10824)	19/11/2009	Area
	Additional Information: Reports (1) Press Archive (0)		
19.	Flooding at Mallow, Co Cork November 2009 (ID-10832)	19/11/2009	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
20.	Blackwater River Mallow Nov 19th 2009 (ID-11326)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

Appendix B

CFRAMS Fluvial Flood Extent Maps

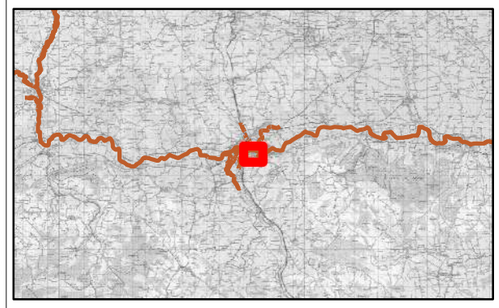
B1



Node Label	10% AEP Water Level (mOD)	10% AEP Flow (m³/s)	1% AEP Water Level (mOD)	1% AEP Flow (m³/s)	0.1% AEP Water Level (mOD)	0.1% AEP Flow (m³/s)
SG_00	45.87	9.12	46.61	12.9	47.33	13.1
BS_Weir_2	46.20	2.25	46.84	3.98	47.62	6.02
BS_Cul_in	46.74	3.13	47.04	4.99	47.75	7.16
BS_A3S7	47.32	3.13	47.60	4.99	47.94	7.16
BS_A3S24	46.06	0.868	46.80	0.993	47.50	1.10
BS_A3S19	46.13	0.879	46.82	1.01	47.55	1.11
BS_A3S16	46.16	0.881	46.83	1.01	47.58	1.11
BS_A3S13A	46.21	0.884	46.83	1.02	47.58	1.13
BS_A2S6_US	48.12	3.13	48.31	4.99	48.46	7.16
blacma_640	47.34	506	48.40	694	49.38	918
blacma_620	47.14	514	48.15	726	49.08	966
blacma_600	46.97	511	47.88	723	48.69	964
blacma_590	46.96	465	47.88	684	48.69	932
blacma_560	46.91	374	47.87	563	48.68	799
blacma_530	46.74	388	47.77	503	48.61	689
blacma_505	46.70	509	47.77	599	48.66	711
blacma_470A	46.05	474	46.79	581	47.50	667
blacma_460A	45.87	439	46.61	531	47.33	618
blacma_450	45.64	454	46.31	577	46.97	698
18GOR00062H	53.86	2.71	53.92	4.31	53.99	6.20
180A	46.34	2.95	47.31	2.88	48.53	6.18
160A	46.32	3.05	47.31	3.17	48.49	65.2
10C	45.87	2.30	46.62	3.31	47.32	3.35
10A	45.87	6.67	46.62	9.60	47.32	10.1
019a	46.97	7.74	47.96	12.2	48.80	17.3
018_A	46.97	7.66	47.96	12.0	48.75	17.2

0 100 200 300 400 500 Meters

Location Plan:



Legend:

- Model Nodes
- Flood Defence - Embankment
- Modelled River Centreline
- Defended Area
- AFA Boundary
- 10% AEP Flood Extent
- 1% AEP Flood Extent
- 0.1% AEP Flood Extent

IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

SOUTH WESTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

Office of Public Works
Jonathan Swift Street
Trim Co. Meath

Mott MacDonald Ireland
5 Eastgate Avenue
Little Island
Co. Cork

Project:
South Western CFRAM Study

Map:
Mallow - Flood Extent

Map type:	Flood Extent
Source:	Fluvial Flooding
Map area:	Urban Area
Scenario:	Current

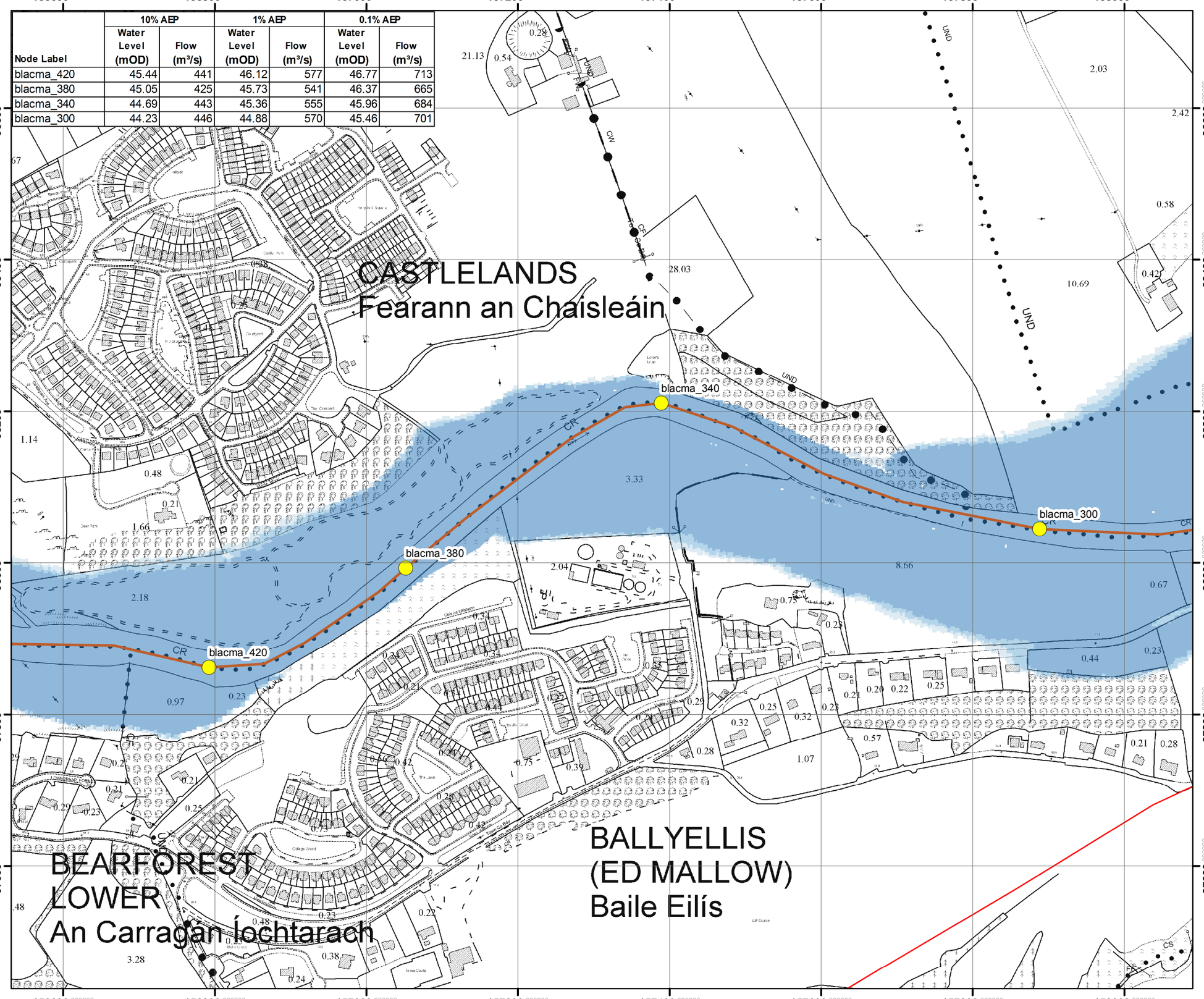
Drawn by:	Lee Cutting	Date:	June 2016
Checked by:	Marianne Piggott	Date:	June 2016
Approved by:	Christian Hetmank	Date:	June 2016

Map No.: MMD/296235/E/DR/I18HMW/EXFCDEXF/F/Sht003

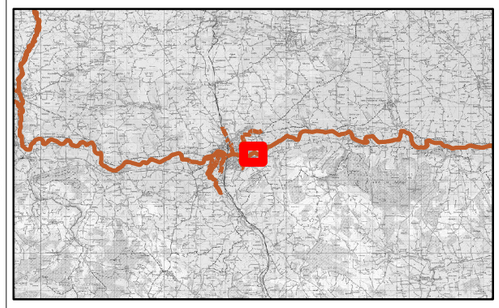
Sheet: 3 of 12 Revision: F

Drawing Scale: 1:5,000 Plot Scale: 1:1@A3

Node Label	10% AEP Water Level (mOD)	10% AEP Flow (m^3/s)	1% AEP Water Level (mOD)	1% AEP Flow (m^3/s)	0.1% AEP Water Level (mOD)	0.1% AEP Flow (m^3/s)
blacma_420	45.44	441	46.12	577	46.77	713
blacma_380	45.05	425	45.73	541	46.37	665
blacma_340	44.69	443	45.36	555	45.96	684
blacma_300	44.23	446	44.88	570	45.46	701



Location Plan:



Legend:

- Model Nodes
- Flood Defence - Embankment
- Modelled River Centreline
- Defended Area
- AFA Boundary
- 10% AEP Flood Extent
- 1% AEP Flood Extent
- 0.1% AEP Flood Extent

IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

SOUTH WESTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Office of Public Works
Jonathan Swift Street
Trim Co. Meath

Mott MacDonald
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island
Co. Cork

Project:	South Western CFRAM Study
Map:	Mallow - Flood Extent
Map type:	Flood Extent
Source:	Fluvial Flooding
Map area:	Urban Area
Scenario:	Current
Drawn by:	Lee Cutting — Date: June 2016
Checked by:	Marianne Piggott — Date: June 2016
Approved by:	Christian Hetmank — Date: June 2016
Map No.:	MMD/296235/E/DR/I18HMW/EXFCDEXF/F/Sht004
Sheet:	4 of 12 — Revision: F
Drawing Scale:	1:5,000 — Plot Scale: 1:1@A3

Appendix C

General Arrangement Plan

C1

GENERAL LAYOUT PLAN 1 - MALLOW TOWN PARK
Scale 1:1,500

TOWN PARK EXISTING ELEMENTS:

E1 - Bridge to be retained and protected

E2 - Soccer Pitch

E3 - Rugby Training Area

E4 - GAA Pitch to be re-positioned further north

E5 - Existing amenity path (concrete finish)

PROPOSED WORKS:

P1 - Entrance 1, refer to drawing 6615_375:
- Upgraded entrance to junction and Mallow bridge
- Pedestrian access to Mallow town park and River walk way

P2 - Entrance 2, refer to drawing 6615_376:
- Pedestrian Access to occasional car park and Town Park
- Controlled vehicular access to Car Park and Multi-Events area
- Access to Town Park

P3 - Entrance 3, refer to drawing 6615_377:
- Pedestrian stepped access widened to 3m
- Connection to Town Park

P4 - Entrance 5, refer to drawing 6615_378:
- Existing pedestrian entrance to be upgraded
- Connect from St. James Avenue
- Connection to Town Park and River walk way
- Incorporate Bishop Casey remembrance plaque and interpretative panel

P5 - Entrance 5, refer to drawing 6615_379:
- Pedestrian access to tree lined avenue
- Connecting Play areas (Skate park to Town Park)

P6 - Entrance 6, refer to drawing 6615_380:
- Pedestrian access to Car park and Town Park pitches
- Controlled vehicular access to parking area

P7 - Skate Park, refer to drawing 6615_383:
- Removal of existing poor quality/outdated play equipment
- Create space by introducing a skate plaza and a new play area

P8 - Pump Track, refer to drawing 6615_385

P9 - N20 Ramped **access**, refer to drawing 6615_381

P10 - Proposed 3m wide pedestrian **bridge** to match other existing bridge in Town Park

P11 - Angling Stands, refer to drawing 6615_309

P12 - Reinforced grass, seasonal event parking area (104 spaces) and access route to blueway

P13 - Proposed Town Park **parking** (97 spaces)

P14 - Multi-Event area (reinforced grass)

P15 - Relocated and extended **GAA pitch** (incl. removal of existing mounding)

P16 - Training area

P17 - Existing 2m wide concrete footpath widened to **3m wide concrete** shared path

P18 - Surface water detention

P19 - Access provision for **kayak/canoes** at Mallow Bridge using existing concrete apron at bridge

PEDESTRIAN CONNECTIONS TO MAIN STREET/ TOWN CENTRE :

C1 - Connect Town Park Pitches area to Mallow Main Street through Emmet Street, Walking distance: Approx. 250m, 3 minutes

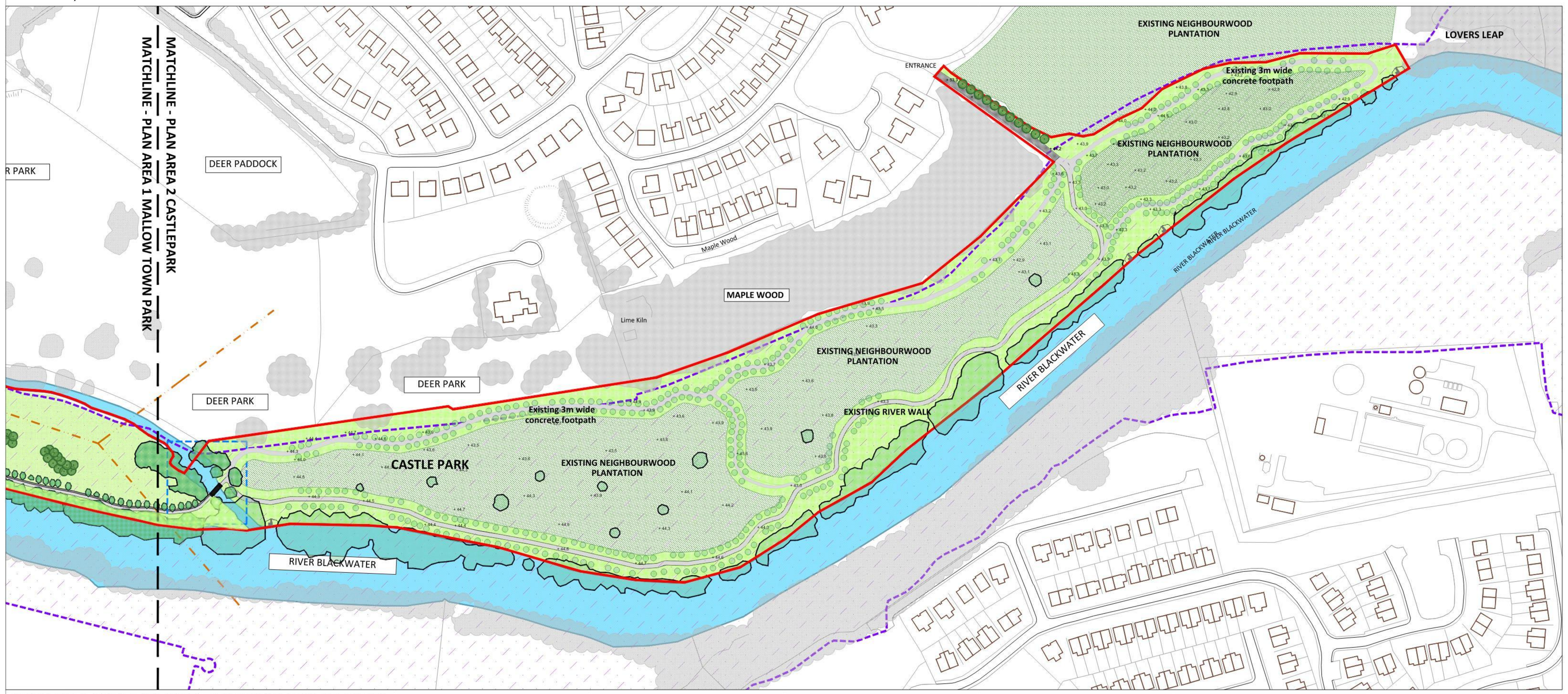
C2 - Connects Mallow Main Street to Town Park through St. James Avenue, Walking distance: Approx. 190m, 2.5 minutes

C3 - Connects Mallow Town Park to Mallow Library and Main Street through Lidl Car Park, Walking distance: Approx. 135m, 2 minutes

C4 - Connects Mallow Town Park to Mallow Bridge Street and Main Street, Walking distance: Approx. 115m, 2 minutes

C5 - Connects Mallow Town Park to Mallow Castle Entrance through Bridge Street, Walking distance: Approx. 175m, 2.5 minutes

C6 - Connects Mallow Town Park to South Mallow (Bellevue and Ballydaheen Industrial Estate) through Mallow Bridge, Walking distance: Approx. 250m, 3 minutes

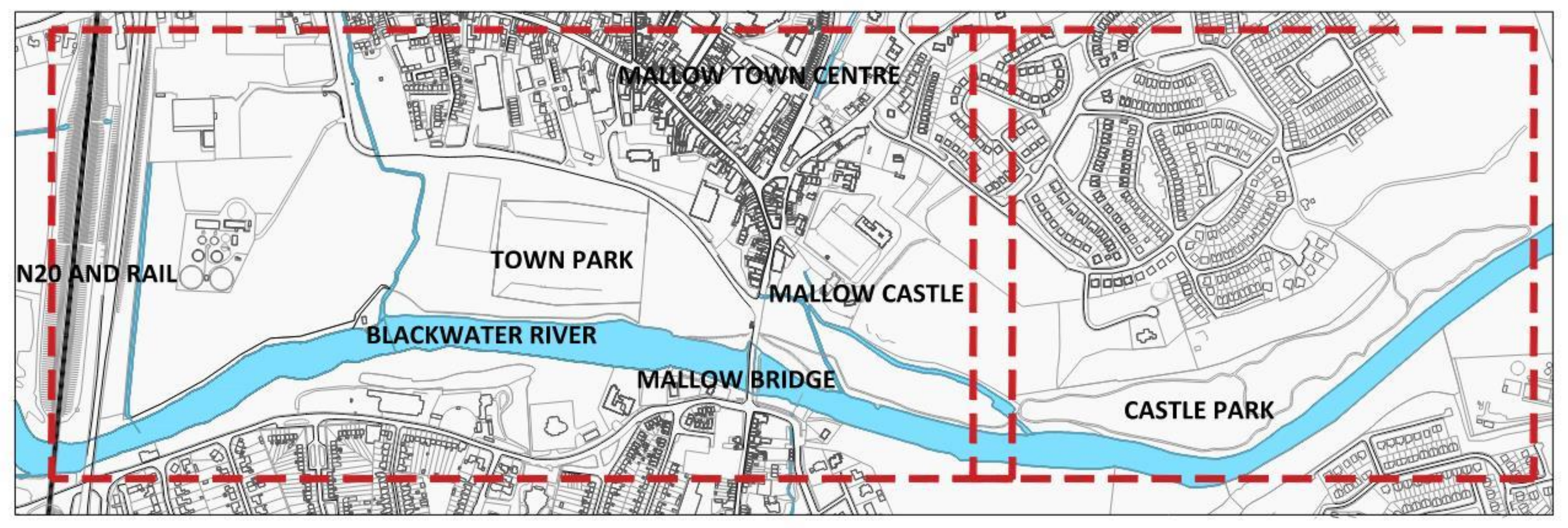


GENERAL LAYOUT PLAN 2 - MALLOW CASTLE PARK
Scale 1:1,500

LEGEND:

Existing:
- Site Boundary
- Vegetation to be retained and protected
- Vegetation outside boundary
- Grass area
- River/Stream
- Concrete path
- River Blackwater Special Area of Conservation (SAC)
- Overhead power line
- Mallow sewerage scheme upgrade, Planning ref. 195078 reg. no.

Proposed:
- Tree planting
- Reinforced grass
- Bitumen macadam
- Concrete path
- Proposed detention basin
- Refer to detailed drawings for areas of proposed development
- Proposed undergrounding of overhead power line
- Connections between proposed Town Park Entrances and Mallow Town
- Proposed Cross-Section, refer to dwg. 6615_387



KEY PLAN

N

Rev	Date	Drawn	Checked	Description

Notes

Project: Mallow Town Park Part XAB Planning Application		Project No. 6615	
Drg. General Arrangement Plan		Drawing No. 371	Rev. 00
Scales 1:1500 @ A0	Status PLANNING	Date 26/02/2021	
Penrose Wharf Business Centre, Penrose Wharf, Cork Tel: +353(0) 21 242 5620	mail@bradyshipmanmartin.com www.bradyshipmanmartin.com	Drn. DB	Chd. DB / Passed

BSM
Est. 1968