Appendix 15.1

Flood Risk Assessment

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ENGINEERS TO INDUSTRY

SITE SPECIFIC FLOOD RISK ASSESSMENT
SITE SUSTAINABILITY PROJECT AT INDAVER WASTE TO ENERGY FACILITY, CARRANSTOWN, DULEEK, CO MEATH.

29 043 / F5.1

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Revision	**D**

1 INTRODUCTION

1.1 Indaver Ireland Limited (Indaver) is seeking a 10 year planning permission under SID for the Site Sustainability Project at the Indaver Waste to Energy Facility in Carranstown, Duleek, Co Meath.

- To provide a sustainable level of treatment capacity to meet the needs of an evolving waste market.
- To improve the energy efficiency and sustainability of the facility in a new and evolving energy market.
- To provide additional buildings and infrastructure on site to adapt to changes in the residue treatment market and to provide for further employment growth on site.

1.2 This document should be read in conjunction with the following drawings:

29043/CD/002	EXISTING SITE PLAN
29043/CD/003	PROPOSED SITE PLAN
29043/CD/004	PROPOSED LONG SECTIONS SHEET 1 OF 2
29043/CD/005	PROPOSED LONG SECTIONS SHEET 2 OF 2

1.3 The flood Risk Assessment for this site has been carried out in accordance with the process set out in '*The Planning System and Flood Risk Management Guidelines for Planning Authorities'* published by the Office of Public Works

2 DESCRIPTION OF THE EXISTING SITE

2.1 The site is bounded by the R152 to the South-East and agricultural land in the remaining directions.

2.2 Access to the site is from the R152

2.3 The existing site is a live waste to energy facility with the following buildings located on site

- Gate House
- Main Building consisting of:
  - Control room & office area
  - Tipping hall
  - Waste bunker
  - Furnace/boiler
  - Bottom ash hall
  - Flue gas cleaning area & stack
  - Residue pre-treatment
- 38kV import/export compound & sub-station building.
- Pump house & process water/firefighting water tank.
- Tank storage for aqueous ammonia & fuel oil.
- Maintenance buildings
- Stormwater Attenuation Pond

The existing site is fully fenced off with gated access provided to the proposed area of site works.

3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Increase in the amount of hazardous waste accepted at the facility for treatment in the waste to energy plant from the current permitted 10,000 tonnes per annum (tpa) up to a maximum of 25,000 tonnes per annum;

3.2 It is also proposed to increase the annual total waste accepted at the site for treatment in the waste to energy facility from the currently permitted 235,000 tonnes per annum to 250,000 tonnes per annum;

3.3 Development of an aqueous waste tank farm and unloading area for the storage and processing of aqueous liquid wastes currently accepted at the facility;

3.4 Development of a 10MWe hydrogen generation unit for connection to the natural gas distribution network, for mobile hydrogen transport applications and other potential uses;

3.5 Development of a bottom ash storage building for the storage of up to 5,000 tonnes of bottom ash which is currently produced on site;

3.6 Additional waste acceptance capacity and infrastructure to receive up to 30,000 tpa (bringing the site total to 280,000 tpa) of third-party boiler ash, flue gas cleaning residues and other similar residues for treatment in the existing ash pre-treatment facility on site;

3.7 Development of a warehouse, workshop and emergency response team (ERT)/office building to support existing maintenance activities on the site.

3.8 Development of a new concrete yard and parking area for up to 10 trucks, tankers or containers on the site;

3.9 Demolition and re-building of an existing single storey modular office building on site with a slightly increased footprint;

3.10 Other miscellaneous site upgrades.

4 HISTORICAL FLOODING

4.1 The Office of Public Works website 'floodmaps.ie' provides information on historical flooding. The Map Report reproduced in Appendix 1 is taken from this website and shows all flood events within 2.5km of the site. It is noted that there is no record of flooding on or adjacent to the site.

5 DEVELOPMENT VULNERABILITY CLASS

5.1 The proposed development involves upgrading an existing industrial site. As such the appropriate development vulnerability class is "less vulnerable development" in accordance of table 3.1 of the guidelines

6 PLUVIAL FLOODING

6.1 The flood risk map (OPW PFRA FLOOD MAP) reproduced in Appendix 3 presents the 1% and 0.5% AEP pluvial flood extents for the site as calculated by the PFRA. It can be seen from the map that the risk of pluvial flooding at the site is very minor with only very small pockets indicated to be at risk.

6.2 It is noted that the existing stormwater attenuation system is designed for a 1% AEP flood event allowing for 20% increase due to climate change. The site is at minimal risk from Pluvial Flooding.

6.3 In the case of pluvial flooding the site location meets the criteria for Flood Zone C as set out in Clause 2.23 of the Guidelines. As such, it is concluded that there is no risk of pluvial damage.

7 FLUVIAL FLOODING

7.1 The flood risk map for Duleek (NAN/MPW/EXT/CURS/002) reproduced in Appendix 2, is published by the Office of Public Works. This map indicates that the site is not at risk from fluvial flooding.

7.2 As indicated in Appendix 2 the River Nanny is approximately 2.1km south of the site Therefore, the site is not at risk from fluvial flooding from this river.

7.3 The flood risk map for The Cruicerath stream (OPW PFRA FLOOD MAP) reproduced in Appendix 3. This map indicates that the site is not at risk from fluvial flooding.

7.4 As indicated in Appendix 3 the Cruicerath stream is approximately 200m southwest of the site and flows to the Nanny river. The stream is 1.5m - 2.0m below the lowest level of the site therefore, the site is not at risk from fluvial flooding from this stream.

7.5 In the case of fluvial flooding the site location meets the criteria for Flood Zone C as set out in Clause 2.23 of the Guidelines. As such, it is concluded that there is

no risk of fluvial damage.

8 FLUVIAL FLOODING

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9 TIDAL FLOODING

9.1 The site is located approximately 10km from the nearest cost line. Ground level on site varies from 30.0m to 37.0m above ordinance datum.

9.2 It is noted that there is no record of tidal flooding on this site.

9.3 In the case of tidal flooding the site location meets the criteria for Flood Zone C as set out in the Clause 2.23 of the Guidelines. As such it is concluded that there is no risk of tidal flooding.

10 GROUND WATER FLOODING

10.1 It is noted that there is no record of flooding on this site due to ground water.

10.2 Ground water level has been observed to be approximately 30.0m below the existing ground level.

10.3 It is considered extremely unlikely that ground water levels on site will rise above ground level. However if this was to occur the water would follow the overland flood routes and away from the buildings.

11 EXISTING DRAINAGE & WATER SUPPLY SYSTEMS

11.1 The surface water drainage from the building roofs and paved areas is collected in a below ground drainage network of 225mm diameter pipes which drain by gravity to the existing attenuation pond on site.

11.2 A flow control device limits the maximum rate of discharge of surface water from the site to 59.8l/s as per condition 3.14 of EPA licence W0167-03

11.3 The existing site drainage system is designed to achieve self-cleaning velocity. This will prevent the build-up of silt deposits in the system which could cause blockage and possibly result in flooding.

11.4 All elements of the existing site drainage systems (pipelines and manholes) are tested to ensure that they are watertight.

11.5 Water supply mains are pressure tested to ensure that they can perform satisfactorily without bursting or leakage.

11.6 With the incorporation of the mitigation measures described above the risk of flooding associated with the proposed drainage and water supply systems is negligible.

APPENDIX 1: MAP REPORT FROM OPW WEBSITE FLOODMAPS.ie

OPW National Flood Hazard Mapping

Summary Local Area Report

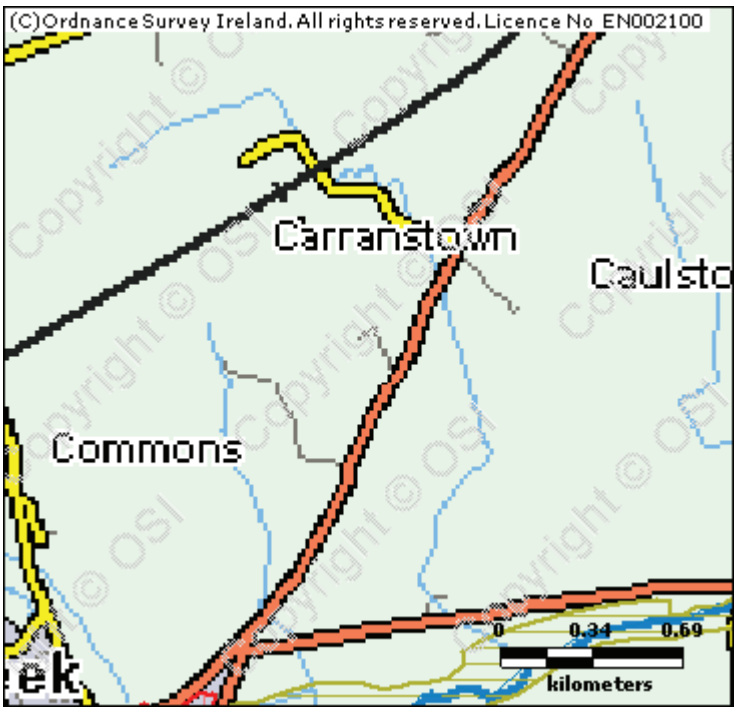
This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Meath

NGR: O 059 700

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.



Map Scale 1:28,513

Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Thier purpose and scope is explained in the Glossary.

10 Results

1. Nanny Duleek Nov 2000
Start Date: 05/Nov/2000
County: Meath
Flood Quality Code:2
Additional Information: Reports (3) Press Archive (4) More Mapped Information

2. Nanny Duleek Oct 1993
Start Date: 07/Oct/1993
County: Meath
Flood Quality Code:1
Additional Information: Reports (2) More Mapped Information

3. Nanny Duleek June 1993
Start Date: 11/Jun/1993
County: Meath
Flood Quality Code:3
Additional Information: Reports (1) Press Archive (14) More Mapped Information

4. Nanny Duleek Jan 1992
Start Date: 01/Jan/1992
County: Meath
Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information

5. Nanny Duleek August 1986
Start Date: 25/Aug/1986
County: Meath
Flood Quality Code:3

Additional Information: Reports (4) Press Archive (2) More Mapped Information

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6. Nanny Duleek Sept 1984

Start Date: 23/Sep/1984

County: Meath

Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information

7. Nanny Duleek Mar 1980

Start Date: 18/Mar/1980

County: Meath

Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information

8. Nanny Duleek Dec 1978

Start Date: 28/Dec/1978

County: Meath

Flood Quality Code:3

Additional Information: Reports (1) Press Archive (3) More Mapped Information

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9. Nanny Duleek Sept 1975

Start Date: 17/Sep/1975

County: Meath

Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information

10. Nanny Duleek Dec 1954

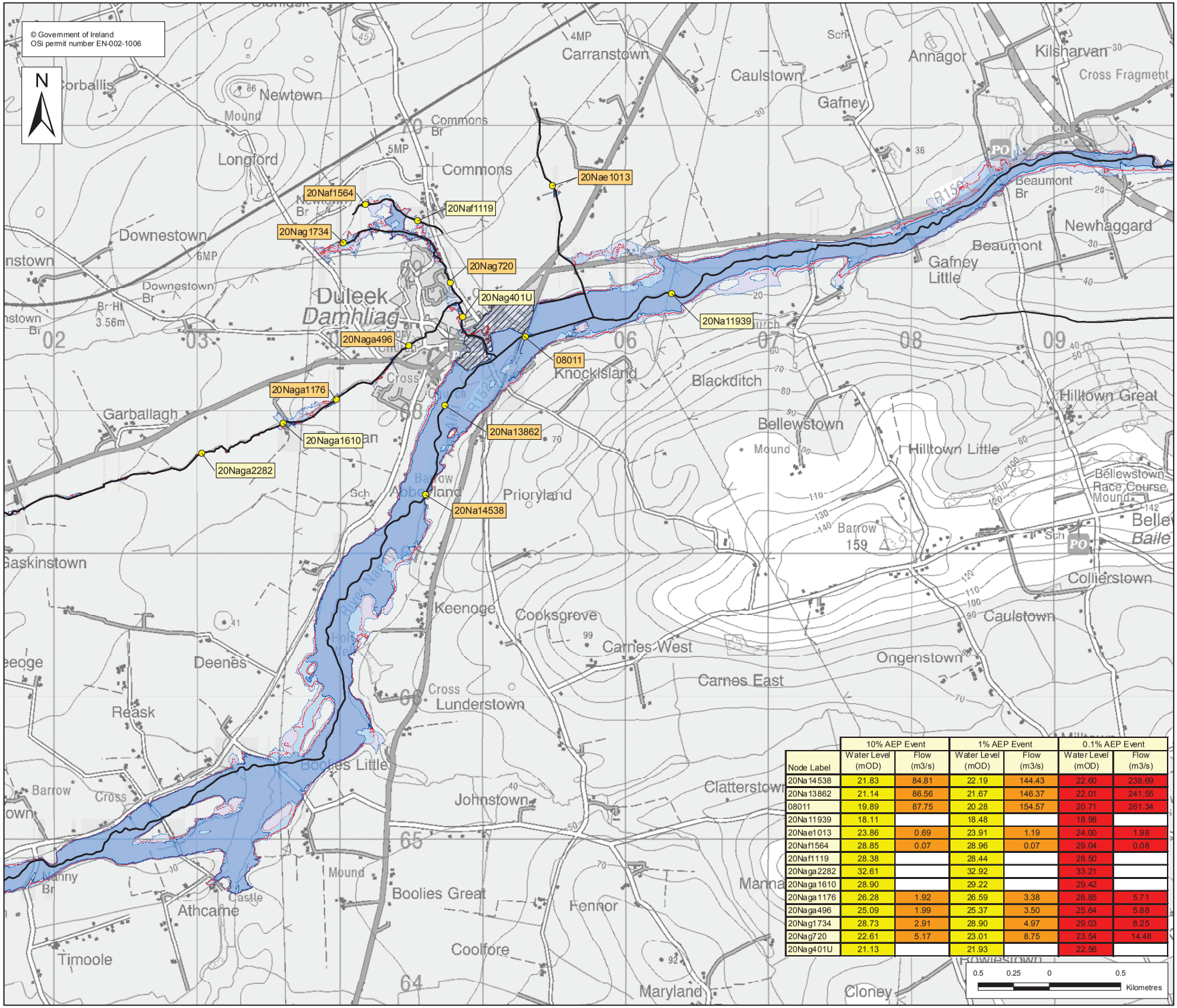
Start Date: 08/Dec/1954

County: Meath

Flood Quality Code:3

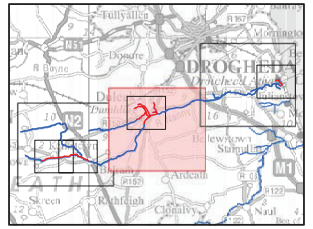
Additional Information: Reports (1) Press Archive (2) More Mapped Information

APPENDIX 2: FLOOD RISK MAP FOR RIVER NANNY (NAN/MPW/EXT/CURS/002)



Node Label	10% AEP Event		1% AEP Event		0.1% AEP Event	
	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)
20Na14538	21.83	84.81	22.19	144.43	22.60	238.69
20Na13862	21.14	86.56	21.67	146.37	22.01	241.55
08011	19.89	87.75	20.28	154.57	20.71	261.34
20Na11939	18.11		18.48		18.98	
20Nae1013	23.86	0.69	23.91	1.19	24.00	1.98
20Naf1564	28.85	0.07	28.96	0.07	29.04	0.08
20Naf1119	28.38		28.44		28.50	
20Naga2282	32.61		32.92		33.21	
20Naga1610	28.90		29.22		29.42	
20Naga1176	26.28	1.92	26.59	3.38	26.85	5.71
20Naga496	25.09	1.99	25.37	3.50	25.64	5.88
20Nag1734	28.73	2.91	28.90	4.97	29.03	8.25
20Nag720	22.61	5.17	23.01	8.75	23.54	14.48
20Nag401U	21.13		21.93		22.56	

Location Plan :



EXTENT MAP

Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Defended area
- High Confidence (<20m) (10% AEP)
- Medium Confidence (<40m) (10% AEP)
- Low Confidence (>40m) (10% and 0.1% AEP)
- High Confidence (<20m) (1% AEP)
- Medium Confidence (<40m) (1% AEP)
- Low Confidence (>40m) (1% AEP)
- Modelled River Centreline
- Node Point
- 21Ma237 Node label with level data (refer to table)
- 21Ma237 Node level with flow & level data (refer to table)

High confidence
Medium confidence
Low confidence
refer to table

USER NOTE :

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

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Clients :

Fingal County Council
Meath County Council
OPW

Project :
FEM FRAMS

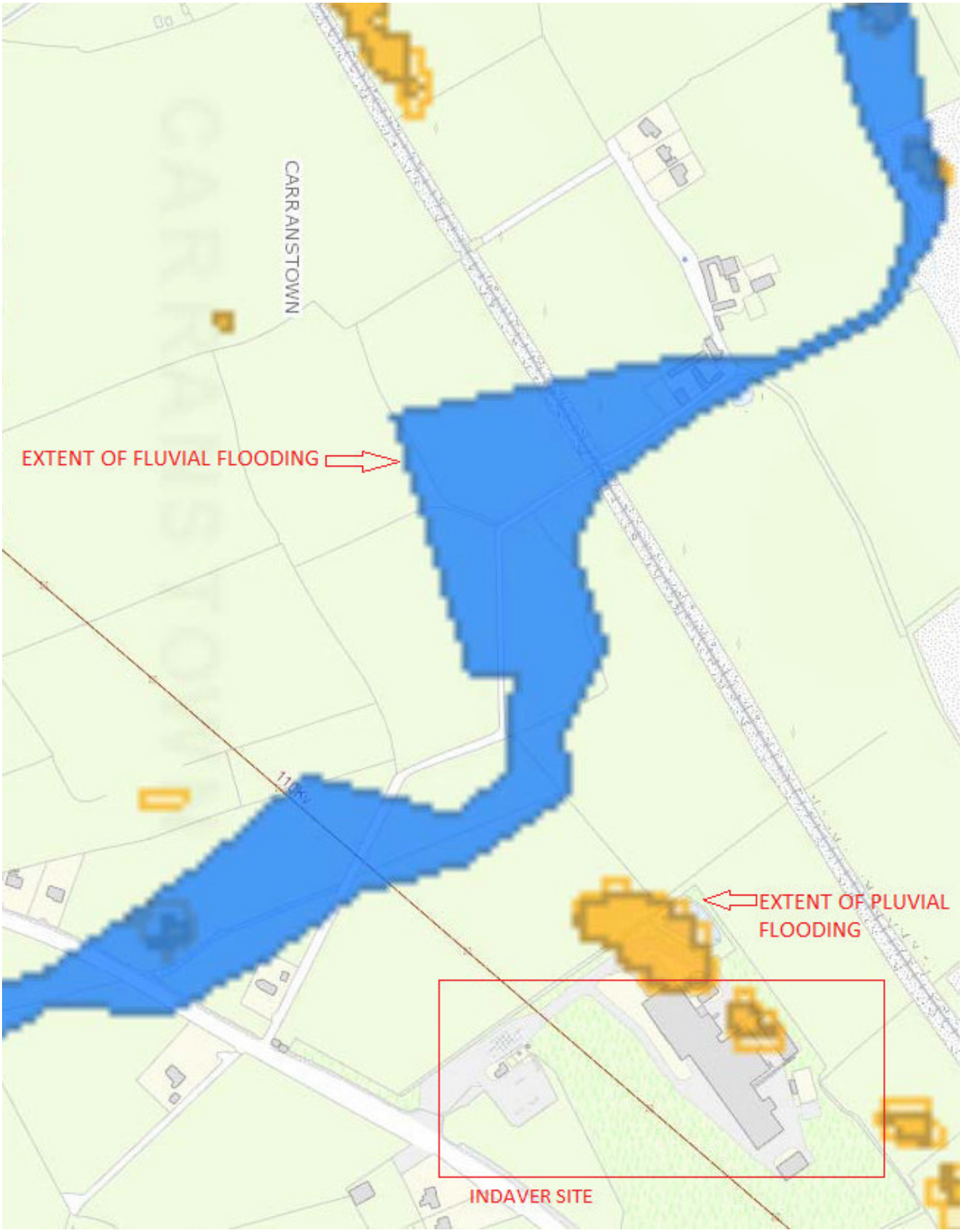
Map :
NANNY MODEL FLOOD EXTENT MAP

Map Type :	FLOOD EXTENT	
Source :	FLUVIAL FLOODING	
Map area :	MEDIUM PRIORITY WATERCOURSE	
Scenario :	CURRENT	
Figure By :	Mara Ruiz	Date : 2 November 2010
Checked By :	Sergio Herbón	Date : 2 November 2010
Approved By :	Clare Dewar	Date : 2 November 2010

Figure No. : NAN/MPW/EXT/CURS/002
Revision : 1

Drawing Scale : 1:25,000 Plot Scale : 1:1 @A3

APPENDIX 3: EXTRACT FROM OPW PFRA FLOOD MAP FOR CRUICERATH STREAM


CARRANSTOWN
EXTENT OF FLUVIAL FLOODING
EXTENT OF PLUVIAL FLOODING
INDAVER SITE