

O'Carroll's Crane Hire

Retention Planning

Site Specific Flood Risk Assessment

231279-PUNCH-XX-XX-RP-C-0002

Document Control

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1 Introduction

1.1 Background

Punch Consulting Engineers are providing civil and structural engineering consultancy services for retention permission at O'Carroll Haulage and Crane hire Ltd, Court, Kildimo, Co. limerick. This report is a Site-Specific Flood Risk Assessment (SSFRA) to be included in a planning application for retention.

The assessment is carried out in full compliance with the requirements of "The Planning System & Flood Risk Management Guidelines" (PSFRMG) published by the Department of the Environment, Heritage and Local Government in November 2009 and Limerick Development Plan 2022-2028.

1.2 Existing Site

The property is an existing commercial premises and depot for O'Carroll Haulage and Crane Hire's and is located at the border of the N69 Road and L8038 Road, approximately 1km east of Kildimo New, Co. Limerick. The location of the site is shown in Figure 1-1 below.

The site prior to construction was a brownfield site consisting of a building, concrete slab and hardcore areas. The site is bound by Derek Walsh Camper Centre to the South, Local Road L8038 Derrybeg Road to the west, and green fields to the north and east.

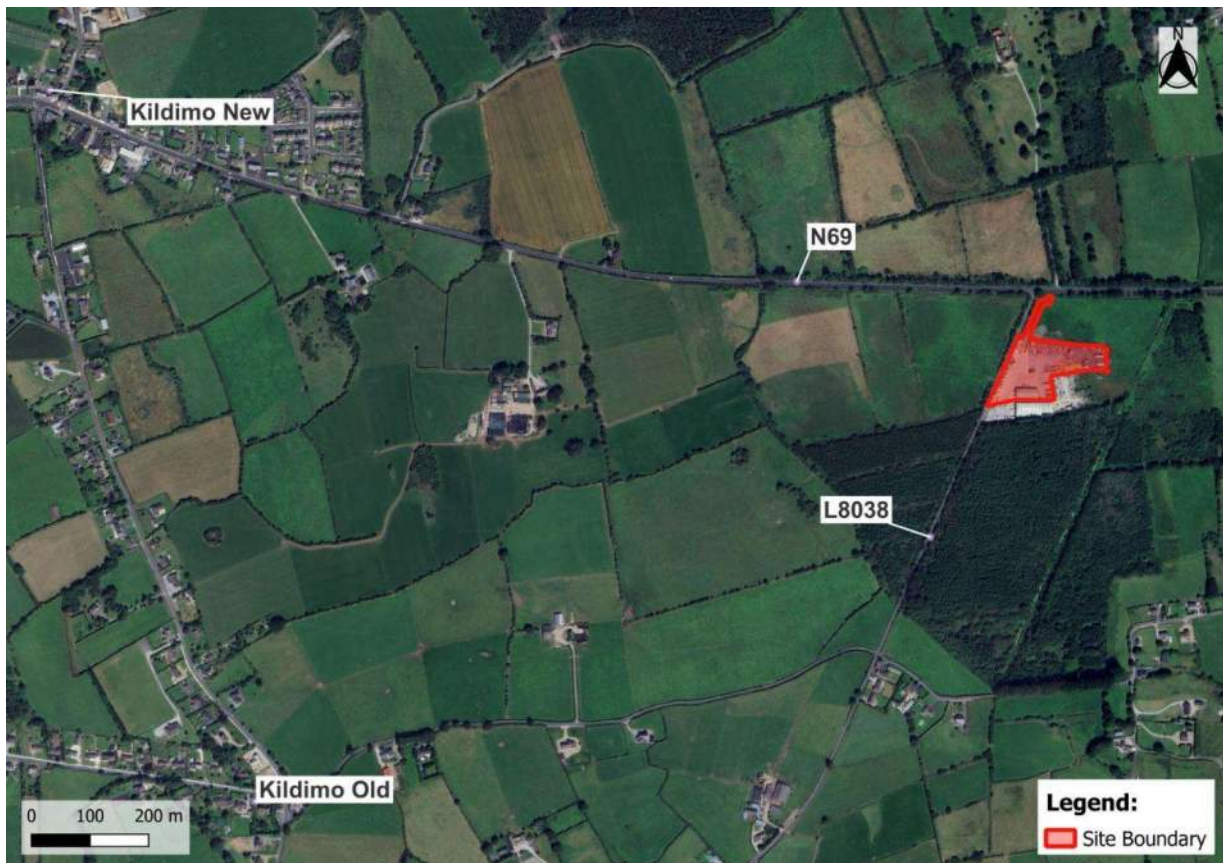


Figure 1-1: Location of Subject Site (Site extents indicated in red)

1.3 Nature of the Proposed Development

The proposal is for retention of constructed hard standing areas comprising 0.16ha of concrete and 0.48ha of gravel. The hard standing surfaces have raised the ground level in these areas by approximately 0.5m. An additional 0.13ha of filled lands will be allowed to return to the wild naturally.

O'Carroll Haulage and Crane Hire Ltd. intend to apply for retention of works consisting of:

1. the filling of land by approximately 0.5m.
2. the provision of extended concrete apron on part of that filled area.
3. the use of part of the filled and concrete areas for hardstanding storage of materials and plant associated with the established and permitted use of the property including provision of security fence and lighting.

Provision of remedial and mitigation measures including:

1. The cessation of use of part of the fill area and facilitating the natural regeneration of that area.
2. The provision of surface water management measures to improve the quality of the existing permitted and proposed discharge of surface water from the site to existing boundary drains.

The works are outlined in a series of drawings prepared by PUNCH Consulting Engineers and supplementary information by HRA Planning. An extract from PUNCH drawing No. 231279-PUNCH-XX-XX-DR-C-0402 is shown in Figure 1-2

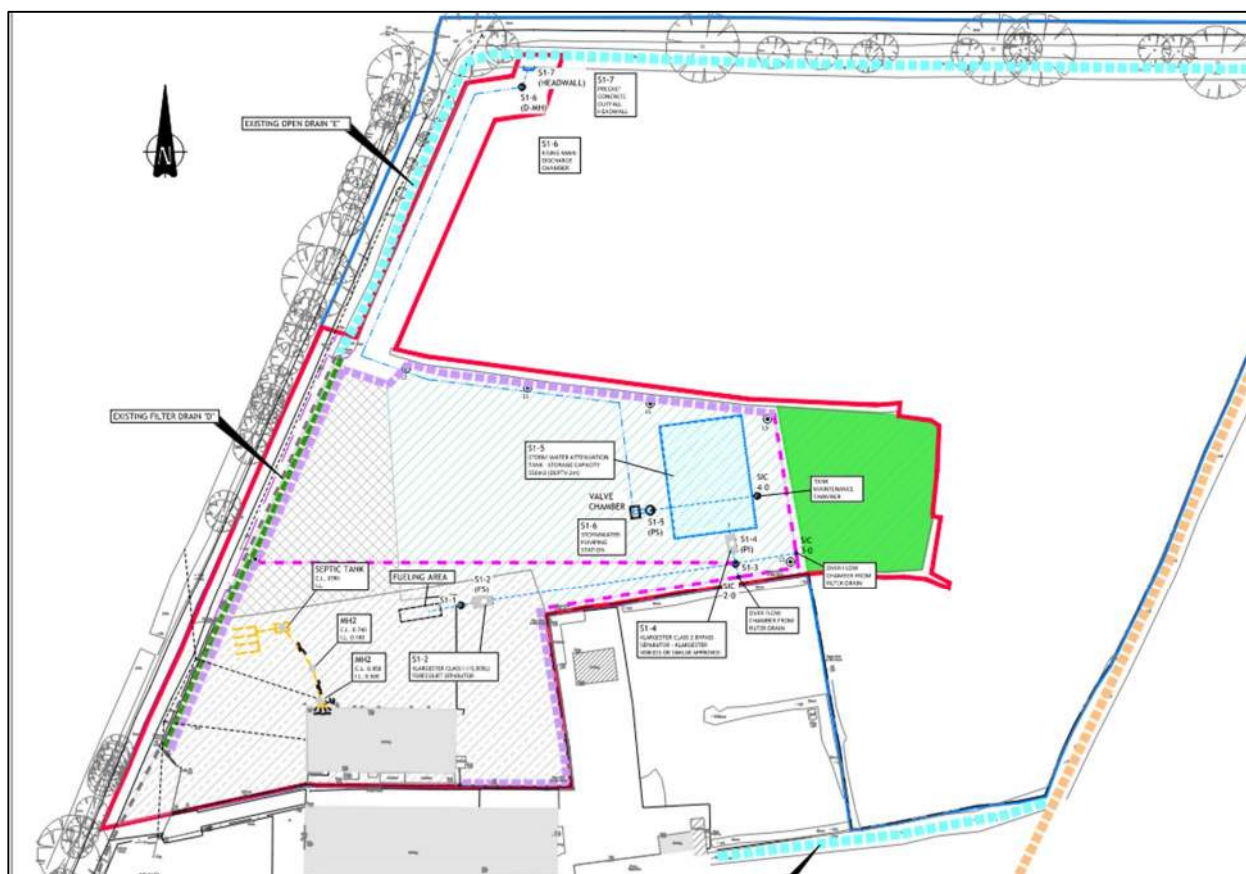


Figure 1-2: Subject Site Pre Works

2 Relevant Guidance

2.1 The Planning System and Flood Risk Management Guidelines

In September 2008, “The Planning System and Flood Risk Management” (PSFRM) Guidelines were published by the Department of the Environment, Heritage and Local Government in Draft Format. In November 2009, the adopted version of the document was published.

The PSFRM Guidelines give guidance on flood risk and development. The guidelines recommend a precautionary approach when considering flood risk management in the planning system. The core principle of the guidelines is to adopt a flood risk sequential approach to managing flood risk and to avoid development in areas that are at risk. The sequential approach is based on the identification of flood zones for river and coastal flooding. The guidelines include definitions of Flood Zones A, B and C, as noted in Table 2-1 below. It should be noted that these do not take into account the presence of flood defences, as there remain risks of overtopping and breach of the defences.

Table 2-1: Flood Zone Designation

Flood Zone	Type of Flooding	Annual Exceedance Probability (AEP)
Flood Zone A	Coastal	Less than a 1:200 (0.5% AEP) year event
	Fluvial	Less than a 1:100 (1% AEP) year event
Flood Zone B	Coastal	Greater than a 1:200 (0.5% AEP) and less than a 1:1000 (0.1% AEP) year event
	Fluvial	Greater than a 1:100 (1% AEP) and less than a 1:1000 (0.1% AEP) year event
Flood Zone C	Coastal	Greater than a 1:1000 (0.1% AEP) year event
	Fluvial	Greater than a 1:1000 (0.1% AEP) year event

Once a flood zone has been identified, the guidelines set out the different types of development appropriate to each zone. Exceptions to the restriction of development due to potential flood risks are provided for through the use of the **Justification Test**, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated. This recognises that there will be a need for future development in existing towns and urban centres that lie within flood risk zones, and that the avoidance of all future development in these areas would be unsustainable.

A three staged approach to undertaking an FRA is recommended:

Stage 1: Flood Risk Identification - Identification of any issues relating to the site that will require further investigation through a Flood Risk Assessment;

Stage 2: Initial Flood Risk Assessment - Involves establishment of the sources of flooding, the extent of the flood risk, potential impacts of the development and possible mitigation measures;

Stage 3: Detailed Flood Risk Assessment - Assess flood risk issues in sufficient detail to provide quantitative appraisal of potential flood risk of the development, impacts of the flooding elsewhere and the effectiveness of any proposed mitigation measures.

This report addresses the requirements for Stage 2.

2.1.1 Assessment of minor proposals in areas of flood risk

The PSFRM Guidelines provide guidance on minor development in flood risk areas which is relevant to this SSFRA. Section 5.28 of the PSFRM Guidelines states the following:

Applications for minor development, such as small extensions to houses, and most changes of use of existing buildings and or extensions and additions to existing commercial and industrial enterprises, are unlikely to raise significant flooding issues, unless they obstruct important flow paths, introduce a significant additional number of people into flood risk areas or entail the storage of hazardous substances. Since such applications concern existing buildings, the sequential approach cannot be used to locate them in lower-risk areas and the Justification Test will not apply. However, a commensurate assessment of the risks of flooding should accompany such applications to demonstrate that they would not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities. These proposals should follow best practice in the management of health and safety for users and residents of the proposal.

2.2 Limerick Development Plan 2022-2028

The proposed site is covered by the Limerick Development Plan 2022-2028 which states the following with regard to flood risk:

Policy CAF P5 Managing Flood Risk

It is a policy of the Council to protect Flood Zone A and Flood Zone B from inappropriate development and direct developments/land uses into the appropriate lands, in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009 (or any superseding document) and the guidance contained in Development Management Standards. Where a development/land use is proposed that is inappropriate within the Flood Zone, then the development proposal will need to be accompanied by a Development Management Justification Test and Site Specific Flood Risk Assessment in accordance with the criteria set out under The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009 and Circular PL2/2014 (as updated/ superseded). In Flood Zone C, the developer should satisfy themselves that the probability of flooding is appropriate to the development being proposed and should consider the implications of climate change.

Objective CAF O20

Flood Risk Assessments It is an objective of the Council to require a Site-specific Flood Risk Assessment (FRA) for all planning applications in areas at risk of flooding (coastal/tidal, fluvial, pluvial or groundwater), where deemed necessary. The detail of these Site-specific FRAs (or commensurate assessments of flood risk for minor developments) will depend on the level of risk and scale of development. A detailed Site-specific FRA should quantify the risks, the effects of selected mitigation and the management of any residual risks. The assessments shall consider and provide information on the implications of climate change with regard to flood risk in relevant locations.

A Strategic Flood Risk Assessment (SFRA) was prepared to accompany the Limerick Development Plan and states the following in relation to the preparation of an SSFRA for Minor Development:

Section 5.28 of the Planning Guidelines on Flood Risk Management identifies certain types of development as being 'minor works'. In such cases, the sequential approach cannot be used to locate such development in lower-risk areas and the Justification Test will not apply. Generally, the approach to deal with flood protection would involve raising the ground floor levels above extreme flood levels. However, in some parts of the plan area, which are already developed, ground floor levels for flood protection could lead to floor

levels being much higher than adjacent streets. This would cause problems for infill development sites if floor levels were required to be significantly higher than those of neighbouring properties. In this regard, for the key sites in the plan area it has been recognised that ground floor levels below predicted high tide levels could be allowed, in limited circumstances, on a site by site basis, for commercial and business developments. However, if this is the case, then these would be required to be flood resistant construction using water resistant materials and electrical fittings places at higher levels. For high risk areas it would also be necessary to impose planning restrictions in these areas.

2.3 Land Zoning

The land on which the development is proposed has no current zoning in the Limerick Development Plan.

2.4 Flood Risk Management Plan

The OPW publish Flood Risk Management Plans detailing the feasible range of flood risk management measures proposed for their respective river basins. The Flood Risk Management Plan for the Shannon Estuary South River Basin was published by the OPW in 2018 and is valid for the period 2018-2021. The plan lists current flood management measures in place and potentially viable Flood Relief Works. There are no specific measures relating to the subject site but there are a number of measures proposed in the plan which are applicable for all areas.

3 Flood Risk Identification

3.1 Existing Hydrological Environment

The existing hydrological environment is characterised primarily by the presence of the River Maigue located approximately 800m to the east of the subject site. The River Maigue is tidally influenced at this location and outfalls into the Shannon Estuary approximately 7km downstream of the site. Additionally, there is a tributary of the River Maigue, identified as Faha 24 in the EPA database, located approximately 60m to the east of the site. The hydrological environment around the site is shown in Figure 3-1 below.

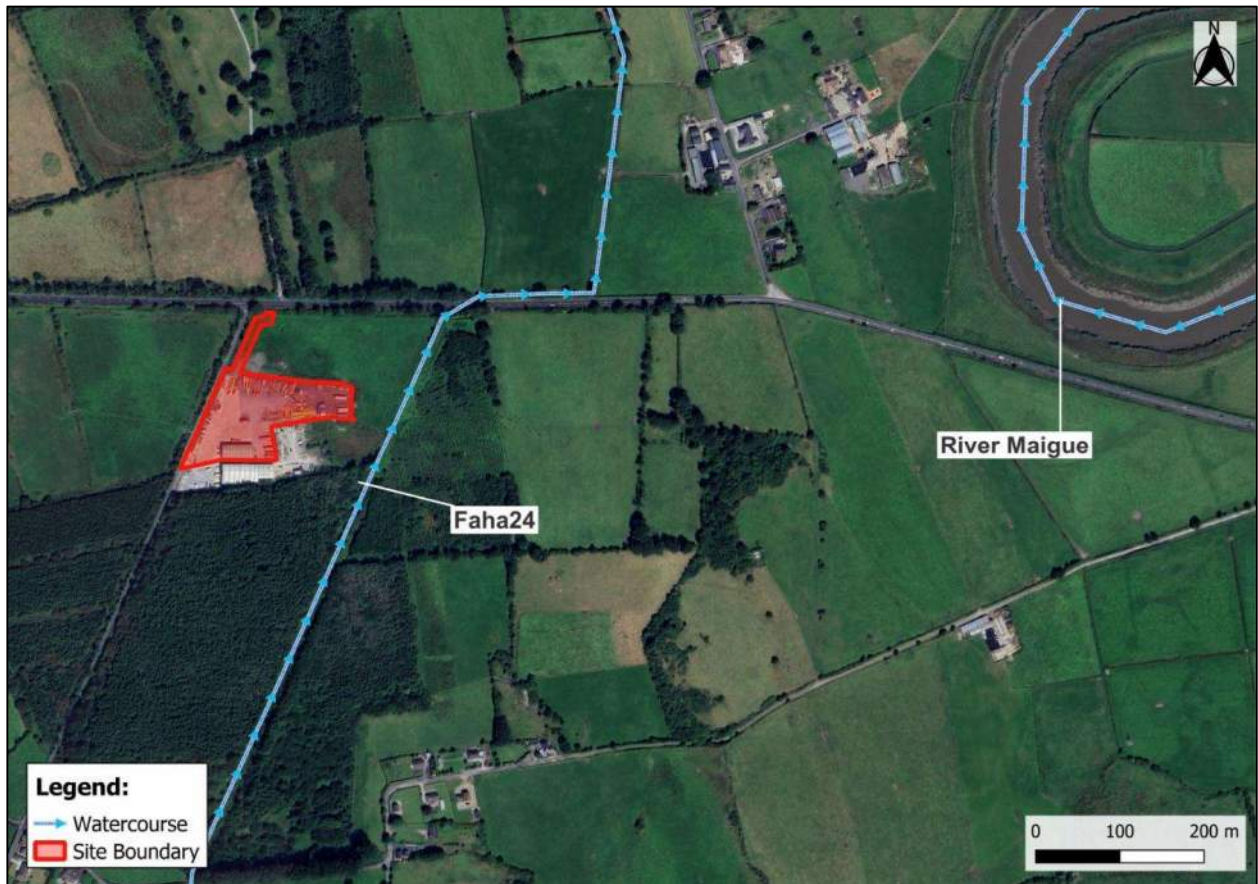


Figure 3-1: Hydrological Environment around the site.

3.2 Topographical Survey

A topographical survey of the site and its environs was completed by Control Surveys in December 2023.

A review of the topographical survey data indicates that the site is relatively flat with levels ranging from 0.00 mAOD and 1.00 mAOD.

It should be noted that this survey was recorded post-works.

Refer to PUNCH drawing 231279-PUNCH-XX-XX-DR-C-0401 for details of the existing drainage.

3.3 Site Walkover

PUNCH Consulting Engineers visited the site on 8th November 2023 to assess the conditions and key features of the site, to establish any potential sources of flooding and to identify the likely routes of flood waters. Appendix A contains a selection of key images taken during the site visits.

The following was established from the site visit:

- The site was accessed via a gate along the R8038 roadway.
- The ground was wet at the time of the visit, with standing water located at low points.
- The surrounding greenfield areas contained reeds and appeared marshy.
- There were no apparent surface water drainage features, eg. gullies / manholes within the site.

3.4 Review of Historic Mapping

A review of the OSI Historical maps¹ was carried out. Figure 3-2 shows an extract from the 6-inch historic mapping and the subject site comprises agricultural lands and is not identified as “liable to flood”.

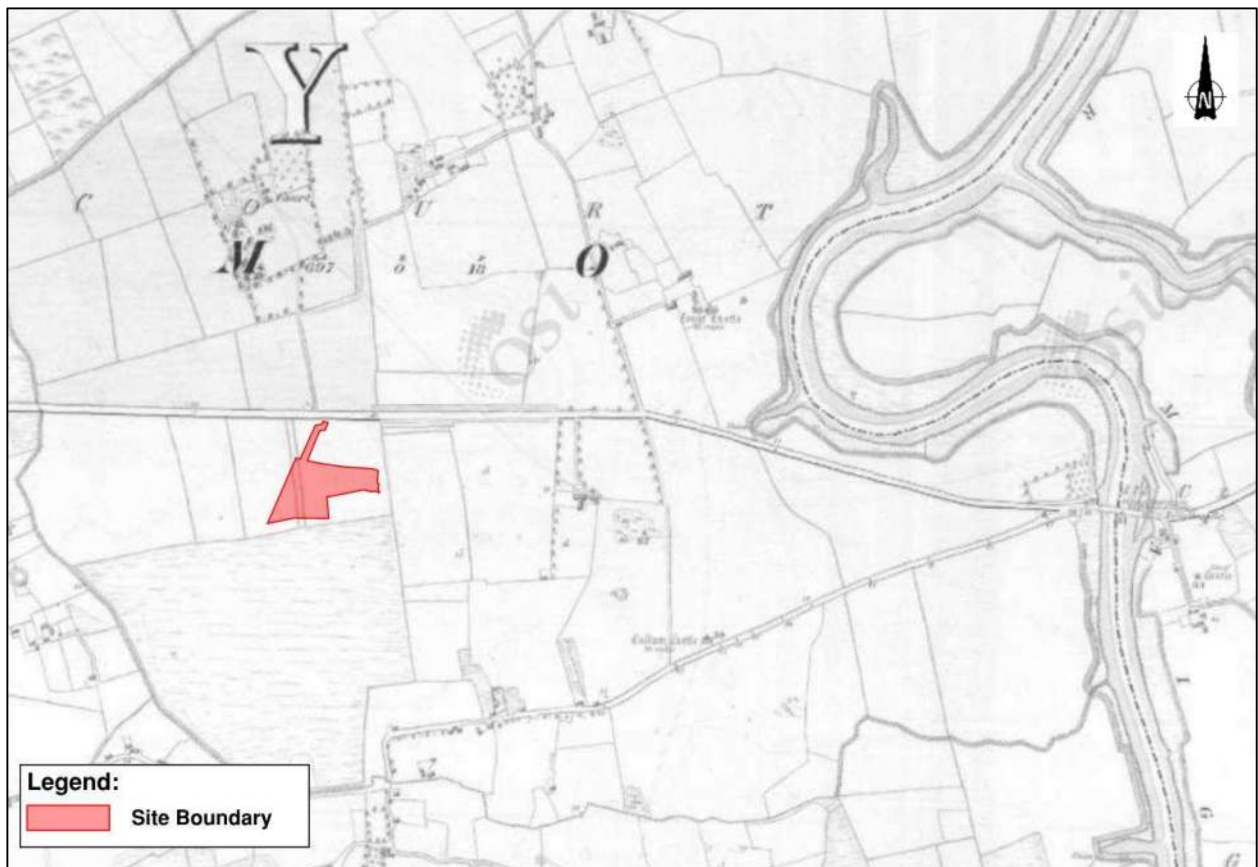


Figure 3-2: Extract from OSI historical 6-inch map

¹ Maps available: <http://map.geohive.ie/mapviewer.html>

3.5 History of Flooding

The Office of Public Works (OPW) Flood Hazard Mapping website holds a record of historic flood events. A review of the database indicates that there are no recorded flood events in the vicinity of the site, as shown in Figure 3-3.

Please note that this is not a guaranteed record of all flood events.

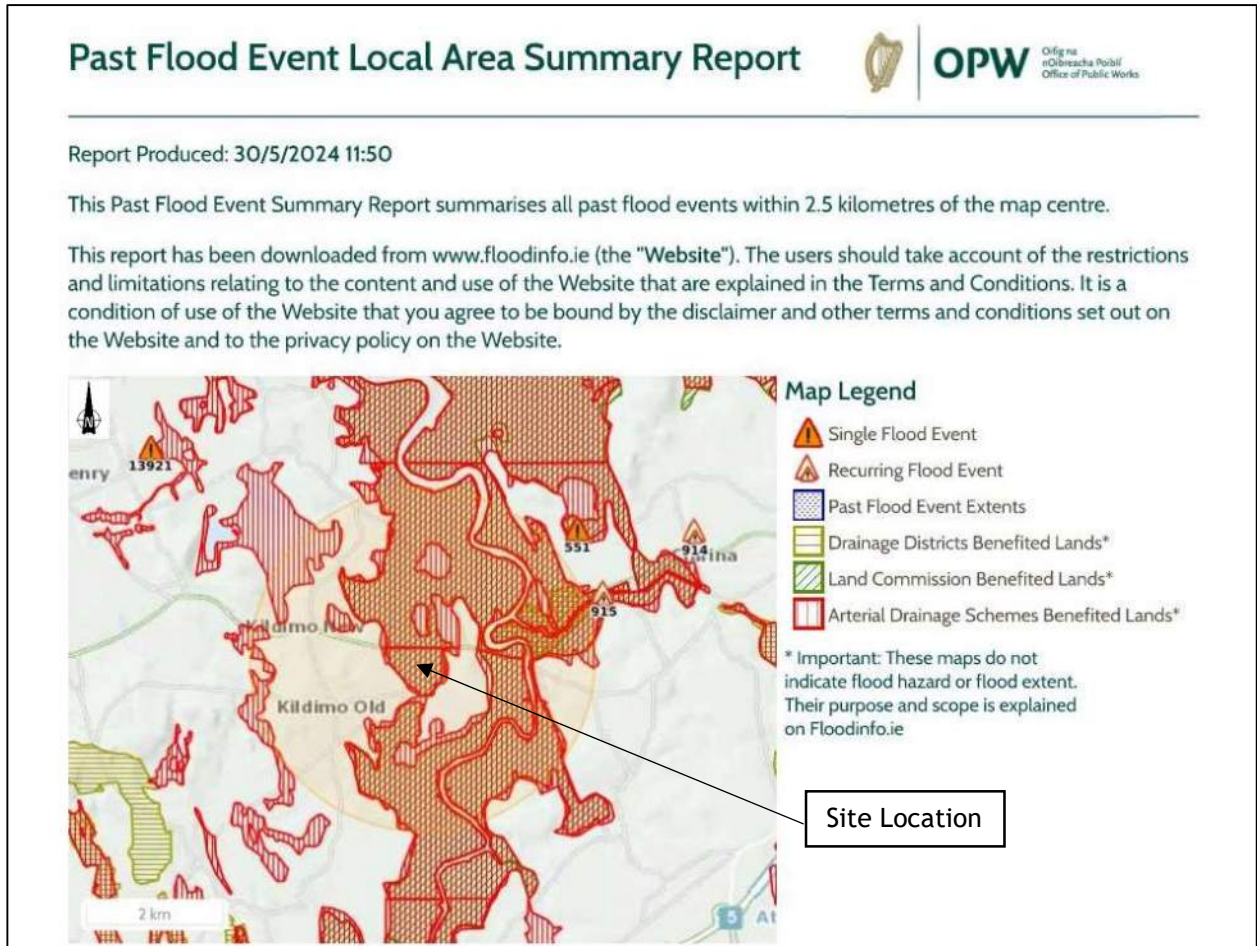


Figure 3-3: Extract from OPW Past Flood Event Local Area Summary Report
<http://www.floodmaps.ie/index.aspx?ReturnUrl=%2fView%2fDefault.aspx>

3.6 Arterial Drainage Scheme

Arterial Drainage Schemes were carried out by the OPW under the Arterial Drainage Act, 1945, to improve land for agriculture and to alleviate flooding. Rivers, lakes, weirs and bridges were modified to enhance conveyance and embankments were built to control the movement of flood water. Flood protection in the benefiting lands was increased as a result of these schemes.

The site subject to this SSFRA is located in lands benefitting from the Mague Outfall Arterial Drainage Scheme which was initially completed between 1973 and 1986. The OPW is tasked with maintaining these drainage works in proper repair and effective condition. The site is located within Arterial Drainage benefitting lands and arterial drainage embankments are located along both banks of the River Mague, as shown in Figure 3-4. A review of publicly available LiDAR data indicates that the crest of the embankments is approximately 4.75mAOD at a location parallel to the site.



Figure 3-4: Arterial Drainage Scheme - Benefitting Lands

3.7 Site Geology

The geology of the site was reviewed using data from the Geological Survey of Ireland (available at www.gsi.ie). The soil type or quaternary sediments within the site boundary is Alluvium, as shown in Figure 3-5 below. The surrounding areas comprise mainly of Alluvium and Tills derived from limestones.

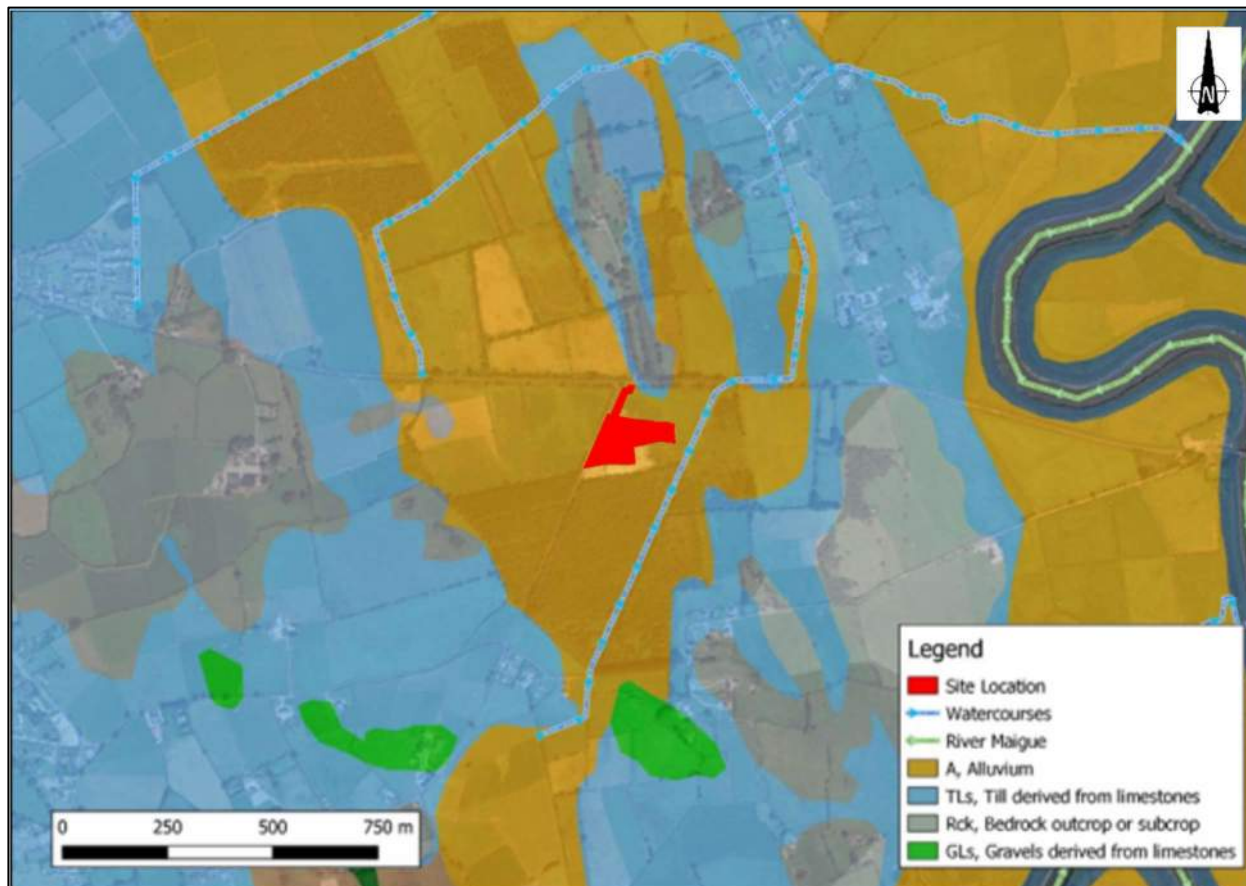


Figure 3-5: Geology of the surrounding area (source: Geological Survey of Ireland (www.gsi.ie))

3.8 Groundwater Flooding

Groundwater flooding occurs when the level of the water stored in the ground rises as a result of prolonged rainfall. A review of data from the Geological Survey of Ireland, does not indicate a groundwater flood risk to the site.

3.9 Pluvial Flooding

Pluvial flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high intensity rainfall.

The provision of a suitable surface water drainage system for the proposed development on the site will mitigate against pluvial flood risk as demonstrated in the accompanying documents. The redevelopment of the site will not adversely affect pluvial flood levels or extents in the area.

3.10 Fluvial Flooding

Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain.

3.10.1 Catchment Flood Risk Assessment and Management Study (CFRAMS) Mapping

The CFRAMS is an OPW led national programme which seeks to identify and map potential existing and future flood hazard in areas at significant risk from flooding. It also aims to identify flood relief measures and prepare Flood Risk Management Plans for these areas.

The site of the proposed development is located in an area which has been assessed as part of the Shannon Estuary South CFRAM Study (UoM 24). The OPW has published detailed flood hazard mapping for the area based on results from the CFRAMS. This includes flood extent and flood depth mapping for a number of return periods for fluvial and coastal flood events. CFRAMS fluvial flood extents in the vicinity of the site are publicly available in GIS format and at <https://www.floodinfo.ie/map/floodmaps/> and are presented here as Figure 3-6.



Figure 3-6: Extract from the CFRAMS fluvial map for the area (site indicated in red)
Maps available: <http://www.floodinfo.ie/map/floodmaps/>

Examination of Figure 3-6 indicates that there is no fluvial flooding predicted at the site on the CFRAMS mapping.

3.10.2 National Indicative Fluvial Mapping

The OPW published the National Indicative Fluvial Mapping (NIFM) in 2021 and they are now publicly available on <https://www.floodinfo.ie/map/floodmaps/>. The NIFM is a series of preliminary mapping or catchments greater than 5km² which are not covered in the OPW's Catchment Flood Risk and Management (CFRAM) programme. These maps are 'predictive' flood maps showing indicative areas predicted to be inundated during a theoretical fluvial flood event with an estimated probability of occurrence. The Faha 24 Stream was not included in the CFRAMS but has been examined as part of the NIFM study. The NIFM extents at the site are shown in Figure 3-7 below:



Figure 3-7: NIFM Flood Extent Mapping

Examination of the NIFM flood extent mapping in Figure 3-7 indicates that the site will be inundated in both the 1%AEP and 0.1%AEP events. However, the OPW note that the NIFM maps “*only provide an indication of areas that may be prone to flooding. They are not necessarily locally accurate and should not be used as the sole basis for defining the Flood Zones nor for making decisions on planning applications.*”.

3.11 Coastal Flooding

Coastal flooding results from sea levels which are higher than normal and result in sea water overflowing onto the land. Coastal flooding is influenced by the following three factors which often work in combination: high tide level, storm surges and wave action.

3.11.1 Catchment Flood Risk Assessment and Management Study

Figure 3-8 below is an extract from the relevant CFRAMS coastal flood extent mapping.



Figure 3-8: Extract from CFRAMS Coastal Flood Extent Mapping

Figure 3-8 indicates that the site is partially flooded in the 0.1%AEP CFRAMS coastal flood event.

3.11.2 National Coastal Flood Hazard Mapping

The OPW published the National Coastal Flood Hazard Mapping (NCFHM) in 2021 and they are now publicly available on https://www.floodinfo.ie/map/coastal_map/. The NCFHM project produced updated national scale coastal flood extent and depth maps. These maps are 'predictive' flood maps showing indicative areas predicted to be inundated during a theoretical flood event with an estimated probability of occurrence. These flood maps do not take account of any existing flood defences.

Current Scenario NCFHM flood extents in the vicinity of the site can be seen below in Figure 3-9. The figure shows that the site is subject to flooding during the 10%, 0.5% and 0.1% AEP events.



Figure 3-9: NCFHM Flood Extents - Current Scenario

The NCFHM flood mapping is based on estimated extreme water level outputs from Phase 1 of the Irish Coastal Wave and Water Level Modelling Study (ICWWS 2018). The ICWWS estimation point closest to the site is South West Point S25, located in the Shannon Estuary. The predicted coastal water levels at this point are presented in Figure 3-1 below:

Table 3-1: ICWWS Coastal Flood Levels Adjacent to the Site

Flood Level (mAOD) (by Return Period)			
NODE	10%AEP	0.5%AEP	0.1%AEP
South West Point S25	3.71	4.14	4.37

Examination of Figure 3-9 reveals that the site is located within the predicted 10%, 0.5% and 0.1% AEP NCFHM coastal flood extents.

3.12 Limerick Development Plan Strategic Flood Risk Assessment

The Strategic Flood Risk Assessment (SFRA), prepared as part of the Limerick Development Plan, does not include Flood Zone mapping in the vicinity of the site.

3.13 Existing Flood Defences

The presence of arterial drainage scheme works along the Faha 24 and the River Mague confers flood protection benefits to the site. Notably, arterial drainage scheme embankments are located along both banks of the River Mague with a crest height of approximately 4.75mAOD adjacent to the site. This height is in excess of the NCFHM predicted extreme coastal flood levels for the 10%, 0.5% and 0.1% AEP events.

The arterial drainage scheme embankments are maintained in good repair by the OPW and an embankment breach or failure is considered unlikely.

3.14 Estimate of Flood Zone

PUNCH Consulting Engineers have reviewed the available information as outlined in the above sections and have concluded that the site is located in fluvial and coastal Flood Zones A. The site benefits from the Arterial Drainage Scheme embankments along the Mague river but retains a residual risk of flooding in the unlikely event of an embankment breach.

4 Flood Risk Assessment

4.1 Sources of Flooding

When carrying out a Flood Risk Assessment, one should consider all potential risk and sources of flood water at the site. In general, the relevant flood sources are:

Fluvial Flooding

Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain. The proposed site is located approximately 60m from the Faha 24 River. From a review of the available information, it is considered that the site is at residual risk of fluvial flooding.

Coastal Flooding

Coastal flooding is the result of sea levels which are higher than normal and result in sea water overflowing onto the land during high tides or storm surges. The site is located 4.5m from the Shannon Estuary and the River Maigue and Faha 24 River are tidally influenced at this point. From a review of the available information, the site it is considered to have a residual risk of coastal flooding due to the presence of arterial drainage scheme flood defence embankments.

Pluvial Flooding

Pluvial Flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high-intensity rainfall. The provision of a suitable surface water drainage system for any proposed development on the site will mitigate against this risk.

Groundwater Flooding

Groundwater flooding occurs when the level of the water stored in the ground rises as a result of prolonged rainfall. From a review of the available information, there is no risk of groundwater flooding at the site.

4.2 Site Vulnerability

The proposed development is commercial in nature, which is classified as "Less Vulnerable Development". The Planning System and Flood Risk Management Guidelines gives definitions for the type of developments that can take place in each Flood Zone. Only Coastal and Fluvial flood zones are considered in determining whether a Justification Test is required.

Table 4-1: Matrix of Vulnerability versus Flood Zone to indicate Justification Requirement

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

As per Table 4-1 above, Less Vulnerable Development, located in Flood Zone A, is subject to the Justification Test. However, as the proposed works consist of alterations / extension to an existing commercial premises, it can be considered a minor infill development under Section 5.28 of the PSFRMG and as such the Justification Test need not apply. A commensurate assessment of the risks of flooding at the site has been provided in Section 4.1 above.

In response to the requirements of Section 5.28 of the PSFRMG, the following points are noted:

- The raising of lands by approximately 0.5m and the change in ground surface from greenfield to hardstanding will not obstruct important flow paths. Should an extreme flood event occur, large portions of the surrounding area will be flooded and flood storage volume lost due to ground raising at the site will be negligible.
- As this development consists only of alterations to the ground surface, it will not impede access to a watercourse, flood plain or flood protection and management facilities.
- The proposed development is an extension to a commercial premises and will not introduce a significant number of additional people into flood risk.
- The proposal will follow best practice in management of health and safety for users of the proposal.

In line with the Sequential Approach outlined in the PSFRM Guidelines,

4.3 Flood Mitigation Measures

With reference 3.14 above, a review of the available data indicates that the site of the development falls within defended Flood Zone A for both fluvial and coastal flooding. The proposed development is commercial in nature and therefore classified in the PSFRMG as 'Less Vulnerable Development'. A Justification Test is not required as the proposed works are considered 'minor works'. In light of this, the following mitigation measures are proposed:

- All fuels and oils stored on site will be stored within sealed tanks. In the event of inundation of the site by natural floodwaters, the risk of damage to the environment from hydrocarbons on site will be minimised.
- A Flood Emergency Response Plan should be prepared for the development. While the details of this plan will be the responsibility of the proprietor of the site, PUNCH recommend that consideration be given to evacuation of personnel and vehicles / machinery and shutting down of services such as gas and electricity.
- Periodic monitoring of national weather warning should be undertaken. National weather warnings are announced via the Irish Meteorological Service Online, Met Éireann, typically 48 hours in advance of a weather event.
- The proposed development will provide stormwater drainage in accordance with the Limerick Development Plan to alleviate pluvial flooding risk.
- Part of the fill area is to be allowed to return to wild naturally.
- Surface water management measures to improve the quality of the existing permitted and proposed discharge of surface water from the site to existing boundary drains.

With the implementation of the above measures the risk of flood damage will be minimised, and the development will not increase the risk of flooding to any adjacent or nearby area.

4.4 Flood Risk Management

Flood risk management under the EU Floods Directive aims to minimise the risks arising from flooding to people, property and the environment. Minimising risk can be achieved through structural measures that block or restrict the pathways of floodwaters, such as river defences or non-structural measures that are often aimed at reducing the vulnerability of people and communities such as flood warning, effective flood emergency response, or resilience measures for communities or individual properties.

Given that the property is located inside Flood Zone A, successful mitigation measures must be implemented to minimise the risk of flood damage. Following the implementation of the mitigation measures outlined in Section 4.3 above, flood damage to property or to people will be minimised during an extreme flood event.

Met Eireann weather warnings are generally issued 48 hours in advance of an events and as such the occupants of the site will have sufficient time to implement a flood emergency response and evacuation plan should it be required.

5 Conclusions

PUNCH Consulting Engineers were appointed by O'Carroll's Crane Hire to carry out a Site-Specific Flood Risk Assessment (SSFRA) for a site in Knockbrack West, Co. Limerick. This SSFRA will be included in a planning application for the retention of ground re-surfacing throughout the site.

This Site-Specific Flood Risk Assessment has been carried out in accordance with "*The Planning System & Flood Risk Management Guidelines*" published by the Department of the Environment, Heritage and Local Government in November 2009 and the Limerick Development Plan.

A review of the flood risk in the area was carried out as the site is located near the Mague River and Faha 24 Stream.

Flood Maps produced as part of the CFRAMS, NIFM and NCFHM were consulted to establish the Flood Zone. It was determined that the proposed development site is currently located in Flood Zone A for fluvial and coastal flooding. The site benefits from the Arterial Drainage Scheme embankments along the Mague river, but retains a residual risk of flooding in the unlikely event of an embankment breach.

As the site is classed as minor development in accordance with Section 5.28 of the Planning System and Flood Risk Management Guidelines, the Justification Test does not apply. A commensurate assessment of the risks of flooding at the site has been provided in Sections 3 and 4 above.

The proposed development has a residual risk of flooding. However, given the nature of the development and with the adoption of the proposed mitigation measures in Section 4.3, it is deemed appropriate.

Appendix A Site Visit Images



Image 1: New Concrete Hard-Standing Area.



Image 2: New Gravel Hard-Standing Area



Image 3: Surface water ponding in low lying areas.



Image 4: Reeds and marsh lands adjacent to site.



Image 5: Drainage Channel Bordering Site Filled with Water