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06 October 2020

County Offaly Development Plan 2021 - 2027

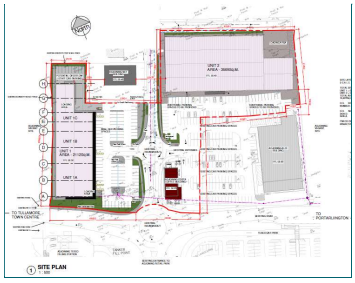
Draft Plan : Submission on behalf of Flanagan Properties Ltd, Cormac Street, Tullamore

Objection to draft Plan in regard to its land at Riverview, Cloncollig, Tullamore

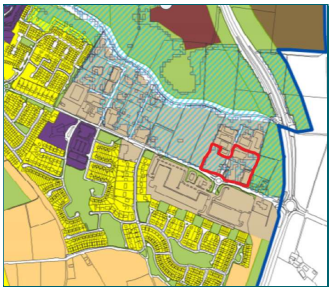
Proposed Amendment – Delete the identified 'Constrained land' designation from this site

Introduction

1. This representation is submitted on behalf of Flanagan Properties Ltd, which is the landowner of the land shown edged red below, at Riverview, Cloncollig, Tullamore.



Source : Kenny Lyons Architects Application 18/535



Source : CODP 2021 DRAFT – Cloncollig, indicative location

2. Flanagan Property welcomes the opportunity of participating in this plan-making process and requests that OCC gives full consideration to this representation, which supports the zoning of this land as Enterprise and Employment but objects the identification of the site as 'constrained' – the site is suitable for retail-led development and this should be recognised in the Plan.

Background

3. Riverview has long been recognised as suitable for development. Planning permission has been granted for retail development at the site since 1999, and most recently in 2019 (reference 18/535). Both Offaly County Council and An Bord Pleanala recognised that the land is constraint free. The entire southern part of the land has already been built out, and part of the land to the north was regraded, in the past.

The Objection – Justification

Identification of the site as 'constrained' – Remove this incorrect annotation

4. The site is identified as 'constrained' in the draft Plan, by virtue of the strategic flood risk assessment carried out by OCC and its partners. However, this takes no recognition of the fact that a detailed Flood Risk Assessment has been carried out for the land in relation to the planning permission for retail warehousing at the site (attached), and that OCC and ABP have recently accepted through the grant of planning permission (18/535) that retail development is acceptable at this site. It is clear, therefore, that the site is not at risk of flooding, and will not contribute to flooding elsewhere, if developed for retail warehousing purposes. There is no need, therefore for that constraint to be included for this site, which affects certainty and deliverability of land.

Conclusion

5. Flanagan Properties welcomes the opportunity to participate in this plan making process and requests that its comments are taken into consideration.

6. In particular, the following changes are requested :

- Removal of the 'constraint to development' annotation – recognising that
  - A single landowner owns / controls this site, which landowner has private finance available to proceed with development of the site, when conditions are favourable;
  - There is no flooding issue relating to commercial development at the site, as demonstrated in the attached Flood Risk Assessment and as accepted by OCC and ABP in the granting of planning permission; and
  - There is no other technical constraint to development.

Arkencourt Limited

PROJECT:

Cloncollig Flood Assessment

DOCUMENT: HYDROLOGICAL ASSESSMENT OF A PROPOSED DEVELOPMENT SITE AT CLONCOLLIG , TULLAMORE.

Document Title: Report

Arkencourt Limited
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November 2007

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HYDROLOGICAL ASSESSMENT OF A PROPOSED DEVELOPMENT AT CLONCOLLIG, TULLAMORE, COUNTY OFFALY.

1. INTRODUCTION.

This report dated 27th October 2007 was commissioned by Dermot O'Keefe and Associates, Consulting Engineers to Arkencourt who propose a retail/industrial development. The site itself comprises the existing Aldi site at Cloncollig and an adjoining field. It is proposed to relocate the Aldi supermarket within the new development and to build a DIY store together with a garden centre and service area etc. The development site is situated in the flood plain of the Tullamore River (Figure 1). It should be noted that there is another development between the proposed development and the river. This river has been known to flood in the past and the nearby Whitehall housing development was flooded in the 1990's. J.B. Barry have requested to review the proposed development and to provide data on the hydrological setting of the site and to assess the potential consequences of the development. The OPW are currently undertaking a flood risk assessment and mitigation study. This report has yet to be finalised. A hydraulic modeling programme has been undertaken to predict flood levels associated with the 100 year storm event.

2. SCOPE

The object of this report is to: -

i) Evaluate upstream and downstream impacts as a result of developing the site to safe level.
ii) We will assign design floor levels that are above the flood level.
iii) Evaluate the need and best approach to surface water runoff attenuation.

It should be noted that this report is not directed at introducing mitigation to prevent existing flooding but assesses whether the proposed development will increase the risk of flooding. The Whitehall housing development which flooded in the past may well flood again in the future and this report examines whether the frequency of flooding or degree of flooding will be increased by undertaking the proposed development.

** All levels in this report refer to metres above Ordnance Datum, Malin Head unless otherwise stated. It should be noted that OPW use the Poolbeg datum and these levels*

have been converted to Malin for consistency. The conversion factor from Malin to Poolbeg datum is taken to be 2.7 metres.

3. DATA SOURCES.

Information and data was gathered from a number of sources to assist in this study. The site contours and proposed surface water drainage network was provided by O'Keefe and Associates. OPW data on the hydrological situation prevailing in the Tullamore area was inspected and assessed. Rainfall data was sourced from Met Eireann.

4. SITE DESCRIPTION.

The site in question has an area of 1.44 hectares. Planning permission is being sought for a commercial retail development (Relocation of Aldi and the erection of a DIY store and Garden Centre). Some 0.75 hectares of the proposed site comprises an existing Aldi supermarket and its associated car park. The runoff from this is collected in drains and piped to the Tullamore River to the north of the site. 0.69 hectares of the proposed development area is a greenfield site which drains by overland flow to natural drainage ditches and from there to the Tullamore River. It is this greenfield area that has been reported to flood during extreme conditions as a result of the river backing up the drainage ditch.

It is proposed to raise the level of the site in order to keep the floor and road levels above the design flood level.

5. TULLAMORE RIVER– HYDROLOGICAL CHARACTERISTICS

The Tullamore River has a catchment area of approximately 112 km^2 (Figure 1) at the site of the proposed development. The Tullamore River rises close to Geashill and for the most part travels through very flat bog land as it flows to Tullamore. The flat nature of this bogland makes large tracts of the catchment prone to flooding. Information supplied by the OPW show that some 13.1 km2 of the catchment above the site in this flat low lying area would experience flooding after extreme rainfall. This assessment was based on the area of land that the OPW would have classified as "Benefiting Land" in their drainage programme. The area of benefiting land is shown in Figure 1. This flooding prompted the major drainage scheme that was undertaken in the 1950's. It should be noted that although these drainage schemes reduce the frequency of flooding and improved the drainage, the land will continue to flood during a major flooding event. The flat nature of the catchment contributes to the flooding vulnerability. The nature of the catchment is such that in response to heavy

rainfall events the water level in the river is relatively slow to rise and also the recession is slow.

Historical flow data on the Tullamore River is sparse. There are staff gauges on the river but these are installed in conjunction with water quality monitoring programme. The main source of data is in relation to the storm rainfall in early November 2000. The data from this storm provided data on high water levels and the time for the peak to travel down the river. In the absence of any other continuous historical data, this data was used to establish the design flood level. There was more severe flooding in 1990 but there is no data available on the flow and levels.

Within the town, downstream of the site, there is a hydraulic control in the form of a weir. There are sluice gates that can allow the flow to bypass the weir and this has been used as an aid to flood control as in the 2000 flood. It is reported that the sluice gates remained closed during the 1990 flood and thus the water levels associated with this event were higher than they would have been had the gates been opened. The OPW have informed us that in the event of future floods it would be envisaged that the sluice gates would be used to control the rise in water levels upstream.

6. WATER LEVEL DATA – NOVEMBER 2000 FLOOD

Despite the lack of historical hydrometric data for the Tullamore River, there was some data collected during the flooding in November 2000. This event caused extensive flooding. The data collected comprised level data at various points in the channel and some flow data.

The November 2000 flooding was caused by a number of factors. In terms of rainfall we will use the data from the meteorological station at Mullingar to provide the details on the amounts that fell. The month of October was wet with the monthly rainfall at Mullingar recorded as 153.7 mm, which is 163% of normal. This was further compounded by extremely heavy rainfall on 2nd and 5th of November. On the 2nd November 25% of the monthly average fell and on the 5th November 40% of the monthly average fell (Met Eireann Monthly Weather Bulletin November 2000). Some 43.7 mm fell in Mullingar on the 5th November. This weather caused widespread flooding across the eastern half of the country.

The OPW first received calls on 3rd November with regard to tributaries flooding. Particular attention was paid to the water level in the vicinity of the housing estate at Whitehall. The water level was measured relative to a water main pipe, which

crosses the river. The peak water level measured has been given as the top of this pipe. The top of this pipe is at 57.35 mOD Malin (60.045 mOD-Poolbeg). This is the highest water level measured. The high water level was reached on at 8am on 6th November. The water level rose by 0.9 metres between 2 pm on 5th November and 8am on 6th November. Water levels were also monitored on the other side of Tullamore downstream of the weir. The highest level at this point was 55.29 mOD Malin (57.99 mOD Poolbeg).

Water levels and flows (downstream of weir in Tullamore) were taken on 8, 9, 10, and 13th of November and are listed below (Table1). The highest measured level was 2.15 metres on the gauge. This data serves to illustrate the flat nature of the hydrograph associated with the Tullamore River.

Observations were also made at Springfield Bridge, which is located approximately 3.00 km upstream of the proposed development site. It was reported by the OPW that the peak took 8 hours to travel from Springfield Bridge to the gauging station downstream of the weir. This reinforces the understanding that this catchment has a flat hydrograph and does not respond rapidly to single storm events.

Date	Gauge Level (metres)	Water Level (mOD Malin)	Flow (cumecs)
?	2.13	55.27	estimated at 10
8/11/00	1.96	55.1	8.17
9/11/00	1.8	54.94	6.98
10/11/00	1.68	54.82	5.05
13/11/00	1.52	54.66	3.16

Table 1: Recession of November 2000 Flood Downstream of Weir in Tullamore.

7. DESIGN FLOOD LEVEL

One of the main concerns of the planning authority is the risk of flooding of the proposed development. Therefore it is necessary to estimate the flood water levels in the river. The design floor level of the buildings will have to be above this level. There are no regulations in place in Ireland specifying the degree of flood protection to be provided to new developments. The Office of Public Works undertakes flood relief schemes throughout Ireland and assesses the flood design standard for each scheme on an individual basis. However, it is recommended that protection against at least the 50-year flood (or increasingly the 100 year flood) be provided where infrastructure is likely to be impacted. Due to the lack of historical data it is not possible to calculate the design flood. The highest water level recorded (57.35 mOD Malin) in November 2000 at the Whitehall site is taken as an indication of high flood level. It is suggested that the design flood should be taken as greater than this

because the flooding in Whitehall was reported to be more severe in 1990. The OPW are presently undertaking a flood study for Tullamore. The final report has not been submitted. However the hydraulic modelling has indicated that the 100 year flood level at the site is approximately 57.87 mOD Malin. This would tally well with the level measured at Whitehall during the 2000 flood.

The minimum level on the access road to the west of the proposed development is 58.07 mOD at its end nearest the river. It is recommended that the minimum ground level for roads and car parks for the new development is set at 58.17 mOD (which is marginally above existing developed road levels in the vicinity. It is recommended that the minimum floor levels be raised another 200 mm to 58.37 mOD. This is 0.5 metres above the proposed design flood level and over 1 metre higher than the level measured in the November 2000 flood.

8. PEAK RUNOFF FROM SITE.

The proposed development will involve the creation of some 1.44 hectares of impermeable surfaces (roofs, roads and paving). It should be noted that some 0.75 hectares (the) site and car park is already paved). It is conservatively assumed that the total site will be 100 % impermeable. In addition the change from a total greenfield site is assessed. As a consequence of this there will be an increase in the peak runoff from the site associated with a particular rainfall event. This will cause the peak flow in the river associated with the rainfall event to be increased. The extreme rainfall amounts for various return periods and durations are given in Table 2.

The peak runoff from the site for various durations of a 100 year return period are given in Table 3. These are calculated using the Rational Method. The coefficients of runoff used for pre-development grassy area (total site) and post development paved area (total site) are 0.35 and 0.95 respectively. The difference in peak runoff as a result of creating some 1.44 hectares of paved area is then calculated by subtracting the runoff associated with this 1.44 hectares when it is grass as it is pre-development. The time of concentration of the site is estimated to be in the order of 15 minutes. The increase in peak run off associated with the 100 year 30 minute rainfall is 0.211 m3/sec.

Duration (Hours)	Return Period (Years) 0.5	1	2	5	10	20	50	100
1min				1.9	2.1	2.5	3.1	3.6
2 min				2.6	3.6	4.3	5.4	6.2
5 min				4.7	6.5	7.8	9.9	11.3
10 min				6.7	9.4	11.4	14.5	16.8
15 min	4.9	6.2	6.9	9.6	11.9	14.5	18.7	22
30 min	6.4	8.1	9	12.5	15.3	18.6	24	28
1	8.2	10.3	11.5	15.7	19.2	23	29	34
2	10.7	13.2	14.8	19.6	23	28	35	41
4	14.4	17.6	19.3	25	29	34	42	48
6	16.9	20.5	22	29	34	39	48	55
12	21.6	26	28	36	42	49	59	67
24	26	31	34	43	50	57	69	78
48	32	38	42	52	60	68	81	91
Location	Tullamore							
Annual Average Rainfall	852							
Notes:	M5 60	15.7		M5 2D	49			
	M5 60 / M5 2D	0.32						

Table 2: Extreme Rainfall Return Periods – Tullamore

Duration (hour)	Rainfall (mm) for 100 Year Return Period	Intensity mm/hour	Qp pre-dev. m3/s	Qp post-dev	Increase in Peak Flow m3/s
0.25	22	88	0.123	0.335	0.211
0.5	28	56	0.078	0.213	0.135
1	34	34	0.048	0.129	0.082
2	41	20.5	0.029	0.078	0.049
4	48	12	0.017	0.046	0.029
6	55	9.17	0.013	0.035	0.022
12	67	5.6	0.008	0.021	0.013
24	78	3.3	0.005	0.012	0.008
48	91	1.9	0.003	0.007	0.005

Legend
Qp = Peak Flow for duration
Qp pre/dev = Peak Flow over grass 1.44 ha area; C=0.35
Qp post/dev = Peak Flow Impervious Developed Area 1.44 ha area; C=0.95 (assume 100% paved)

Table 3: Pre and Post-Development Runoff

A characteristic of this catchment is the flat hydrograph associated with storm events. It has also been observed that the peak flood takes some 8 hours to travel from Springfield Bridge to downstream of the weir in Tullamore, The time to peak for the catchment will be much greater than this as Springfield Bridge is not at the top of the catchment. However in order to be conservative we will assume that the 8 hour lag applies to the entire catchment above the site. The increase in the peak flow in the river will be associated with the 8 hour duration storm and the increase in flow will be 0.0185 m3/sec (by interpolation of Table 3). There is no data available on the 100 year flow in the river. If we assume that the 100 year flood flow is 14.65 m3/sec (see section 10.1 for estimation calc) the paved area of the development will cause the peak flood in the river to increase by 0.13% This assumes that the peak runoff from the site will coincide with the peak flow in the Tullamore River which is not the case due to the lag time. It is also the estimated increase in peak flow from a total Greenfield site. However over half the site is paved at present (Aldi).

9. STORM RUNOFF ATTENUATION.

While it is customary to incorporate stormwater attenuation and storage measures for new developments, we would suggest that in this case there is no advantage to be gained. The characteristics of the Tullamore River are summarised in Section 5 above. We feel that attenuation will achieve no benefit in this case for the following reasons.

i) The Tullamore River has a very flat hydrograph. Flooding of the Tullamore River is associated with prolonged heavy rainfall as opposed to single high intensity storms. The peak flow in the river will pass the site a considerable time later than the storm water has discharged from site. Attenuation is designed to reduce the risk of flooding in catchments, which are subject to flash flooding.

ii) It is proposed to discharge the storm runoff into the main channel directly. We would agree that attenuation should be incorporated if the storm water were to be discharged to a tributary where the volume of runoff would form a significant portion of the peak flow. In this case, it is estimated that the peak flow in the river will increase by only 0.13 %. This estimate was determined using very conservative assumptions and in reality the increase will probably be significantly less.

iii) In this case we would suggest that rather than storing water after a storm event it is more appropriate to discharge before the peak flow arrives. This could actually improve the situation in the same manner as the drainage works carried out in the past. This will get drainage to the river as the flood hydrograph is rising.

10. IMPACTS ON FLOOD LEVELS IN TULLAMORE RIVER.

The main determinants of flood water levels at the proposed site are
(i) the flood discharge,
(ii) the hydraulic conditions and behaviour of the river reach extending downstream of the site as far as the next hydraulic control (the weir in Tullamore).

10.1 Discharge

There is no extended record of flows or annual maxima available for the Tullamore River. However the maximum flow recorded in the Tullamore River during the 2000 flood was 8.17 m3/sec. The 100 year flood for the catchment of the site was calculated by applying a growth factor to the QBAR (mean annual flood) determined using the three variable equation (Institute of Hydrology Report 124). The following inputs were used;

Catchment Area	=	112 km2
SAAR	=	852 mm
Soil Coefficient	=	0.23 (for soil between Type 1 and Type 2

This provides a QBAR estimate of 7.96 m3/sec.

100 Year Growth Factor for Ireland (New) = 1.84

Applying the 100 year growth factor of 1.84 the 100 year flood was determined to be 14.65 m3/sec

Using the same methodology the estimated 2000 storm flow max of 10 m3/sec would have a return period of 5-6 years.

10.2 Increase in Water Levels.

Flood plains act in two ways in the event of a flooding event.
Firstly, they provide storage for overbank flow. The water that goes into storage does not flow down the main channel and consequently the flooding can reduce the peak flow. The reduction in the flow is equivalent to the rate at which the water flows into the storage in the flood plain. The removal of flood plain storage may therefore

increase the peak flow passing the site. This can increase the risk of flooding down stream.

Secondly, floodplains can increase the width of the cross sectional area of flow and therefore reduce the velocity (providing the flood plain acts as part of the conveyance channel). The rise in water surface level required to accommodate high flood flows is not as significant as when the width of the conveyance channel remains the same for the higher flows. The impact of loss of conveyance channel can result in an increase in upstream water levels as an effect of the bottle neck caused by the reduction in cross-sectional area (conveyance channel).

10.3 Loss of Flood Plain Storage- Downstream Impacts

In the case of the Tullamore River, the rise in flood water levels is slow (rate of flooding is slow) and consequently the rate at which water enters storage will be much less than in a river where the water level rises rapidly in response to a storm event. In order to protect the site itself against flooding it is proposed to raise the ground level to a minimum of 58.17mOD Malin and to have a minimum floor level of 58.37. The high flood level is taken to be 57.87 mOD. Any area where the existing ground level is below 57.87 mOD and where it is proposed to raise the ground levels will result in a loss of flood plain. It has been conservatively calculated that some 0.69 hectares (0.0069 km2) of flood plain area will be removed as result of this. The total flood plain of the Tullamore River above the site is estimated to be 13.1 km2 (calculated on the basis of benefiting area in drainage scheme). The flood plain in the flat bog area in the vicinity of the main channel is estimated to be 6.6 km2. The flood plain lost as a consequence of the development constitutes only 0.1% of the area of the main channel floodplain. Taking into account the miniscule loss in overall floodplain together with the slow rate of flooding it is reasonable to assume that there will be no discernible impact on down stream water levels as a result of the proposed development.

10.4 Reduction in Conveyance Channel – Upstream Impacts.

The boundary of the proposed site is located approximately 120 metres from the main channel of the Tullamore River. There is an existing warehouse between the proposed development site and the river. The development of the site will have no effect on the conveyance of the river during extreme flood conditions and consequently there will be no increase in water levels upstream during extreme flood events

11. SUMMARY AND CONCLUSIONS.

The hydrological assessment carried out in connection with the proposed development at Cloncollig can be summarised as follows.

i) The OPW are undertaking a flood risk assessment for the Tullamore River but the final report has not been submitted. The catchment of the Tullamore River above the site has a considerable flood plain and is characterised by its slow response to storm event. Flooding arises from prolonged steady rainy periods rather than from short high intensity storm events. The OPW report that the flood peak takes 8 hours to travel the Springfield Bridge to the weir. The maximum estimated flow in 2000 has a return period in the order of 5-6 years.

ii) The 100 year flood level is estimated to be 57.87 mOD Malin. The minimum road level on the development will be 58.17 mOD. The minimum floor level is recommended to some 58.37 mOD. This is 0.5 metres above the proposed design flood level

iii) In view of the slow response nature of the catchment it is considered inappropriate to construct storm attenuation tanks. It is also not considered appropriate as the discharge will be to the main channel rather than a small tributary. The increase in the peak flow of the river is calculated to increase by only 0.13% which is considered insignificant.

iv) There will be no interference in the flood conveyance channel as a result of the proposed development due to its location some 120 metres from the main channel and the fact that there is an existing development and building between it and the river. Consequently there will be no rise in the flood levels upstream.

v) The loss of flood plain only amounts to 0.13% of the immediate main channel storage and the water level rise downstream would not be discernible.

Finally, it should be noted while this study has shown that the proposed development will not be subject to flooding and that the rise in the peak 100 year flood level will be insignificant, the areas that have flooded in the past will continue to flood due to their low lying nature.

FIGURES

All Levels are in Metres and Relate to O.S. Datum Malin

All Maps are Referenced to Irish National Grid (I.N.G.)

PROPOSED DEVELOPMENT SITE

LEGEND

- Catchment Boundary
- Flood Plain/Benefiting areas

0 1 2 kilometres

TULLAMORE FLOOD ASSESSMENT
CATCHMENT AND FLOOD PLAIN -TULLAMORE RIVER
Figure 1

BARRY & PARTNERS consulting engineers

19/11/2007

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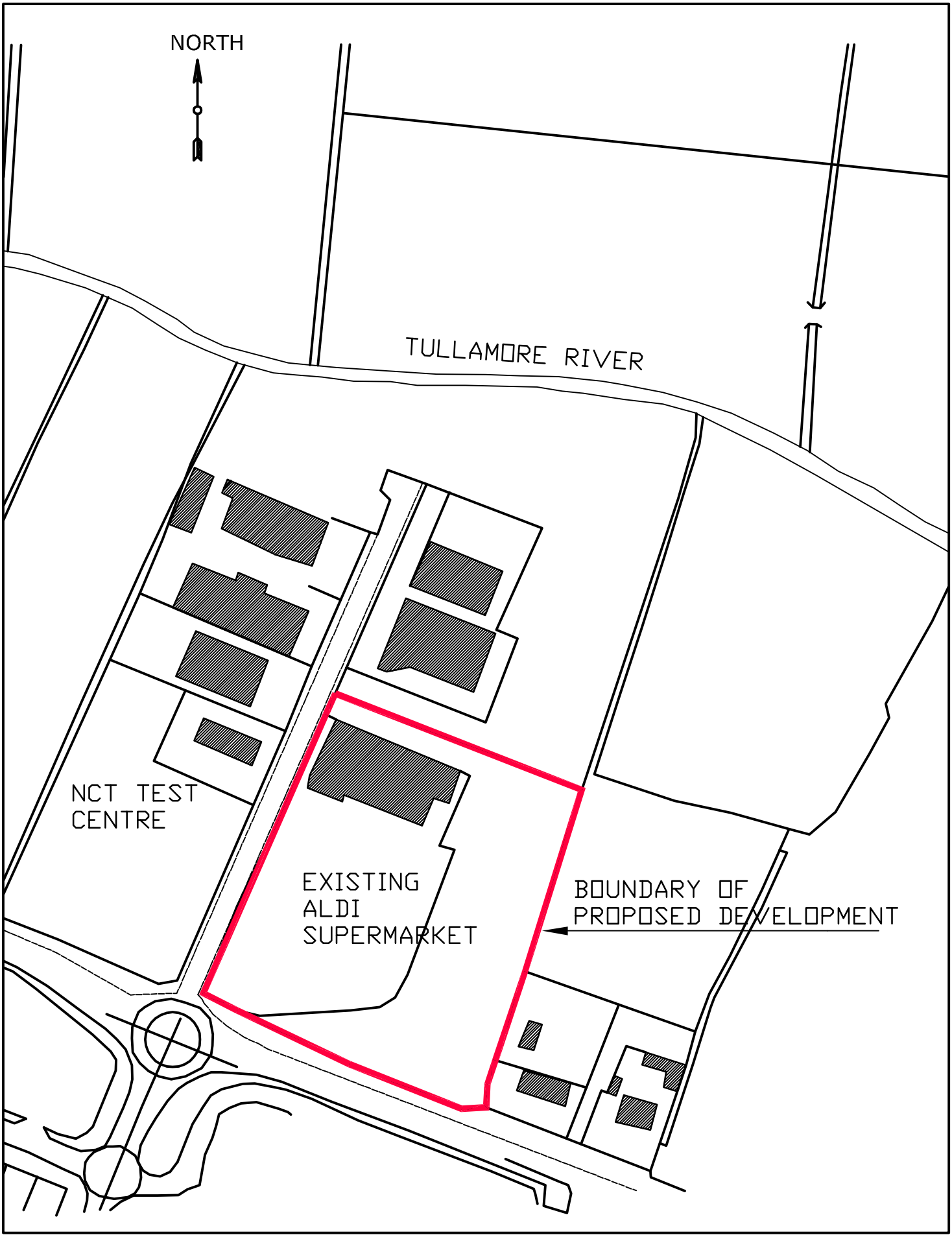

TULLAMORE FLOOD ASSESSMENT
PROPOSED DEVELOPMENT SITE
Figure 2

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Arkencourt Developments Limited

PROJECT:

Flood Assessment for a Proposed Retail Development, Cloncollig, Tullamore

**DOCUMENT: FLOOD ASSESSMENT
OF A PROPOSED RETAIL SITE
AT CLONCOLLIG , TULLAMORE.**

Document Title: Report

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February 2009

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Figure 2: Excerpt from OPW Report

FLOOD ASSESSMENT FOR A PROPOSED RETAIL DEVELOPMENT AT CLONCOLLIG, TULLAMORE.

1. INTRODUCTION

This report dated 15th February 2008 was commissioned by Sheila Hobbs of Scott Hobbs Planning Limited, Consultants on behalf of Arkencourt Developments who are applying for planning permission for a retail/industrial development at Cloncollig, Tullamore. The site is located at Cloncollig to the east of Tullamore town. The development site is partially situated in the flood plain (as designated by the OPW FRAMS report) of the Tullamore River. The river has been known to flood in the past and the nearby Whitehall housing development was flooded in the 1990's. J.B. Barry have been requested to review the proposed development, consider the hydrological setting of the site and to assess the potential consequences of the development. This assessment has been undertaken in the context of the OPW FRAMS report.

2. SCOPE

The object of this report is to: -

i) Provide a safe floor level for the development that will ensure that buildings will not become inundated as result of the design flood event (1%AEP)
ii) Assess the consequences upstream and downstream of the raising of the ground level on the site.

It should be noted that this report is not directed at introducing mitigation to prevent existing flooding but assesses whether the proposed development will increase the risk of flooding. The Whitehall housing development which flooded in the past may well flood again in the future and this report examines whether the frequency of flooding or degree of flooding will be increased by undertaking the proposed development.

** All levels in this report refer to metres above Ordnance Datum, Malin Head unless otherwise stated*

3. DATA SOURCES

Information and data was gathered from a number of sources to assist in this study. The site contours was provided by Kenny Lyons and Associates. The Tullamore Flood Risk Assessment and Management Study – Final Report (June 2008) was used to provide design flood levels and indications of the options of flood protection that may be put in place by Offaly County Council. Rainfall data was sourced from Met Eireann.

4. SITE DESCRIPTION

The site in question has an area of 0.82 hectares (Figure 1). Planning permission is being sought for a commercial retail development. The original ground level of the site has been raised and varies between 57.77 and 59.36 mOD. The site drains to the Tullamore River which is located approximately 130 metres from the nearest property boundary. The land between the proposed development site and the river has been developed and there a series of warehouses and factory units built.

It is proposed to raise the level of the site in order to keep the floor and road levels above the design flood level.

5. OPW TULLAMORE FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY (FRAMS)

5.1 Report Overview

The OPW Tullamore FRAMS was undertaken in response to periodic flooding in the vicinity of the Whitehall Estate and development pressures of flood risk areas. The report recommends a scheme to address flooding to existing properties and identifies options that may assist in facilitating development of flood risk areas. At this stage there has been no indication as to which of the options and recommendations it is pro[posed to implement. Similarly there is no indication of when the improvement will be completed.

The proposed development is located at a chainage of 3250 as used in the OPW flood risk assessment and management report for Tullamore. The Table in Appendix 1.1 of the OPW report indicates that the predicted flood level for the 1:100 event for this

site is 57.87m (*Tullamore FRAMS Appendix 1.1*). This level is that predicted without any flood alleviation measures. The contoured map of the site indicates that there are some spot levels below this. This indicates that the site with its present water levels would be subject some very minor localised flooding for this event. The spot levels provided show that the deepest flooding would be only 10 centimetres. The limited extent of the flooding predicted under present conditions is illustrated in Figure 2 (an excerpt from the OPW Tullamore report).

5.2 OPW Recommendations. -35m Development free strip versus 70m development free strip

The OPW Report recommends three alternative scheme options to facilitate development upstream of the town (*Tullamore FRAMS 7.2.1*), they are:

- Option 5.2.2 – 35m development free strip with 8m wide berms lowered to WL 70;
- Option 5.1.3 – 70m development free strip with berms lowered to within 0.5m of the river bed;
- Option 5.1.7 – 70m development free string with berms lowered to WL 70.

Tullamore FRAMS Section 6.10 suggests that Option 5.1.3 is preferred over 5.2.2 due to 'Technical' and 'Uncertainty, Sensitivity and Risk' criteria.

Under the technical scoring criteria, Option 5.1.3 is found to produce a 'significantly beneficial' (>-20cm) reduction in water levels as opposed to the Option 5.2.2 'beneficial' (-11cm to -20cm) reduction in water levels. However in assessing the change in water level between the alternative options, the marginal reduction in flood levels **is associated with the lower berms rather than the wider development free strip**. In comparing *Tullamore FRAMS Figures 36 and 37* there is no appreciable difference between Options 5.1.5 (70m setback 8m berms to 70% wl) and 5.2.2 (35m setback 8m berms to 70% wl). By comparing Option 5.1.3 (70m setback and berms lowered to within 0.5m of riverbed) with 5.1.5 (70m setback 8m berms to 70% wl) the 'significantly beneficial' as opposed to 'beneficial' reduction in water level is associated with the reduction in berm levels rather than development free strip.

Under the 'Uncertainty, Sensitivity and Risk' criteria both Options 5.1.3 and 5.2.2 are found to be sensitive to increased flow rates if defence structures are used to protect ground. However, should raising ground be used as a means of defence, this would

be decreased to not sensitive. The report does not justify the alternative sensitivity scoring between Option 5.1.3 and 5.2.2, and based on the rationale for the scoring of Option 5.1.3, it is anticipated that Option 5.2.2 should be afforded the same score.

In summary it is our contention that the 35 metre setback with berms lowered to 0.5 metres of the river bed would have a 'significantly beneficial' reduction in flood water levels, on par with the 70 m setback option 5.1.3 (with berms lowered to 0.5 m of the river bed). In the interests of encouraging development in a close proximity of Tullamore, it is recommended that the Local Authority and OPW adopts a 35m development free strip solution.

Whether the Local Authority chooses the 70 metre or 35 metre option is not relevant to the present application as the application boundary is over 130 metres from the Tullamore River.

6. PROPOSED GROUND LEVELS.

As previously outlined, the Tullamore FRAMS report indicates a 1 in 100 year flood level (under existing conditions) of 57.87m for the site. The report also recommends that ground levels are raised by 0.5m above the predicted flood level (*Tullamore FRAMS pg 19)***.** Based on standard construction practise, the minimum floor level should be 0.25m above ground level. Therefore the minimum floor level of the Cloncollig Development should be **58.62m**. It is recommended that all essential services and access routes are at or above **58.37m.**

If the development is undertaken to the above levels, then the proposed development and employees will be protected from flooding to OPW standards. By providing protection by raising land, it is anticipated that the OPW could be satisfied that the development itself will be protected in advance of any element of the OPW flood alleviation scheme being implemented.

7. IMPACTS OF LOSS OF FLOODPLAIN DUE TO DEVELOPMENT

In view of the fact that it is not known exactly when the proposed flood alleviation works will be undertaken, the impact of the proposed development has been estimated from the existing scenario OPW Tullamore FRAMS report results.

The recently published Department of Environment draft Planning System and Flood Risk Management guidelines provide guidance to Local Authorities in assessing developments in flood risk areas. Box 3.2 of the Guidelines outlines the basis within which Local Authorities can consider developments in flood risk areas, and paraphrased as relevant to the proposed Cloncollig Development as follows:

Part 1

- The area is within or adjoining the centre of the city of town
- The area comprises significantly unutilized lands within the urban envelope
- Development of the area is essential to facilitate town centre expansion
- Strategic Environmental Assessment undertaken
- No reasonable alternative development areas within lower flood risk areas.

Part 2 A detailed Flood Risk Assessment that demonstrates:

- the development will not increase flood risk elsewhere
- Measures to minimize flood risk to people, property and economy.

Flood plains act in two ways in the event of a flooding event.

Firstly, floodplains can increase the width of the cross sectional area of flow and therefore reduce the velocity (providing the flood plain acts as part of the conveyance channel). The impact of loss of conveyance channel can result in an increase in upstream water levels as an effect of the bottle neck caused by the reduction in cross-sectional area (conveyance channel).

Secondly, they provide storage for overbank flow. The water that goes into storage does not flow down the main channel and consequently the flooding can reduce the peak flow. The reduction in the flow is equivalent to the rate at which the water flows into the storage in the flood plain. The removal of flood plain storage may therefore increase the peak flow passing the site. This can increase the risk of flooding downstream.

In order to follow the guidelines the proposed development must be assessed in terms of whether there will be an increase flood risk elsewhere. The data in the Tullamore FRAMS provides an indication of the degree of response of the river to the loss of floodplain.

7.1 Upstream Impacts - Reduction in Conveyance Channel.

Tullamore FRAMS Figure 10 suggests that if development in-fills the entire area on both sides of the river between Pound Bridge and the proposed by-pass (upstream of the Cloncollig development) to within 70m of the river without river berm work, then an increase of approximately 0.11m in flood level could be anticipated further upstream. This reflects the entire undeveloped floodplain being in-filled to within 70 metres of the river (on both sides) from Pound bridge to the bypass.

It should be noted that the development has already been in-filled to a level of between 57.77 and 59.36 mOD and that these levels were used in the FRAMS assessment to represent the existing conditions. The development is not being undertaken within 130 metres of the river. Although it is not possible to provide a definitive answer regarding the potential component of the rise in water level attributable to the loss of storage resulting from the proposed Cloncollig Development, a conservative estimate is made. The impacts of the rise in water level will be focused upstream of the proposed development due the reduction in the cross-sectional area. The proposed development forms less than 1 % of the existing floodplain area between Pound Bridge and proposed Bypass. In addition the depth of flooding associated with the 100 year event is small. It is therefore anticipated the contribution to flood level would be a tiny fraction of the 0.11m increase. Conservatively we suggest that the rise attributed to the proposed development would be 5% of the predicted rise. This would be 0.005 metres.

The boundary of the proposed site is located approximately 130 metres from the main channel of the Tullamore River. There are existing Buildings/warehouses between the proposed development site and the river. The development of the site will have no effect on the conveyance of the river during extreme flood conditions and consequently there will be no increase in water levels upstream during extreme flood events. The estimated 0.005m rise in the water level upstream was based on the reduction of conveyance channel and as such can be regarded as a very conservative estimate.

7.2 Downstream Impacts – Loss of Flood Plain Storage.

In the case of the Tullamore River, the rise in flood water levels is slow (rate of flooding is slow) and consequently the rate at which water enters storage will be much less than in a river where the water level rises rapidly in response to a storm

event. In order to protect the site itself against flooding it is proposed to raise the ground level to a minimum of 58.37mOD Malin and to have a minimum floor level of 58.62 mOD. The high flood level is taken to be 57.87 mOD. Any area where the existing ground level is below 57.87 mOD and where it is proposed to raise the ground levels will result in a loss of flood plain. It has been conservatively calculated that approximately 25% of the site is marginally below the design (1:100 year) flood level. Approximately 0.21 hectares (0.0021 km2) of flood plain area will be removed as result of this. If we assume that the total flood plain of the Tullamore River above the site is estimated to be 13.1 km2 (calculated on the basis of benefiting area in drainage scheme). The flood plain in the flat bog area in the vicinity of the main channel is estimated to be 6.6 km2. The flood plain lost as a consequence of the development constitutes only 0.03% of the area of the main channel floodplain. Taking into account the miniscule loss in overall floodplain together with the slow rate of flooding it is reasonable to assume that there will be no discernible impact on downstream water levels as a result of the proposed development. This is further illustrated by estimating the volume of storage lost. Again applying conservative principals and assuming the flood plain area of the site is flooded to a depth of 0.1 metres (the depth at the lowest point on the site), the volume of storage lost would be 210 m3. This is insignificant in relation to the flood plain of the Tullamore rive.

It must also be noted that once the FRAMS measures have been decided and implemented the flood levels will reduce considerably, compensating for any development in the floodplain.

8. SUSTAINABLE URBAN DRAINAGE SYSTEMS REQUIREMENTS

While it is customary to incorporate stormwater attenuation and storage measures for new developments, we would suggest that in this case there is no advantage to be gained in this case for the following reasons.

i) The Tullamore River has a very flat hydrograph. Flooding of the Tullamore River is associated with prolonged heavy rainfall as opposed to single high intensity storms. The peak flow in the river will pass the site a considerable time later than the storm water has discharged from site. Attenuation is

designed to reduce the risk of flooding in catchments, which are subject to flash flooding.

ii) It is proposed to discharge the storm runoff into the main channel directly. We would agree that attenuation should be incorporated if the storm water were to be discharged to a tributary where the volume of runoff would form a significant portion of the peak flow. In this case, it is estimated that the peak flow in the river will be barely perceptible.

However the planning authorities insist that stormwater attenuation be incorporated. A retention system can be provided that will limit the runoff to the existing greenfield runoff. Regardless of whether the stormwater runoff is attenuated the discharge should be passed through a stormwater interceptor prior to discharge to the River.

The rainfall data for Tullamore was obtained from Met Eireann

Duration (Hours)	**Return Period (Years)**							
	0.5	**1**	**2**	**5**	**10**	**20**	**50**	**100**
1min				1.9	2.1	2.5	3.1	3.6
2 min				2.6	3.6	4.3	5.4	6.2
5 min				4.7	6.5	7.8	9.9	11.3
10 min				6.7	9.4	11.4	14.5	16.8
15 min	4.9	6.2	6.9	9.6	11.9	14.5	18.7	22
30 min	6.4	8.1	9	12.5	15.3	18.6	24	28
1	8.2	10.3	11.5	15.7	19.2	23	29	34
2	10.7	13.2	14.8	19.6	23	28	35	41
4	14.4	17.6	19.3	25	29	34	42	48
6	16.9	20.5	22	29	34	39	48	55
12	21.6	26	28	36	42	49	59	67
24	26	31	34	43	50	57	69	78
48	32	38	42	52	60	68	81	91
Location	Tullamore							
Annual Average Rainfall	852							
Notes:	M5 60	15.7		M5 2D	49			
	M5 60 / M5 2D	0.32						

Table 1: Extreme Rainfall Return Periods – Tullamore

It is proposed to limit the run off from the site to the pre-development runoff. The predevelopment runoff is calculated using the equation developed in the Institute of Hydrology Report No.124.

$$\mathbf{Q\ BAR = 0.00108\ x\ (Area)^{0.89}\ x\ (SAAR)^{1.17}\ x\ (Soil)^{2.17}}$$

Where:

QBAR rural is an estimate of the mean of an annual maximum series (cumecs) ,

AREA is catchment area (km2),

SAAR is the Standard Annual Average Rainfall (mm)

SOIL is a soil index (dimensionless, but varying from 0 to 0.5)

Area = 8235 m2 = .008235 km2 = Entire area of development site

SAAR = 852 mm

Soil = 0.3

The GDSDS (www.irishsuds.com) website indicates that the soil category at the site is 2 (a soil index of 0.3).

QBAR = 2.96 litres/sec = permissible outflow

The GDSDS stormwater storage assessment tool (www.irishsuds.com) was used to calculate the volume of storage required . It is assumed that the 60 % of the site (4941 m2) will comprise impermeable area. The area of the buildings is 2430 m2. An additional area is included to allow for roads and other paved areas. It is recommended that the car park be constructed of permeable pavement.

An allowance of 10% has been made for increase in rainfall due to climate change.

The storage required to accommodate the 1:100 event is calculated to be 238 m3 with the discharge restricted to a maximum of 2.96 litres per sec. It is recommended that this storage be created beneath the car park area. Storage of 30 m x 30 m x 0.3 m (300 m3) will be more than sufficient to prevent the runoff from the site increasing after the development has been completed. It should be noted that the storage provided is greater than the estimate of floodplain lost and consequently there will be no increase in the risk of flooding as a result of the proposed measures.

9. SUMMARY AND CONCLUSIONS

The flood assessment carried out in connection with the proposed development at Cloncollig can be summarised as follows.

i) The OPW have undertaken a Flood Risk Assessment and Management Study (FRAMS) of Tullamore Town. This study indicates that only parts of the site (A maximum of 25%) of the proposed development is at risk from flooding. The predicted flooding depth is minor the greatest depth of flooding for the 1:100 year flood is 0.01 metres. The loss of flood plain storage as a result of the proposed development is considered negligible in relation to the overall storage available.

ii) The OPW predicted 1 in 100 year flood level is estimated to be 57.87 mOD Malin. The minimum ground level on the development should be 58.37 mOD. The minimum floor level is recommended to 58.62 mOD. This is 0.75 metres above the OPW predicted 1 in 100 year flood level (without flood alleviation scheme). Therefore the proposed Cloncollig Development could be adequately protected from flooding in advance of any element of the OPW scheme in place.

iii) The nearest boundary of the site is greater than 130 metres from the Tullamore River. There are other buildings between the site and the river and consequently the raising of the site will not interfere with the conveyance during flood conditions.

iv) Less than 25% of the site will be subject to flooding as a result of the 1:100 year event

v) Based on the OPW predicted 1 in 100 year flood levels (without flood alleviation measures), the proposed Cloncollig development will not adversely impact upon flooding to other properties in advance of the OPW flood alleviation scheme. A rise in the order of 0.5 cm (negligible) is predicted upstream and no measurable increase is predicted downstream. This prediction is based on OPW prediction for infill to 70 metres and loss of conveyance and consequently it is conservative as no conveyance will be lost. The OPW predicts that the proposed flood alleviation scheme will lower the 1

in 100 year flood level, thereby negating any negligible rise in flood level caused by the Cloncollig development.

vi) It is proposed to incorporate storm attenuation measures in accordance with the GDSDS guidelines and the volume of storage provided is greater than than the estimated loss of storage due to infill.

In summary, this report has found that the Cloncollig development can be appropriately protected from the predicted 1 in 100 year flood level and will not adversely impact upon predicted flooding to other properties. The proposed development does not compromise any of the alternative measures for flood alleviation recommended in the OPW FRAMS report.

FIGURES

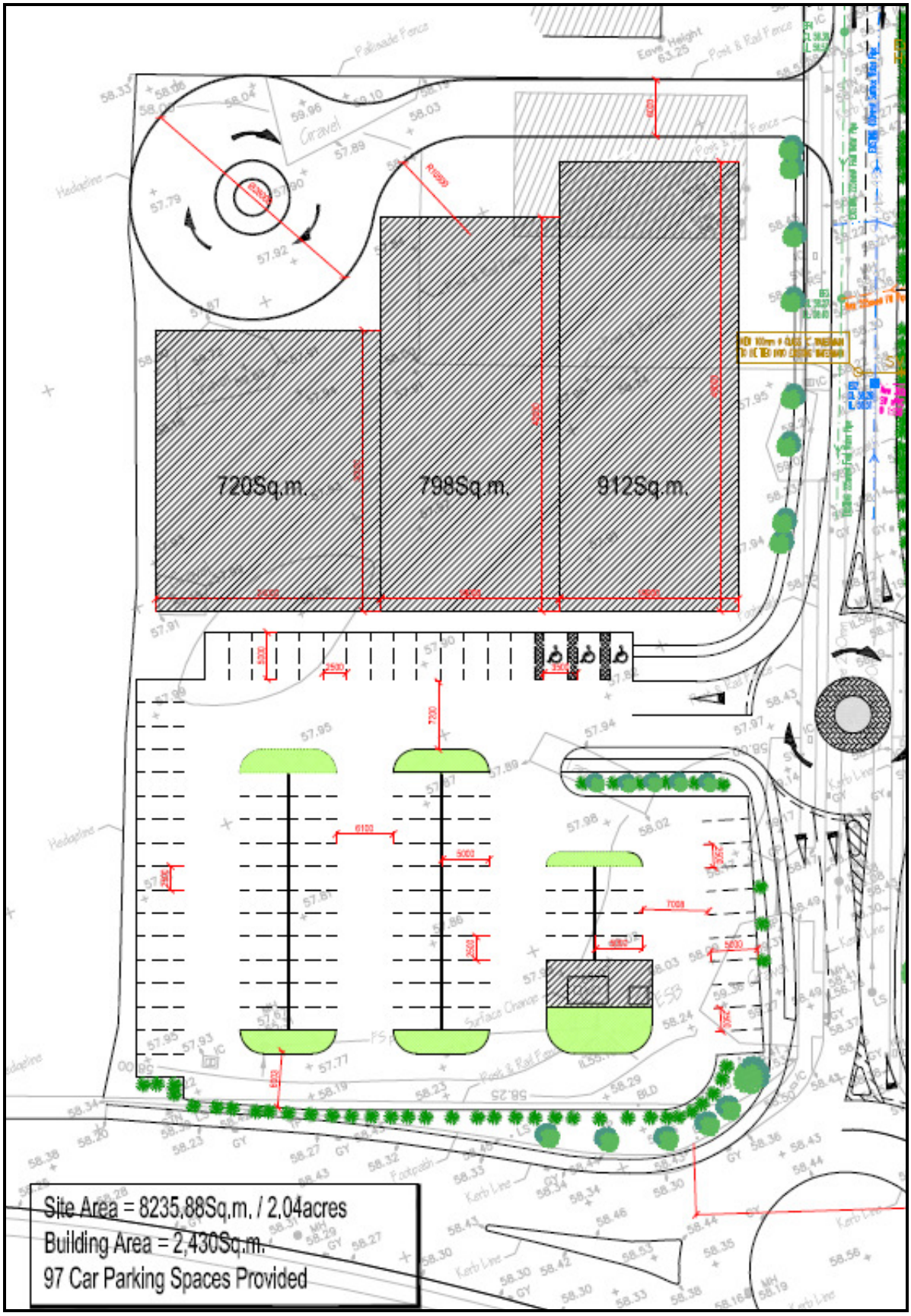

Figure 1: Proposed Development Area and Existing Spot Levels.

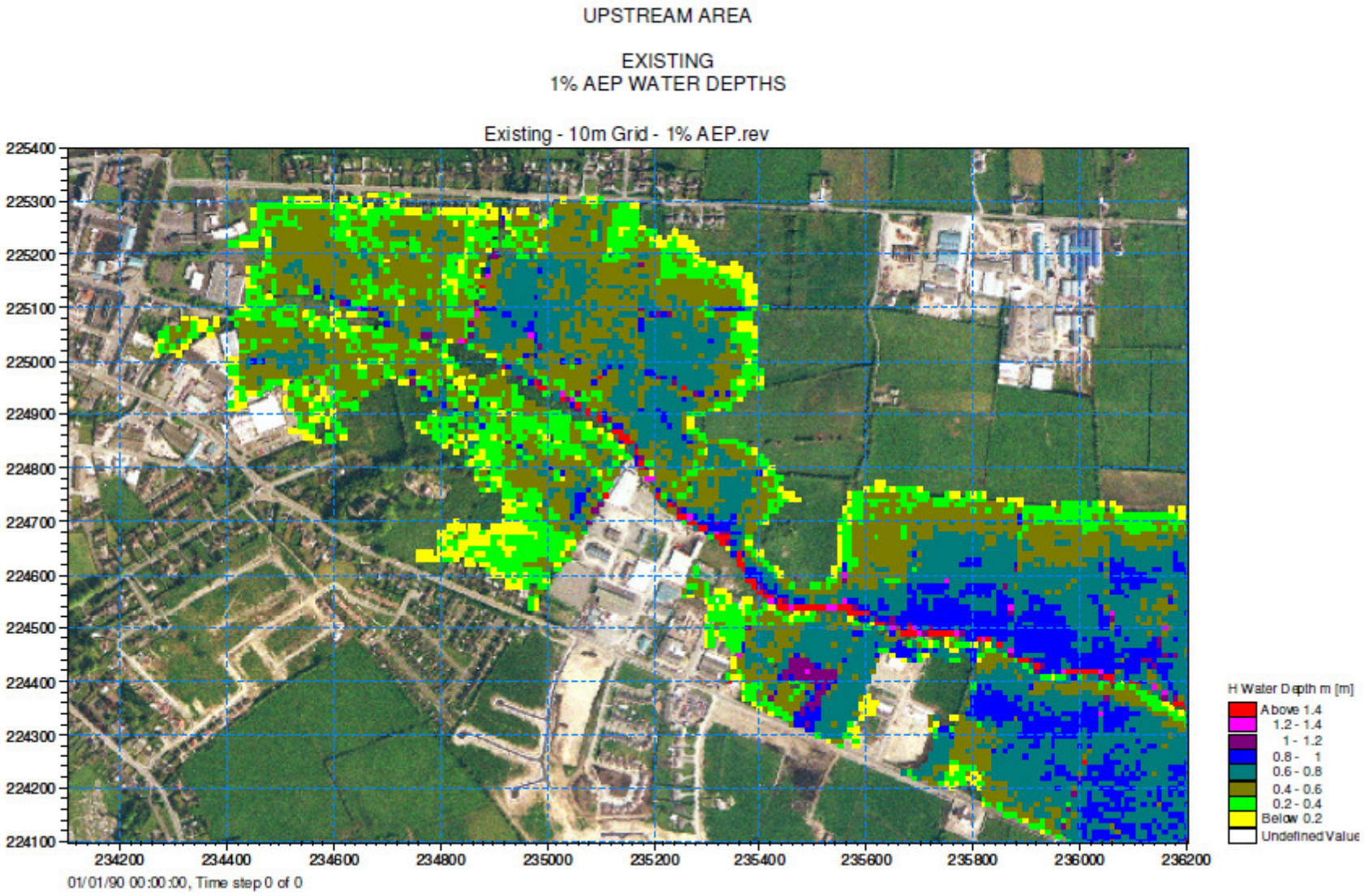

Figure 2: Excerpt from OPW Report