# Holiday Blue & Express Red (Zone Y and Z) Long-term car parks

## The Express Red (Zone Y and Z) Car Park Flood Risk Assessment

daa

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# Notice

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# 1. Introduction

Atkins were commissioned by the daa to prepare a Flood Risk Assessment (FRA) to accompany a planning application for the existing Express Red Zone (Y and Z) Car park (hereafter referred to as the Express red car park) at Dublin Airport.

This FRA consists of the following:

- Stage 1 – Flood Risk Identification
- Stage 2 – Initial Flood Risk Assessment

The scope for Stage 1 is to identify whether there may be any flooding or surface water management issues related to the existing car park that may warrant further investigation. If the results from the Stage 1 assessment concludes that no flood risks are identified, then this FRA is not required to proceed to Stage 2.

The scope for Stage 2 is to confirm sources of flooding that may affect the existing site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding to the existing car park. The potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures is to be considered. If required, the scope for a detailed assessment should be listed.

This FRA has been undertaken in consideration of the following guidance document;

- '*The Planning System and Flood Risk Management – Guidelines for Planning Authorities'* DOEHLG 2009.

# 2. Site Description

## 2.1. General

The existing Express red car parkis located south-east of Dublin Airport. The car park is bound to the north and south by greenfield sites; to the east by the sliproad from the M50 to the M1 motorway northbound; and to the west by the Dardistown Cemetery.

## 2.2. Existing Site Layout

The existing Express red car parkconsists of impermeable paving with ancillary infrastructure and facilities, such as the existing internal circulation road including bus shelters, car park building (including public toilets and staff break room), security huts, car park maintenance portacabin and car park administration portacabin, lighting, boundary fencing, car park barriers, CCTV cameras, internal car park signage, existing drainage network including existing surface water attenuation area, and surrounding landscaping.

There is no proposal for works within the existing Express red car park.

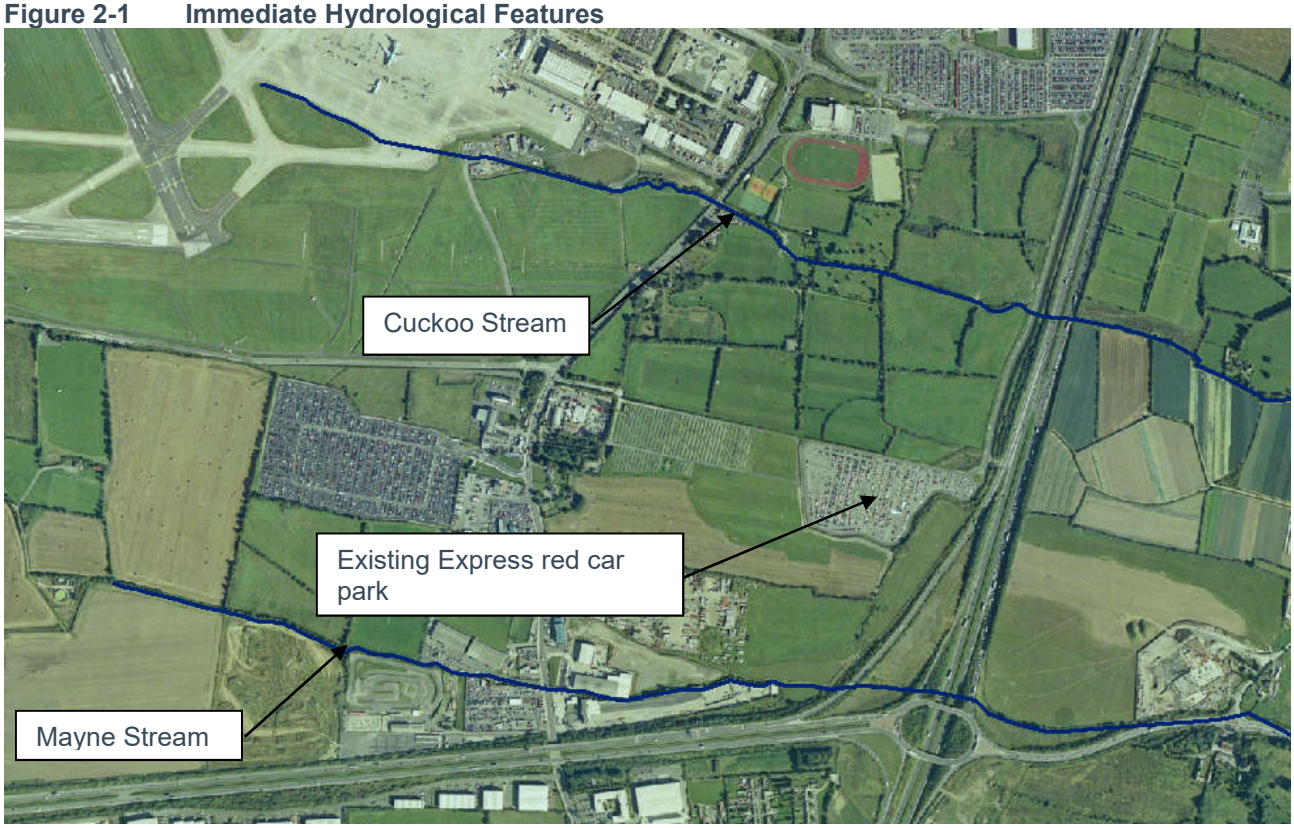
## 2.3. Existing Topographical Levels

The existing car park and surrounding lands are slightly to moderately sloping in the general direction from south-west to north-east. The existing carpark elevations range from 50.500 to 53.500m.OD Malin.

## 2.4. Local Hydrology & Existing Drainage

The most immediate hydrological features in the vicinity of the site are the Cuckoo Stream and Mayne Stream. The locations of both streams in relation to the existing car park are shown in Figure 2-1 below:

**Figure 2-1 Immediate Hydrological Features**



The Cuckoo Stream runs from west to east approximately 370 metres from the northern boundary of the existing Express red car park. The catchment area upstream is approximately 3.0km$^2$, which consist largely of Dublin Airport Drainage Network and adjacent greenfield sites.

The Mayne Stream runs from west to east approximately 320 metres from the southern boundary of the existing Express red car park. The catchment area upstream is approximately 4.5km$^2$, which of a section of Dublin Airport Drainage Network, section of Holiday blue car park, Quickpark car park, a number of retail/commercial units and greenfield sites.

The existing car park is largely covered with impermeable paving with a closed pipe network which drains the carpark area into an attenuation area. The attenuation area was designed to store excess flow for up to 1 in 100 year return period with discharge to the Cuckoo Stream limited to 23.6l/s rate for the existing Express red car park. This discharge rate was set out and agreed in the planning compliance submission to Fingal County Council on the 1st April 2015 (reference file SDI/01/13/C1) in response to storm drainage condition 6 set out in An Bord Pleanála planning reference: PL06F.PA.002.

# 3. Initial Flood Risk Assessment

This flood study for the site is undertaken in three principle stages, these being 'Step 1 – Screening Assessment', Step 2 – Scoping Assessment' and 'Step 3 – Assessing Flood Risk'.

## 3.1. Possible Flooding Mechanisms

Table 3-1 below summarises the possible flooding mechanisms considered for the site;

**Table 3-1 Possible Flooding Mechanisms**

| Source/Pathway | Significant? | Comment/Reason |
|---|---|---|
| Tidal/Coastal | No | The site is not at a coastal location. |
| Fluvial | Possible | Two watercourses adjacent to the existing carpark. |
| Pluvial (urban drainage) | Possible | The existing car park are largely covered with hardstanding. |
| Pluvial (overland flow) | No | The existing car park is not surrounded by elevated lands. |
| Blockage | Possible | The access road to Express red car parkcrosses over a culvert located on the Cuckoo Stream. |
| Groundwater | No | There are no significant springs or groundwater discharges recorded in the immediate vicinity of the site. |

The primary flood risks to the site can be attributed to pluvial (urban drainage) and fluvial flooding, Secondary flood risks can be attributed to blockage of a culvert on the Cuckoo Stream immediately downstream of the site.

# 4. Screening Assessment

The purpose of this screening assessment is to establish the level of flooding risk that may exist for a particular site and to collate and assess existing current or historical information and data which may indicate the level or extent of any flood risk.

The following information and data was collated as part of the screening assessment carried out for the site.

## 4.1. OPW / EPA / Local Authority Hydrometric Data

The OPW, EPA and local authority hydrometric data were investigated, and no existing hydrometric stations were identified for the Cuckoo Stream and Mayne Stream at the vicinity of the existing car park.

## 4.2. OPW Draft PFRA Mapping

Draft Preliminary Flood Risk Assessment (PFRA) Maps have been produced for the whole country by the OPW. Figure 4-1 below, extracted from OPW PFRA Map number 2019/MAP/256/A, and illustrates predictive flood zones in the vicinity of the site.

**Figure 4-1 OPW PFRA Map**

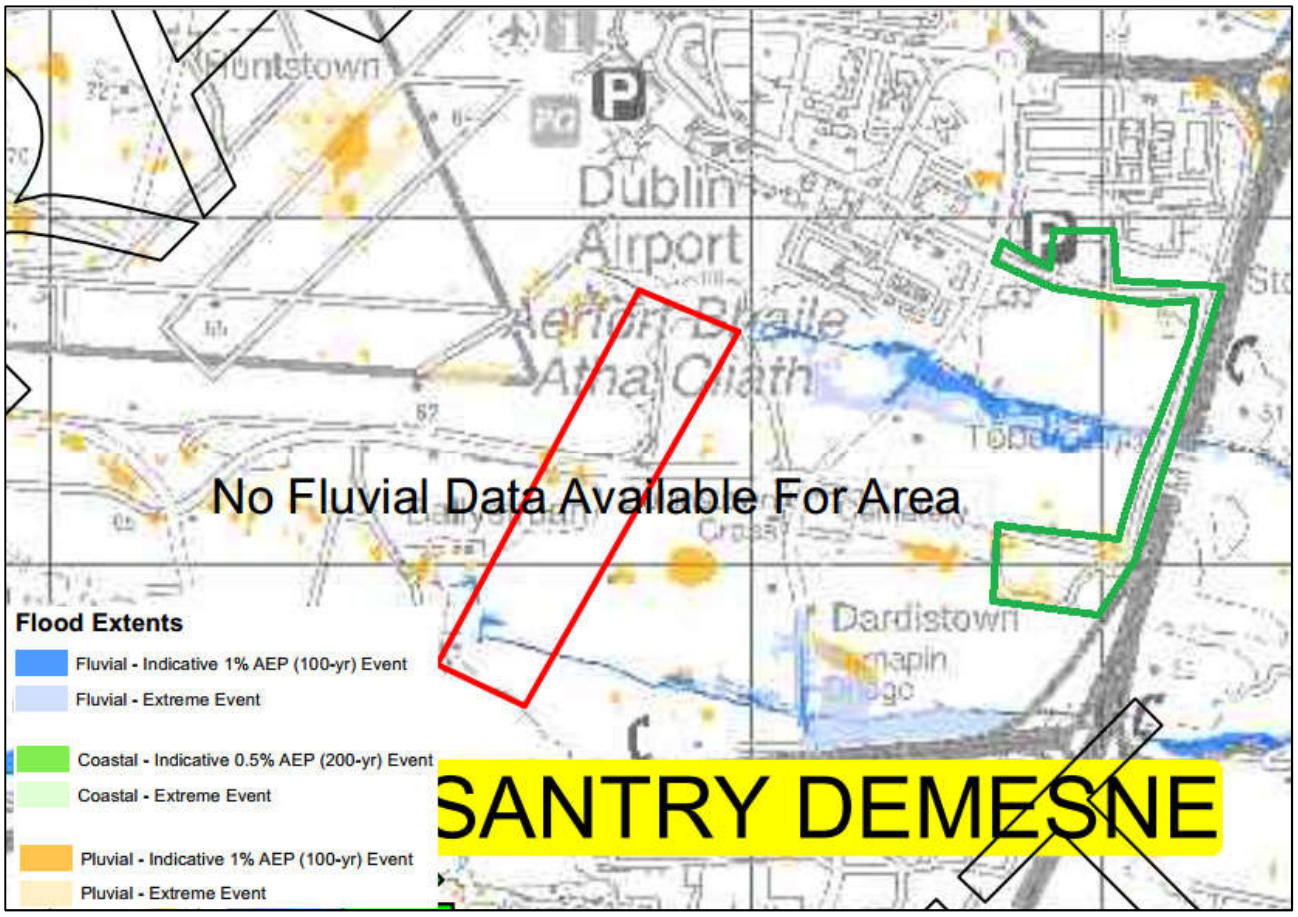



Figure 4-1 above indicates possible pluvial flooding within the existing car park area, and potential fluvial flooding at the access road crossing over the Cuckoo Stream. It should be noted that the predicted extent of the flooding shown on these maps was developed using low resolution digital terrain model (DTM) and the illustrated flood extents are intended to be indicative only.

## 4.3. OPW Flood Hazard Website

The OPW Flood Hazard Mapping website (www.floodmaps.ie) was consulted in relation to available historical or anecdotal information on any flooding incidences or occurrences in the vicinity of the site. Figure 4-2 below shows mapping from the Flood Hazard Mapping website in vicinity of the study area.

**Figure 4-2 OPW Flood Hazard Map**

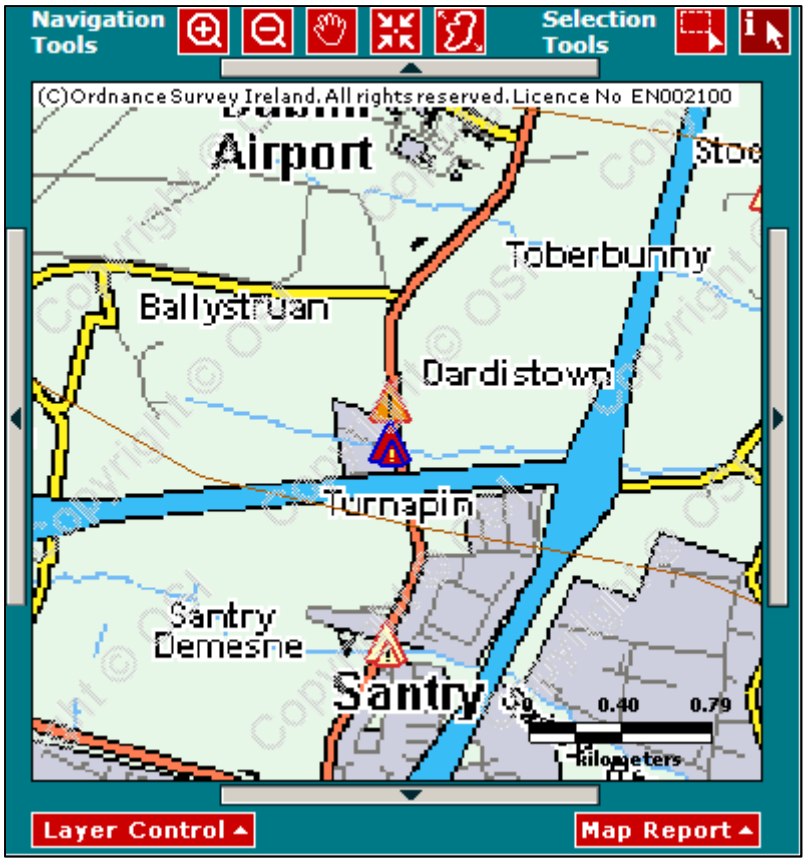



Figure 4-2 above does not indicate flooding in the immediate vicinity of the existing car park. The nearest reported flood event identified was at the R132 regional road crossing the Mayne Stream and Cuckoo Stream approximately 700 metres upstream of Express red car park. This flood event resulted in flooding at both crossings over the period of 13th-15th November 2002 and did not impact the Express red car park.

## 4.4. Ordnance Survey Historic Mapping

Available historic mapping for the area was consulted as this can provide evidence of historical flooding incidences or occurrences. The maps consulted were the pre-1900's historic 6-inch colour and 25-inch maps. The flood maps layer was investigated to identify any potential flood plains within the environs of the site.

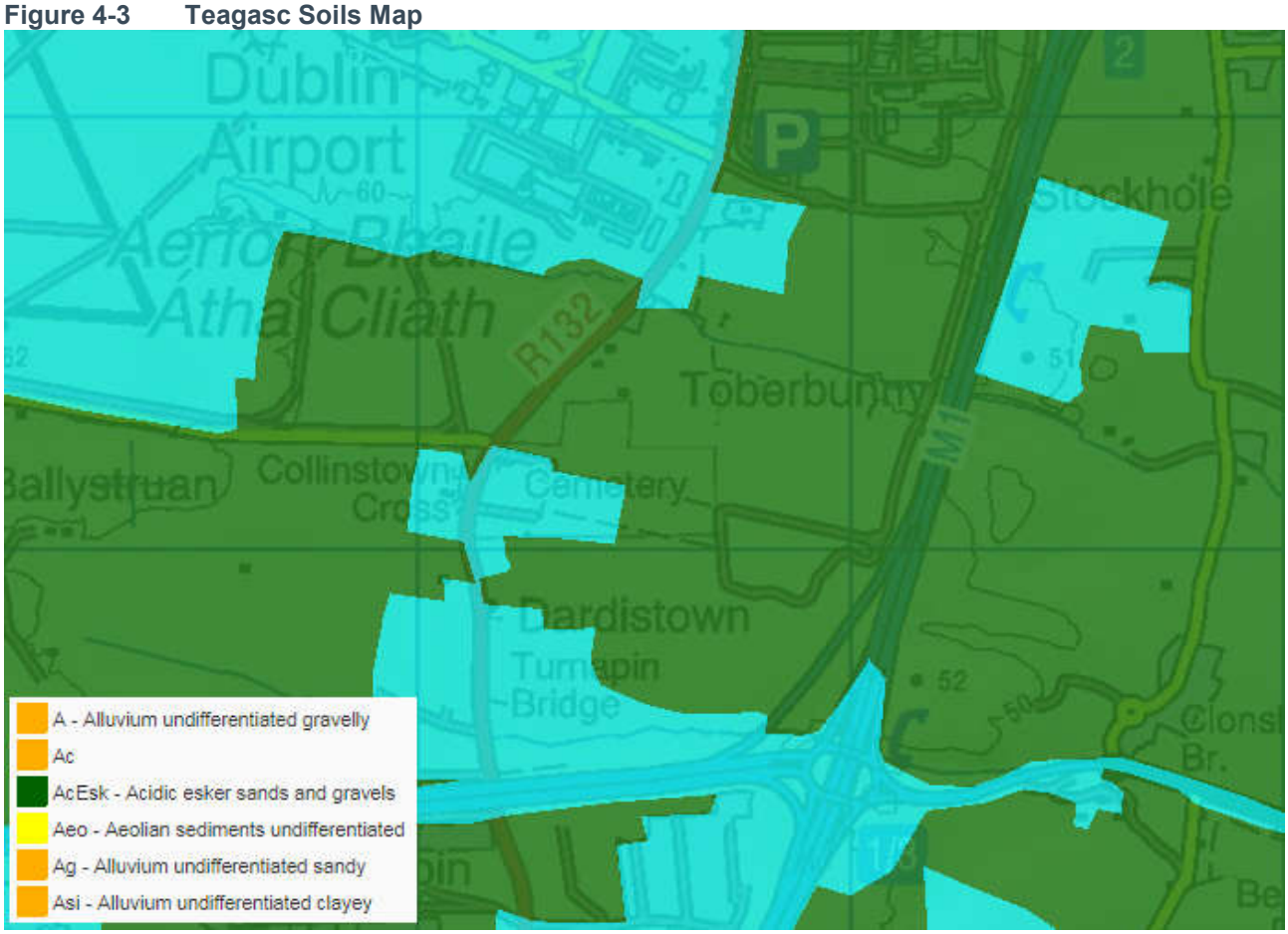
The maps consulted showed no indication of historical or anecdotal instances of flooding within the environs of the existing car park.

## 4.5. Teagasc Soils Mapping

The Teagasc Soils maps were consulted to determine the presence of alluvium deposits in the vicinity of the site. Deposition of alluvium deposits can be an indicator of areas which have flooded in the recent geological past.

Figure 4-3 below show the sub-soils mapping for the site of which does not indicate alluvium deposits within the immediate vicinity of the existing car park.

**Figure 4-3 Teagasc Soils Map**




## 4.6. Fingal East Meath CFRAM Study

The Fingal East Meath Catchment Flood Risk Assessment Management (CFRAM) Study was undertaken by the Office of Public Works (OPW) and its Partners. This study involved detailed flood studies into the areas recommended for further assessment from the Fingal East Meath District, which included the Cuckoo Stream, as part of the PFRA study.

A detailed flood risk extents map produced for Cuckoo Stream adjacent to the southern boundary of the existing car park is shown in Figure 4-4 below.

**Figure 4-4 Fingal East Meath CFRAM Study Detailed Flood Map**

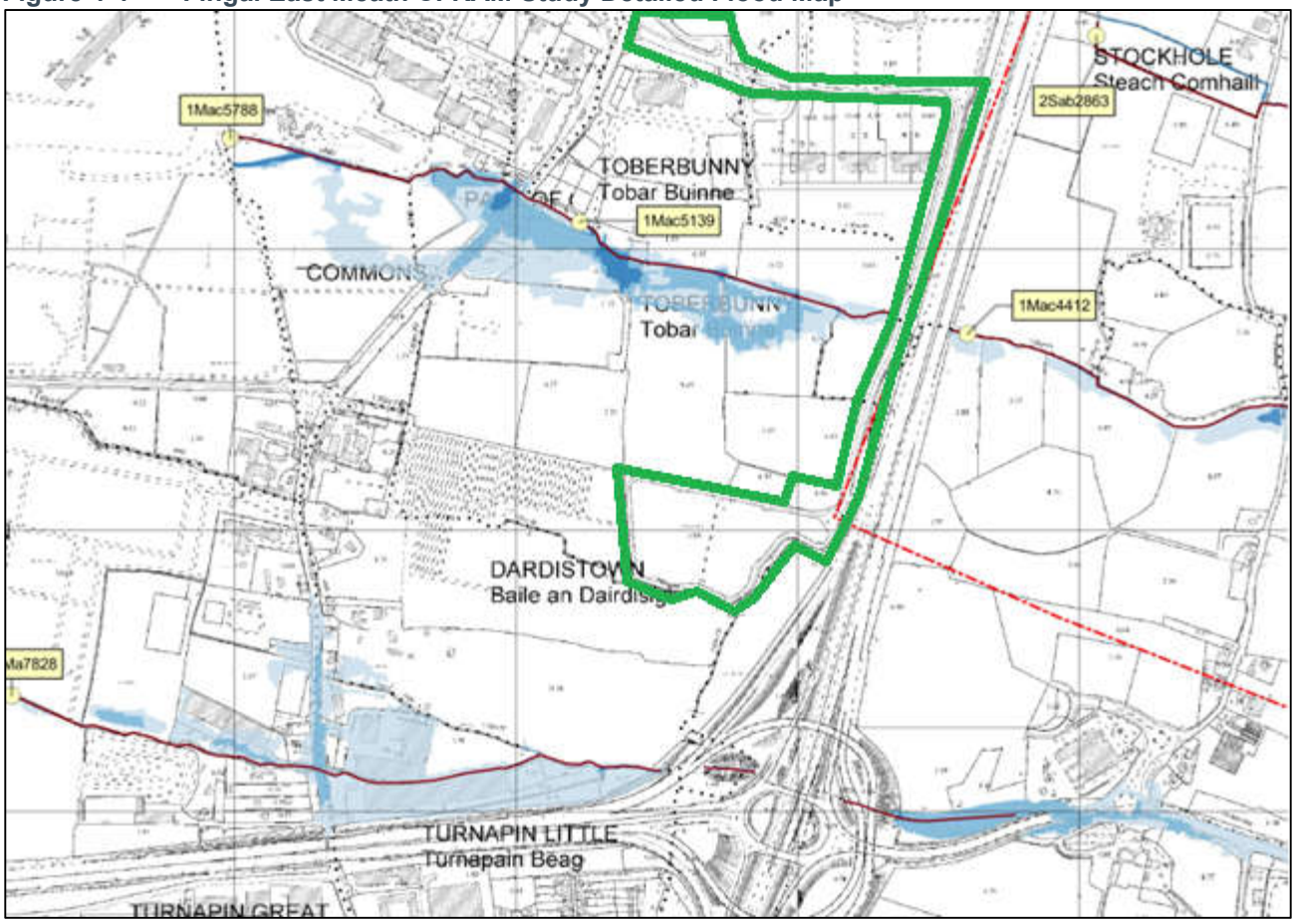
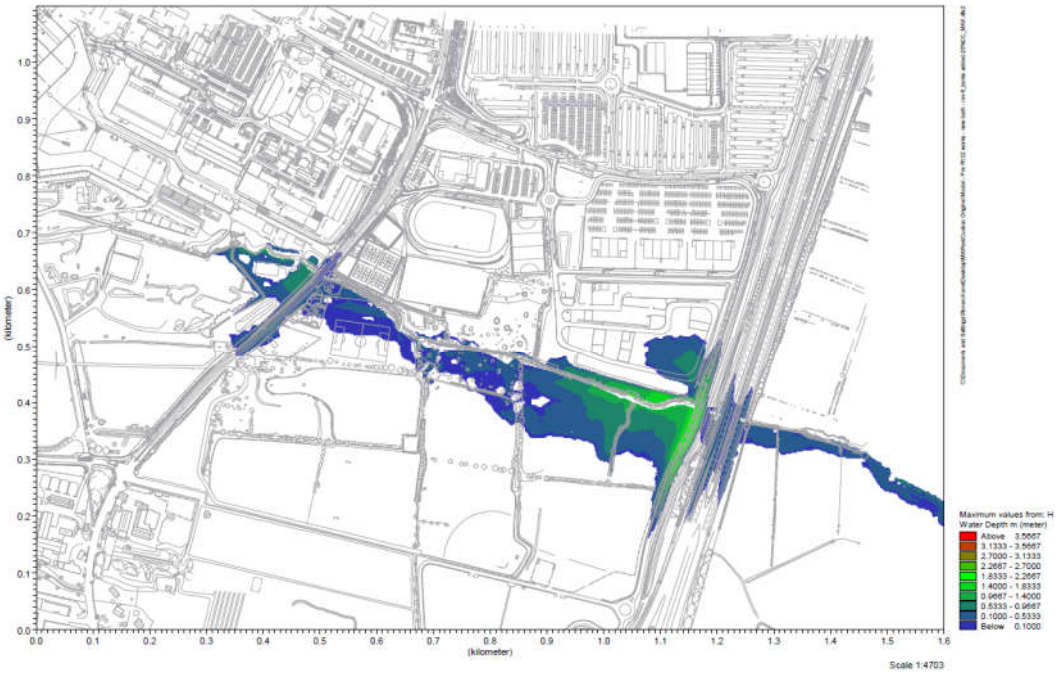



Figure 4-4 above does not indicate the existing car park and access road at risk from flooding from both the Cuckoo Stream and Mayne Stream.

## 4.7. R132 Road Improvement Scheme

RPS consultants were commissioned by the daa to undertake a detailed flood risk assessment in relation to the R132 road improvement scheme. Under this commission RPS carried out detailed hydraulic modelling for the Cuckoo stream to assess the extent of flooding for the 1 in 100 year and 1 in 1000 year scenarios. The study indicated that the existing car park does not fall into any of these flood extent zones. However the study revealed that a section of the existing access road particularly the crossing over the Cuckoo Stream fell within the 100yr flood as shown in below Figure 4-5 thus improvement works was recommended then for the safe ingress and access to the car park.

**Figure 4-5 Flood Extent Map for Cuckoo stream (Extract from RPS Study)**



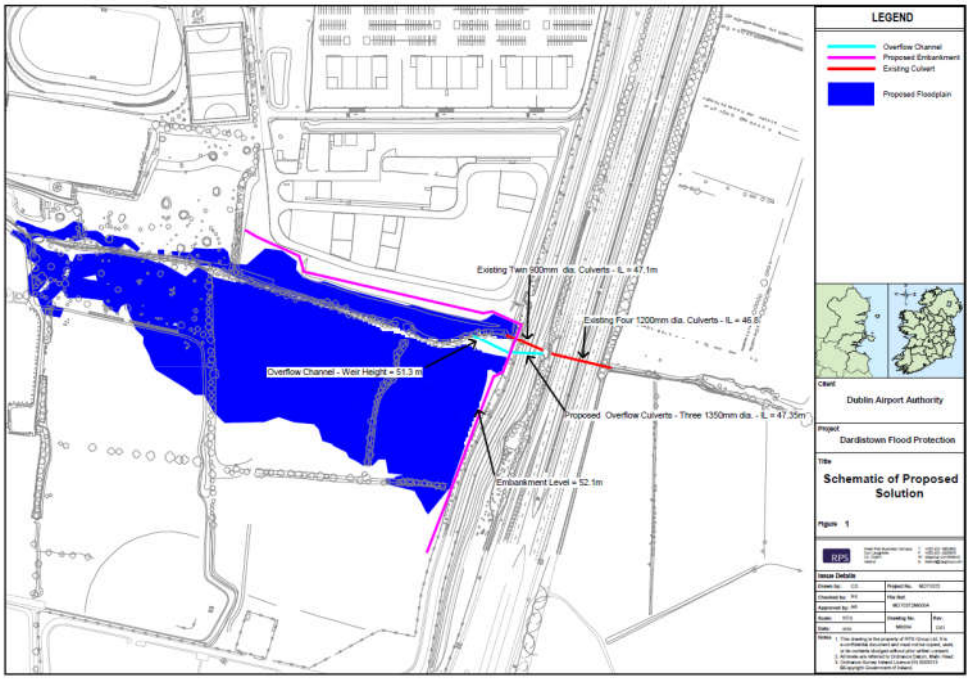

Map 2 Q100 + CC - Existing - Pre R132 Upgrade

Following this study RPS consultants conducted a detailed hydraulic model analysis of the measures required to provide the required level of flood protection. The mitigation measures proposed included;

- Construction of a new embankment to maximum elevation of 52.1mOD of approximate length 350m

The proposed new embankment was constructed in 2016 as part of the Express Red Zone (Y and Z) drainage upgrade works outlined in section 4.8 below.

**Figure 4-6 Flood Extent Map for Cuckoo stream- post development (Extract from RPS Study)**



## 4.8. Eastlands Carpark Drainage Study

Atkins then were commissioned by the daa in August 2013 to complete a drainage study for Eastlands Car park which includes Express red car park. The existing drainage system for the Express red car parkconsists of a combination of traditional gully and carrier drain network and a SUDs attenuation area with an outfall to the Cuckoo Stream limited to a run-off rate of 23.6l/s from the car park. The study included detailed hydraulic model analysis for the existing drainage network at the Express red car park.

The results of the analysis confirmed that the existing car park pipe network did not have sufficient capacity to accommodate rainfall for the 1 in 100 year return period without flooding. The study confirmed that the attenuation area with discharge limited to a run-off rate of 23.6l/s has sufficient storage capacity for the 1 in 100 year return period including for 10% climate change. Following further analysis of the hydraulic model, recommendations were made as part of this study to upgrade the pipe network to provide capacity for no surface flooding for up to a 1 in 30 year return period *in line with the requirements of GDSDS Guidelines.* The upgrade works to the existing pipe network at Express red car park have since been carried out.

All of the above measures have been implemented as set out and agreed in the planning compliance submission to Fingal County Council on the 1st April 2015 (reference file SDI/01/13/C1) in response to storm drainage items set out in An Bord Pleanála planning reference: PL06F.PA.002.

## 4.9. Conclusion of Screening Assessment

The purpose of the screening assessment is to establish whether a flood-risk issue exists or may exist in the future. If there is a potential flood risk issue then this procedure should move to “Step 2 – Scoping Assessment” or if no potential flood risk is identified from the screening assessment, then the overall assessment can end at Step 1.

Based on the findings of the screening assessment, this flood study is required to proceed to “Step 2 – Scoping Assessment”.

# 5. Scoping Assessment

The purpose of the scoping assessment is to identify possible flood risks and to implement the necessary level of detail and also to assess these possible risks, and to ensure they can be adequately addressed in this study. The scoping assessment should also identify whether sufficient quantitative information is already available to complete this study.

The potential flood risks identified at the initial flood risk assessment stage are listed below:

- Fluvial
- Blockage of Culvert
- Pluvial (urban drainage)

The PFRA, Fingal East Meath CFRAM and R132 Improvement Scheme flood maps indicate there is no potential fluvial flood risks to the existing Express red car park. However the detailed hydraulic model analysis carried out for the R132 Improvement scheme identified potential fluvial flood risk to the access road to the existing carpark. This study recommended measures to provide the required level of flood protection (1 in 100 year return period) following detailed hydraulic model analysis as discussed in Section 4.7 above. The measures have since been implemented. Hence the residual fluvial flood risk to existing car park and access road is deemed to be acceptable.

The measures implemented as per the R132 Improvement Scheme recommendations included upgrade works to the existing culvert crossing on the Cuckoo Stream underneath the access road. The culverts have been sized to allow for 1 in 100 year flows and blockages. Hence there is adequate protection provided against potential blockages for the culverts.

The PFRA predicted flood map and the Eastlands Carpark drainage study identified potential pluvial flooding at the vicinity of the Express red car park. The Eastlands Car park Drainage Study provided recommendations to upgrade the pipe network within Express red car park to mitigate flooding from 1 in 100 year rainfall events. The recommendations were determined by detailed hydraulic model analysis as discussed in Section 4.8 of this report and have since been carried out. Hence the Express red car park drainage system has sufficient capacity to accommodate rainfall for up to 1 in 100 year return period.

In consideration of the above scoping assessment, the potential flood risks identified are considered to be addressed sufficiently. Hence this flood risk assessment is not required to proceed to the "*Assessing the Flood Risk*" stage.

# 6. Conclusion

The results of this Flood Risk Assessment concluded that the risks from flooding at the existing Express red car park due to pluvial (urban drainage) and fluvial due to blockage of culvert have been addressed and are managed to acceptable limits as per the OPW Guidelines '*The Planning System and Flood Risk Management – Guidelines for Planning Authorities'* DOEHLG 2009.

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