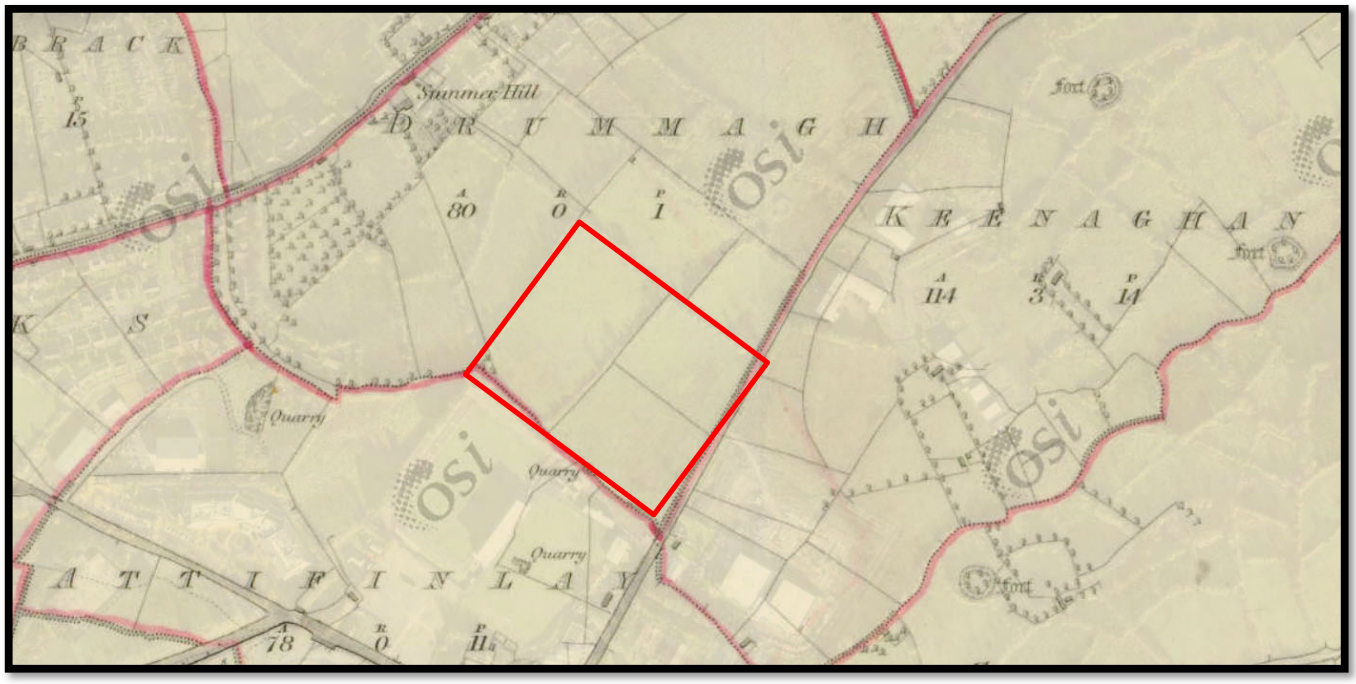
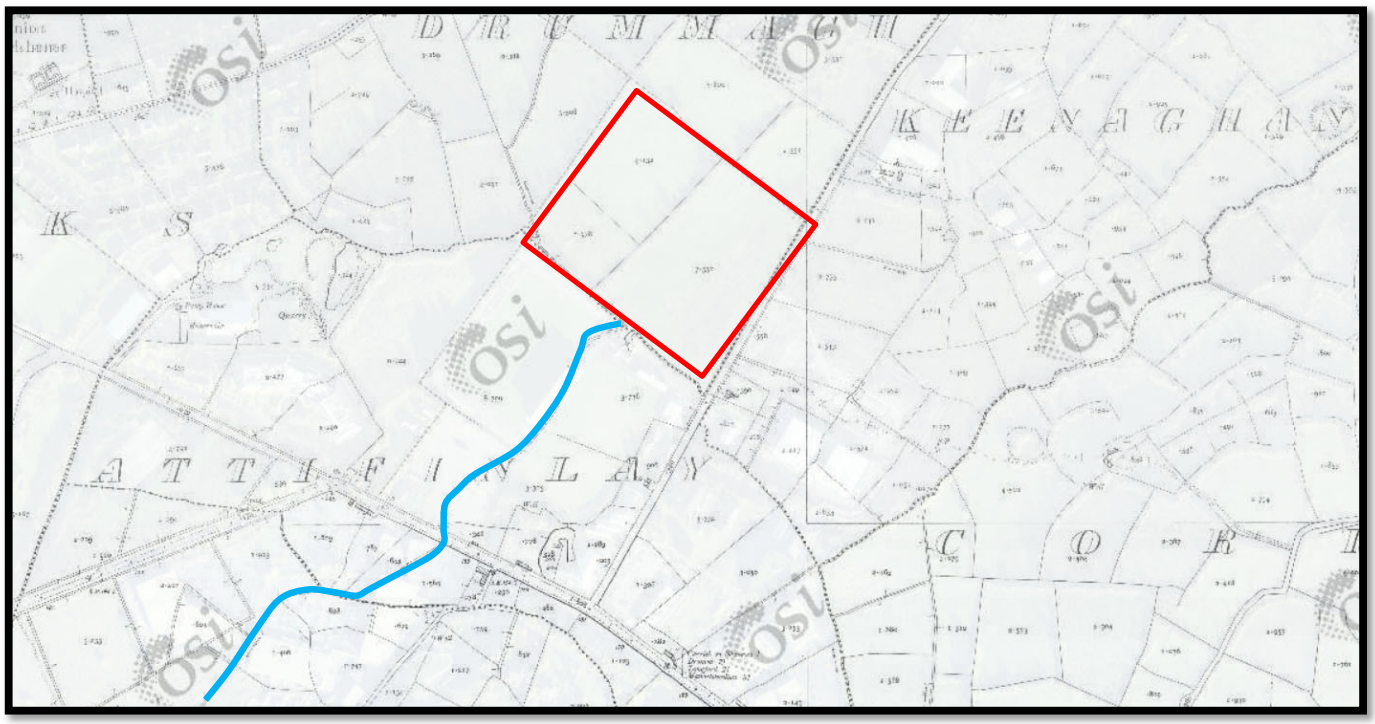
Shannon Recreation Centre – Hydrology Assessment

Appendix A – OSI Mapping & Aerial Photograph

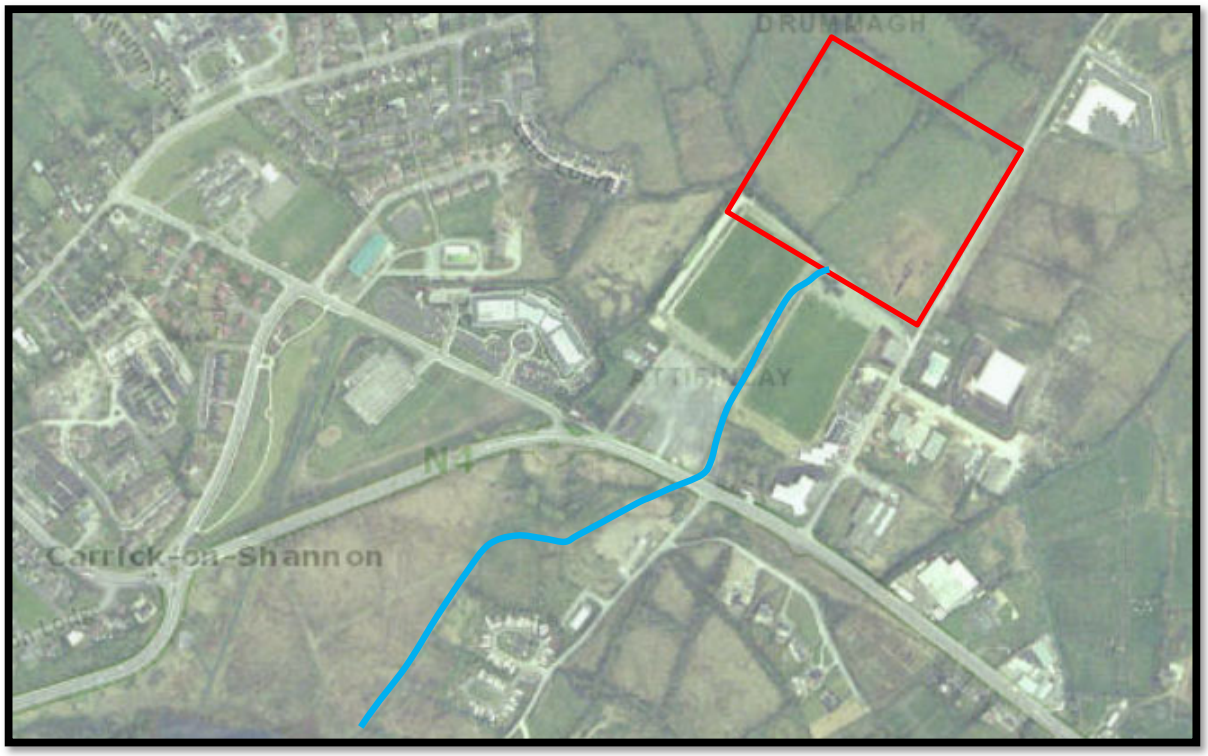


Map 01: OSI Old 6" Mapping (1837-1842) Note quarries on southern boundary and to south and west.
(Site Area highlighted by red box).

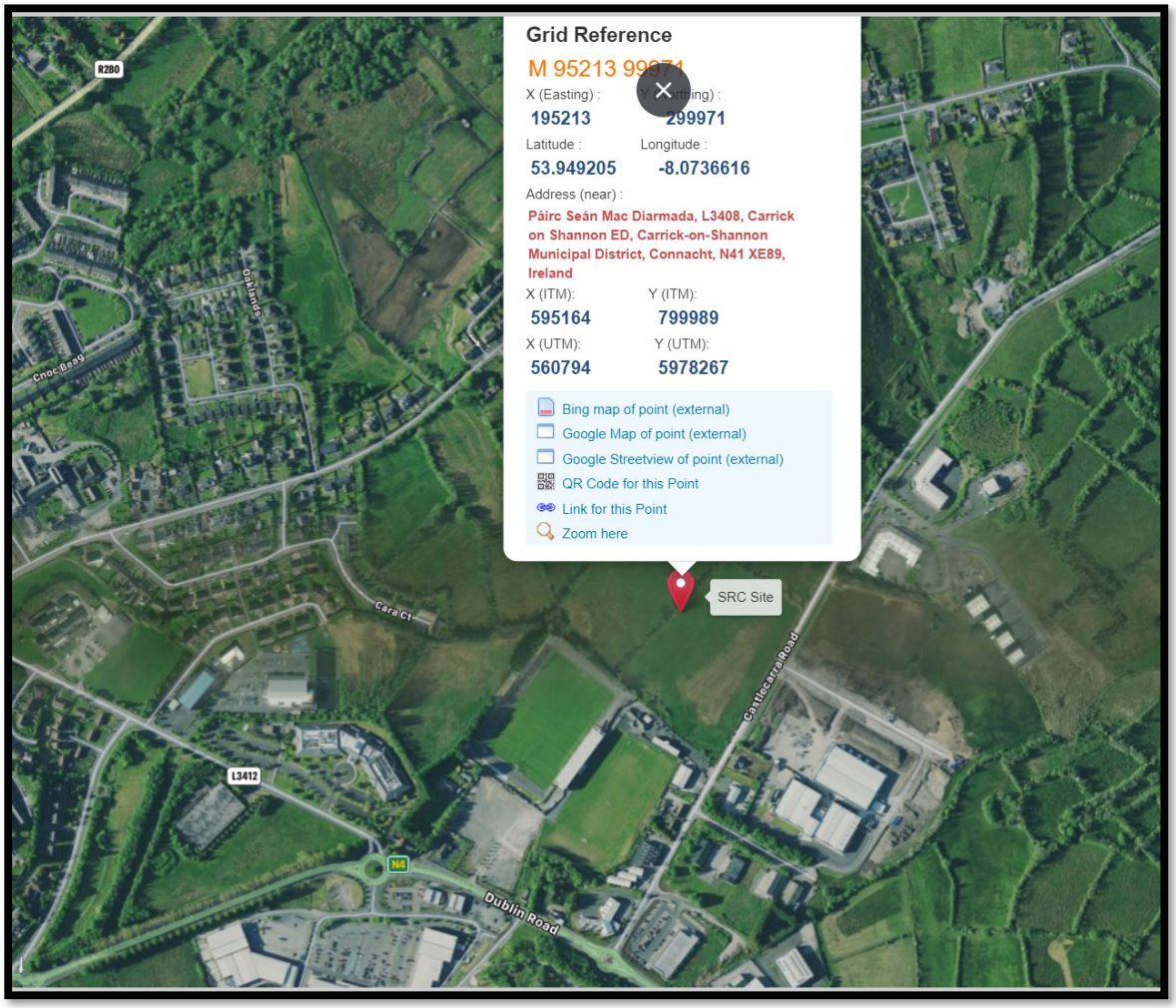


Map 02: OSI Old 25" Mapping (1888 to 1913) – mapped drainage stream highlighted by blue line.

Map 03: OSI Mapping Showing contours and flood extent for locality around the SRC site.



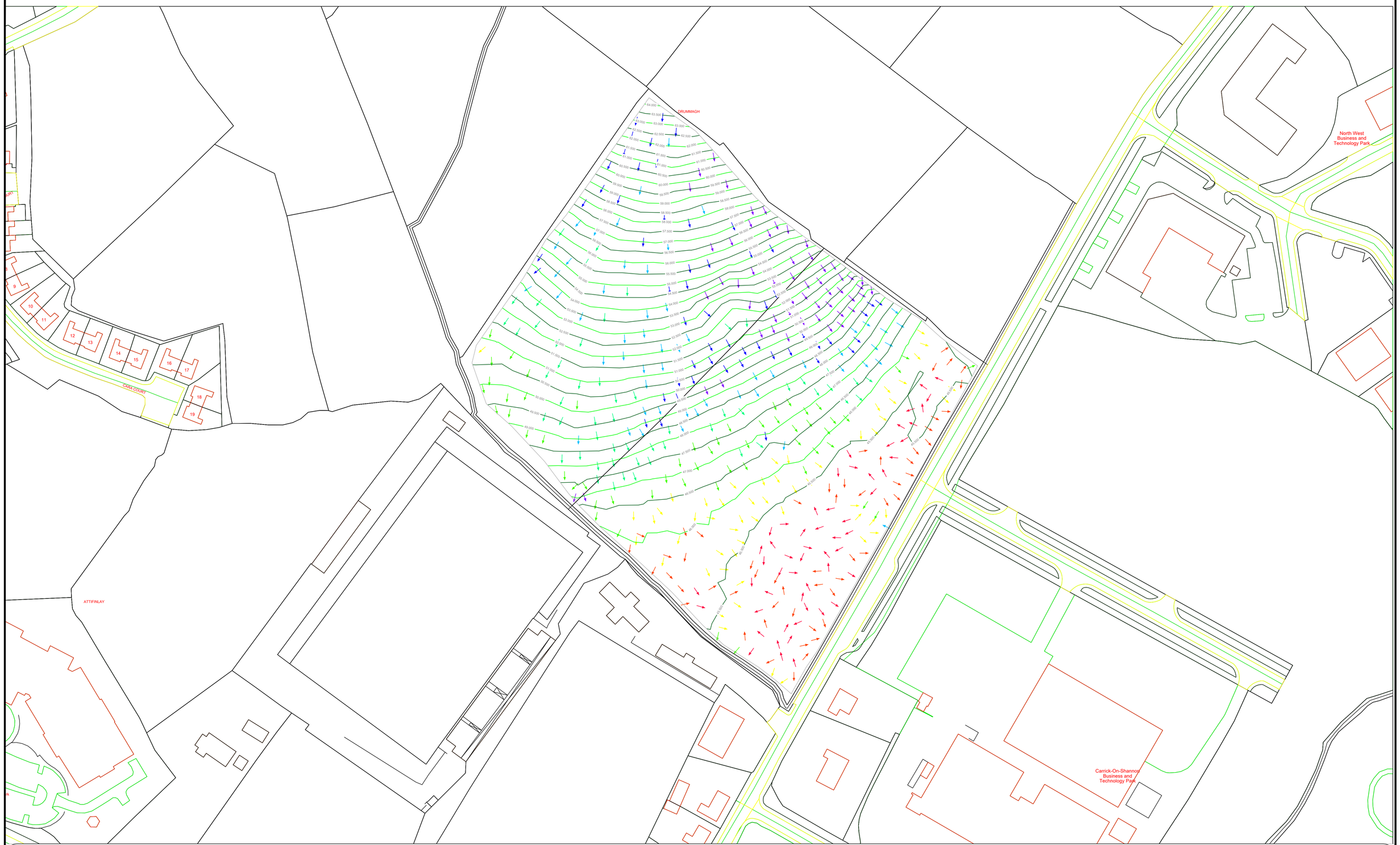
Map 04: Old OSI Aerial Photogrpah from 2000 with drain from site area visible south of N4.



Map 05: Screen Grab from Irish Grid Reference Finder Web Site - showing Grid Ref Data. (https://irish.gridreferencefinder.com/

Shannon Recreation Centre – Hydrology Assessment

Appendix B – Site Specific Topography Map



Notes:

1. This drawing is the copyright Collins Boyd Engineering Ltd. It is a confidential document and must not be copied, used or its contents divulged without prior written permission.
2. DO NOT SCALE, use figured dimensions only, if in doubt ask.
3. Drawings for Planning Permissions purposes only unless otherwise stated.

Rev	Description	By	Date
01	The SRC- Topographical survey, Contours & slope direction.	BC	23/09/2020

collinsboyd ENGINEERS & ARCHITECTS

Galway Road
Roscommon
Co.Roscommon
F42 V344

Phone: 090 6634421
Fax: 090 6634423
Email: info@collinsboydeng.com

Client:
The SRC

Drawing Title:
Topographical Survey, Contours & Slope direction.

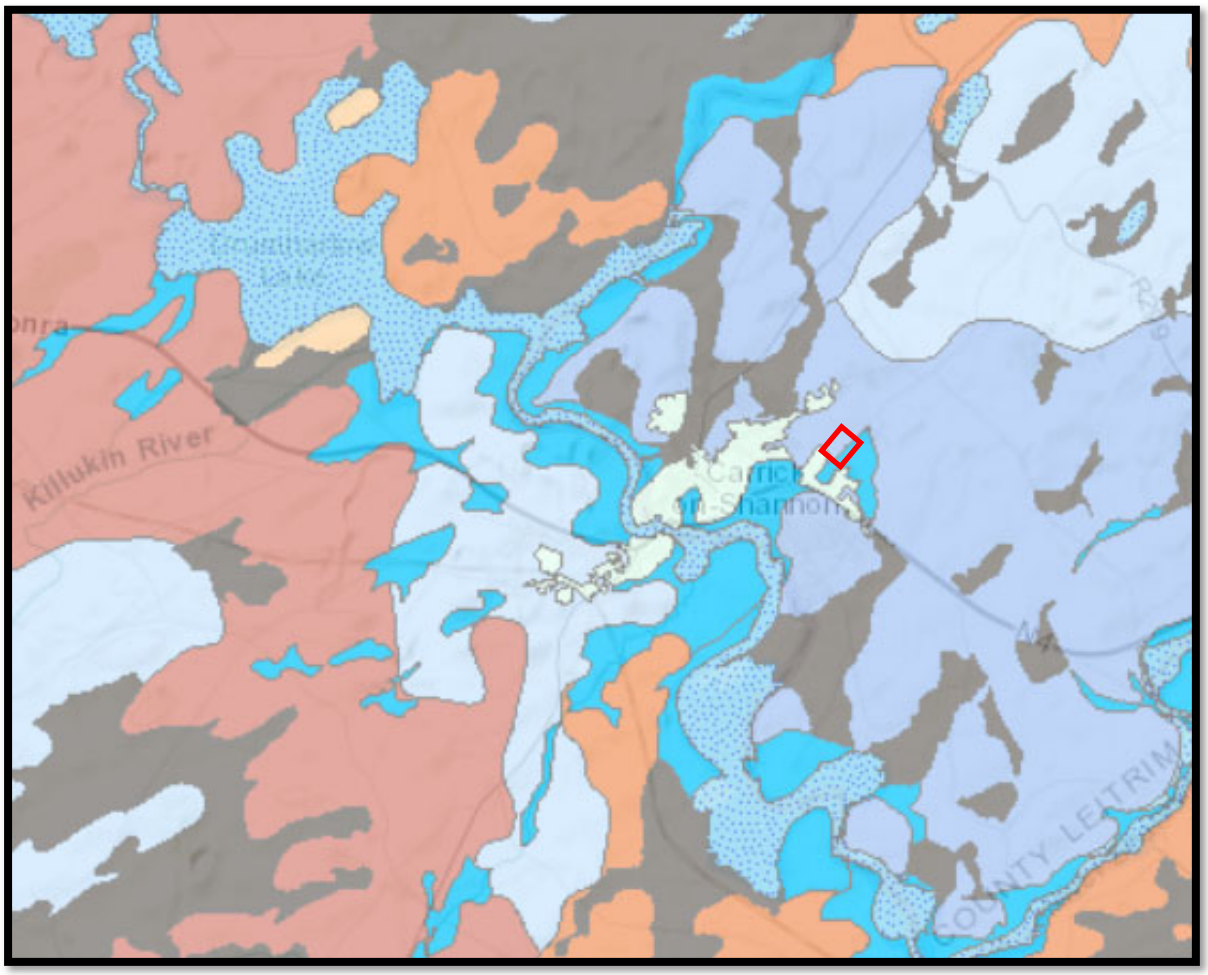
Job Title:
20.153- SRC Carrick-on Shannon

Status: Planning
Date: September 2020
Scale: 1:2500 @ A1
Drawn by: BC

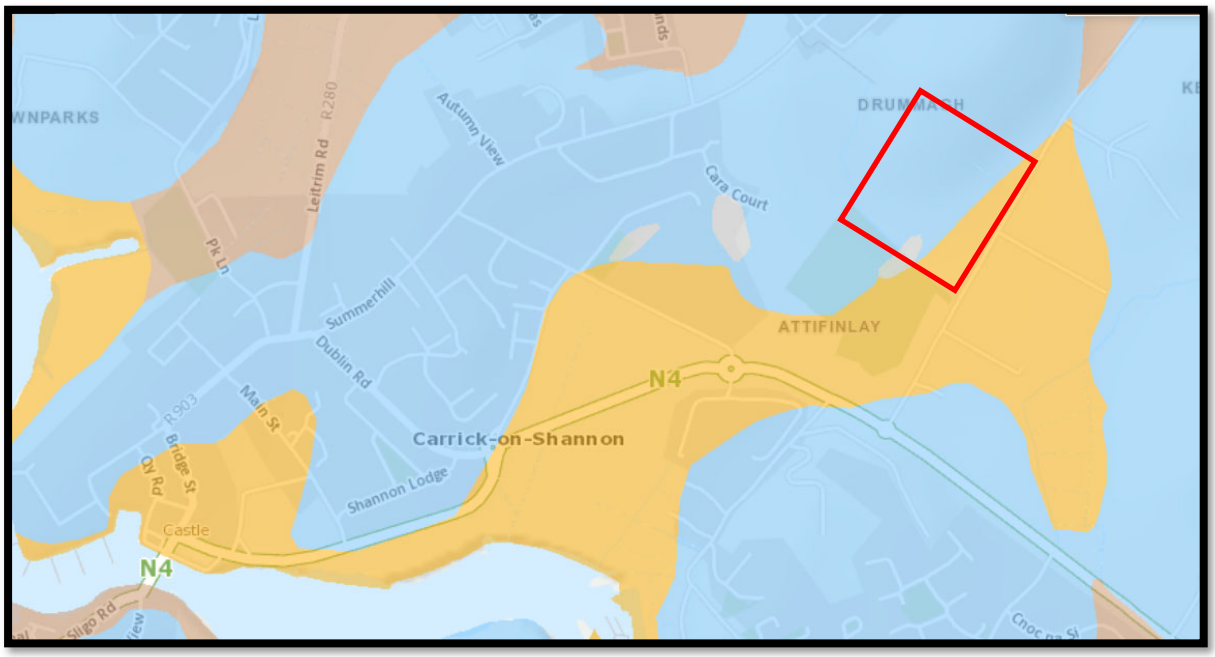
JOB No.	DRG No.	REV.
20.153	20.153-102	01

Shannon Recreation Centre – Hydrology Assessment

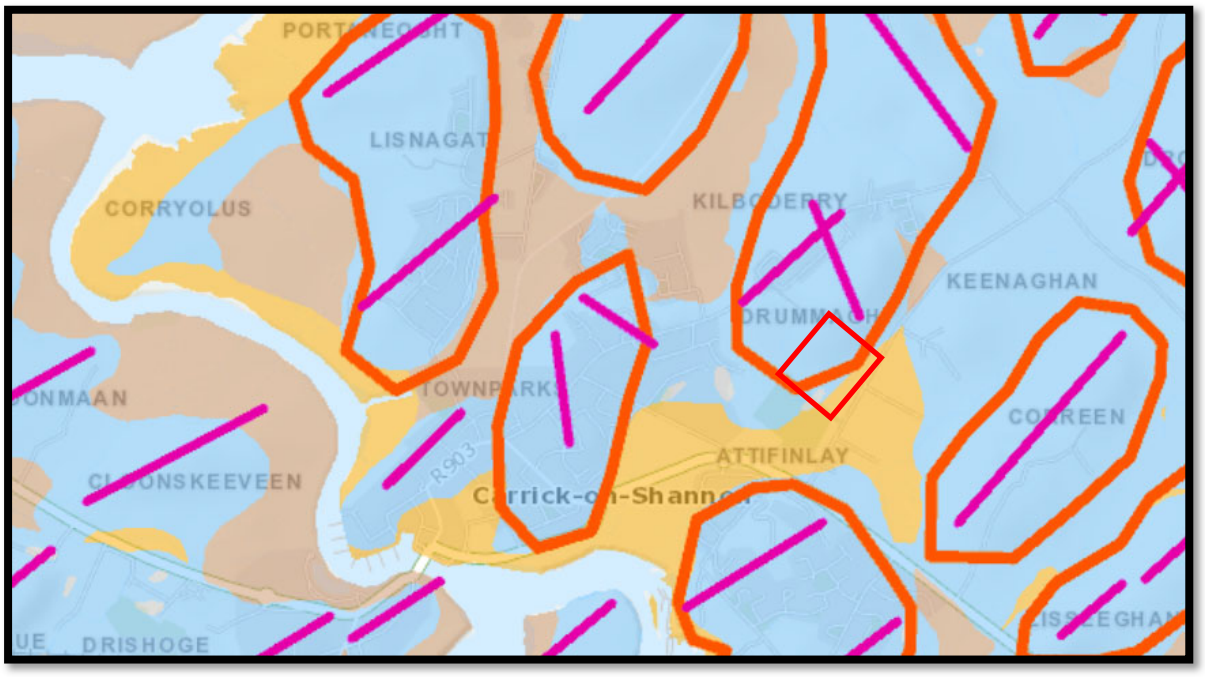
Appendix C – Teagasc & Geological Survey Mapping



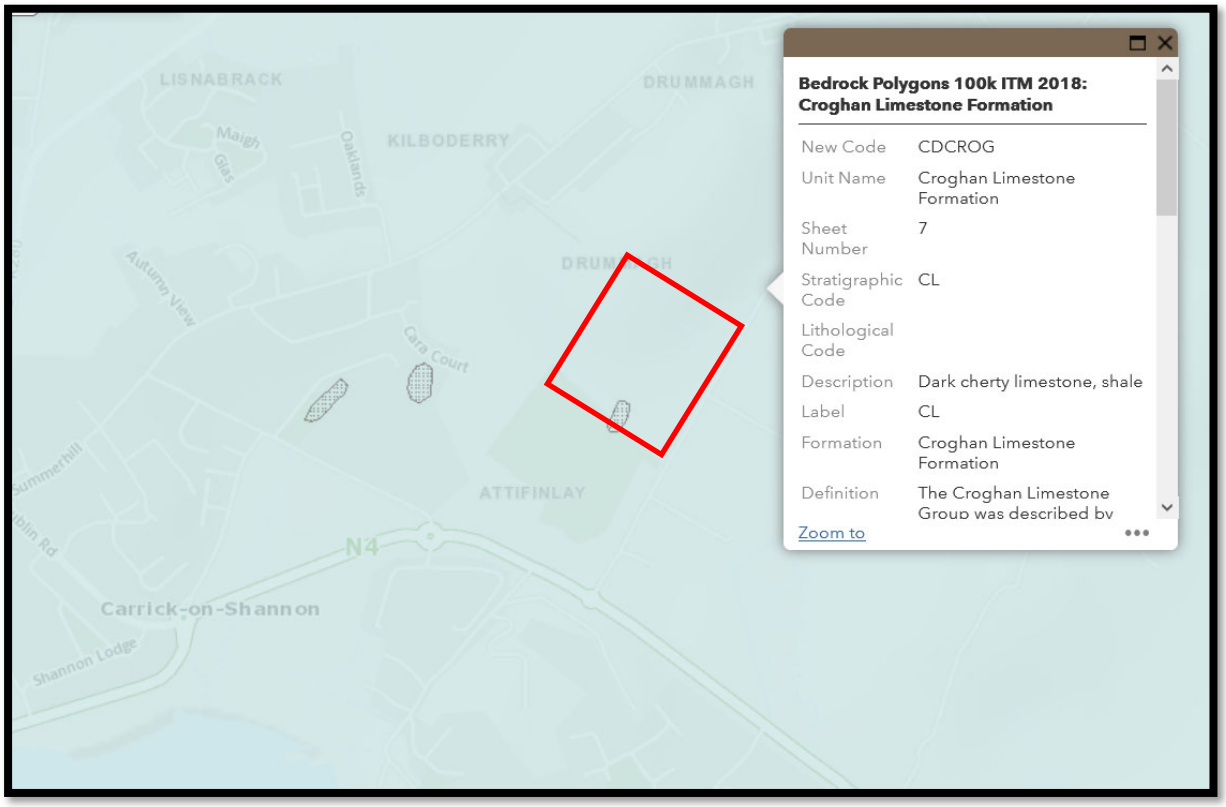
Map 01: Cranford/Teagasc Soil Association (SA) Mapping. Ballinmore SA - fine loamy drift (purple). Boyne SA - silty river alluvium (blue). (Site location is shown by red box).



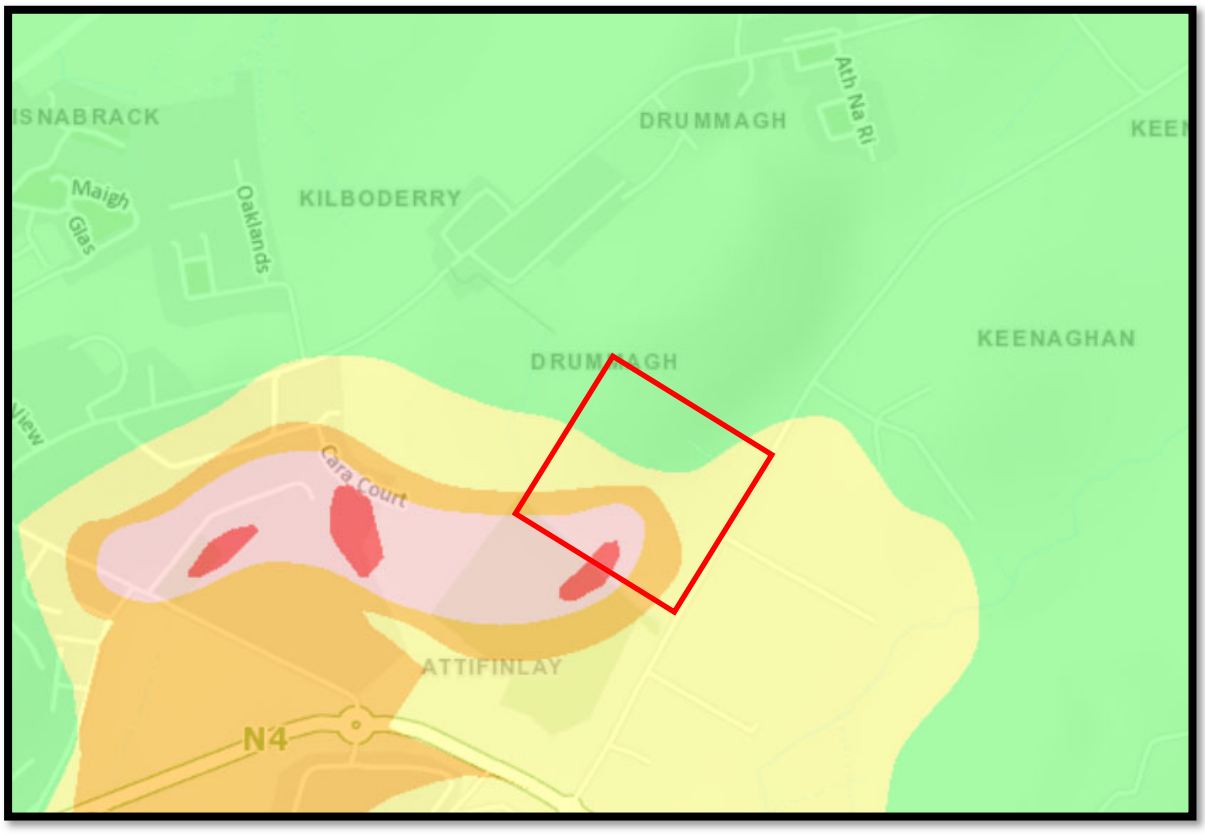
Map 02: GSI Soil Map. Glacial Till limestone derived (blue), alluvium (orange) & rock close (grey).



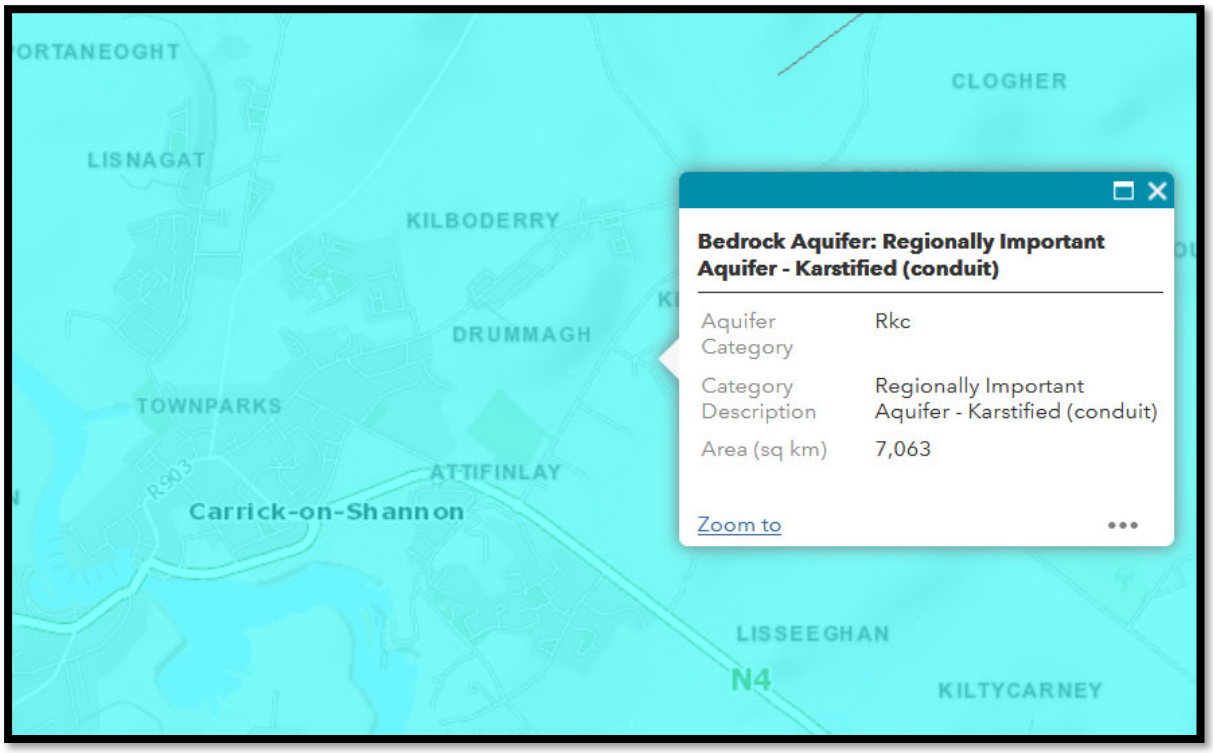
Map 03: GSI Quaternary Geomorphology Mapping – site at south end of glacial drumlin feature.



Map 04:GSI Bedrock Geology. Croghan Limestone Formation (CL) (pale blue). Rock Outcrop, (grey).



Map 05:GSI Vulnerability Map. Low=Green, Moderate=Yellow, High=Orange, Pink & Red=Extreme.



Map 06: GSI Aquifer Mapping – Regionally Important Karstified Limestone Aquifer.

Shannon Recreation Centre – Hydrology Assessment

Appendix D – Site Investigation BH/Probe Location Plan

CAUSEWAY GEOTECH

Project No.:	18-0441	**Client:**	
Project Name:	Site Investigation Carrick on Shannon	**Client's Representative:**	Alan Traynor Consulting

Legend Key

- Locations By Type - CP
- Locations By Type - DP

Title:

Site Location Plan

Last Revised:	**Scale:**
12/06/2018	1:2500

Shannon Recreation Centre – Hydrology Assessment

Appendix E – EPA Mapping

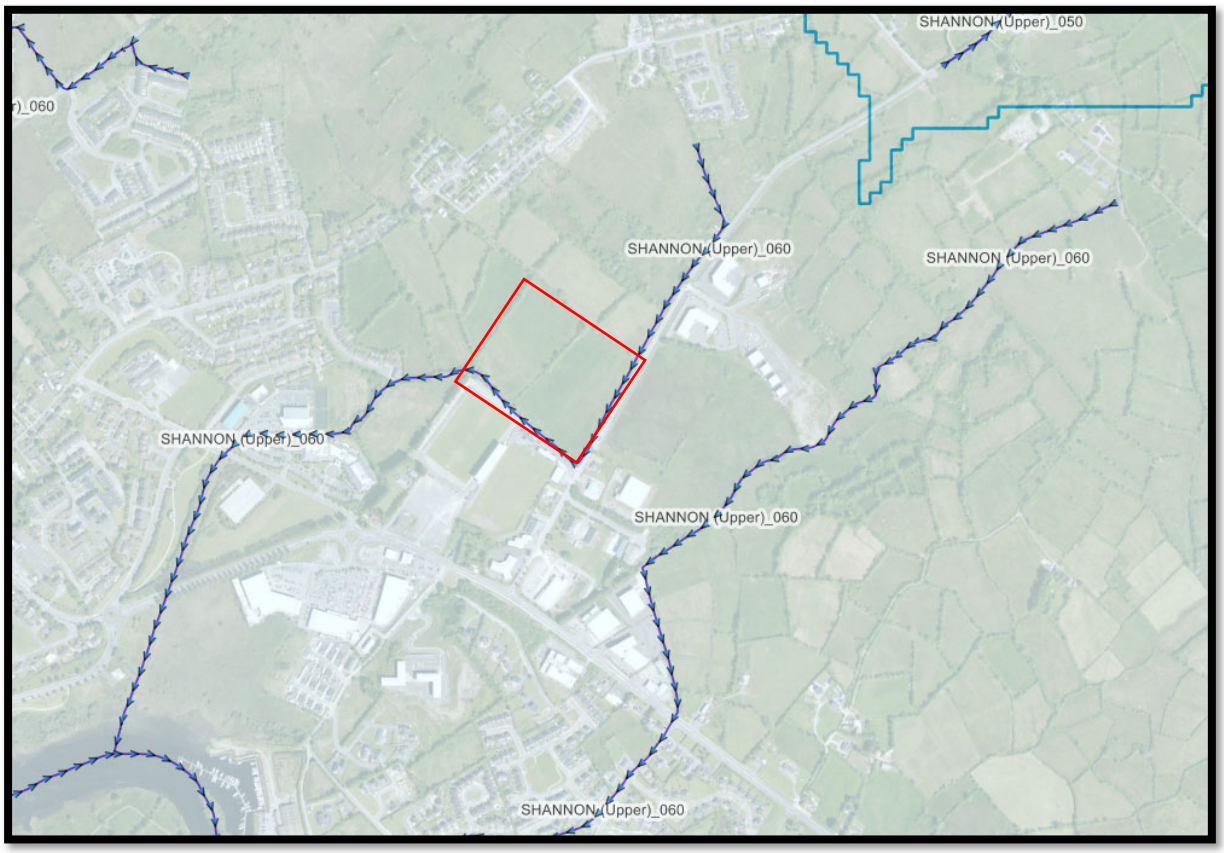


Image 01: EPA Drainage Mapping – Site is part of the Shannon Upper_060 Catchment.
(Note: The drainage map is not correct as the left hand (western) stream does not drain the site).

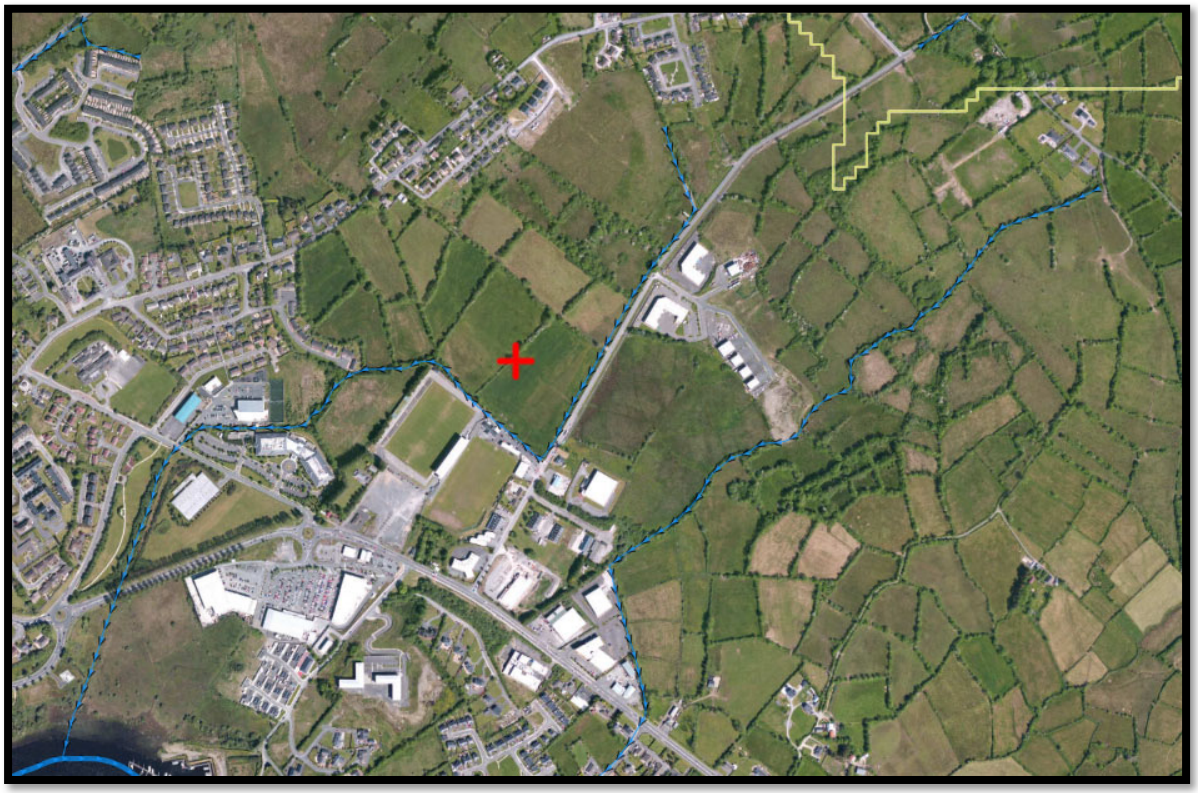


Image 02:EPA Watercourse Map. Attifinlay Stream to SW, Aghancarra (Keenaghan) Stream to east.

Egmont Churchtown Land Area – Geological Assessment.

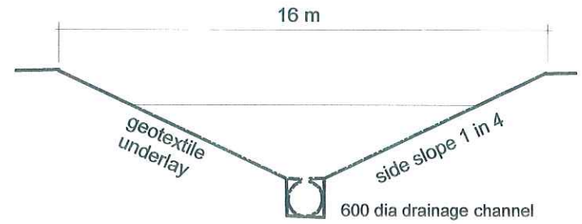
Appendix F – Local Area Plan Flood Risk & Drainage Map

FLOOD RISK MAPPING & STRATEGIC DRAINAGE AREAS FOR CARRICK - ON-SHANNON

Draft Local Area Plan 2010-2016

LEGEND

- Existing Open Drain
- Existing Culvert
- 16 m wide Drainage Reserve Corridor
- Attenuation Areas
- OPW Flood Extents 1999/2000
- Other Lands Susceptable to Flooding



Typical Cross Section Through Drainage Reserve Corridor (NTS) (Flood Corridor)

A

B

0 0.5 1 kilometers

N

CARRICK ON SHANNON FLOOD RISK MAPPING & STRATEGIC DRAINAGE AREAS

Map 7

Shannon Recreation Centre – Hydrology Assessment

Appendix G – VCL Site Walkover Photographs

Photo 01: View north from southern corner (bottom) of site area.

Photo 02: View south from northern corner (top) of site area.

Photo 03: View SE towards southern boundary of site – tree line is adjacent to Leitrim GAA Pitch. (Note that the drain along the western side of the southern boundary flows eastwards).

Photo 04: View of southern corner of the site from the top of the most southern field.

Photo 05:View east of north end of the eastern boundary with level area beside the Castlecara Rd.

Photo 06: View South along the existing drainage ditch located along the eastern boundary.

Photo 07: Southern corner of site. The drainage ditch turns west along the southern boundary.

Photo 08: View North from Southern corner of site area – drainage ditch turns westwards.

Photo 09: View west along the southern boundary. Drainage channel flows westwards in this area.

Photo 10: View east of 3 piles of limestone rock on southern boundary. Possibly old quarry area?

Photo 11: View of water in eastern part of southern boundary, Flowing westwards to the culvert.

Photo 12:Water flowing eastwards from the western half of the Southern boundary to the culvert.

Photo 13: Start of drainage culvert from southern boundary going under St. Marys carpark area.

Photo 14: View North of St Marys pitch. Site drainage is culverted under path on left hand side.

Photo 15: View of drainage ditch starting at the of southern corner of St Marys pith area.

Photo 16: View South of open channel which flows beside the GAA carpark area.

Photo 17: View of good water flow in overgrown drainage channel on east side of GAA car park.

Photo 18: View East of the N4 where the drainage channel is culverted into the Carrick Retail Park.

Photo 19: View of the south side of retail park where the drainage culvert enters the wetland area.

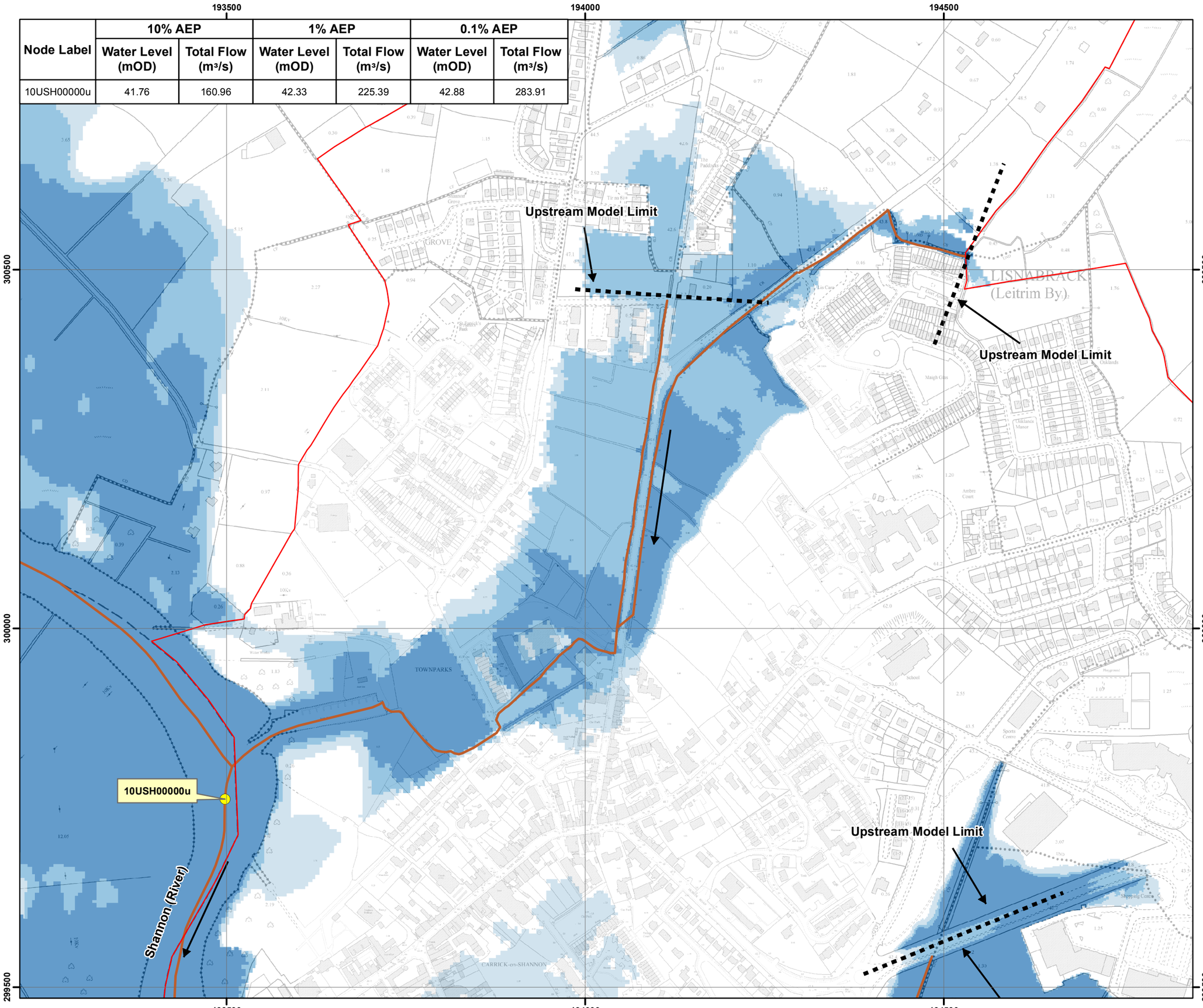
Photo 20:View East of River Shannon. The drainage channel enters the river near the boat marina.

Egmont Churchtown Land Area – Geological Assessment.

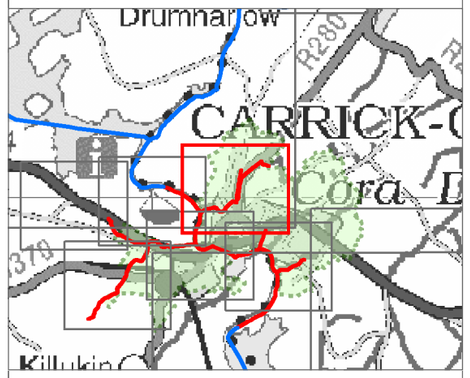
Appendix H – OPW Flood Risk Mapping

Image 01: OPW Flood Risk Mapping with historic flood events highlighted.
(Site location in area with red x)

Node Label	10% AEP		1% AEP		0.1% AEP	
	Water Level (mOD)	Total Flow (m^3/s)	Water Level (mOD)	Total Flow (m^3/s)	Water Level (mOD)	Total Flow (m^3/s)
10USH00000u	41.76	160.96	42.33	225.39	42.88	283.91



Location Plan:



Legend:

- Nodes
- Model Reach
- AFA Boundary
- Flood Defence: Wall
- Flood Defence: Embankment
- Defended Area

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)

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath
C15 NX36

JACOBS
Merrion House
Merrion Road
Dublin 4
D04 R2C5

Project:	SHANNON CFRAM STUDY
Map Type:	EXTENT
Source:	FLUVIAL
Area:	CARRICK ON SHANNON
Scenario:	EXISTING
Drawn by: EF	Date: JULY 2016
Checked by: PT	Date: JULY 2016
Reviewed by: PT	Date: JULY 2016
Approved by: PS	Date: JULY 2016
Map Number:	S2526COS_EXFCD_F1_02
Sheet: 2 of 9	Revision: 0
Scale:1:5000	Plot Scale: 1 : 1 @ A3

Egmont Churchtown Land Area – Geological Assessment.

Appendix I – Depth Duration Frequency Table

Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 195213, Northing: 299971,

	Interval		Years												
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.5,	3.5,	4.0,	4.8,	5.4,	5.8,	7.2,	8.7,	9.7,	11.1,	12.4,	13.3,	14.8,	16.0,	16.9,	N/A ,
10 mins	3.5,	4.9,	5.6,	6.7,	7.5,	8.1,	10.0,	12.1,	13.5,	15.5,	17.2,	18.6,	20.6,	22.3,	23.6,	N/A ,
15 mins	4.1,	5.8,	6.6,	7.9,	8.8,	9.5,	11.7,	14.2,	15.9,	18.2,	20.3,	21.8,	24.3,	26.2,	27.7,	N/A ,
30 mins	5.5,	7.5,	8.6,	10.2,	11.2,	12.1,	14.7,	17.6,	19.5,	22.2,	24.5,	26.3,	29.1,	31.2,	33.0,	N/A ,
1 hours	7.4,	9.9,	11.2,	13.1,	14.3,	15.3,	18.4,	21.8,	24.0,	27.0,	29.7,	31.7,	34.8,	37.2,	39.1,	N/A ,
2 hours	9.8,	12.9,	14.5,	16.8,	18.3,	19.4,	23.0,	27.0,	29.5,	33.0,	36.0,	38.2,	41.7,	44.3,	46.5,	N/A ,
3 hours	11.6,	15.1,	16.8,	19.4,	21.0,	22.3,	26.3,	30.5,	33.3,	37.0,	40.2,	42.7,	46.3,	49.1,	51.4,	N/A ,
4 hours	13.1,	16.9,	18.8,	21.5,	23.3,	24.6,	28.8,	33.4,	36.2,	40.2,	43.5,	46.1,	49.9,	52.8,	55.2,	N/A ,
6 hours	15.5,	19.7,	21.8,	24.9,	26.8,	28.3,	32.9,	37.8,	40.9,	45.1,	48.7,	51.4,	55.5,	58.5,	61.0,	N/A ,
9 hours	18.4,	23.1,	25.4,	28.7,	30.9,	32.5,	37.5,	42.8,	46.1,	50.6,	54.5,	57.3,	61.6,	64.9,	67.5,	N/A ,
12 hours	20.7,	25.8,	28.3,	31.9,	34.2,	35.9,	41.2,	46.8,	50.3,	55.0,	59.0,	62.0,	66.4,	69.8,	72.5,	N/A ,
18 hours	24.6,	30.2,	33.0,	36.9,	39.4,	41.2,	47.0,	53.0,	56.7,	61.7,	65.9,	69.1,	73.8,	77.3,	80.2,	N/A ,
24 hours	27.7,	33.8,	36.7,	40.9,	43.5,	45.5,	51.6,	57.9,	61.8,	67.0,	71.4,	74.7,	79.5,	83.2,	86.1,	95.8,
2 days	34.8,	41.7,	44.9,	49.5,	52.3,	54.5,	61.0,	67.6,	71.7,	77.1,	81.7,	85.0,	90.0,	93.7,	96.6,	106.4,
3 days	41.0,	48.4,	51.9,	56.8,	59.9,	62.2,	69.1,	76.1,	80.4,	86.0,	90.8,	94.3,	99.4,	103.2,	106.2,	116.3,
4 days	46.5,	54.5,	58.3,	63.5,	66.7,	69.1,	76.4,	83.8,	88.2,	94.1,	99.0,	102.6,	107.9,	111.9,	115.0,	125.3,
6 days	56.6,	65.5,	69.7,	75.4,	79.0,	81.6,	89.6,	97.5,	102.3,	108.7,	113.9,	117.7,	123.3,	127.5,	130.8,	141.6,
8 days	65.8,	75.5,	80.1,	86.3,	90.2,	93.0,	101.5,	110.0,	115.1,	121.8,	127.3,	131.3,	137.2,	141.6,	145.0,	156.3,
10 days	74.5,	85.0,	89.9,	96.5,	100.6,	103.6,	112.6,	121.5,	126.9,	133.9,	139.7,	144.0,	150.1,	154.7,	158.3,	169.9,
12 days	82.8,	94.0,	99.1,	106.1,	110.5,	113.6,	123.1,	132.5,	138.1,	145.4,	151.5,	155.9,	162.3,	167.0,	170.7,	182.8,
16 days	98.6,	111.0,	116.7,	124.4,	129.1,	132.6,	142.9,	153.1,	159.1,	167.0,	173.4,	178.2,	185.0,	190.0,	193.9,	206.7,
20 days	113.8,	127.2,	133.4,	141.7,	146.8,	150.5,	161.5,	172.4,	178.8,	187.2,	194.0,	199.0,	206.2,	211.4,	215.6,	229.0,
25 days	132.0,	146.7,	153.4,	162.4,	167.9,	171.9,	183.7,	195.3,	202.2,	211.1,	218.3,	223.6,	231.2,	236.8,	241.1,	255.3,

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

Egmont Churchtown Land Area – Geological Assessment.

Appendix J – Runoff Coefficients – Example Table

Appendix 6E-1 Rational Method Runoff Coefficients

Recommended Coefficient of Runoff Values for Various Selected Land Uses

Description of Area	Runoff Coefficients
Business: Industrial and Commercial	0.80-0.90
Apartments and Townhomes	0.65-0.75
Schools	0.50-0.60
Residential - lots 10,000 sq. ft.	0.40-0.50
- lots 12,000 sq. ft.	0.40-0.45
- lots 17,000 sq. ft.	0.35-0.45
- lots ½ acre or more	0.30-0.40
Parks, Cemeteries and Unimproved Areas	0.20-0.35
Paved and Roof Areas	0.90
Cultivated Areas	0.50-0.70
Pasture	0.35-0.45
Lawns	0.25-0.35
Forest	0.20-0.30
Steep Grass (2:1)*	0.40-0.70
Shoulder and Ditch Areas *	0.35-0.50

Comments:

1. The lowest range of runoff coefficients may be used for flat areas (areas where the majority of the grades and slopes are 2% and less).

2. The average range of runoff coefficients should be used for intermediate areas (areas where the majority of the grades and slopes are from 2% to 6%).

3. The highest range of runoff coefficients shall be used for steep areas (areas where the majority of the grades are greater than 6%), for cluster areas, and for development in clay soil areas.

4. See Appendixes 6E-2, 6E-3, 6E-4 and 6E-5 for runoff coefficients with the C_f factor applied.

*Lower runoff coefficients should be used for permanent or established conditions (post-construction), i.e. sizing stormwater management basins.

*Higher runoff coefficients should be used to design roadside ditch linings (construction). The design considers the ditch lining as not yet established.

Comments: Runoff Coefficients compiled from various sources.

Egmont Churchtown Land Area – Geological Assessment.

Appendix K – Runoff Volume & Attenuation Spreadsheets

Appendix K - Shannon Recreation Center Development SW Runoff Rational Formula Calculations

		Green Field	Post Development		
C	Coefficient of ru	0.45	0.80	From Literature	Peak Flow Q=2.78CiA l/s
i	Rainfall intensit	see below			
Built Area	Catchment area	6.3	6.3		

With Area 6.3ha of Full Site Development

Duration (hours)	Return Period (year)	6hrs T year rainfall (mm)	Intensity (mm/hr)	Green Field		Post development		Attenuation Volume (m3)
				Runoff (l/s)	Run-off Volume (m3)	Runoff (l/s)	Run-off Volume (m3)	
6	1	19.7	3.3	26	559	46	994	435
6	30	40.9	6.8	54	1160	96	2063	903
6	100	51.4	8.6	68	1458	120	2593	1134

Return Period (year)	Attenuated Volume (m3)	Length (m)	Width (m)	Depth (m)
1	435	21	21	1
30	903	30	30	1
100	1134	34	34	1

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Viridus Consulting Ltd.
Site name:	SRC
Site location:	Carrick on Shannon

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.94875° N
Longitude:	8.0738° W
Reference:	3344935760
Date:	Feb 06 2021

Site characteristics

Total site area (ha):	6.3
Significant public open space (ha):	0.5
Area positively drained (ha):	5.8
Impermeable area (ha):	4.3
Percentage of drained area that is impermeable (%):	74
Impervious area drained via infiltration (ha):	1.3
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0.3
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	5.8
Net impermable area for storage volume design (ha):	3.38
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	5	4
SPR:	0.53	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	51.4
Rainfall 100 yrs 12 hrs:	--	62
FEH / FSR conversion factor:	1	1
SAAR (mm):	1267	1084
M5-60 Rainfall Depth (mm):	17	14
'r' Ratio M5-60/M5-2 day:	0.3	0.3
Hydological region:	13	13
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 10 year:	1.4	1.4
Growth curve factor 30 year:	1.65	1.65
Growth curve factor 100 years:	1.95	1.95
Q_{BAR} for total site area (l/s):	79.03	50.74
Q_{BAR} for net site area (l/s):	72.76	46.71

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.1
Volume control approach	Use long term storage
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	61.8	39.7
1 in 30 years (l/s):	120.1	77.1
1 in 100 year (l/s):	141.9	91.1

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m³):	1280	1267
Long term storage 1/100 years (m³):	0	0
Total storage 1/100 years (m³):	1280	1267