HAYES HIGGINS PARTNERSHIP
CHARTERED ENGINEERS • PROJECT MANAGERS

Civil Engineering Planning Report

For

Housing at Whitestown Way

Oldbawn, Dublin 24

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DOCUMENT CONTROL SHEET

	Client	Clúid Housing Agency							
	Project Title	Housing at Whitestown Way, Oldbawn, Dublin 24							
	Project Ref.	18D011							
	Document Title	Planning Report							
	Document No.	18D011-PR 01							
	This Document Comprises	DCS	PD	TOC	Text	-	-	-	Appendices
		1	0	1	6				4
	Check								

Revision	**Status**	**Author**	**Reviewed By**	**Approved By**	**Issue Dates**
P	Planning	EG	KH	RL	28.08.18

1. Introduction

Hayes Higgins Partnership have been commissioned to prepare a Civil Engineering Services Report for the proposed residential development at Whitestown Way, Oldbawn, Dublin 24.

The design of both the surface water and foul drainage systems has been carried out in accordance with the following:

- The Greater Dublin Regional Code of Practice for Drainage Works
- Technical Guidance Document H of the Building Regulations
- The Greater Dublin Strategic Drainage Study (GDSDS)
- DOE Recommendations for Site Development Works for Housing Areas
- BS 8301:1985, Code of practice for Building Drainage
- IS EN 752 Drain and Sewer Systems Outside Buildings

The proposed foul drainage system for the proposed development is a gravity feed system within the site falling to an existing foul sewer east of Whitestown Way.

The proposed surface water drainage system is a combination of porous surfacing and a gravity feed drainage system to an attenuation system on site. The surface water system is designed to take the runoff generated by a 1 in 100 year storm event (+20%). The attenuation system will be connected to the Tallaght Stream via a hydrobrake.

Refer to Hayes Higgins Partnership drawing 18D011-01 included in Appendix A for site drainage layout and details.

2. Proposed Site

The site in question is located east of Whitestown Way, Tallaght, Dublin 24. The existing site is a brownfield site currently occupied by South Dublin County Council Parks Department and Petting Zoo which are to be demolished. The proposed overall site area measures approximately 6750m^2.

The site is bounded to the north by an existing car park, to the west by Whitestown Way, to the east & south by a park, the Tallaght Stream and associated lake. Proposed on the site is a sheltered housing development consisting of 81 units split into 4 blocks and associated facilities. Entrance to the development will be via an existing vehicular entrance off Whitestown Way at the west of the site.

The site has existing drainage connections to the public foul sewer network and the watermain network on Whitestown Way.

3. Surface Water Drainage System & SuDS

Local Authorities require that all developments must include a sustainable urban drainage system, SuDS.

A combination of porous paving and a gravity feed system discharging to Tallaght Stream are to be used to dispose of the surface water from the developed site.

The gravity feed surface water system will serve the roofs and impermeable roads within the site. The total impermeable surface area is 3889m^2. The surface water system is designed to take the runoff generated by a 1 in 100 year storm event (+20%). Surface water sewers will fall by gravity to a stormtech attenuation system located under the car park spaces in the west of the site. The attenuation system will discharge via a hydrobrake (flow limited to 2l/s) into the Tallaght Stream.

The required storage volume is 340m^3 to retain the on-site runoff. To alleviate any possible risk of flood the storage is designed for a 1in100 year storm (+20%). A 20% increase in runoff due to global warming is included as per "Greater Dublin Regional Code of Practice for Drainage Works" and the "GDSDS".

Parking bays will be constructed using permeable paving allowing infiltration of the surface water directly to the ground.

The surface water drains have been designed in accordance with IS EN 752. Details of the proposed surface water drainage system are shown on Hayes Higgins Partnership drawing 18D011-01 included in Appendix A and calculations within Appendix B.

4. Foul Water Drainage

The foul drainage system has been designed in accordance with BS 8301:1985, Code of practice for Building Drainage and the current Building Regulations.

The foul drainage system for the development is a gravity feed system falling to the east of the site and discharging to an existing 825mm diameter foul sewer east of the proposed site. (Average flow of 0.563l/s and a peak flow of 11.29l/s based on discharge units)

The main foul sewers in the proposed development are to consist of 225mm diameter uPVC pipes with fall 1:170 so chosen throughout to minimise the risk of blockages and to aid maintenance. Based on the 225mm diameter pipes with a 1:170 fall the design flow is calculated as 35l/s.

The discharge from the proposed development will exit via 300mm diameter uPVC pipes at 1:170 fall. This fall will also minimise the risk of blockages and aid maintenance. Based on the 300mm diameter pipes with a 1:170 fall the design flow is calculated as 45l/s.

A roughness coefficient (ks) of 1.5mm is applied to the design of all pipes.

Details of the proposed foul drainage system are shown on Hayes Higgins Partnership drawing 18D011-01 included in Appendix A and calculations within Appendix C.

5. Water Supply System

There is an existing 150mm diameter public watermain located on Whitestown Way that is currently serving the existing site. A new connection to this water main will be installed with a looped watermain installed within the site.

In accordance with requirements, a water meter will be installed at the connection from each dwelling to the site watermain. Air valves and scour valves will be provided around the site as necessary. Hydrants will be provided as per Technical Guidance Document B of the Building Regulations 2017. Water saving devices including aerated taps and low water usage appliances will be used in the proposed development in accordance with best practice.

The proposed watermain layout and details are shown on Hayes Higgins Partnership drawings 18D011-01 included in Appendix A.

6. Flood Risk Assessment Summary

In consideration of the findings of this site specific flood risk assessment and analysis the following conclusions and recommendations are made in respect of the proposed development site:

- A Site Specific Flood Risk (SSFRA) assessment, appropriate to the type and scale of development proposed, and in accordance with 'The Planning System and Flood Risk Management Guidelines – DoEHLG-2009' has been undertaken.

- The proposed site has been screened, scoped and assessed for flood risk in accordance with the above guidelines.

- The primary flood risk to the proposed site can be attributed to a fluvial flood event in the Tallaght Stream located close to the southern boundary of the site. The site is not at risk of groundwater flooding.

- A detailed Digital Terrain Model (DTM) has been developed for the site. Utilising the DTM, and the predicted 1 in 100 year (1% AEP) and 1 in 1000 year (0.1% AEP) flood levels, the flood extents have been delineated over the full extent of the DTM. This analysis has determined that the southern and south-western area of the site falls within Flood Zone 'A' and Flood Zone 'B'.

- Secondary flood risk can be attributed to a potential surcharge due to a blockage in the Whitestown Way Road Bridge located on the Tallaght Stream located close to the south-western boundary of the proposed development site. In the event the bridge becomes blocked and begins to surcharge flood waters would spill out onto Whitestown Way road. It is predicted that the flood waters would flow overland in a northerly direction and into the existing access road adjacent to the site. These flood waters would then flow along the existing access road and spill back into the Tallaght Stream. Overall the blockage of the Whitestown Way road bridge does not pose a significant flood risk to the site.

- Secondary pluvial flood risk can also be attributed to a potential surcharge of the urban drainage network and /or damage to the water supply infrastructure in the vicinity of the site. It is anticipated that the any flooding due damage of the 400mm Water Main to the south of the site would spill into the open park area and flow directly into the Tallaght Stream. It is not anticipated that these waters would enter the boundary of the site.

- There is an 825mm foul sewer and the 160mm water main located in the car park to the north of the site. The car park is drained via a channel drain located along the southern boundary of the

site. It is likely that any potential flood water from these would be collected by the channel drain or flow along the boundary wall out onto Whitestown Way road. It is predicted that the flood waters would flow overland in a southerly direction along the road to a low point adjacent to the existing entrance road into the site. These flood waters would then flow along the existing access road and spill back into the Tallaght Stream. It is not anticipated that these waters would enter the boundary of the site.

- The finished floor levels of the proposed houses shall be constructed to a minimum level of 96.00m OD, which is 0.353m above the upstream peak 1 in 1000 year (0.1% AEP) flood level of 95.647m OD in the Tallaght Stream.

- The access road, public spaces and areas surrounding the proposed dwellings within the site shall be raised to a minimum level of 95.800m OD, which is 0.153m above the upstream peak 1 in 1000 year (0.1% AEP) flood level of 95.647m OD in the Tallaght Stream.

- Flood storage compensation shall be provided to account for flood waters that may be displaced as a result of raising the grounds in the southern area of the proposed development site above the 1 in 1000 year flood level.

- The proposed development is considered to comply with the requirements of the Justification Test for development management.

- In consideration of implementation of the recommendations of this SSFRA the flood risk to and from the proposed development site is considered to be **LOW.** Development of the site is not expected to result in an adverse impact to the hydrological regime of the area or increase flood risk elsewhere.

For full report, please visit Appendix D.

7. Site Access

Vehicular and pedestrian access to the site is proposed via the existing vehicular entrance at the south of the site off Whitestown Way with a pedestrian gate provided at the south of the site also off Whitestown Way. The available sight distance in each direction satisfies the requirements of National Roads Authority Guidelines for the road speed.

Given the internal constraints within the site, it is proposed to provide for internal turning circles for small vehicles only. It is proposed that larger vehicles (Bin & Fire Trucks) are to enter the proposed site through

the primary entrance and exit the site via access controlled gate at the South-East corner of the proposed site.

8. Services Design Summary

The proposed Surface water drainage system has been set up so as to ensure that adequate self-cleansing velocities are obtained and in accordance with the Building Regulations and comply in full with the Greater Dublin Regional Code of Practice for Drainage Works.

Similarly, the proposed Foul drainage system has been set up so as to ensure that adequate self-cleansing velocities are obtained for partial flows under design loading, in accordance with the Building Regulations.

Air valves and scour valves will be provided around the site as necessary along with looping of the proposed main.

Appendix A

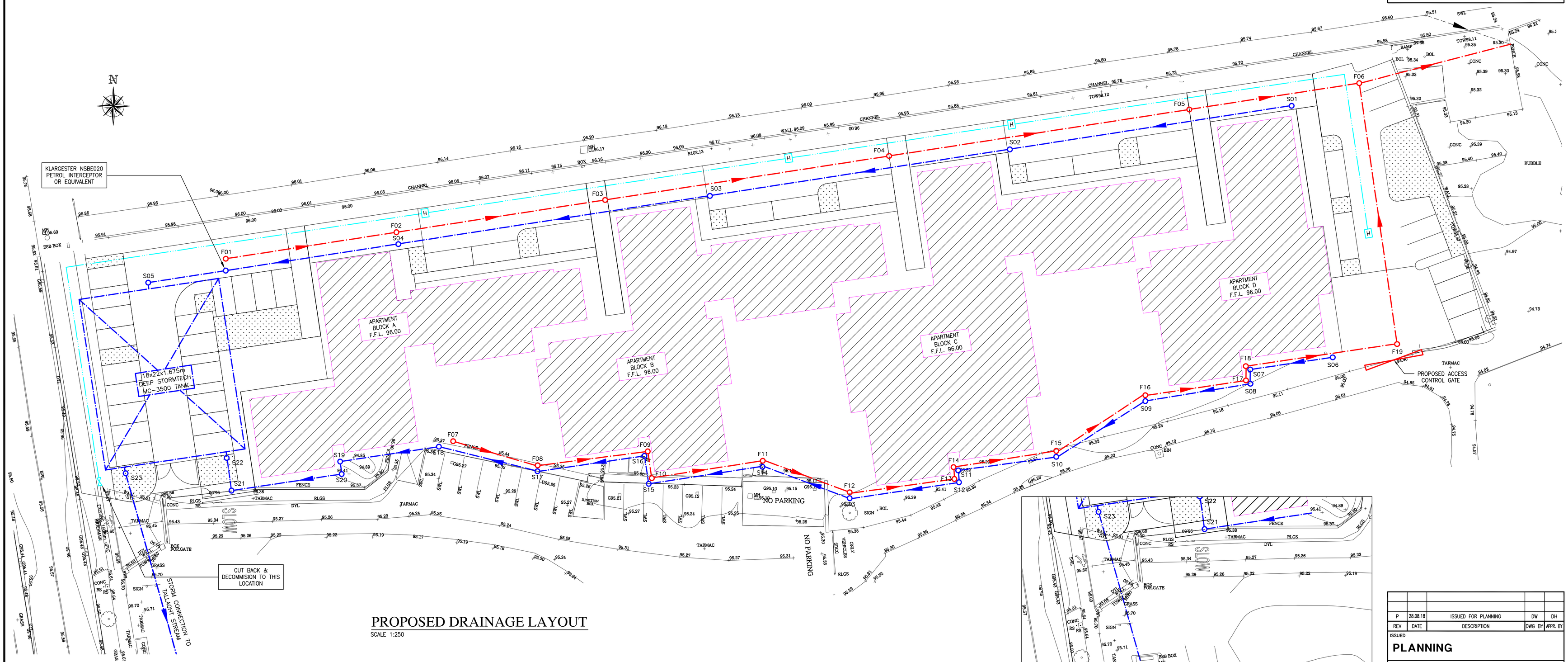
Drawings

NOTES

GENERAL

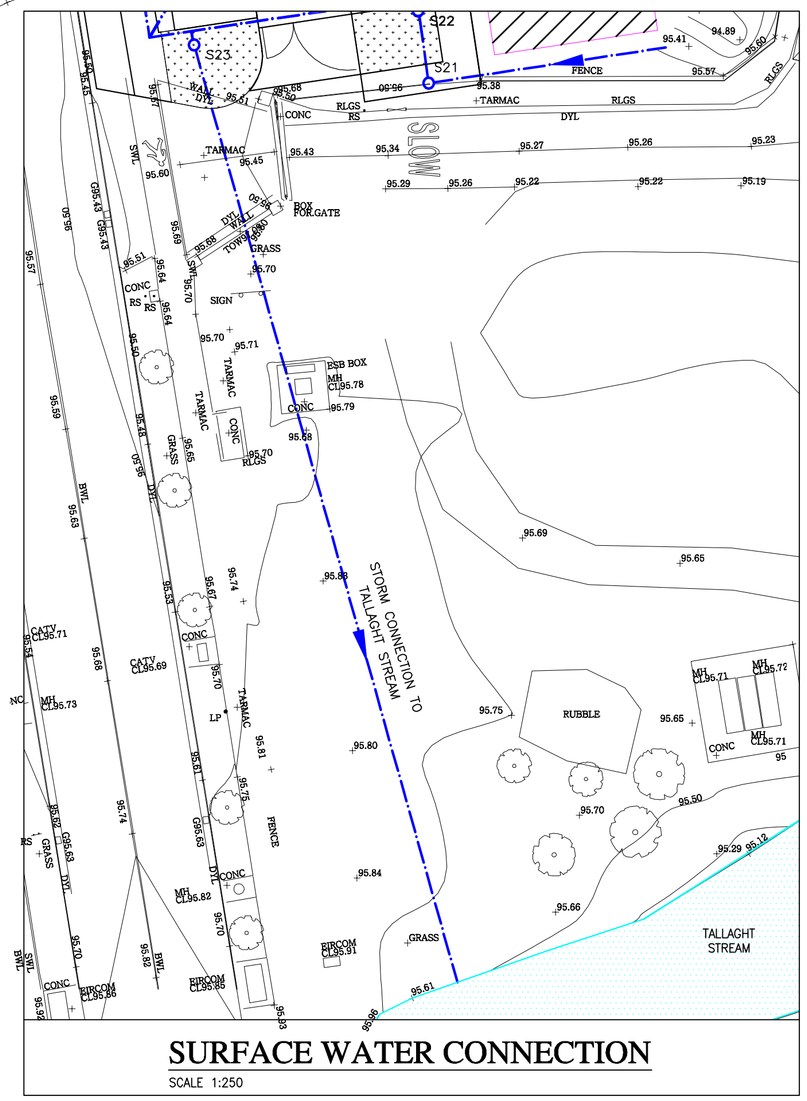
1.) THESE DRAWINGS TO BE READ IN CONJUNCTION WITH ALL RELEVANT HAYES HIGGINS ENGINEERING DRAWINGS AND SPECIFICATIONS.

2.) DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.



PROPOSED DRAINAGE LAYOUT

SCALE 1:250



SURFACE WATER CONNECTION

SCALE 1:250

DRAINAGE LEGEND

- EXISTING FOUL SEWER
- EXISTING SURFACE SEWER
- PROPOSED 150mm ø WATERMAIN
- H — NEW HYDRANT
- NEW SLUICE VALVE
- PROPOSED SURFACE WATER SEWER 300mm ø uPVC PIPEWORK WITH PRECAST MANHOLES. MIN. GRADIENT 1:170
- PROPOSED FOUL SEWER 225mm ø uPVC PIPEWORK WITH PRECAST MANHOLES. MIN. GRADIENT 1:150

FOUL SEWER DRAINAGE TABLE

MANHOLE	COVER LEVEL	INVERT LEVEL	MH – MH	PIPE DIA.	MIN. PIPE GRAD.
F01	95.65	92.17	F01 – F02	225mm	1:150
F02	95.75	92.02	F02 – F03	225mm	1:150
F03	95.75	91.84	F03 – F04	225mm	1:150
F04	95.75	91.60	F04 – F05	225mm	1:150
F05	95.75	91.34	F05 – F06	225mm	1:150
F06	95.75	91.19	F06 – EX.MH.	225mm	1:150
F07	95.50	92.78	F07 – F08	225mm	1:150
F08	95.50	92.70	F08 – F09	225mm	1:150
F09	95.50	92.54	F09 – F10	225mm	1:150
F10	95.50	92.51	F10 – F11	225mm	1:150
F11	95.50	92.36	F11 – F12	225mm	1:150
F12	95.50	92.09	F12 – F13	225mm	1:150
F13	95.50	91.92	F13 – F14	225mm	1:150
F14	95.50	91.91	F14 – F15	225mm	1:150
F15	95.50	91.82	F15 – F16	225mm	1:150
F16	95.50	91.65	F16 – F17	225mm	1:150
F17	95.50	91.57	F17 – F18	225mm	1:150
F18	95.50	91.55	F18 – F19	225mm	1:150
F19	95.50	91.19	F19 – F06	225mm	1:150

STORM WATER DRAINAGE TABLE

MANHOLE	COVER LEVEL	INVERT LEVEL	MH – MH	PIPE DIA.	MIN. PIPE GRAD.
S01	95.75	94.25	S01 – S02	300mm	1:170
S02	95.75	94.04	S02 – S03	300mm	1:170
S03	95.75	93.81	S03 – S04	300mm	1:170
S04	95.75	93.57	S04 – S05	300mm	1:170
S05	95.65	93.38	S05 – TANK	300mm	1:170
S06	95.45	93.95	S06 – S07	300mm	1:170
S07	95.50	93.89	S07 – S08	300mm	1:170
S08	95.50	93.87	S08 – S09	300mm	1:170
S09	95.50	93.79	S09 – S10	300mm	1:170
S10	95.50	93.65	S10 – S11	300mm	1:170
S11	95.50	93.51	S11 – S12	300mm	1:170
S12	95.50	93.50	S12 – S13	300mm	1:170
S13	95.50	93.42	S13 – S14	300mm	1:170
S14	95.50	93.18	S14 – S15	300mm	1:170
S15	95.50	93.05	S15 – S16	300mm	1:170
S16	95.50	93.02	S16 – S17	300mm	1:170
S17	95.50	92.89	S17 – S18	300mm	1:170
S18	95.50	92.81	S18 – S19	300mm	1:170
S19	95.50	92.68	S19 – S20	300mm	1:170
S20	95.50	92.67	S20 – S21	300mm	1:170
S21	95.50	92.52	S21 – S22	300mm	1:170
S22	95.50	92.48	S22 – TANK	300mm	1:170
S23	95.55	92.15	S23 – STREAM	300mm	1:170

REV	DATE	DESCRIPTION	DWG BY	APPR. BY
P	28.08.18	ISSUED FOR PLANNING	DW	DH

ISSUED
PLANNING

CLIENT
CLUID HOUSING

PROJECT NAME
HOUSING AT WHITESTOWN WAY

DRAWING NAME
PROPOSED DRAINAGE LAYOUT

PROJECT No.
18D011

DRAWING No.	REVISION
01	P
SCALE	DRAWN DATE
AS SHOWN	22.08.18

CAD DRAWN BY	CHECKED BY	APPROVED BY
D.W.	E.G.	D.H.

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A1

Appendix B

Surface Water Calculations

18D011 - Surface Water Attenutation Calculation 1-100 + 20%

1	2	3	4	5	6
Storm Frequency & Duration	***Rainfall (mm)***	***Rainfall Intensity (mm/hr)***	***Potential Run-off From Developed Site (l/s)***	***Allowable Run-off From Developed Site (l/s)***	***Storage Requirement (m3)***
M100-5 min	22.56	270.72	292.45	4.7	86.3
M100-10 min	31.56	189.36	204.56	4.7	119.9
M100-15 min	37.08	148.32	160.23	4.7	140.0
M100-30 min	46.92	93.84	101.37	4.7	174.0
M100-60 min	59.52	59.52	64.30	4.7	214.6
M100-2 hr	75.48	37.74	40.77	4.7	259.7
M100-3 hr	86.76	28.92	31.24	4.7	286.6
M100 - 4hr	95.76	23.94	25.86	4.7	304.7
M100-6 hr	109.92	18.32	19.79	4.7	326.0
M100-9 hr	126.36	14.04	15.17	4.7	339.1
M100-12 hr	**139.44**	**11.62**	**12.55**	**4.7**	**339.2**
M100-18 hr	160.32	8.91	9.62	4.7	318.9
M100-24 hr	176.88	7.37	7.96	4.7	281.8
M100-2day	194.52	4.05	4.38	4.7	-55.7

Allowable Run-off 4.7 l/s

	Area	Factor	Total	
Roof	2224	1	2224	m^2
Road/Footpath	1134	1	1134	m^2
Paving	531	1	531	m^2
Total Area			**3889**	**m^2**

STORMTECH Stormwater Management System Design Tool

ver: Aug15

PROJECT REF:	18D011
LOCATION:	Whitestown Way, Dublin 24
DATE:	27.08.2018
CREATED BY:	EG

SYSTEM PARAMETERS

Required Total Storage	**340**	m^3
Stormtech chamber model	**MC3500**	
Filtration Permeable Geo or Impermeable Geo	Filter geo	
Number of Isolator Rows (IR)	1	

SITE PARAMETERS

Stone Porosity	40%		
Excavation Batter Angle (degrees)	60	°	*Minimum Requirement*
Stone Above Chambers	0.3	m	*0.30*
Stone Below Chambers	0.23	m	*0.23*
In-between Row Spacing	0.23	m	*0.23*
Additional Storage outside Excavation. E.g manholes, Header Pipe	0	m^3	

HEADER PIPE

Is Header pipe required within excavation	No	
Orientation of Header Pipe	Parrallel to IR	
Diameter of Header Pipe	0.6	m
Length of Header Pipe	0	m

CHAMBER SYSTEM DIMENSIONS

	Calculated	Adopted	
Number of Rows		6	ea
Number of units per Row		6	ea
System Installed Storage Depth (effective storage depth)	1.675		
Tank overall installed Width at base	13.48	18	m
Tank overall installed Length at Base	14.82	22	m
Total Effective System Storage	**225.3**	**364.3**	m^3

STORMTECH SYSTEM DETAIL

StormTech Chamber Model	MC3500	
Unit Width	1.955	m
Unit Length	2.18	m
Unit Height	1.145	m
Min Cover Over System	0.3	m
Max Cover Over Chamber	2.4	m
Chamber Internal Storage Vol.	3.11	m^3
Header Pipe Internal Storage Vol in Excavation	0.0	m^3

STONE AND EXCAVATION DETAIL

Volume of Dig for System	731	m^3
Width at base	18.00	m
Width at top	19.93	m
Length at base	22.00	m
Length at top	23.93	m
Depth Of System	1.68	m
Area of Dig at Base of System	396	m^2
Area of Dig at Top of System	477	m^2
Void Ratio	50%	
Stone Requirement - m3	612	m^3
Stone Requirement - tonne	1004	tonne

Appendix C

Foul Water Calculations

Job Title: Housing at Whitestown Way, Tallaght **Job Number:** 18D011
Calculation by: EG **Date:** 27.08.18
Checked by: RL

Proposed Foul Drainage: BS 8301 1985

RESIDENTIAL

SITE COMPRISES

No. of Apartments/houses = 81

DETERMINE AVERAGE DAILY FLOW

Assume foul discharge for each dwelling = 600 litres/day

Average Residential Daily Flow = 0.583 l/s

DESIGN FOR PEAK FOUL FLOW

Assume 21 Discharge Units/Apartment/house

Therefore, No. of Discharge Units = 1701

PEAK FLOW = 11.28848381 l/s

COLEBROOK - WHITE FORMULA

Q = 11.29 l/s

ks = 1.5 mm

Kinematic viscosity @ 15 degrees Celsius = 1.141×10^{-6} m^2/s

Self Cleansing Velocity= 0.75 m/s

Single dwelling foul sewer

Use 225 mm Pipe
@ 1 in 150 Gradient

Q = 37.21 l/s -

v = 0.936 m/s -

	Irish Water Info		Survey Info	
MH Ref.	Cover level	Invert level	Cover level	Invert level (based on IW manhole depth)
7508	59.55	57.72	59.671	57.841
7506	58.94	57.21	59.062	57.332

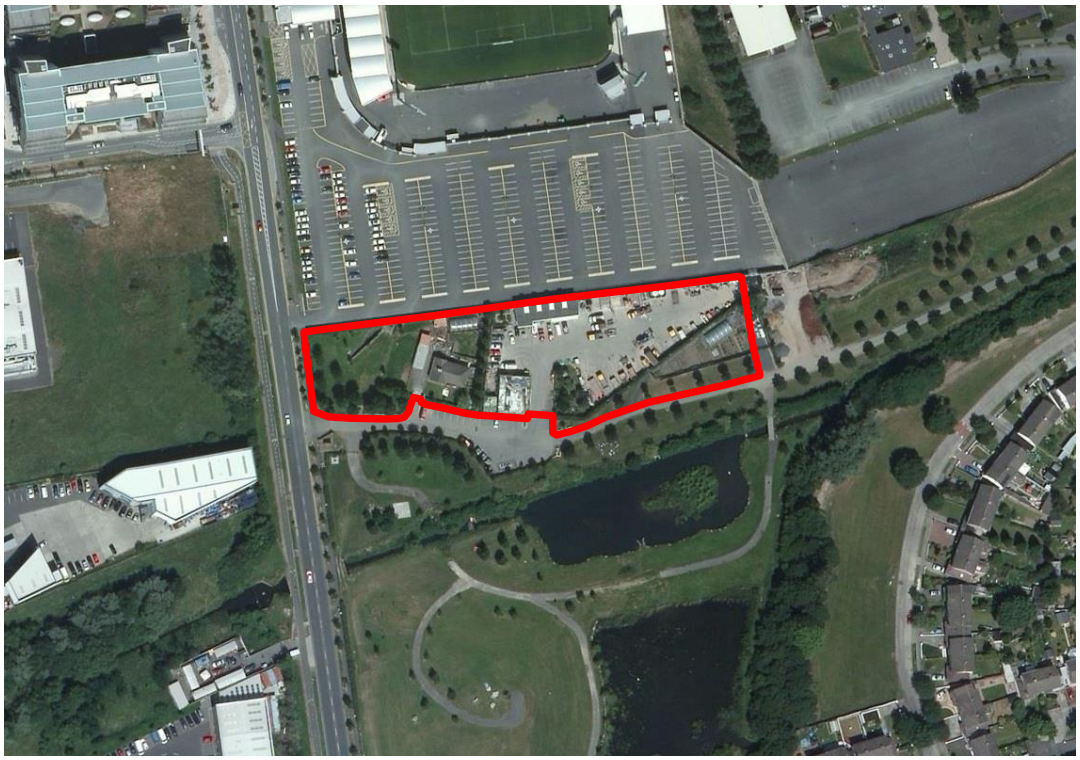
Appendix D

Flood Map Report

PROPOSED DEVELOPMENT SITE

WHITESTOWN WAY, TALLAGHT, DUBLIN 24

SITE SPECIFIC FLOOD RISK ASSESSMENT



IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

Integrated Engineering Consulting

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

PROPOSED DEVELOPMENT SITE

WHITESTOWN WAY, TALLAGHT, DUBLIN 24

SITE SPECIFIC FLOOD RISK ASSESSMENT

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Document No:	IE1652-2755
Issue No:	02-ISSUE
Project No:	IE1652
Date:	27th August 2018
Revision:	2.0
Prepared By:	N O'Malley BEng(Hons) MIEI
Checked By:	P McShane BEng(Hons) MIEI

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Appendix A

Drawing No. IE1652-001-A

Drawing No. IE1652-002-A

Drawing No. IE1652-003-A

Drawing No. IE1652-004-A

Drawing No. IE1652-005-A

Drawing No. IE1652-006-A

1 Introduction

IE Consulting was requested by Hayes Higgins Partnership on behalf of Cluid Housing Association to undertake a Site Specific Flood Risk Assessment (SSFRA) for a proposed development site at Whitestown Way, Tallaght, Dublin 24. It is proposed to construct a residential development and all other associated site works.

The purpose of this SSFRA is to assess the potential flood risk to the proposed development site and to assess the impact that development of the site may or may not have on the hydrological regime of the area.

A hydrological engineer from IE Consulting undertook a survey of the site area and surrounding catchment on the 21st May 2018.

Quoted ground levels or estimated flood levels relate to ordnance datum (Malin) unless stated otherwise.

This flood risk assessment study has been undertaken in consideration of the following guidance document:-

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

2 Proposed Site Description

2.1 General

The proposed development site is located at Whitestown Way, Tallaght, Dublin 24.

The site is bounded to the north by an existing car park, to the west by Whitestown Way road, to the east and south by a park, the Tallaght Stream and associated lake. The total area of the proposed development site is approximately 0.675 hectares.

The location of the proposed development site is illustrated on *Figure 1* below and shown on *Drawing Number IE1652-001-A in Appendix A*.

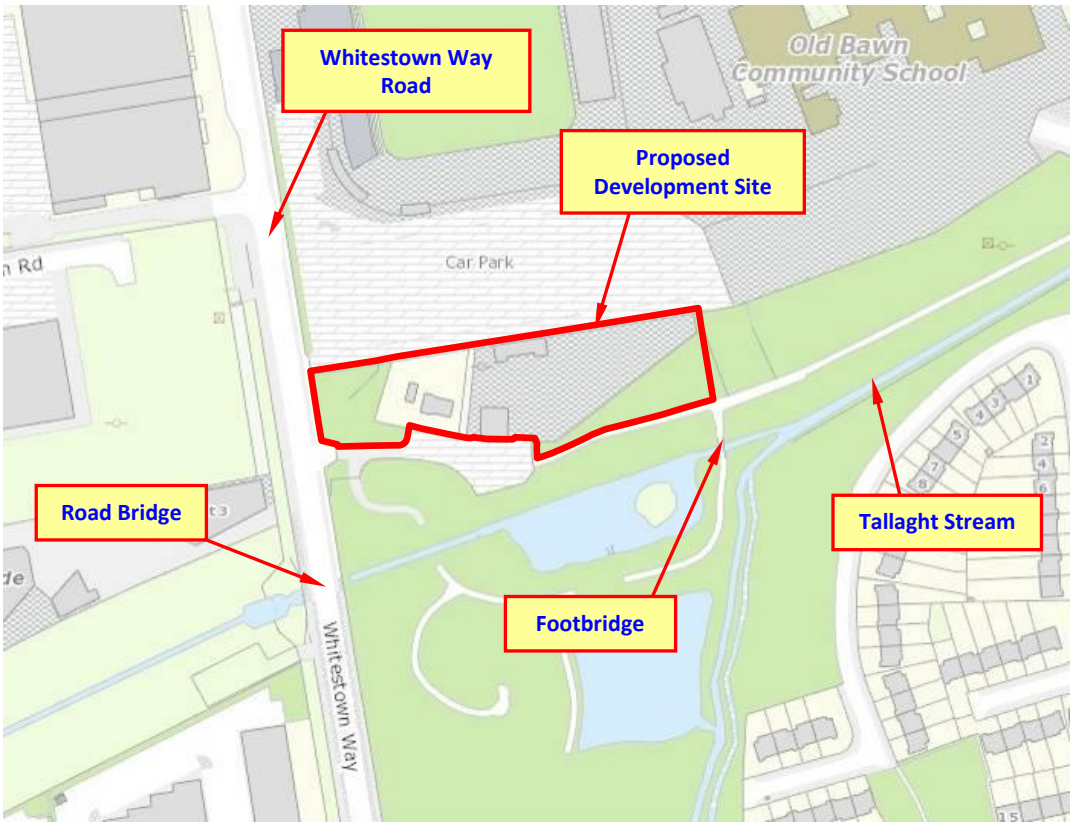


Figure 1 - Site Location

2.2 Existing Topography Levels at Site

The proposed development site slopes moderately from the northern boundary of the site to the southern boundary of the site at an average gradient of approximately 1.6% (1 in 63).

Existing ground elevations range from approximately 97.750m OD in the northern area of the site to 94.90m OD in the southern area of the site. There is also a small pond area in the western area of the site with a minimum ground level of 93.126m OD.

2.3 Local Hydrology, Landuse & Existing Drainage

The most immediate hydrological feature in the vicinity of the proposed development site is the Tallaght Stream which flows close to the southern boundary of the proposed development site in a west to east direction. The catchment area of the Tallaght Stream was delineated and found to be approximately **5.1km^2** to the downstream boundary of the site. Assessment of the upstream catchment area of the Tallaght Stream indicates a predominately urban catchment, with urban development accounting for approximately 62% of the total catchment area.

3 Initial Flood Risk Assessment

The flood risk assessment for the proposed development site is undertaken in three principle stages, these being *'Step 1 – Screening', 'Step 2 – Scoping'* and *'Step 3 – Assessing'*.

3.1 Possible Flooding Mechanisms

Table 1 below summarises the possible flooding mechanisms in consideration of the proposed development site:-

Source/Pathway	Significant?	Comment/Reason
Tidal/Coastal	No	The site is not located within a coastal region.
Fluvial	Yes	The Tallaght Stream is located close to the southern boundary of the proposed development site.
Pluvial (urban drainage)	Possible	There is urban drainage and water supply infrastructure located in the vicinity of the site.
Pluvial (overland flow)	No	The site is not surrounded by significantly elevated lands and does not provide an important surface water discharge point to adjacent lands.
Blockage	Possible	There are two bridges located on the Tallaght Stream in the immediate vicinity of the proposed development site.
Groundwater	No	There are no significant springs or groundwater discharges mapped or recorded in the immediate vicinity of the site.

Table 1

The primary potential flood risk to the proposed development site can be attributed to an extreme fluvial flood event in the Tallaght Stream located close to the southern boundary of the site. Secondary flood risk can be attributed to a potential surcharge of the urban drainage network or damage to the water supply infrastructure in the vicinity of the site. Secondary flood risk can also be attributed to a potential surcharge due to blockage of either of the bridges on the Tallaght Stream in the vicinity of the site.

In accordance with 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities - DOEHLG 2009' these potential flood risks are analysed in the subsequent 'Screening Assessment' and ''Scoping Assessment'' section of this study report.

4 Screening Assessment

The purpose of the screening assessment is to establish the level of flooding risk that may or may not exist for a particular site and to collate and assess existing current or historical information and data which may indicate the level or extent of any flood risk.

If there is a potential flood risk issue then the flood risk assessment procedure should move to *'Step 2 – Scoping Assessment'* or if no potential flood risk is identified from the screening stage then the overall flood risk assessment can end at *'Step 1'*.

The following information and data was collated as part of the flood risk screening assessment for the proposed development site:-

4.1 OPW/EPA/Local Authority Hydrometric Data

Existing sources of OPW, EPA and local authority hydrometric data were investigated. As illustrated in *Figure 2* below, this assessment has determined that there are no hydrometric gauging stations located in the vicinity of the proposed development site.

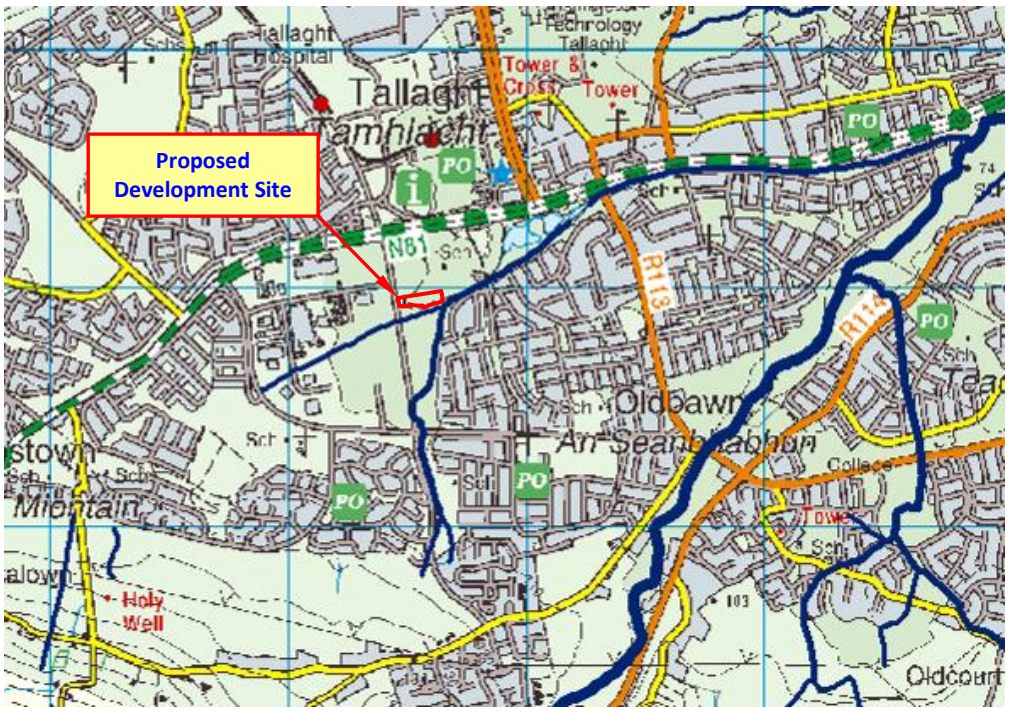


Figure 2 – Hydrometric Gauging Stations

4.2 OPW PFRA Indicative Flood Mapping

Preliminary Flood Risk Assessment (PFRA) Mapping for Ireland was produced by the OPW in 2011. OPW PFRA indicative flood map number 2019/MAP/238/A illustrates indicative flood zones within this area of Dublin.

Figure 3 below illustrates an extract from the above indicative flood map in the vicinity of the proposed development site.

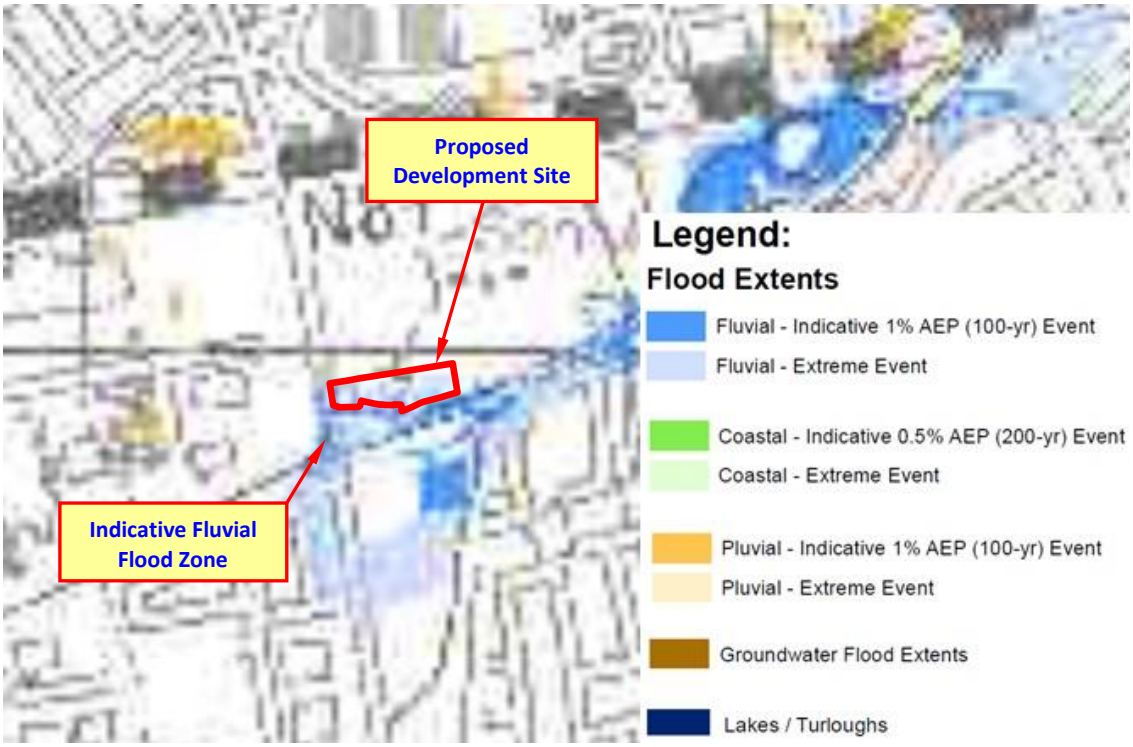


Figure 3 – PFRA Mapping

The PFRA flood mapping does not indicate any indicative pluvial or groundwater flooding within or in close proximity to the site.

Figure 4 below illustrates the PFRA indicative flood zones from *Figure 4* overlaid onto higher resolution background mapping. It should be noted that the extent of flooding illustrated on these maps was developed using a low resolution digital terrain model (DTM) and illustrated flood extents are intended to be indicative only. The flood extents mapped on the PFRA maps are not intended to be used on a site specific basis.

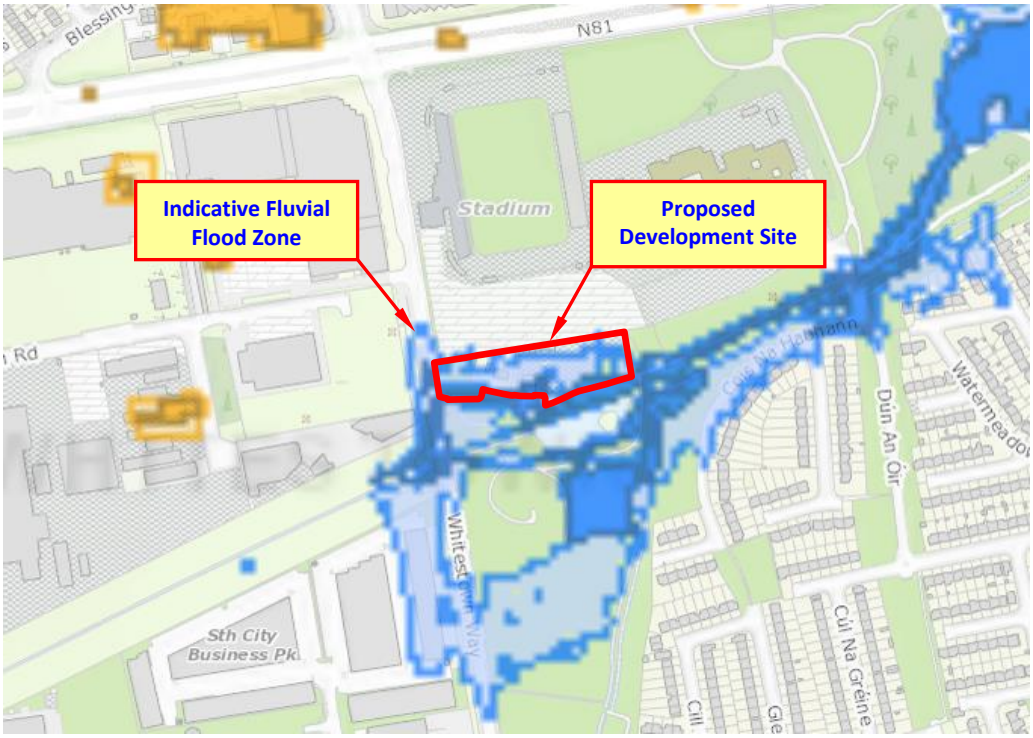


Figure 4 – PFRA Fluvial Mapping

4.3 OPW Flood Maps Website

The OPW Flood Maps Website (www.floods.ie) was consulted in relation to available historical or anecdotal information on any flooding incidences or occurrences in the vicinity of the proposed development site. *Figure 5* below illustrates mapping from the Flood Maps website in the vicinity of the site.

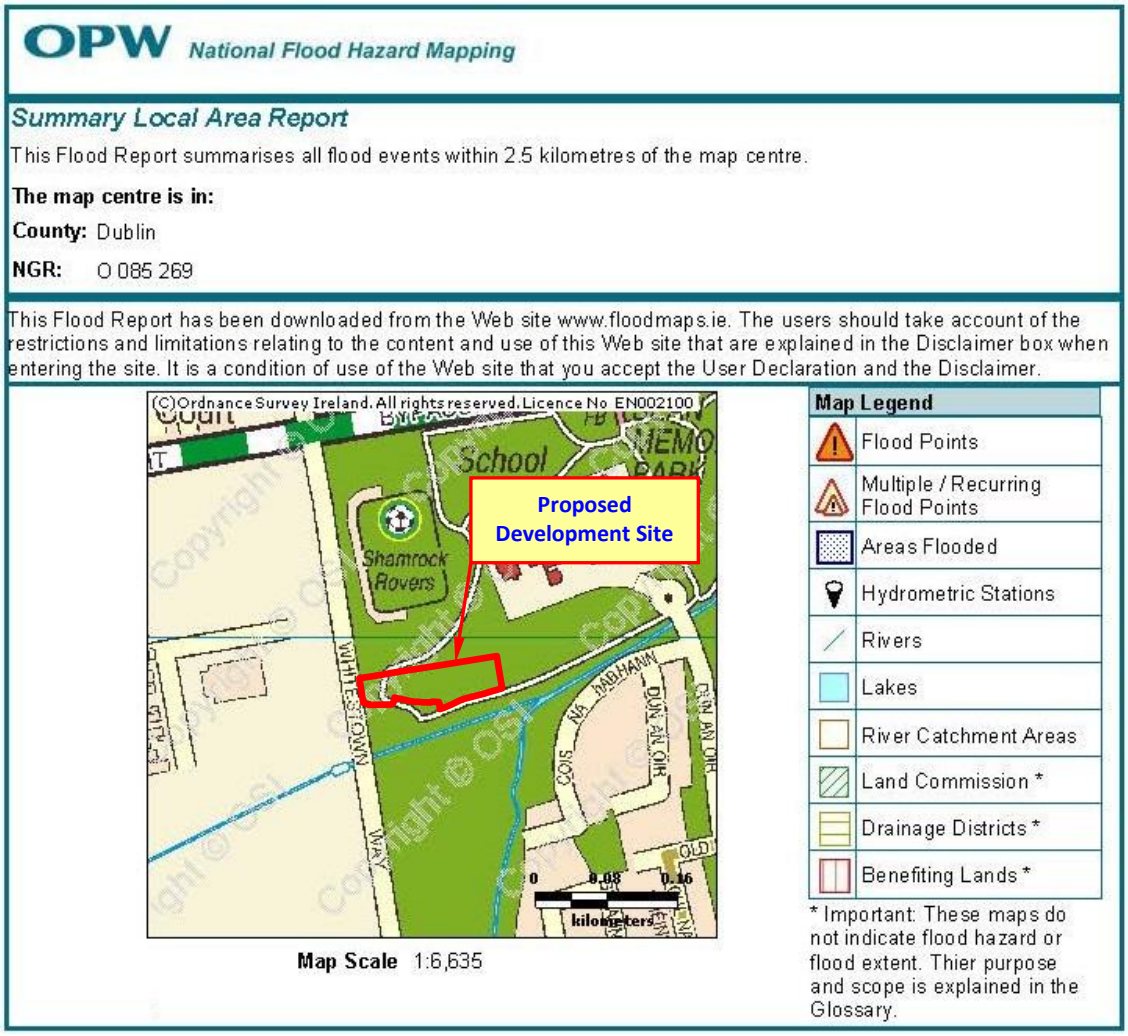


Figure 5 – OPW Flood Maps

Figure 5 above indicates that there are no recorded or anecdotal instances of flooding at or in the immediate vicinity of the proposed development site.

4.4 Ordnance Survey Historic Mapping

Available historic mapping for the area was consulted, as this can provide evidence of historical flooding incidences or occurrences. The maps that were consulted were the historical 6-inch maps (pre-1900), and the historic 25-inch map series.

Figures 6 and *Figure 7* below show the historic mapping for the area of the proposed development site.

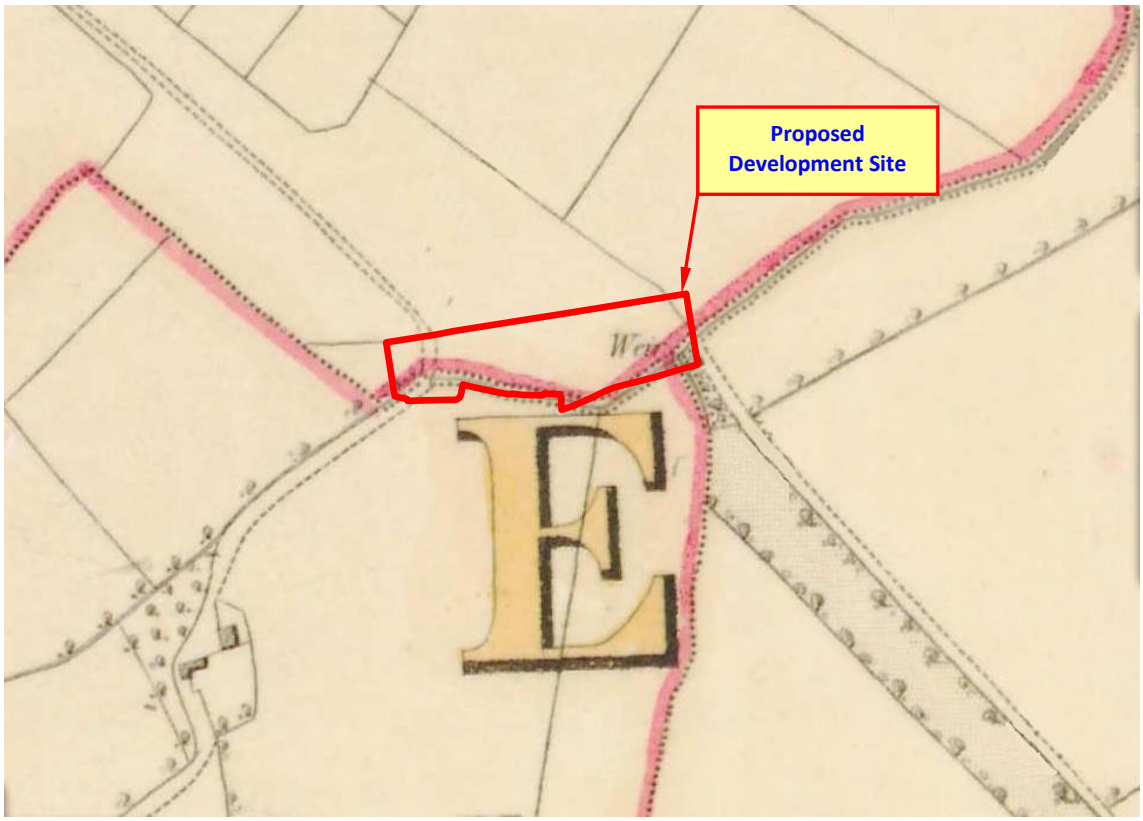


Figure 6 – Historic 6-Inch Mapping

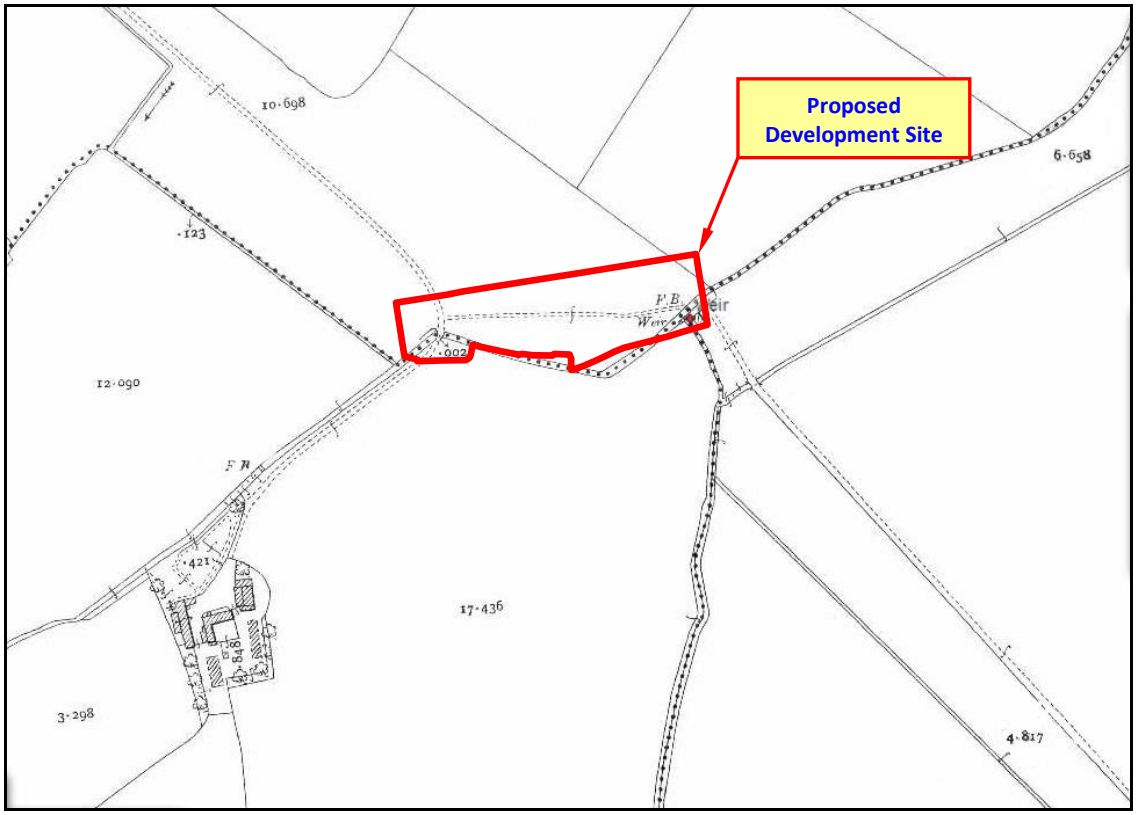


Figure 7 – Historic 25-Inch Mapping

The historic 6 inch and 25 inch mapping does not indicate any historical or anecdotal instances of flooding within or adjacent to the boundary of the proposed development site.

4.5 Geological Survey of Ireland Mapping

The alluvial deposit maps of the Geological Survey of Ireland (GSI) were consulted to assess the extent of any alluvial deposits in the vicinity of the proposed development site. Alluvial deposits can be an indicator of areas that have been subject to flooding in the recent geological past.

Figure 8 below illustrates the sub-soils mapping for the general area of the site.

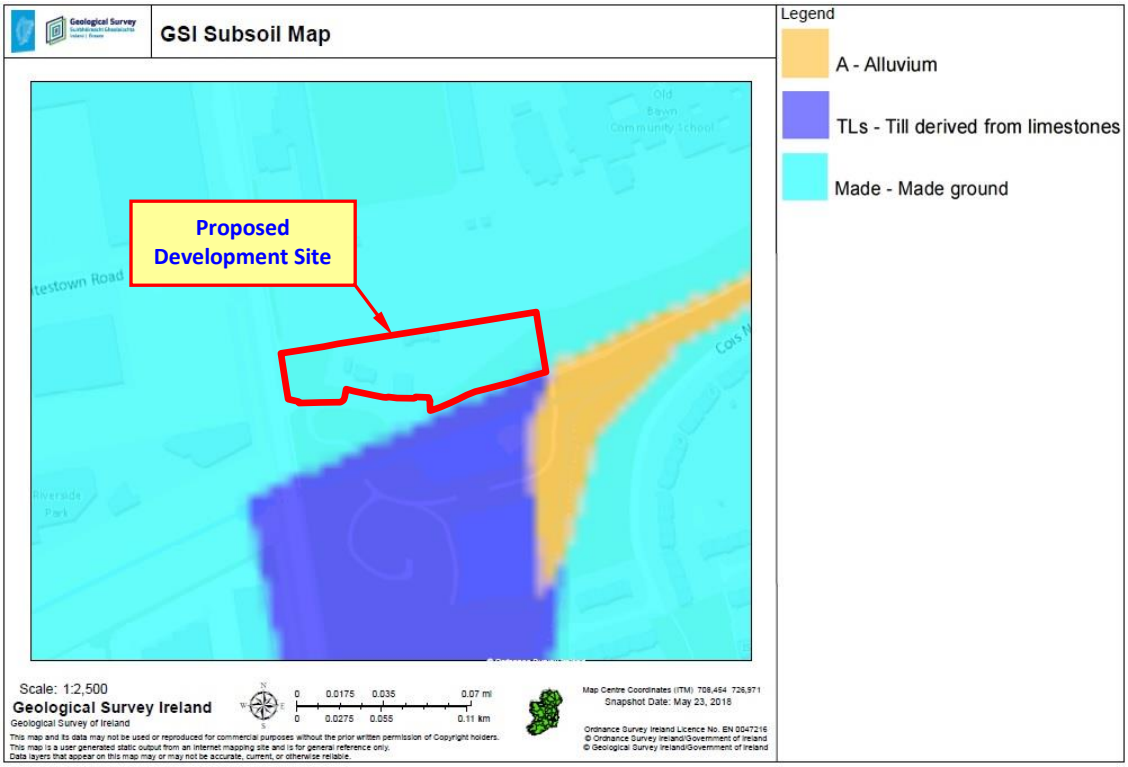


Figure 8 – GSI Subsoil Mapping

Figure 8 above indicates that the proposed development site is entirely underlain by Made Ground. There are also alluvial deposits mapped adjacent to the south eastern corner of the site, which could be indicative of the areas that have flooded in the recent geological past.

4.6 Dodder CFRAM Study

The Dodder Catchment Flood Risk & Management Study (CFRAMS) has been undertaken by the OPW and the Final version of the flood maps were issued in November 2010. Flood risk extent and depth maps for further assessment areas within Dublin have also been produced. OPW CFRAMS predictive flood map number *TS/EXT/UA/CURS/102* illustrates predictive extreme fluvial flood extent zones associated with the Tallaght Stream in the vicinity of the proposed development site.

Figure 9 below (extracted from CFRAMS flood map *TS/EXT/UA/CURS/102*), illustrates the predicted extreme 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) fluvial flood extents in the vicinity of the proposed development site.

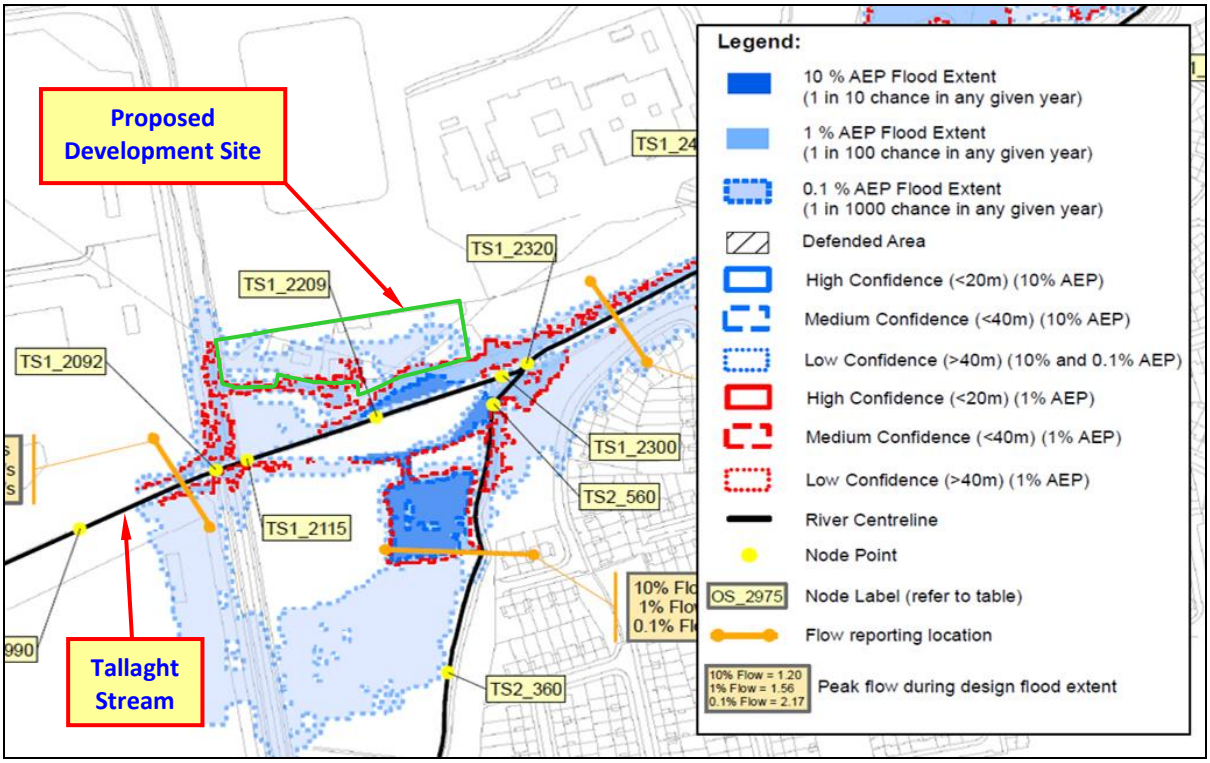


Figure 9 – CFRAMS Fluvial Flood Maps

The CFRAMS flood map also provides information on predicted water levels for 10% AEP, 1% AEP and 0.1% AEP fluvial flood events at various node points along the Tallaght Stream. As illustrated in *Figure 9* above, the node points closest to the proposed development site are referenced as node points *TS1_2092, TS1_2115, TS1_2209 and TS1_2300*. Details of the predicted extreme fluvial flood levels for these CFRAMS node points in the vicinity of the proposed development site are listed in *Table 2* below, which has been extracted from CFRAMS flood map reference *TS/EXT/UA/CURS/102.*

Node Label	Water Level (mOD) 10% AEP	Water Level (mOD) 1% AEP	Water Level (mOD) 0.1% AEP
TS1_2092	95.20	96.09	96.35
TS1_2115	95.08	95.46	95.59
TS1_2209	95.08	95.45	95.60
TS1_2300	94.26	94.59	94.85

Table 2 – CFRAMS Fluvial Map Predicted Flood Levels

4.7 Strategic Flood Risk Assessment

A Strategic Flood Risk Assessment (SFRA) was prepared for South Dublin County Council by RPS Consulting Engineers in 2016. A map of the site was extracted from *Drawing Number MDW0657QG0010F02 Fluvial Flood Zone Mapping* and is shown below in *Figure 10* below. This map indicates that an area of the site falls within a potential Flood Zone 'B' (1 in 1000 year, or 0.1% AEP flood event).

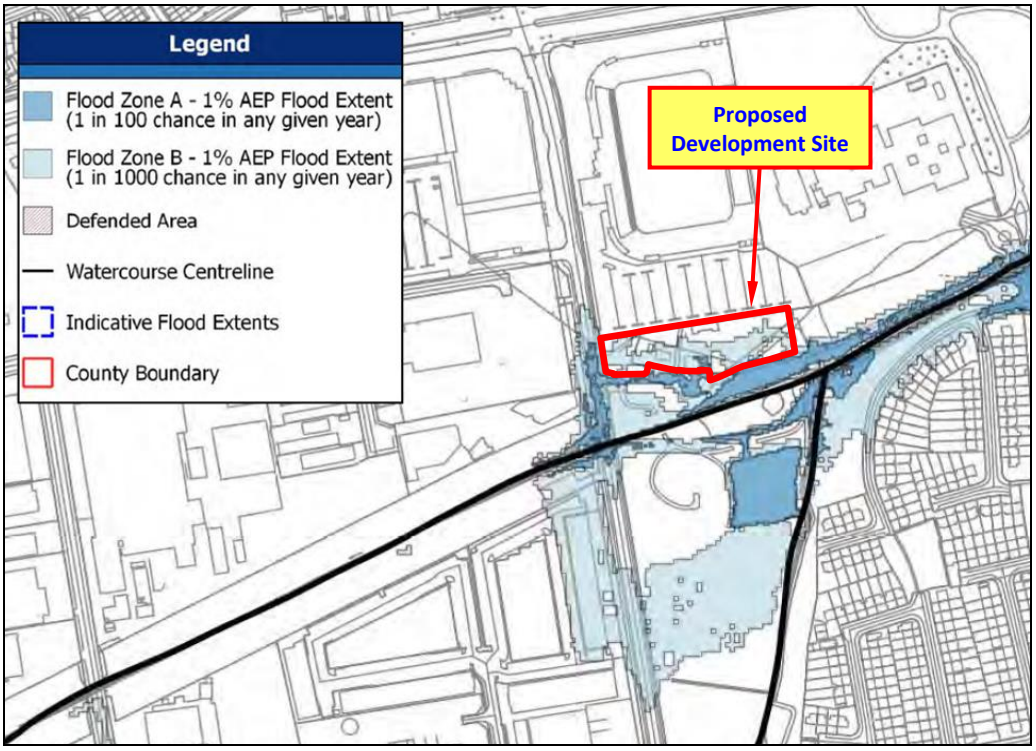


Figure 10 – Strategic FRA Flood Extents

5 Scoping Assessment

The purpose of the scoping stage is to identify possible flood risks and to implement the necessary level of detail and assessment to assess these possible risks, and to ensure these can be adequately addressed in the flood risk assessment. The scoping exercise should also identify that sufficient quantitative information is already available to complete a flood risk assessment appropriate to the scale and nature of the development proposed.

The above screening assessment indicates that the proposed development site may be susceptible to an extreme fluvial flood event in the Tallaght Stream. Secondary flood risk can be attributed to a potential surcharge of the urban drainage network or damage to the water supply infrastructure in the vicinity of the site. Secondary flood risk can also be attributed to a potential surcharge due to blockage of any of the three bridges on the Tallaght Stream in the vicinity of the site.

In consideration of the information collated as part of the screening exercise, and the availability of other information and data specific to the proposed development site, it is considered that sufficient quantitative information to complete an appropriate flood risk assessment can be derived from the information collated as part of the screening exercise alone. In particular, the final flood extent maps for the area produced as part of the Dodder CFRAM study, dated November 2010, are based on the results of detailed hydraulic modelling undertaken along the reach of the Tallaght Stream, close to the site, and therefore provide an reasonably accurate delineation of flood zones and prediction of flood depths in the general vicinity of the proposed development site.

The specific flood risk to and from the proposed development site is assessed in the subsequent 'Assessing Flood Risk' stage of this study report.

6 Assessing Flood Risk

Flood risk from a particular watercourse is normally assessed for a 1 in 100 and 1 in 1000 year flood event, in accordance with most county development plans and in accordance with the DOEHLG guidelines *'The Planning System and Flood Risk Management Guidelines'*.

The following sections present an analysis and assessment of the estimated 1 in 100 year (1% AEP) and 1 in 1000 year (0.1% AEP) flood levels in the Tallaght Stream in the vicinity of the proposed development site.

6.1 Estimation of Extreme Flood Levels in the Tallaght Stream

Extreme flood levels have been derived as part of the Dodder CFRAM Study at a number of nodes along the Tallaght Stream in the vicinity of the proposed development site. Utilising this information, predicted flood levels at the upstream and downstream ends of the proposed development site have been interpolated as illustrated in *Table 3* below.

Node Label	Water Level (mOD) 1% AEP	Water Level (mOD) 0.1% AEP
TS1_2092	96.09	96.35
Upstream Site Boundary	95.507	95.647
TS1_2115	95.46	95.59
TS1_2209	95.45	95.60
Downstream Site Boundary	94.760	94.998
TS1_2300	94.59	94.85

Table 3 – Extreme Flood Levels

6.2 Topographical Survey & Contour Mapping

In order to assist in the assessment of any potential flooding in the general area of the proposed development site, topographical survey information was utilised to develop a Digital Terrain Model (DTM) of the proposed development site area. Development of a DTM allows the flood level predictions listed in *Table 3* above to be analysed in more detail at the location of the proposed development site. The contour mapping and DTM developed for the area is illustrated in *Figure 11* and *Figure 12* below.

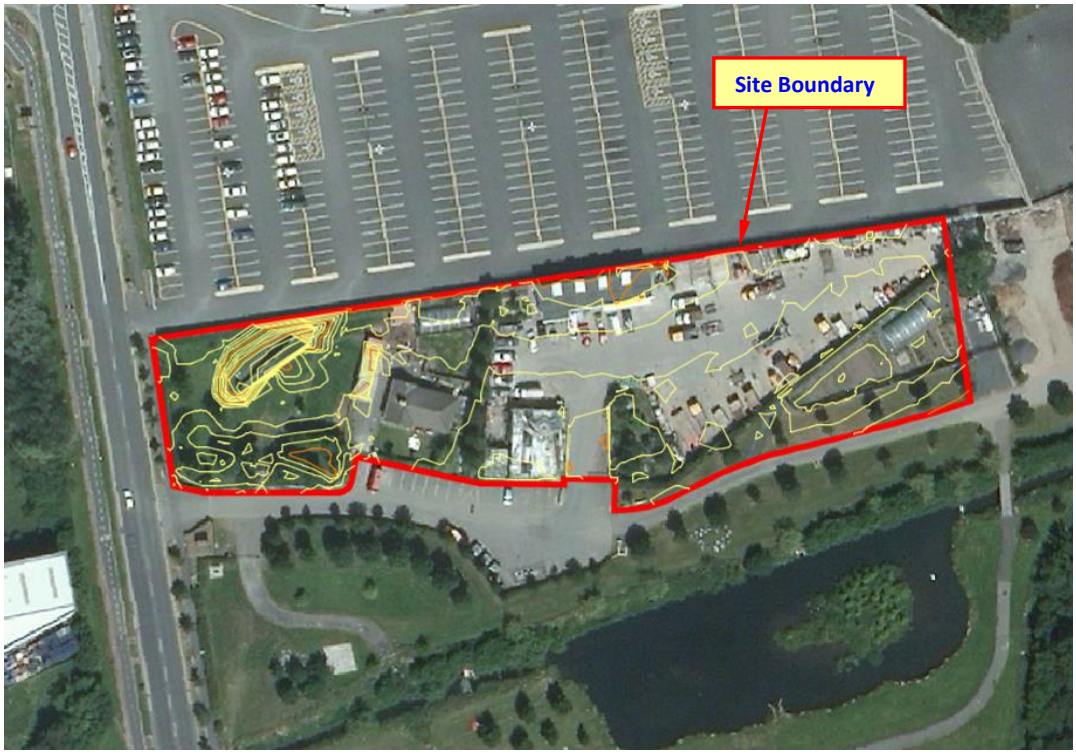
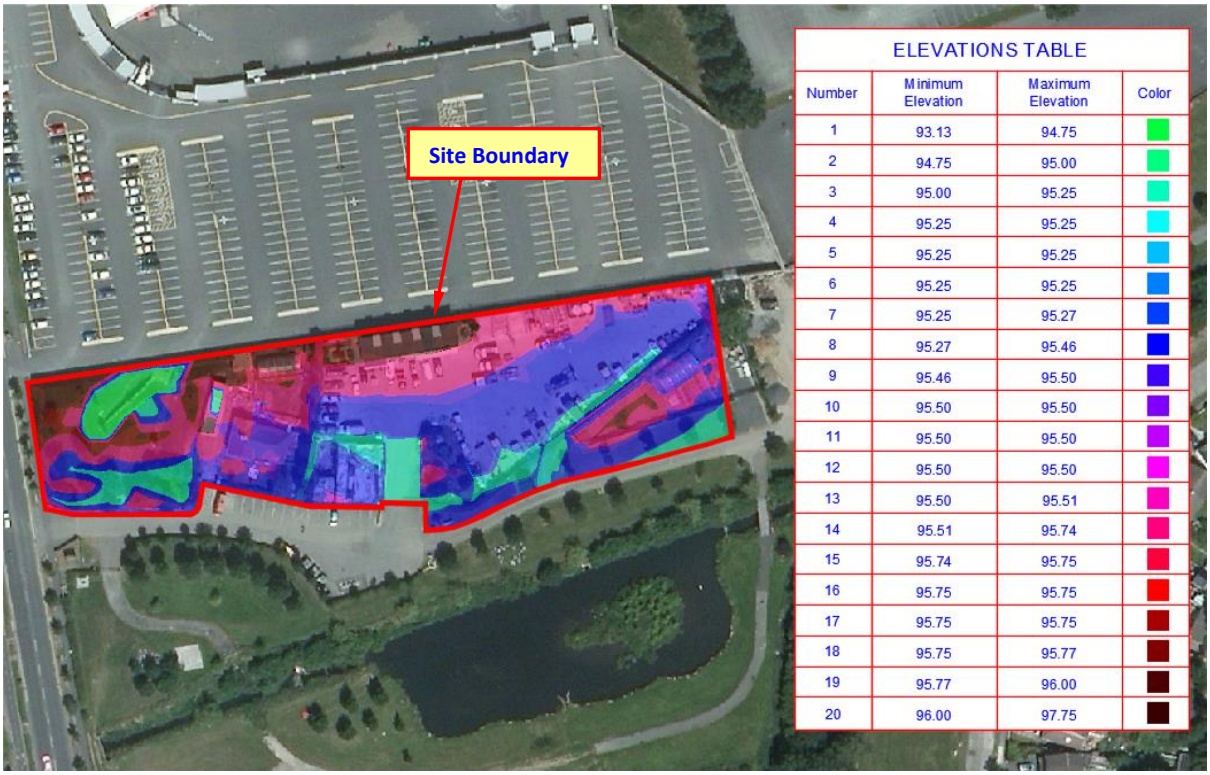


Figure 11 – Contour Map



ELEVATIONS TABLE

Number	Minimum Elevation	Maximum Elevation	Color
1	93.13	94.75	
2	94.75	95.00	
3	95.00	95.25	
4	95.25	95.25	
5	95.25	95.25	
6	95.25	95.25	
7	95.25	95.27	
8	95.27	95.46	
9	95.46	95.50	
10	95.50	95.50	
11	95.50	95.50	
12	95.50	95.50	
13	95.50	95.51	
14	95.51	95.74	
15	95.74	95.75	
16	95.75	95.75	
17	95.75	95.75	
18	95.75	95.77	
19	95.77	96.00	
20	96.00	97.75	

Figure 12 – Topographical Survey Derived DTM

6.3 Flood Zone Mapping & Delineation

Utilising the DTM illustrated in *Figure 11* and *Figure 12* above, and the 1 in 100 year (1% AEP) and 1 in 1000 year (0.1% AEP) extreme flood levels in the adjacent watercourse to the south of the site from the node points listed in *Table 3* above, the 1% AEP and 0.1% AEP flood zones within the boundary of the site were delineated.

The highest topographical elevation surveyed within the boundary of the proposed development site is 97.750 m OD, which is located in the northern area of the site. The lowest topographical elevation within the site is 94.90m OD (excluding the small pond), which is located in the southern area of the site. The DTM illustrated in *Figure 12* above indicates that an area of the existing topography of the site is below the 1% AEP and 0.1% AEP predicted flood levels (as per *Table 3* above). *Drawing Number IE1652-002-A, Appendix A* illustrates the delineated 1 in 100 year flood extent (Flood Zone 'A') and 1 in 1000 year flood extent (Flood Zone 'B') over the full area of the proposed development site.

6.4 Assessment of Secondary Flood Risk

6.4.1 Surcharge/Blockage – Bridges

Secondary flood risk can be attributed to a potential surcharge due to a blockage of either of the two bridges located on the Tallaght Stream in the immediate vicinity of the site.

Road Bridge along Whitestown Way

There is a single span road bridge on Whitestown Way located immediately upstream of the western boundary of the proposed development site. The bridge is 6m wide and approximately 1.25m high as shown in *Figure 13* below.

Figure 13 – Whitestown Way Bridge Looking Upstream

In the event the bridge becomes blocked and begins to surcharge flood waters would surcharge/back up the Tallaght Stream, overtop the bank and potentially spill out onto the surrounding land upstream of the site. If the water levels continue to rise it is predicted that flood waters would rise to a level of 96.03m OD after which the flood waters would overtop the bridge and cause flooding on Whitestown Way road. It is predicted that the flood waters would flow overland in a northerly direction along the road to a low point adjacent to the existing entrance road into the site as shown in *Figure 14* below. These flood waters would then flow along the existing access road and spill back into the Tallaght Stream.

Overall the blockage of the Whitestown Way road bridge does not pose a significant additional flood risk to the site beyond the unblocked scenario.

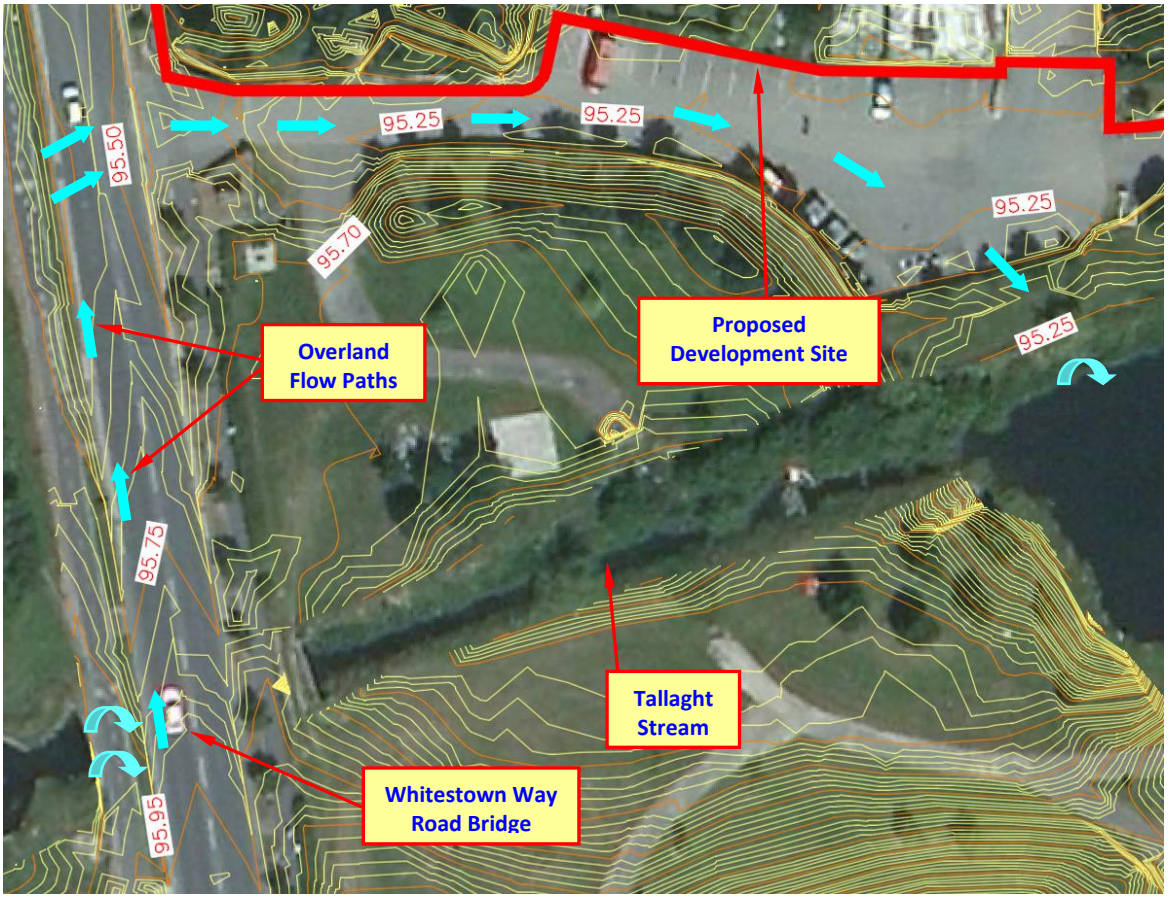


Figure 14 – Whitestown Way Road Bridge Surcharge Overland Flow Path

Footbridge on Tallaght Stream

There is a steel footbridge located on the Tallaght Stream located at the downstream end of the site. In the event the bridge becomes blocked and begins to surcharge upstream it is anticipated that the water levels would rise to a level of 94.64m OD after which the flood waters would overtop the bridge and spill directly into the land downstream as shown in *Figure 15* below. It is not anticipated that blockage of this bridge would pose an additional flood risk to the site beyond the unblocked scenario.

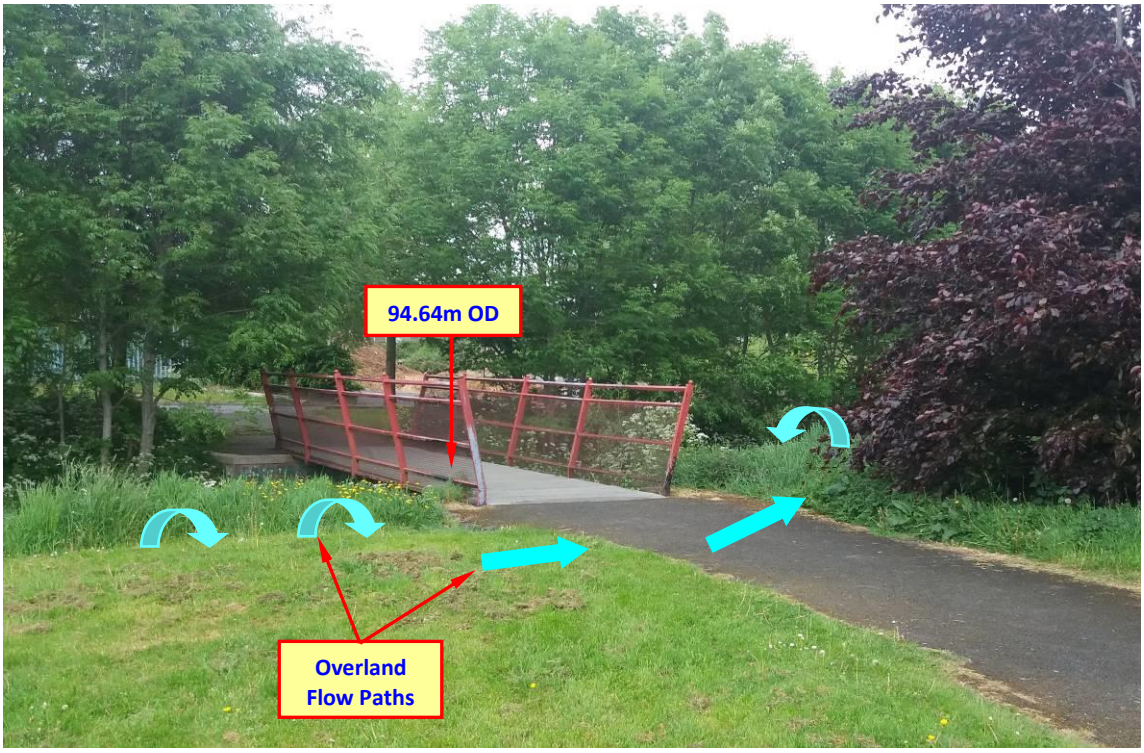


Figure 15 – Footbridge

6.4.2 Pluvial - Urban Drainage/Water Supply Infrastructure

Secondary pluvial flood risk can also be attributed to a potential surcharge of the urban drainage network and /or damage to the water supply infrastructure in the general vicinity of the site. An urban drainage infrastructure map was obtained from Irish Water, an extract of which is illustrated in *Figure 16* below. The following drainage infrastructure has been identified in the vicinity of the proposed development site:

- 400mm DI Water Main to the south and west of the site
- 160mm PVC Water Main to the north of the site
- 825mm Foul Pipe to the north of the site

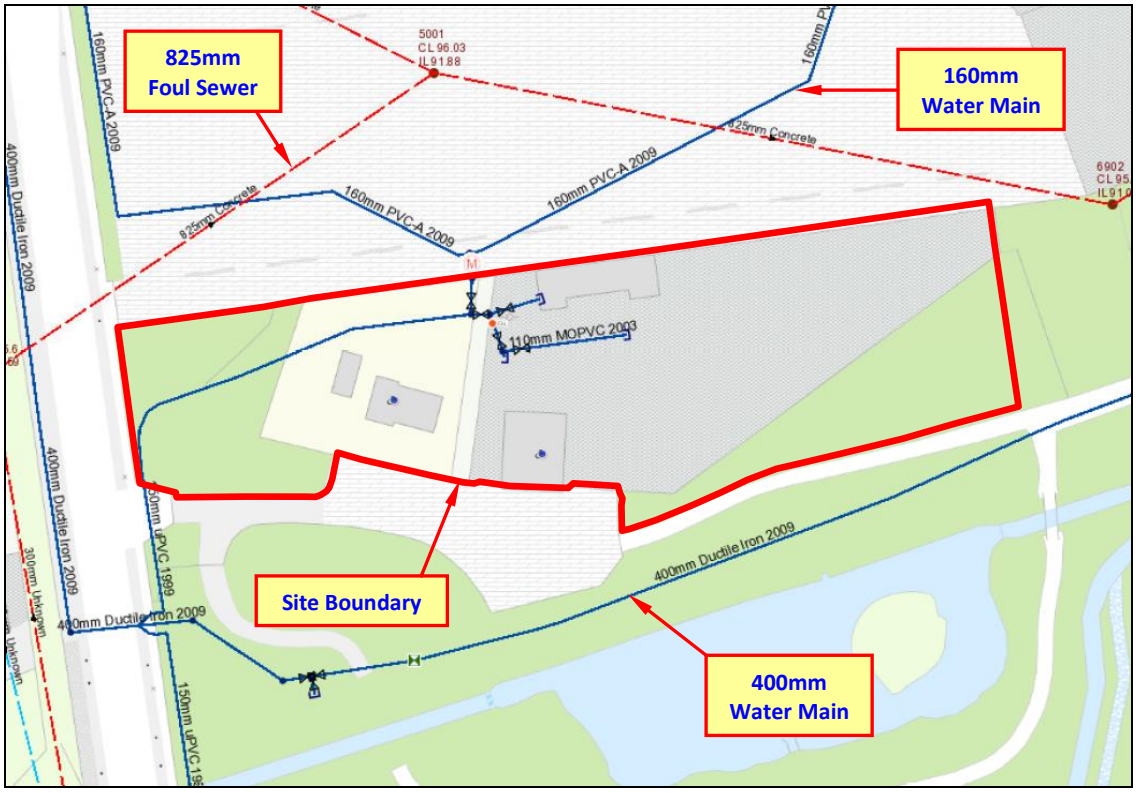


Figure 16 – Urban Drainage Records

It is anticipated that the any flooding due damage of the 400mm Water Main to the south of the site would spill into the open park area and flow directly into the Tallaght Stream. It is not anticipated that these waters would enter the boundary of the site.

The 825mm foul sewer and the 160mm water main are located in the car park associated with Shamrock Rovers Football Stadium. The car park is drained via a channel drain located along the southern boundary of the site. There is also a high wall along this boundary which would prevent any potential flood waters from the 825mm foul sewer or the 160mm water main from entering the proposed development site. It is likely that these flood waters would be collected by the channel drain or flow along the boundary wall out onto Whitestown Way road as shown in *Figure 17* below. It is not anticipated that these waters would enter the boundary of the site.

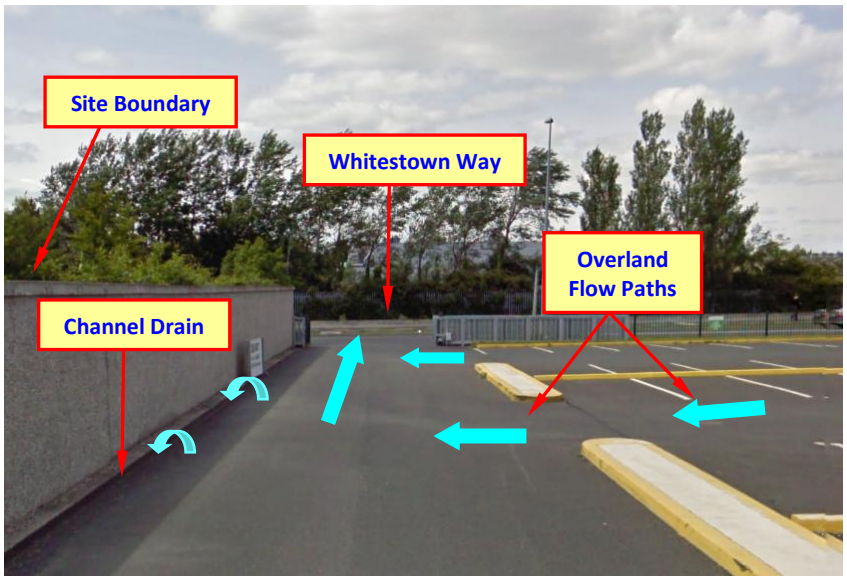


Figure 17 – Foul Sewer and Water Main Overland Flow Paths

It is also predicted that any flooding that may occur on Whitestown Way Road as a result of the foul sewer or water mains may result in ponding in the road. It is predicted that the flood waters would flow overland in a southerly direction along the road to a low point adjacent to the existing entrance road into the site as shown in *Figure 18* below. These flood waters would then flow along the existing access road and spill back into the Tallaght Stream. It is not anticipated that these waters would enter the boundary of the site.

Figure 18 – Overland Flow Paths on Whitestown Way

7 Proposed Development in the Context of the Guidelines

In the context of the *'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009'* three flood zones are designated in consideration of flood risk to a particular development site.

Flood Zone 'A' – where the probability of flooding from rivers and watercourses is the highest (greater than 1% or 1 in 100 year for river and watercourse flooding and 0.5% or 1 on 200 for coastal or tidal flooding).

Flood Zone 'B' – where the probability of flooding from rivers and watercourses is moderate (between 0.1% or 1 in 1000 year for river and watercourse flooding and 0.5% or 1 on 200 for coastal or tidal flooding).

Flood Zone 'C' – where the probability of flooding from rivers and watercourses is low or negligible (less than 0.1% of 1 in 1000 year for both river and watercourse and coastal flooding). *Flood Zone 'C'* covers all areas that are not in *Zones 'A'* or '*B*'.

The *'Planning System and Flood Risk Management Guidelines'* list the planning implications for each flood zone, as summarised below:-

Zone A – High Probability of Flooding. Most types of development would not be considered in this zone. Development in this zone should be only be considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the *'Planning System and Flood Risk Management Guidelines'* justification test has been applied. Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space and outdoor sports and reaction would be considered appropriate in this zone.

Zone B – Moderate Probability of Flooding. Highly vulnerable development such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses, strategic transport and essential utilities infrastructure would generally be considered inappropriate in this zone, unless the requirements of the justification test can be met. Less vulnerable development such as retail, commercial and industrial uses and recreational facilities might be considered appropriate in this zone. In general however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in *Zone 'C'* and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to the development can be adequately managed and that development in this zone will not adversely affect adjacent lands and properties.

Zone C – Low to Negligible Probability of Flooding. Development in this zone is appropriate from a flood risk perspective. Developments in this zone are generally not considered at risk of fluvial flooding and would not adversely affect adjacent lands and properties from a flood risk perspective.

In the context of the *'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009'* this Site Specific Flood Risk Assessment has determined that the southern and south-western areas of the site within Flood Zone 'A' and Flood Zone 'B'.

In accordance with the *'Planning System & Flood Risk Management Guidelines, DOEGLG, 2009'* development proposals for the site may be subject to the requirements of the Justification Test.

8 Flood Depth & Volume Analysis

An analysis was undertaken to assess the depths and volumes of flood waters that may potentially inundate the proposed development site during a 1 in 100 year (1% AEP) and 1 in 1000 year (0.1% AEP) extreme flood event in the Tallaght Stream. Using the hydrology module of the Autodesk Civil Design 3D-2015 software package further analysis was therefore undertaken to determine the range of flood water depths and volumes which may possibility inundate the site area.

Drawing Numbers IE1652-003-A and *IE1652-004-A, Appendix A,* illustrate the calculated depth of flood waters that may occur within the existing site area in consideration of a 1% AEP and 0.1% AEP flood event in the Tallaght Stream. The possible depth of flood waters for these return periods is illustrated on the drawings via a graphical representation of flood depths within the boundary of the proposed development site and via a table of predicted flood water depths. The flood water depth table presents flood water depths over 20 separate elevation ranges within the boundary of the proposed development site.

By applying a Triangulated Irregular Network (TIN) analysis to the existing DTM surface and the predicted 1% AEP and 0.1% AEP year extreme flood levels in the Tallaght Stream, the volume of flood waters which may inundate the site was calculated. The potential maximum and mean flood depths and flood inundation volumes are summarised in *Table 4* below.

	1% AEP Flood	0.1% AEP Flood
Maximum Flood Depth (m)	**0.605**	**0.743**
Mean Flood Depth (m)	**0.154**	**0.187**
Total Flood Water Volume (m^3)	**215**	**551**

Table 4 – Site Flood Depth and Inundation Volumes

9 Discussion

The analysis undertaken as part of this Site Specific Flood Risk Assessment indicates that the southern and south-western areas of the proposed development site falls within a delineated Flood Zone 'A' and Flood Zone 'B' associated with the Tallaght Stream. In order to enable a sustainable development of the site and to reduce the risk of flood inundation to the site it is proposed to raise the site above the 1 in 1000 year (0.1% AEP) flood levels in this area of the site.

9.1 Flood Storage Compensation

It is proposed to provide flood storage compensation within the existing park located to the south of the proposed development site to compensate for the volume of flood water displaced by raising the site levels above the peak upstream 1 in 1000 year flood level of 95.647m OD. It is proposed to lower two areas of the existing green space area located close to the northern and southern banks of the Tallaght Stream. The proposed areas and levels of flood storage compensation are shown in on *Drawing Numbers IE1652-005-A* and *IE1652-006-A, Appendix A.*

The volume of storage provided within the site is summarised in *Table 7* below.

	Area 1 + Area 2 0.1% AEP Flood Volumes
Proposed Total Storage Compensation Volume (m^3)	**596**
Proposed Flood Volume Displaced by Filling Site (m^3)	**551**
Net Additional Volume of Storage Provided (m^3)	**45**

Table 7 – Proposed Flood Storage Area Volumes

The volume of storage provided during 1 in 1000 year (0.1% AEP) extreme flood events is greater than the volume displaced by raising the site levels and therefore the impact is considered to be low.

Considering the above it is therefore predicted that the proposed site would not result in any alteration to the existing fluvial and hydrological regime in the area and would not result in an increased flood risk elsewhere.

10 Justification Test for Development Management

In the context of the '*Planning System and Flood Risk Management Guidelines, DOEHLG, 2009*' and in consideration of the scenario that the proposed development site is undefended, this Site Specific Flood Risk Assessment has determined that the southern area of the proposed development site falls within Flood Zone 'A' and Flood Zone 'B'.

Table 3.1 of the guidelines lists the vulnerability class of various types of development. The proposed development site is therefore classified as Highly Vulnerable development.

Table 3.2 of the guidelines (*duplicated below*) provides a matrix of different vulnerability classes of development in relation to Flood Zones A, B and C, and lists if development is appropriate in each Zone and where the Justification Test should be applied.

	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

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

With reference to the table above, the form of development proposed at the site is 'Highly Vulnerable Development' (i.e. residential) and the site partially falls within a delineated Flood Zone 'A' and Flood Zone 'B', therefore development proposals for the site are subject to the Justification Test.

Where 'Highly vulnerable development' is proposed within a delineated Flood Zone 'A' or Flood Zone 'B', the planning authority must be satisfied that the development satisfies the criteria of the Justification Test as described in Box 5.1 of the guidelines (*duplicated below*):-

Box 5.1 Justification Test for development management (to be submitted by the applicant)

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. 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 these Guidelines.

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

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

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

   (iii) 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; and

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

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

Each of the criteria listed in Box 5.1 above are considered as follows:-

1. *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 these guidelines.*

   Answer – The land is zoned to preserve and provide for open space and recreational amenities in the SDCC Development Plan. However section 2.1.2 of the plan allows for the development of older persons housing within this zoning.

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

   (i) The development proposed will not increase flood risk elsewhere and, if practical will reduce overall flood risk;

   Answer – Flood Storage Compensation shall be provided to reduce the overall flood risk as a result of raising grounds levels within the site. The proposed volume of flood storage provided is 596m^3, which provides an additional storage volume of 45m^3 during a 1 in 1000 year (0.1% AEP) flood event in the Tallaght Stream.

   In consideration of the proposed flood compensation, the proposed development is not expected to result in an adverse impact to the hydrological regime of the area and is not expected to increase flood risk elsewhere.

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

   Answer – The finished floor levels of the proposed houses shall be constructed to a minimum level of 96.00m OD, which is 0.353m above the upstream peak 1 in 1000 year (0.1% AEP) flood level of 95.647m OD in the Tallaght Stream.

   The access road, public spaces and areas surrounding the proposed dwellings within the site shall be raised to a minimum level of 95.800m OD, which is 0.153m above the upstream peak 1 in 1000 year (0.1% AEP) flood level of 95.647m OD in the Tallaght Stream.

   (iii) 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 or any future flood risk management measures and provisions for emergency services access;

Answer – Access to the proposed development site during an extreme flood event is provided along Whitestown Way and the existing access road along the southern boundary of the site. The predicted depth of flooding on Whitestown Way adjacent to the proposed development site during a 1 in 1000 year event is 320mm. The predicted depth of flooding on the existing access road adjacent to entrance to the proposed development site during a 1 in 1000 year event is 295mm. The predicted depths of flooding in these locations are not predicted to impeded access to the site for emergency vehicles.

Access is provided within the boundary of the proposed development site by raising the access road above the 1 in 1000 year flood level.

(iv) *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;*

Answer – The scheme has been developed in accordance with the guidelines for urban design and the public realm set out in the following publications:

- Quality Housing for Sustainable Communities.
- Urban Design Manual - A best Practice Guide
- Sustainable Urban Housing - Design Standards for New Apartments. Guidelines for Planning Authorities.
- Design Manual for Urban Roads and Streets (DMURS.)

11 Summary Conclusions and Recommendations

In consideration of the findings of this site specific flood risk assessment and analysis the following conclusions and recommendations are made in respect of the proposed development site:-

- *A Site Specific Flood Risk (SSFRA) assessment, appropriate to the type and scale of development proposed, and in accordance with 'The Planning System and Flood Risk Management Guidelines – DoEHLG-2009' has been undertaken.*
- *The proposed site has been screened, scoped and assessed for flood risk in accordance with the above guidelines.*
- *The primary flood risk to the proposed site can be attributed to a fluvial flood event in the Tallaght Stream located close to the southern boundary of the site. The site is not at risk of groundwater flooding.*
- *A detailed Digital Terrain Model (DTM) has been developed for the site. Utilising the DTM, and the predicted 1 in 100 year (1% AEP) and 1 in 1000 year (0.1% AEP) flood levels, the flood extents have been delineated over the full extent of the DTM. This analysis has determined that the southern and south-western area of the site falls within Flood Zone 'A' and Flood Zone 'B'.*
- *Secondary flood risk can be attributed to a potential surcharge due to a blockage in the Whitestown Way Road Bridge located on the Tallaght Stream located close to the south-western boundary of the proposed development site. In the event the bridge becomes blocked and begins to surcharge flood waters would spill out onto Whitestown Way road. It is predicted that the flood waters would flow overland in a northerly direction and into the existing access road adjacent to the site. These flood waters would then flow along the existing access road and spill back into the Tallaght Stream. Overall the blockage of the Whitestown Way road bridge does not pose a significant flood risk to the site.*
- *Secondary pluvial flood risk can also be attributed to a potential surcharge of the urban drainage network and /or damage to the water supply infrastructure in the vicinity of the site. It is anticipated that the any flooding due damage of the 400mm Water Main to the south of the site would spill into the open park area and flow directly into the Tallaght Stream. It is not anticipated that these waters would enter the boundary of the site.*
- *There is an 825mm foul sewer and the 160mm water main located in the car park to the north of the site. The car park is drained via a channel drain located along the southern boundary of the site. It is likely that any potential flood water from these would be collected by the channel drain or flow along the boundary wall out onto Whitestown Way road It is predicted that the flood*

waters would flow overland in a southerly direction along the road to a low point adjacent to the existing entrance road into the site. These flood waters would then flow along the existing access road and spill back into the Tallaght Stream. It is not anticipated that these waters would enter the boundary of the site.

- *The finished floor levels of the proposed houses shall be constructed to a minimum level of 96.00m OD, which is 0.353m above the upstream peak 1 in 1000 year (0.1% AEP) flood level of 95.647m OD in the Tallaght Stream.*
- *The access road, public spaces and areas surrounding the proposed dwellings within the site shall be raised to a minimum level of 95.800m OD, which is 0.153m above the upstream peak 1 in 1000 year (0.1% AEP) flood level of 95.647m OD in the Tallaght Stream.*
- *Flood storage compensation shall be provided to account for flood waters that may be displaced as a result of raising the grounds in the southern area of the proposed development site above the 1 in 1000 year flood level.*
- *The proposed development is considered to comply with the requirements of the Justification Test for development management.*
- *In consideration of implementation of the recommendations of this SSFRA the flood risk to and from the proposed development site is considered to be* ***LOW.*** *Development of the site is not expected to result in an adverse impact to the hydrological regime of the area or increase flood risk elsewhere.*

APPENDIX A

Drawing Number IE1652-001-A

Drawing Number IE1652-002-A

Drawing Number IE1652-003-A

Drawing Number IE1652-004-A

Drawing Number IE1652-005-A

Drawing Number IE1652-006-A

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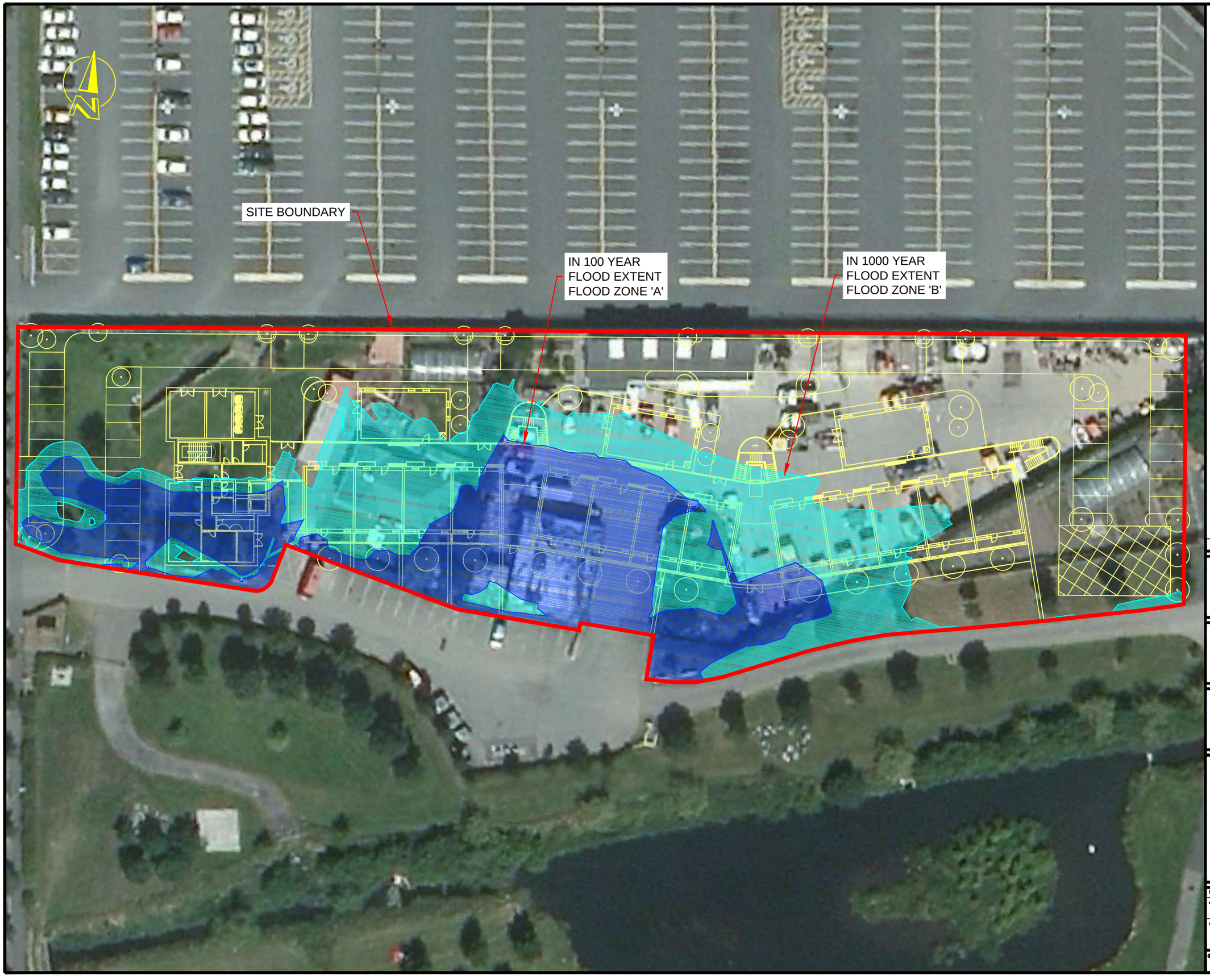
WATER-ENVIRONMENTAL-CIVIL

Project Title:	FLOOD RISK ASSESSMENT
Project Address:	WHITESTOWN WAY, TALLAGHT, DUBLIN 24
Client:	CLUID HOUSING ASSOCIATION
Drg. Title:	SITE LOCATION MAP

Dwg.Scale:	Date:	Dwg.No:	Job No:	Revision:	Dwg.By:
1:50,000	25-05-18	IE1652-001	IE1652	A	JMCG



LEGEND

- SITE BOUNDARY
- 100 YEAR FLOOD EXTENT (1% AEP) FLOOD ZONE 'A'
- 1000 YEAR FLOOD EXTENT (0.1% AEP) FLOOD ZONE 'B'

rev.	date	amendment	drn	ckd
A	01.08.18	PLANNING	NOM	PMS

PROPOSED DEVELOPMENT SITE
WHITESTONE WAY, TALLAGHT, DUBLIN 24

SITE SPECIFIC FLOOD
RISK ASSESSMENT

1 IN 100 YEAR (1% AEP)
& 1 IN 1000 YEAR (0.1% AEP) FLUVIAL
FLOOD EXTENTS

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INNOVATION CENTRE
GREEN ROAD
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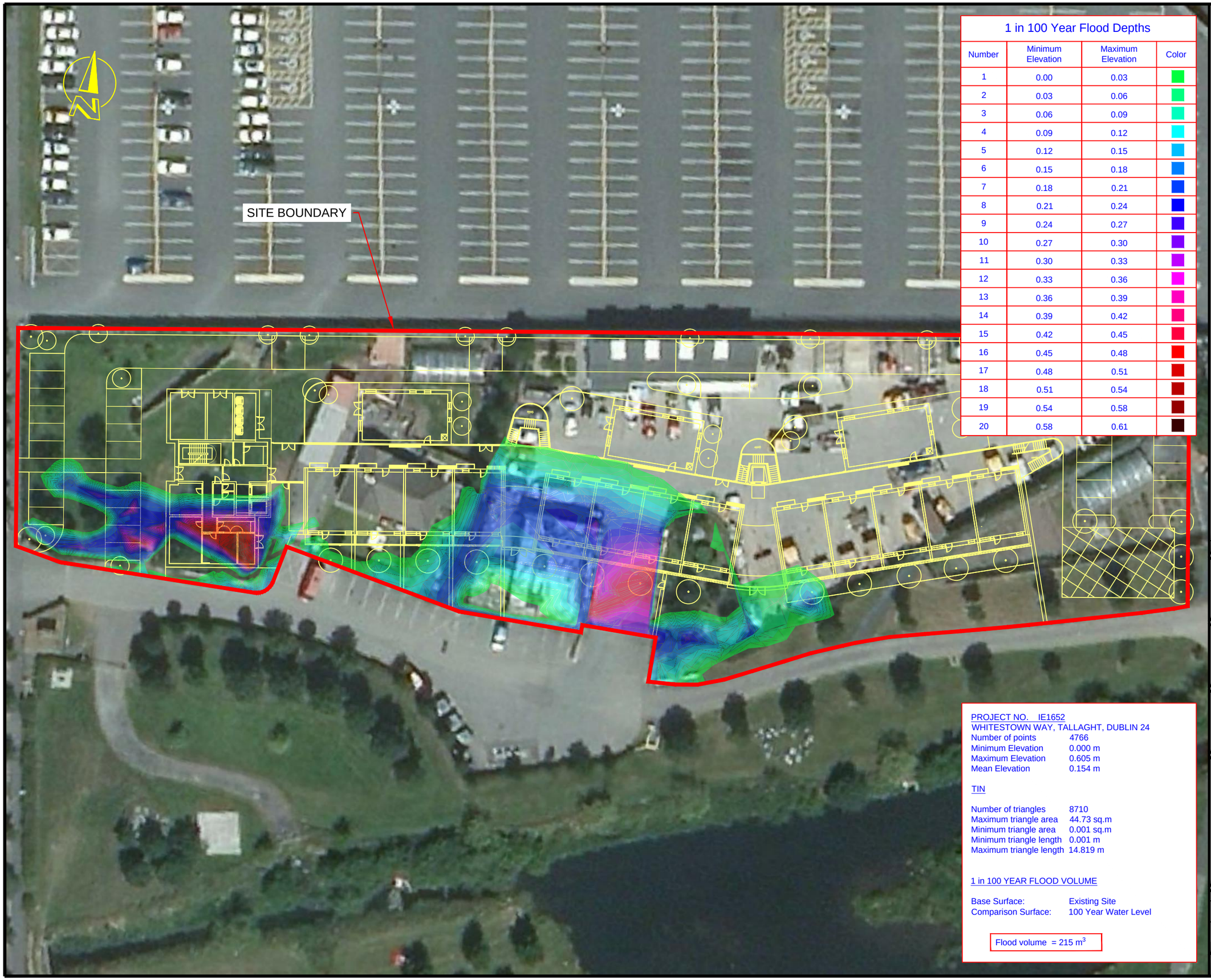

1 in 100 Year Flood Depths

Number	Minimum Elevation	Maximum Elevation	Color
1	0.00	0.03	
2	0.03	0.06	
3	0.06	0.09	
4	0.09	0.12	
5	0.12	0.15	
6	0.15	0.18	
7	0.18	0.21	
8	0.21	0.24	
9	0.24	0.27	
10	0.27	0.30	
11	0.30	0.33	
12	0.33	0.36	
13	0.36	0.39	
14	0.39	0.42	
15	0.42	0.45	
16	0.45	0.48	
17	0.48	0.51	
18	0.51	0.54	
19	0.54	0.58	
20	0.58	0.61	

PROJECT NO. IE1652
WHITESTOWN WAY, TALLAGHT, DUBLIN 24

Number of points	4766
Minimum Elevation	0.000 m
Maximum Elevation	0.605 m
Mean Elevation	0.154 m

TIN

Number of triangles	8710
Maximum triangle area	44.73 sq.m
Minimum triangle area	0.001 sq.m
Minimum triangle length	0.001 m
Maximum triangle length	14.819 m

1 in 100 YEAR FLOOD VOLUME

Base Surface:	Existing Site
Comparison Surface:	100 Year Water Level

Flood volume = 215 m^3

LEGEND

SITE BOUNDARY

rev.	date	amendment	drn	ckd
A	01.08.18	PLANNING	NOM	PMS

PROPOSED DEVELOPMENT SITE
WHITESTONE WAY, TALLAGHT, DUBLIN 24

SITE SPECIFIC FLOOD
RISK ASSESSMENT

1 IN 100 YEAR (1% AEP) FLUVIAL FLOOD
VOLUME & DEPTH ANALYSIS

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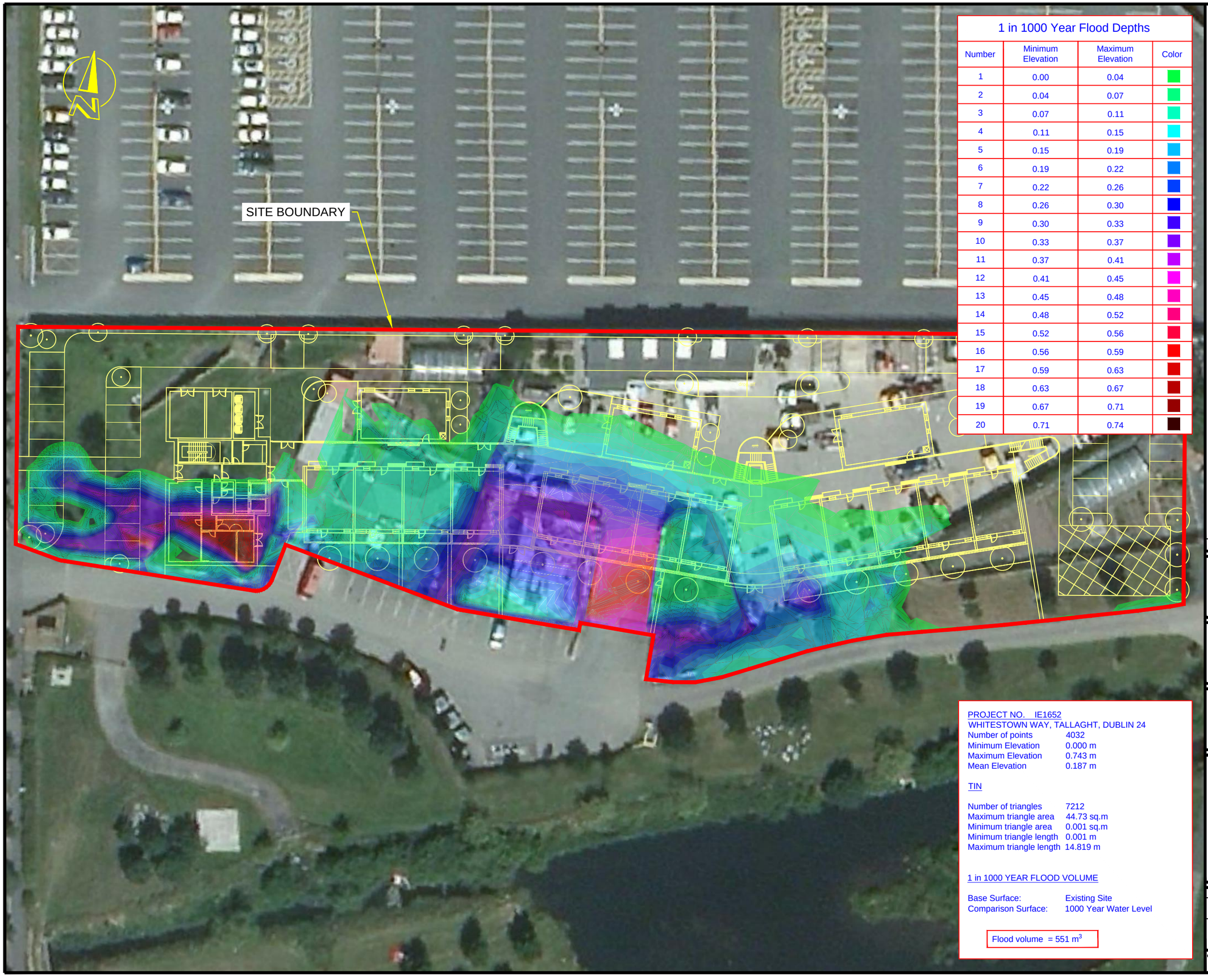

1 in 1000 Year Flood Depths

Number	Minimum Elevation	Maximum Elevation	Color
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2	0.04	0.07	
3	0.07	0.11	
4	0.11	0.15	
5	0.15	0.19	
6	0.19	0.22	
7	0.22	0.26	
8	0.26	0.30	
9	0.30	0.33	
10	0.33	0.37	
11	0.37	0.41	
12	0.41	0.45	
13	0.45	0.48	
14	0.48	0.52	
15	0.52	0.56	
16	0.56	0.59	
17	0.59	0.63	
18	0.63	0.67	
19	0.67	0.71	
20	0.71	0.74	

PROJECT NO. IE1652
WHITESTOWN WAY, TALLAGHT, DUBLIN 24

Number of points	4032
Minimum Elevation	0.000 m
Maximum Elevation	0.743 m
Mean Elevation	0.187 m

TIN

Number of triangles	7212
Maximum triangle area	44.73 sq.m
Minimum triangle area	0.001 sq.m
Minimum triangle length	0.001 m
Maximum triangle length	14.819 m

1 in 1000 YEAR FLOOD VOLUME

Base Surface:	Existing Site
Comparison Surface:	1000 Year Water Level

Flood volume = 551 m^3

LEGEND

SITE BOUNDARY

rev.	date	amendment	drn	ckd
A	01.08.18	PLANNING	NOM	PMS

PROPOSED DEVELOPMENT SITE
WHITESTONE WAY, TALLAGHT, DUBLIN 24

SITE SPECIFIC FLOOD
RISK ASSESSMENT

1 IN 1000 YEAR (0.1% AEP) FLUVIAL FLOOD
VOLUME & DEPTH ANALYSIS

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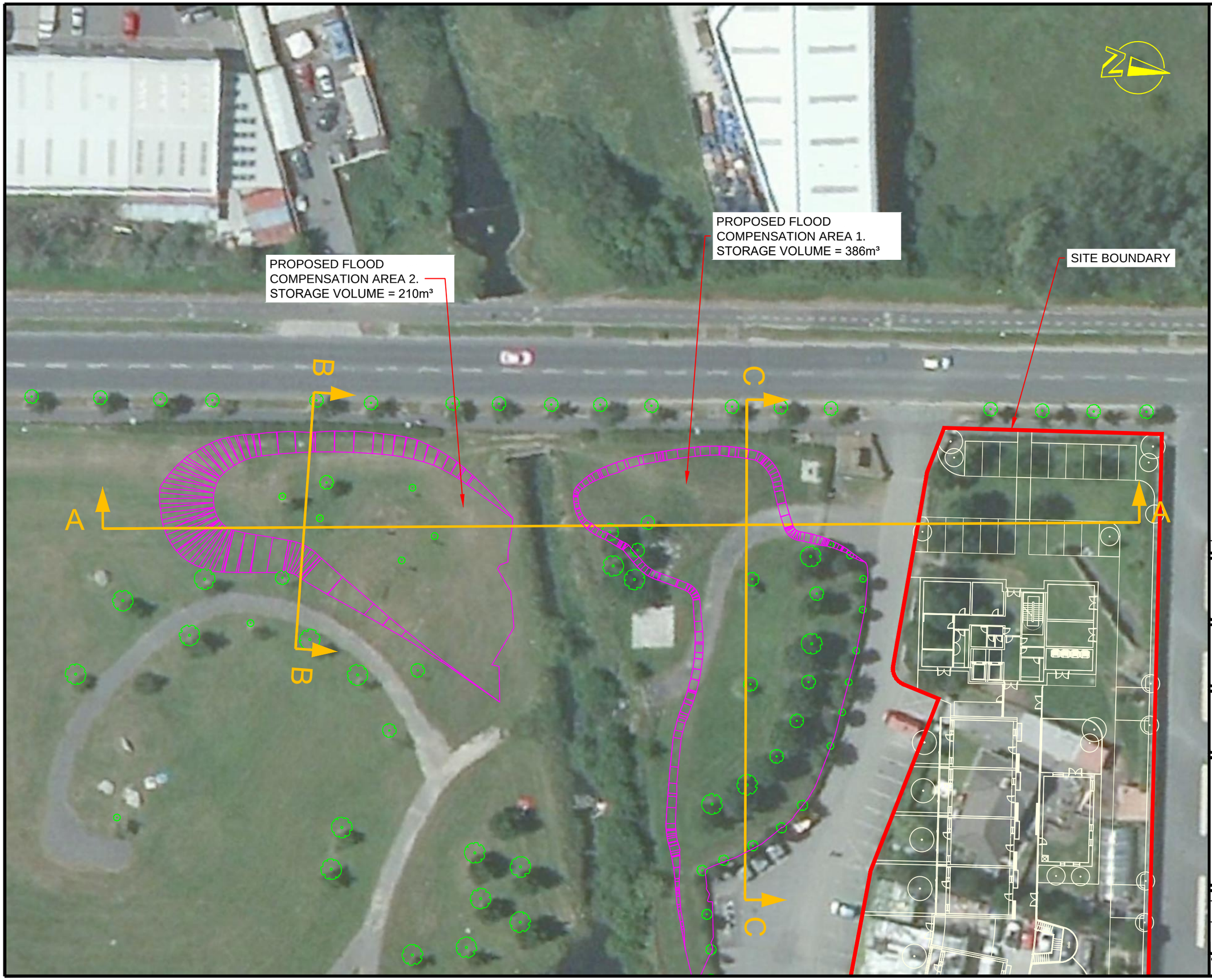

LEGEND

SITE BOUNDARY

rev.	date	amendment	drn	ckd
A	01.08.18	PLANNING	NOM	PMS

PROPOSED DEVELOPMENT SITE

WHITESTONE WAY, TALLAGHT, DUBLIN 24

SITE SPECIFIC FLOOD
RISK ASSESSMENT

PROPOSED FLOOD STORAGE
COMPENSATION AREAS
LAYOUT PLAN

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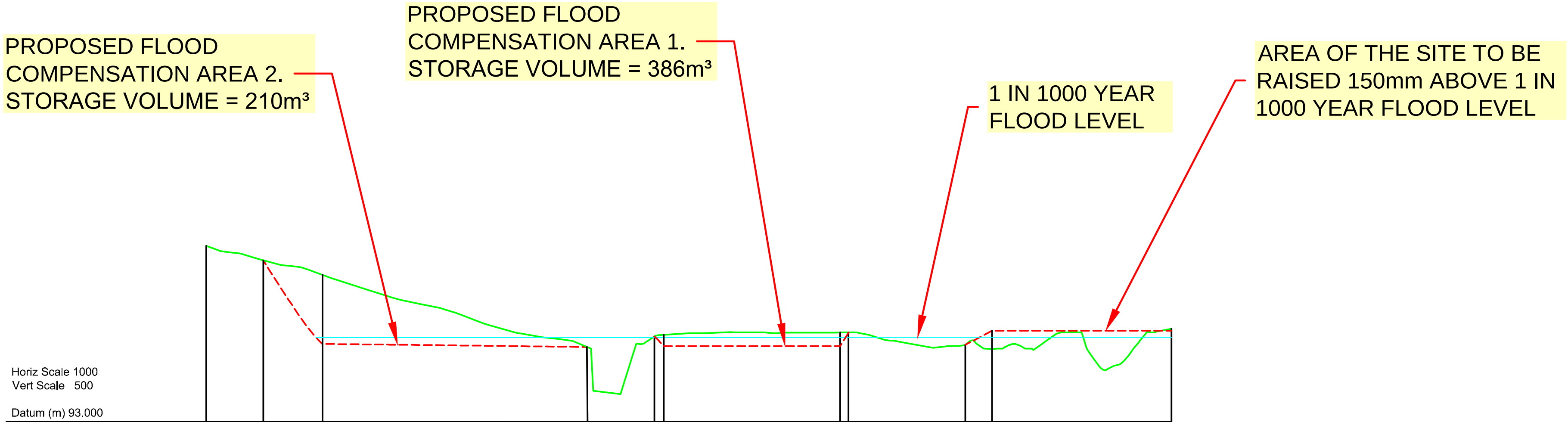
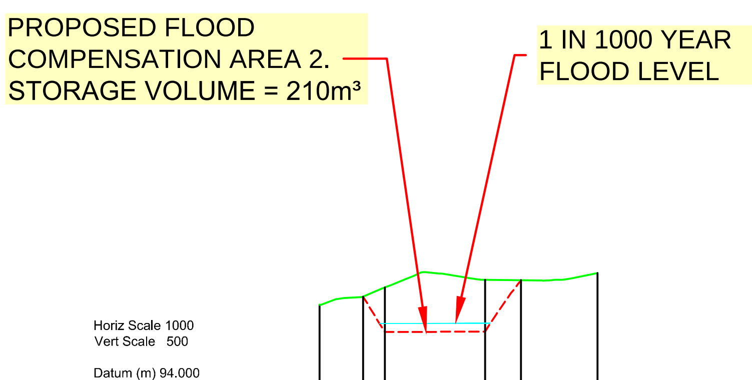


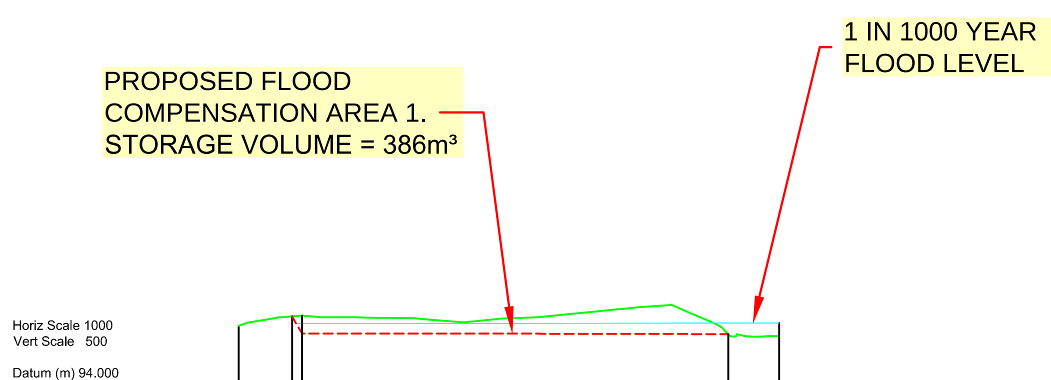
EXISTING GROUND LEVEL (m)	98.411	97.962	97.514	95.300	95.621	95.671	95.748	95.750	95.366	95.242	95.858
PROPOSED GROUND LEVEL (m)	98.411	97.962	95.393	95.300	95.621	95.325	95.746	95.750	95.366	95.797	95.797
CHAINAGE (m)	0.000	8.755	17.867	58.799	68.848	70.283	97.379	98.658	116.596	120.713	148.273

SECTION A-A



EXISTING GROUND LEVEL (m)	96.082	96.298	96.541	96.741	96.730	96.924
PROPOSED GROUND LEVEL (m)	96.082	96.298	95.363	95.371	96.730	96.924
CHAINAGE (m)	0.000	5.746	8.599	21.849	26.629	36.742

SECTION B-B



EXISTING GROUND LEVEL (m)	95.524	95.775	95.798	95.300	95.253
PROPOSED GROUND LEVEL (m)	95.524	95.775	95.325	95.300	95.253
CHAINAGE (m)	0.000	7.079	8.406	64.764	71.507

SECTION C-C

LEGEND

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PROPOSED DEVELOPMENT SITE
WHITESTONE WAY, TALLAGHT, DUBLIN 24

SITE SPECIFIC FLOOD
RISK ASSESSMENT

PROPOSED FLOOD STORAGE
COMPENSATION AREAS
SECTION DETAILS

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