Malachy Walsh and Partners

Engineering and Environmental Consultants Cork | Tralee | Limerick | London

Water and Sewage

Design Report

For

Pollahoney 110kV GIS Substation & MV Control Building

at

Arklow, Co. Wicklow

For H&MV Engineering Ltd

On behalf of Crag Digital Avoca Ltd.

Project No.: Document No.: Date: 21697 6003-C January 2021

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Project No.	Doc. No.	Rev.	Date	Prepared By	Checked By	Approved By	Status
21697	6003	A	20/10/20	G McNamara	J O Leary Brian Sayers	J O Leary	Information
21697	6003	В	11/12/20	G McNamara	Brian Sayers	Brian Sayers	Information
21697	6003	С	18/01/21	G McNamara	Brian Sayers	Brian Sayers	Information

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1 Introduction

Malachy Walsh and Partners (MWP) were commissioned by H&MV Engineering Ltd on behalf of Crag Digital Avoca Ltd to act as Civil and Structural Engineering design consultants for a proposed 110kV GIS Substation and MV Control Building in the Avoca River Park Industrial Estate, Co. Wicklow. This report outlines the engineering design philosophy employed for the proposed storm and foul water sewer systems serving the development.

The philosophy was prepared taking cognisance of the following documents:

- Wicklow County Council Development Plan (2016 2022)
- Greater Dublin Strategic Drainage Study (GDSDS)
- IS EN 752
- Sewers for Adoption 6th Edition
- IS EN 858-2 Separator System for Light Liquids (e.g., oil and petrol)
- Irish Water Code of Practice for Wastewater Infrastructure
- Irish Water Code of Practice for Water Infrastructure

2 Site Location

The site is located within a brownfield site in the townland of Arklow in Co Wicklow. The landholding comprises of a brownfield site with derelict buildings as can be seen in Figure 2-1. The site of the proposed development comprises approximately 1.69 hectares and is located near the Avoca River. It is proposed to demolish the existing building onsite as part of the enabling works for this project. The total ground floor area of structures to be demolished is 2992m².

The site is bound to the north by a local access road which serves Avoca River Park. To the south and to the west the site is bound by Holfeld Plastics Limited. To the east the site is bound by the wider landholding that currently incorporate Harmony Timber and Stunt Drive Ireland which will cease operation and relocate prior to commencement of the facility.



Figure 2-1: Aerial Image of Site (Google Earth)



3 Foul Water

The proposed substation will be served by a single 150mm diameter foul sewer which will discharge into a storage tank on site. The storage tank is to be designed for 5 maintenance personnel being present on site 6-8 times per month with the system emptied approximately twice per annum.

3.1 Sewer System

The flow rate assumed for the design is what is advised for an industrial office/factory type setting without a canteen given the nature and usage which is advised as being which is 50l/person/day within Irish Water's Code of Practice. This equates to 250l/day for the substation. As a result, the peak flow will be below 2.5l/s. Therefore, the drains are proposed to be laid at the minimum recommended gradient of 1 in 60 as per Table 6 of TGD Part H.

3.2 Holding Tank System

The volume of effluent that would be generated by the flow rates is estimated to be $2.0m^3$ /month which equates to $12m^3$ every six months. The proposed volume of the holding tank is 15m3 which has spare capacity of $3m^3$.

Emptying times of the holding tank may vary depending on usage on the site but should be emptied every 6 months at a minimum. An alarm should be fitted to the tank to advise the maintenance management that the system is close to capacity. This is so that the system can be emptied to prevent the risk of it overflowing and causing an environmental impact on the local environment. A vent pipe is proposed to serve the tank to reduce the risk of odour nuisance on the site due to the tanks.

4 Storm Water

The existing developments within the Avoca River Park attenuate stormwater on site by means of drainage channels and attenuation ponds before discharging to the local River Avoca. It is proposed to construct a new surface water drainage network to intercept, attenuate and discharge surface water generated by the proposed development on our site. The system will consist of a piped network, underground attenuation system, petrol interceptor and a hydrobrake. The hydrobrake will limit the rate of discharge from the site to a suitable outflow rate.

The outflow rate will be calculated using the IH124 method developed by the UK Institute of Hydrology with further guidance adopted from the Greater Dublin Strategic Drainage Study (GDSDS). For small sites it is deemed appropriate to use a single outflow rate rather than separate control rates. The GDSDS suggests the following:

- The discharge from all rainfall events up to 1-year return period should be throttled to the mean annual peak flow of 2.5 l/s (Qbar)
- while all rainfall events between 1-year and 30-year return period should be throttled to the factored 30-year peak flow of 5.3 l/s (30-year growth factor of 2.1) Drainage
- and all rainfall events between 30-year and 100-year return period should be throttled to the factored 100-year peak flow of 6.6 l/s (100-year growth factor of 2.6)

In accordance with current good design practice and guidance the surface water runoff from the proposed development will be limited to a pre-development greenfield rate. The total site area is 1.69 Ha. The uksuds.com website shows the calculated Qbar flow rate for the site based on the Institute of Hydrology Report 124 (IH124) method.



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Runoff estimation app	IH124				
Site characteristics					
Total site area (ha):	1.69				
Methodology					
Q _{BAR} estimation method:	Q _{BAR} estimation method: Calculate fro				
SPR estimation method:	SPR estimation method: Calculate fro				
Soil characteristics	Default	Edited			
SOIL type:		4	3		
HOST class:	N/A	N/A			
SPR/SPRHOST:	0.47	0.37			
Hydrological characte	Default	Edited			
SAAR (mm):	1074	1074			
Hydrological region:		12	12		
Growth curve factor 1 year:		0.85	0.85		
Growth curve factor 30 year	rs:	2.13	2.13		
Growth curve factor 100 yes	ars:	2.61	2.61		
Growth curve factor 200 yes	2.86	2.86			
Greenfield runoff rates Default Edited					
Q _{BAR} (I/s):	13.46	8.01			
1 in 1 year (l/s):	11.44	6.81			
1 in 30 years (l/s):	28.68	17.06			
1 in 100 year (l/s):	35.14	20.91			
1 in 200 years (l/s):		29.51	22.01		

Figure 2: IH124 Method from uksuds website

The default SOIL type for the site is categorised as type 4 form the UKSuDS online tool. This is deemed to be unusually high and would lead to a high discharge rate for the site. A SOIL type of 3 is more appropriate and this will incorporate a more conservative design. The discharge rate will be limited to Q_{BAR} 8.01 l/s equating to 4.74 l/s/ha which coincides with the guidance of limiting the runoff to the pre-development greenfield runoff rate. Controlled discharge to the Avoca River will be via a pumping system. Separate attenuation systems are proposed for the MV Control Building and GIS Substation Building as these will be operated and maintained by separate entities in the future scenario. A hydrobrake will be installed at the outlet of each respected attenuation tank. The discharged flow rate will combine at a pumping station, located on common grounds, near the site entrance. It is proposed to install approximately 250m of rising main to pump storm water to a discharge manhole and subsequently discharge via a class 1 hydrocarbon interceptor to capture any potential hydrocarbon contamination prior to discharge into the attenuation system and the Avoca River. This is in accordance with the requirements of Wicklow CC Water Objective

The storm drainage proposals will incorporate the following elements:

- Pipes are designed to reach maintain self cleansing velocity in the one in 5-year event.
- Sewers not surcharging in the 5-year event with 10% Climate Change in line with what is advised for industrial areas within IS EN 752.
- Sewers not flooding in the 100-year event with 10% Climate Change.
- Trapped road gullies pots are proposed in line with PPG by the Environment Agency in the UK. Manholes immediately upstream and downstream of the soakaway are to have a sump also.



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• A sub-surface infiltration system designed for full storage of a 1 in 100-year storm plus climate change.

Details of the storm drainage proposals are included on the drawing showing the proposed site services in Appendix A.

5 Water Supply

It is proposed to install a rainwater harvesting unit to supply non-potable water that is suitable for flushing toilets and washing hands. The rainwater harvesting unit is to be Molloy Environmental Systems H+ Tank or similarly approved. The tank is to supply a minimum volume of 3500 litres capacity catering for 5 users (reserve supply for 10 days for 5 people). The system is to be installed in accordance with the manufacturer's requirements and is to be fitted with a UV bulb, pressure vessel with and an overflow to the storm network. Signage will be incorporated in the relevant areas to highlight the water is non-potable. It is anticipated that if potable water is needed this will be supplied in bottle form. See Appendix B attached which includes specifications drawings for the proposed rainwater harvesting unit.



Appendix A

Proposed Storm, Foul and Watermain Layout





DO N V	OT SCALE ERIFY DIN THIS DRA	E FROM THIS MENSIONS C AWING TO B	S DRAWING. USE FIGL ON SITE AND REPORT DESIGNERS IMMEDIA E READ IN CONJUNCT SPECIFICATION	JRED DIMENSIONS ANY DISCREPANC ATELY. FION WITH THE DE I.	SIN ALL CASES. SIES TO THE SIGNERS		
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LEG	END:		APPLICATION	SITE			
_			LANDS IN THE APPLICANT/LA	LANDS IN THE CONTROL OF THE APPLICANT/LANDOWNER			
_			UNDERGROUN	UNDERGROUND DUCTS UNDERGROUND DUCTS (RURAL SUPPLY) BOUNDARY POST & RAIL FENCE (1.2M)			
_			UNDERGROUN				
-(BOUNDARY P				
—(0	O	COMPOUND P	COMPOUND PALISADE FENCE (2.6M)			
			ESB UNIT SUB	ESB UNIT SUBSTATION			
			COMPOUND S	STONE			
			INTERNAL CO		NAY		
			INTERNAL CO	MPOUND PATHV	VAY		
			TRANSFORME	ER & EQUIPMEN	T PLINTHS		
			EXISTING ACC	CESS ROAD/TRA	ск		
			EXISTING FOO	OTPATH			
			REALIGNED A	REALIGNED ACCESS ROAD			
			GREEN AREA	GREEN AREA			
			PROPOSED/EX	PROPOSED/EXISTING LEVELS FOUL WATER PIPE STORM WATER PIPE			
			FOUL WATER				
			STORM WATE				
			STORM WATE (TO RAINWATI HARVESTING	(TO RAINWATER HARVESTING TANK)			
			FOUL WATER	FOUL WATER AJ			
		мн	FOUL WATER	FOUL WATER MANHOLE			
1		A.J.	STORM WATE	STORM WATER AJ			
	—(мн	STORM WATE	STORM WATER MANHOLE			
•			WATER SUPP (FROM RAINW HARVESTING	WATER SUPPLY (FROM RAINWATER HARVESTING TANK)			
			ROAD GULLY				
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DATE: OCT '20 SCALE @ A1: 1:250							
PROJECT 21697 DRAWING STATUS: S2							
DRAWING NUMBER: 21697-MWP-SS-00-DR-C-0011 P04							



Appendix B

Rainwater Harvesting Unit Specifications





A good firm, rock free, level base is required.



Clara Road, Tullamore, Co. Offaly, Ireland Tel: 057 9326000 info@molloyprecast.com Fax: 057 9326060 www.molloyprecast.com Note: Observe all safety regulations in regard to excavation and lifting requirements. Never leave opening uncovered or unattended at any time. Note: Specify any specific requirements prior to ordering. All civil works by customer.

Note: Do not scale from this drawing. Only for illustration purposes.

Tank Type: H+ Tank	Title: Rainwater Harvesting H+ Tank		
Tank Size: 2044mm x 1770mm	Reserve Supply: 10 days for 5 people		
Height: 2250mm	Date: July 2017		
Volume: 3500 liters	Drg. No.: RWH-H+-02		
Weight: 1500kg	Drawn By: KR		
(Tank Dim: ± 20 mm. Weight: ± 30 Kg.)	This drawing is ©. All rights reserved.		

