

# **MEATH COUNTY ARCHIVE NAVAN**

# **ENGINEERING SERVICES REPORT FOR**

# **MEATH COUNTY COUNCIL**

**PROJECT NO. 0684** 

**MAY 2022** 

# ENGINEERING SERVICES REPORT

# **MEATH COUNTY ARCHIVE NAVAN**

for

**MEATH COUNTY COUNCIL** 



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# **MEATH COUNTY ARCHIVE NAVAN**

# **ENGINEERING SERVICES REPORT**

# **MAY 2022**

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## **MEATH COUNTY ARCHIVE**

# **ENGINEERING SERVICES REPORT**

**MAY 2022** 

# 1 INTRODUCTION

# 1.1 Overview

O'Connor Sutton Cronin have been appointed as Civil & Structural Engineers as part of the Architect led design team for the proposed restoration and repurposing of the St Patricks Classical School Navan as a Count Archive Building.

# 1.2 Site Location

The site of the proposed development is at Dillonsland, Navan Co. Meath. The site is indicated in Figure 1 below.

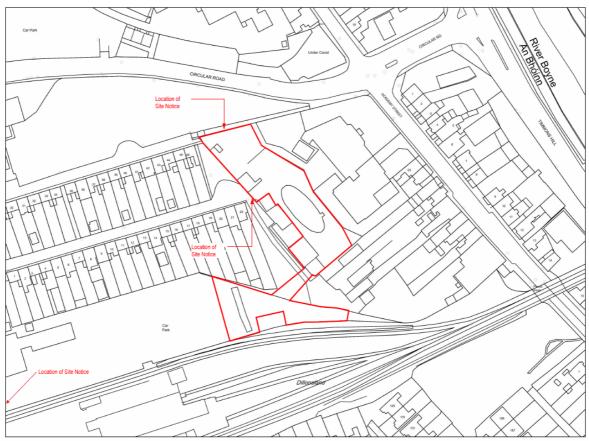


Figure 1-Site Location







# 1.3 Site Overview

The site of the proposed development consists of the original building, outhouses and grounds of St Patricks Classical School, Navan Co. Meath covering a total site areas of approximately 0.265hectares. The structure for St Patricks Classical School dates back to mid 19<sup>th</sup> century and is a protected structure. The structure comprises a seven bay, two-storey building with elliptical shape on plan with inclined buttress walls and timber roof structure. The building has undergone previous alterations with the most significant of these being the conversion to factory use c.1975. In more recent years, the disused building has fallen into disrepair with a partial roof collapse in mid-2021 necessitating the removal of sections of the roof and the provision of temporary bracing to portions of the walls.. Images of the building in its current condition are shown in Figure 2 below.



Figure 2-Current Building Condition

The site for the proposed development is gently falling from a high point of c.41.8m in the south western corner to a general low of c.40 in the north western corner over an approximate length of 100m. There is a more pronounced fall in levels locally in the north-eastern corner of the site. The ground levels rise over a short length to a high of c.43m at the vehicular







entrance to the site off St Finians Terrace. The levels outside of the site fall steeply from St Finians Terrace to the R161-Circular Road to the north of the site with the existing ground levels immediately to the north of the site of c.35m OD. Stepped pedestrian access is provided along the north-western edges of the site linking St Finians Terrace to the R161-Circular Road.

The existing site is indicated in Figure 3 below.

Figure 3-Site Survey

A copy of the topographical survey is included in Appendix A of this report.

The site is bounded to the north by the footpath along the R161-Circular Road, to the east by a car dealership and to the southern edge by small scale industrial units. The western edge to the site consists of a third party property and a public access roadway.





#### 1.4 **Proposed Development**

The works will consist of the following; the restoration / replacement of original natural slate and lead roof to its original profile and the provision of two new replacement roof lanterns; the removal of the modern external cement roughcast render and the provision of a new lime render external finish to match the original finish to the building; the provision of high quality external glazing and doors; the provision of new entrance signage and canopy; the provision of sundry new internal screens and partitions to facilitate the new archive function. The proposed development will include; the restoration of the original 1950's science block for use as a plant room and ground maintenance store; the removal of a number of modern ancillary site structures; the provision of new gates and a new accessible entrance from St Finian's Terrace; the provision of a new public entrance and gate from Circular Road; the provision of high quality public realm and landscaping within the site boundary and the restoration of the existing handball alley. Permission is also sought for temporary construction access from the adjacent Meath County Council car park which is accessed from Railway Street. St Finian's Study Hall, the former St Patrick's Classical School is a Protected Structure.

The proposed development is shown in Figure 4 below.

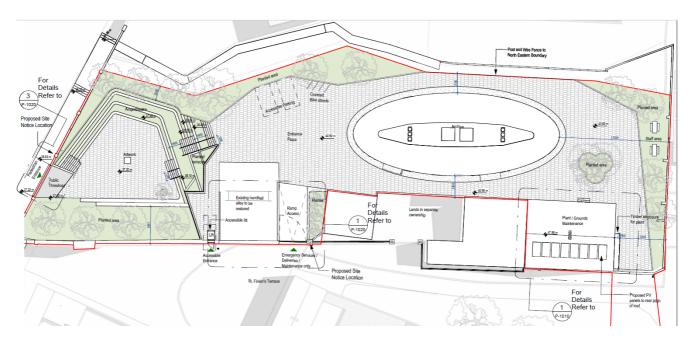


Figure 4-Proposed Development







## 2 SCOPE OF REPORT

This report has been prepared to describe the proposed civil engineering aspects of the development and will form part of the planning application documentation. This report has been prepared by reviewing available data from Local Authority records and national bodies, ie Meath County Council, Irish Water as well as the wider design team and client body. The report addresses

- Storm drainage proposals;
- Foul drainage proposals;
- Potable water supply;
- Traffic & Transportation.

All design and calculations will be in accordance with;

- Local Authority Requirements;
- BS EN 752 Drainage Outside Buildings;
- The Building Regulations Technical Guidance Document Part 'H';
- The Building Regulations Technical Guidance Document Part 'M';
- Recommendations for Site Development works for housing Areas, Dept. of Environment, 1998;
- Greater Dublin Strategic Drainage Study (GDSDS);
- BS EN 12056-2:2000 Gravity drainage systems inside buildings;
- The SuDS Manual (CIRIA C753);
- Irish Water Code of Practice for Water Infrastructure;
- Irish Water Code of Practice for Wastewater Infrastructure;

Other aspects of the site development strategy relating to architectural design, conservation, visual quality and planning compliance are covered by other members of the design team.

This report should be read in conjunction with the following documents also prepared by OCSC:

- Drawing O684-OCSC-XX-XX-DR-S-0500 Proposed Drainage Layout;
- Drawing O684-OCSC-XX-XX-DR-S-0550 Proposed Watermain Layout.







## **3 STORM DRAINAGE**

# 3.1 Existing Drainage Infrastructure

The proposed site is served by existing drainage infrastructure. A review of local authority records has identified both foul and surface water infrastructure in the vicinity of the site. A 600mm diameter foul sewer is located in St Finians Terrace to the west of the site and travels on a northern direction along the western boundary of the site. The storm drainage in area is indicated as a 2000mm diameter trunk main located along the R161 Circular Road.

A copy of the Local Authority record drawings are included in Appendix B of this report with an extract included as Figure 5 below.



Figure 5-Extract of Local Authority Drainage Records

The locations of this drainage infrastructure is shown on the utilities survey included in Appendix C of this report with part reproduced as Figure 6 below.







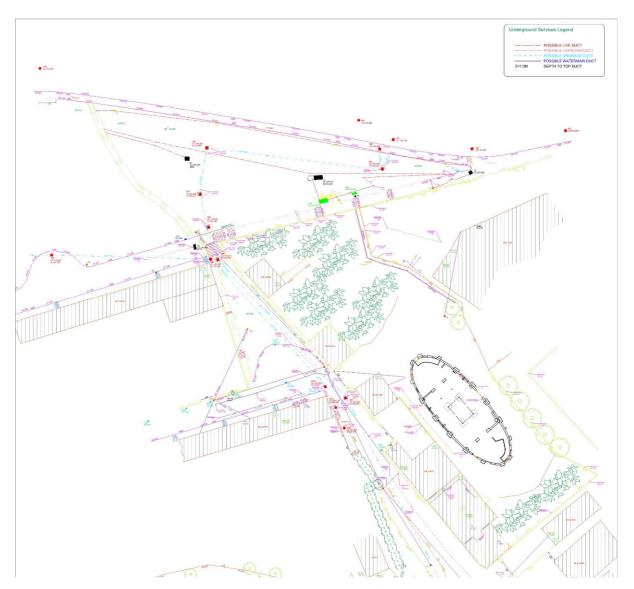


Figure 6-Extract from Utility Survey Drawings

It is noted that there is no current storm drainage connection to the site. The original building design with elliptical shaped roof and overhang, did not allow for rainwater downpipes.

# 3.2 Storm Drainage Proposals

The proposed stormwater drainage for the proposed development consist of a number of different approaches. As there are no existing rainwater downpipes or none proposed in the re-development, a filter drain will be provided to the perimeter of the building. This will encourage infiltration of rainwater run-off from the roof into the existing ground whilst an impermeable geotextile membrane will be provided on the building side of the drain to prevent







undermining of the building. A perforated pipe wrapped in a geotextile membrane is proposed to be provided to connect this filter drain into the local drainage network and thus allow for a positive drainage connection in the event of a heavy rainfall event.

The vast majority of the site surrounding the building is proposed to be left as soft landscaping or to have a permeable paving surfacing. Thus, no formal drainage to the upper/southern portion of the site. Rainwater run-off from the existing handball alley and from the entrance area will be gathered with any excess from the filter drain and passed through a silt trap before travelling to the northern portion of the site. A backdrop manhole will be required due to the drop in levels in this area.

The proposed layouts for the northern portion of the site involve a regrading and re-landscaping to provide connectivity along the northern edge of the site. This will generally involve a mixture of soft landscaping and permeable paving but elements of stepped access and paths will be provided. Thus, it is proposed that run-off from this portion of the site will be gathered in an oversized pipe and oversized manhole chambers before joining with the remainder of draiange from the site and discharging to the public drainage system to the north of the site. Discharge will be limited to 2l/s for the northern portion of the site via a hydrobrake.

The total site area is c.2,650m<sup>2</sup>. However, the majority of this site will consist of soft landscaping or permeable paving. Other portions of the site consist of existing hardstanding areas which are being drained to infiltration areas in the first instance. Thus, the attenuation requirement for the proposed development has been assessed based on the relandscaped area to the northern portion of the site. This consists of an area of 365m<sup>2</sup> as indicated in Figure 7 over.

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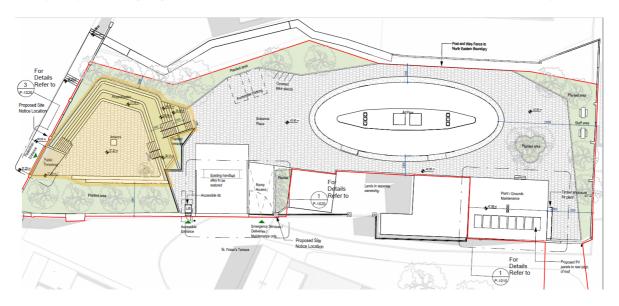


Figure 7-Contributing area considered for Attenuation

The proposed attenuation requirement has been assessed at 7m<sup>3</sup> for the proposed development, with the calculations included in Appendix D of this report.

The proposed storm drainage layout is shown on OCSC drawing O684-OCSC-XX-XX-DR-S-0500 with part shown in Figure 8 below and included as Appendix E of this report.

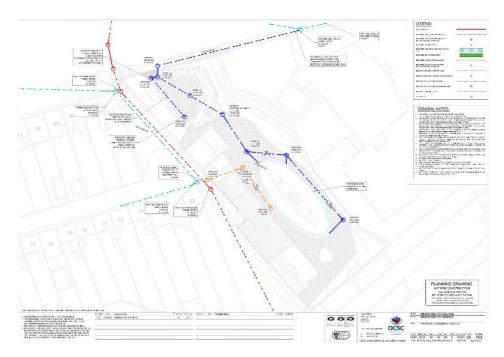


Figure 8-Proposed Drainage Layouts

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# 3.3 Proposed Specific SuDS Measures

It is proposed to provide a Sustainable Urban Drainage System (SuDS) in accordance with the Greater Dublin Strategic Drainage Study Regional Drainage Policy Volume 2 - New Development (GDSDS-RDP Volume 2). Specific design requirements for SuDS components are established by the Construction Industry Research and Information Association's publication CIRIA C753-SuDS Manual (C753).

- <u>Attenuation Storage</u>-is provided for the new portions of hard standing within the development
- <u>Permeable paving</u> is proposed to all non soft landscaped areas.

## 3.4 Flood Risk Assessment

A Flood Risk Assessment is the identification, quantification and communication of flood risk using the source-pathway-receptor model. It examines the source of flooding and the pathways by which floodwaters might reach receptors, such as people, property and environment to determine the likelihood of them being affected by flooding. It also examines the flood hazards that are likely to arise and the vulnerability of receptors to such hazards. The principles of the source pathway receptor model are outlined in Figure 9 below.

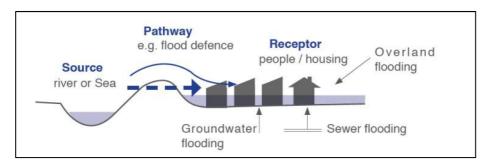


Figure 9-Source-Pathway-Receptor Model

#### 3.4.1 Level of Service

The risk of a flood event is a function of the probability of occurrence in any given year. Traditionally, this has been expressed as a return period (e.g 1-in 100-year return period). However, this has led to misconceptions about the likelihood of repeat occurrences. A less ambiguous expression of probability is the Annual exceedance Probability (AEP), which may be defined







as the probability of a flood event being exceeded in any given year. A 1-in-100-year return period flood event is therefore expressed as a 1% AEP flood event. Likewise, a 1-in-100 return year period flood event is expressed as a 100% AEP flood event.

The Greater Dublin Strategic Drainage Study (published by the Local Authorities in the greater Dublin Region) and The Planning System and Flood Risk Management, Guidelines for Planning Authorities set out the best practice standards for flood risk in Ireland. These are summarised in Table 1 over.

Use	Flood Source					
	Drainage	River	Tidal/Coastal			
Residential	1% AEP	0.1% AEP	0.1% AEP			
Commercial	1% AEP	1% AEP	0.5% AEP			
Water-	-	>1% AEP	>0.5%AEP			
compatible						

Table 1-Summary of Level of Service-Flooding Source

Both the Greater Dublin Strategic Drainage Study and The Planning System and Flood Risk Management, Guidelines for Planning Authorities require that account be taken of the effects of climate change over the design life of a development, normally 100 years. Flood risk will therefore change over the lifetime of a development. The Flood Risk Assessment therefore considers "present day" flood risk and "future" flood risk.

The proposed development would be classed as Commercial Development and thus requires the level of service to be 1% AEP for drainage, 1% AEP for river flooding and 0.5% AEP for tidal/coastal flooding.

## 3.4.2 Flood Risk & Mitigation Measures

# Fluvial Flooding

A review of the OPW portals Floodinfo.ie and Floodmaps.ie have been undertaken in reviewing the risk of fluvial flooding at the site of the proposed







development. The site is located in close proximity to the River Boyne and thus is within the extent of mapping from the CFRAMS study for the River Boyne. There is no record of flooding at the site and a review of mapping shows the site of the proposed development to be outside of the 1% AEP for fluvial flooding. Please refer to Figure 10 over with floodmaps included as Appendix . Thus, it is considered that the risk of fluvial flooding is low.



Figure 10-Extract from Floodinfo.ie

# **Tidal/Coastal Flooding**

The site is located approximately 30km from the sea. A review of the mapping on Floodinfo.ie has shown that the coastal flood events are remote from the site. Thus, it is considered that the risk of tidal/coastal flooding is low.

## **Pluvial Flooding**

A review of the OPW website Floodinfo.ie and Floodmaps.ie does not show any records of flood events in the vicinity of the site. In addition, the location of the site at a height from the ground to the north and east of the site, mitigates against the risk of pluvial flooding. Thus, it is considered that the risk of pluvial flooding is low.







# **Groundwater Flooding**

There is no basement structure proposed as part of the development. The proposed ground floor level is at or above the existing at grade level on the site. Thus, it is considered that the risk of groundwater flooding is low.





## **4 FOUL WATER DRAINAGE**

## 4.1 Overview

The existing drainage infrastructure in the vicinity of the site is discussed in Section 3.1 of this report. Of greatest significance from a foul drainage perspective is the existing 600mm diameter foul sewer to the west of the development.

# 4.2 Proposed Foul Drainage Layout

The foul drainage from the proposed development will be gathered from popup connections in a 150mm diameter sewer. This dedicated foul sewer will discharge to the existing 600mm diameter foul sewer travelling to the west of the site.

The proposed foul drainage layout is shown on OCSC drawing O684-OCSC-XX-XX-DR-S-0500 included as Appendix E of this report.

### 4.3 Foul Flow Calculations

An assessment has been undertaken on the proposed foul flow once the development has been completed. A conservative allowance of 10 persons has been included to account for staff and visitors within the Archive section of the development. Details of same are included in Table 2 below. It is noted that the foul flow rates have been based on the rates set out in Irish Water Code of Practice for Wastewater (Appendix C).

	Occupancy	Rate (I/day/person)	Total (I/day)	1DWF (l/s)	6DWF (I/s)
Proposed	10	50	500	0.006	0.036

Table 2- Foul Flow







## 5 POTABLE WATER SUPPLY

## 5.1 Overview

The site is well served by existing mains water infrastructure. Existing local authority records identify a 75mm diameter mains on St Finians Terrace-please refer to Figure 4 and Appendix B.

# **5.2 Watermain Proposals**

It is proposed that a new connection be provided to the development via the public main on St Finians Terrace.

The proposed watermain layout is shown on OCSC drawing O684-OCSC-XX-XX-DR-S-0550 shown as Figure 11 below and included in Appendix G of this report.

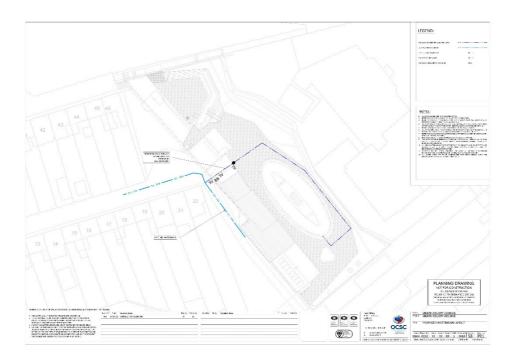


Figure 11-Proposed Watermain Layout

## **5.3** Water Demand

An assessment on the proposed water demand of the development on the local network has been undertaken. It is noted that the water demand rates have







been based on the rates as referenced in Irish Waster Code of Practice for Wastewater Infrastructure (Appendix C) to match foul flow daily rates.

	Occupancy	Rate (I/day/person)	Total (I/day)	Average (I/s)	Peak (I/s)
Proposed	10	50	500	0.006	0.0375

Table 3- Water Demand

In Cula

# **5.4 Water Saving Devices**

In accordance with best practice, new water saving devices (low water usage appliances and aerated taps etc.) will be fitted into the proposed new buildings on site.

IAN CREHAN BE, CEng, MIEI, MIStructE, RConsEI

OCSC MULTIDISCIPLINARY CONSULTING ENGINEERS

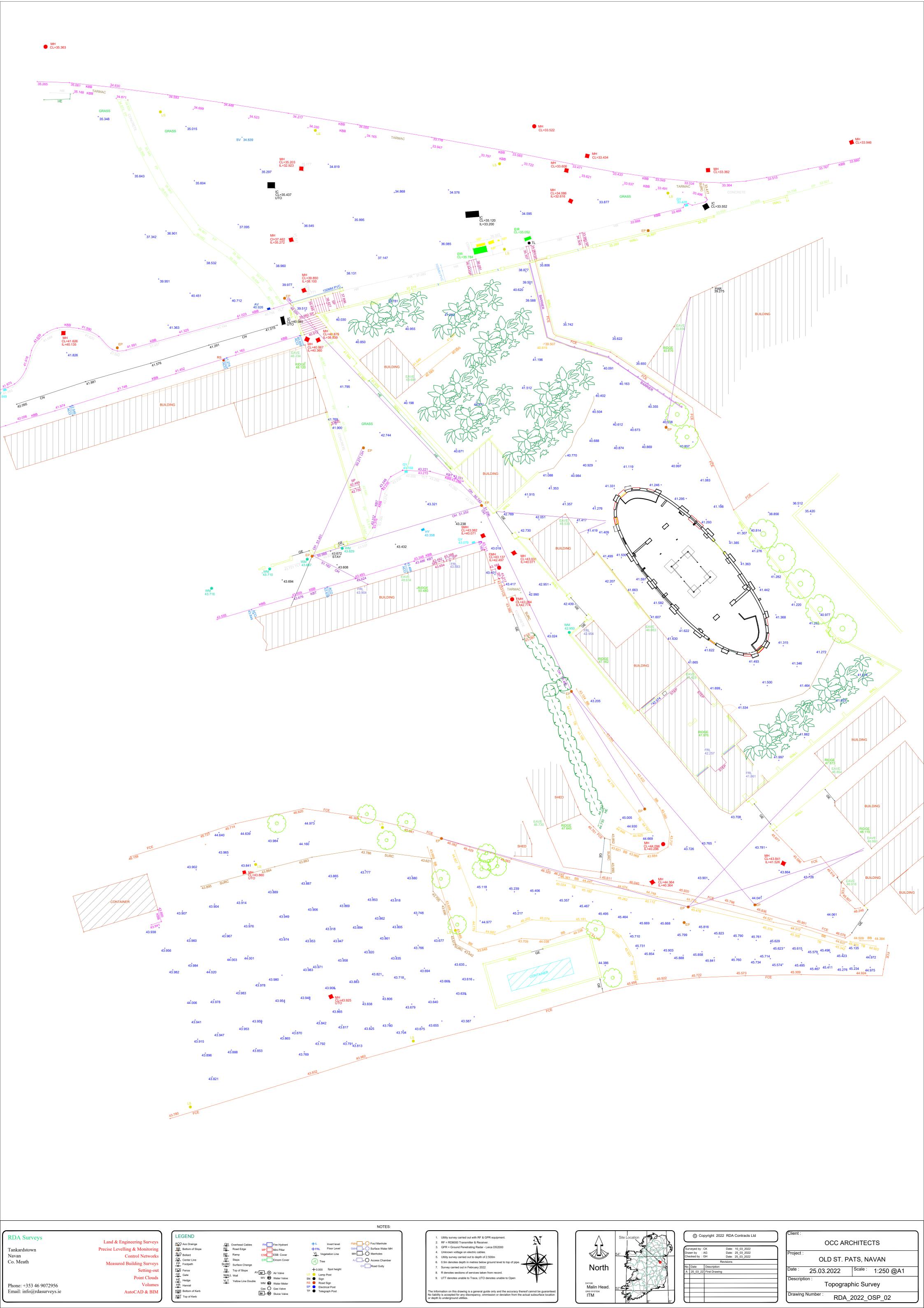
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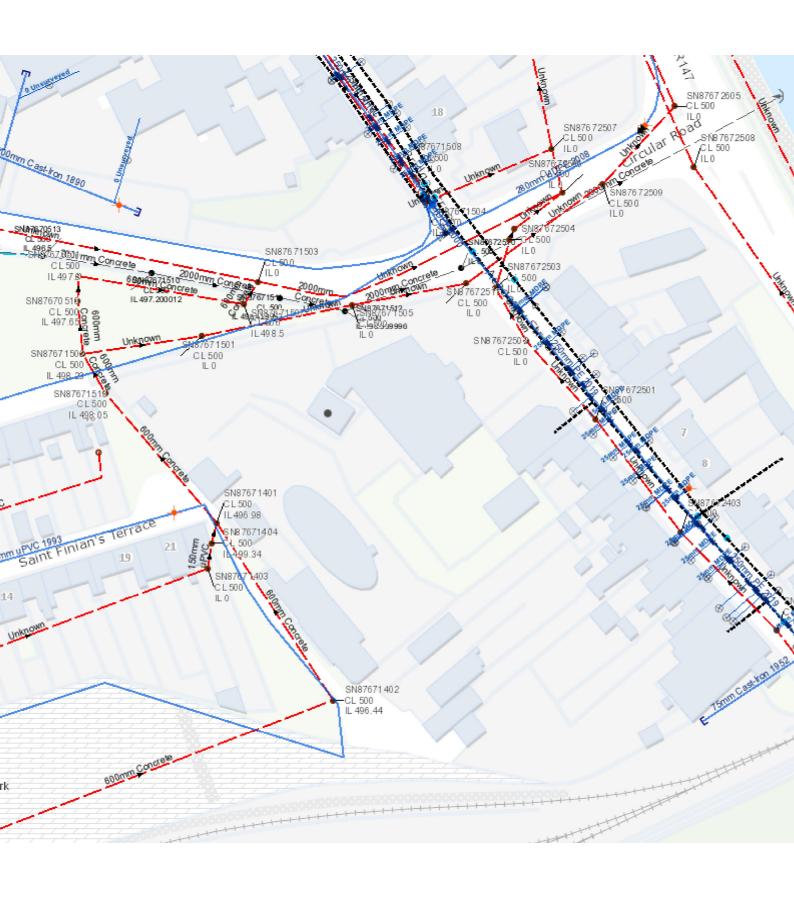


APPENDIX A. TOPOGRAPHICAL SURVEY



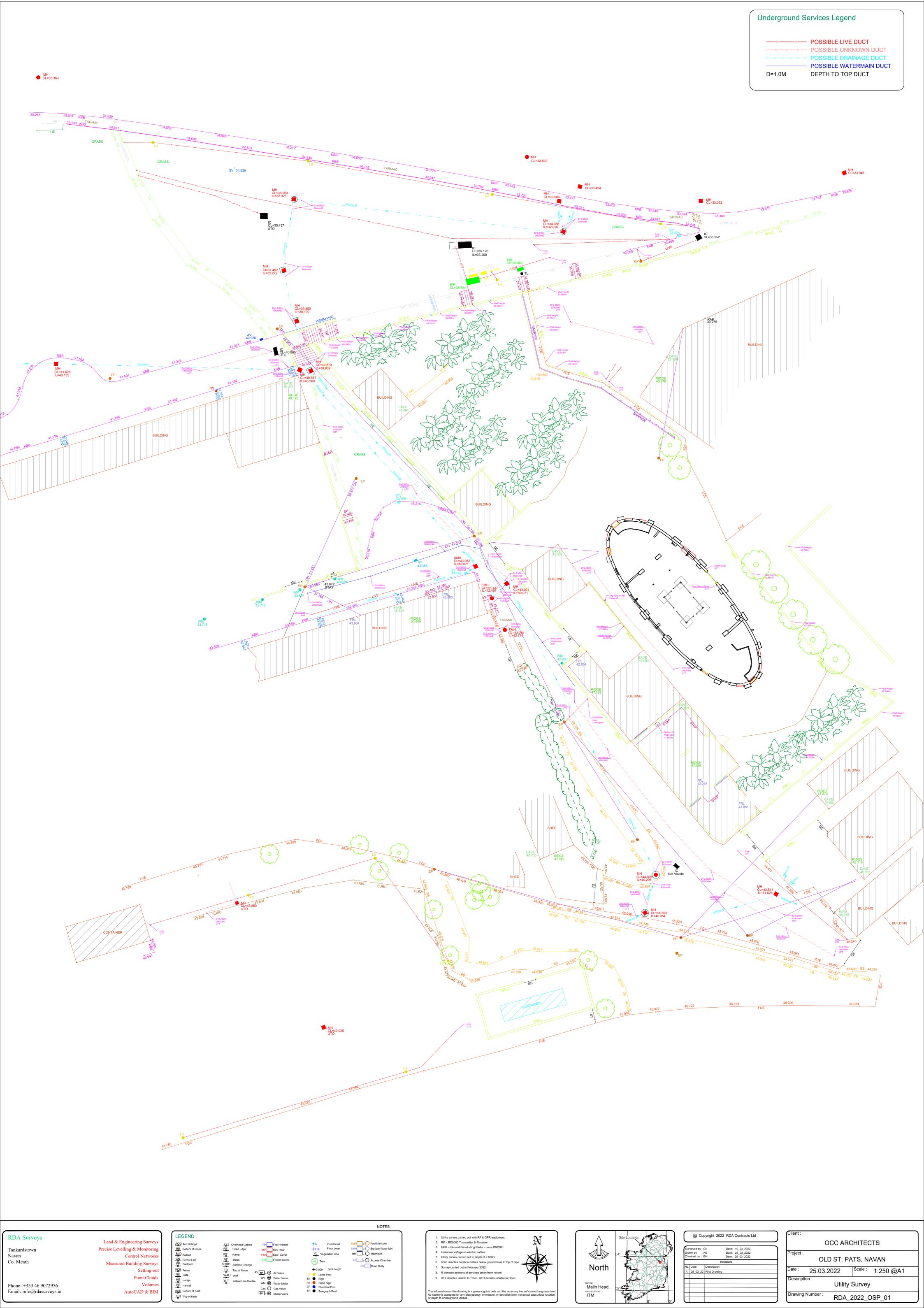


# **APPENDIX B. LOCAL AUTHORITY RECORDS**





**APPENDIX C. UTILITY SURVEY** 





# **APPENDIX D. ATTENUATION CALCULATIONS**

**Project:** Meath County Archive

Project No.: O684

**Calculation:** Attenuation 100-year

Calcs By: IC Checked By: IC

**Date:** 30/04/2022





Site Location:	Navan		
Design Storm Return Period:	100 years		
Climate Change Factor:	20 %		
Soil Type:	4		
Total Site Area:	0.27 ha		
Roof Area	0.06 ha	@	0% Existing
Existing hardstanding	0.03	@	0% Existing
Lower Portion of site	0.04	@	100% New
Hardstand Area (Permeable Paving):	0.12 ha	@	0% Impervious
Softstand Area:	0.08 ha	@	0% Impervious
Effective Impermeable Area:	0.04 ha		

Allowable Outflow	Specify	
Specified Allowable Outflow	2 l/s/ha	
Allowable Outflow	2.0 l/s	

Storage required =	7 m <sup>3</sup>	
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Duration	Rainfall 100-Year	Rainfall 100- Year with CCF	Intensity	Discharge (Q = 2.71iA)	Proposed Runoff	Contiguous Land Runoff	Total Runoff	Allowable Outflow	Storage Required
(min)	(mm)	(mm)	(mm/hr)	(I/s)	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )	(m <sup>3</sup> )	(m³)
2	0.0	0.0	0.0	0	0	0	0	0	0
5	12.8	15.4	184.3	18	5	0	5	1	5
10	17.8	21.4	128.2	13	8	0	8	1	6
15	20.9	25.1	100.3	10	9	0	9	2	7
30	25.9	31.1	62.2	6	11	0	11	4	7
60	32.0	38.4	38.4	4	14	0	14	7	6
120	39.6	47.5	23.8	2	17	0	17	14	3
180	44.8	53.8	17.9	2	19	0	19	22	-2
240	48.9	58.7	14.7	1	21	0	21	29	-8
360	55.4	66.5	11.1	1	24	0	24	43	-20
540	62.7	75.2	8.4	1	27	0	27	65	-38
720	68.5	82.2	6.9	1	29	0	29	86	-57
1080	77.5	93.0	5.2	1	33	0	33	130	-96
1440	84.6	101.5	4.2	0	36	0	36	173	-137
2880	96.1	115.3	2.4	0	41	0	41	346	-305
4320	106.5	127.8	1.8	0	46	0	46	518	-473
5760	116.2	139.4	1.5	0	50	0	50	691	-642
8640	133.7	160.4	1.1	0	57	0	57	1037	-980
11520	149.7	179.6	0.9	0	64	0	64	1382	-1318
14400	164.6	197.5	0.8	0	70	0	70	1728	-1658
17280	178.7	214.4	0.7	0	76	0	76	2074	-1997
23040	205.4	246.5	0.6	0	88	0	88	2765	-2677
28800	230.6	276.7	0.6	0	99	0	99	3456	-3357
36000	260.5	312.6	0.5	0	111	0	111	4320	-4209

**Project:** Meath County Archive

Project No.: O684

**Calculation:** Attenuation 100-year

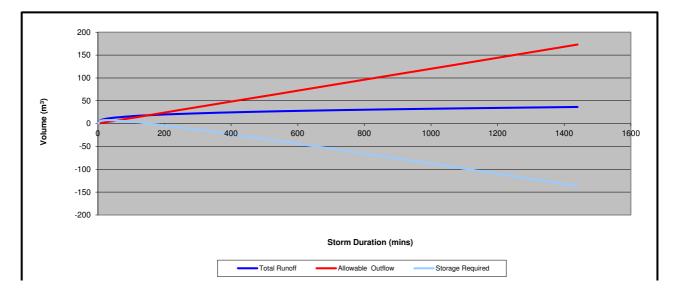
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**Date:** 30/04/2022



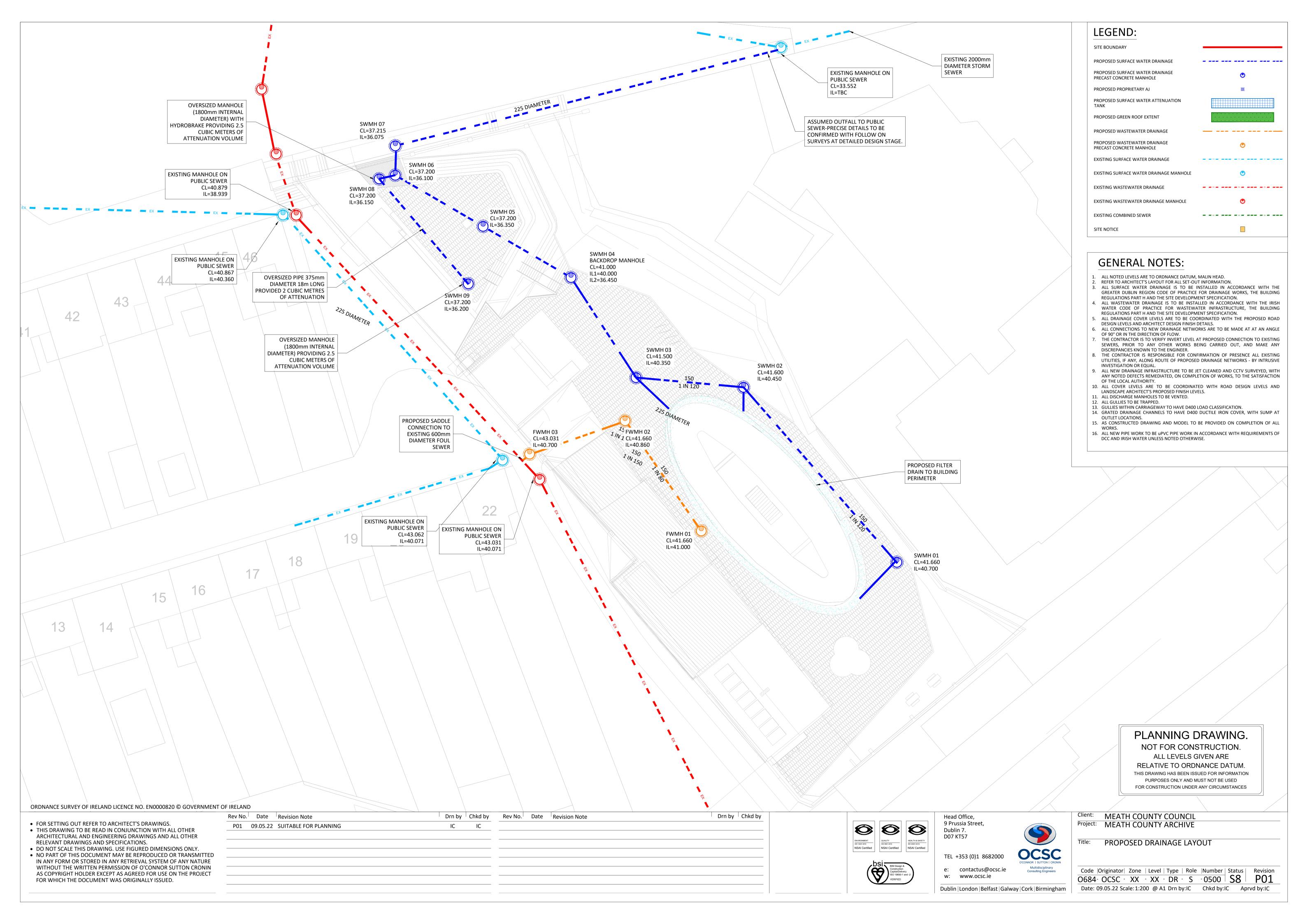






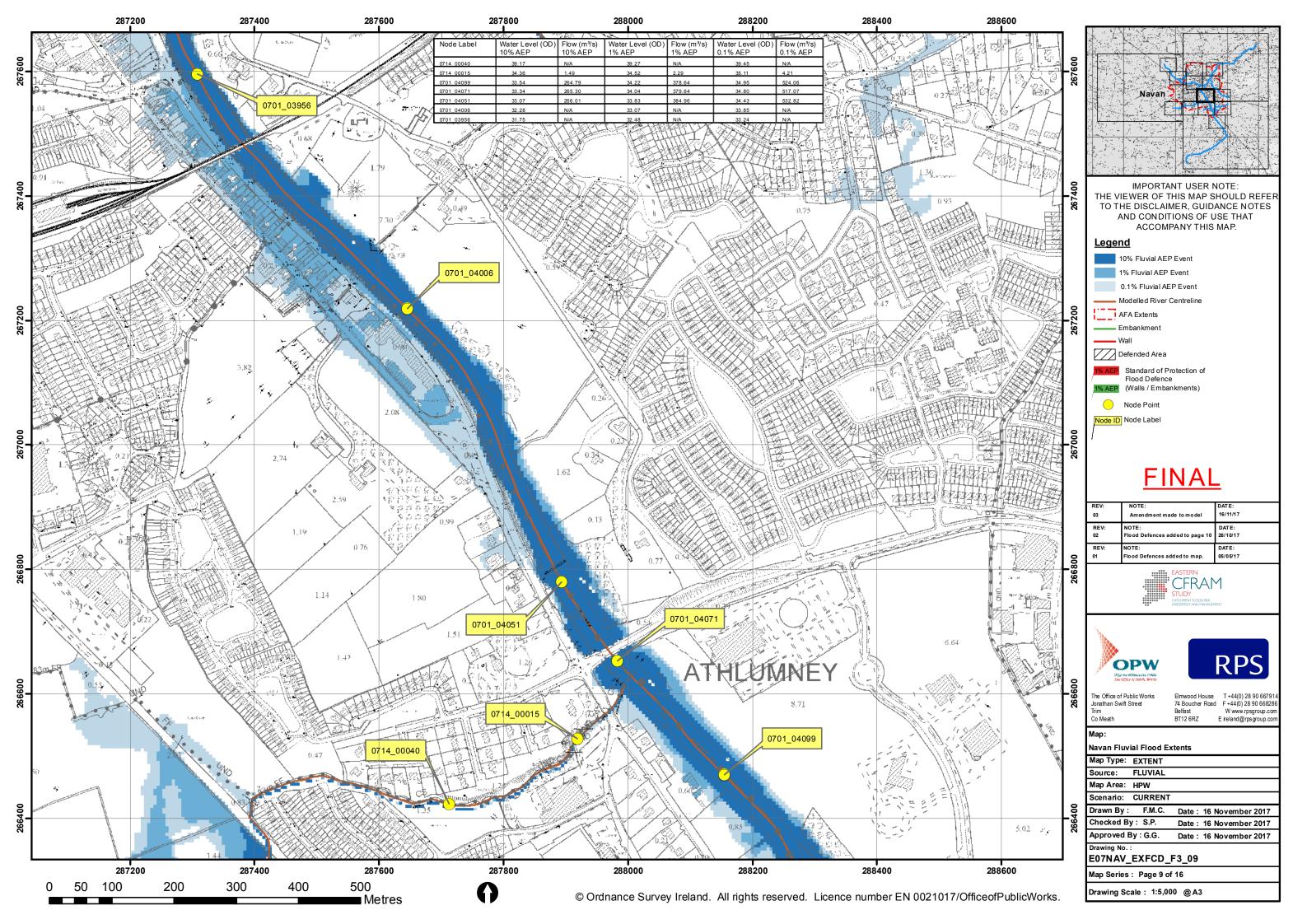


# APPENDIX E. PROPOSED DRAINAGE LAYOUT





# APPENDIX F. EXTRACT FROM FLOODMAPS





# APPENDIX G. PROPOSED WATERMAIN LAYOUT

