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FLOOD RISK ASSESSMENT REPORT

Construct agricultural shed incorporating loose and storage areas, wall manure area, hardcore area & access roadway, up-grading of existing entrance and all associated site works

at

Brownsbarn, Lower Baldonnell, Co. Dublin

Applicant: Maurice Lyons

Reg No. SD22A/0141

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Applicant:
Maurice Lyons

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Report Writing:

John Delaney (MSc; BSc; MIEI)
Geoscientist & Hydrologist

Date:

3rd Oct 2022

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1.0 Introduction

Geoenvironmental Environmental Consultants were commissioned by Maurice Lyons to complete a flood risk assessment in connection with a proposed planning application to construct agricultural shed incorporating loose and storage areas, wall manure area, hardcore area & access roadway, up-grading of existing entrance and all associated site works.

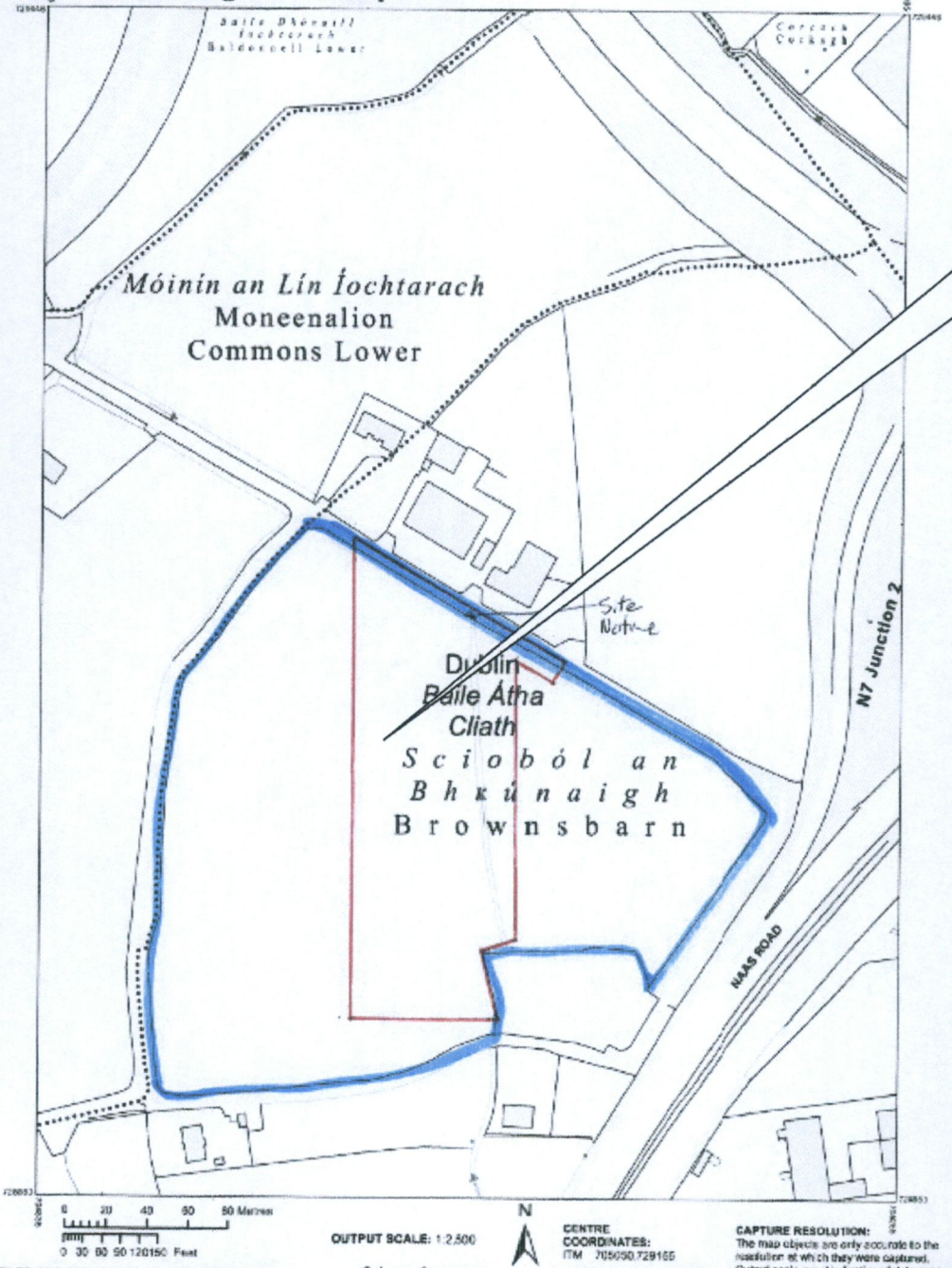
The applicant has been advised in item 5 (a & b) that the site is located in Flood Zone B according the OPW's CFRAMS maps and is therefore at risk from a 1;100 yr event (1%) AEP Flood event. The applicant is requested to submit a report and drawings showing details of measures to mitigate the risk of flooding to the proposed development and to adjoining lands. The finished floor levels shall be above the closest known 1:100 year river flood level data point with appropriate free-board. This site specific assessment is submitted as is a requirement under the Planning System and Flood Risk Management Guidelines for Planning Authorities, DEHLG 2009 required to be submitted as part of the application.

The Baldonnell Upper stream flows close to the east and north (roadside boundary) of the field in which the proposed development is located. This site specific assessment will assess if the proposed site is likely to be at risk from an extreme flood event in the river. The site location is identified in Figure 1.0.

The Flood Risk Assessment contains the findings from the examination of existing Limerick County Council & OPW documentary and cartographic flood risk data sources and also incorporates detailed hydraulic modelling of the nearby stream. The modelling, which is based on a detailed topographical survey of the river channel and surrounding area, will project the 1:100 and 1:1000 year fluvial flood elevations.

1.0: *Proposed Development Location at*

Planning Pack Map



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CENTRE COORDINATES: ITM 705050,729165

PUBLISHED: 27/04/2022
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MAP SHEETS: 3326-C 3389-02

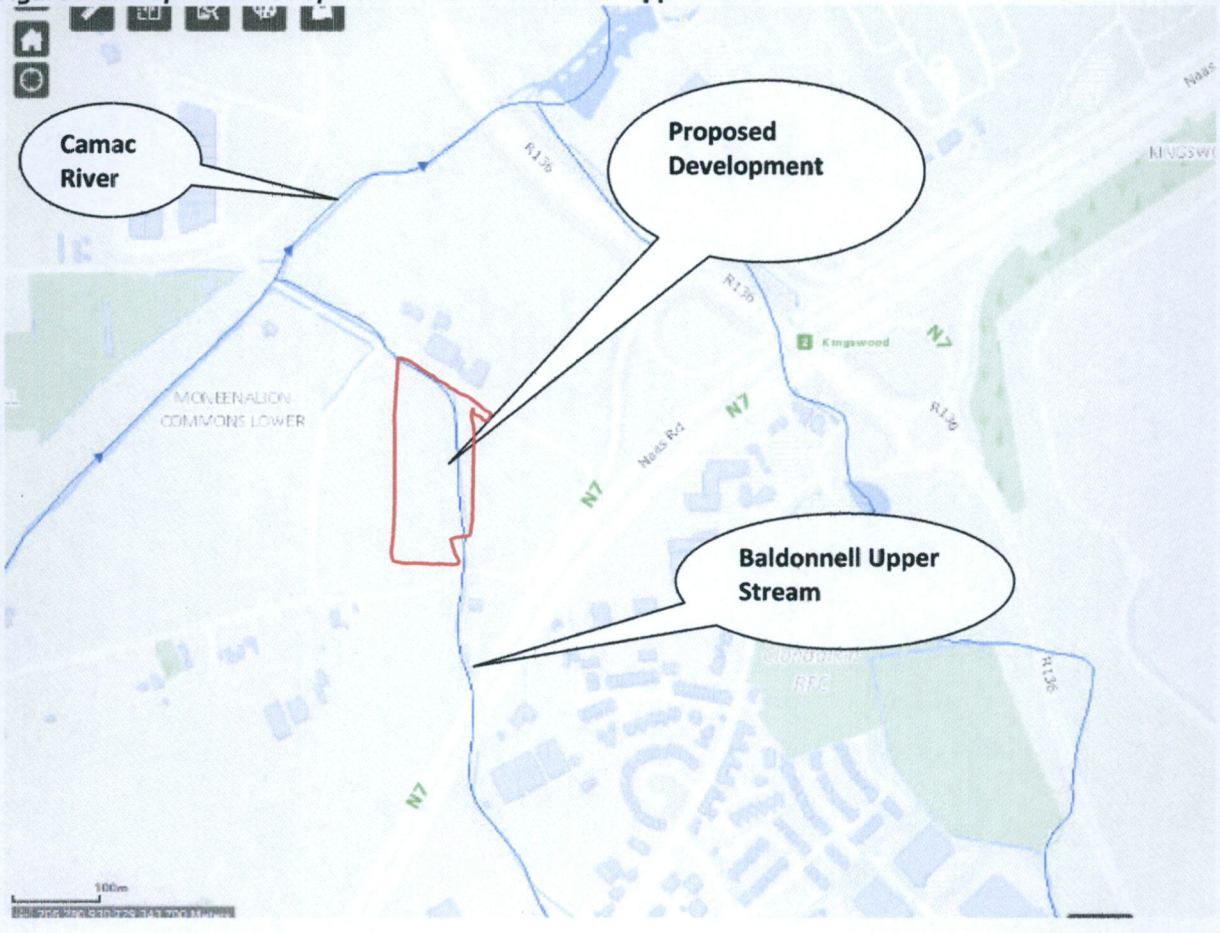
CAPTURE RESOLUTION: The map objects are only accurate to the resolution at which they were captured. Output scale is not indicative of data capture scale. Further information is available at http://www.osi.ie; search 'Capture Resolution'
LEGEND: http://www.osi.ie; search 'Large Scale Legend'

Ordnance Survey Ireland

2.0 Hydrology of Baldonnell Upper Stream

The Baldonnell Upper Stream rises 2.5km south of the study location in the townsland of Fortunestown close to the Boherboy Road. The stream flows mainly in a northerly direction following the direction of the City West Road. The stream crosses under the City West Road approximately 1km south of the study location before crossing under the Old Naas Road. The stream continues to flow mainly in a northerly direction and flows under the N7 (Naas Road) 200m south of the study location. The stream switches to a northerly direction once in reaches the roadside boundary before eventually confluencing with the larger Camac River 150m North-West of the study location.

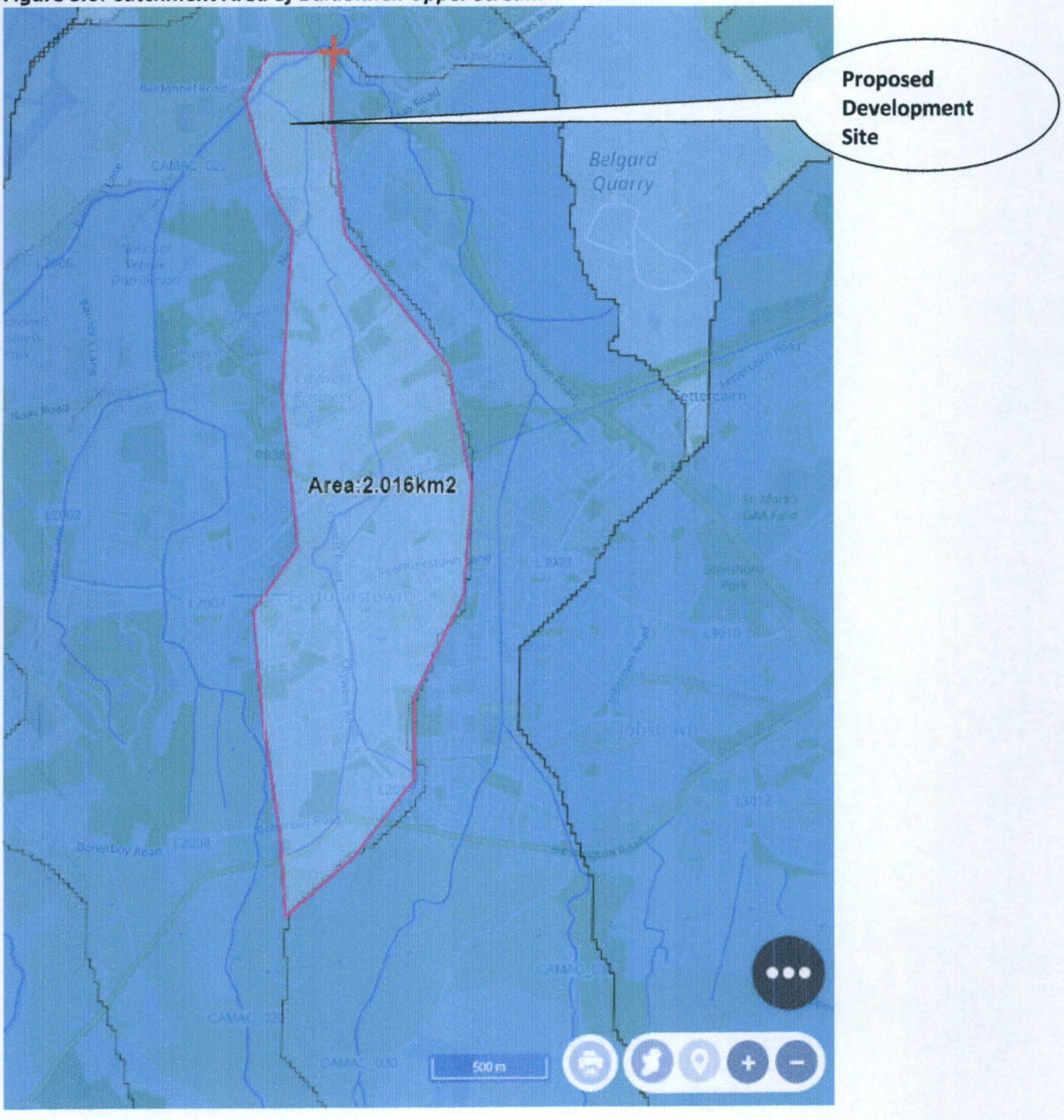
Figure 2.0: Proposed Development Site and Baldonnell Upper Stream



3.0 Baldonnell Upper Stream Catchment Area

The catchment area of the Baldonnell Upper Stream to the study point location was calculated using the EPA Hydronet Tool. The proposed development site is located close to where the stream confluences with the larger Camac River. The stream has a catchment area of only 2.016 km^2 from source to the study location as illustrated in Figure 3. The catchment descriptors of the stream re set out in Table 1.

Figure 3.0: Catchment Area of Baldonnell Upper Stream



4.0 Flood Risk Identification

4.1 Source Pathway Receptor Model

The Source-Pathway-Receptor (S-P-R) Model has become widely used to assess and inform the management of environmental risks. Flood risk assessments require identification and assessment of all three components:

- The probability and magnitude of the source (in this case high river levels within the Baldonnell Upper Stream
- The performance and response of pathways and barriers to pathways such as floodplain areas and flood defense systems; and
- The consequences to receptors such as students, teachers, properties and the environment.

The ultimate aim of a flood risk assessment is to combine these components so that the consequences can then be analysed. Flood Risk Assessments (FRAs) need to consider the situation both as it is now and also how it might change in the future. Such consideration should include changes in climate (which impact largely on sources), the construction of flood protection or drainage schemes within the locality by others, the deterioration of existing and proposed defenses. A desk top study and site inspection were undertaken as part of the Flood Risk Assessment. The desk top study entailed an examination of documentary and cartographic sources.

4.2 Types of Flooding

The 4 principal types of flooding are explained below.

Fluvial Flooding occurs when rivers and streams break their banks and water flows out onto the adjacent low-lying areas (the natural floodplains).

Pluvial flooding can be defined as flooding that results from rainfall-generated overland flow, before the runoff enters any watercourse or sewer. It is usually associated with high intensity 'extreme or monster' rainfall events (typically >30mm/h) resulting in overland flow and ponding.

Coastal floods occur around much larger bodies of water, usually when the tide gets very high and/or high winds coupled with a is a storm surge at sea

Groundwater flooding occurs when the natural underground drainage system cannot drain rainfall away quick enough, causing the water table to rise above the ground surface. Groundwater flooding is much slower to occur than river flooding.

4.3 Sources of flood data

The primary source of flood risk information includes the following;

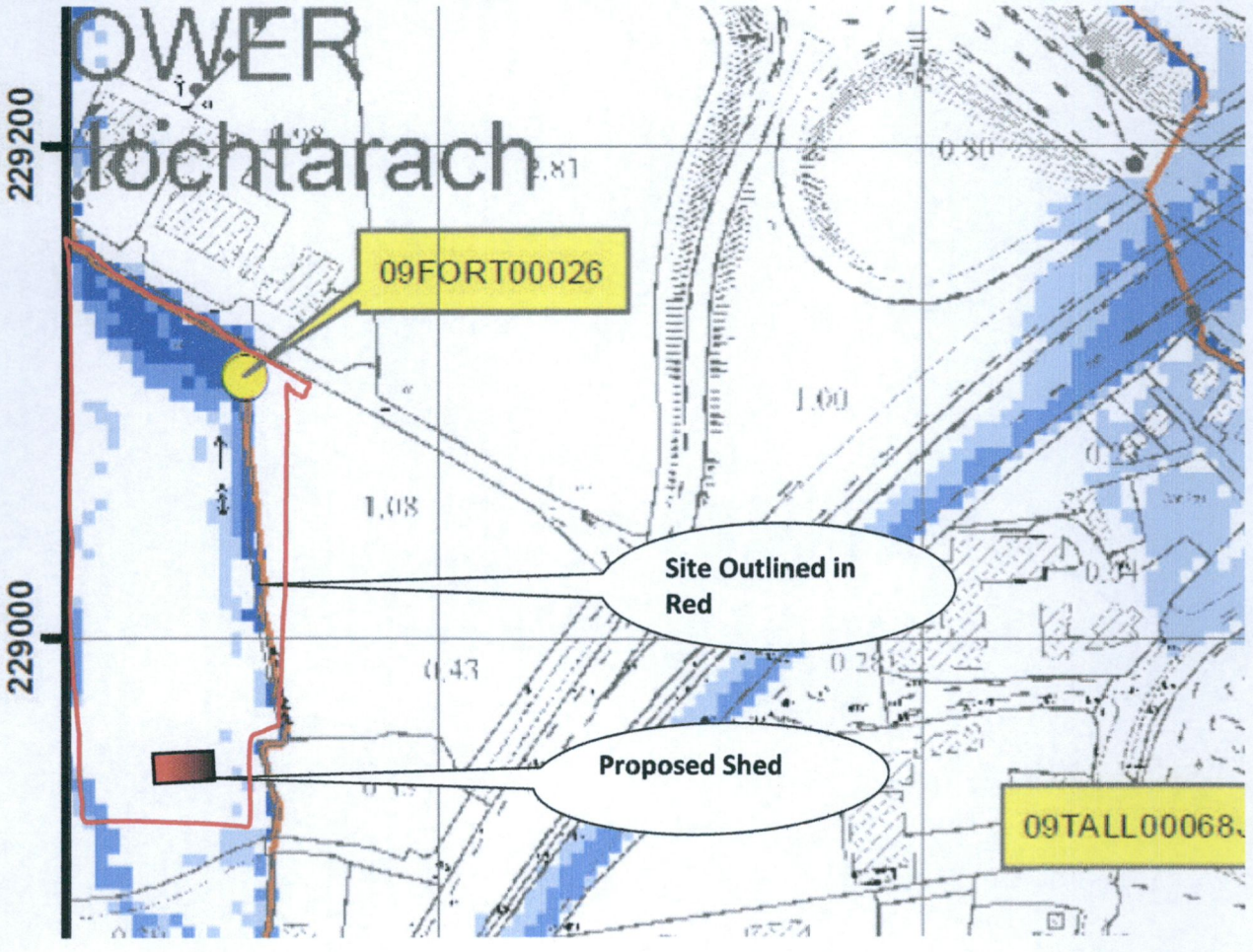
- OPW CFRAMS Maps
- The Planning System and Flood Risk - Guidelines for Planning Authorities – Department of Environment, Heritage and Local Government & OPW 2009

4.4 *OPW CFRAMS Fluvial Map*

Fluvial and Coastal Flood Maps made available by the OPW on the flooddata.ie website predict flood risk extent and other impact scenarios. The Flood Maps illustrate the chances of different types of flood events that may occur in the future and their potential impact. The maps show possible flooding from rivers (fluvial flooding -river over-topping) and from extreme sea levels (coastal flooding) for those river reaches, estuaries and coastlines that have been modeled thus far

The fluvial mapping layers show that ***the entrance of the site may be impacted from a 1:100 and or a 1:1000 yr fluvial event but the proposed shed and all other proposed infrastructure will not be*** of the proposed development site is at risk from a fluvial event from a medium probability event and a smaller section potentially at risk from a less likely ***low probability event***. An extract from the fluvial indicative mapping of the study area is set out below in Figure 5.0.

Figure 5.0: OPW Flooddata Fluvial Indicative Mapping



4.5 Assessment of Possible Flood Sources

- OPW CFRAMS Map indicates possible fluvial risk at roadside and eastern boundary of the site but not where proposed loose shed, manure storage area and hardcore yard are proposed
- Flooding due to inadequate surface water infrastructure – is not relevant in this case
- No risk of pluvial flooding (which is rainfall generated overland flow that arises before run off enters watercourse or sewer) is unlikely provided all gullies, Access Joints and surface water sewers remain un-blocked.
- Groundwater related flooding is again not relevant as there are no excavations planned that will breach the water table and no high water table conditions were discovered during the Site Suitability Assessment Investigations

5.0 Survey Data & Flood Risk Evaluation

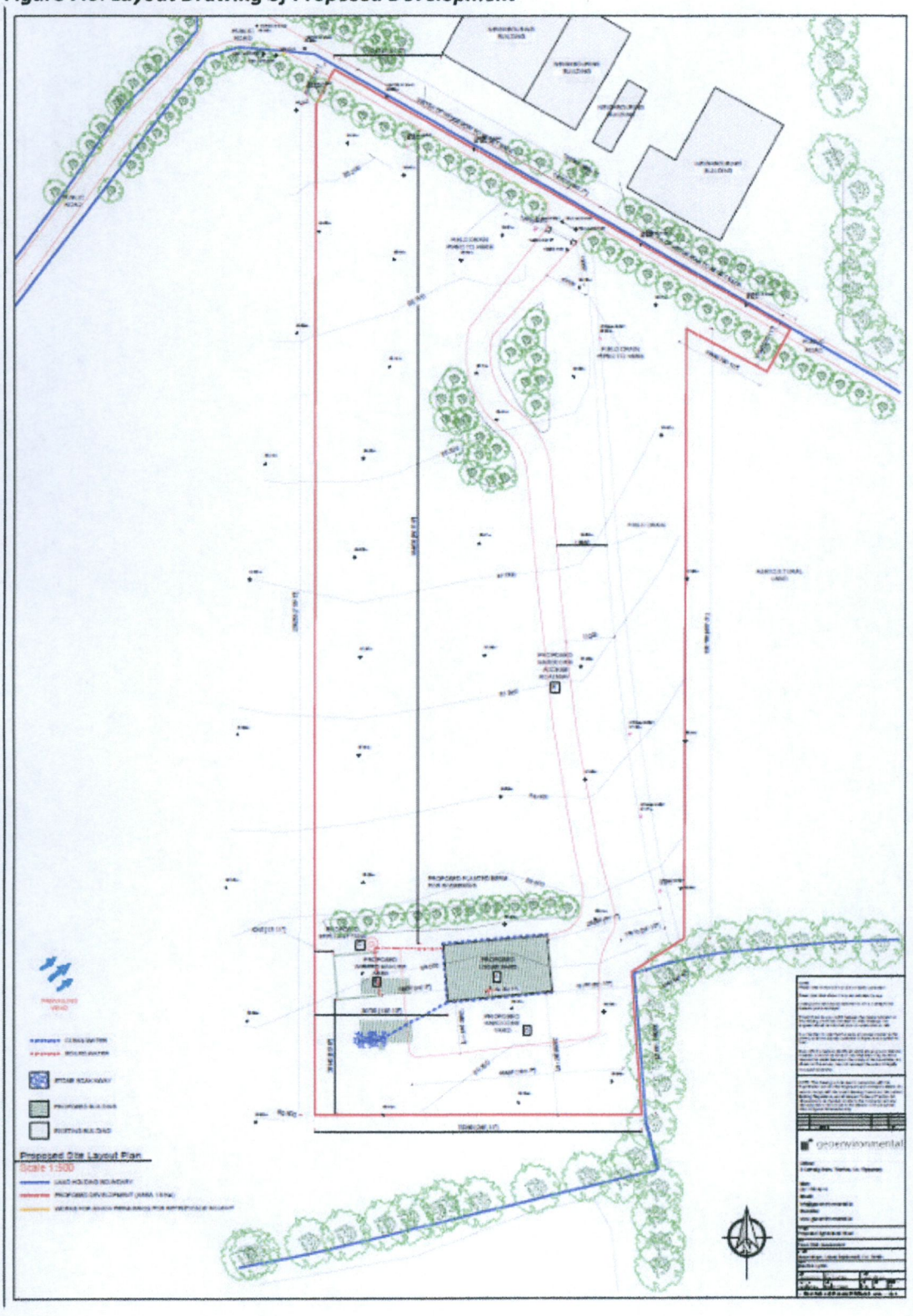
A topographical survey of the proposed site and river channel was completed by John Delaney of Geoenvironmental Ltd. The survey was carried out using a GeoMax GPS Rover in OD Datum (Malin). The survey elevations were compared with Ordance Datum as shown on the OPW CFRAMS Maps. The nearest OPW Node on the Baldonnel Upper/Fortunestown Stream (09FORT00026) is located close to the roadside boundary of the site. The OPE Flood Extents Map projects the following flood levels at this location on site

Table 1.0: OPW CFRAMS Node 09FORT00026

Fluvial Risk Probability	(AOD Malin)
1:10 yr (10% AEP)	86.38m
1:100 yr (1% AEP)	86.44m
1:1000 yr (0.1% AEP)	86.45m

The survey shows that the floor level of the proposed shed will be located at 89.250m or 2.8m above the projected 1:1000 yr flood level (86.45m) as set out in the CFRAMS Flood Extents Map. All other proposed infrastructure (proposed hardcore yard and walled manure area will be located at >2.5m above this level. The stream invert at the CFRAMS Node was surveyed at 85.66m indicating that the flood waters will rise by 0.8m above stream invert during an extreme 1:1000 yr event. The stream invert closest to the proposed shed was surveyed to be 87.57m. This invert is more relevant that the down-stream node when assessing the impact on the proposed shed etc. Using the same OPW rationale that the water level in the stream would rise by 0.8m during a 1:1000 yr flood elevation would reach 88.37m at this upper section of the stream which would still allow for a 0.88m freeboard between the projected 1:1000 yr flood level and the finished floor level of the proposed shed. The projected maximum 1:1000 yr flood level in the watercourse sloe to the entrance will reach 85.87m. This will not impact on the proposed entrance which will be at 86.037m. The projected flood levels are illustrated on the layout and section drawings set out in Appendix A of this report.

Figure 7.0: Layout Drawing of Proposed Development



6.0 Vulnerability Class

The vulnerability of development to flooding depends on the nature of the development, its occupation and the construction methods used. The classification of different land uses and types of development as highly vulnerable, less vulnerable and water-compatible is influenced primarily by the ability to manage the safety of people in flood events and the long-term implications for recovery of the function and structure of buildings. The proposed development comprises a commercial/agricultural development associated site works and is classified as less vulnerable than residential developments or essential infrastructure such as schools or hospitals. The vulnerability class should be appropriate to the level of flood risk quantified when assessed with regard to justification test.

Table 2.0 as Set out in 2009 Planning System and Flood Risk Management Guidelines

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

7.0 Justification Test

A Justification Test in the context of flood risk is an assessment of whether a development proposal within an area at risk of flooding meets specific criteria for proper planning and sustainable development and demonstrates that it will not be subject to unacceptable risk nor increase flood risk elsewhere. The justification test should be applied only where development is within flood risk areas that would be defined as inappropriate under the screening test of the sequential risk-based approach adopted by this guidance. Section 3 of the DOELG Flood Risk Management Guidelines for Planning Authorities requires that any developments and land-use types including residential dwellings are subject to a justification test. The South Dublin County Council Strategic Flood Risk Assessment Report divides the Justification Criteria into the following categories

- Existing, developed, High Vulnerability Zonings
- Existing, developed, Less Vulnerable Zonings
- Undeveloped lands at risk of flooding

7.1 Justification Test - Criteria 1.

Criteria 1 is whether the subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of the Local Authority Guidelines.

The Daft South Dublin Draft Strategic Flood Risk Assessment Report identifies some lands in the area Greenogue – Baldonnell area as being at risk flooding from the Griffeen river and its tributaries affect areas from Naas Road to College Lane, across Greenogue Business Park / Aerodrome Park, and up until Baldonnel Road. Additional flooding from the Camac affects areas between Naas Road and Baldonnel Road (Casement Aerodrome Baldonnel) as well as areas in Corkagh Park and lands west of Grange Castle Road. The lands in this area are currently zoned as

"RU" To protect and improve rural amenity and to provide for the development of agriculture"
"OS" – To preserve and provide for open space and recreational amenities",
"EE – To provide for enterprise and employment related uses",
"RES – To protect and/or improve residential amenity " and
"RES-N – To provide for new residential communities in accordance with approved area plans".

The lands at the study location at Brownsbarn, Lower Baldonnell are classified as under-developed lands which in part may be at risk of flooding. The recommended land use is **'RU'** which is to protect and improve rural amenity and to provide for the development of agriculture".

The Justification Test criteria encourages the use of lands at the study location in Brownsbarn for the development of agriculture 'RU' thereby complying with the recommended land-use as set out in the South Dublin County Development Plan.

7.2 Justification Test - Criteria 2

The proposal has been subject to an appropriate flood risk assessment that demonstrates:

The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;

The OWP CRFRAMS Maps shows that the proposed development i.e. shed area will not be at risk from an extreme fluvial event in the nearby stream but that the section of the development close to roadside boundary may be impacted

The findings of the FRA indicates that the proposed development will have no adverse impact on existing and on any possible future likely flood events. There will not be any overall increase in flood water displacement or increased flood risk within the site or adjacent lands arising from the proposed development. All surface water generated from the proposed agricultural development will be discharged to ground with soakaways located outside of any potential flood risk area.

The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;

The proposed development is classified as lower vulnerability

The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access;

There is no risk of flooding so no measures to minimise or mitigate against flood risk and to permit access for emergency vehicles are required

The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The proposed development complies with the land used zoning in the Greenogue – Baldonnell area. The level risk is proportionate to the land use type proposed. The site specific FRA shows that the proposed development will not be impacted from a 1:100 or 1;1000 yr fluvial event in the nearby Baldonnell Upper Stream.

8.0 Conclusions and Recommendations

This site specific Flood Risk Assessment has been prepared in accordance with the requirements of The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) and Circular PL02/2014 (August 2014). CFRAMS Mapping carried out by the OPW indicates that a small section of the proposed development site close to the east and road boundary of the proposed development may be at risk from a flood event in the nearby Baldonnell Upper Stream which bisects the site.

A topographical survey of the proposed site and stream channel illustrates that the proposed shed will be located 2.8m above the 1:1000 yr flood level at the closest node as set out in the CFRAMS Flood Extents Map. The stream invert adjacent to the proposed shed was surveyed to be 87.57m. This invert is more relevant when assessing the possible fluvial impact on the development. The projections indicate that 1:1000 yr flood elevation would reach 88.37m at this upper point on the stream which would still allow for a 0.88m freeboard between the flood level the finished floor level of the proposed shed. The projected maximum 1:1000 yr flood level in the watercourse sloe to the entrance will reach 85.87m. This will not impact on the proposed entrance which will be at 86.037m.

The application of the extreme discharge volumes and associated flood elevation illustrates that the proposed development and all associated works will not be impacted by any projected fluvial flood event in the nearby Baldonnell Upper Watercourse. A 1:1000 yr event has only a 0.1% probability of occurrence in any calendar year and therefore has a very low change of occurring. A 1:10 yr event has a 10% chance of occurance and is therefore much more likely.

All surface water run-of from the development will be discharged to ground and therefore there will be no increased risk of flooding as a result of the proposed development and therefore no measurable impact on any red party lands. All proposed services will be located above the projected high flood levels and therefore no risk to these are envisaged.

9.0 References

A. M. Cawley & C. Cunnane - *"Comment On Estimation Of Greenfield Runoff Rates"*; **2002**

CFRAMS Website - www.cfram.ie/pfra/interactive-mapping

Dept of Environment, Heritage and Local Government (2009) – *"The Planning System and Flood Risk Guidelines for Local Authorities "*, **November 2009**

Dr. Michael Bruen with the assistance of Mr. Fasil Gebre (2005) - *"An investigation of the Flood Studies Report ungauged catchment method for Mid-Eastern Ireland and Dublin"; **July, 2005***

EPA Hydrometric Data – www.epa.ie & EPA Hydrometric Tool - watermaps.wfdireland.ie

HEC-RAS – River Analysis System Software

Institute of Hydrology (1994) – *"Flood estimation for small catchments" - Report No. 124;* **June 1994**

OPW Hydrometric Website – www.opw.ie/hydro

OPW National Flood Mapping Site – www.flooddata.ie

South Dublin County Development Plan – Draft Strategic Flood Risk Assessment, ***May 2021***

13.0 Appendix: Site Layout Drawing & Cross-Sections

PUBLIC ROAD

NEIGHBOURING BUILDING

NEIGHBOURING BUILDING

NEIGHBOURING BUILDING

NEIGHBOURING BUILDING

55515m OF HEDGEROW TO BE SET BACK

120560 [395'-7"]

120570 [395'-7"]

85.500

10000

FIELD DRAIN PIPED TO HERE

PROPOSED HARDCORE ACCESS ROADWAY WILL BE CONSTRUCTED HIGHER THAN THE PROJECTED FLOOD LEVELS

86.000

10000

10000

1

PUBLIC ROAD

20980 [68'-10"]

10945 [35'-11"]

FIELD DRAIN PIPED TO HERE

184630 [605'-9"]

230255 [755'-5"]

FIELD DRAIN

11480

87.000

11220

PROPOSED HARDCORE ACCESS ROADWAY

E

87.500

138760 [455'-3"]

AGRICULTURAL LAND

88.000

2

PROPOSED PLANTED BERM FOR SCREENING

88.500

4245 [13'-11"]

PROPOSED EFFLUENT TANK

C

PROPOSED WALLED MANURE AREA

B

89.000

PROPOSED LOOSE SHED

A

89.250 FFL

15000 [49'-2"]

19150 [62'-10"]

30735 [100'-10"]

12480 [40'-11"]

PROPOSED HARDCORE YARD

D

26145 [85'-9"]

28205 [92'-8"]

89.500

48835 [160'-3"]

89.500

75260 [246'-11"]

FLOOD RISK LEGEND

HATCH	DESCRIPTION
	10% AEP FLUVIAL FLOOD EXTENT (1 IN 10 CHANCE IN ANY GIVEN YEAR)
	1% AEP FLUVIAL FLOOD EXTENT (1 IN 100 CHANCE IN ANY GIVEN YEAR)
	0.1% AEP FLUVIAL FLOOD EXTENT (1 IN 1000 CHANCE IN ANY GIVEN YEAR)

PREVAILING WIND

CLEAN WATER

SOILED WATER

STONE SOAK AWAY

PROPOSED BUILDING

EXISTING BUILDING

Proposed Site Layout Plan

Scale 1:500

LAND HOLDING BOUNDARY

PROPOSED DEVELOPMENT (AREA 1.8 Ha)

WORKS FOR WHICH PERMISSION FOR RETENTION IS SOUGHT

NOTE:
Please note contours (if any) are computer generated.

Sewer pipe sizes shown if any are estimated by eye.

Underground services are assumed to run in a straight line between points surveyed.

Should there be any conflict between the details indicated on this drawing and those indicated on other drawings, the engineer should be informed prior to construction on site.

It is important to note that the same accuracies implied by the plotting scale are equally applicable to digital data supplied for CAD.

Every effort is made to identify all visible above ground features. However, it should be borne in mind that there may be items obscured at visible features in the vicinity of the boundaries, as shown on this survey, may not represent the extent of legally conveyed ownership.

NOTE: This drawing is to be read in conjunction with the Specification and all other Engineer's and Architect's details. All work to comply with the current Building Control Act, the current Building Regulations, and all relevant Codes of Practice. All dimensions to be checked on site by the Contractor and any discrepancies to be brought to the attention of the Engineer. Work to figured dimensions only.

Rev.	Description	By	Date

geoenvironmental
ENVIRONMENTAL CONSULTANTS

Office:
2 Carraig Duin, Thurles, Co. Tipperary

Mob:
087 755 6013

Email:
info@geoenvironmental.ie

Website:
www.geoenvironmental.ie

PROJECT: Proposed Agricultural Shed

TITLE: Flood Risk Assessment Site Layout

LOCATION: Brownsbarn, Lower Baldonnell, Co. Dublin

CLIENT: Maurice Lyons

DATE	DWG No.	SCALE
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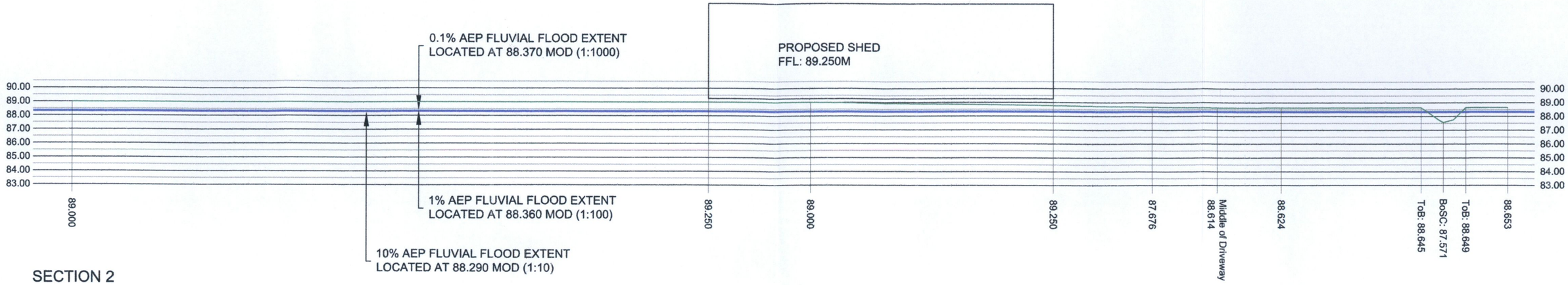
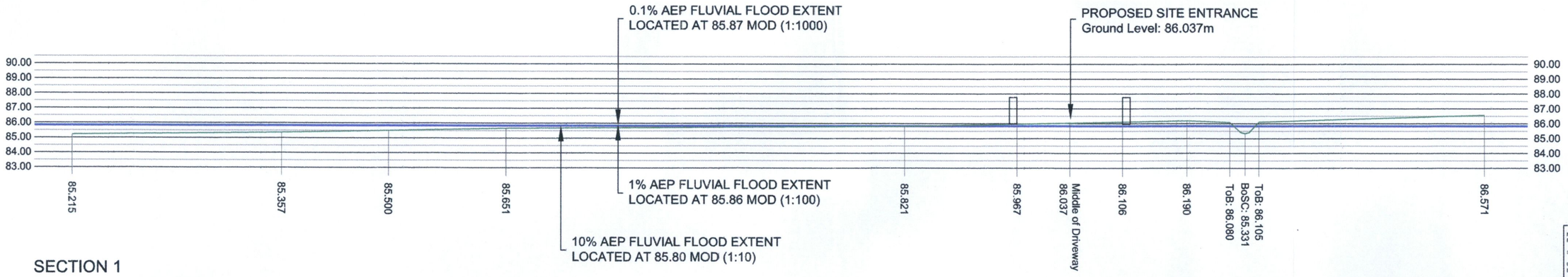
DRAWN BY	CHKD	REV. / SHEET No.
J.Delaney	Malin Head	ITM - 01



SECTION 2

SCALE 1:100



SECTION 1

SCALE 1:100

FLOOD RISK LEGEND

HATCH	DESCRIPTION
	10% AEP FLUVIAL FLOOD EXTENT (1 IN 10 CHANCE IN ANY GIVEN YEAR)
	1% AEP FLUVIAL FLOOD EXTENT (1 IN 100 CHANCE IN ANY GIVEN YEAR)
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Mob:
087 755 6013
Email:
info@geoenvironmental.ie
Website:
www.geoenvironmental.ie

PROJECT	Proposed Agricultural Shed
TITLE	Flood Risk Assessment Sections
LOCATION	Brownsbarn, Lower Baldonnell, Co. Dublin
CLIENT	Maurice Lyons

DATE	DRWG No.	SCALE	
02/10/2022	22.22.FRA	1:200 @ A2	
DRAWN BY	DESIGN	JOB	REV.
J.Delaney	Malin Head	ITM	-

SHEET No. 02