PHM Consulting
Civil - Structural - Environmental

Social Housing Development

Masseytown, Macroom, Co. Cork

SERVICES REPORT

December 2022

Social Housing Development
Masseytown, Macroom, Co. Cork

Services Report

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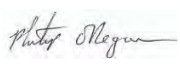
13/12/2022	First	Planning	P. O'Regan		

CLIENT:
Cork County Council
County Hall
Carrigrohane Road
Cork

CONSULTANT:
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11 Mallow Street,
Limerick.

Contents

1.0 INTRODUCTION

PHM Consulting have been engaged by Cork County Council (applicant) to provide engineering design solutions for a proposed residential development on lands at Masseytown, Macroom, Co. Cork which is to be the site of a planning application. Engineering design services to cover Roads, Foul Drainage and disposal, Surface water collection and disposal, and Water supply connection to public mains and internal network.

The planning application is for the construction of a new housing development consisting of:

18 No. Residential Units plus 1 no. Acquired Brian Injury Ireland (ABII) 5-bed communal dwelling consisting of:

4 No. 1 bed, 2 person single storey units.

4 No. 2 bed, 4 person single storey units.

6 No. 2 bed, 4 person two storey units.

4 No. 1 bed, 2 person own door apartments

1 No. ABII, 5-bed communal dwelling

2 No. paved homezone areas, a total of 41 No. car parking spaces including visitor parking and designated parking. Ducting to 1 No. future EV charging point for each residential unit, and 4 No. visitor spaces. Soft landscaping including green spaces, planting, and tress. Connection to public utilities. All associated site works.

Access to the proposed development will be via two new junctions off the existing internal eatate roads off the Meadowlands Estate, connection to existing public water supply; foul water drainage network, surface water drainage network.

The site is located at ITM E533593151354, N573483. Existing ground levels range from 76.0m to 82.00m above ordnance datum (AOD) Malin.

This report outlines the provision of services for a proposed housing development as described above.

This site is currently Greenfield and zoned for the purpose intended. The site was previously granted permission for the development of housing and existing services were provided with the intent of connection of the subject lands. The application site comprises an overall area of approximately 0.809 Hectares (2.0 Acres).

2.0 TOPOGRAPHY

An electronic topographical survey of the site has been carried out for the purpose of the preparation of the design of the roads and infrastructure of this proposed development. All surveyed information has been tied into National Grid Reference system and Ordnance Survey Malin.

The general topography can be viewed on Drg 109-79-110 with the lands falling from a high point located to the north of the site and falling in a southern direction to the existing estate road.

The lands are currently undeveloped. The site is bounded to the north by Fairfield Drive Estate, to the south by the Meadowlands Estate, to the east by existing properties and to the west by open agricultural lands.

There is no history of flooding of these lands. A review of available hydrometric data from the OPW has been undertaken. Located to the south of the site a distance of 400m is Macroom Town Bridge. A Hydrometric Station (19101) is located adjacent. The highest recorded Annual Maximum Flood Level is provided which occurred in 2020 to a level of 68.065m AOD.

A record of flooding from August 1986 of the River Sullane (20120309 – Updated in Sept 2022) indicates an upstream of bridge flood level of 70.06m AOD.

As previously stated the lowest level within the application site is 76.00m AOD – well in excess of any possible flood event from the River Sullane.

3.0 ROADS

3.1 General

The proposed road layout for the development is shown on Drawings No. 109-72-111 & 112 Series.

The proposed development comprises of two separate elements creating two new access junctions off the main spine road through the Meadowlands Estate.

Clear sightlines of 45m x 2.4m setback are available without impact on third part properties at the two new access point locations, as required under the Design Manual for Urban Roads and Street for junctions within a 50 km/h speed zone.

All new roads are a minimum of 5.5m wide with 3.0m – 6.0m radii at junctions except for turning heads which are provided with 6.0m radii to facilitate turning by larger vehicles such as refuse vehicles.

All proposed dwellings have at least a footpath to the front boundary of a minimum width of 1.8m. Full pedestrian linkage from each dwelling to the main entrances is available based on a system of desire lines. Pedestrian access to the centre of the town is also available through pedestrian footpath linkage through the Meadowlands estate onto the junction of Masseytown Road/Mill Road.

Dished kerbs are to be provided at all entrances to properties and at pedestrian crossing points. The road layout has been designed taking account of the recommendations within the Design Manual for Urban Roads and Streets whereby the horizontal alignment is such that vehicular speeds are naturally curtailed with no straight sections of road greater than 60m.

3.2 Road Construction and Drainage

Construction details for the Roads of the proposed development are shown on enclosed drawings. The pavement construction details shown have been designed in accordance with the guidelines set out in the DoEHLG's '*Recommendations for Site Development Works for Housing Areas*'. Actual pavement construction depths will be dependent on CBR tests carried out during the construction stage of this development. Where soils with a CBR of less than 2% underlie the carriageway, custom designs will be required for the pavement make-up. The rate of CBR testing is given in Table 3.1 below:

CBR TESTING RATE
Minimum 1 per road or 1 per 100m length of road

Table 3.1

Roads are to be constructed with cambers or crossfalls of 1/40. Road gullies are to be spaced at less than 30m centres with double gullies with separate connections provided at all sag curves and low points. Vertical gradients will be a minimum of 0.5% (1/200) and a maximum of 5.0% (1/20). Private driveways shall be limited to a maximum gradient of 2% (1/50) to provide a comfortable area for persons with mobility impairments to alight from a vehicle with ease as required by the Building Regulations. Each dwelling to be provided with a minimum of two car parking spaces off street. Visitor parking has been provided at a rate of 1 space per 3 dwellings.

4.0 FOUL WATER MANAGEMENT STRATEGY

4.1 Introduction

This report outlines the proposed provision of the foul water service for a proposed residential development.

4.2 Foul Water Design Strategy

The proposed foul sewer system has been design in accordance with the DoEHLG Recommendations, and with BS 8005: Part 1, 1987 *'Guide to New Sewerage Construction'*. Foul sewers are sized for a peak flow of 6 DWF assuming a discharge of 180 Litres per day per person and 2.7 persons per unit.

A minimum size of 225mmϕ pipe PVC SN8 is to be used for all foul sewers with a minimum gradient of 1:200. This gradient will ensure a velocity greater than the minimum velocity specified in the Irish Water Code of Practice for Wastewater. A minimum size of 100mmϕ PVC SN8 is to be used for the private foul drains. Each dwelling is to be provided with individual private foul connections to the main system with a foulwater inspection chamber (FWIC) provided inside the boundary line of each dwelling. All main system sewers are located within roads or proposed open spaces.

The proposed foul sewer layout is shown on Drawings 109-72-121. Calculations for the foul sewer networks are included in Appendix A at the end of this report.

The proposed network will connect via gravity to the existing foulwater network of the Meadowlands Estate. There is an existing foul sewer traversing the site from the Fairfield Estate to the north which has been incorporated into the design of the scheme, and will be maintained live during the construction phase.

Irish Water have been consulting in relation to the development of these lands and a Pre-connection Enquiry was submitted. Reference Number CDS21008632.

A Confirmation of Feasibility date 7 December 2021 was received noting a wastewater connection of the development to be ***Feasible without Infrastructure Upgrade***. Refer to Appendix D.

5.0 STORM WATER MANAGEMENT STRATEGY

5.1 Storm Water Drainage

This chapter of the Services Report outlines the way in which the storm water runoff from the proposed development is to be managed and discharged.

The storm water sewer layout for the proposed development is shown on Drawings 109-72-121.

5.2 Drainage Strategy

It is proposed that all generated storm waters from the development will be collected via a separate stormwater gravity network and discharged to the existing storm sewer network of the Meadowlands Estate.

All sewers proposed to be eventually Taken-In-Charge are located within public areas and generally under roads.

Longitudinal sections of proposed sewers are provided. Refer to Appendix B for Storm Network design spreadsheets. The storm network has been designed to cater for a 1 in 5-year rainfall event utilising Met Eireann rainfall records. The provided Met Eireann data has been factored by an additional 20% to allow for the potential impact of Climate Change and an additional 10% to provide for Urban Creep.

Under the original development of Meadowlands the overall lands were catered for in terms of pre-development run-off in the form of attenuation to be located within the parkland area to the west adjacent the River Sullane.

5.3 Sustainable Drainage

Irrespective of the aforementioned attenuation provisions already provided as part of the overall development of the lands, for the development of the subject lands, additional measures in the form of natural Sustainable Drainage mechanisms have been incorporated into the design to slow the release of surface waters into the existing gravity system. Sustainable drainage systems (SuDS) aim to maintain or restore a more natural hydrological regime, such that the impact of urbanisation on downstream flooding and water quality is minimised. Originally, SuDS were introduced primarily as single purpose facilities, however, this has now evolved into more integrated systems which serve a variety of purposes, including habitat and amenity enhancement.

SuDS involves a change in our way of managing urban run-off from solely looking at volume control to an integrated multi-disciplinary approach which addresses water quality, water quantity, amenity and habitat. SuDS minimise the impacts of urban runoff by capturing runoff as close to source as possible and then releasing it slowly. The use of SuDS to control runoff also provides the additional benefit of reducing pollutants in the surface water by settling out suspended solids, and in some cases providing biological treatment.

The successful achievement of sustainable urban drainage does not solely rely on the use of engineered techniques to control and treat runoff. 'Good housekeeping' measures, such as safe storage and handling of oils and chemicals, street sweeping and control of sediment run-off from construction sites are an essential component of SuDS. Public awareness is also an important factor in ensuring the successful implementation of sustainable drainage practices.

5.4 Natural SuDS

The proposed development provides for the integration of such features as Permeable Paving, Sub-surface storage, Swales and Rain Gardens into the design which will aid in the slowing of storm run-off and allow for natural drainage to ground in as far as the natural subsoils will accept. Any waters not absorbed will discharge to the gravity storm network and discharged from the site.

The Rain Gardens and Swale have been sized to cater for a 1-hour storm of varying Return Events of 5, 30 & 100 year with an allowance for Climate Change of 20%. The swale and raingardens have been limited to a maximum water depth of 200mm. Refer to Appendix B.

In terms of maintenance, both SuDS features and conventional drainage systems require regular maintenance to perform adequately. The key difference here is that SuDS are generally visible and

relatively straightforward to maintain. Maintenance requirements can be identified and remedied relatively easily while issues with conventional drainage systems are often only realised when they fail.

Typical maintenance schedule:

During Establishment Period (Year 1 & 2)

- Watering - Weekly during dry periods
- Weeding - 3-monthly
- Litter picking - 3-monthly
- Pruning/trimming - 3-monthly
- Check/clean inlets/outlets - 3-monthly
- Mulching - Annually (or as required)

Following Establishment Period (Year 3 onwards)

- Weeding - 6-monthly
- Litter picking - 6-monthly
- Pruning/trimming - 6-monthly
- Check/clean inlets/outlets - 6-monthly
- Re-planting Annually (or as required)

Every 10-15 years remove silt and re-plant as necessary.

5.5 Water Quality

The removal of suspended solids is integral to the success of any sustainable urban drainage system. It is proposed that all road gulleys and drainage channels are trapped to retain grit and debris prior to entering the collection system.

It is proposed to provide for contaminant removal prior to discharge to the storm outfall through the provision of natural cleansing through granular and soil mediums of the proposed swale and rain gardens located as per drawing 109-72-121. See details as per drawing 109-72-162 & 163.

6.0 WATERMAINS

6.1 General

This chapter of the Services Report outlines the way in which potable water will be supplied to the proposed residential development.

6.2 Water Supply

The proposed water main layout is shown on Drawing No. 109-72-141. As seen from this drawing, the overall development will be serviced via a single connection off the existing 200mm watermain located in the estate road front the scheme.

The proposed watermain will be a 100mm PE80 SDR17 provided in accordance with Irish Water Code of Practice for Water Networks. All junctions will be provided with 3-way valving. Hydrants have been

positioned so that no dwelling is greater than 46m from a hydrant, in accordance with DoEHLG *'Recommendations for Site Development Works for Housing Areas'*.

Construction and commissioning shall be to Irish Water Code of Practice and Standard Details.

Irish Water have been consulting in relation to the development of these lands and a Pre-connection Enquiry was submitted. Reference Number CDS21008632.

A Confirmation of Feasibility dated 7 December 2021 was received noting a wastewater connection of the development to be ***Feasible without Infrastructure Upgrade***. Refer to Appendix D.

A Connection Agreement will be entered into with Irish Water prior to commencement.

Appendix A

Foulwater Network Design

Storm Sewer Design

A	B	C	D		
Pipe Ø	Length (m)	Approx. Outside Ø (mm) O/D	Approx. Wall Thickness (mm)	Approx. Weight in kgs	Pipe Type
150mm	1.25	290	33	80	S & S
225mm	1.25	392	38	122	S & S
300mm	2.0	505	60	358	S & S
375mm	2.5	606	65	565	S & S
450mm	2.5	707	69	730	S & S
525mm	2.5	808	77	980	S & S
600mm	2.5	909	91	1240	S & S
675mm	2.5	1008	97	1520	S & S

PIPE LAYOUT

Design Parameters				Pumping Requirements		
Pipe Material	PVC SN8	Density(kg/m3)	1000	Flow per Day		
Viscosity (Pa.s)	0.0012	Limiting V(m/s)	0.7-3.0 m/s	Sump invert		
Roughness (m)	0.00060	Storm event	1 in 5 yr	Manhole Invert		
Gravity(m/s2)	9.81			Rise Height		

Section	Grd Lvl U/S	Grd Lvl D/S	Inv U/S	Inv D/S	Cover U/S	Cover D/S	ΔH	Plan (L)	Pipe (L)	Grad	Gradient	Diameter	Cover Check >0.9m		Section
	m	m	m	m	m	m	m	m	m	dec	1 in	m	Upstream	Dn.stream	
S1-S2	80.588	80.000	79.129	78.494	1.23	1.28	0.635	18.112	18.123	0.035	29	0.225	U.S OK	D.S OK	S1-S2
S2-S3	80.000	78.810	78.494	77.190	1.28	1.40	1.304	41.893	41.913	0.031	32	0.225	U.S OK	D.S OK	S2-S3
S3.1-S3	79.250	78.810	77.640	77.190	1.39	1.40	0.450	9.010	9.021	0.050	20	0.225	U.S OK	D.S OK	S3.1-S3
S3-S4	78.810	77.850	77.190	76.178	1.40	1.45	1.012	24.210	24.231	0.042	24	0.225	U.S OK	D.S OK	S3-S4
S4-S5(Ext)	77.850	77.550	76.178	75.985	1.45	1.34	0.193	5.685	5.688	0.034	29	0.225	U.S OK	D.S OK	S4-S5
S10-S11	77.600	77.400	75.740	75.464	1.64	1.71	0.276	7.733	7.738	0.036	28	0.225	U.S OK	D.S OK	S10-S11
S11-S12	77.400	76.600	75.464	74.785	1.71	1.59	0.679	18.998	19.010	0.036	28	0.225	U.S OK	D.S OK	S11-S12
S12-S13(Ext)	76.600	76.290	74.785	74.360	1.59	1.71	0.425	11.889	11.897	0.036	28	0.225	U.S OK	D.S OK	S12-S13(Ext)
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Storm Sewer Design

CAPACITY CHECK

Design Parameters					
Pipe Material	PVC SN8	Density(kg/m3)	1000	Te min	4.00
Viscosity(Pa s)	0.0012	Limiting V(m/s)	0.7-3.0 m/s	Cv	0.80
Roughness (m)	0.00060				
Gravity (m/s2)	9.81				

Return Period	Time of Entry (te) (min)
1	4 – 8
2	4 – 7
5	3 - 6
>5	2 - 4

Times of Entry (t_e) typically used for design purposes

Section	A	2gdi	Velocity	Velocity	ToF	ToC Section	ToC Used	Intensity	Imp Area	Imp Area	Cumul Area	Q Section	Q Cumul	Capacity	Capacity	Section
	m2		m/s	Check	min	min	min	mm/hr	m2	ha	ha	l/s	l/s	l/s	Check	
S1-S2	0.04	0.3934	2.46	OK	0.12	4.12	4.12	76.92	403	0.040	0.040	8.96	8.96	97.71	OK	S1-S2
S2-S3	0.04	0.3707	2.31	OK	0.30	4.42	4.42	73.81	528	0.053	0.093	11.25	19.85	92.04	OK	S2-S3
S3.1-S3	0.04	0.4696	2.94	OK	0.05	4.05	4.05	77.71	112	0.011	0.011	2.51	2.51	116.74	OK	S3.1-S3
S3-S4	0.04	0.4296	2.68	OK	0.15	4.20	4.20	76.08	480	0.048	0.152	10.54	33.45	106.75	OK	S3-S4
S4-S5	0.04	0.3871	2.42	OK	0.04	4.24	4.24	75.66	0	0.000	0.152	0.00	33.27	96.14	OK	S4-S5
S10-S11	0.04	0.3969	2.48	OK	0.05	4.00	4.00	78.29	1097	0.110	0.110	24.80	24.80	98.59	OK	S10-S11
S11-S12	0.04	0.3972	2.48	OK	0.13	4.13	4.13	76.87	506	0.051	0.160	11.24	35.59	98.66	OK	S11-S12
S12-S13(Ext)	0.04	0.3972	2.48	OK	0.08	4.21	4.21	76.01	171	0.017	0.177	3.75	38.95	98.67	OK	S12-S13(Ext)
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	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Appendix B

Stormwater Network Design

Storm Sewer Design

PIPE LAYOUT

Design Parameters				Pumping Requirements		
Pipe Material	PVC SN8	Density(kg/m3)	1000	Flow per Day		
Viscosity (Pa.s)	0.0012	Limiting V(m/s)	0.7-3.0 m/s	Sump invert		
Roughness (m)	0.00060	Storm event	1 in 5 yr	Manhole Invert		
Gravity(m/s2)	9.81			Rise Height		

Table 3

A	B	C	D		
Pipe Ø	Length (m)	Approx. Outside Ø (mm) O/D	Approx. Wall Thickness (mm)	Approx. Weight in kgs	Pipe Type
150mm	1.25	290	33	80	S & S
225mm	1.25	392	38	122	S & S
300mm	2.0	505	60	358	S & S
375mm	2.5	606	65	565	S & S
450mm	2.5	707	69	730	S & S
525mm	2.5	808	77	980	S & S
600mm	2.5	909	91	1240	S & S
675mm	2.5	1008	97	1520	S & S

Section	Grd Lvl U/S	Grd Lvl D/S	Inv U/S	Inv D/S	Cover U/S	Cover D/S	ΔH	Plan (L)	Pipe (L)	Grad	Gradient	Diameter	Cover Check >0.9m		Section
	m	m	m	m	m	m	m	m	m	dec	1 in	m	Upstream	Dn.stream	
S1-S2	80.588	80.000	79.129	78.494	1.23	1.28	0.635	18.112	18.123	0.035	29	0.225	U.S OK	D.S OK	S1-S2
S2-S3	80.000	78.810	78.494	77.190	1.28	1.40	1.304	41.893	41.913	0.031	32	0.225	U.S OK	D.S OK	S2-S3
S3.1-S3	79.250	78.810	77.640	77.190	1.39	1.40	0.450	9.010	9.021	0.050	20	0.225	U.S OK	D.S OK	S3.1-S3
S3-S4	78.810	77.850	77.190	76.178	1.40	1.45	1.012	24.210	24.231	0.042	24	0.225	U.S OK	D.S OK	S3-S4
S4-S5(Ext)	77.850	77.550	76.178	75.985	1.45	1.34	0.193	5.685	5.688	0.034	29	0.225	U.S OK	D.S OK	S4-S5
S10-S11	77.600	77.400	75.740	75.464	1.64	1.71	0.276	7.733	7.738	0.036	28	0.225	U.S OK	D.S OK	S10-S11
S11-S12	77.400	76.600	75.464	74.785	1.71	1.59	0.679	18.998	19.010	0.036	28	0.225	U.S OK	D.S OK	S11-S12
S12-S13(Ext)	76.600	76.290	74.785	74.360	1.59	1.71	0.425	11.889	11.897	0.036	28	0.225	U.S OK	D.S OK	S12-S13(Ext)
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	
					0.00	0.00	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!		U.S FAIL	D.S FAIL	

Storm Sewer Design

CAPACITY CHECK

Design Parameters					
Pipe Material	PVC SN8	Density(kg/m3)	1000	Te min	4.00
Viscosity(Pa s)	0.0012	Limiting V(m/s)	0.7 - 3.0 m/s	Cv	0.80
Roughness (m)	0.00060	Climate +	20%		
Gravity (m/s2)	9.81	Urban Creep	10%		

Return Period	Time of Entry (te) (min)
1	4 – 8
2	4 – 7
5	3 - 6
>5	2 - 4

Times of Entry (t_e) typically used for design purposes

Section	A	2gdi	Velocity	Velocity	ToF	ToC Section	ToC Used	Intensity	Imp Area	Imp Area	Cumul Area	Q Section	Q Cumul	Capacity	Capacity	Section
	m2		m/s	Check	min	min	min	mm/hr	m2	ha	ha	l/s	l/s	l/s	Check	
S1-S2	0.04	0.3934	2.46	OK	0.12	4.12	4.12	99.99	403	0.040	0.040	11.65	11.65	97.71	OK	S1-S2
S2-S3	0.04	0.3707	2.31	OK	0.30	4.42	4.42	95.96	528	0.053	0.093	14.62	25.80	92.04	OK	S2-S3
S3.1-S3	0.04	0.4696	2.94	OK	0.05	4.05	4.05	101.02	112	0.011	0.011	3.27	3.27	116.74	OK	S3.1-S3
S3-S4	0.04	0.4296	2.68	OK	0.15	4.20	4.20	98.90	480	0.048	0.152	13.70	43.49	106.75	OK	S3-S4
S4-S5	0.04	0.3871	2.42	OK	0.04	4.24	4.24	98.36	0	0.000	0.152	0.00	43.25	96.14	OK	S4-S5
S10-S11	0.04	0.3969	2.48	OK	0.05	4.00	4.00	101.77	1097	0.110	0.110	32.24	32.24	98.59	OK	S10-S11
S11-S12	0.04	0.3972	2.48	OK	0.13	4.13	4.13	99.93	506	0.051	0.160	14.61	46.27	98.66	OK	S11-S12
S12-S13(Ext)	0.04	0.3972	2.48	OK	0.08	4.21	4.21	98.82	171	0.017	0.177	4.88	50.64	98.67	OK	S12-S13(Ext)
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.177	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0.000	0.330	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Rain Garden Design

		Storm Flow					Rain Garden Parameters							
	RG Ref.	Catchment	Cv	Intensity (M60)	Inflow		Width	Freeboard	Sub-base (D)	Sub-base (W)	length	Outflow	Available Storage	Result
		m2		mm	m3		m	m	m	m	m	m3 (1 x 10^-5)	m3	
First Flush	RG 1	250	0.4	5.00	0.5		4.8	0.2	0.75	0.6	8.5	1.5	3.6	OK
1:5 yr		250	0.4	19.68	2.0		4.8	0.2	0.75	0.6	8.5	1.5	3.6	OK
1:30 yr		250	0.4	27.60	2.8		4.8	0.2	0.75	0.6	8.5	1.5	3.6	OK
1:100 yr		250	0.4	34.08	3.4		4.8	0.2	0.75	0.6	8.5	1.5	3.6	OK
First Flush	RG 2	140	0.4	5.00	0.3		2.8	0.2	0.6	0.6	8	0.8	2.2	OK
1:5 yr		140	0.4	19.68	1.1		2.8	0.2	0.6	0.6	8	0.8	2.2	OK
1:30 yr		140	0.4	27.60	1.5		2.8	0.2	0.6	0.6	8	0.8	2.2	OK
1:100 yr		140	0.4	34.08	1.9		2.8	0.2	0.6	0.6	8	0.8	2.2	OK
First Flush	RG 3	100	0.4	5.00	0.2		3.5	0.2	0.6	0.6	4.5	0.6	1.6	OK
1:5 yr		100	0.4	19.68	0.8		3.5	0.2	0.6	0.6	4.5	0.6	1.6	OK
1:30 yr		100	0.4	27.60	1.1		3.5	0.2	0.6	0.6	4.5	0.6	1.6	OK
1:100 yr		100	0.4	34.08	1.4		3.5	0.2	0.6	0.6	4.5	0.6	1.6	OK
First Flush	Swale	404	0.9	5.00	1.8		3	0.2	1.5	1	18.5	2.0	13.0	OK
1:5 yr		404	0.9	19.68	7.2		3	0.2	1.5	1	18.5	2.0	13.0	OK
1:30 yr		404	0.9	27.60	10.0		3	0.2	1.5	1	18.5	2.0	13.0	OK
1:100 yr		404	0.9	34.08	12.4		3	0.2	1.5	1	18.5	2.0	13.0	OK

Appendix C

Met Eireann Data

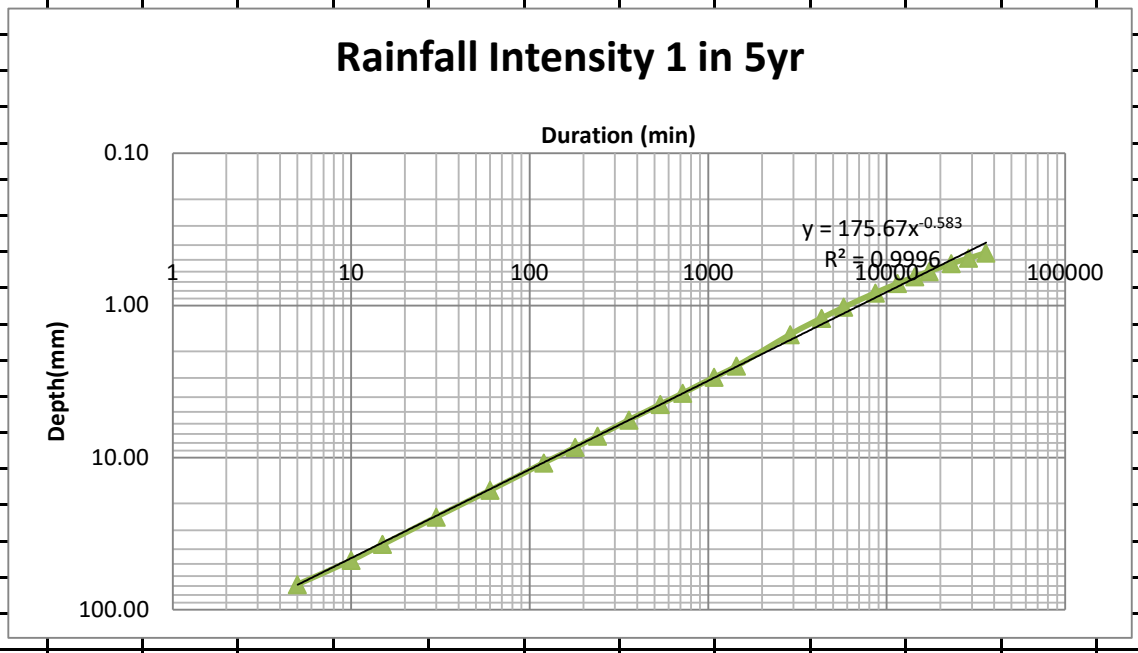
Met Eireann
Return Period Rainfall Depths for sliding Durations
Irish Grid: Easting: 133640, Northing: 73425,

	Interval		Years												
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	3.1,	3.9,	4.3,	5.0,	5.4,	5.7,	6.6,	7.6,	8.3,	9.2,	9.9,	10.5,	11.3,	12.0,	12.5,	N/A ,
10 mins	4.3,	5.4,	6.0,	6.9,	7.5,	7.9,	9.2,	10.6,	11.5,	12.8,	13.8,	14.6,	15.8,	16.7,	17.5,	N/A ,
15 mins	5.0,	6.4,	7.1,	8.1,	8.8,	9.3,	10.9,	12.5,	13.6,	15.0,	16.3,	17.2,	18.6,	19.7,	20.5,	N/A ,
30 mins	6.9,	8.7,	9.6,	10.9,	11.7,	12.3,	14.3,	16.4,	17.7,	19.4,	21.0,	22.1,	23.8,	25.1,	26.1,	N/A ,
1 hours	9.4,	11.8,	12.9,	14.5,	15.6,	16.4,	18.8,	21.4,	23.0,	25.2,	27.0,	28.4,	30.4,	32.0,	33.2,	N/A ,
2 hours	13.0,	15.9,	17.4,	19.5,	20.8,	21.7,	24.8,	27.9,	29.9,	32.5,	34.8,	36.4,	38.9,	40.8,	42.3,	N/A ,
3 hours	15.6,	19.0,	20.7,	23.1,	24.6,	25.7,	29.1,	32.7,	34.9,	37.8,	40.3,	42.2,	44.9,	47.0,	48.7,	N/A ,
4 hours	17.8,	21.6,	23.4,	26.0,	27.7,	28.9,	32.6,	36.5,	38.9,	42.1,	44.8,	46.8,	49.8,	52.0,	53.8,	N/A ,
6 hours	21.4,	25.8,	27.9,	30.8,	32.7,	34.1,	38.3,	42.7,	45.4,	48.9,	52.0,	54.2,	57.5,	59.9,	61.9,	N/A ,
9 hours	25.8,	30.8,	33.2,	36.6,	38.7,	40.2,	45.0,	49.9,	52.9,	56.9,	60.2,	62.7,	66.4,	69.1,	71.3,	N/A ,
12 hours	29.4,	35.0,	37.6,	41.3,	43.6,	45.3,	50.5,	55.8,	59.0,	63.3,	66.9,	69.6,	73.5,	76.4,	78.7,	N/A ,
18 hours	35.4,	41.8,	44.8,	48.9,	51.5,	53.4,	59.3,	65.2,	68.9,	73.6,	77.6,	80.6,	84.9,	88.1,	90.6,	N/A ,
24 hours	40.4,	47.4,	50.7,	55.2,	58.0,	60.1,	66.5,	72.9,	76.8,	81.9,	86.2,	89.4,	94.0,	97.4,	100.2,	109.1,
2 days	51.6,	59.8,	63.7,	69.0,	72.3,	74.7,	82.0,	89.4,	93.9,	99.7,	104.6,	108.2,	113.4,	117.2,	120.3,	130.3,
3 days	61.1,	70.4,	74.8,	80.8,	84.5,	87.2,	95.4,	103.6,	108.5,	115.0,	120.3,	124.3,	130.0,	134.2,	137.6,	148.6,
4 days	69.8,	80.1,	84.9,	91.4,	95.5,	98.5,	107.4,	116.3,	121.7,	128.7,	134.5,	138.8,	145.0,	149.6,	153.2,	165.0,
6 days	85.6,	97.6,	103.2,	110.8,	115.5,	118.9,	129.2,	139.4,	145.6,	153.6,	160.2,	165.0,	172.1,	177.2,	181.3,	194.7,
8 days	100.2,	113.7,	120.0,	128.5,	133.8,	137.6,	149.1,	160.5,	167.3,	176.2,	183.5,	188.9,	196.6,	202.3,	206.9,	221.6,
10 days	113.9,	128.9,	135.8,	145.2,	151.0,	155.2,	167.7,	180.2,	187.7,	197.4,	205.4,	211.2,	219.6,	225.8,	230.7,	246.7,
12 days	127.1,	143.5,	151.0,	161.1,	167.4,	172.0,	185.6,	199.0,	207.1,	217.5,	226.1,	232.4,	241.5,	248.1,	253.4,	270.5,
16 days	152.4,	171.2,	179.9,	191.5,	198.7,	203.9,	219.4,	234.7,	243.9,	255.7,	265.4,	272.5,	282.8,	290.3,	296.2,	315.4,
20 days	176.7,	197.8,	207.5,	220.5,	228.5,	234.3,	251.6,	268.6,	278.8,	291.9,	302.7,	310.5,	321.8,	330.1,	336.7,	357.8,
25 days	206.0,	229.9,	240.8,	255.4,	264.4,	270.9,	290.3,	309.3,	320.6,	335.3,	347.2,	355.9,	368.5,	377.7,	385.0,	408.5,

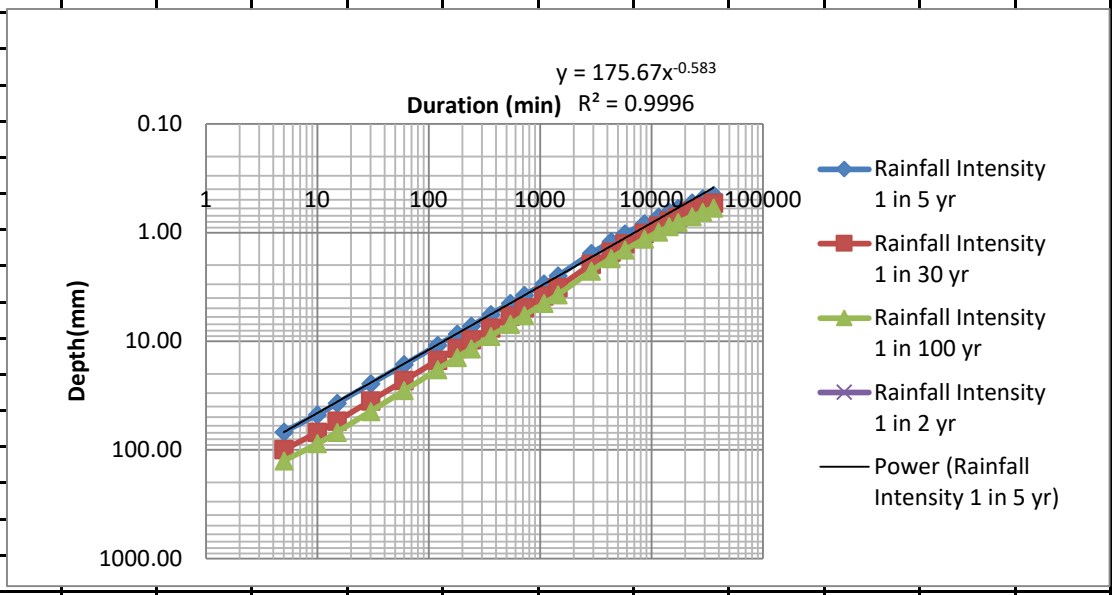
NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

Met Eireann Record

Depth												
Return period			2	3	4	5	10	20	30	50	75	100
Duration												
5	5					5.7			8.3			10.5
10	10					7.9			11.5			14.6
15	15					9.3			13.6			17.2
30	30					12.3			17.7			22.1
60	1					16.4			23			28.4
120	2					21.7			29.9			36.4
180	3					25.7			34.9			42.2
240	4					28.9			38.9			46.8
360	6					34.1			45.4			54.2
540	9					40.2			52.9			62.7
720	12					45.3			59			69.6
1080	18					53.4			68.9			80.6
1440	24					60.1			76.8			89.4
2880	2					74.7			93.9			108.2
4320	3					87.2			108.5			124.3
5760	4					98.5			121.7			138.8
8640	6					118.9			145.6			165
11520	8					137.6			167.3			188.9
14400	10					155.2			187.7			211.2
17280	12					172			207.1			232.4
23040	16					203.9			243.9			272.5
28800	20					234.3			278.8			310.5
36000	25					270.9			320.6			355.9



Met Eireann Record



Depth											
Return period		2	3	4	5	10	20	30	50	75	100
Duration											
5	12.000	0.00	0.00	0.00	68.40	0.00	0.00	99.60	0.00	0.00	126.00
10	6.000	0.00	0.00	0.00	47.40	0.00	0.00	69.00	0.00	0.00	87.60
15	4.000	0.00	0.00	0.00	37.20	0.00	0.00	54.40	0.00	0.00	68.80
30	2.000	0.00	0.00	0.00	24.60	0.00	0.00	35.40	0.00	0.00	44.20
60	1.000	0.00	0.00	0.00	16.40	0.00	0.00	23.00	0.00	0.00	28.40
120	0.500	0.00	0.00	0.00	10.85	0.00	0.00	14.95	0.00	0.00	18.20
180	0.333	0.00	0.00	0.00	8.56	0.00	0.00	11.62	0.00	0.00	14.05
240	0.250	0.00	0.00	0.00	7.23	0.00	0.00	9.73	0.00	0.00	11.70
360	0.166	0.00	0.00	0.00	5.66	0.00	0.00	7.54	0.00	0.00	9.00
540	0.111	0.00	0.00	0.00	4.47	0.00	0.00	5.88	0.00	0.00	6.97
720	0.083	0.00	0.00	0.00	3.77	0.00	0.00	4.91	0.00	0.00	5.80
1080	0.056	0.00	0.00	0.00	2.97	0.00	0.00	3.83	0.00	0.00	4.48
1440	0.042	0.00	0.00	0.00	2.50	0.00	0.00	3.20	0.00	0.00	3.72
2880	0.021	0.00	0.00	0.00	1.55	0.00	0.00	1.95	0.00	0.00	2.25
4320	0.014	0.00	0.00	0.00	1.21	0.00	0.00	1.51	0.00	0.00	1.73
5760	0.010	0.00	0.00	0.00	1.03	0.00	0.00	1.27	0.00	0.00	1.45
8640	0.007	0.00	0.00	0.00	0.83	0.00	0.00	1.01	0.00	0.00	1.15
11520	0.005	0.00	0.00	0.00	0.72	0.00	0.00	0.87	0.00	0.00	0.98
14400	0.004	0.00	0.00	0.00	0.65	0.00	0.00	0.78	0.00	0.00	0.88
17280	0.003	0.00	0.00	0.00	0.60	0.00	0.00	0.72	0.00	0.00	0.81
23040	0.003	0.00	0.00	0.00	0.53	0.00	0.00	0.64	0.00	0.00	0.71
28800	0.002	0.00	0.00	0.00	0.49	0.00	0.00	0.58	0.00	0.00	0.65
36000	0.002	0.00	0.00	0.00	0.45	0.00	0.00	0.53	0.00	0.00	0.59

Appendix D

SuDS Indices Calculation

SIMPLE INDEX APPROACH: TOOL

1. The steps set out in the tool should be applied for each inflow or 'runoff area' (ie each impermeable surface area separately discharging to a SuDS component).

2. The supporting 'Design Conditions' stated by the tool must be fully considered and implemented in all cases.

3. The process that is automated in this tool is described in the SuDS Manual, Chapter 26 (Section 26.7)

3. Relevant design examples are included in the SuDS Manual Appendix C.

4. Each of the steps below are part of the process set out in the flowchart on Sheet 3.

5. Sheet 4 summarises the selections made below and indicates the acceptability of the proposed SuDS components.

6. Interception should be delivered for all upstream impermeable areas as part of the strategy for water quantity and quality control for the site. This is required in order to deliver both of the water quality criteria set out in Chapter 4 of the SuDS Manual

DROP DOWN LIST — RELEVANT INPUTS NEED TO BE SELECTED FROM THESE LISTS, FOR EACH STEP

USER ENTRY — USER ENTRY CELLS ARE ONLY REQUIRED WHERE INDICATED BY THE TOOL

STEP 1: Determine the Pollution Hazard Index for the runoff area discharging to the proposed SuDS scheme

This step requires the user to select the appropriate land use type for the area from which the runoff is occurring

If the land use varies across the 'runoff area', either:

- use the land use type with the highest Pollution Hazard Index

- apply the approach for each of the land use types to determine whether the proposed SuDS design is sufficient for all. If it is not, consider collecting more hazardous runoff separately and providing additional treatment.

If the generic land use types suggested are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in the row below the drop down lists.

	Runoff Area Land Use Description	*Pollution Hazard*	*Pollution Hazard Indices* Total Suspended Solids	Metals	Hydrocarbons
Select land use type from the drop down list (or 'Other' if none applicable):	Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)	Low	0.5	0.4	0.4
If the generic land use types in the drop down list above are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in this row:					
	Landuse Pollution Hazard Index	**Low**	**0.5**	**0.4**	**0.4**

DESIGN CONDITIONS: 1 | 2

STEP 2A: Determine the Pollution Mitigation Index for the proposed SuDS components

This step requires the user to select the proposed SuDS components that will be used to treat runoff - before it is discharged to a receiving surface waterbody or downstream infiltration component
If the runoff is discharged directly to an infiltration component, without upstream treatment, select 'None' for each of the 3 SuDS components and move to Step 2B

This step should be applied to evaluate the water quality protection provided by proposed SuDS components for discharges to receiving surface waters or downstream infiltration components (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

If you have fewer than 3 components, select 'None' for the components that are not required

If the proposed component is bespoke and/or a proprietary treatment product and not generically described by the suggested components, then 'Proprietary treatment system' or 'User defined indices' should be selected and a description of the component and agreed user defined indices should be entered in the rows below the drop down lists

	SuDS Component Description		*Pollution Mitigation Indices* Total Suspended Solids	Metals	Hydrocarbons
Select SuDS Component 1 (i.e. the upstream SuDS component) from the drop down list:	Pervious pavement (where the pavement is not designed as an infiltration component)		0.7	0.6	0.7
Select SuDS Component 2 (i.e. the second SuDS component in a series) from the drop down list:	Swale		0.5	0.6	0.6
Select SuDS Component 3 (i.e. the third SuDS component in a series) from the drop down list:	Proprietary treatment system	Enter User Defined Indices in row below			
If the proposed SuDS components are bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary treatment system' or 'User defined indices' and enter component descriptions and agreed user defined indices in these rows:					
	Petrol Interceptor	SuDS Component 3	0.99	0.99	0.99
	Aggregated Surface Water Pollution Mitigation Index		**>0.95**	**>0.95**	**>0.95**

DESIGN CONDITIONS

1	2	3
SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B		
SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B		
Detailed assessment of performance of designed component in reducing inflow concentrations of each pollutant type required as evidence of adopted indices. Enter indices approved by the environmental regulator in appropriate 'User Defined Indices' row below	SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. WAT-RM-08 (SEPA, 2014) also provides a flow chart with a summary of checks on suitability of a proprietary system	See Chapter 15 Proprietary treatment systems for approaches to demonstrate product performance. Note: a British Water/Environment Agency assessment Code of Practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: http://www.britishwater.co.uk/Publications/codes-of-practise.aspx.

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at ">0.95". In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

Is the runoff now discharged to an infiltration component?

Yes ? Go to Step 2B
No ? Go to Step 2C

STEP 2B: Determine the Pollution Mitigation Index for the proposed Groundwater Protection

This step requires the user to select the type of groundwater protection that is either part of the SuDS component or that lies between the component and the groundwater

This step should be applied where a SuDS component is specifically designed to infiltrate runoff (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

'Groundwater protection' describes the proposed depth of soil or other material through which runoff will flow between the runoff surface and the underlying groundwater.

Where the discharge is to surface waters and risks to groundwater need not be considered, select 'None'

If the proposed groundwater protection is bespoke and/or a proprietary product and not generically described by the suggested measures, then a description of the protection and agreed user defined indices should be entered in the row below the drop down list

		Pollution Mitigation Indices Total Suspended Solids	Metals	Hydrocarbons
Select type of groundwater protection from the drop down list:	Pervious pavement underlain by 300 mm minimum depth of soils with good contamination attenuation potential	0.7	0.6	0.7
If the proposed groundwater protection is bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary product' or 'User defined indices' and enter a description of the protection and agreed user defined indices in this row:				
	Groundwater Protection Pollution Mitigation Index	**0.7**	**0.6**	**0.7**

DESIGN CONDITIONS

1	2	3	4
All designs must include a minimum of 1 m unsaturated depth of subsoil or aquifer material between the infiltration surface and the maximum likely groundwater level. Infiltration components should always be preceded by upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate lined zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events	The permeable pavement must include a suitable filtration layer provides treatment and must include a geotextile at the base separating the foundation from the sub-grade. The underlying soils must provide good contaminant attenuation potential (eg as recommended in Sniffer 2008 (a) and (b) / Scott Wilson (2010) or other appropriate guidance). Alternative depth and soil combinations must provide equivalent protection to the underlying groundwater		

STEP 2C: Determine the Combined Pollution Mitigation Indices for the Runoff Area

This is an automatic step which combines the proposed SuDS Pollution Mitigation Indices with any Groundwater Protection Pollution Mitigation Indices

	Combined Pollution Mitigation Indices Total Suspended Solids	Metals	Hydrocarbons
Combined Pollution Mitigation Indices for the Runoff Area	**>0.95**	**>0.95**	**>0.95**

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at ">0.95". In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

STEP 2D: Determine Sufficiency of Pollution Mitigation Indices for Selected SuDS Components

This is an automatic step which compares the Combined Pollution Mitigation Indices with the Land Use Hazard Indices, to determine whether the proposed components are sufficient to manage each pollutant category type

When the combined mitigation index exceeds the land use pollution hazard index, then the proposed components are considered sufficient in providing pollution risk mitigation.

In England and Wales, where the discharge is to protected surface waters or groundwater, an additional treatment component (ie over and above that required for standard discharges), or other equivalent protection, is required that provides environmental protection in the event of an unexpected pollution event or poor system performance. Protected surface waters are those designated for drinking water abstraction. In England and Wales, protected groundwater resources are defined as Source Protection Zone 1. In Northern Ireland, a more precautionary approach may be required and this should be checked with the environmental regulator on a site by site basis.

Note: In order to meet both Water Quality criteria set out in the SuDS Manual (Chapter 4), Interception should be delivered for all impermeable areas wherever possible. Interception delivery and treatment may be met by the same components, but interception requires separate evaluation.

Sufficiency of Pollution Mitigation Indices Total Suspended Solids	Metals	Hydrocarbons
Sufficient	**Sufficient**	**Sufficient**

DESIGN CONDITIONS

1
Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see *Chapter 7 The SuDS design process*). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England

Appendix E

Irish Water Correspondence

Philip O'Regan

PHM Consulting
11 Mallow Street
Limerick
V94WRN4
Ireland

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

7 December 2021

Re: CDS21008632 pre-connection enquiry - Subject to contract | Contract denied

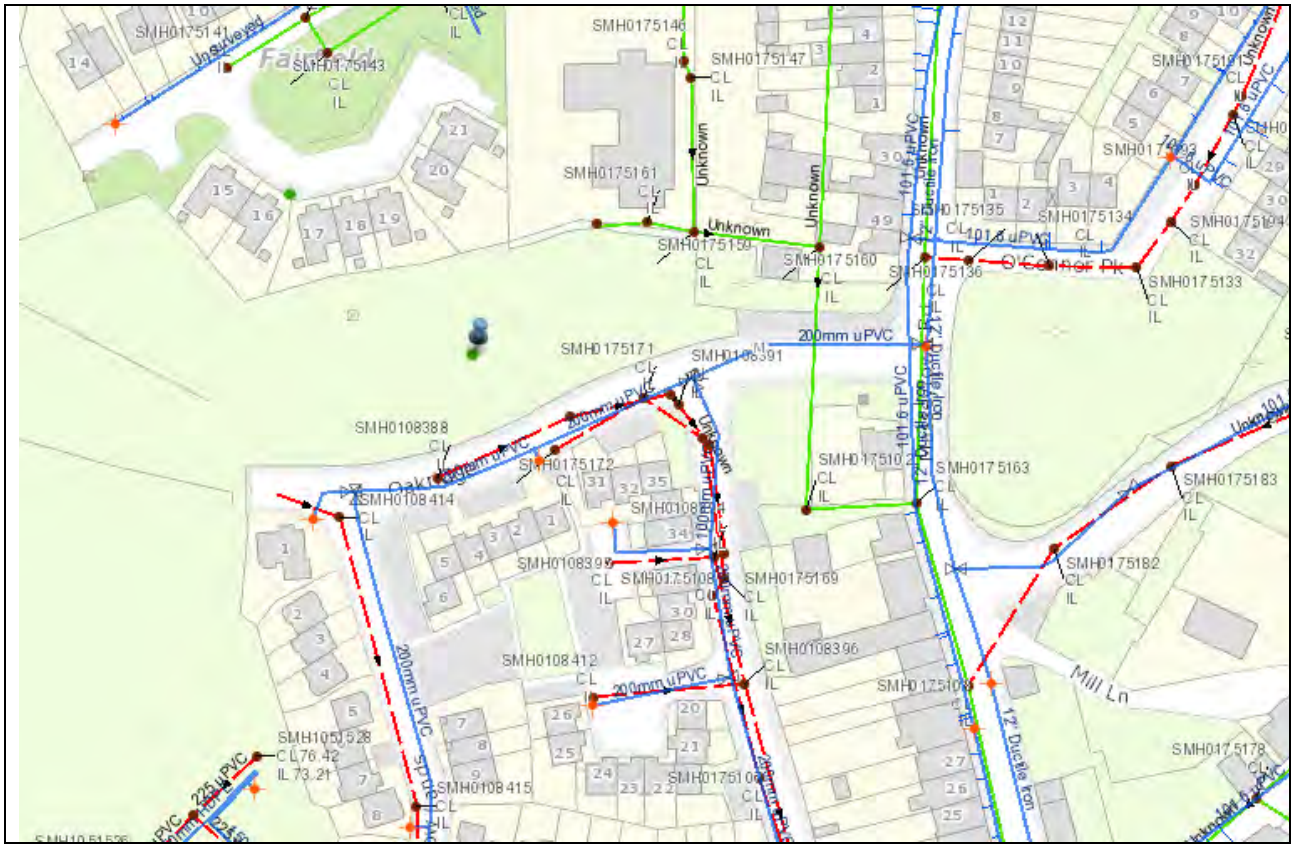
Connection for Multi/Mixed Use Development of 19 unit(s) at Masseytown, Macroom, Cork

Dear Sir/Madam,

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Masseytown, Macroom, Cork (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible without infrastructure upgrade by Irish Water
SITE SPECIFIC COMMENTS	
Water Connection	
Wastewater Connection	
The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.	

The map included below outlines the current Irish Water infrastructure adjacent to your site:



Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

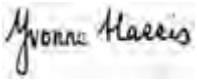
General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.

6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Brian Lavelle from the design team on or email brian.lavelle@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,



Yvonne Harris

Head of Customer Operations

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Civil - Structural - Environmental

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Web.:www.phm.ie

Project/Contract	Sheet No.
109-72	1.0

DRAWING REGISTER AND ISSUE SHEET

Project Title	Issue Date
Proposed Social Housing Development at	14
Masseytown, Macroom, Co. Cork	12
	22

Distribution	No. of Copies (E)=Email (F)=Fax (D)=Disk
EML Architects	E
Status: DRAFT(D) PLANNING(P) TENDER(T) CONSTRUCTION(C)	P
Issued by:	

Drawing Title	Size/ Type	Drg. No.	Draft/Rev.
Site Survey	A1	**110**	P1
Roads Layout - General Arrangement	A1	**111**	P1
Roads Layout - Signs & Markings	A1	**112**	P1
Drainage Layout	A1	**121**	P1
Roads - Longitudinal Sections	A1	**131**	P1
Watermain Layout	A1	**141**	P1
Roads Details	A1	**151**	P1
Manhole Details	A1	**161**	P1
Surface Water Details	A1	**162**	P1
Sustainable Drainage Details	A1	**163**	P1
Watermain Details	A1	**171**	P1
Construction Environmental Management Plan	A1	**181**	P1

Other Documents	
Services Report	P1
Construction Environmental Management Plan	P1
Construction Waste Management Plan	P1
Flood Risk Assessment	P1
Drainage Assessment	P1

PHM Consulting
Civil - Structural - Environmental

Social Housing Development

Massytown, Macroom, Co. Cork

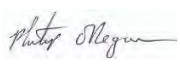
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

November 2022

Social Housing Development
Massytown, Macroom, Co. Cork

Construction Environmental Management Plan

Document Title :	CEMP P1
Document Ref(s). :	109-72/17b

Date	Edition/Rev	Status	Originator	Checked	Approved
26/11/2022	First	Planning	P. O'Regan		

CLIENT:
Cork County Council
County Hall
Carrigrohane Road
Cork

CONSULTANT:
PHM Consulting,
11 Mallow Street,
Limerick.

Contents

1.0 INTRODUCTION

1.1 Brief

PHM Consulting have been engaged by Cork County Council (applicant) to provide engineering design solutions for a proposed residential development on lands at Massytown, Macroom, Co. Cork which is to be the site of a planning application. Engineering design services to cover Roads, Foul Drainage and disposal, Surface water collection and disposal, and Water supply connection to public mains and internal network.

The planning application is for the development of 18 No. residential units, and a standalone building for the purpose of accommodation and ancillary surface car parking, vehicular, pedestrian access to the proposed development via new junctions off the existing internal eatate roads of the Meadowlands Estate, connection to existing public water supply; foul water drainage network, surface water drainage network and all associated site development and landscape works.

The site is located at ITM E533593151354, N573483. Existing ground levels range from 76.0m to 82.00m above ordnance datum (AOD) Malin.

This site is currently Greenfield and zoned for the purpose intended. The site was previously granted permission for the development of housing and existing services were provided with the intent of connection of the subject lands. The application site comprises an overall area of approximately 0.809 Hectares (2.0 Acres) with a single vehicular access route off the Masseytown Road.

This outline Construction Environmental Management Plan (CEMP) defines the project specific environmental measures that are to be put in place and procedures to be followed for the scope of construction works, both permanent and temporary, for the envisaged project. Please note this outline CEMP is produced as part of the planning application. It is intended that this will be updated to include more site-specific information once the Construction Management Team is appointed.

1.2 Scope of the Environmental Management Plan

This CEMP defines the approach to environmental management at the site during the construction phase. Compliance with the CEMP, the procedures, work practices and controls will be mandatory and must be adhered to by all personnel and contractors employed on the construction phase of the project.

This CEMP seeks to:

1. Provide a basis for achieving and implementing the construction related mitigation measures identified in the accompanying environmental report.

2. Comply with all relevant conditions attached to the Planning Permission (if granted).

3. Promote best environmental on-site practices for the duration of the construction phase.

This CEMP is a final document, however, the construction contractor will provide a further detailed CEMP to include any subsequent planning conditions relevant to the proposed development. As explained in more detail in the later sections, the procedures agreed in this CEMP will be adopted and audited regularly throughout the construction phase to ensure the further detailed CEMP is compliant with relevant planning conditions and updated environmental management practices.

1.3 Project Roles & Responsibilities

The assigned environmental roles and responsibilities for the relevant project personnel are detailed below. Note: Not all roles may be relevant to this particular project and will be engaged as and when necessary:

1.3.1 Construction Director

The Construction Director will have an overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project environmental requirements. The principal duties and responsibilities of this position will include:

- Overall responsibility for the development and implementation of the CEMP;
- Allocating resources to ensure the implementation of the CEMP;
- Participates in the management review of the CEMP for suitability, adequateness and effectiveness; and
- Sets the focus of environmental policy, objectives and targets for the Contractor.

1.3.2 Construction Manager

The Construction Manager is directly responsible to the Construction Director for the successful execution of the project. The principal duties and responsibilities of this position will include:

- To report to the Construction Director on the on-going performance of the CEMP;
- To discharge his/her responsibilities as outlined in the CEMP; and
- To support and augment the CMT and the Environmental Officer through the provision of adequate resources and facilities in the implementation of the CEWP.

1.3.3 Environmental Officer

The CMT Environmental Officer will be responsible for, but not limited to, the following activities:

- Ensuring that the requirements of the CEMP are developed and environmental system elements (including procedures, method statements and work instructions) are implemented and adhered to with respect to environmental requirements;
- Reviewing the Environmental responsibilities of other managed Contractors in scoping their work and during Contract execution;
- To ensure that advice, guidance and instruction on all CEMP matters are provided to all their managers, employees, construction contractors and visitors on site;
- Report to the Construction Manager on the environmental performance of Line Management, Supervisory Staff, Employees and Contractors; and
- Advise site management (including, but not limited to, the site Construction/Commissioning Manager) on environmental matters.

1.3.4 Project Environmental Consultant

The Project Environmental Consultant will be responsible for, but not limited to, the following activities:

- Preparation of the CEMP, environmental control plans, supporting procedures;
- Advise site management (including, but not limited to, the site Construction/Commissioning Manager) on environmental matters;
- Carry out environmental surveys (data logging (noise, water, dust, etc.)) where necessary;
- Generate reports as required to show environmental data trends and incidents;

- Ensure adherence to the specific measures listed in the Planning Conditions and in the EcIA;
- Advise upon the production of written method statements and site environmental rules and on the arrangements to bring these to the attention of the workforce;
- Investigate incidents of significant, potential or actual environmental damage, ensure corrective actions are carried out and recommend means to prevent recurrence; and
- Be responsible for maintaining all environmental related documentation.

1.3.5 Project Archaeologist

The Project Archaeologist will report to the Environmental Officer and is responsible for advising on all archaeological monitoring activities, conducting watching briefs and distributing information relevant to monitoring. The responsibilities and duties of the Project Archaeologist will include the following;

- Monitor all ground disturbance works associated with the construction of the development;
- Ensure the appropriate course of action is taken in the event that archaeological material is discovered during the works;
- Liaison with the CMT throughout the construction phase of the project; and
- Liaison with the Department Applications Unit, National Monuments Service, Department of Arts, Heritage and Gaeltacht and the Cork County Council archaeologist as required.

1.3.6 Project Ecologist

The Project Ecologist will report to the Environmental Officer and is responsible for the protection of sensitive habitats and species encountered during the construction phase of the project. The responsibilities and duties of the Project Ecologist will include the following;

- Provision of specialist input and supervision, where necessary, of construction activities in relation to habitats and species;
- Provision of specialist advice on ecological monitoring, and conduct surveys, monitoring and site inspections as set out in the AA/EIAR and by Cork County Council; and
- Liaison with the National Parks and Wildlife Service (NPWS) as required.

1.3.7 Project Communications Officer

The Project Communications Officer is responsible for conducting all public liaison associated with the construction phase of the project. The responsibilities and duties of the Project Communications Officer include the following;

- Responding to any concerns or complaints raised by the public in relation to the construction phase of the project;
- To liaise with the Environmental Officer on community concerns relating to the environment;
- Ensure the Environmental Officer is informed of any complaints relating to the environment; and
- Keep the public informed of project progress and any construction activities that may cause inconvenience to the local community.

1.3.8 Site Supervisors

CMT Site Supervisors are required to:

- Read, understand and implement the CEMP;
- Know the broad requirements of the relevant law in environmental matters and take whatever action is necessary to achieve compliance. Where necessary seek the advice of the CMT Environmental Officer;
- Ensure that environmental matters are taken into account when considering Contractors' construction methods and materials at all stages;

- Be aware of any potential environmental risks relating to the site, plant or materials to be used on the premises and bring these to the notice of the appropriate management;
- Ensure plant suggested is environmentally suited to the task in hand;
- Co-ordinate environmental planning of CMT activities to comply with environmental authorities requirements and with minimum risk to the environment. Give Contractors precise instructions as to their responsibility to ensure correct working methods where risk of environmental damage exists;
- Where appropriate, ensure Contractors method statements include correct waste disposal methods;
- Be aware of any potential environmental risks relating to the Contractors and bring these to the notice of the appropriate management; and
- Ensure materials/waste register is completed.

1.3.9 Site Personnel

All Contractors, and other site personnel, on the project will adhere to the following principal duties and responsibilities:

- To co-operate fully with the CMT and the Environmental Officer in the implementation and development of the CEMP at the site;
- To conduct all their activities in a manner consistent with regulatory and best environmental practice;
- To participate fully in the environmental training programme and provide management with any necessary feedback to ensure effective environmental management at the site; and
- Adhere fully to the requirements of the site environmental rules.

1.4 Project Environmental Policy

The Applicant recognises and seeks to minimise the impacts of its business on the environment. The appointed Main Contractor will be committed to:

- Carrying out the Project in full compliance with all applicable environmental regulations and to other requirements to which we subscribe.
- Implementing good environmental practice as part of designs, e.g. carry out design reviews, risk assessments, etc. on all relevant projects.
- Preventing pollution from activities through a system of operational controls that include written instructions and staff training appropriate to the environmental requirements of their work.
- Continually improving Project environmental performance by setting objectives and targets and implementing them through an environmental programme.
- Informing all project employees about Environmental Policy and explaining what they should do to protect the environment.
- Implementing this Policy through the successful operation of the CEMP.
- This policy will be reviewed periodically, taking into account current and potential future business issues.

1.5 Keeping of Records

The Construction Manager will ensure that fully detailed records are maintained of any ‘incident/event’ likely to cause non-compliance and/or harm to the environment. Environmental Incidents/Near Miss Reports are reported and recorded.

Complaints and Follow up Actions on the construction site will be managed by the CMT and contractors will ensure that all complaints are recorded according to CMT requirements.

Each contractor will be responsible for ensuring that a full record and copy of all Safety Data Sheets (SDS) pertaining to their works is kept on file and up to date in their site offices. Contractors will also retain a duplicate copy of all SDSs held by the contractors.

The CMT will be responsible for monitoring the movement and treatment of all waste during the construction phase of the project. Monitoring will be carried out by the CMT who will record the nature, quantities and off-site destination of wastes.

1.6 Monitoring, Audits and Inspections

Periodic inspections by the CMT will address environmental issues including dust, litter, noise, traffic, surface water, waste management and general housekeeping.

An EHS Inspection Audit of the construction site will be carried out by an appointed contractor. Environmental aspects of this audit will be documented. The frequency of these audits (weekly/monthly/other) will be based on the nature of contractor activity.

1.7 Non Conformance and Corrective and Preventative Action

Corrective Action Requests (CARs) will be issued to ensure that prompt action is agreed and committed to, with a view to the effective resolution of any deviations from the CEMP requirements or any environmental issues.

CARs may be raised as a result of:

- An internal or external communication;
- An internal audit;
- A regulatory audit or inspection;
- A suggestion for improvement;
- An incident or potential incident.

All corrective action requests will be numbered and logged.

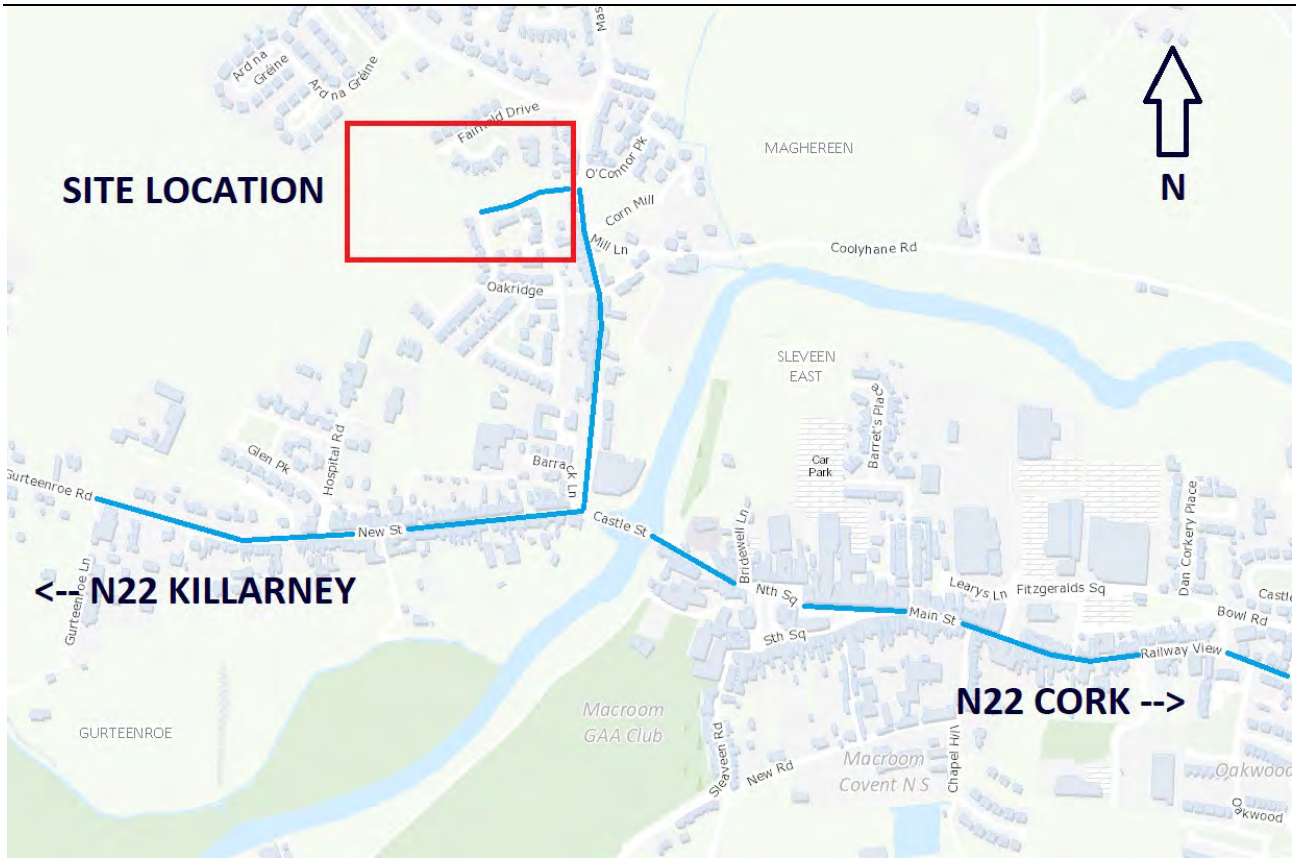


Fig 1.1 – Site Location Map

2.0 SITE BACKGROUND

Details of the site physical setting are outlined below. Information on the site location, hydrology, geology, hydrogeology of the area has been obtained from records held by the Geological Survey of Ireland (GSI), Environmental Protection Agency (EPA), Ordnance Survey of Ireland (OSI) databases and on-line resources of Department of Environment, Community and Local Government (myplan.ie).

The site is a greenfield site with no history of previous development. The site is currently accessed directly off the existing Meadowlands housing development spine road fronting the southern boundary.

2.1 Topography

An electronic topographical survey of the site has been carried out for the purpose of the preparation of the design of the roads and infrastructure of this proposed development. All surveyed information has been tied into National Grid Reference system and Ordnance Survey Malin.

The general topography can be viewed on Drg 109-79-110 with the lands falling from a high point located to the north of the site and falling in a southern direction to the existing estate road.

The lands are currently undeveloped. The site is bounded to the north by Fairfield Drive Estate, to the south by the Meadowlands Estate, to the east by existing properties and to the west by open agricultural lands.

There is no history of flooding of these lands. A review of available hydrometric data from the OPW has been undertaken. Located to the south of the site a distance of 400m is Macroom Town Bridge. A Hydrometric Station (19101) is located adjacent. The highest recorded Annual Maximum Flood Level is provided which occurred in 2020 to a level of 68.065m AOD.

A record of flooding from August 1986 of the River Sullane (20120309 – Updated in Sept 2022) indicates an upstream of bridge flood level of 70.06m AOD.

As previously stated the lowest level within the application site is 76.00m AOD – well in excess of any possible flood event from the River Sullane.

2.2 Geology

From the Geological Survey of Ireland the site is described as follows:

Soil Type: AminDW – Deep well drained mineral (Mainly acidic)

Quaternary Sediments: Till derived from Devonian sandstones.

Bedrock: Purple and Green Sandstone and Siltstone

Bedrock Geology: Waulsortian mudbank; Pale-grey massive limestone

Groundwater Vulnerability: Extreme

Groundwater Subsoil Permeability: Moderate

Taking account of this information it is anticipated that the proposed foundations for new structures are envisaged to be of a tradition strip nature with bearing onto bedrock.

2.2 Site Investigation

A detailed Site Investigation was carried out in March 2020 by Priority Geotechnical. The objective of the ground investigation was to assess subsoil and bedrock conditions in order to inform the foundation and ancillary works design for the proposed residential housing development.

The scope of the ground investigation, which was specified by PHM, comprised of:

Indirect geophysical survey, seismic refraction and electrical resistivity ERT;

- 2Nr. Trial pit excavations;
- A grid of dynamic probing (approx. 69Nr.);
- Associated sampling;
- Associated laboratory testing and
- Associated reporting.

Ground and Groundwater Conditions

Made ground, slightly sandy Gravel with Cobble content was encountered in TP01 to a depth 1.2m below existing ground level (bgl) this was underlain by granular deposits; dense, silty very sandy GRAVEL with medium Cobble content to a depth 2.9m bgl. A non-woven geotextile (Terram or similar) appeared to separate these deposits.

Made ground, silty very sandy Gravel with Cobble content was encountered in TP02 to a depth 2.0m below existing ground level (bgl) this was underlain by granular deposits; silty very sandy GRAVEL with medium Cobble content and low Boulder content to a depth 2.9m bgl. Probing terminated at depths between 0.3m bgl to 3.2m bgl.

Bedrock (Sandstones to the west and Siltstones to the east) was interpreted on all geophysical profiles, at depths between 2m to 11m deep with a variable superficial deposits; sandy gravelly CLAY and sandy CLAY.

No groundwater was encountered during the period of fieldworks. Groundwater levels may be subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc. The groundwater regime should be assessed from standpipe well installations where available.

The current conceptual ground model is such that bedrock (Sandstones to the west and Siltstones to the east) was interpreted on all geophysical profiles, at depths between 2m to 11m deep with a variable overburden layer above it. Overburden was expected to be sandy gravelly CLAY with some areas of lower resistivity to the west being more sandy CLAY deposits. Trial pit excavations encountered dense silty very sandy GRAVEL deposits with Cobble and Boulder contents to depths up to 2.9m bgl. Probing terminated at depths between 0.3m bgl to 3.2m bgl on assumed obstructions where coarse Cobble and Boulder particles were identified within the superficial deposits. Dynamic probe data identified loose deposits (N100H<4) to depths 0.8m bgl (DP57) to 2.9m bgl (DP59). Below this medium dense deposits (N100H 5 - 15) were identified with dense deposits (N100H >15) below depths typically between 1.0m bgl to 2.0m bgl in the superficial GRAVEL deposits. Refusal of the dynamic probing should not automatically be indicative of shallow bedrock.

No groundwater was encountered during the period of works at a depth 2.9m bgl.

Geotechnical Risk Register

The site was characterized as geotechnical category GC-1.

Category 1 contains only small and simple structures. The fundamental requirements of EC7 may be satisfied only on the qualitative and experience geotechnical investigations. There is a negligible risk for

life and property. The design of structures of this category requires person with appropriate comparable experience. Some examples of structures of category 1 are structures with maximum design column load 250kN and maximum design wall load of 100kN, retaining walls and excavation which does not exceed the 2m and small excavations for pipes and drainage (Orr and Farrell, 1999).

Characteristic properties

The mixed glacial till, silty sandy GRAVEL was characterised by natural moisture contents 8% to 14%. Grading analysis indicated 59% to 99% Gravel fraction (content); 1% to 26% Sand fraction and 10% to 12% Silt fraction with low Cobble contents (2% to 5%).

Foundations

Shallow foundations in medium dense to dense GRAVEL are considered. Some localised loose deposits were encountered within the site. A presumed allowable bearing pressure of 200kNm-2 (kPa) to 600kPa is expected for the medium dense GRAVEL deposits (BS8004, Code of practice for foundations, 1986, Table 1). A presumed allowable bearing pressure of >600kNm-2 (kPa) is expected for the dense GRAVEL deposits (BS8004, Code of practice for foundations, 1986, Table 1).

Taking the following empirical relationship for allowable bearing capacity; Qall (kPa) = NSPT x 10 (Terzaghi and Peck, 1967) for settlement up to a maximum of 25mm.

Foundations are recommended to be constructed within the shallow SANDSTONE/SILTSTONE bedrock where encountered (BS8004, Code of practice for foundations, 1986) identified a presumed bearing value of 2,000 kN/m2 (kPa) for non-weathered sedimentary rockmass. In accordance with *Figure 1 — Allowable bearing pressures for square pad foundations bearing on rock (for settlement not exceeding 0.5 % of foundation width*) this should be reduced to a value of 150MPa for an assumed Group 4, weak and fractured rock mass.

2.3 Conservation Areas

The subject site is located to the north of The Gearagh Special Area of Conservation – NPWS Site Code 000108. (Lat:51.8821, Long:-8.98419).

Qualifying Interests

- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]
- Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation [3270]
- Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]
- Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]
- Lutra lutra (Otter) [1355]

NPWS Conservation Objectives:

3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation - To maintain the favourable conservation condition of Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation in The Gearagh SAC.

3270 Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation - To maintain the favourable conservation condition of Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation in The Gearagh SAC.

91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles - To maintain the favourable conservation condition of Old sessile oak woods with Ilex and Blechnum in the British Isles in The Gearagh SAC

91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) - To maintain the favourable conservation condition of Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* in The Gearagh SAC

1355 Otter Lutra lutra - To maintain the favourable conservation condition of Otter in The Gearagh SAC

2.4 Mitigation Measures to Minimise Environmental Impacts

The following measures should be employed on site as a minimum in order to mitigate any potential impact of the proposed works to offsite receptors.

- Where off-site disposal of soils/materials (waste) is required, all lorry loads will be sheeted once loaded before leaving site to reduce dust generation. Provision will be made for washing vehicles' wheels at the site entrance to prevent any mud being deposited on local roads.
- Where importation of materials/fill is required, measures shall be constructed to prevent soiled run-off from entering adjacent watercourses following Best Management Practices as described in this report.
- Adequate precautions will be taken during site works to prevent surface water run-off from the site affecting the local surface waters and drainage network.
- Dust monitoring and dust suppression will be carried out during excavation works. As a minimum this will include visual inspections to identify dust generating activities and damping down such sources as and when required. The aim should be to prevent the generation of dust and any potential risk to site workers and neighbouring properties and amenity sites.

2.5 Communication & Education Plan:

The CMT will conduct on-site pre-commencement meetings with all subcontractors. Attendance will be required for the subcontractor's key field personnel. The purpose of the meeting will be to reinforce to subcontractor's key field employees the commitments made by their companies with regard to the project goals and requirements.

As each new subcontractor comes on site, the CMT will present him/her with a copy of the Site Specific CEMP.

The subcontractor will be expected to make sure all their crews comply with the CEMP.

2.6 Keeping of Records

The Construction Manager will ensure that fully detailed records are maintained of any 'incident / event' likely to cause non-compliance and / or harm to the environment. Environmental Incidents/Near Miss Reports are reported and recorded.

Complaints and Follow up Actions on the construction site will be managed by the CMT and contractors will ensure that all complaints are recorded according to CMT requirements.

Each contractor will be responsible for ensuring that a full record and copy of all Material Safety Data Sheets (SDS) pertaining to their works is kept on file and up to date at the CMT site offices.

2.7 Flora & Fauna

There shall be on-going monitoring of wildlife in the vicinity of the construction site and any unusual species, dead species or damaged habitats should be reported immediately to the Construction Manager and/or Environmental Officer.

Where unexpected ecological habitats are uncovered the habitats protection protocol will be adhered to by site contractors.

Protection Protocol: This protocol is designed to ensure that ALL persons working on the construction site are fully aware of their legal obligations under the Wildlife Act 1976, as amended.

This Act affords protection to a range of wildlife in Ireland including wild birds, animals and plants. Whilst the project has received permission from the Government to proceed, this does not override certain laws that prevent wilful harm to protected species. What is protected that may be found in the Project Area?

- All wild birds and their eggs, nests and young, with the exception of certain species, are protected under the Wildlife Acts.

- Certain animals including all bat species.

- Surveys of the area may identify where protected species may be present.

- Bat Surveys. Contractors may discover bat roosts and if any bats are found, the Construction Manager and/or Environmental Officer is to be contacted immediately.

2.8 Environmental Regulatory Requirements

A register of regulatory, legal and other requirements will be developed by the CMT. This will be a summary list of the major environmental legislation and other requirements to which the project must subscribe.

A typical register of environmental legislation is divided into a number of categories, which include:

- General Environmental Legislation
- Flora & Fauna
- Emissions to Air
- Emissions to Water & Groundwater
- Waste Management
- Noise & Vibration

For each piece of legislation the following information is provided:
- Index Number
- Title of Legislation
- Summary of Legislation

- Relevance

All legislation included in this Register can be readily accessed on www.irishstatutebook.ie or will be available through the construction manager's office.

The Register of Legislation will be reviewed and updated on a minimum six-monthly basis. This is a controlled document and as such will comply with all the requirements of the Contractor document control procedures.

2.9 Emergency Planning & Response

In line with the Safety, Health and Welfare (Construction) Regulation 2014 a Project Supervisor Construction Stage will be appointed for the project and will ensure that installation works are carried out consistent with all emergency response plans and procedures.

The emergency management procedure ensures that emergencies such as fires, explosions, accidents, leaks, sabotage or emergencies caused by force majeure occur as little as possible; if they do, however, occur, it ensures that all countermeasures proceed in a controlled manner so that greater damages are avoided and the possible effects upon persons, the environment and property are avoided or limited.

2.10 Environmental Emergency

In the event of an environmental emergency, a procedure for Environmental Emergency Preparedness and Response will be developed prior to commencement of construction and can be implemented by the CMT in order to ensure to minimise environmental impacts. An environmental emergency at the site may include;

- Discovery of a fire within the site boundary

- Uncontained spillage / leakage / loss of containment action

- Discharge concentration of potential pollutants in excess of environmental trigger levels

The general required emergency response actions will be posted at strategic locations, such as the site entrance, canteen and near the entrances to buildings.

3.0 OUTLINE ENVIRONMENTAL MANAGEMENT PLAN

3.1 Construction Activities

This section describes the main activities involved in the construction of the proposed development. The proposed development is located on a greenfield site.

3.2 Construction Schedule

The construction period for the development is expected to last 15 months. The site area will be adequately fenced off with a semi-solid hoarding of minimum 2.0m height to prevent unauthorised access during the construction stage. Appropriate signage will also be erected. The proposed development will involve the following activities:

- Installation of site office, welfare facilities, waste skips, wheel wash area and erection of site hoarding and associated advanced site signage.
- Site clearance – to be limited to areas of construction. A full initial site clearance is not to take place.
- Installation of required protection berm and retention ponds to prevent soiled waters entering the adjacent watercourses.
- Construction of the new roads and dwelling buildings and associated, water supply, services, foul water drainage, stormwater swales, outfall to existing services and landscaping within the site.

It is expected that the construction of the proposed development will commence in 2023, subject to planning and other approvals.

3.3 Method Statement for Construction

An Environmental Management Plan and Construction Health and Safety Plan will be developed by the eventual Main Contractor (CMT) to include all aspects of the project.

3.3.1 Site Preparation Works

Initially the site will be securely fenced, and a construction compound will be established.

The following is an outline of the sequence of works particular to the site preparation works:

- Establish a site set-up, hoarding, traffic management signage and markings, and welfare facilities;
- Carry out a pre-commencement dilapidation survey of existing boundaries, adjacent public road areas, and hedgerows, trees and foraging areas adjacent to and within the site to be protected during the works;
- Review of existing infrastructure given the provided topographical information;

A project programme will be developed for the project taking cognisance of the recommendations of the AA and EIAR.

3.3.2 Site Construction Compound

The site compound will be developed, comprising of offices and welfare facilities for the contractors on site. Water supply is available on site, therefore a temporary works connection is not required. The temporary construction compound will include a site office for the construction management team and site facilities for the construction staff. The compound will be serviced with electrical power, water supply and toilet facilities with connection to the existing foul sewer running through the site.

The compound will be used as a storage area for the various components, fuels and materials required for construction. Any fuels will be stored in self bunded tanks. The compound will be fenced off to ensure site security is maintained.

- Fuels, Lubricants, hydraulic fluid, solvents and oils to be carefully handled and spill kits provided.
- Accidental spillages to be immediately contained and contaminated soil removed from site.
- Waste fluids to be collected and removed from site.
- Dedicated wash down area to be provided for concrete trucks.
- All surface water to be treated for the removal of Hydrocarbon and grit prior to discharge.

3.3.3 Construction of New Structures

The development comprises the construction of new entrances, roads, services and dwellings.

The buildings will be constructed in accordance with current building regulations and certified by an Assigned Certifier upon completion.

3.3.4 Material Sources and Transportation

Construction materials will be sourced locally where possible. This will be based on the necessary constraints of performance, durability and cost.

3.3.5 Construction Delivery and Haulage

It is envisaged that the CMT will maintain a tidy site and will operate a 'just in time' policy for the delivery and the supply of materials for the works, particularly the final phase of the works when on site storage will be at a minimum.

In order to transport construction material to the site in the most efficient and environmentally sensitive manner appropriate routes need to be identified. Having considered the site location it is proposed that the most appropriate route to the site for material and plant delivery will be via the N22, albeit this will be through the main street of the town. Alternative routes have been considered and deem insufficient for larger vehicles.

The delivery of larger loads will be subject to scheduling outside of peak traffic times 08:00-10:00 & 15:00-17:00.

3.3.6 Construction of Services

3.3.6.1 Electrical Connections

Power will be provided from a new temporary connection for the construction compound. Power will be required for temporary lighting during the works.

3.3.6.2 Surface Water

All surface water shall be treated prior to discharge to the adjacent storm sewer. Measures to protect surface waters from contamination are outlined in Section 4 of this Plan – Best Management Practices.

3.3.6.3 Foul Sewer

As part of the new development a new foul water drainage system will be constructed to collect and convey the foul water flow generated by the development. The foul network will discharge to the existing FW Gravity Sewer which traverses the site and located within the estate road of the Meadowlands estate.

All foul pipes and manholes will be tested for infiltration through air testing and hydraulic testing prior to commissioning, in accordance with Irish Water Code of Practice.

3.3.6.4 Storm Sewer

All surface waters from the development will be conveyed via a gravity collection network and discharged to the existing storm network. All surface waters are to be treated for the removal of contaminates such are floating debris, suspended solids and hydrocarbons prior to eventual discharge, through the use of permeable paving with subsurface filtration, rain gardens and swale. The use of such natural mechanisms will provide ensure all surface water are treated prior to entering the gravity system.

The existing gravity system of the Meadowlands estate discharges to the Sullane River.

There is an open drain running along the northern boundary of the site which collects surface water from the lands to the north. This open is currently discharged to the Meadowlands gravity system. It is not proposed to alter this arrangement.

3.3.6.5 Water Main

The proposed development is to be supplied with potable water from the existing public mains in line with Irish Water guidance. A new connection is proposed and will be subject to agreement with Irish Water.

3.4 Health and Safety

The site is located within an existing residential development which requires that the site be secured at all times. A combination of hoarding and existing wall boundaries will be erected/utilised along all boundaries of the site with the purpose of restricting access to the work area for security and health and safety reasons. In accordance with the statutory requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013, a Health and Safety Plan will be prepared.

This will address health and safety issues from the design stages through to the completion of the construction and maintenance phases. This plan will be reviewed and updated as the development

progresses. The contents of the Health and Safety Plan will comply with the requirements of the Regulations. Copies will be held on site for inspection.

Safety on site will be of utmost importance. On appointment of any contractor or subcontractor on site, safety statement, insurances, training records, and method statements/risk assessments of each contractor will be required prior to any work being undertaken on site. Prior to working on site, each individual will receive a full safety briefing and induction. The main contractor and each sub-contractor will be required to provide safe systems of work, relevant safety equipment to the tasks being undertaken for their employees on site. Safety briefings will be held regularly and prior to any onerous or special tasks. 'Toolbox talks' will be held weekly to ensure all workers are fully aware of the tasks to be undertaken and the parameters required to ensure the task will be successfully and safely completed.

All workers and visitors will be required to wear appropriate personal protective equipment prior to going on to the site and will undergo a safety briefing by a member of the site safety team.

Regular site safety audits will be carried out throughout the construction programme to ensure that the rules and regulations established for the site are complied with at all times.

At any time that a potentially unsafe practice is observed, the site safety manager will have the right as well as the responsibility to halt the work in question, until a safe system of working is again put in place.

3.5 Employment and Accommodation

Through the construction phase there will be some variation in the numbers working on site. It is anticipated that approximately 40 construction workers could be employed during the peak construction periods. Temporary office accommodation and other construction facilities will be installed on site for the construction phase. All temporary units will be of a high standard, as a minimum in accordance with statutory regulations.

The co-ordination of people and materials on-site will be one of the key activities throughout the construction phases. A construction management plan will be put in place prior to the commencement of the works. This plan will designate traffic routes, timings and parking arrangements. Worker vehicles will not be allowed to park on the public road.

Typical working hours during the construction phase would be envisaged as:

Start Finish

- Monday – Friday 07:00 to 18:00
- Saturday 07:00 to 14:00

Currently, there are no significant works foreseen outside of normal working hours in relation to the main construction stage.

In relation to the required infrastructure installation on the public road, this will be done during period of low traffic volumes, in order to minimise impact on existing residents. This will be subject to agreement with Cork County Council, and Irish Water through the process of application of a Road Opening License.

3.6 Potential Construction Phase Environmental Effects and Control Measures

The construction activities described in Section 3.3 will have a range of effects. This section describes the likely consequences of the works, and outlines the proposed control measures that will minimise negative environmental impacts. The potential construction phase impacts include emissions to air such as dust, noise and vibration, construction traffic, and controlled construction waste. Surface water run-off from the site during periods of heavy rainfall, and leaks or spills from construction plant and equipment, have the potential to impact on the quality of soils, surface water and groundwater.

3.6.1 Noise Generating Activities

During the construction phase, the potential noise and vibration impacts are associated with site preparation works, rock breaking, deliveries, general construction activities and construction vehicle movements. Similar to any construction site, there is potential for noise generation associated with site clearance, demolition and construction activities.

Principal sources of noise will include:

- Earthworks plant and equipment.
- Construction plant and equipment.
- Construction traffic.

3.6.2 Proposed Noise Control Measures

With regard to construction activities, reference will be made to BS5228: Noise Control on Construction and Open Sites, which offers detailed guidance on the control of noise and vibration from demolition and construction activities. It is proposed that various practices be adopted during construction, including:

- Hours will be limited during which noisy site activities are permitted.
- Channels of communication will be established between the Contractor/Developer, Local Authority and Residents.
- A Site Representative will be appointed responsible for matters relating to noise.
- Typical levels of noise will be monitored during critical periods and at sensitive locations.
- Plant will be selected with low inherent potential for the generation of noise.
- All site roads will be kept even to mitigate the potential for vibration from lorries.
- Barriers will be erected as necessary around items such as generators or heavy-duty compressors.
- Noisy plant will be sited as far away from sensitive properties as permitted by site constraints.
- Engines, vehicles and equipment will be switched off when not in use.
- Significant sources of noise will be enclosed.
- Plant will be used and serviced regularly in accordance with manufacturer's instructions.
- Cranes will be shut down during work periods / throttled to minimum when not in use.
- Machinery having rotating parts will be serviced according to supplier recommendations to prevent friction induced sound.
- Materials should be lowered, not dropped, insofar as practicable and safe.
- All personnel must be made aware that noisy construction activities resulting in significant noise levels must be minimised and made aware of the above control measures.

During the construction stage the following codes and regulations will be adhered to:

- BS 5228:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites, Part 1 and Part 2;
- SHWW (General Application) Regulations 2007 – 2016, Part 5 Noise and Vibration.

The noise limits to be applied for the duration of the works are those specific to the b Category of BS 5228. These limits are summarised below:

- Night (23:00 - 07:00) = 45dB
- Evening (19:00 – 23:00) = 45dB
- Day (07:00 – 19:00) = 70dB

Noise levels will be monitored continuously and a threshold of 65dB free field at residential noise sensitive locations in the vicinity of the development will be adopted. Where noise levels exceed this threshold, adequate steps will be taken by the CMT to review works activities and implement additional mitigation measures.

3.6.3 Vibration

Vibration from construction activities will be limited to the values set out in the following table but will likely be far below these values. It should be noted that these limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage, these limits may need to be reduced by up to 50%.

Allowable Vibration during Construction Phase

Allowable vibration (in terms of peak particle velocity) at the closest part of any sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	10 to 50Hz	50 to 100Hz (and above)
3 mm/s	3 to 8 mm/s	8 to 10 mm/s

3.6.4 Dust Generating Activities

Construction activities have the potential to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with ambient conditions, including rainfall, wind speed and the distance to potentially sensitive locations. There is potential for dust emissions from construction activities associated with the demolition of the existing buildings and the construction of the new buildings. The Main Contractor will ensure that a dust minimisation plan is prepared and implemented by the building contractor during the construction phase of the project. Construction activities are likely to generate some dust emissions, particularly during the site clearance and excavation stages. The following avoidance, remedial or reductive measures will be implemented as part of the dust minimisation plan:

- During very dry periods when dust generation is likely, construction areas will be sprayed with water.
- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor through regular servicing of machinery.
- Vehicle speeds will be limited in the construction site.
- Surrounding roads used by trucks to access to and egress from the site will be cleaned regularly using an approved mechanical road sweeper. Roads will be cleaned subject to local authority requirements. Site roads will be cleaned on a daily basis, or more regularly, as required.
- Wheel-wash facilities will be provided to remove excess mud from wheels. These facilities will be located at the exit from the site and away from sensitive receptors, where possible.
- The technique adopted for all works shall minimise the release of dust into the atmosphere.

- Daily visual inspections will be carried out at locations around the site boundary as required. These inspections will monitor the effectiveness of dust mitigation measures.

3.6.5 Construction and Security Lighting

Artificial lighting is a requirement to ensure working areas are adequately lit for the safe operation and working conditions for all personnel during winter periods of the year. Construction sites by their nature are areas of curiosity and unauthorised access during out-of-hours periods by members of the general public is a common occurrence irrespective of the level of determent offered by the site hoarding.

It is envisaged that artificial lighting will be a requirement on this construction site. In order to minimise the impact of such lighting on neighbouring properties and impact on protected species – Bats etc. the following lighting requirements shall be adopted.

Lighting Arrangement: Construction lighting can be arranged in different ways onsite to allow for the most efficient use. Lighting can be fixed to support poles, scaffolding, and tower cranes, or it can be put on movable supports.

Construction Lighting Requirements: Every part of the construction site that is in use should be well-lit, either with natural light or artificial lighting. This ensures that wherever people are working, they can do their work effectively and move around the site safely and efficiently.

If work needs to carry on beyond daylight hours, or the building structure is enclosed, artificial lighting must be used.

Illuminate Shadow Areas: It is common on construction sites for shadows to form, obscuring hazards such as machinery and nails. To avoid any injuries, aim to provide extra lighting around the construction site to help illuminate any areas currently in shadow.

Always Provide Emergency Lighting: To ensure the safety of everyone on site, provide emergency lighting. This ensures that workers descending scaffolding or escaping the site in an emergency, don't have to do so in the dark.

Light Emergency Routes: When there is an emergency on the construction site, it is essential everyone can follow a well-list escape route. Ensure emergency lighting is provided in all emergency routes so that it can illuminate escapes if the primary lighting fails. Emergency lighting doesn't need to be very bright; it only needs to be bright enough to illuminate emergency escape routes sufficiently.

Illuminate General Working Areas: To light general working areas, overhead lighting can be suspended from grids to illuminate spaces effectively. This ensures workers can complete projects safely and efficiently, without damaging their eyes or becoming susceptible to injury. Lighting general working areas is especially important out of hours when there is no more natural light.

Lighting Requirements and Surrounding Areas: When lighting construction sites, light spillage to be kept to a minimum. If the construction area is particularly close to residential properties and busy roads, light spillage must be avoided as it can cause distraction. Ensure lighting is not affecting surrounding areas. Where necessary, appropriate lighting should also be provided around site boundaries to ensure pedestrians are able to pass by safely.

Points to Consider:

- Hazards should be easily noticeable so they can be assessed.
- All lighting must be suitable for the work undertaken and the environment.

- Different coloured lights must be easily distinguishable to promote safety.
- No strobes, flickers, or glares should be caused by lighting.
- Lights should not pose a risk to health and safety.
- Lighting should be easily accessible so that maintenance can be carried out and units can be replaced with ease.

In order to minimise interference of the Normal Working Hours Construction site lighting and the Out-of-hours Security Lighting on the adjacent neighbouring properties and public traffic routes the following limitations shall be observed:

- Only illuminate what needs to be illuminated – Minimise or Prevent light spill. If lighting a Pathway, the light should be directed at the Path only, with no up-light or illumination of nearby Trees, bushes, river, waters, buildings, etc.
- Reducing the light levels.
- Height of Luminaires - drop the maximum height of the Luminaires (with good cut-off, no up-light, narrow beams etc.).
- Reflectance – Ensure against Downward lighting which can be reflected from bright surfaces.
- Shielding of Luminaires & Light – Add Shields/Baffles or allow natural objects (trees etc) to stand between the luminaire.
- Type of Light – Use warm coloured lighting (e.g. HPS) which is less disruptive than colder coloured lighting (e.g. Metal Halide).
- Minimising or eliminating UV light. LED lighting has no UV, HPS has a little (0.2%), and Metal Halide (2%-7%).

Lighting Controls – Provide motion sensors so light auto turn off at night.

3.6.6 Litter and Mud on Public Roads

The following are some of the measures that will be taken to ensure that the site and surroundings are maintained to a high standard of cleanliness:

- Daily inspections will be undertaken to monitor tidiness.
- A regular program of site housekeeping will be established to ensure a safe and orderly site.
- Scaffolding will have debris netting attached to prevent materials and equipment being scattered by the wind.
- Food waste will be strictly controlled on all parts of the site and source separated.
- Wheel wash facilities will be provided for vehicles exiting the project site.
- Wheel wash run off will be stored in an onsite storage tank and will be disposed of by licensed waste haulage company and disposed of off-site at a licensed facility.
- In the unlikely event that mud is carried over from the project site to the public roads, they will be cleaned regularly as required and will not be allowed to accumulate.
- Loaded lorries and skips will be covered as required.
- Surrounding roads used by trucks for access to and egress from the site will be inspected regularly and cleaned, using an approved mechanical road sweeper, when required.

- In the event of any fugitive solid waste escaping the site, it will be collected immediately and removed to storage on site, and subsequently disposed of in the normal manner.

3.6.7 Potential Impacts on Soils, Groundwater and Surface Water

There are water courses located close to the site. During the construction phase, control measures to avoid discharges to receptors will be put in place to mitigate against nuisance and protect the environment.

3.6.7.1 Proposed Control Measures

The employment of good construction management practices will minimise the risk of pollution of soil, storm water run-off or groundwater. The Construction Industry Research and Information Association (CIRIA) has issued a guidance note on the control and management of water pollution from construction sites, Control of Water Pollution from Construction Sites, guidance for consultants and contractors (Masters-Williams et al 2001). The guide is written for project promoters, design engineers and site and construction managers. It addresses the main causes of pollution of soil, groundwater and surface waters from construction sites and describes the protection measures required to prevent pollution of groundwater and surface waters and the emergency response procedures to be put in place so that any pollution, which occurs, can be remedied. The guide addresses developments on green field and brownfield sites.

The construction management of the site will take account of the recommendations of the CIRIA guidance to minimise as far as possible the risk of soil, groundwater and surface water contamination. Site activities considered in the guidance note include the following:

- excavation
- earthmoving
- concreting operations

Additional specific guidance is provided in the CIRIA technical guidance on Control of Water Pollution from Linear Construction Projects (Murnane et al 2006).

Surface run-off from wheel washing areas can contain pollutants such as:

- detergents
- oil and fuel
- suspended solids
- grease

Measures, as recommended in the guidance above, that will be implemented to minimise the risk of spills and contamination of soils and waters include:

- Careful consideration will be given to the location of any fuel storage facilities. These will be designed in accordance with guidelines produced by CIRIA, and will be fully bunded to 110% of the storage capacity.
- All vehicles and plant will be regularly inspected for fuel, oil and hydraulic fluid leaks. Suitable equipment to deal with spills will be maintained on site.
- Where at all possible, soil excavation will be completed during dry periods and undertaken with excavators and dump trucks. Topsoil and subsoil will not be mixed together.
- Ensure that all areas where liquids are stored or cleaning is carried out are in a designated impermeable area that is isolated from the surrounding area, e.g. by a roll-over bund, raised kerb, ramps or stepped access.
- Use collection systems to prevent any contaminated drainage entering surface water drains, watercourses or groundwater, or draining onto the land.
- Minimise the use of cleaning chemicals.

- Use trigger-operated spray guns, with automatic water-supply cut-off.
- Use settlement lagoons or suitable absorbent material such as flocculent to remove suspended solids such as mud and silt.
- Ensure that all staff are trained and follow vehicle cleaning procedures. Post details of the procedures in the work area for easy reference.
- The above measures will be implemented, as appropriate along with the following site specific measures:
- Fuel, oil and chemical storage on site will be secure.
- Site storage will be on an impervious base within a secondary containment system such as a bund.
- A spill kit with sand, earth or commercial products that are approved for the stored materials will be kept close to the storage area. Staff will be trained on how to use spill kits correctly.
- Damaged, leaking or empty drums will be removed from site immediately and disposed of via a registered waste disposal contractor.
- Mobile plant will be refuelled in a designated area, on an impermeable base away from drains or watercourses.
- A wheel wash will be installed for use by all construction vehicles leaving site.
- A road sweeper will be used to remove dirt and debris from roads.
- Silt traps will be located around the site to collect run off, with settled solids removed regularly and water recycled and reused where possible.
- A filter drain and silt pits will be located at the base of all embankments, settled solids will be removed from the silt pits regularly.

A bypass petrol interceptor will be installed in the drainage network prior to connection to the public drainage network to prevent any hydrocarbon spills from entering the surrounding drainage network.

3.8 Invasive Species Management

Prior to commencement, a baseline invasive species survey will be carried out at the site to identify the presence and location of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2015)).

If the presence of such species is found during the construction period at or adjacent to the site, particularly in areas where its excavation may be required, an invasive species management plan will be prepared by the Project Ecologist and implemented by the Environmental Officer to prevent the introduction or spread of any invasive species within the site of the works. An invasive species management plan, if required, will set out best practice control methods as summarised in the following sections.

Where importation of soil material is required for the purpose of the capping and topsoil layer, an invasive species survey of the material source will be carried out prior to excavation at source. This survey shall also include the transfer route from the source to the site.

3.8.1 General Best Practice Control Methods

The following general best practice guidelines in the treatment and control of invasive species during construction works are outlined below having regard to guidance documents particularly those issued by Transport Infrastructure Ireland (Tii) and The Best Practice Management Guidelines produced by Invasive Species Ireland.

3.8.2 Site Management

Careful preparation of the site and planning of the works is crucial to successful treatment of invasive species. The following list of guidelines, which is not exhaustive, shall be followed by all on-site personnel. Only those who have been inducted into biosecurity measures on-site may enter the contaminated zones within the works areas. Should any risk of contaminated material escaping be observed by the site supervisor, the management plan for the site must be amended by an appropriately qualified person to mitigate the risk.

3.8.3 Establishing Good Site Hygiene

- A risk assessment and method statement must be provided by the Contractor prior to commencing works.
- Fences will be erected around areas of infestation, as confirmed by test pits and warning signs shall be erected.
- A designated wash-down area will be created, where power-washed material from machinery can be contained, collected and disposed of off-site with other contaminated material. This area will contain a washable membrane or hard surface.
- Stockpile areas will be chosen to minimise movement of contaminated soil.
- Stockpiles will be marked and isolated.
- Contaminated areas which will not be excavated will be protected by a root barrier membrane if they are likely to be disturbed by machinery. Root barrier membranes will be protected by a layer of sand above and below and topped with a layer of hardcore.
- The use of vehicles with caterpillar tracks within contaminated areas will be avoided to minimise the risk of spreading contaminated material.
- A suitably qualified ecologist will be on site to monitor and oversee the implementation of invasive species management plans.

Plant and equipment which is operated within an area for the management of materials in contaminated areas should be decontaminated prior to relocating to a different works area. The decontamination procedures should take account of the following:

- Personnel may only clean down if they are familiar with the plant and rhizome material and can readily identify it.
- Decontamination will only occur within designated wash-down areas.
- Vehicles will be cleaned using stiff-haired brush and pressure washers, paying special attention to any areas that might retain rhizomes e.g. wheel treads and arches.
- All run-off will be isolated and treated as contaminated material.

3.9 Emergency Planning & Response

As required under the Safety, Health and Welfare at Work Act 2005 a Project Supervisor Construction stage (PSCS) will be appointed by the Client for the project and will ensure that construction/installation works are carried out consistent with all existing emergency response plans and procedures.

The emergency management procedure to be employed shall ensures that emergencies such as fires, explosions, accidents, leaks, sabotage or emergencies caused by force majeure, occur as little as possible; if they do, however, occur, it ensures that all counter measures proceed in a controlled manner so that greater damages are avoided and the possible effects upon persons, the environment and property are avoided or limited.

3.10 Environmental Emergency

3.10.1 Preparedness and Response

In the event of an environmental emergency, a procedure for Environmental Emergency Preparedness and Response will be developed prior to commencement of construction and can be implemented by the CMT in order to ensure to minimise environmental impacts. An environmental emergency at the site may include;

- Discovery of a fire within the site boundary.
- Uncontained spillage / leakage / loss of containment action.
- Discharge concentration of potential pollutants in excess of environmental trigger levels.

The general required emergency response actions will be posted at strategic locations, such as the site entrance, canteen and near the entrances to buildings.

A set of standardised emergency response procedures will govern the management of emergency incidents. The main contractor will be required to develop emergency incident response procedures in the detailed CEMP and to develop an Emergency Incident Response Plan.

The Emergency Incident Response Plan will contain emergency phone numbers and the method of notifying Local Authorities, Statutory Authorities and stakeholders. Contact numbers for key personnel will also be included therein. Contractors will be required to adhere to and implement these procedures and ensure that all staff and personnel on site are familiar with the emergency arrangements.

In the event of an emergency incident occurring, the contractor will be required to investigate and provide a report including the following, as a minimum:

- A description of the incident, including location, the type and quantity of contaminant and the likely receptor(s);
- Contributory causes;
- Negative effects;
- Measures implemented to mitigate adverse effects; and
- Any recommendations to reduce the risk of similar incidents occurring.

The Main Contractor will consult with the relevant statutory authority, stakeholders and relevant parties such as the HSA, Fire and Ambulance Services, EPA, IFI, Irish Water, Tii and Cork County Council when preparing and developing response measures. Furthermore, if any sensitive receptor is impacted, the appropriate environmental specialists will be informed and consulted with accordingly.

Any response measures will be incorporated into the Emergency Incident Response Plan that should be disseminated accordingly to construction staff, and the Employer's Representative.

3.11 Emergency Access

The Main Contractor will maintain emergency access routes throughout the construction period and identify site access points for each phase. This shall be developed in consultation with the emergency services.

3.12 Extreme Weather Event

Given the location of the site and the proximity to receiving waters the Main Contractor will be required to consider the impacts of extreme weather events and relates conditions during construction. The contractor will use a short to medium range weather forecasting service from Met Eíreann or other approved meteorological data and weather forecast provider to inform short to medium term programme management, environmental control and mitigation measures.

The detailed CEMP will consider all measures deemed necessary and appropriate to manage extreme weather events and will specifically cover training of personnel and prevention and monitoring arrangement for staff. As appropriate, method statement will also consider extreme weather events where risks have been identified.

3.13 Unexpected Discoveries

The Main Contractor will be required to put in place appropriate procedures to be employed in the event of encountering unexpected archaeological or cultural heritage assets or subsurface contamination during intrusive ground works.

The contractor will be required to develop appropriate procedures as part of their detailed CEMP and the Environmental Officer will ensure that specialists are facilitated to ensure management in accordance with industry best practice and effective compliance with the relevant legislation. All unexpected discoveries will be reported to the appropriate authorities and documented in an appropriate manner.

4.0 WATER POLLUTION CONTROL BEST MANAGEMENT PRACTICES (BMP's)

4.1 Preventative measures

During the construction phase the following procedures shall be adhered to by the contractor in order to protect nearby watercourses from pollutants and general interference.

This section provides a toolbox to aid in proper implementation of water pollution control Best Management Practices (BMPs) on the construction site. This is organised into the following parts:

- **Part I**: Introduction briefly presents:

  (1) the principles of erosion and sediment control,
  (2) common storm water pollutants on the construction site, and
  (3) guidelines for implementing a proper monitoring and inspection program for the construction site, including the use of the Storm Water Pollution Prevention Plan (SWPPP) or Water Pollution Control Program (WPCP) to ensure an effective water pollution control program.

- **Part II**: Project Operations and BMPs:

  identifies typical water pollution control challenges for specific construction operations and the BMPs that are available to meet those challenges.

- **Part III**: BMP Implementation and Troubleshooting:

  provides guidance for installing, maintaining and troubleshooting selected BMPs

Best Management Practices (BMPs) refer to a variety of pollution prevention controls implemented throughout a project site at various times of the project. BMPs outlined here are specifically aimed to control pollution in stormwater runoff during the construction phase of a project.

The principal categories of potential pollutants can be broken down into:

- Sediment Control (SE)
- Tracking Control (TC)
- Non-Stormwater (NS)
- Waste and Materials Pollution Control (WM)

4.2 Principles of Erosion and Sediment Control

The greatest water pollution threat from soil-disturbing activities is the introduction of sediment from the construction site into storm drain systems or natural receiving waters. Soil-disturbing activities such as clearing, grubbing, and earthwork increase the exposure of soils to wind, rain, and concentrated flows that cause erosion. On this site there is further risk of contaminates from the existing imported fill material which will be exposed during the construction phase.

A three-pronged approach is necessary to combat this storm water threat:

- Temporary soil stabilisation practices reduce erosion associated with disturbed soil areas (DSAs).
- Temporary run-on control practices prevent storm water flows (sheet and concentrated) from contacting DSAs.
- Temporary sediment control practices reduce sediment caused by erosion from entering a storm drain system or receiving water.

Soil stabilisation BMPs reduce the erosive impact of rain on exposed soil. Run-on control practices reduce the erosive impacts by preventing storm water flows from contacting DSAs. Sediment control BMPs remove sediment from storm water by ponding and settling, and/or filtering prior to discharge

offsite. It is imperative that soil stabilisation and sediment control BMPs are implemented together to reduce the discharge of sediment from the construction site.

The following conditions on construction sites contribute to erosion caused by storm water flows:

- Larger areas of impermeable structures and surfaces reduce natural infiltration resulting in increased storm water flow volume and velocity.
- Changes to surface flow patterns cause storm water flows to be more erosive.
- Concentration of flows to areas that are not naturally subjected to such runoff volume increases erosion.

Proper management of a construction project minimises or prevents soil erosion and sediment discharges. Good construction management for soil conservation requires an understanding of the following basic principles:

Soil Erosion Control – The First Line of Defence: Soil stabilisation is a key component in the control of erosion. By stabilising DSAs with covers or binders, the exposed soils are less likely to erode from the effects of wind or rain.

Prevent Storm Water Flows from Contacting DSAs - The Second Line of Defence: Another key component in the control of erosion is the diversion of storm water flows around DSAs or the conveyance of flows through DSAs in a non-erosive manner.

Sediment Control – The Last Line of Defence: Storm water runoff may originate from active or inactive DSAs whether or not proper erosion and/or run-on controls have been implemented. Implementing proper sediment control BMPs can reduce sediment amounts in storm water discharges.

Combine Soil Erosion and Sediment Control - Effective Protection: An effective combination of soil erosion and sediment controls should be implemented to prevent sediment from leaving the site and/or entering a storm water drainage system or receiving water.

Soil stabilisation and other erosion control BMPs are not 100 percent effective at preventing erosion. Soil erosion control BMPs must be supported by sediment control BMPs to capture sediment on the construction site.

Sediment control BMPs alone are not 100 percent effective primarily due to their capacity limits. To be effective for storm water protection, the amount of sediment must be reduced at the source using soil erosion control BMPs, and then sediment control BMPs are used to further reduce the sediment that leaves the site or enters the storm drain system.

Inspection and Maintenance – Ensure Protection for the Duration of the Project: Inspection and maintenance are required for all BMPs (soil stabilisation, run-on control, and sediment control) to maintain effectiveness for reducing or eliminating the amount of sediment that leaves a site.

4.3 Common Pollutants on the Construction Site

There are a number of potential storm water pollutants that are common to construction sites.

The soil-disturbing nature of construction activities and the use of a wide range of construction materials and equipment are the sources of contaminants with the potential to pollute storm water discharges. Common construction activities that increase the potential for polluting storm water with sediment include:

- Clearing and grubbing operations
- Demolition of existing structures

- Grading operations
- Soil importing and stockpiling operations
- Clear water diversions
- Landscaping operations
- Excavation operations

Common construction materials with the potential to contribute pollutants, other than sediment, to storm water include the following:

- Vehicle fluids, including oil, grease, petroleum, and coolants
- Asphalt concrete (AC) and Portland cement concrete (PCC) materials and wastes
- Joint seal materials and concrete curing compounds
- Paints, solvents, and thinners
- Wood products
- Metals and plated products
- Fertilisers, herbicides, and pesticides

Construction-related waste must also be managed to prevent its introduction into storm water. Typical waste on construction sites includes:

- Used vehicle fluids and batteries
- Wastewater from vehicle cleaning operations
- Green waste from vegetation removal
- Non-storm water from dewatering operations
- Trash from materials packaging, employee lunch/meal breaks, etc.
- Contaminated soils
- Slurries from sawing and grinding operations
- Wastewater/waste from concrete washout operations
- Hazardous materials waste
- Sanitary waste

4.4 Monitoring And Inspection Program

The Resident Engineer on site will be responsible for ensuring that all personnel monitor the contractor's water pollution control practices and maintain compliance with the approved project waste management plan. This includes reviewing the contractor's plan, reviewing written inspection reports, and conducting field inspections.

5.0 PROJECT OPERATIONS AND BMPs

5.1 Best Management Practices

Table 2 identifies individual BMPs that are applicable to specific construction operations. The BMPs listed in the table are for general consideration during each phase of construction. The indicated BMPs may not be applicable to every construction operation, nor is every possible BMP listed for each construction operation. The Resident Engineer shall determine the appropriateness of an individual BMP to the construction site.

Table 2 - Storm Water BMPs for Construction Operations

Construction Operation	BMPs
Mobilisation	TC-1 Stabilised Construction Entrance/Exit
Clearing/Grubbing	SS-1 Scheduling SS-2 Preservation of Existing Vegetation
	WE-1 Wind Erosion Control
	NS-1 Water Conservation Practices NS-8 Vehicle and Equipment Cleaning NS-9 Vehicle and Equipment Fuelling NS-10 Vehicle and Equipment Maintenance
	NS-1 Water Conservation Practices NS-8 Vehicle and Equipment Cleaning NS-9 Vehicle and Equipment Fuelling NS-10 Vehicle and Equipment Maintenance
Earthwork	SS-2 Preservation of Existing Vegetation
	SC-1 Silt Fence SC-2 Desilting Basin SC-3 Sediment Trap SC-4 Check Dam SC-5 Fibre Rolls SC-6 Gravel Bag Berm SC-7 Street Sweeping and Vacuuming SC-8 Sandbag Barrier SC-9 Straw Bale Barrier SC-10 Storm Drain Inlet Protection
	TC-1 Stabilised Construction Entrance/Exit
	WE-1 Wind Erosion Control
	NS-8 Vehicle and Equipment Cleaning NS-9 Vehicle and Equipment Fuelling NS-10 Vehicle and Equipment Maintenance
PCC and AC Operations	SC-7 Street Sweeping and Vacuuming
	TC-1 Stabilised Construction Entrance/Exit
	NS-3 Paving and Grinding Operations
Mobile Operations	SC-7 Street Sweeping and Vacuuming SC-10 Storm Drain Inlet Protection
	TC-1 Stabilised Construction Entrance/Exit
	NS-8 Vehicle and Equipment Cleaning NS-9 Vehicle and Equipment Fuelling NS-10 Vehicle and Equipment Maintenance
Trenching Operations	SC-7 Street Sweeping and Vacuuming SC-10 Storm Drain Inlet Protection

5.2 Best Management Practice Implementation

5.2.1 Temporary Soil Stabilisation

SS-2 PRESERVATION OF EXISTING VEGETATION

Preservation of existing vegetation involves the identification and protection of desired vegetation.

Applications

- Delineate Environmentally Sensitive Areas
- Delineate areas where no construction activities are planned
- Delineate areas where construction activities will occur at a later date
- Delineate areas outside the project right-of-way or boundary

Key Points

Timing: Areas to be protected should be delineated prior to clearing and grubbing operations or other soil disturbing activities. It is also appropriate for areas where no construction activity is planned or where activity is planned for a later date.

Layout: Areas of existing vegetation that are scheduled for preservation should be clearly marked with a temporary fence. Minimise disturbance by locating temporary roadways, storage facilities, and parking areas away from preserved vegetation.

Tree Preservation: Keep equipment away from trees to prevent root and trunk damage. Trenching should be as far away from tree trunks as possible, typically outside the drip line. Trenches should be filled in as soon as possible to avoid root drying. Fill trenches carefully and tamp the soil to fill in air pockets. Never expose roots to the air.

5.2.2 Temporary Sediment Control

SC-1 SILT FENCE

Silt fence is a temporary linear barrier that captures sediment by ponding and filtering storm water runoff to allow sediment to settle out of the runoff water.

Application

- Below the toe of slopes as required
- Down slope of exposed soil areas
- Around temporary stockpiles as required

Key Points

Installation: Install on a relatively level contour. This means the barrier should be installed as close as possible to a level horizontal plane near the toe of the slope. Turn the end of the barrier up the slope to prevent ponded water from escaping around the end.

Setback: A silt fence should be placed with a setback of at least 1m. Where a 1m setback is not practicable due to site conditions, the fence may be constructed at the toe of slope but should be placed as far from the toe as practicable to increase the ponding area and allow sediment to settle out.

Key In: The bottom of the silt fence must be keyed in or water may flow underneath. A trench should be excavated along the proposed layout line of the fence. After the silt fence stakes have been driven into the trench, backfill over the fence fabric and compact.

Cross Barriers: For silt fence installed on a level contour with long reaches, install cross barriers at a minimum of 150m intervals. For silt fence not installed on a level contour, install cross barriers, at a minimum, where the change in elevation equals 1/3 the height of the silt fence.

Limitations: Do not install silt fence across intermittent or permanent streams, channels, or any location where concentrated flow is anticipated.

Inspection and Maintenance: Perform inspection before and after rain events, every 24 hours during extended rain events, and weekly throughout the rainy season. Should silt fence fabric tear or decompose, replace immediately. Remove sediment deposits when the sediment accumulation reaches 1/3 of the barrier height.

SC-2 DESILTING BASIN

A desilting basin is a temporary basin formed by excavation and/or construction of an embankment so that storm water runoff is temporarily detained, allowing sediment to settle out before the water is discharged.

Applications

- Where storm water can enter a drainage system or receiving water from a construction area
- At outlets of DSAs between 2 and 4 ha in size.

Key Points

Capacity: Desilting basins shall be designed to have a capacity of 100m3 of storage for every 1 ha of contributory area. Basin storage capacity is measured from the top of the basin to the principal outlet. Basins must be designed to drain within 72 hours following storm events.

Configuration: The basin inlet shall be located to maximise travel distance to the basin outlet. The outlet structure should be placed as far away from the inlet structure as possible to maximise travel distance and allow suspended sediment to settle out.

Basin Dimensions: The length of the basin shall be more than twice the width of the basin. Basin depth must not be less than one 1m or greater than 1.5m. Check the approved SWPPP for actual dimensions.

Limitations: Basins generally require excavation of large surface areas so that sediment will settle out efficiently. The availability of right-of-way may limit basin size or deployment on construction sites. Basins may not be located in live streams. Basins may require protective fencing to ensure safety.

Inspection and Maintenance: Inspect basins before and after rainfall events, weekly during the rainy season, and at 24 hours intervals during extended storm events. Check inlet and outlet structures and spillways for signs of erosion, damage, or obstructions. Examine basin banks for seepage and structural soundness. Remove accumulated sediment when the basin storage capacity is 1/3 full.

SC-3 SEDIMENT TRAP

A sediment trap is a temporary basin formed by excavation or by construction of an earthen embankment across a waterway or low drainage area and has a controlled release structure.

Applications

- Permissible where contributing area is less than 2 ha
- Sites where storm water can enter a storm drain or receiving water from a construction area
- As a supplemental control for reducing sediment before it enters a drainage system or receiving water

Key Points

Location Traps: should be excavated in a suitable area or by constructing a low embankment across a swale where failure would not pose a risk to life or property. Traps should provide access for maintenance, including sediment removal.

Configuration: The trap inlet shall be located as far away from the trap outlet to maximise travel distance and allow suspended sediment to settle out.

Dimensions: The length of the trap shall be more than three times the width.

Limitations: Traps generally require excavation of large surface areas to permit settling of sediment. The availability of right-of-way may limit their size or deployment on construction sites. Sediment traps should be limited to drainage areas of 2 ha or less. Traps may not be located in live streams. Traps may require protective fencing to ensure safety.

Inspection and Maintenance: Traps should be inspected before and after rainfall events, weekly during the rainy season, and at 24-hour intervals during extended storm events. Check inlet and outlet structures and spillways for signs of erosion, damage, or obstructions. Examine trap banks for seepage and structural soundness. Remove accumulated sediment when the trap storage capacity is 1/3 full.

SC-4 CHECK DAM

A check dam is a small structure constructed of rock or gravel bags placed across a natural or man-made channel or drainage ditch. Check dams reduce scour and channel erosion by reducing flow velocity and encouraging sediment to settle out.

Applications

- In small open channels that drain 4 ha or less
- In steep channels where storm water runoff velocities exceed 1.5 m/s
- In drainage ditches or channels in which grass linings are being established
- In temporary ditches where a short-term service does not warrant establishment of erosion resistant linings
- In combination with other BMPs such as sediment basins and traps

Key Points

Installation: Install check dams 5m from the outfall device and at regular intervals along the channel based on the erosion characteristics and slope degree of the drainage swale. Swales that are very steep or have a high potential of eroding require check dams placed closer together.

Dimensions: Check dams should be placed at a height and distance as to allow small pools to form behind them but allow high velocity flows (typically a 2-year storm or larger) to safely flow over them without an increase in upstream flooding or damage to the check dam. Check dams should be

constructed to pond runoff flows so that the backwater from the downstream check dam reaches the toe of the upstream dam.

Limitations: Check dams should not be placed in live streams or in channels that are already grass-lined unless erosion is expected, as existing vegetation may be damaged. Check dams are not appropriate in channels that drain areas greater than 4 ha.

Inspection and Maintenance: Check dams require extensive maintenance after storm events or high velocity flows to repair damage. Remove sediment when it reaches 1/3 the check dam height.

SC-5 FIBRE ROLLS

A fibre roll consists of straw, flax, or similar material that is rolled and bound into a tight tubular cylinder and placed at regular intervals on a slope face. Fibre rolls intercept runoff, reduce runoff flow velocity, and release the runoff as sheet flow. Fibre rolls are also used as a filter to remove sediment from runoff.

Applications

- Along the top, face, and at grade breaks of exposed and erodible slopes

Key Points

Installation: Proper fibre roll installation is crucial to ensure effectiveness and performance. Fibre rolls should be placed on a level contour in a shallow trench with a maximum depth of 50 mm to 100mm. The fibre roll should be staked at each end and at regular intervals along its length with a maximum distance of 1.2m between stakes. If more than one fibre roll is placed in a row, the ends of the adjoining rolls should be tightly abutted together and not overlapped.

Vertical Spacing: When used to create storm water benches on a slope, the vertical spacing of the fibre rolls rows is determined by the inclination and length of the slope. For slopes 1:2 (V:H) and steeper and 15m and greater, fibre rolls shall be placed at intervals no greater than 7.5m. For slopes between 1:20 (V:H) and 1:2 (V:H) and 30m and greater, fibre rolls shall be placed at intervals no greater than 15m.

Sediment Control: Fibre rolls are acceptable for use as sediment control and may be used in conjunction with other soil stabilisation methods (soil binders, mulches, etc.) and/or other sediment controls.

Removal: Fibre rolls are typically left in place. If they are removed, dispose of the accumulated sediment and fill in trenches, holes, or depressions to blend in with adjacent ground contours.

Inspection and Maintenance: Inspect fibre rolls prior to and after rain events, and at least daily during prolonged rainfall. Maintenance includes replacing slumping rolls, removing accumulated sediment, and filling in rills. If fibre rolls split, tear, unravel, or become ineffective, replace them immediately.

SC-6 GRAVEL BAG BERM

A gravel bag berm consists of a single row of gravel bags that are installed end-to-end to form a barrier across a slope to intercept runoff, reduce runoff velocity, release runoff as sheet flow, and provide some sediment removal.

Applications

- Along the top, face, and at grade breaks of exposed and erodible slopes.

Key Points

Installation: Proper gravel bag berm installation is crucial to ensure its effectiveness and performance. Gravel bag berms should be placed on a level contour along the slope. Gravel bags should be tightly abutted together and not overlapped.

Bag Design: Bags should be made of a woven polypropylene, polyethylene or polyamide fabric, or burlap material. When full, a bag should be 450mm long, 300mm wide, and 75 mm thick, with a mass of approximately 15kg. Bag dimensions are standardised but may vary based on locally available materials. Alternative bag sizes shall be submitted to the Resident Engineer for approval prior to deployment. Fill material shall be 13mm to 25mm class 2 aggregate base that is clean and free from clay and undesirable materials.

Sediment Control: Although gravel bag berms remove some sediment, they should not be used in place of linear sediment barriers.

Limitations: Gravel bags are sensitive to ultraviolet light resulting in a limited durability that may make them unsuitable for long-term projects. Gravel bag berms are labour intensive. Installation, removal, and maintenance costs should be evaluated when considering this BMP.

Inspection and Maintenance: Inspect gravel bag berms weekly and prior to and after rainfall events during the rainy season. Repair or replace broken or ripped bags, and reshape as necessary. Remove accumulated sediment when it reaches 1/3 the height of the berm. Repair washouts and rills as needed.

SC-7 STREET SWEEPING AND VACUUMING

Street sweeping and vacuuming are practices to remove tracked sediment from public roads in order to prevent sediment and dirt from entering storm drains or receiving waters. Areas of concern include ingress and egress points, portions of roadway within the project limits adjacent to a freeway or other public road, and any other paved surface within project limits that is to remain after construction is complete.

Applications

- Where sediment is tracked onto public or private roadways from the project site

Key Points

Sweepers: Sweepers should have vacuum or other mechanical attachments for collecting dirt and sediment. Adjust brooms regularly to maximise efficiency of sweeping operations. Never use kick brooms or sweeper attachments for the implementation of this BMP.

Inspection: Inspect project ingress and egress points and roadways daily for signs of tracked sediment.

Sweeping Waste Disposal: After sweeping is finished, properly dispose of sweeper waste. Sweeper waste that includes trash and debris should be disposed of at an approved dumpsite. For collected sediment that is free of trash and debris, consider incorporating the sediment back into the project's earthwork operations.

Site Entrances and Exit: Designate a limited number of centralised ingress/egress locations for the site and instruct construction personnel to use only those locations for entering/exiting the project.

SC-8 SANDBAG BARRIER

A sandbag barrier is a temporary linear sediment barrier constructed of stacked sandbags. This type of barrier is designed to intercept and slow storm water sheet flow runoff. Sandbag barriers allow sediment in runoff to settle before the water leaves the construction site. Sandbag barriers can also be used to divert and detain moderately concentrated flows associated with ditches, swales, and storm drain inlets.

Applications

- Along the perimeter of a site
- Below the toe of slopes as required
- Down slope of exposed soil areas
- Around temporary stockpiles as required
- Parallel to a roadway to keep sediment from paved areas
- To divert or direct flow

Key Points

Installation: When used as a linear sediment barrier for slopes, sandbags should be placed along a level contour with the end of each row turned up-slope to prevent flow around the ends. Due to the limited sediment holding capacity behind the bags, they should be used in conjunction with other erosion source controls such as soil binders, covers, and/or mulches to provide effective control.

Setback: A sandbag barrier should be placed with a setback of at least 1m. Where a 1m setback is not practicable due to site conditions, the barrier may be constructed at the toe of slope but should be placed as far from the toe as practicable to increase the ponding area and allow sediment to settle out.

Configuration: Sandbags should be stacked in a pyramid formation. To do this, the base of the barrier should be the widest, with the width decreasing with each higher row. The joints between bags should be staggered for each row.

Cross Barriers: For sandbag barriers not on a level contour and for longer reaches, install cross barriers at a minimum of 150m intervals to prevent concentrated flow.

Limitations: Sandbag materials are sensitive to ultraviolet light resulting in a limited durability that may make them unsuitable for long-term projects. Sandbag barriers are labour intensive. Installation, removal, and maintenance costs should be evaluated when considering this BMP.

Inspection and Maintenance: Inspect sandbag barriers weekly and prior to and after rainfall events during the rainy season. Repair or replace broken or ripped bags, and reshape as necessary. Remove accumulated sediment when it reaches 1/3 the barrier height. Repair washouts and rills as needed. When no longer needed, remove the barrier and accumulated sediment then clean, re-grade, and stabilise the area.

SC-9 STRAW BALE BARRIER

A straw bale barrier is a temporary linear sediment barrier constructed of straw bales. This type of barrier is designed to intercept and slow storm water runoff. Straw bale barriers allow sediment in runoff to settle before water leaves the construction site.

Applications

- Along the perimeter of a site

- Below the toe of slopes as required
- Down slope of exposed soil areas
- Around temporary stockpiles as required

Key Points

Installation: When used as a linear sediment barrier for slopes, straw bales should be placed along a level contour with the end of each row turned up-slope to prevent flow around the ends. Bales should be installed in a shallow trench with ends tightly abutted together.

Setback: Straw bales placed at the toe of slopes should be set back at least 1m from the toe. Where a 1m setback is not practicable due to site conditions, the barrier may be constructed at the toe of the slope but should be placed as far from the toe as practicable to increase the ponding area and allow sediment to settle out.

Configuration: Straw bales should be placed in two rows back to back with a half-bale offset to cover the butted ends of the bales. Key Point #4 – Cross Barriers For straw bale barriers not on a level contour and for longer reaches, install cross barriers at a minimum of 150m intervals to prevent concentrated flow.

Application Limitations: Straw bale barriers should not be used in areas subject to highly concentrated flows such as channels or live streams as they may be easily overtaken or washed away. Straw bale barriers should not be used on paved surfaces, in lined ditches, or for drain inlet protection. Consider using sandbag barriers instead.

Durability Limitations: Straw bales fall apart when removed or degrade when left in place for extended periods. They can be labour intensive to install, remove, and maintain.

Inspection and Maintenance: Inspect straw bale barriers weekly and prior to and after rainfall events during the rainy season. Repair or replace broken or damaged bales as necessary. Remove accumulated sediment when it reaches 1/3 the barrier height. Repair washouts or other damage as needed or required. When no longer needed, remove barrier and accumulated sediment then clean, re-grade, and stabilise the area.

SC-10 STORM DRAIN INLET PROTECTION

Storm drain inlet protection is a practice to reduce sediment from storm water runoff discharging from the construction site prior to entering the storm drain system. Effective storm drain inlet protection allows sediment to settle out of water or filters sediment from the water before it enters the drain inlet. Storm drain inlet protection is the last line of sediment control defence prior to storm water leaving the construction site.

Applications

- Where storm water surface runoff can enter a drain inlet
- Where disturbed drainage areas have not yet been permanently stabilised
- Where ponding will not encroach into traffic
- Where the drainage area is 4 ha or less

Key Points

Identify Drain Inlets: Identify existing and/or planned storm drain inlets that have the potential to receive storm water runoff and discharge from the construction site. For those drain inlets that are to be

protected, determine the most effective method to use. Consider drain inlet protection for active inlets that are downstream of DSAs.

Sandbag Barriers: A sandbag barrier is the most common type of protection due to the flexibility of its use. Sandbag barriers are constructed by placing the bags around the inlet to create a holding area that allows suspended sediment to settle.

Filter Fence: A filter fabric fence is effective in open areas where sheet flows are low and are not expected to exceed 0.14m3/s. Filter fabric fences are installed similarly to silt fences but are constructed to surround the inlet to create an enclosure. Use plastic sheeting or geotextile blankets to stabilise any DSAs within the enclosure to prevent sediment within the enclosed area from entering the inlet.

Sediment Traps: Excavated drop inlet sediment traps are typically used where relatively heavy flows are expected and overflow capacity is needed. A drain inlet sediment trap is constructed by excavating the soils surrounding the inlet to create a temporary trap that detains flows and allows suspended sediments to settle before storm water is discharged from the site.

Inspection: Inspect all inlet protection devices before and after storm events, at 24 hour intervals during extended storms, and weekly during the rest of the rainy season. Check storm drain inlet after several storms to determine if sediment is bypassing inlet protection devices.

Maintenance: Maintenance is critical to ensure that drain inlet protection remains functional. Remove accumulated sediment when it reaches 1/3 the barrier height or 1/3 the holding capacity. For barriers, replace broken or torn bags. For fences, repair/replace fencing material and re-stake fences that are damaged.

5.2.3 Wind Erosion Control

WE-1 WIND EROSION CONTROL

Wind erosion control consists of applying water or other dust palliatives to prevent or alleviate dust nuisance. Dust control shall be applied in accordance with Caltrans standard practices.

Applications

- On all exposed soils that are subject to wind erosion

Key Points

Dust Control Operation: Care should be taken when applying water or palliative to prevent the washing of sediment offsite or into storm drains or receiving waters. Do not apply so much that runoff occurs.

Stockpile and Small Area Management: Cover small stockpiles or small DSAs as an alternative to applying water or dust palliative.

Palliative Application Rates: When applying palliatives or binders as a wind erosion control, refer to the manufacturer's recommendations for guidance.

5.2.4 Tracking Control

TC-1 STABILISED CONSTRUCTION ENTRANCE/EXIT

Stabilised construction access is a defined point of entrance/exit to a construction site that is stabilised to reduce the tracking of sediment (mud and dirt) onto public roads by construction vehicles. Stabilised construction entrances are an effective method for reducing tracking of sediment from the construction site.

Applications

- As a preventive method instead of a treatment method (e.g., sweeping or dust control)
- Where dirt or mud can be tracked onto public roads
- Adjacent to water bodies
- Where poor soils are encountered

Key Points

Design: Site conditions may dictate the design and need for access points. Design a stabilised construction entrance/exit to support the heaviest vehicles and equipment that will use it. The access point should be at least 15m in length or four times the circumference of the largest construction vehicle tire, whichever is greater. Designate access points and require all employees, subcontractors, and others to use them.

Grading: Grade construction entrance/exit points to prevent runoff from leaving the construction site. Route runoff from entrances/exits through a sediment-trapping device before discharge.

Aggregate Characteristics: Stabilise the roadway with aggregate, AC, or PCC, depending on expected usage and site conditions. When access points are constructed from aggregate, aggregate should be 75mm to 150mm in diameter and at least 300mm in depth. Place aggregate over a geotextile fabric.

Alternative Stabilisation Methods: Alternative stabilisation methods such as manufactured steel plates or steel pipes/gratings require written approval of the Resident Engineer. The use of cold mix asphalt or AC grindings is not allowed.

Inspection and Maintenance: Inspect and maintain stabilised construction entrance/exit points. Routinely check for damage and effectiveness. Remove accumulated sediment and/or replace stabilisation material as needed.

5.2.5 Non-Storm Water Management

NS-1 WATER CONSERVATION

Water conservation involves the use of practices that reduce the amount of water used for a given activity. If less water is used, the potential for erosion decreases and the transport of construction-related pollutants offsite is less likely.

Applications

- On all projects where water is used during the course of construction

Key Points

Watering Equipment: Watering equipment should be kept in good working order. Repair leaky watering equipment promptly.

Equipment Washing: Discourage the washing of vehicles and equipment on the construction site. Workers should never wash their personal vehicles on site. Vehicles and equipment that regularly leave the construction site should be washed offsite.

Paved Areas: Paved areas should be swept and vacuumed rather than washed off. Always protect storm drain inlets or receiving waters from sediment or other pollutants susceptible to non-storm water run-off. When possible, direct runoff water to areas where it can percolate into the ground.

Dust Control: When watering for dust control, ensure that watering operations do not cause erosion.

NS-3 PAVING AND GRINDING OPERATIONS

Paving and Grinding Operations include the handling of materials and wastes and the use of equipment associated with pavement preparation, paving, grinding, removal, surfacing, resurfacing, thermoplastic striping, and placing pavement markers.

Application

- During pavement grinding and removal
- During PCC paving
- During AC paving and resurfacing
- During placement of thermoplastic striping and pavement markers

Key Points

Asphalt Concrete (AC): Remove or dispose of grindings and wastes as work progresses. Place AC pieces in embankments above the water table and cover with plastic until they are removed from the site. Remove wastes from the site immediately.

AC Equipment: Coat AC equipment with non-toxic non-foaming products. Clean equipment offsite whenever possible. When paving equipment is kept onsite, place paving equipment on plastic sheeting to capture drips or leaks. Dispose of hardened AC properly.

Wastes: Do not allow wastes, such as AC pieces, PCC grinding residue/slurry (Photo 3), sand/gravel, exposed aggregate concrete residue, or dig-out materials into storm drains or receiving waters. Sweep, vacuum, and collect such wastes and recycle or dispose of properly.

Seal Coats: Do not apply seal coat, tack coat, slurry seal, or fog seal if rain is predicted during the application or curing period. Do not conduct digout operations in the rain. During application of seal coat, tack coat, slurry seal, or fog seal, cover drainage inlets and manhole covers with filter fabrics. Do not apply these materials in the rain.

Thermoplastic Striping: Verify that equipment shut-off valves function properly to avoid thermoplastic leakage. Do not pre-heat, transfer, or load thermoplastic near storm drains or receiving waters. When filling the pre-heater, leave 150mm of space at the top of the container to prevent spills when the equipment is moved. Clean truck beds daily and recycle thermoplastic material when possible.

Raised/Recessed Pavement Markers: Do not transfer or load bituminous materials near storm drains or receiving waters. Verify that all pressure is released before filling melting tank. When filling the melting tank, leave 150mm of space at the top of the container to prevent spills when the equipment is moved.

NS-5 CLEAR WATER DIVERSION

A clear water diversion is a system of structures that intercepts surface water from a running stream or waterway upstream of a project, transports it around the construction site, and discharges it downstream of the site, with minimal water quality impacts. Typical structures used for clear water

diversions include diversion ditches, berms, dykes, slope drains, cofferdams, pipes, and drainage and interceptor swales.

Applications

- Where appropriate permits have been secured
- Where work must be performed in an active drainage system, a running stream, or a water body

Key Points

Permits: Verify that applicable permits have been obtained before the diversion is installed.

During Design: The structure should not constrict waterway flow such that backups or washouts occur due to fluctuations in water depth or flow volume. Materials used to construct diversion structures must be free of potential pollutants such as soil, silt, sand, clay, grease, or oil. At all times during construction, operation, maintenance, and removal, sufficient water flow/volume must be diverted to maintain downstream aquatic life.

During Construction: When possible, construct diversion structures during periods of low or no stream flow. Minimise disturbance and removal of adjacent vegetation. If riparian vegetation is disturbed for construction of the diversion, the vegetation should be cut no lower than ground level and covered with a layer of clean river cobble. The exterior of vehicles and equipment in wet areas of the diversion construction site should be free of petroleum residues and sealed so as to prevent leakage of fuels and oils into the water body if submerged. Only the bucket of an excavator/backhoe may operate in a water body. The main body of the equipment is not to enter the water portions of the water body except to cross the stream to access the work site.

Operation: Barriers should be installed to prevent muddy water from flowing from adjacent construction activity to the stream. Drip pans must be placed under all stationary equipment and vehicles located over water diversions that remain idle for more than one hour. Being in such close proximity to a watercourse, this BMP, and others implemented with it, must be installed correctly and maintained to prevent any discharge. Any incident of discharge requires submittal of a Notice of Non-Compliance.

Inspection and Maintenance: Inspect diversion structures weekly and after significant rain events for damaged linings, sediment buildup, trapped debris, or reduced slope protection. Ensure that debris is removed and linings are repaired promptly.

NS-7 POTABLE WATER/IRRIGATION

Non-storm water discharges that originate from onsite and offsite sources must be properly managed to reduce the potential for pollutants being discharged from the construction site. Sources of these non-storm waters include broken water lines, landscape irrigation, lawn watering, water line flushing, and fire hydrant flushing.

Applications

- All projects susceptible to the above-listed and other non-storm water discharges from the construction site

Key Points

Divert Flows: Where possible, direct potable/irrigation water originating from offsite sources around the construction site or through the site in a way that minimises contact with construction activities.

Onsite Irrigation: Inspect irrigated areas on the construction site for excessive watering. Adjust watering schedules to ensure landscaping receives adequate water but minimises associated runoff. Promptly shut off water to broken lines, sprinklers, or valves and repair as needed.

Water Conservation: Reuse water from line flushing for landscape irrigation.

NS-8 VEHICLE AND EQUIPMENT CLEANING

Wash water from vehicle and equipment cleaning is not to be discharged from construction sites because the rinse water may contain contaminates such as sediment, petroleum/lubricant residues, soaps, or solvents that could enter storm drain systems or receiving waters.

Applications

- All construction sites

Key Points

Offsite Cleaning: Equipment/vehicle cleaning should be conducted offsite. All vehicles that regularly enter and leave the construction site must be cleaned offsite.

Onsite Cleaning: For equipment that must be cleaned on site, the Resident Engineer must be notified in advance. All waste from onsite cleaning operations must be fully contained and disposed of on site and not allowed to discharge into the public sewers or onto the public road.

Wash Area Requirements: The vehicle wash area must be properly identified by sign and located away from storm drain inlets, drainage facilities, and watercourses. It must be paved with concrete or asphalt and have a berm to contain runoff and prevent run-on. It must be equipped with a sump for the collection and disposal of wash water.

Water Conservation: Use as little water as possible and use a positive shut-off valve to conserve on water usage.

NS-9 VEHICLE AND EQUIPMENT FUELING

Potential fuel spills and leaks from vehicle/equipment fuelling operations must be prevented from entering storm drain systems or receiving waters.

Applications

- All construction sites

Key Points

Fuel Offsite: All vehicles and equipment that regularly enter and leave the construction site should be fuelled offsite.

Fuelling Area Location: Designated fuelling areas are selected by the contractor and approved by the Resident Engineer. The fuelling area should be on level grade and must be at least 15m downstream of storm drain facilities or receiving waters. The fuelling area should be protected by a berm or dike to prevent storm water run-on and to prevent storm water from leaving the fuelling area.

Spill Response: Absorbent spill clean-up materials and spill kits must be available in fuelling areas and on fuelling trucks. Spills should be cleaned up immediately. Absorbent materials should be used on small spills. All used absorbent materials must be disposed of properly.

Leak Containment: Drip pans or absorbent pads must be placed under vehicles/equipment if being fuelled in areas other than a dedicated fuelling area with an impermeable surface.

Fuelling Guidelines: Fuelling operations are not to be left unattended. Fuel tanks are not to be topped off. Mobile fuelling trucks must also follow BMP guidelines.

Fuel Nozzles: Fuel nozzles are to be equipped with automatic shut-off to control drips. Where required by Air Quality Management Districts, vapour recovery nozzles shall be used.

NS-10 VEHICLE AND EQUIPMENT MAINTENANCE

Petroleum products, lubricants, solvents, and other pollutants related to vehicle/equipment maintenance must be prevented from entering storm drain systems or receiving waters.

Applications

- All construction sites

Key Points

Offsite: Storage and Maintenance All vehicles and equipment that regularly enter and leave the construction site should be maintained offsite.

Maintenance Area Design: Designated vehicle maintenance areas must be at least 15m downstream of storm drain facilities or receiving waters. For long-term projects, a portable tent or cover over the maintenance area is recommended.

Maintenance Operations: For maintenance involving fluids, place drip pans or absorbent pads under the vehicle unless the work is being done in a dedicated maintenance area constructed over an impermeable surface.

Spill Prevention/Cleanup: All fluid and oil leaks must be cleaned up immediately. The maintenance area must be equipped with appropriate absorbent spill clean-up materials.

Waste Disposal: All used absorbents must be disposed of properly. Waste fluids must be placed in appropriate leak-free containers with secondary containment. All used maintenance materials should be disposed of properly off the construction site. Used fluids, tires, batteries, etc. are not to be dumped or buried on the construction site.

NS-11 PILE DRIVING OPERATIONS

Proper control and use of equipment, materials, and waste products from pile driving operations will reduce the discharge of potential pollutants to the storm drain system or watercourses.

Applications

- All construction sites near or adjacent to a watercourse or groundwater where permanent and temporary pile driving operations take place.

Key Points

Be Prepared: Use drip pans or absorbent pads at all times. However, the equipment should be as leak-free as possible. Have spill kits and clean-up materials available at all pile driving locations. Implement other BMPs as applicable.

Equipment Use: Park equipment over plastic sheeting or equivalent. Plastic sheeting is not a substitute for drop pans or absorbent pads. Use less hazardous products, e.g. vegetable oil, when practicable.

Equipment Storage: Store pile driving equipment away from flow lines, drainage courses, and inlets. Protect hammers and other hydraulic attachments from run-on by placing them on plywood. Cover them with plastic when rain is forecast.

Inspection and Maintenance: Inspect entire pile driving areas and equipment for leaks and spills on a daily basis. Inspect equipment routinely for damage and repair equipment as needed.

NS-12 CONCRETE CURING

Following proper procedures in the use of cure, chemical or water, during construction of concrete structures will minimise pollution through run-off.

Applications

- All construction sites where concrete structures are subject to curing requirements.

Key Points

Use of Chemical Cure: Protect drain inlets prior to application of cure. Use proper storage and handling techniques at all times and have spill kits available at the location of curing. .Avoid over-spraying cure, allowing it to become airborne.

Use of Water Cure: Ensure cure water does not flow to inlets or watercourses but rather to collection areas for infiltration or other means of removal approved by the RE and in accordance with all applicable permits.

Inspection and Maintenance: Ensure that cure is stored, handled, and used properly. Ensure that the Contractor keeps cure containers leak-free and spray nozzles clean.

NS-14 CONCRETE FINISHING

Following proper procedures in performing concrete finishing methods will minimise the impact of potential pollutants on runoff.

Applications

- All sites where concrete finishing operations are performed.

Key Points

Containment: Ensure containment of all waste materials from high-pressure water blasting, sandblasting, grinding, etc. Without containment or water suppression of particles, these operations can become problems.

Disposal: Refer to NS-2, “Dewatering” and the Dewatering Manual for options. Ensure disposal method is approved by the RE and is in compliance with applicable permits in advance of disposal.

Secure the Area: Protect all inlets that may be affected by any concrete finishing work. Direct any water, through none rodible methods, to collection areas for infiltration or other disposal means.

Inspection and Maintenance: Inspect containment structures prior to use, during use, and prior to rainfall. If any repairs are required, ensure these are done in a timely manner and especially before a rain event. After use or at the end of the shift, ensure containment structures and general work area are clean and the wastes are disposed of properly.

NS-16 TEMPORARY BATCH PLANTS

Proper control and use of equipment, materials, and waste products from temporary batch plant facilities will reduce the potential of pollutant discharges to storm drain systems and/or watercourses, reduce air emissions, and mitigate noise impacts.

Applications

- Construction projects where temporary batch plant facilities are used. Batch plants may be on or off site.

Key Points

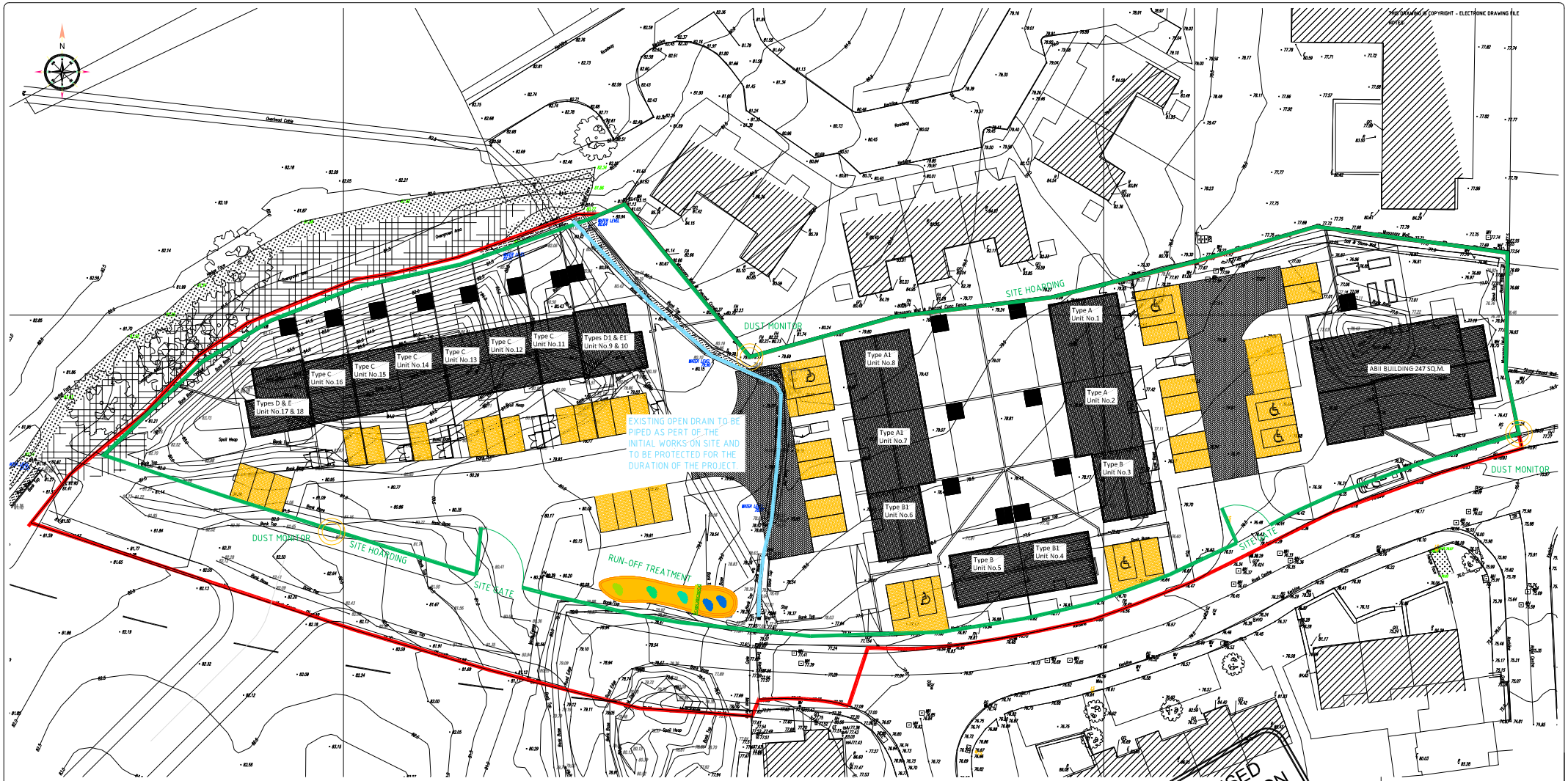
Planning: A Notice of Intent (NOI) must be submitted to the Local Authority for construction and operation of a temporary batch plant. Consideration for minimising nuisance noise and impacts to air and water quality should be observed during construction and operation. Appropriate BMPs must be implemented within the boundaries of the batch plant.

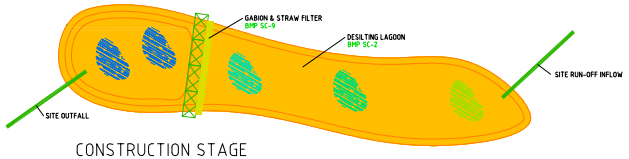
Layout and Design: Batch plants should be located at least 100m away from any recreational area, school, residence, or other structure not associated with the construction project. AC or PCC berms should be constructed around plant equipment to facilitate proper containment and cleanup. Runoff should be directed to a collection area or baker tank.

Operational Procedures: Designate a concrete washout area in accordance with WM-8. All operations should be conducted so as to have no visible emissions including fabric or cartridge type filters for dry material transfers, dust-tight service hatches on silos and auxiliary bulk storage trailers, wet suppression systems at all transfer points, and covered conveyors and transporting vehicles. All plant roads shall be stabilised, watered, treated, or paved so as to control dust and tracking. All entrances and exits shall likewise be stabilised.

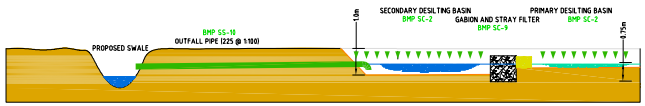
Materials Storage and Disposal: Refer to WM-1, “Material Delivery and Storage” as well as WM-2, “Material Use” for proper handling procedures and secondary containment requirements. All stockpiles within the batch plant boundaries shall be in accordance with WM-3, “Stockpile Management.” Refer to WM-4, 5, 8, and 10 for further discussion of handling and disposal of wastes.

Inspection and Maintenance: Inspect batch plant equipment, components, and BMPs daily during construction and operation.

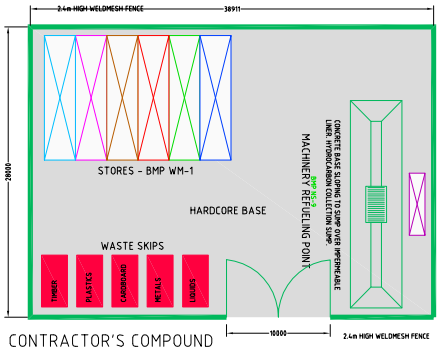




CONSTRUCTION STAGE
SURFACE WATER MANAGEMENT
SCALE 1:200



TEMPORARY SURFACE WATER MANAGEMENT
SCALE 1:100



CONTRACTOR'S COMPOUND
SCALE 1:250

RECEPTION OFFICE (PREFAB)
MEETING ROOM / OFFICES (PREFAB)
CANTEEN / WELFARE FACILITIES (PREFAB)
SMALL PLANT STORE (STEEL)
S&H EQUIPMENT STORE (STEEL)
HAZARDOUS MATERIAL STORE (STEEL)

NOT TO BE USED FOR CONSTRUCTION

NOTES:
1. ALL HOUSE DRAINS TO BE 160mm Ø PVC SN8.
2. LOCAL DRAINS TO RUN AT A GRADIENT OF 1/40 UNLESS OTHERWISE NOTED.
3. DOUBLE GULLIES TO BE PROVIDED AT ALL ROAD SAG CURVES & CUL DE SACS WHERE INDICATED. SEPARATE CONNECTIONS 150mm DIA. SHALL BE PROVIDED FOR EACH GULLY. NO GULLEY SHALL BE MORE THAN 10m FROM A SURFACE WATER CONNECTION.
4. HOUSE DRAINS SHALL NOT PASS THROUGH A PROPERTY THEY DO NOT SERVE.
5. MANHOLES ON HOUSE DRAIN RUNS SHALL BE LOCATED IN PRIVATE PROPERTY IN ALL CASES.
6. FOR SEWER LONG SECTIONS SEE DRAWING No.'s 130 SERIES
7. FOR ROAD CONSTRUCTION DETAILS SEE ORG. No. 151.
8. FOR MANHOLE DETAILS SEE ORG. No. 152.
9. FOR PIPE BEDDING DETAILS SEE ORG. No. 153.
10. ALL PIPES WHICH ARE TO BE TAKEN IN CHARGE BY THE LOCAL AUTHORITY ARE TI BE CONCRETE PIPES COMPLYING WITH I.S. 6 & I.S. 166 OR B.S. 5911.
11. ALL PIPES WHICH ARE TO BE TAKEN IN CHARGE BY IRISH WATER ARE T1 BE CONSTRUCTED IN ACCORDANCE WITH RELEVANT IW CODE OF PRACTICE AND STANDARD DETAILS.

REV	DATE	DESCRIPTION	BY/CHKD/APPD

Client
TUATH HOUSING

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PROPOSED RESIDENTIAL DEVELOPMENT AT MASSEYTOWN, MACROOM, CO. CORK
CONST. ENVIRONMENTAL MANAGEMENT PLAN

Drawn	Scale
POR	1:250
Chkd.	Date
POR	11/2022
Apprd.	Status
EOD	PLANNING P1

Project Number	Rev.
109-72	~
Drawing Number	
181	A1

PHM Consulting
Civil - Structural - Environmental

Social Housing Development

Massytown, Macroom, Co. Cork

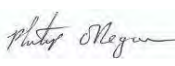
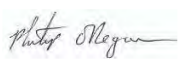
CONSTRUCTION WASTE MANAGEMENT PLAN

November 2022

Social Housing Development
Massytown, Macroom, Co. Cork

Construction Waste Management Plan

Document Title :	CWMP P1
Document Ref(s). :	109-72/17c

Date	Edition/Rev	Status	Originator	Checked	Approved
28/11/2022	First	Planning	P. O'Regan		

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CONSULTANT:
PHM Consulting,
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Limerick.

Contents

1.0 INTRODUCTION

1.1 Brief

PHM Consulting have been engaged by Cork County Council (applicant) to provide engineering design solutions for a proposed residential development on lands at Massytown, Macroom, Co. Cork which is to be the site of a planning application. Engineering design services to cover Roads, Foul Drainage and disposal, Surface water collection and disposal, and Water supply connection to public mains and internal network.

The planning application is for the development of 18 No. residential units, and a standalone building for the purpose of accommodation and ancillary surface car parking, vehicular, pedestrian access to the proposed development via new junctions off the existing internal eatate roads of the Meadowlands Estate, connection to existing public water supply; foul water drainage network, surface water drainage network and all associated site development and landscape works.

The site is located at ITM E533593151354, N573483. Existing ground levels range from 76.0m to 82.00m above ordnance datum (AOD) Malin.

This site is currently Greenfield and zoned for the purpose intended. The site was previously granted permission for the development of housing and existing services were provided with the intent of connection of the subject lands. The application site comprises an overall area of approximately 0.809 Hectares (2.0 Acres) with a single vehicular access route off the Masseytown Road.

This outline Construction Waste Management Plan (CWMP) defines the project specific measures that are to be put in place and procedures to be followed for the scope of construction works, both permanent and temporary, for the envisaged project. Please note this outline CWMP is produced as part of the planning application. It is intended that this will be updated to include more site specific information once the Construction Management Team (CMT) is appointed.

1.2 Scope of the Waste Management Plan

The purpose of the CWMP is to provide information to ensure that the management of construction and demolition (C&D) waste at the site is undertaken in accordance with current legal and industry standards including the Waste Management Act 1996-2011 and associated Regulations:

EPA Act 1992

Protection of the Environment Act 2003

Waste Management Act 1996

Litter Pollution Act 1997 and

The relevant Waste Management Plans.

This CWMP defines the approach to Waste management at the site during the construction phase. Compliance with the CWMP, the procedures, work practices and controls will be mandatory and must be adhered to by all personnel and contractors employed on the construction phase of the project.

The primary applicable legislations governing waste management include:

- Waste Management Act 1996 (No. 10 of 1996) Revised Aug 2020, as amended
- Waste Management (Collection Permit) Regulations (SI No. 820 of 2007), as amended
- Waste Management (Facility Permit & Regulation) Regulations 2007 (SI No. 821 of 2007), as amended
- Waste Management (Licensing) Regulations 2004 (SI No. 395 of 2004), as amended
- Waste Management (Packaging) Regulations 2014 (SI No. 282 of 2014), as amended
- Waste Management (Planning) Regulations 1997 (SI No. 137 of 1997), as amended
- Waste Management (Landfill Levy) Regulations 2015 (SI No. 189 of 2015)
- Waste Management (Hazardous Waste) Regulations 1998 (SI No. 147 of 1998)
- Environmental Protection Act 1992 (No. 7 of 1992), as amended
- Litter Pollution Act 1997 (No. 12 of 1997), as amended
- Planning and Development Act 2000 (No. 30 of 2000), as amended.

The principal aims and objectives of the CWMP is to:

- Assess the planned activities associated with demolition and construction of the project;
- Determine the type, nature and estimated volumes of generated waste;
- Identify any potential environmental impacts from the generated waste;
- Recommend appropriate waste handling and disposal measures;
- Categorise waste material where practicable;
- Promote recycling, reuse and recovery of waste and diversion from landfill;
- Ensure appropriate methods of transportation of waste;

1.3 Project Roles & Responsibilities

The assigned environmental roles and responsibilities for the relevant project personnel are detailed below. Note: Not all roles may be relevant to this particular project and will be engaged as and when necessary:

1.3.1 Construction Director

The Construction Director will have an overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project environmental requirements. The principal duties and responsibilities of this position will include:

- Overall responsibility for the development and implementation of the CWMP;

- Allocating resources to ensure the implementation of the CWMP;
- Participates in the management review of the CWMP for suitability, adequateness and effectiveness; and
- Sets the focus of environmental policy, objectives and targets for the Contractor.

1.3.2 Construction Manager

The Construction Manager is directly responsible to the Construction Director for the successful execution of the project. The principal duties and responsibilities of this position will include:

- To report to the Construction Director on the on-going performance of the CWMP;
- To discharge his/her responsibilities as outlined in the CWMP; and
- To support and augment the CMT and the Environmental Officer through the provision of adequate resources and facilities in the implementation of the CWWP.

1.3.3 Environmental Officer

The CMT Environmental Officer will be responsible for, but not limited to, the following activities:

- Ensuring that the requirements of the CWMP are developed and environmental system elements (including procedures, method statements and work instructions) are implemented and adhered to with respect to environmental requirements;
- Reviewing the Environmental responsibilities of other managed Contractors in scoping their work and during Contract execution;
- To ensure that advice, guidance and instruction on all CWMP matters are provided to all their managers, employees, construction contractors and visitors on site;
- Report to the Construction Manager on the environmental performance of Line Management, Supervisory Staff, Employees and Contractors; and
- Advise site management (including, but not limited to, the site Construction/Commissioning Manager) on environmental matters.

1.3.4 Project Communications Officer

The Project Communications Officer is responsible for conducting all public liaison associated with the construction phase of the project. The responsibilities and duties of the Project Communications Officer include the following;

- Responding to any concerns or complaints raised by the public in relation to the construction phase of the project;
- To liaise with the Environmental Officer on community concerns relating to the environment;
- Ensure the Environmental Officer is informed of any complaints relating to the environment; and
- Keep the public informed of project progress and any construction activities that may cause inconvenience to the local community.

1.3.5 Site Supervisors

CMT Site Supervisors are required to:

- Read, understand and implement the CWMP;
- Know the broad requirements of the relevant law in environmental matters and take whatever action is necessary to achieve compliance. Where necessary seek the advice of the CMT Environmental Officer;
- Ensure that environmental matters are taken into account when considering Contractors' construction methods and materials at all stages;
- Be aware of any potential environmental risks relating to the site, plant or materials to be used on the premises and bring these to the notice of the appropriate management;

- Where appropriate, ensure Contractors method statements include correct waste disposal methods;
- Ensure materials/waste register is completed.

1.3.6 Site Personnel

All Contractors, and other site personnel, on the project will adhere to the following principal duties and responsibilities:

- To co-operate fully with the CMT and the Environmental Officer in the implementation and development of the CWMP at the site;
- To conduct all their activities in a manner consistent with regulatory and best environmental practice;
- To participate fully in the environmental training programme and provide management with any necessary feedback to ensure effective environmental management at the site;
- Adhere fully to the requirements of the site environmental rules.

1.4 Project Environmental Policy

The Applicant recognises and seeks to minimise the impacts of its business on the environment. The appointed Main Contractor will be committed to:

- Carrying out the Project in full compliance with all applicable environmental regulations and to other requirements to which we subscribe.

- Implementing good environmental practice as part of designs, e.g. carry out design reviews, risk assessments, etc. on the relevant project.

- Preventing pollution from activities through a system of operational controls that include written instructions and staff training appropriate to the environmental requirements of their work.

- Continually improving Project environmental performance by setting objectives and targets and implementing them through an environmental programme.

- Informing all project employees about Environmental Policy and explaining what they should do to protect the environment.

- Implementing this Policy through the successful operation of the CEWMP.

This policy will be reviewed periodically, taking into account current and potential future business issues.

2.0 WASTE MANAGEMENT PROCEDURES

2.1 Waste Management Goals

This project will aim to recycle or salvage for reuse to its maximum potential all waste generated on-site. Waste reduction will be achieved through building design, and reuse and recycling efforts will be maintained throughout the construction process.

Waste Prevention Planning: The main contractor will implement procedures that will endeavour to segregate and recycle construction materials which include:

- Paper / corrugated cardboard
- Plastic and glass
- Timber – natural and engineered
- Metals

Project Construction Documents – Requirements for waste management which will be included in all work. The Main Contractor will be contractually required along with all subcontractors to comply with the principals of this CWMP. A copy of this Plan will accompany all Subcontractor Agreements and require subcontractor participation.

A Construction Waste Reduction Plan shall be developed by the Main contractor, implemented and executed as follows and as per Table 1:

- Salvageable materials will be diverted from disposal where feasible.
- There will be a designated area on the construction site reserved for a row of dumpsters each specifically labelled for respective materials to be received.
- Before proceeding with any removal of construction materials from the construction site, the Site Supervisor will inspect containers for compliance with this plan.
- Wood cutting will occur in centralised locations to maximise reuse and make collection easier.
- All hazardous waste will be handled by a licensed hazardous waste haulier.

2.2 Waste Management Communication & Education Plan:

The Main Contractor will conduct on-site pre-commencement meetings with all subcontractors. Attendance will be required for the subcontractor's key field personnel. The purpose of the meeting will be to reinforce to subcontractor's key field employees the commitments made by their companies with regard to the project goals and requirements.

As each new subcontractor comes on site, the recycling coordinators will present him/her with a copy of the Construction Waste Management Plan and provide a tour of the recycling areas.

The subcontractor will be expected to make sure all their crews comply with the CWMP.

All recycling containers will be clearly labelled. Containers shall be located in close proximity to the construction site in which recyclables/salvageable materials will be placed. The selected location will be such that skip collection vehicles will not traverse the construction site. The skips will be located on a hardcore base with a temporary access road. This will eliminate the risk of soil material being removed from the site and deposited on the public road on the wheels of the vehicles.

Lists of acceptable/unacceptable materials will be posted throughout the site.

All subcontractors will be informed in writing of the importance of non-contamination with other materials.

The Site Supervisor shall inspect the containers on a weekly basis to insure that no contamination is occurring and precautions shall also be taken to deter any contamination by the public.

2.3 Keeping of Records

The Construction Manager will ensure that fully detailed records are maintained of any 'incident / event' likely to cause non-compliance and / or harm to the environment. Environmental Incidents/Near Miss Reports are reported and recorded.

Complaints and Follow up Actions on the construction site will be managed by the CMT and contractors will ensure that all complaints are recorded according to CMT requirements.

Each contractor will be responsible for ensuring that a full record and copy of all Safety Data Sheets (SDS) pertaining to their works is kept on file and up to date in their site offices. Contractors will also retain a duplicate copy of all SDSs held by the contractors.

The CMT will be responsible for monitoring the movement and treatment of all waste during the construction phase of the project. Monitoring will be carried out by the CMT who will record the nature, quantities and off-site destination of wastes.

2.4 Monitoring, Audits and Inspections

Periodic inspections by the CMT will address environmental issues including dust, litter, noise, traffic, surface water, waste management and general housekeeping.

An EHS Inspection Audit of the construction site will be carried out by an appointed contractor. Environmental aspects of this audit will be documented. The frequency of these audits (weekly / monthly / other) will be based on the nature of contractor activity.

2.5 Non Conformance and Corrective and Preventative Action

Corrective Action Requests (CARs) will be issued to ensure that prompt action is agreed and committed to, with a view to the effective resolution of any deviations from the CWMP requirements or any environmental issues.

CARs may be raised as a result of:

- An internal or external communication;
- An internal audit;
- A regulatory audit or inspection;
- A suggestion for improvement;
- An incident or potential incident.

All corrective action requests will be numbered and logged.

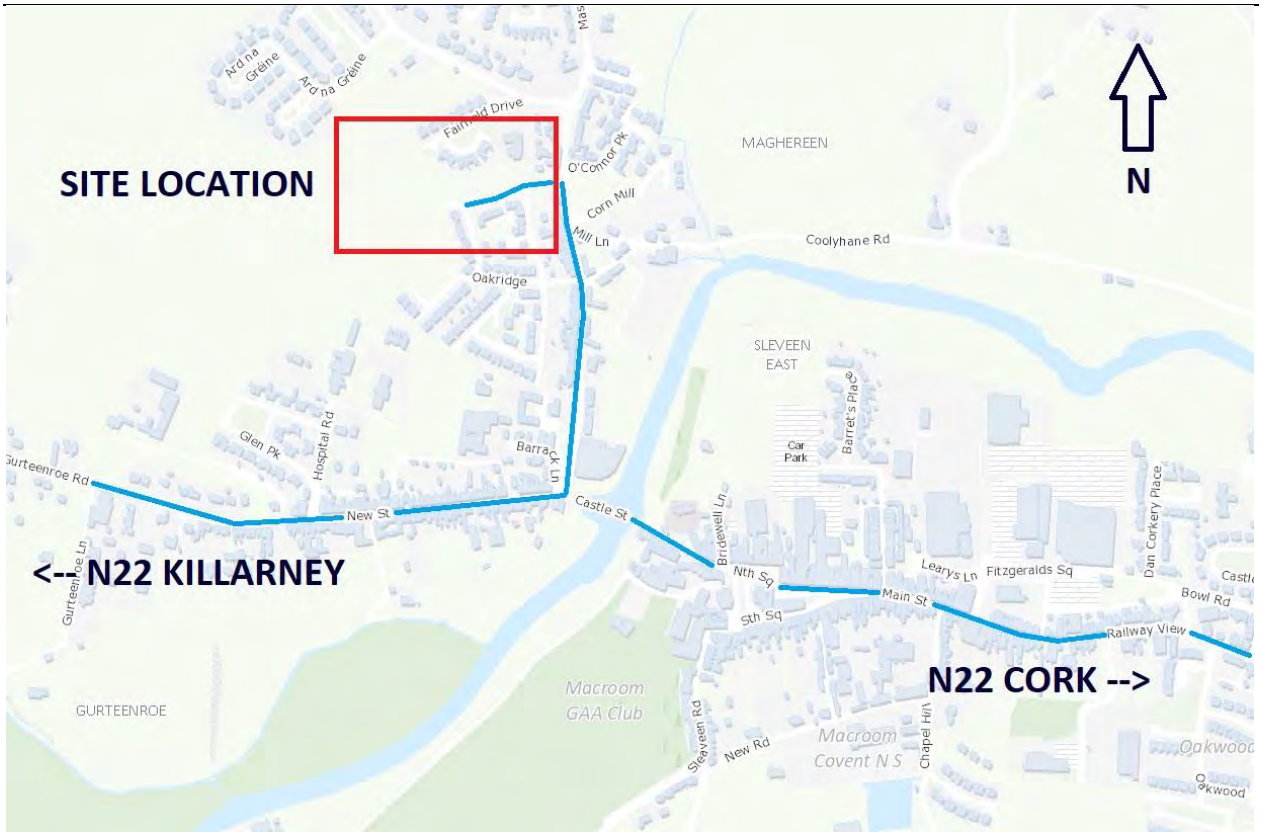

Fig 1 – Site Location Map

3.0 OUTLINE CONSTRUCTION WASTE MANAGEMENT PLAN

3.1 Construction Activities

This section describes the main activities involved in the construction of the proposed development. As the proposed development is located on a greenfield site, there are no demolition works associated with the project.

Stockpiled within the application site there is a volume of soil that was deposited by previous construction contractors associated with the adjacent Meadowlands housing estate. This deposit is located in two locations which are apparent from the topographic survey drawing 109-72-110.

The large deposit to the west of the site measures 55m (L) x 18m (W) and 5m (H) with an approx. Volume of 1750m^3 while the smaller deposit to the east measures 12m (L) x 10m (W) and 3m (H) with an approx. Volume of 100 m^3.

3.2 Construction Schedule

The construction period for the development is expected to last 15 months. The development is not proposed to be phased. The proposed development will involve the following activities:

- Installation of site office, welfare facilities, waste skips, wheel wash area and erection of site hoarding and associated advanced site signage.
- Site clearance – to be limited to areas of construction. A full initial site clearance is not to take place.

- Importation of granular capping material.
- Construction of construction access, cabin bases. Erection of site hoarding and advanced signage in accordance with the traffic management plan.
- Retention and protection of existing boundaries on site.
- Construction of the new roads and dwelling buildings and associated, water supply, services, foul water drainage, stormwater swales, outfall to existing services and landscaping within the site

It is expected that the construction of the proposed development will commence in 2023, subject to planning and other approvals. It is envisaged that the construction activities will be completed in 2024.

3.3 Method Statement for Construction

A Construction Stage Waste Management Plan will be developed by the appointed Main Contractor to include all aspects of the project.

It is anticipated that there will be a single contract to cover all the elements of the proposed development and that the contractor will be required to prepare more detailed CWMP for submission to Cork County Council for approval prior to commencement.

The contractor will be required to comply with all of the performance requirements set out in tender documentation including the statutory consent approvals granted by Cork County Council.

It is the responsibility of the contractor to ensure compliance and to avoid and/or reduce significant adverse effects that have been identified where practicable. Where the contractor diverts from the methodologies and working areas outlined herein and/or defined in the granted planning consent ad associated conditions that may be granted, it would be the responsibility of the contractor to obtain the relevant licences, permits and consents for such changes.

3.4 Housekeeping

The contractor will employ a “good housekeeping” policy at all times. This will include, but not necessarily limited to the following requirement:

- General maintenance of working areas and cleanliness of welfare facilities and storage areas;
- Provision of site layout map showing key areas such as first aid posts, material storage, spill kits, material and waste storage, welfare facilities etc.;
- Maintain all plant, material and equipment required to complete the construction work in good order, clean and tidy;
- Keep construction compounds, access routes and designated parking areas free and clean of excess dirt, rubbish piles, scrap wood, etc. at all times;
- Details of site managers, contact numbers (including out of hours) and public information signs (including warning signs) will be provided at the boundaries of the working areas;
- Provision of adequate welfare facilities for site personnel;
- Installation of appropriate security, lighting, fencing and hoarding at each working area;
- Effective prevention of oil, grease or other objectionable matter being discharged from any working area;

- Provision of appropriate waste management at each working area and regular collections to be arranged;
- Excavated material generated during construction will be reused on site, if deemed acceptable.
- Effective prevention of infestation from pests or vermin including arrangements for regular disposal of food and material attractive to pests will be implemented, if infestation occurs the contractor will take appropriate action to eliminate and prevent further occurrence;
- Maintenance of wheel washing facilities and other contaminant measures as required in each working area;
- No discharge of site run-off or water discharge without agreement of the relevant authorities.
- No discharge of site run-off or water discharge will be acceptable onto public roads or into third party lands.
- Open fires will be prohibited at all times;
- The use of less intrusive noise alarms which meet the safety requirements such as broadband reversing warnings, or proximity sensors to reduce the requirement for traditional reversing alarms;
- Maintenance of public right of way, diversions and entry/exit area around working areas for pedestrians and cyclists where practicable and to achieve inclusive access;
- All loading and unloading of vehicles will take place off the public highway;
- Material handling and/or stockpiling will be appropriately located to minimise exposure to wind;
- Water misting or sprays will be used as required to minimise dust generation during dry or windy periods.

3.5 Waste Management

The CMT will be responsible for the development of a final Construction Management Plan, and to develop final quantities of materials, and construction methodologies and approaches. Quantities of construction waste materials may vary depending on such methodologies. Therefore, the difficulty of estimating waste quantities is noted which depends on the approach of the appointed Main Contractor.

This CWMP will form the basis of the appointed Main Contractor's operational CWMP. Their operational plan will incorporate the elements identified in this plan to promote sustainable waste management in line with the waste hierarchy, and focus on integrating good site management practices to ensure efficiency and reduce potential for any other negative environmental effects.

3.6 Demolition and Spoil Waste

The proposed development does not include demolition of structures.

The existing spoil heaps of soil and stone material have undergone Waste Classification Assessment in the form of a WAC analysis by Enviroguide Consulting.

The objective of the assessment was to complete a waste classification of the stockpiles that need to be removed from the site in order to complete the envisaged project and to enable said removal in accordance with all relevant waste management legislation.

The scope of the assessment included:

- Site visit to inspect and sample stockpiled soil and stone material only;
- Submit soil samples to a UKAS accredited laboratory for analysis of a comprehensive waste classification analytical suite appropriate to the site and waste acceptance criteria (WAC);
- Waste classification of stockpiled soils in accordance with relevant legislation and Environmental Protection Agency (EPA) guidance document 'List of Waste & Determining if Waste is Hazardous or Non-hazardous and Waste Classification' (EPA, 2018);
- Screening the sample analytical results against the landfill waste acceptance criteria (landfill WAC) set out in the adopted EU Council decision 2003/33/EC and the EPA "Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities" (EPA, 2020) as appropriate; and
- Preparation of comprehensive soil assessment report incorporating all support documentation.

The site investigation was completed in January 2022 taking cognisance of industry standards including BS10175-2011 Investigation of Potentially Contaminated Sites Code of Practice and supervised by the on-site Enviroguide Consultant.

The following samples were collected from two (2No.) stockpiles:

- Stockpile 1 (SP1): one (1No.) samples (SP1-1)
- Stockpile 2 (SP2): three (3 No.) samples (SP2-1, SP2-3, and SP2-5)

The stockpile and sample locations are presented in Figure 1.

The soil encountered at each stockpile location (SP1 and SP2) was visually inspected, by the onsite Enviroguide scientist, for composition and to determine if there was any visual or olfactory evidence of anthropogenic contamination.

Four (4No.) samples were collected and placed in appropriate laboratory supplied containers. Each sample container was labelled with a unique sample reference number and stored in cool, dark conditions for transfer to the laboratory. The samples were transported to Element Materials Technology Ltd., a UKAS accredited laboratory, under standard 'Chain of Custody' conditions for a comprehensive suite of analysis.

All soil samples were screened on site for the potential presence of volatile organic compounds (VOCs) using a calibrated MiniRAE Lite+ Photoionisation Detector (PID).

The samples taken from the stockpiles were assessed and classified into a waste category based on the criteria as summarised below:

Waste Category	Classification Criteria
Category A (Inert Soil, Recovery Facility)	Uncontaminated soil and stone free from anthropogenic contamination (including up to 2% non-natural materials such as rubble, concrete brick) as per the EPA 'Guidance on waste acceptance criteria at authorised soil recovery facilities' (EPA, 2020). Note that individual soil recovery / waste permit/ COR facilities may have specific acceptance criteria that vary from this guidance (EPA, 2020) agreed with EPA or Local Authority.
Category B1 (Inert Landfill)	Results found to be non-hazardous using the HazWasteOnline™ application[2]. Analytical results meet the inert waste acceptance criteria (WAC) limit values set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002).
Category B2 (Inert Landfills x3)	Results found to be non-hazardous using the HazWasteOnline™ application[2]. Reported concentrations greater than Category B1 but meet the inert waste acceptance criteria for specific facilities that are licensed by the EPA to accept waste with limit values of up to three time the limit set in 2003/22/EC for example the IMS Hollywood (W0129 02/C) and Walshestown Restoration (W0254-01) .
Category C (Non- Hazardous Landfill)	Results found to be non-hazardous using the HazWasteOnline™ application[2]. Analytical results greater than Category B1 and B2 criteria but less than non-hazardous waste acceptance criteria, which are based on waste acceptance criteria set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002).
Category C1 (Non- Hazardous) with asbestos fibre content <0.001% w/w	As category C and containing <0.001% w/w asbestos fibres.
Category C2 (Non- Hazardous) with asbestos fibre content <0.01% w/w	As category C and containing <0.01% w/w asbestos fibres.
Category C3 (Non- Hazardous) with asbestos fibre content <0.1% w/w	As category C and containing <0.1% w/w asbestos fibres.
Category D (Hazardous for Export)	Analytical results found to be hazardous using the HazWasteOnline™ application.[2]
Category D1 (Hazardous for Export) with asbestos fibre content >0.1% w/w	Hazardous due to presence of fragments of identifiable fragments of asbestos containing material and (if applicable) analytical results found to be hazardous using the HazWasteOnline™ application.[2]

The 4 No. samples were analysed by certified Element Materials Technology Ltd. With the results summarised below:

Sample I.D.	Waste Category and Classification	List of Waste (LoW) Code	Asbestos Results % wet weight (%w/w)
SP1-1	Category B1 (Inert Landfill)	17 05 04 soil and stones other than those mentioned in 17 05 03	No Asbestos Detected
SP2-1	Category B1 (Inert)	17 05 04 soil and stones other than those mentioned in 17 05 03	No Asbestos Detected
SP2-3	Category B1 (Inert)	17 05 04 soil and stones other than those mentioned in 17 05 03	No Asbestos Detected
SP2-5	Category B1 (Inert)	17 05 04 soil and stones other than those mentioned in 17 05 03	No Asbestos Detected
Notes: Number in brackets denotes the sample meets the specified Geochemical Domain Maximum Concentrations and/or Trigger Levels (EPA, 2020) are met for the specified 1, 2, 3, 4 5, 6 and/or 7. '*' = Sample exceeds the EPA Soil Recovery Facility Maximum Concentrations and/or Trigger Levels (EPA, 2020) for all Geochemical Domains 1 through 7.			

Waste Classification Results

All four samples were classified as non-hazardous soil and stone assigned the LoW code 17 05 04 soil and stone other than those mentioned in 17 05 03 based on the observed nature and composition of the sampled material at the time of sampling and the chemical analytical results.

Waste Acceptance Criteria

The analtical results of all four samples meet the inert landfill WAC waste Acceptance Criteria as set out in EU Council Decision 2003/22/EC.

The analytical results for all four samples exceed the Soil Recovery Facility waste acceptance criteria as set out in the EPA guidance (EPA 2020) for the parameter total 17 PAH which has a maximum concentration of 1mg/kg (EPA 2020), the reported analytical results for the total 17 PAH for the four samples ranged between 1.67mg/kg and 4.99mg/kg.

Whilst the material can be classified as inert based on EU Council Decision 2003/33/EC the acceptance criteria at various permitted and licensed soil recovery facilities and waste (landfill) facilities can vary. Consultation with the eventual chosen receiving authorised facility will require verification of compliance with the specific waste acceptance criteria for the facility as set out in the permit or licence for the facility and waste management legislation.

Any material removed from site will be hauliers with valid National Waste Collection Permits for the transportation of material and delivery to receiving facility.

Transportation of material will be carried out strictly in accordance the provisions of this Waste Management Plan.

Reuse of materials on site will be encouraged where it meets the required regulatory and engineering requirements. The quantities for reuse, re-cycling and disposal are to be confirmed by the relevant waste receiver once the Main Contractor has completed the site assessment.

An estimation of the expected tonnage of various waste streams are identified in Tables 3.2, 3.3 & 3.4. A detailed demolition management plan including construction volumes will be recorded by the contractor.

3.7 Construction Waste

It is anticipated that the majority of wastes generated will be suitable for reuse, recovery or recycling and will therefore be segregated to facilitate the reuse, recovery and/or recycling, wherever possible.

A non-exhaustive list of construction waste categories which may be generated during the construction phase of the Proposed Development have been identified below and the appropriate European Waste Catalogue Code for these wastes has been identified in Table 3.1.

Non-Hazardous Waste Streams:

- Topsoil, sub soil, stones, made ground fill from excavations;
- Excess new concrete, brick, tiles and ceramics;
- Excess asphalt and tar products;
- Excess plasterboard;
- Scrap metal;
- Cardboard and other packaging;
- Plastic including wrapping and packaging;
- Waste wood;

- Paper;
- Glass;
- Waste from portable site toilets;
- Canteen and food waste; and
- Damaged materials.

Hazardous Waste Streams:

- Contaminated soils;
- Asbestos;
- Batteries;
- Oils, fuels and lubricants from machinery and equipment; and
- Excess paints.

C&D Waste expected from the construction phase of the Proposed Development:

Waste Material	LoW / EWC Code
Concrete, Bricks, Tiles and Ceramics	17 01
Concrete	17 01 01
Bricks	17 01 02
Ceramics	17 01 03
Mixture of concrete, bricks tiles & ceramics	17 01 07
Wood, Glass and Plastic	17 02
Wood	17 02 01
Glass	17 02 02
Plastic	17 02 03
Bituminous mixtures, coal tar and products	17 03 01*
Bituminous mixtures containing other than those mentioned in 17 03 01	17 03 02
Metals (including their alloys)	17 04
Copper, Bronze, Brass	17 04 01
Aluminium	17 04 02
Lead	17 04 03
Zinc	17 04 04
Iron and Steel	17 04 05
Tin	17 04 06
Mixed Metals	17 04 07
Soil and stones containing hazardous substances	17 05 03*
Soil and stones, other than those mentioned in 17 05 03*	17 05 04
Insulation and Construction Materials	17 06 04
Construction materials containing Asbestos	17 06 05*
Gypsum based construction material	17 08 02
Mixed Construction and Demolition Waste other than those mentioned in 17 09 01, 17 09 02, 17 09 03	17 09 04
Paper and Cardboard	20 01 01
Wood other than that mentioned in 20 01 37	20 01 38
Soil and Stones	20 02 02
Mixed Municipal Waste	20 03 01
Hydraulic oils	13 01 01*
Fuel oils and diesel	13 07 01*
Aqueous liquid waste other than those mentioned in 16 10 01 (to be considered for portable toilet wastes)	16 10 02

3.8 Bulk Excavation

Volumes of soils to be removed are detailed below in Tables 3.2, 3.3 & 3.4 as these are expected to be generated from foundation, services and road reduction excavations. There will be limited opportunity to re-use this material on site and must be removed offsite for onward recovery or disposal.

3.9 Expected Project Waste, Disposal, and Handling

The Main Contractor and C&D waste Manager will ensure that all waste which arises from the construction of the proposed development will be removed from site by an approved waste haulier. These hauliers will be required to hold a valid waste collection permit. Furthermore, all waste materials which are required to be disposed off-site will be reused, recycled, recovered or disposed of at an appropriate facility which holds appropriate registration, permit or licence. The C&D Waste Manager will retain on file up-to-date copies of the relevant collection permits, and facility registrations, permits and licences.

The following Table 3.1a indicated an estimation of the expected waste generation from the proposed development based on the available information to date with the targets for management of the waste streams. The predicted waste amounts are based on an average residential development waste generation rate per m^2, using the EPA National Waste Report guidance for a Tier 2 project.

Table 3.1a: The following table identifies Construction waste materials expected on this project, their disposal method, and handling procedures:

Construction of Proposed Buildings									
Treatment type	Recycle (t)	Energy Recover (t)	Backfill (t)	Disposal (T)	Total (T)	Recycle (%)	Energy Recover (%)	Backfill (%)	Disposal (%)
Metal waste	25	0	-	-	25	100%	0%	0%	0%
Segregated wood, glass & plastic	39	10	-	1	50	78%	20%	0%	2%
Concrete, brick, tile & gypsum	10	0	13	3	25	40%	0%	50%	10%
Waste Bituminous mixtures	8	0	-	2	10	80%	0%	0%	20%
Mixed C&D waste	50	25	38	13	125	40%	20%	30%	10%
Excavated Soil and Stone	0	0	-	2,050	2,050	0%	0%	0%	100%
Spoil Heaps	0	0	-	1,850	1,850	0%	0%	0%	100%
Total	**132**	**35**	**50**	**3,918**	**4,135**				

Given the expected waste streams to be generated from the construction phase of this development it will be necessary to establish disposal and handling procedures on site. The following table proposes methodology for the Reuse/Disposal and Handling of various expected waste streams.

Table 3.1b

Material	ReUse/Disposal Method	Handling Procedure
Clean dimensional wood and palette wood	Keep separate for reuse by on-site construction or by site employees for either heating stoves or reuse in home projects. Recycle at:	Keep separated in designated areas on site. Place in "Clean Wood" skip.
Plywood, OSB, particle board	Reuse, landfill	Keep separated in designated area on site. Place in skip container.
Painted or treated wood	Reuse, landfill	Keep separated in designated area on site. Place in skip container.
Concrete	Recycle to:	Keep separated in designated area on site.
Concrete Masonry Blocks	Keep separate for re-use by on-site construction or by site employees	Keep separated in designated area on site
Metals	Recycle to: Ferrous and non-ferrous metals (banding, stud trim, ductwork, piping, rebar, roofing, steel, iron, galvanized sheet steel, stainless steel, aluminium, copper, zinc & lead)	Keep separated in designated area on site. Place in "Metals" container.
Gypsum Plasterslab	Recycle with supplier:	Keep scraps separate for recycling – stack on pallets provided on site.
Paint	Reuse or recycle at:	Keep separated in designated area on site – Lockable container
Insulation	Reuse, landfill	
Flooring	Reuse, landfill	
Glass	Glass: Recycle at:	Keep separated in designated area on site. Place in container: 'Glass'
Plastics	Plastic Bottles: Recycle at:	Keep separated in designated area on site. Place in container: 'Plastic'
Paper / Cardboard	Recycle at:	Keep separated in designated area on site. Place in container: 'Mixed Paper / Cardboard' container
ACM's	Construction materials containing Asbestos – Specialist handling and disposal.	To be handled by specialist sub-contractor for isolation and disposal.

Based on information available and the current design proposal the following waste material is expected to be generated and to be removed from site in accordance with the measures outlined in this plan.

Table 3.2: In respect to reducing levels of the existing site to formation level for the proposed buildings and services the following volumes are expected:

Excavation Volume Calculation					
Section	**Width**	**Avg. Grd. Lvl.**	**Avg. Inv. Lvl.**	**Length**	**Volume**
	m	m	m	m	m3
S1-S2	0.525	80.294	78.812	18.12	11.251
S2-S3	0.525	79.405	77.842	41.89	27.778
	0.300	0.000	0.000	0.00	0.000
S3.1-S3	0.525	79.030	77.415	9.01	6.220
S3-S4	0.525	78.330	76.684	24.21	17.108
S4-S5(Ext)	0.525	77.700	76.082	5.69	3.935
	0.300	0.000	0.000	0.00	0.000
S10-S11	0.525	77.500	75.602	7.73	6.488
S11-S12	0.525	77.000	75.125	19.00	15.714
S12-S13(Ext)	0.525	76.445	74.573	11.89	9.815
					0.000
F1-F2	0.525	80.244	78.784	19.89	12.116
F2-F3	0.525	79.350	77.930	38.13	22.428
	0.300	0.000	0.000	0.00	0.000
F3.1-F3	0.525	78.875	76.762	3.90	3.714
F3-F4	0.525	78.175	75.928	28.12	28.750
	0.300	0.000	0.000	0.00	0.000
F10-F11	0.525	77.402	75.453	12.61	10.917
F11-F12	0.525	76.825	74.557	26.71	27.598
					203.832
	Width		Depth		
Watermain	0.45		1.2	270	**145.800**
Roads					
Road 1	6			40	
Road 2	6			25	
Road 3	8			60	
Road 4	8			18	
	Length	Nr.	Depth	Width	
Parking	2.5	90	0.6	5	**675.000**
				Total	**1024.632**
Foundations	Perimeter	Internal	Avg Grd Lvl	Form Lvl	Volume
	m	m	m	m	m3
ABII	75.3	105	76.500	75.525	146.5
Unit 1	33	27	78.500	76.900	82.6
Unit 2	33	27	78.000	76.450	80.0
Unit 3	25	14	77.500	75.775	59.1
Unit 4	30	14	77.250	75.675	61.4
Unit 5	30	14	77.250	75.675	61.4
Unit 6	25	14	78.000	77.475	18.0
Unit 7	33	27	79.000	77.925	55.5

Unit 8	33	27	79.500	78.375	58.1
Unit 9/10	30	20	80.500	78.675	79.4
Unit 11	20	10	80.500	78.675	48.4
Unit 12	20	10	80.750	79.125	43.1
Unit 13	20	10	81.000	79.125	49.7
Unit 14	20	10	81.000	79.575	37.8
Unit 15	20	10	81.250	79.575	44.4
Unit 16	28	10	81.500	80.025	50.3
Unit 17/18	30	20	81.500	80.025	64.2
				Total	**1039.6**

3.10 Waste Collection, Handling and Disposal

The CMT will ensure through the establishment of a Waste Contractor Register that all companies engaged by the Main Contractor are legally compliant with respect to waste transport and disposal/recovery/recycling. This includes the requirement that a contractor handles, transports and disposes of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of the planned construction activities.

The Waste Contractor Register will include specific information including Collection Permit numbers as issued by the National Waste Collection Permit Office, Category of materials permitted, vehicle registration numbers and delivery receipts of the waste receiver.

Where waste is to be transported out of the state it must be done in accordance with the Transfrontier Shipment of Waste (TFS) Regulations and must meet the approval of the National TFS office operated by Dublin City Council.

S.I. No. 419/2007 - Waste Management (Shipments of Waste) Regulations 2007

4.0 WASTE MANAGEMENT OPERATIONS AND BMPs

4.1 Best Management Practices

Table 2 identifies individual BMPs that are applicable to specific construction operations. The BMPs listed in the table are for general consideration during each phase of construction. The indicated BMPs may not be applicable to every construction operation, nor is every possible BMP listed for each construction operation. The Resident Engineer shall determine the appropriateness of an individual BMP to the construction site.

Table 4.1 - BMPs for various Construction Operations

Construction Operation	**BMPs**

Mobilisation	WM-1 Material Delivery and Storage WM-2 Material Use WM-4 Spill Prevention and Control WM-5 Solid Waste Management WM-6 Hazardous Waste Management WM-9 Sanitary/Septic Waste Management
Clearing/Grubbing	WM-3 Stockpile Management WM-5 Solid Waste Management WM-7 Contaminated Soil Management
Earthwork	WM-7 Contaminated Soil Management
PCC and AC Operations	WM-1 Material Delivery and Storage WM-2 Material Use WM-3 Stockpile Management WM-5 Solid Waste Management WM-8 Concrete Waste Management
Roadway Construction	WM-1 Material Delivery and Storage WM-2 Material Use WM-3 Stockpile Management WM-5 Solid Waste Management WM-6 Hazardous Waste Management WM-8 Concrete Waste Management WM-10 Liquid Waste Management
Mobile Operations	WM-1 Material Delivery and Storage WM-2 Material Use WM-3 Stockpile Management WM-5 Solid Waste Management WM-6 Hazardous Waste Management WM-8 Concrete Waste Management
Trenching Operations	WM-3 Stockpile Management

4.2 Best Management Practice Implementation

WM-1 MATERIAL DELIVERY AND STORAGE

Materials associated with construction activities must be delivered and stored using practices that prevent these materials from polluting receiving waters. Typical materials include PCC components, petroleum products, pesticides, herbicides, fertilisers, detergents, plasters, acids, lime, glues, adhesives, paints, and solvents.

Applications

- All construction sites with applicable material storage

Key Point

Storage Areas: Store materials indoors in existing structures when available. Temporary storage sheds must meet building and fire code requirements and should be located away from vehicle traffic. Storage instructions should be posted, and employees should be trained in proper storage and delivery procedures.

Hazardous Materials: Do not store hazardous materials directly on the ground. Store liquid chemicals in drums and bags on pallets under cover and in secondary containment. Store materials in original containers with their original product labels.

MSDS: The contractor must provide the Resident Engineer with the Material Safety Data Sheets (MSDS) for all materials stored on the site.

Liquid Materials and Petroleum Products: Do not store incompatible materials in the same temporary storage facility. Allow sufficient space between stored containers to allow for spill cleanup and emergency response access.

Containment: Temporary containment facilities for storage must be of sufficient volume to contain precipitation from a 24-hour, 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater. Accumulated rainwater or spills should be removed from containment areas promptly.

Bagged/Boxed Materials: Store materials delivered in bags and boxes on pallets. Cover bagged/boxed materials on non-working days and prior to rain events to protect materials from wind and precipitation.

Spill Cleanup: Contain and clean up spills immediately in accordance with BMPs detailed in Spill Prevention and Control (WM-4).

WM-2 MATERIAL USE

Materials associated with construction activities must be used in accordance with practices that prevent them from polluting receiving waters. Typical materials include AC, PCC, PCC compounds, petroleum products, pesticides, herbicides, fertilisers, detergents, plasters, acids, lime, glues, adhesives, paints, solvents, and curing compounds.

Applications

- All construction sites with applicable material uses

Key Points

MSDS: The contractor must provide the Resident Engineer with the Material Safety Data Sheets (MSDS) for all materials used on the site.

Paint Materials: Mix paint indoors or in a containment area. Allow time for drying before rain events. Never clean brushes or rinse equipment so waste water enters street, gutter, storm drain, or receiving water. Items used with water-based paint can be cleaned, discharging rinse water to a sanitary sewer. When dry, empty latex paint cans, brushes, etc. can be disposed of with other construction debris. Filter used paint thinner/solvents and reuse. Paint thinners and solvents that cannot be recycled must be disposed of as hazardous waste.

Landscaping-Related Products: The contractor must complete a "Report of Chemical Spray Form" when spraying herbicides and pesticides. Products must be applied by a licensed applicator. Do not over-apply fertilisers or pesticides and follow product usage recommendations. Apply in small amounts, allowing time for product to work in or dry before rain events.

Spill Cleanup: Maintain spill clean-up materials near areas that products will be used.

WM-3 STOCKPILE MANAGEMENT

Construction stockpiles of materials such as soil, PCC, AC, PCC/AC rubble, aggregate base, aggregate sub-base, and asphalt based cold-mix have the potential to pollute receiving waters if not protected from contact with storm water.

Applications

- All construction sites with applicable stockpiles

Key Points

General Guidelines: Stockpile protection is a year-round requirement. Install temporary barriers around stockpile perimeters to prevent contact with storm water when required. Temporary barriers can be berms, dikes, silt fences, straw bales, or sandbag barriers. All active stockpiles are to be protected by linear sediment barriers prior to rain events.

Soil Stockpiles: During the rainy season, cover inactive soil stockpile or protect them with soil stabilisation at all times. During the non-rainy season, cover inactive soil stockpiles or protect them with linear barriers prior to rain events.

Paving Material Stockpiles: During the rainy season, cover inactive stockpiles of PCC, AC, AC/PCC rubble, and aggregate base and sub-base, and protect with a temporary perimeter barrier at all times. During the non-rainy season, cover inactive stockpiles or protect with a linear barrier prior to rain events.

Asphalt Based Cold-Mix Stockpiles: Place active and inactive cold-mix stockpiles on plastic and cover with plastic prior to rain events. The key is to prevent contact between rainfall and run-on with the stockpiles.

WM-4 SPILL PREVENTION AND CONTROL

Spill prevention and prompt appropriate spill response reduces the potential for polluting receiving waters with spilled contaminants. Spills of concern include chemicals and hazardous wastes such as soil stabilisers/binders, dust palliatives, herbicides, growth inhibitors, fertilisers, de-icing products, fuels, lubricants, paints, and solvents.

Applications

- All construction sites where chemicals or hazardous materials are stored or used

Key Points

Spill Types: Be prepared for spills. Locate and clearly label spill kits and used absorbent containers. Respond to all spills immediately upon discovery. The appropriate spill response is determined by the quantity and/or composition of spilled substance, as follows:

〉 A “minor spill” involves a small quantity of oil, gas, paint, etc. that can be controlled by the first responder upon discovery of the spill.

〉 A “semi-significant spill” can be controlled by the first responder with the aid of other personnel and may require cessation of all other activity.

〉 A “significant/hazardous spill” is a spill that cannot be controlled by personnel in the immediate vicinity.

Minor Spill Response

〉 Contain the spill.

〉 Recover the spilled material.

〉 Clean the spill area. Use absorbent materials. Do not hose down the area.

〉 Dispose of clean-up materials appropriately.

Semi-Significant Spill Response:

〉 On impermeable surfaces, surround the spill with absorbent material to contain it. Clean spill using absorbent material.

〉 On dirt areas, construct an earthen dike to contain the spill. Dig up contaminated soil and dispose of properly.

〉 If spill occurs during rain, cover spill area to prevent contaminating storm runoff.

Key Point

Significant/Hazardous Spill Response:

〉 Contractor notifies the RE immediately.

〉 Contractor calls 999 and appropriate emergency response services.

〉 Contractor notifies the Local Authority.

- All verbal notification must be followed up by written reports.

- Contractor obtains services of spill contractor or a HazMat team immediately. Contractor staff is not to attempt cleanup until qualified assistance has arrived onsite.

Education: Train employees regarding the appropriate response for spills for the materials they use. Incorporate spill response procedures into regular safety meetings.

WM-5 SOLID WASTE MANAGEMENT

Solid construction wastes must be collected, stored, and disposed of using practices that minimise contact with storm water. Solid wastes include such items as used brick, mortar, timber, steel, vegetation/landscaping waste, empty material containers, and litter.

Applications

- All construction sites

Key Points

Waste Storage Areas: Solid waste storage areas should be located in an area with little potential for flooding and at least 15m from drainage facilities and receiving waters. Use berms, dykes, or temporary diversion structures to protect stockpiled waste materials from contacting storm water. During foul weather, waste should be stored in watertight skips or securely covered. Salvage or recycle waste as appropriate.

Litter Control: Provide adequate trash receptacles in the yard, field trailer areas, and where workers gather for breaks and meals. Do not place litter receptacles near drainage inlets or receiving waters. All litter within the construction site is to be collected weekly, regardless of the litter's origin. Litter is to be removed from the site by waste hauling contractors.

Skips: Provide an adequate number of watertight skips to collect the anticipated volume of construction waste. Plan for additional skips and skip pickups during demolition phases. Do not place skips near drainage inlets or receiving waters. Full skips are to be removed from the site and disposed of appropriately. Washing out skips on the project site is prohibited.

Litter and Debris: Do not let litter interfere with the functioning of the storm drain system. Ensure that litter and debris are removed regularly from drainage grates and ditch lines.

Hazardous Wastes: Separate potentially hazardous waste from non-hazardous waste. Do not dispose of toxic liquid wastes in skips designated for construction wastes. Dispose of hazardous wastes in accordance with WM-6.

WM-6 HAZARDOUS WASTE MANAGEMENT

Hazardous wastes should be collected, stored, and disposed of using practices that prevent contact with storm water. The following types of wastes are considered hazardous: petroleum products, concrete curing compounds, palliatives, septic wastes, paints, stains, wood preservatives, asphalt products, pesticides, acids, solvents, and roofing tar. There may be additional wastes on the project that are considered hazardous. It is also possible that non-hazardous waste could come into contact with these hazardous wastes, such that they become contaminated and are therefore considered hazardous waste.

Applications

- All construction projects

Key Points

Hazardous Material Use: Use containment berms in fuelling areas. Provide secondary containment in paint mixing areas and paint clean-up areas. Place hazardous waste collection containers at convenient locations.

Hazardous Waste Storage Areas: Ensure that adequate waste storage volume is provided and is located away from storm drains and receiving waters. Provide temporary containment sufficient to contain precipitation from a 24-hour, 25- year storm event, plus 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater. Temporary containment should be impervious to spilled wastes for a minimum of 72 hours. Equip storage areas with appropriate spill clean-up materials. Allow sufficient space between storage containers to allow for spill cleanup and emergency response access.

Hazardous Waste Containers: Store hazardous wastes in appropriate sealed containers that are clearly labelled with contents and starting date of accumulation. Do not mix different types of waste together in one container. Do not store incompatible wastes in the same temporary containment facility. If dry waste containers are not watertight, store containers on pallets. Prior to predicted rain events, cover the containment area.

Disposal: Hazardous waste is to be transported from the site by a licensed hazardous waste transporter and disposed of at an authorised, licensed disposal or recycling facility within 90 days of being accumulated. Properly dispose of rain water removed from temporary containment that may have mixed with hazardous waste.

Education: Contractor and subcontractor employees should be educated regarding identification, storage, and disposal of hazardous wastes. Ongoing hazardous waste training should be incorporated into regular safety meetings.

Inspection and Maintenance: Ensure that hazardous waste storage areas are inspected in conformance with contract provisions. Repair or replace perimeter controls, containment structures, covers, and liners as needed.

WM-7 CONTAMINATED SOIL MANAGEMENT

Contaminated soil on construction sites should be managed to prevent any pollutants from entering storm drain systems or receiving waters. Typical soil contamination is due to spills, illicit discharges, underground storage tank leaks, or aerially deposited lead (ADL). Contaminated soils tend to occur on projects in urban or industrial areas. Soil contaminants and locations are often identified in the project plans and specifications.

Applications

- Areas of contamination as identified on project plans and specifications
- Suspected areas of contamination due to site history, spills, leaks, soil discoloration/odour, abandoned tanks, pipes, or buried debris
- Highway widening project where adjoining soils may contain ADL

Key Points

Aerially Deposited Lead (ADL): Soil from areas with ADL may be used as indicated in the contract special provisions providing that operations result in no visible dust. When excavating soils containing ADL, monitor air quality. Soils containing ADL may also be transported to a licensed landfill or other disposal site. At all times, prevent storm water, groundwater, etc. from mixing with and transporting contamination.

Identification and Coordination: If needed, an approved certified lab shall test suspected soil. Upon confirmation of contamination, contractor shall work with appropriate local agencies to implement appropriate excavation, transportation, and disposal practices.

Stockpiling: Avoid stockpiling contaminated soils. If stockpiling is necessary, cover stockpile with plastic sheeting or tarps, install a berm around stockpile to prevent run-on, and locate the stockpile away from storm drains and receiving waters.

Underground Storage Tank Removal: Obtain required approvals and permits from Local Authority prior to removal. If tank contains liquid or sludge, ensure that it is tested for hazardous substances prior to removal. Test underlying soils to determine if there is contamination. Prevent storm water, groundwater, etc. from mixing with and transporting contaminated substances from the storage tank. Ensure that tank and any liquid, sludge, or contaminated soils are transported and disposed of properly.

WM-8 CONCRETE WASTE MANAGEMENT

Concrete waste materials must be properly managed to minimise or eliminate contact with storm water.

Applications

- On construction sites where new concrete is placed or demolition of concrete structures occurs
- Where concrete slurries are generated such as sawing, coring, grinding, and grooving
- At mortar mixing stations

Key Points

Concrete Slurry Waste: Place temporary berms or sandbags around coring and saw-cutting locations to contain slurry. Vacuum slurry waste or collect it in a temporary lined pit and allow it to dry. Dispose of concrete waste in compliance with Solid Waste Management (WM-5).

Temporary Concrete Washout: Wash out concrete trucks in designated areas only. Locate washout facilities a minimum of 15m from storm drains or receiving waters. Keep the washout areas away from areas of construction traffic. A sign shall be installed at each location in accordance with Chapter 8 - Roadworks Signage. The facility shall have a pit or berm to provide sufficient volume to contain all concrete waste resulting from washout. Allow concrete waste to dry and then dispose of on a regular basis

Above Grade Washout Facilities: Above grade facilities shall be constructed as shown in the details. A minimum length and width of 3m is recommended, but the area should have sufficient volume to contain the anticipated waste. The lining material shall be a minimum of 1000 Guage polyethylene sheeting, free of holes or other defects.

Below Grade Washout Facilities: Below grade facilities shall be constructed as shown in the details. A minimum length and width of 3m is recommended, but the area should have sufficient volume to contain the anticipated waste from operation. The lining material shall be a minimum of 1000 Gauge polyethylene sheeting, free of holes or other defects. Commercial type lath and flagging shall be used.

Inspection and Maintenance: Washouts should be maintained to provide a minimum 100mm freeboard for above ground facilities and 300mm freeboard for below grade facilities. Maintenance includes removal and disposal of hardened concrete as previously described. Existing facilities must be cleaned or additional facilities constructed when the washout is 75% full.

Washout Removal: Materials used to construct the facility become the property of the contractor and shall be removed and disposed from site, all depressions shall be backfilled and repaired.

WM-9 SANITARY/SEPTIC WASTE MANAGEMENT

This BMP includes procedures to prevent the introduction of wastes from construction site toilet facilities to storm drains or receiving waters.

Applications

- All construction sites that use temporary or portable sanitary/septic waste systems

Key Points

Installation: Temporary sanitary facilities should not be located near drainage facilities or receiving waters, nor should they be located in areas that will collect water. If the site is deemed to be a high wind area by the RE, the facilities shall be secured to prevent overturning.

Sanitary Sewer Discharge: Discharges direct to the sanitary sewer should be in compliance with Local Authority requirements. Ensure that the temporary facility is properly connected to the sanitary sewer to prevent illicit discharges.

On-Site Disposal: Waste water shall not be discharged or buried within the site. Ensure that any on-site disposal systems comply with local authority requirements.

Inspection and Maintenance: The contractor's Water Pollution Control Manager shall monitor sanitary/septic waste storage and disposal procedures weekly. Ensure that the sanitary/septic facilities are maintained in good working order and wastes are transported offsite by a licensed service.

WM-10 LIQUID WASTE MANAGEMENT

This BMP includes procedures to prevent pollutants related to non-hazardous liquid wastes from entering storm drains or receiving waters. Liquid wastes include drilling slurries, drilling fluids, wastewater that is free from grease and oil, dredgings, and other non-storm water liquid discharges not covered by separate permits. This BMP does not apply to the following:

〉 Dewatering operations (See NS-2)

〉 Solid wastes (See WM-5)

〉 Hazardous wastes (See WM-6)

〉 Concrete slurries (See WM-8)

〉 Liquid wastes covered by specific laws or permits

Applications

- All construction sites where liquid wastes are generated

Key Points

Capture: Capture all liquid wastes that have the potential to impact water entering the storm drain system. Use temporary dykes or berms to direct surface flow of liquid wastes to a containment structure or device. If liquid waste contains sediment, capture and treat the flow to remove sediment or capture in a containment structure to allow sediment to settle.

Containment: Contain liquid wastes in a controlled area that is structurally sound, leak-free, and provides sufficient storage for the anticipated volume. Appropriate structures include holding pits, sediment basins, roll-off bins, and portable tanks. Locate the containment structure such that accidental releases do not discharge to storm drains or receiving waters or threaten health or safety.

Disposal: Some liquid wastes may require testing and certification that they are non-hazardous before an appropriate disposal method is selected. Liquid waste may need to be treated to remove sediment or other pollutants prior to disposal. Typical liquid waste disposal requires Dewatering (NS-2) with disposal of resulting solids per Solid Waste Management (WM-5).

Inspection and Maintenance: Frequently inspect liquid waste containment areas and capturing devices for damage. Repair as needed.

PHM Consulting
Civil - Structural - Environmental

Social Housing Development

Masseytown, Macroom, Co. Cork

FLOOD RISK ASSESSMENT

December 2022

Social Housing Development
Masseytown, Macroom, Co. Cork

Flood Risk Assessment

Document Title :	Flood Risk Assessment P1
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Date	Edition/Rev	Status	Originator	Checked	Approved
13/12/2022	First	Planning	P. O'Regan	P. O'Regan	P. O'Regan

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Contents

1.0 INTRODUCTION

PHM Consulting have been engaged by Cork County Council (applicant) to provide engineering design solutions for a proposed residential development on lands at Masseytown, Macroom, Co. Cork which is to be the site of a planning application. Engineering design services to cover Roads, Foul Drainage and disposal, Surface water collection and disposal, and Water supply connection to public mains and internal network.

The planning application is for the construction of a new housing development consisting of:

18 No. Residential Units plus 1 no. Acquired Brian Injury Ireland (ABII) 5-bed communal dwelling consisting of:

4 No. 1 bed, 2 person single storey units.

4 No. 2 bed, 4 person single storey units.

6 No. 2 bed, 4 person two storey units.

4 No. 1 bed, 2 person own door apartments

1 No. ABII, 5-bed communal dwelling

2 No. paved homezone areas, a total of 41 No. car parking spaces including visitor parking and designated parking. Ducting to 1 No. future EV charging point for each residential unit, and 4 No. visitor spaces. Soft landscaping including green spaces, planting, and tress. Connection to public utilities. All associated site works.

Access to the proposed development will be via two new junctions off the existing internal eatate roads off the Meadowlands Estate, connection to existing public water supply; foul water drainage network, surface water drainage network.

The site is located at ITM E533593151354, N573483. Existing ground levels range from 76.0m to 82.00m above ordnance datum (AOD) Malin.

This report outlines the provision of services for a proposed housing development as described above.

This site is currently Greenfield and zoned for the purpose intended. The site was previously granted permission for the development of housing and existing services were provided with the intent of connection of the subject lands. The application site comprises an overall area of approximately 0.809 Hectares (2.0 Acres).

2.0 TOPOGRAPHY

An electronic topographical survey of the site has been carried out for the purpose of the preparation of the design of the roads and infrastructure of this proposed development. All surveyed information has been tied into National Grid Reference system and Ordnance Survey Malin.

The general topography can be viewed on Drg 109-79-110 with the lands falling from a high point located to the north of the site and falling in a southern direction to the existing estate road.

The lands are currently undeveloped. The site is bounded to the north by Fairfield Drive Estate, to the south by the Meadowlands Estate, to the east by existing properties and to the west by open agricultural lands.

3.0 FLOOD RISK ASSESSMENT

3.1 Site Background

A review of current available information has been undertaken in terms of the location of the site and the potential of flooding in the locality of the site. Refer to Section 3.4.

The OPW CFRAMS – Lee Catchment Flood Risk Assessment and Management Study was also consulted.

The objectives of the CFRAMS are to:

- Produce detailed flood mapping that identifies and maps out the existing and potential future flood risk within the study area
- Build up the information base needed to make informed and effective decisions in relation to managing flood risk
- Identify measures and options for managing flood risks, both in local high-risk areas and across the whole study area
- Prepare a Flood Risk Management Plan for each Unit of Management that sets out how OPW, local authorities and stakeholders should work together to create sustainable and cost-effective ways of dealing with flood risk now and into the future

Given the location of the subject site and having consulted the CFRAMS data it was noted that the site of the proposed development is located in close proximity to lands potentially subject to predicted Fluvial Flooding – 1% AEP (100-yr) & 0.1% AEP (1000-yr) Events. In accordance with Section 5.28 of 'The Planning System and Flood Risk Management, Guidelines for Planning Authorities November 2009' – a flood risk assessment is therefore required.

3.2 Scope of the FRA

Flood risk assessments can be undertaken at a range of scales relevant to the planning process. The key scales of FRA are:

- Regional (for regional planning guidelines);
- Strategic (for city or county development plans or local area plans); and
- Site Specific (for master plans and individual site planning applications).

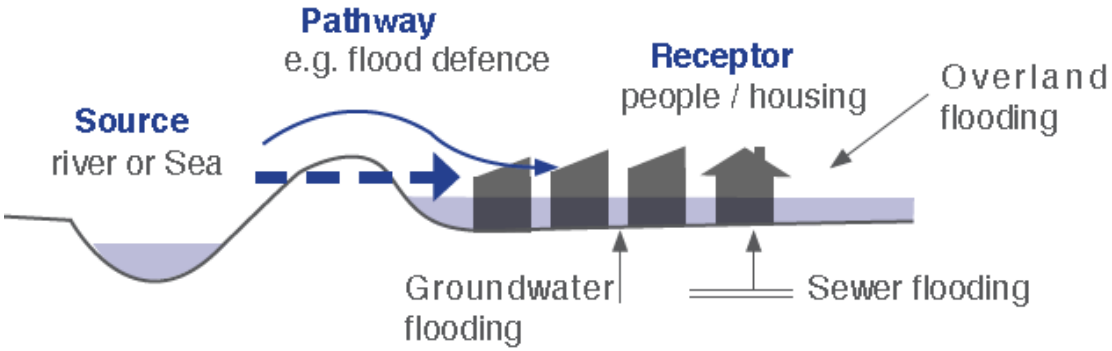
General principles of flood risk assessment

Flood risk assessments should (be):

- Proportionate to the risk scale, nature and location of the development;
- Undertaken by competent people, such as a suitably qualified hydrologist, flood risk management professional or specialist water engineer;
- Undertaken as early as possible in the particular planning process;
- Supported by appropriate data and information, including historical information on previous events, but focusing more on predictive assessment of less frequent or more extreme events, taking the likely impacts of climate change into account;
- Clearly state the risk to people and development and how that will be managed over the lifetime of the development;
- Focused on addressing the impact of a change in land use or development on flood risk elsewhere, ensuring that any such change or development must not add to and should, where practicable, reduce flood risk;
- Consider the vulnerability of those that could occupy the development, including arrangements for safe access and egress; and
- Consider the modification to flood risk that infrastructure such as raised defences, flow channels, flood-storage areas and other artificial features provide, together with the consequences of their failure.

3.3 Source-Pathway-Receptor Model

- The assessment of flood risk requires a thorough understanding of the sources of flood water (e.g. high sea levels, intense or prolonged rainfall leading to runoff and increased flow in rivers and sewers), the people and assets affected by flooding (known as the receptors) and the pathways by which the flood water reaches those receptors (e.g. river channels, river and coastal floodplains, drains, sewers and overland flow).
- The Source-Pathway-Receptor (S-P-R) Model has become widely used to assess and inform the management of environmental risks.



Source-Pathway-Receptors of Flooding

Flood risk assessments require identification and assessment of all three components:

- The probability and magnitude of the source(s) (e.g. high river levels, sea levels and wave heights);

- The performance and response of pathways and barriers to pathways such as floodplain areas and flood defence systems; and

- The consequences to receptors such as people, properties and the environment.

The ultimate aim of a flood risk assessment is to combine these components and map or describe the risks on a spatial scale, so that the consequences can then be analysed. FRAs need to consider the situation both as it is now, and also how it might change in the future. Such consideration should include changes in climate (which impact largely on sources), the construction of flood protection or drainage schemes within the locality by others, the deterioration of existing and proposed defences, the operational performance of screens and pumps over time both locally and provided by development (which all modify the pathways) and the introduction, through development, of receptors into areas at risk of flooding.

Given the proposed development a Site-specific Flood Risk Assessment is required which aims to assess all types of flood risk for the new development. The FRA is to identify the sources of flood risk, the effects of climate change on this, the impact of the development, the effectiveness of flood mitigation and management measures and the residual risks that remain after those measures are put in place. Must be carried out in all areas where flood risk has been identified but the level of detail differs if a SFRA at development plan level has been carried out.

3.4 Stages in the assessment of flood risk

The stages of assessment are:

Stage 1 Flood risk identification – to identify whether there may be any flooding or surface water management issues related to the proposed development site that may warrant further investigation.

Stage 2 Initial flood risk assessment – to confirm sources of flooding that may affect the proposed development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. The extent of the risk of flooding should be assessed which may involve preparing indicative flood zone maps. Where existing river or coastal models exist, these should be used broadly to assess the extent of the risk of flooding and potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures; and

Stage 3 Detailed risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to the proposed development, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

A Stage 1 and Stage 2 Flood Risk Assessment has been carried out and the results presented in this report in order that there is sufficient information available about the site such that an informed decision can be made on the flood risk of the site.

Flood Risk Zones

The guidelines give guidance on flood risk, its identification, assessment and management in areas of potential development. The guidelines recommend a precautionary approach when considering flood risk management in the planning system. The core principle of the guidelines is to adopt a risk based

sequential approach to managing flood risk and to identification of flood zones for rivers and coastal flooding.

Flood Zones:

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three types of flood zones defined for the purpose of these Guidelines:

Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1:100 year for river flooding or 0.5% or 1:200 for coastal flooding);

Development in Flood Zone A should be avoided and/or only considered in exceptional circumstances such as in cities or towns or in the case of essential infrastructure.

Flood Zone B - where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1:1000 year and 1% or 1:100 year for river flooding or 0.1% or 1:1000 year and 0.5% or 1:200 year for coastal flooding);

Development in Flood Zone B should be limited to developments of a less vulnerable nature such as retail, commercial and industrial uses. Developments such as hospitals, care homes, residential, emergency services and infrastructure provisions should not be located within this zone without satisfying the requirements of the Justification Test.

Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1:1000 year for both river and coastal flooding)

Development in this zone is generally appropriate from a flood risk perspective.

4.0 STAGE 1

4.1 Potential Sources

Stage 1 requires the identification of potential sources of flooding to be established through the desktop review of available information and the on-site assessment.

Possible sources of information can include:

- Predictive and historic flood maps, and Benefiting Lands Maps, such as those at www.floodmaps.ie;
- Predictive flood maps produced under the CFRAM Studies;
- River Basin Management Plans and reports;
- Previous Strategic Flood Risk Assessments;
- Expert advice from OPW who may be able to provide reports containing the results of detailed modelling and flood-mapping studies, including critical drainage areas, and information on historic flood events, including flooding from all sources;

- Consultation with Local Authorities who may be able to provide knowledge on historic flood events and local studies etc.
- Topographical maps, in particular digital elevation models produced by aerial survey or ground survey techniques;
- Information on flood defence condition and performance;

The gathered information particular to the local area of Macroom is presented as follows:

Mapping:

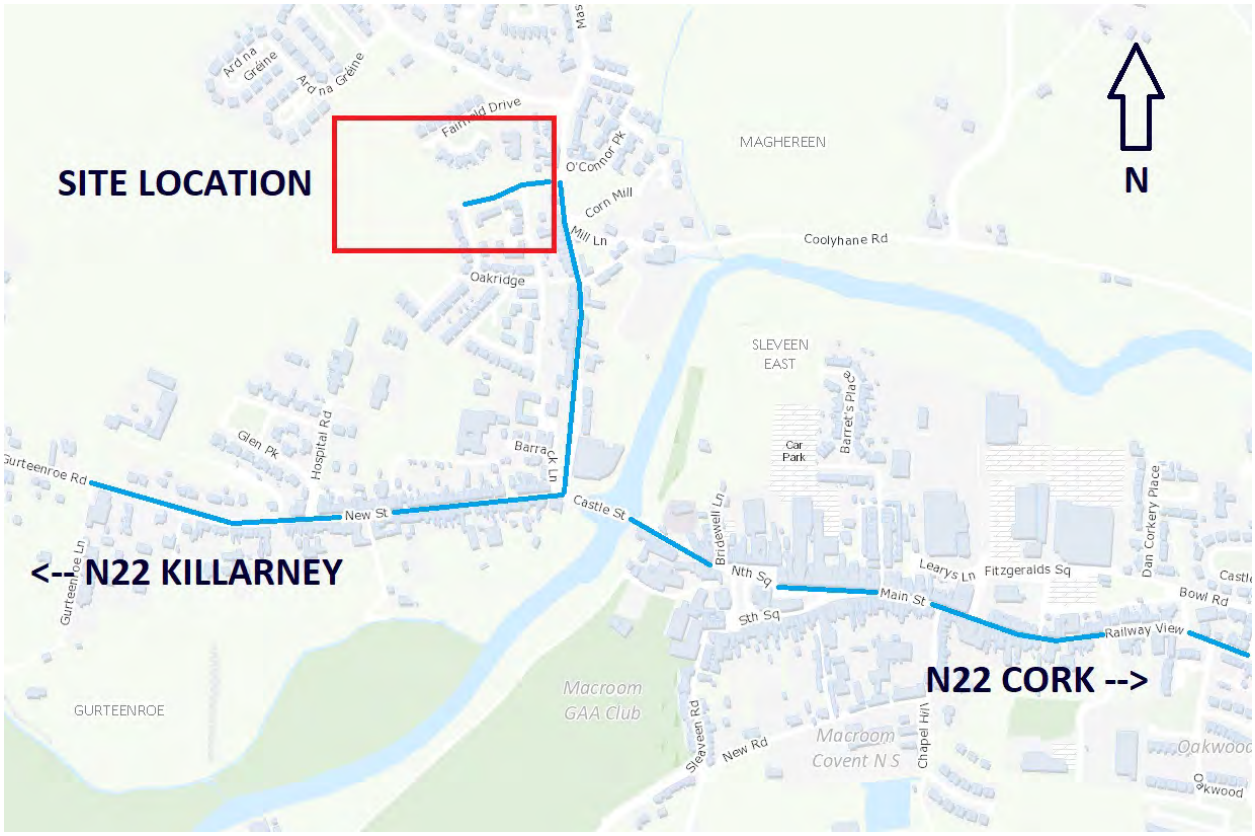


Fig 4.1 - A location map

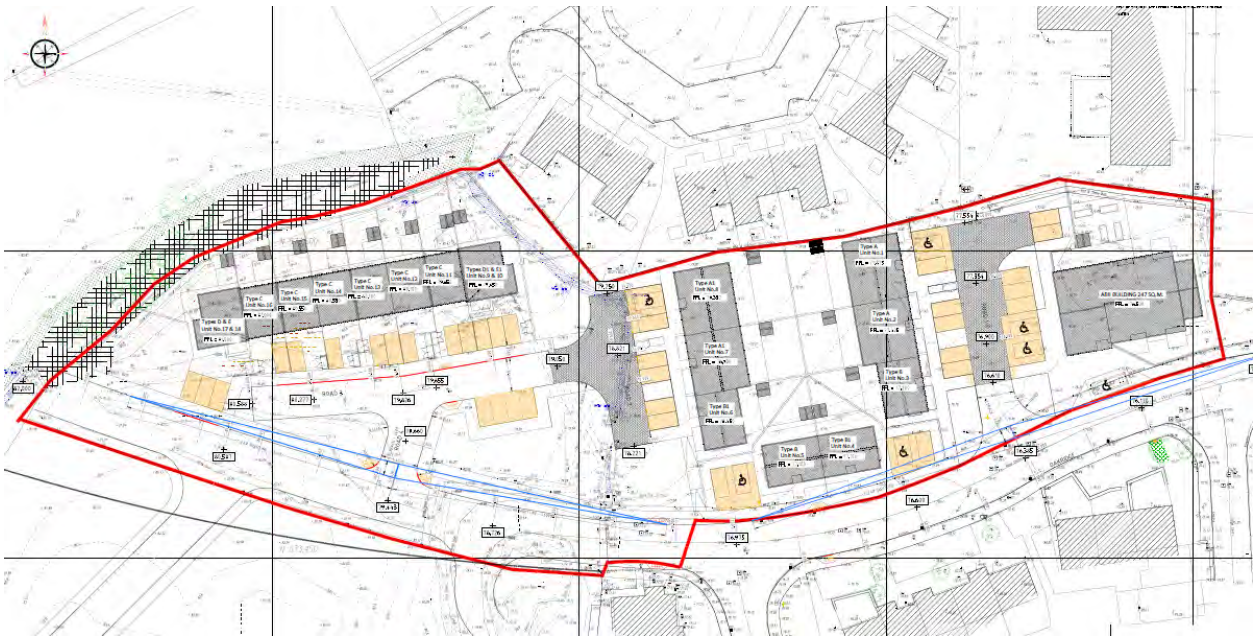


Fig 4.2 - A Plan that shows existing site and proposed development.

A completed digital contoured survey has been carried out of the site and the adjoining lands. This survey is included separately in the drawing package of this application. Refer to drawing 109-72-110.

The proposed development is contained with the RED line boundary as identified generally on Fig 4.2.

Elements such as service connections and discharge location extend outside of this line – refer to detailed drawings included separately as part of this application.

Ordnance Survey Ireland:

Historic Ordnance Survey mapping do not identify the area of the proposed development as being 'Liable to Flooding'.

Office of Public Works:

From the OPW records the nearest flood events are shown on the attached. Full report is included at the end of this section.

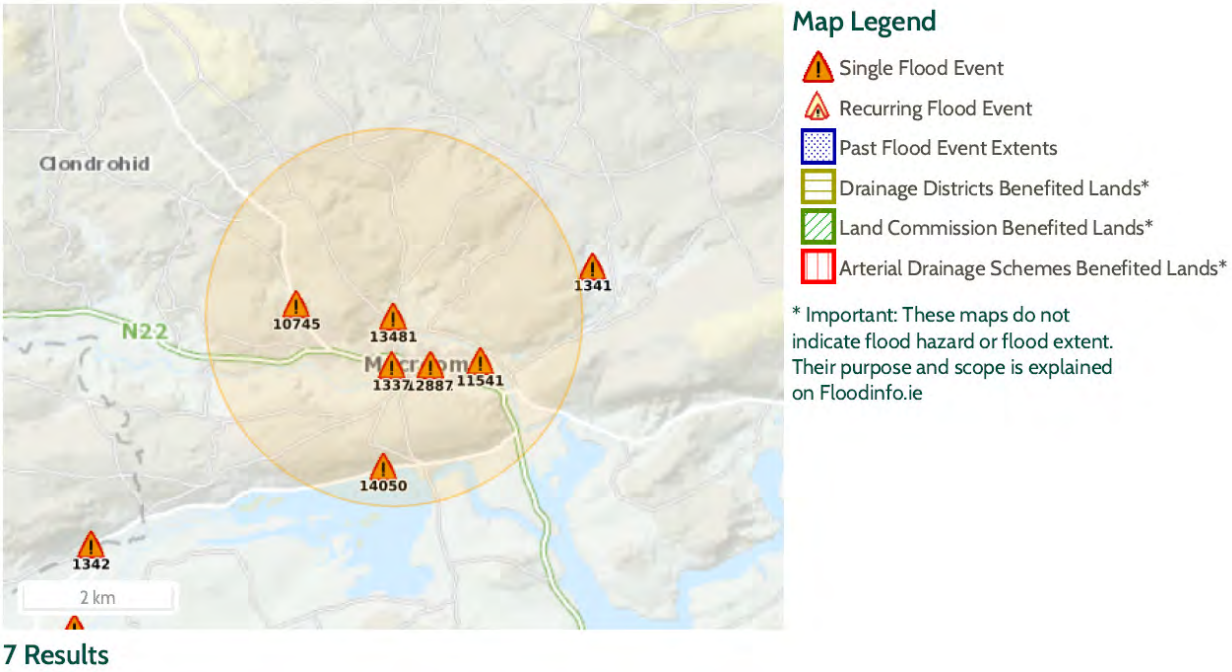


Fig 4.3 – Recorded Flood Events

Of the 7 results the events which occurred in close proximity to the site include:

13481 – 29/12/2015 - No Report Provided

1337 – 04/08/1986

2 No. Reports provided which are of particular relevance to the vicinity of the site.

1) 20120309 SW Macroom Sullane data REPORT prepared in March 2012

Summary (Extract)

An amount of historic flood data (levels) has been gathered in the Masseytown area of Macroom and upstream and downstream of this area. Flood levels have been gathered for the 1986 and 2009 flood events.

Of particular note is the record of a recurring flood level (that impacts on an electric motor in a Mill in the area) and the record of one flood level at the gauge downstream on the same date as one of the floods affecting the electric motor in the Mill. At the gauge this is the highest recorded incident (though there are many gaps in the record and it is now known that the gauge missed a number of large floods), but at the Mill, the level of the electric motor has been equalled or exceeded 5 times since 1986. The level of the Motor at the Mill and the highest recorded flood level at the gauge both approximately sit on the same flood profile, and this is at or above the 0.1% AEP (1000 year return period) estimated flood profile from the Lee CFRAM study.

The record at the gauge downstream of Masseytown is short and now can be seen to have missed a significant number of large events. However, it is also be noted that the highest level recorded by the gauge (3.377m), while it may be an outlier compared to the 8 or so years of annual maximum data available, now can be regarded as valid record. This level sits on or above the 0.1% AEP profile estimated flood profile from the Lee CFRAM study. It is not known to the writer if the 15 minute data containing this record was available to the Lee CFRAM study team during the study.

Finally, it was observed that the Survey drawing of the Bridge prepared for the study, and the Hydraulics Report, show and refer to (respectively) the town bridge as a 9 arch bridge, when, in fact the Bridge has 10 arches. It seems likely that the bridge has been modelled as having 9 arches rather than 10.

Table 1: Flood Levels at Masseytown Mill.

Level.	*Description.*
m AOD Malin	
68.816	*1986 flood level at doorstep of house*
68.809	*1986 flood level from Tide Mark in Mill*
68.069	*2009 flood level from partial tide mark in Mill*
67.929	*Level of top of Motor – flooded four times since installation in 1988*
67.229	*Level 0.1m over floor – floods reach this level regularly (every year or second year)*
67.459	*Approx level (not surveyed directly) of floor in machinery room.*

2) Report updated September 2022

In February and March 2012 data was gathered by OPW in the Masseytown area of Macroom relating to the impact on property and infrastructure of the flood which occurred on August 5th and 6th 1986.

The N22 Cork to Killarney road was flooded immediately west of Macroom bridge. About 200m of the road from Macroom Bridge going north to Masseytown was flooded. Further flooding of this road occurred in the vicinity of the Mill at Masseytown.

It is estimated that between 15 & 20 properties were flooded in this flood event. One property some distance downstream of the bridge had about 1.7m of water on a low floor in the property.

The following flood levels were gathered. Most of these were surveyed or estimated by OPW (after property owners or occupiers advising as to the level reached by the flood).

Flood Levels for 1986 flood in Macroom

Chainage	*1986 Flood Level*	
m	*m AOD*	*Comment*
4850	*70.06*	*Surveyed upstream of bridge February 2012 OPW*
4523	*68.81*	*Surveyed at property February 2012 OPW*
3340	*66.587*	*Surveyed at WWTP site March 2012*

12887 – 24-08-2012 – No Report Provided

Lee CFRAMS:

The development site falls under the catchment of the Sullane River which is a tributary of the Lee. As such it is within the modelled Lee river basin. As part of the Hydraulic and Hydrology Reports a series of predictive flood maps are available for reference.

Below is aa snip of the predicted (Current Scenario) flood model mapping with various nodes along the river.

The node closest to the bridge is Ref.: 5SUL_4837

The table contained predicts the following levels:

1 in 10 yr (10% AEP) - 68.95m AOD

1 in 100 yr (1% AEP) - 69.47m AOD

1 in 1000 yr (0.1% AEP) - 69.91m AOD

	Water Level (mOD) per AEP		
Node Label	WL 10%	WL 1%	WL 0.1%
5SUL_6570	70.11	70.62	71.06
5SUL_6389	70.05	70.54	70.99
5SUL_6272	69.85	70.37	70.87
5SUL_6099	69.66	70.22	70.73
5SUL_5948	69.59	70.18	70.70
5SUL_5819	69.51	70.12	70.65
5SUL_5709	69.44	70.06	70.61
5SUL_5568	69.36	69.99	70.53
5SUL_5448	69.32	69.96	70.52
5SUL_5325	69.31	69.95	70.51
5SUL_5170	69.29	69.93	70.49
5SUL_5081	69.25	69.89	70.45
5SUL_4970	69.23	69.87	70.43
5SUL_4837	68.95	69.47	69.91
5SUL_4719	67.52	67.93	68.25
5SUL_4611	67.32	67.75	68.08

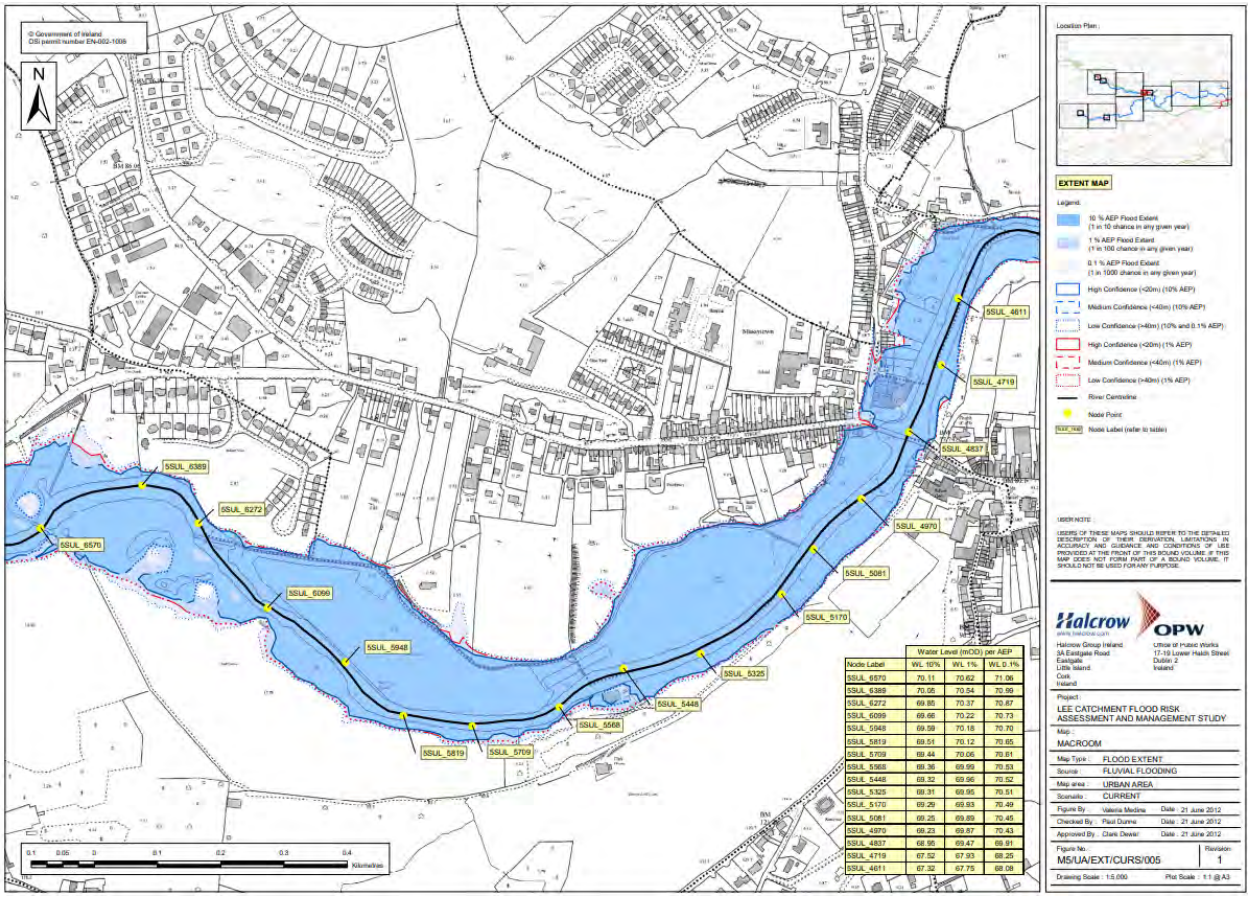


Fig 4.4 – Lee CFRAMS Map M5/UA/EXT/CURS/005

5.0 STAGE 2

5.1 Sources of Flooding

Confirm sources of flooding that may affect the proposed development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. The extent of the risk of flooding should be assessed which may involve preparing indicative flood zone maps. Where existing river or coastal models exist, these should be used broadly to assess the extent of the risk of flooding and potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures

The site of the proposed development is located within a land holding of approximately 0.809 Ha. The proposed works comprise of the construction of 18 No. residential units, and a standalone building for the purpose of accommodation and all associated site infrastructure.

The Finished Floor Level of the lowest proposed dwelling is 76.50m OD Malin.

The lowest point of the proposed road networks will be at a level of 76.30m OD Malin to tie in with the existing access road of the Meadowlands estate.

Given the predicted 1:1000 yr Fluvial Flood Event Level of 68.08m OD Malin at the Sullane River – All Dwellings will be at least 6.5m above the highest predicted water level.

Fluvial Flooding is deemed not a risk.

There is no history of flood risk from groundwaters in this area. Subsoils are derived chiefly from sandstone deposits with Moderate permeability.

Infrastructural failure is also not considered a risk in relation to this site as there are no major infrastructural supply mains in the locality.

The topography of the land in the area of the rises in a north-westerly direction. The lads behind the western portion of the site rises rapidly. This land is currently agricultural. With the houses backing onto this land there is potential for pluvial flow in the direction of the houses resulting in water ingress to rear gardens. Currently there is an open drain along this north western boundary. It is proposed to provide along this line a filter drain which will capture any run-off from the lands behind. This collector drain will be piped through the development and discharged to the surface water system. Presently this open drain discharged to the surface water collection system of the Meadowlands estate. No change to the current regime is proposed.

The filter drain will be finished at a level below the level of the private gardens and will follow the current open drain route thereby providing an overland flow path without interruption.

Consequently, there is no risk of Pluvial Flooding.

5.2 Flood Mitigation Measures

- All surface waters to be collected and discharged will be to at a predevelopment run-off rate from the overall Meadowlands estate as provided under the overall lands development planning permission.

5.3 Conclusions & Justification

Flood Risk of the application site has been assessed in accordance with The Planning System and Flood Risk Management Guidelines.

This Flood Risk Assessment has been compiled in consultation with the OPW Floodmaps database and the Lee Catchment Flood Risk Assessment Management.

The proposed development being the development of a Residential Housing scheme and associated infrastructure on a site located at Masseytown, Macroom.

Having carried out a desktop review of the available information and a visual site assessment (walk-over) and collected level information specific to the site the following are our conclusions.

The application site is outside of lands at risk from either pluvial & fluvial flooding and is considered to be within Flood Zone C.

The site is not at risk from ground water flooding.

The natural drainage topography of the land is in the constant direction. The proposed development is not in the natural flowpath of fluvial flood waters.

The lowest site level is 76.3m OD Malin. The predicted 1:1000 yr event of Fluvial flooding is 69.91m OD at a point on the Sullane River which is of close proximity to the site.

The development is considered to be within Flood Zone C and is not at risk for extreme flood events as predicted in the Lee CFRAM study. The development will not impact of current areas of flood risk. The proposed development is in line with the Development Plan Zoning. There are no significant existing infrastructural services which may give rise to accidental flood risk.

Appendix A

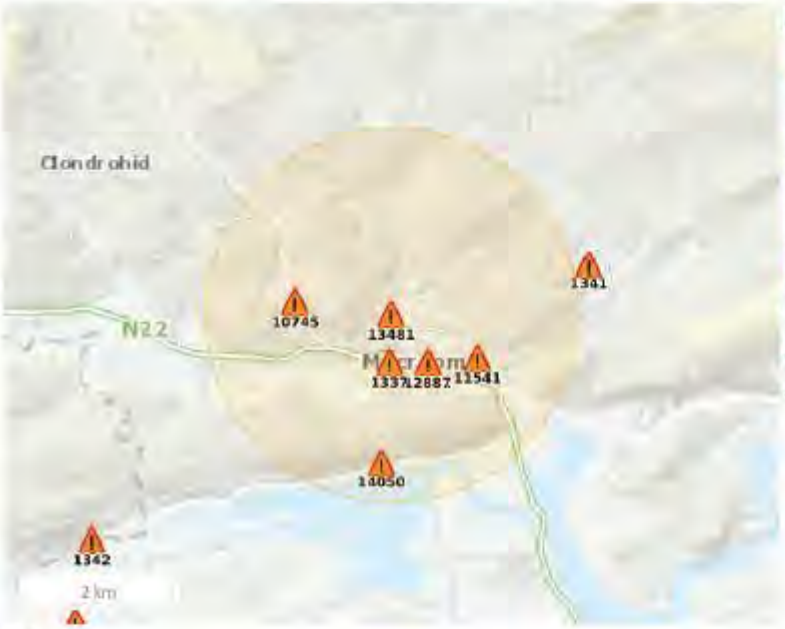
OPW Flood Report

Past Flood Event Local Area Summary Report

Report Produced: **7/12/2022 17:42**

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

This report has been downloaded from www.floodinfo.ie (the "Website"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

7 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Flooding in Macroom 19th November 2009 (ID=11541)	19/11/2009	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
2.	Sullane Macroom August 1986 (ID=1337)	04/08/1986	Approximate Point
	Additional Information: Reports (4) Press Archive (4)		
3.	Flooding at Macroom on 29/12/2015 (ID=13481)	29/12/2015	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		
4.	Flooding at Toonsbridge on 23/02/2021 (ID=14050)	23/02/2021	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		
5.	Flooding at Macroom on 24/08/2012 (ID=12887)	24/08/2012	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		
6.	Gurteenroe Macroom 10 January 2008 (ID=10745)	10/01/2008	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Macroom Co.Cork on 24th August 2012 (ID=12022)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

PHM Consulting
Civil - Structural - Environmental

Social Housing Development

Masseytown, Macroom, Co. Cork

DRAINAGE ASSESSMENT

December 2022

Social Housing Development
Masseytown, Macroom, Co. Cork

Drainage Assessment

Document Title :	Drainage Assessment P1
Document Ref(s). :	109-72/17e

Date	Edition/Rev	Status	Originator	Checked	Approved
13/12/2022	First	Planning	P. O'Regan		

CLIENT:
Cork County Council
County Hall
Carrigrohane Road
Cork

CONSULTANT:
PHM Consulting,
11 Mallow Street,
Limerick.

Contents

1.0 INTRODUCTION

PHM Consulting have been engaged by Cork County Council (applicant) to provide engineering design solutions for a proposed residential development on lands at Masseytown, Macroom, Co. Cork which is to be the site of a planning application. Engineering design services to cover Roads, Foul Drainage and disposal, Surface water collection and disposal, and Water supply connection to public mains and internal network.

The planning application is for the construction of a new housing development consisting of:

18 No. Residential Units plus 1 no. Acquired Brian Injury Ireland (ABII) 5-bed communal dwelling consisting of:

4 No. 1 bed, 2 person single storey units.

4 No. 2 bed, 4 person single storey units.

6 No. 2 bed, 4 person two storey units.

4 No. 1 bed, 2 person own door apartments

1 No. ABII, 5-bed communal dwelling

2 No. paved homezone areas, a total of 41 No. car parking spaces including visitor parking and designated parking. Ducting to 1 No. future EV charging point for each residential unit, and 4 No. visitor spaces. Soft landscaping including green spaces, planting, and tress. Connection to public utilities. All associated site works.

Access to the proposed development will be via two new junctions off the existing internal eatate roads off the Meadowlands Estate, connection to existing public water supply; foul water drainage network, surface water drainage network.

The site is located at ITM E533593151354, N573483. Existing ground levels range from 76.0m to 82.00m above ordnance datum (AOD) Malin.

This report outlines the provision of services for a proposed housing development as described above.

This site is currently Greenfield and zoned for the purpose intended. The site was previously granted permission for the development of housing and existing services were provided with the intent of connection of the subject lands. The application site comprises an overall area of approximately 0.809 Hectares (2.0 Acres).

2.0 TOPOGRAPHY

An electronic topographical survey of the site has been carried out for the purpose of the preparation of the design of the roads and infrastructure of this proposed development. All surveyed information has been tied into National Grid Reference system and Ordnance Survey Malin.

The general topography can be viewed on Drg 109-79-110 with the lands falling from a high point located to the north of the site and falling in a southern direction to the existing estate road.

The lands are currently undeveloped. The site is bounded to the north by Fairfield Drive Estate, to the south by the Meadowlands Estate, to the east by existing properties and to the west by open agricultural lands.

There is no history of flooding of these lands. A review of available hydrometric data from the OPW has been undertaken. Located to the south of the site a distance of 400m is Macroom Town Bridge. A Hydrometric Station (19101) is located adjacent. The highest recorded Annual Maximum Flood Level is provided which occurred in 2020 to a level of 68.065m AOD.

3.0 DRAINAGE ASSEMESSMENT

3.1 Storm Water Drainage

This chapter outlines the way in which the storm water runoff from the proposed development is to be managed and discharged.

The proposed development is located on lands adjacent the existing residential development known as Meadowlands. The subject site was previously included within the overall development lands and included as part of the original development previously planned for the lands.

Planning Permission P0554023 was granted in 2005 for Construction of 248 Residential Units, 5 No. Retail Units and 1 No. Créche.

This previously granted permission provided for stormwater management with restricted discharge and outfall to the Sullane River. Stormwater treatment in the form of a Petrol Interceptor was included as part of the drainage strategy.

The majority of the lands to which this permission was granted has been constructed and the subject application lands form part of same.

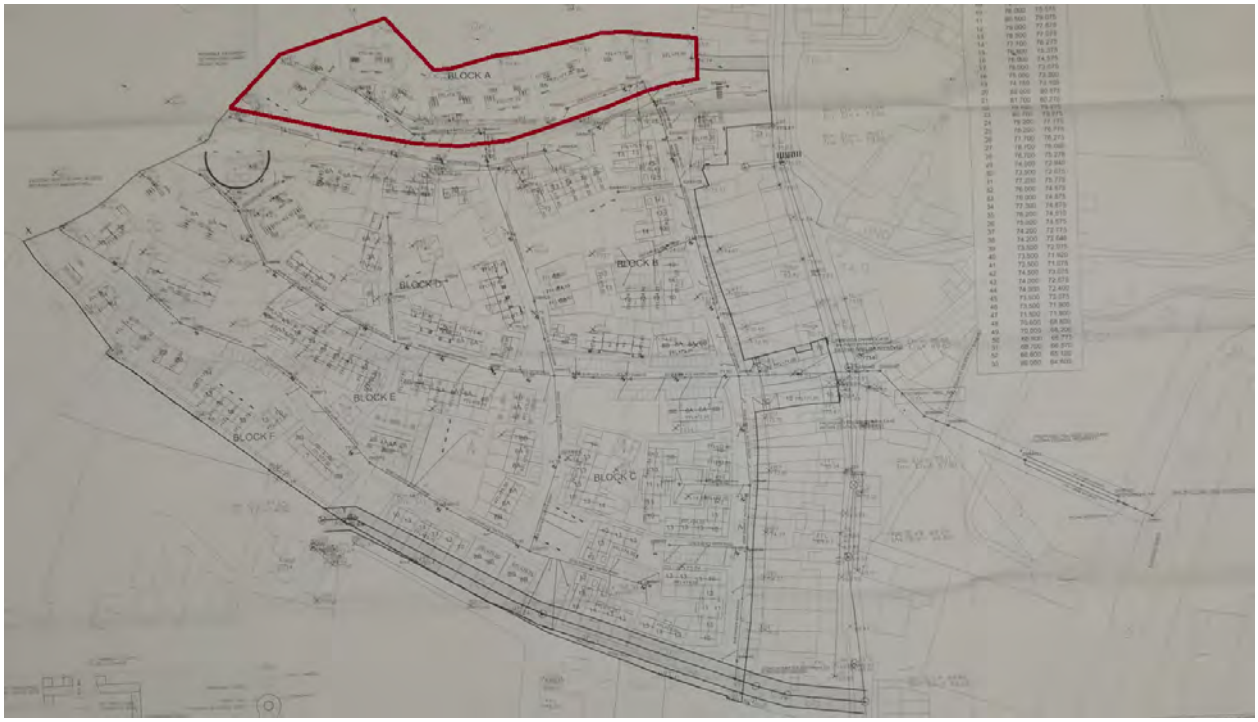


Fig 1 – Original Development under P0554023 with subject site outlined in Red

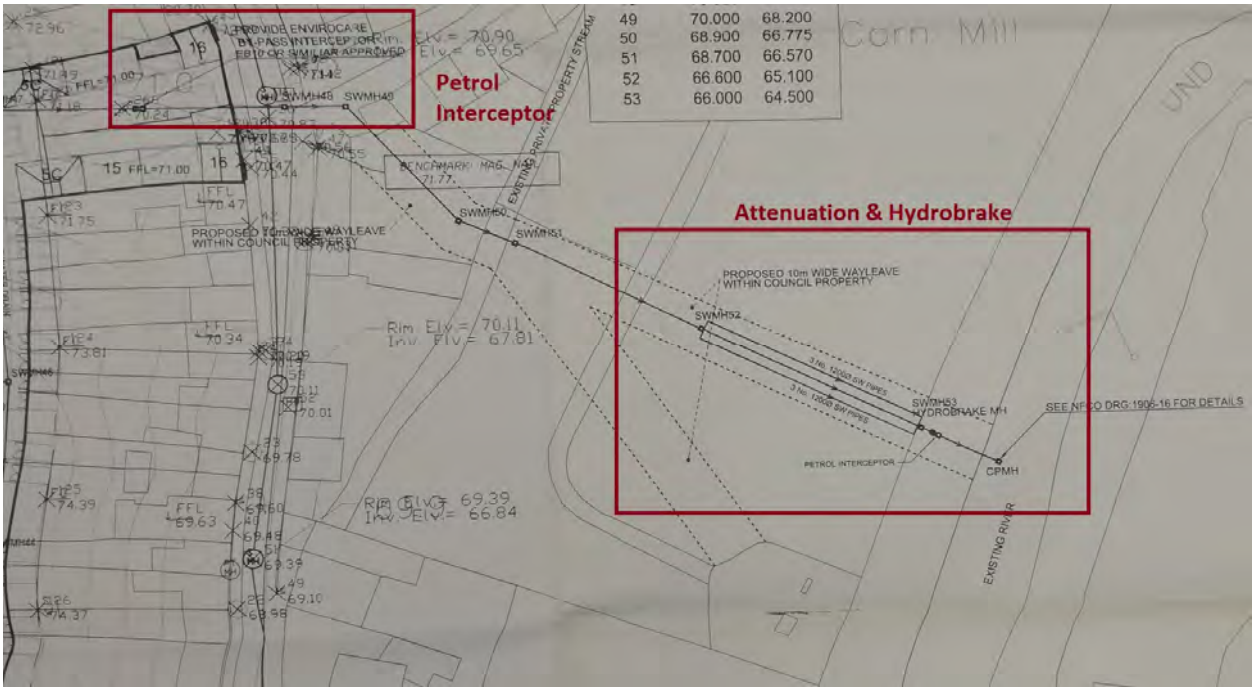


Fig 2 – Location of Petrol Interceptor, Attenuation and Hydrobrake within Council Lands adjacent Sullane River.

3.2 Drainage Strategy

It is proposed that all generated storm waters from the development will be collected via a separate stormwater gravity network and discharged to the existing storm sewer network of the Meadowlands Estate.

All sewers proposed to be eventually Taken-In-Charge are located within public areas and generally under roads.

The storm network has been designed to cater for a 1 in 5 year rainfall event utilising Met Eireann rainfall records which have been factored by an additional 20% to allow for the potential impact of Climate Change and an additional 10% to provide for Urban Creep.

The storm water sewer layout for the proposed development is shown on Drawings 109-72-121.

3.3 Sustainable Drainage

Irrespective of the aforementioned attenuation provisions already provided as part of the overall development of the lands, for the development of the subject lands, additional measures in the form of natural Sustainable Drainage mechanisms have been incorporated into the design to slow the release of surface waters into the existing gravity system. Sustainable drainage systems (SuDS) aim to maintain or restore a more natural hydrological regime, such that the impact of urbanisation on downstream flooding and water quality is minimised. Originally, SuDS were introduced primarily as single purpose facilities, however, this has now evolved into more integrated systems which serve a variety of purposes, including habitat and amenity enhancement.

SuDS involves a change in our way of managing urban run-off from solely looking at volume control to an integrated multi-disciplinary approach which addresses water quality, water quantity, amenity and habitat. SuDS minimise the impacts of urban runoff by capturing runoff as close to source as possible and then releasing it slowly. The use of SuDS to control runoff also provides the additional benefit of

reducing pollutants in the surface water by settling out suspended solids, and in some cases providing biological treatment.

The successful achievement of sustainable urban drainage does not solely rely on the use of engineered techniques to control and treat runoff. 'Good housekeeping' measures, such as safe storage and handling of oils and chemicals, street sweeping and control of sediment run-off from construction sites are an essential component of SuDS. Public awareness is also an important factor in ensuring the successful implementation of sustainable drainage practices.

3.4 Natural SuDS

The proposed development provides for the integration of such features as Permeable Paving, Sub-surface storage, Swales and Rain Gardens into the design which will aid in the slowing of storm run-off and allow for natural drainage to ground in as far as the natural subsoils will accept. Any waters not absorbed will discharge to the gravity storm network and discharged from the site.

The Rain Gardens and Swale have been sized to cater for a 1 hour storm of varying Return Events of 5, 30 & 100 year with an allowance for Climate Change of 20%. The swale and raingardens have been limited to a maximum water depth of 200mm.

In terms of maintenance, both SuDS features and conventional drainage systems require regular maintenance to perform adequately. The key difference here is that SuDS are generally visible and relatively straightforward to maintain.

3.5 Water Quality

The removal of suspended solids is integral to the success of any sustainable urban drainage system. It is proposed that all road gulleys and drainage channels are trapped to retain grit and debris prior to entering the collection system.

It is proposed to provide for contaminant removal prior to discharge to the storm outfall through the provision of natural cleansing through granular and soil mediums of the proposed swale and rain gardens.

NOTES:

N 573,500

N 573,450

N 573,400

NOT TO BE USED FOR CONSTRUCTION

NOTES:
1. ALL HOUSE DRAINS TO BE 100mmø.
2. LOCAL DRAINS TO RUN AT A GRADIENT OF 1/40 UNLESS OTHERWISE NOTED.
3. DOUBLE GULLIES TO BE PROVIDED AT ALL ROAD SAG CURVES & CUL DE SACS WHERE INDICATED. SEPARATE CONNECTIONS 150mm DIA. SHALL BE PROVIDED FOR EACH GULLY. NO GULLEY SHALL BE MORE THAN 10m FROM A SURFACE WATER CONNECTION.
4. HOUSE DRAINS SHALL NOT PASS THROUGH A PROPERTY THEY DO NOT SERVE.
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6. FOR SEWER LONG SECTIONS SEE DRAWING No.'s 130 SERIES
7. FOR ROAD CONSTRUCTION DETAILS SEE DRG. No. 151.
8. FOR MANHOLE DETAILS SEE DRG. No. 152.
9. FOR PIPE BEDDING DETAILS SEE DRG. No. 153.
10. ALL PIPES WHICH ARE TO BE TAKEN IN CHARGE BY THE LOCAL AUTHORITY ARE T1 BE CONCRETE PIPES COMPLYING WITH I.S. 6 & I.S. 166 OR B.S. 5911.

REV	DATE	DESCRIPTION	BY/CHKD/APPR

Client

TUATH HOUSING

PHM Consulting
Civil - Structural - Environmental
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Tel.: +353 (0)61 576020 E-mail: info@phm.ie Web.: www.phm.ie

RESIDENTIAL DEVELOPMENT AT MASSEYTOWN, MACROOM, CO. CORK

SITE SURVEY

Drawn: POR	Scale: 1:250
Chkd.: POR	Date: 11/2022
Apprd.: EOD	Status: PLANNING P1

Project Number: 109-72	Rev.: ~
Drawing Number: 110	A1

ROADS LEGEND

PROPOSED KERB LINE	
PROPOSED CENTRE LINE	
PROPOSED SIGHT LINE	
PROPOSED ROAD NO	ROAD 1
PROPOSED ROAD LEVEL	120.100
PROPOSED FINISHED FLOOR LEVEL	
CENTRELINE CHAINAGE	40.000 = CHAINAGE (m)
DROPPED KERBS	
TACTILE PAVING AT CROSSINGS GREY OF BUFF BLISTER	DROP KERB

NOTES:

1. ALL HOUSE DRAINS TO BE 100mmØ PVC SN8.
2. LOCAL DRAINS TO RUN AT A GRADIENT OF 1/40 UNLESS OTHERWISE NOTED.
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Tel.: +353 (0)61 576020 E-mail: info@phm.ie Web.: www.phm.ie

PROPOSED RESIDENTIAL DEVELOPMENT AT MASSEYTOWN, MACROOM, CO. CORK
ROADS LAYOUT - GENERAL ARRANGEMENT

Drawn	Scale	Project Number	Rev.
POR	1:250	109-72	~
Chkd.	Date	Drawing Number	
POR	11/2022	111	A1
Apprd.	Status		
EOD	PLANNING P1		

NOTES

ROADS LEGEND

PROPOSED KERB LINE

PROPOSED CENTRE LINE

PROPOSED SIGHT LINE

PROPOSED ROAD NO — ROAD 1

PROPOSED ROAD LEVEL — 120.100

PROPOSED FINISHED FLOOR LEVEL

CENTRELINE CHAINAGE — 40.000 = CHAINAGE (m)

DROPPED KERBS — 82.14

TACTILE PAVING AT CROSSINGS. GREY OF BUFF BLISTER — DROP KERB

N 573,500

N 573,450

N 573,400

Types D & E Unit No.17 & 18 FFL = 81.000

Type C Unit No.16 FFL = 81.000

Type C Unit No.15 FFL = 80.550

Type C Unit No.14 FFL = 80.550

Type C Unit No.13 FFL = 80.100

Type C Unit No.12 FFL = 80.100

Type C Unit No.11 FFL = 79.650

Types D1 & E1 Unit No.9 & 10 FFL = 79.650

Type A1 Unit No.8 FFL = 79.350

Type A1 Unit No.7 FFL = 78.900

Type B1 Unit No.6 FFL = 78.450

Type B Unit No.5 FFL = 77.100

Type B1 Unit No.4 FFL = 77.100

Type B Unit No.3 FFL = 77.200

Type A Unit No.2 FFL = 77.425

Type A Unit No.1 FFL = 77.875

ABII BUILDING 247 SQ.M. FFL = 76.500

ROAD 1

ROAD 2

ROAD 3

ROAD 4

OAKRIDGE

STOP RUS027

NOT TO BE USED FOR CONSTRUCTION

NOTES:
1. ALL HOUSE DRAINS TO BE 100mmØ PVC SN8.
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11. ALL PIPES WHICH ARE TO BE TAKEN IN CHARGE BY IRISH WATER ARE T1 BE CONSTRUCTED IN ACCORDANCE WITH RELEVANT IW CODE OF PRACTICE AND STANDARD DETAILS.

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PROPOSED RESIDENTIAL DEVELOPMENT AT MASSEYTOWN, MACROOM, CO. CORK

ROADS LAYOUT - SIGNS & MARKINGS

Drawn	Scale
POR	1:250
Chkd.	Date
POR	29/04/2022
Apprd.	Status
EOD	DRAFT D4

Project Number	Rev.
109-72	~
Drawing Number	
112	A1

NOTES

DRAINAGE LEGEND

- PROPOSED FOUL SEWER & MANHOLE — F2, IL= 14.500
- PROPOSED STORM SEWER & MANHOLE — S2, IL= 14.500
- PROPOSED COMBINED SEWER & MANHOLE — S2, IL= 14.500
- PROPOSED ROAD GULLY
- EXISTING FOUL SEWER & MANHOLE — F4(Ex), IL= 14.500
- EXISTING STORM SEWER & MANHOLE — S17(Ex), IL= 14.500
- EXISTING COMBINED SEWER & MANHOLE — S17(Ex), IL= 14.500
- LAND DRAIN & CATCHPIT — CP2
- RISING MAIN
- PRIVATE STORM DRAIN — 100MM PVC @ 1:40 MAX FWIC (FOUL WATER IC)
- PRIVATE PERFORATED STORM DRAIN
- PRIVATE FOUL DRAIN — 100MM PVC @ 1:40 MAX
- DIRECTION OF FOUL FLOW
- DIRECTION OF STORM FLOW

TREATMENT TO EXISTING OPEN DRAIN: 300mm THICK LAYER OF 28-50mm GRAVEL OVER 900x900 COLLECTOR DRAIN WITH 20-50mm CLEAN GRAVEL WITH TERRAM GEOTEXTILE SURROUND WITH 300mm DIA PERFORATED PIPE AT 1:200 MIN. REFER TO DRG 163 FOR DETAIL

N 573,500

N 573,450

N 573,400

Type C Unit No.16 FFL = 81.000
Type C Unit No.15 FFL = 80.550
Type C Unit No.14 FFL = 80.550
Type C Unit No.13 FFL = 80.100
Type C Unit No.12 FFL = 80.100
Type C Unit No.11 FFL = 79.650
Types D1 & E1 Unit No.9 & 10 FFL = 79.650
Types D & E Unit No.17 & 18 FFL = 81.000

ALL DRIVEWAYS TO BE FORMED AS PERMEABLE AREAS WITH PROPRIETARY PERMEABLE PAVING ON BEDDING LAYER ON TERRAM ON MIN 250mm CLEAN WASHED GRAVEL WITH MIN POROSITY VALUE OF 0.4 ON TERRAM LAYER ON MIN 150 CL804 ON ORIGINAL STRATA.

PROPRIETARY SW CHANNEL WITH OUTFALLS TO PERFORATED FRENCH DRAIN OUTFALLING TO SWALE

Type A1 Unit No.8 FFL = 79.350
Type A1 Unit No.7 FFL = 78.900
Type B1 Unit No.6 FFL = 78.450
Type B1 Unit No.5 FFL = 77.100
Type B1 Unit No.4 FFL = 77.100
Type B Unit No.3 FFL = 77.200
Type A Unit No.2 FFL = 77.425
Type A Unit No.1 FFL = 77.875

ABII BUILDING 247 SQ.M. FFL = 76.500

RAIN GARDEN 1
RAIN GARDEN 2

225ø OVERFLOW TO SW GRAVITY SEWER

SW SWALE - EMBANKMENTS 1:3 FILTRATION DRAIN - 300ø PERFORATED WITH MIN 150mm GRAVEL SURROUND AND TERRAM LAYER BELOW MIN 200 GRAVEL BED

S1 S2 S3 S4 S5 S10 S11 S12 S13
F1 F2 F3 F4 F5 F10 F11 F12
F3.1 S3.1

NOT TO BE USED FOR CONSTRUCTION

NOTES:
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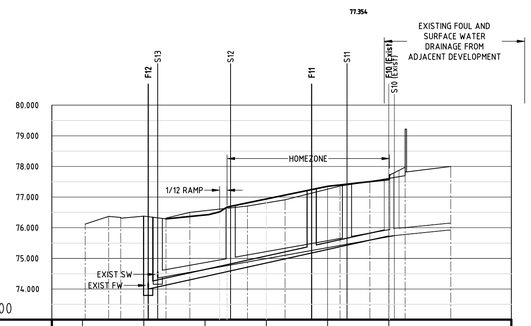
PROPOSED HOUSING DEVELOPMENT AT MASSEYTOWN, MACROOM, CO. CORK

DRAINAGE LAYOUT

Drawn	Scale	Project Number	Rev.
POR	1:250	109-72	~
Chkd. POR	Date 11/2022	Drawing Number 121	A1
Apprd. EOD	Status PLANNING D1		



DATUM 73.000

CHAINAGE		-10.000 0.000 10.000 20.000 30.000 40.000
EXISTING GROUND LEVEL		76.310 76.380 76.290 76.500 76.710 76.910 77.360 77.510 77.580
ALIGNMENT LEVEL		76.385 76.290 76.430 76.610 76.900 77.354 77.554
HORIZONTAL ALIGNMENT		
VERTICAL ALIGNMENT		1:50 (+2.0%) 1:22 (+4.54%) 1:50 (+2.0%)
STORMWATER	INVERT	74.360 74.785 75.464 75.740
	DETAILS	Dia 225 Type CONC 1 in 28 Dia 225 Type CONC 1 in 28 Dia 225 Type CONC 1 in 28
	LENGTHS	Len 11.889 Len 18.998 Len 7.733
FOULWATER	INVERT	73.939 75.175 75.73
	DETAILS	Dia 225 Type PVC SN8 1 in 22 Dia 225 Type PVC SN8 1 in 23
	LENGTHS	Len 26.683 Len 12.594

ROAD 1

SCALE : H=1:500, V=1:100

DATUM 73.000

CHAINAGE		25.220 20.000 14.957 10.000 0.000
EXISTING GROUND LEVEL		80.700 79.770 79.370 79.115 79.100 78.880 78.500 78.000 77.500 77.290
ALIGNMENT LEVEL		79.250 78.821 78.221
HORIZONTAL ALIGNMENT		
VERTICAL ALIGNMENT		1:20 (-5.0%)
STORMWATER	INVERT	77.640 77.190 76.178 75.985 75.230
	DETAILS	Dia 225 Type CONC 1 in 20 Dia 225 Type CONC 1 in 24 Dia 225 CONC 1 in 29 Dia 550 1 in 39
	LENGTHS	Len 9.010 Len 24.210 Len 5.685
FOULWATER	INVERT	76.859 76.665 75.190
	DETAILS	Dia 225 Type PVC SN8 1 in 20 Dia 225 Type PVC SN8 1 in 19 Dia 225 1 in 21
	LENGTHS	Len 3.897 Len 28.080

ROAD 2

SCALE : H=1:500, V=1:100

DATUM 73.000

CHAINAGE		30.000 20.000 10.000 0.000 10.000 20.000 30.000 35.493 40.000 50.000 60.000
EXISTING GROUND LEVEL		78.800 79.000 79.500 79.115 80.000 80.500 81.000 81.090
ALIGNMENT LEVEL		78.821 79.050 79.343 79.655 79.826 80.277 80.588
HORIZONTAL ALIGNMENT		
VERTICAL ALIGNMENT		1:32 (+3.1%) 1:32 (+3.1%)
STORMWATER	INVERT	77.190 78.494 79.129
	DETAILS	Dia 225 Type CONC 1 in 32 Dia 225 Type CONC 1 in 29
	LENGTHS	Len 41.893 Len 18.112
FOULWATER	INVERT	76.665 BD 77.34 78.511 79.057
	DETAILS	Dia 225 Type PVC SN8 1 in 33 Dia 225 Type PVC SN8 1 in 36
	LENGTHS	Len 38.108 Len 19.887

ROAD 3

SCALE : H=1:500, V=1:100

NOT TO BE USED FOR CONSTRUCTION

THIS DRAWING IS COPYRIGHT - ELECTRONIC DRAWING FILE

NOTES:

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DATUM 73.000

CHAINAGE		0.000 10.000 17.644 20.000 30.000
EXISTING GROUND LEVEL		81.500 81.000 80.500 80.500 81.000 81.500 82.000
ALIGNMENT LEVEL		79.443 79.660 79.826
HORIZONTAL ALIGNMENT		
VERTICAL ALIGNMENT		1:46 (+2.1%)
STORMWATER	INVERT	
	DETAILS	
	LENGTHS	
FOULWATER	INVERT	
	DETAILS	
	LENGTHS	

ROAD 4

SCALE : H=1:500, V=1:100

DATUM 73.000

CHAINAGE		-120.000 -110.000 -100.000 -90.000 -85.484 -80.000 -70.000 -60.000 -57.535 -50.000 -40.000 -30.000 -20.000 -10.000 0.000 10.000 20.000 30.000 40.000 47.595 50.000 60.000 70.000 80.000 90.000 100.000 110.000 120.000 130.000
EXISTING GROUND LEVEL		81.500 81.500 81.200 81.200 81.500 81.500 81.850 82.000 82.500 82.500 82.000 81.500 81.000 80.500 80.000 79.500 79.000 78.500 78.000 77.500 77.000 76.975 76.870 76.730 76.660 76.570 76.450 76.350 76.260 76.170 76.070 75.970 75.890 75.900 75.910 75.880 75.820 75.820 75.840
ALIGNMENT LEVEL		82.000 80.587 79.443 78.726 76.975
HORIZONTAL ALIGNMENT		
VERTICAL ALIGNMENT		-1:24 (-4.1%)
STORMWATER	INVERT	74.75 74.37 74.36 74.35 73.88
	DETAILS	Dia 225 1 in 73 Dia 225 1 in 288 Dia 225 1 in 53
	LENGTHS	Len 27.956 Len 5.762 Len 25.167
FOULWATER	INVERT	74.50 74.01 73.939 73.96 73.84
	DETAILS	Dia 225 1 in 48 Dia 225 1 in 162 Dia 225 1 in 185
	LENGTHS	Len 23.539 Len 8.104 Len 22.274

SPINE ROAD

SCALE : H=1:500, V=1:100

REV	DATE	DESCRIPTION	BY/CHKD/APPR

Client

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RESIDENTIAL DEVELOPMENT AT
MASSEYTOWN, MACROOM, CO. CORK
ROADS - LONGITUDINAL SECTIONS

Drawn POR	Scale AS SHOWN		Project Number 109-72	Rev. ~
Chkd. POR	Date 11/2022		Drawing Number 131	A1
Apprd. EOD	Status PLANNING P1			

NOTES

N 573,500

N 573,450

N 573,400

Type A Unit No.1

Type A Unit No.2

Type B Unit No.3

Type B1 Unit No.4

Type B Unit No.5

Type B1 Unit No.6

Type A1 Unit No.7

Type A1 Unit No.8

Types D1 & E1 Unit No.9 & 10

Type C Unit No.11

Type C Unit No.12

Type C Unit No.13

Type C Unit No.14

Type C Unit No.15

Type C Unit No.16

Types D & E Unit No.17 & 18

ABII BUILDING 247 SQ.M.

100mm PE80 SDR17 WATERMAIN

PROPOSED 100mm PE80 SDR17 WATERMAIN

EXISTING 200mm UPVC

PROPOSED BY-PASS FLOW METER CHAMBER B-P FMC

PROPOSED LOWEST POINT OF WATERMAIN AT SCOUR VALVE

PROPOSED CONNECTION TO EXISTING WITH 3 No. SV's

NOT TO BE USED FOR CONSTRUCTION

WATERMAIN LEGEND

- 100mm NOMINAL BORE
- 150mm NOMINAL BORE
- 200mm NOMINAL BORE
- EXISTING WATERMAIN
- SLUICE VALVE
- FIRE HYDRANT
- AIR VALVE
- SCOUR SLUICE VALVE & CHAMBER — ScV
- SCOUR CHAMBER — ScV(C)
- 25mm HDPE NOMINAL BORE PRIVATE WATERMAIN WITH A TALBOT MATRIX BOUNDARY BOX — WSER
- THRUST BLOCK — TB
- BY-PASS FLOW METER CHAMBER — B-P FMC

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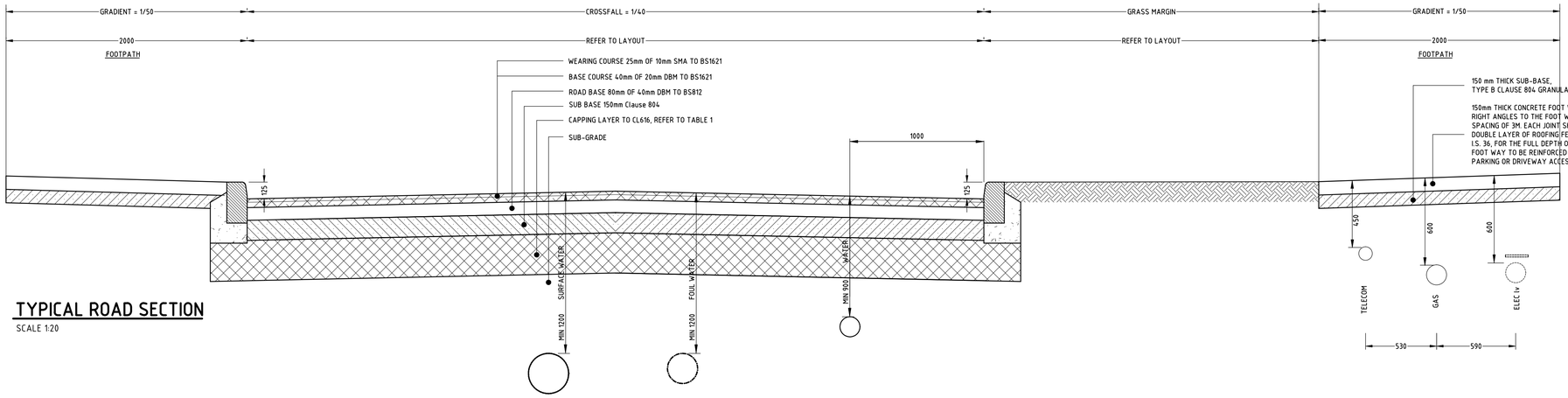
RESIDENTIAL DEVELOPMENT AT MASSEYTOWN, MACROOM, CO. CORK

WATERMAIN LAYOUT

Drawn: POR	Scale: 1:250	Project Number: 109-72	Rev.: ~
Chkd.: POR	Date: 11/2022	Drawing Number: 141	A1
Apprd.: EOD	Status: PLANNING P1		



TYPICAL ROAD SECTION

SCALE 1:20

TABLE No.1

C.B.R. OF SUB GRADE (%)	MINIMUM THICKNESS OF CAPPING LAYER (MM)
Less than 2	REFER to NOTE 1 BELOW
2-5	300
5-15	150
Greater than 15	0

1. THE CONTRACTOR IS TO VERIFY THE CBR VALUES TO DETERMINE THE THICKNESS OF CAPPING LAYER, AS DIRECTED BY TABLE 1. SOFT SPOTS TO BE REMOVED AND REPLACED WITH SUITABLE GRANULAR MATERIAL.

Note: C.B.R. tests to be carried out at a minimum rate of 1 per road or 1 per 100m length of road.

NOTES:
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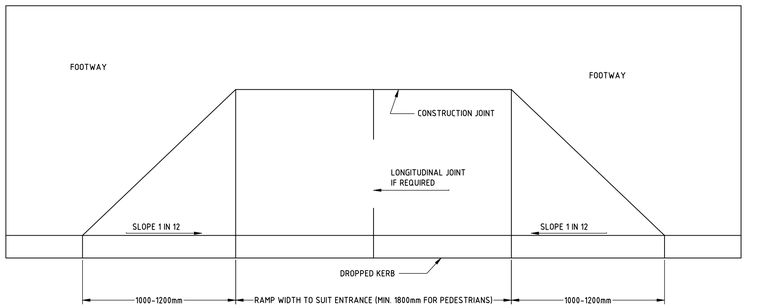
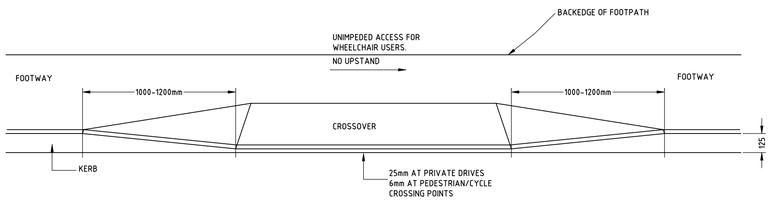
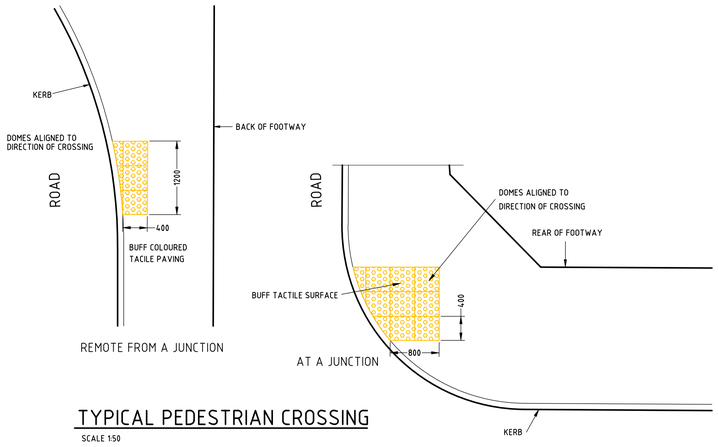




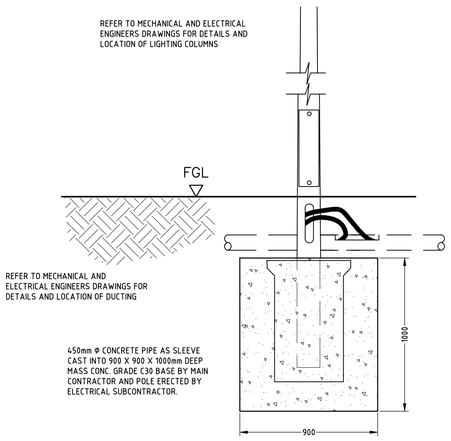
DISHED KERB DETAIL AT PRIVATE DRIVES AND PEDESTRIAN CROSSING POINTS

N.T.S



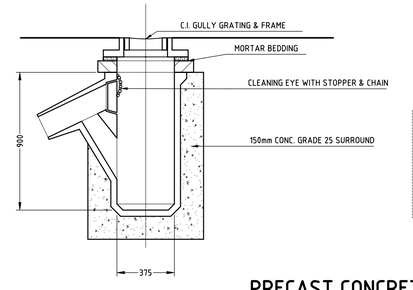
TYPICAL PEDESTRIAN CROSSING

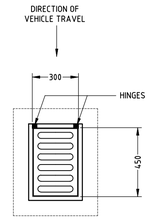
SCALE 1:50



TYPICAL LIGHTING BASE

SCALE 1:20

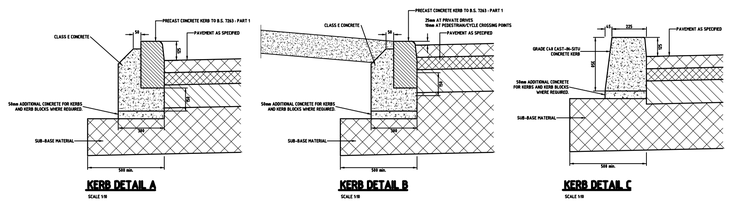


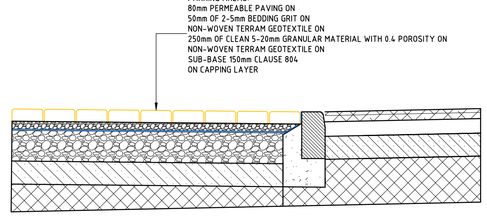


PRECAST CONCRETE ROAD GULLY

SCALE 1:20

NOT TO BE USED FOR CONSTRUCTION





TYPICAL ROAD-PARKING SECTION

SCALE 1:20

REV	DATE	DESCRIPTION	BY/CHKD/APPR

Client

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PHM Consulting
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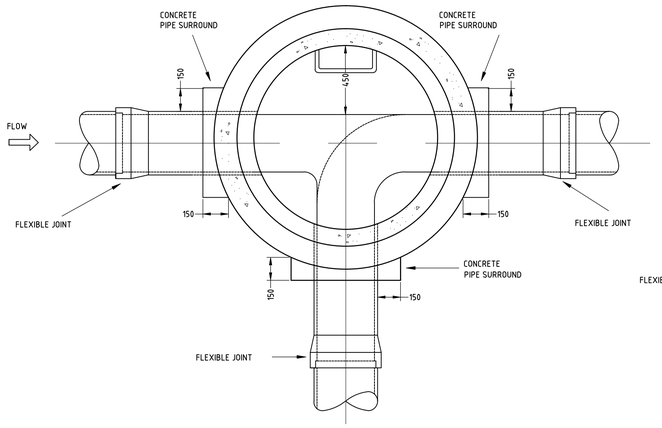
Tel.: +353 (0)61 576020 E-mail: info@phm.ie Web.: www.phm.ie

RESIDENTIAL DEVELOPMENT AT MASSEYTOWN, MACROOM, CO. CORK

ROADS DETAILS

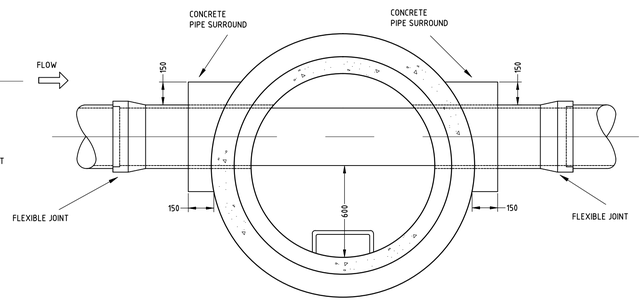
Drawn: POR	Scale: AS SHOWN	Project Number: 109-72	Rev.: ~
Chkd.: POR	Date: 11/2022		
Apprd.: EDD	Status: PLANNING P1	Drawing Number: 151	A1

NOTES:
1. ALL HOUSE DRAINS TO BE 150mmØ.
2. LOCAL DRAINS TO RUN AT A GRADIENT OF 1/40 UNLESS OTHERWISE NOTED.
3. DOUBLE GULLIES TO BE PROVIDED AT ALL ROAD SAG CURVES & CUL DE SACS WHERE INDICATED. SEPARATE CONNECTIONS 150mm DIA. SHALL BE PROVIDED FOR EACH GULLY. NO GULLEY SHALL BE MORE THAN 10m FROM A SURFACE WATER CONNECTION.
4. HOUSE DRAINS SHALL NOT PASS THROUGH A PROPERTY THEY DO NOT SERVE.
5. MANHOLES ON HOUSE DRAIN RUNS SHALL BE LOCATED IN PRIVATE PROPERTY IN ALL CASES.
6. FOR SEWER LONG SECTIONS SEE DRAWING No.'s 130 SERIES
7. FOR ROAD CONSTRUCTION DETAILS SEE DRG. No. 151.
8. FOR MANHOLE DETAILS SEE DRG. No. 152.
9. FOR PIPE BEDDING DETAILS SEE DRG. No. 153.
10. ALL PIPES WHICH ARE TO BE TAKEN IN CHARGE BY THE LOCAL AUTHORITY ARE T1 BE CONCRETE PIPES COMPLYING WITH I.S. 6 & I.S. 166 OR B.S. 5911.



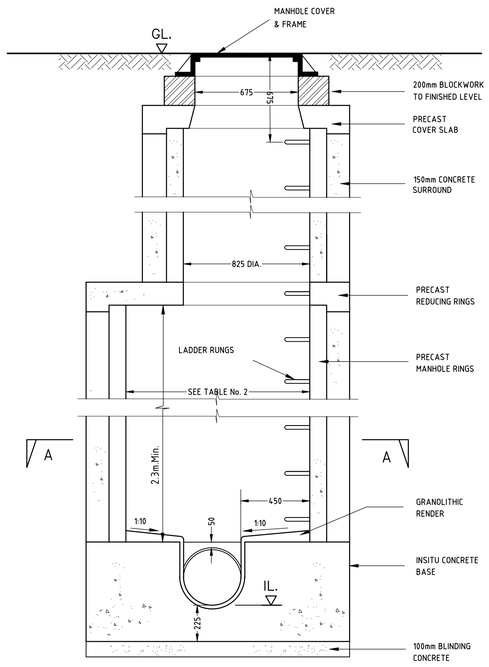
SECTIONAL PLAN A-A

(JUNCTION MANHOLE OR ANGLE > 45°)



SECTIONAL PLAN A-A

(STRAIGHT THROUGH OR ANGLE < 45°)

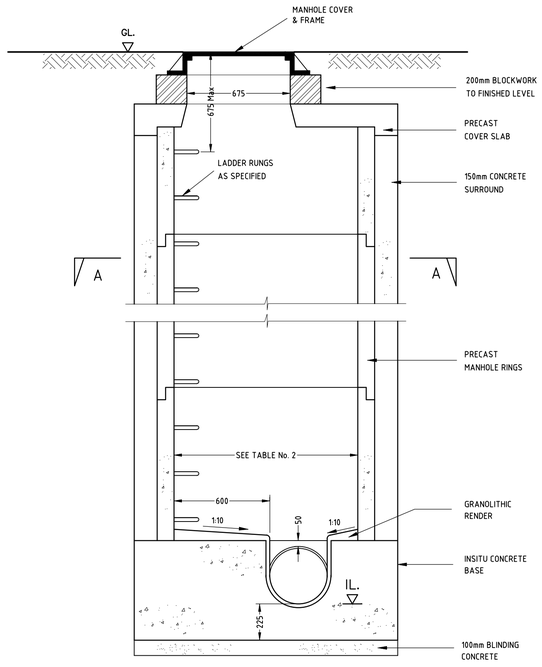


TYPE A MANHOLE

DEPTH FROM GL. TO SOFFIT OF PIPE 3.0 TO 6.0m

TABLE No.2

Diameter of largest pipe in manhole (mm)	Internal diameter of manhole (mm)
Less than 375	1200
375 - 450	1350
500 - 700	1500
750 - 900	1800



SURFACE WATER MANHOLE

DEPTH FROM GL. TO SOFFIT OF PIPE 3.0m

IN

NOT TO BE USED FOR CONSTRUCTION

REV	DATE	DESCRIPTION	BY/CHKD/APPR

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RESIDENTAL DEVELOPMENT AT MASSEYTOWN, MACROOM, CO. CORK

MANHOLE DETAILS

Drawn	Scale	Project Number	Rev.
POR	AS SHOWN	109-72	~
Chkd. POR	Date 11/2022	Drawing Number 161	A1
Apprd. EOD	Status PLANNING P1		

NOTES:
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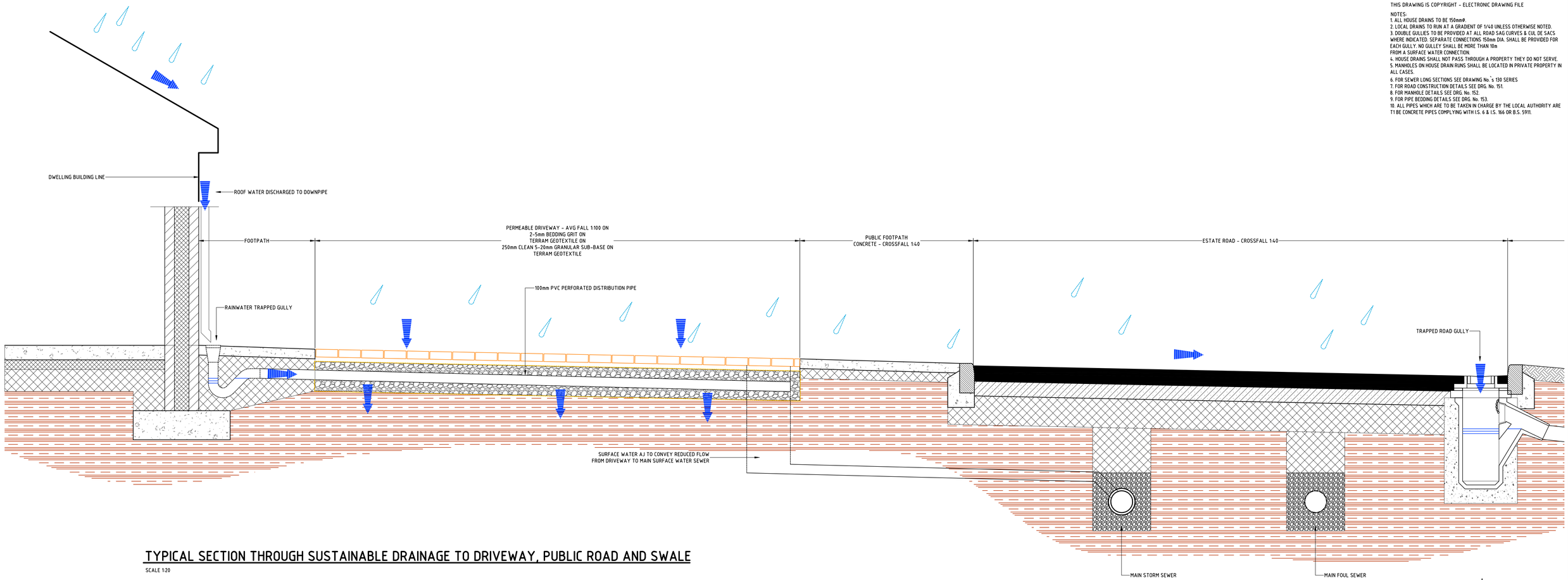
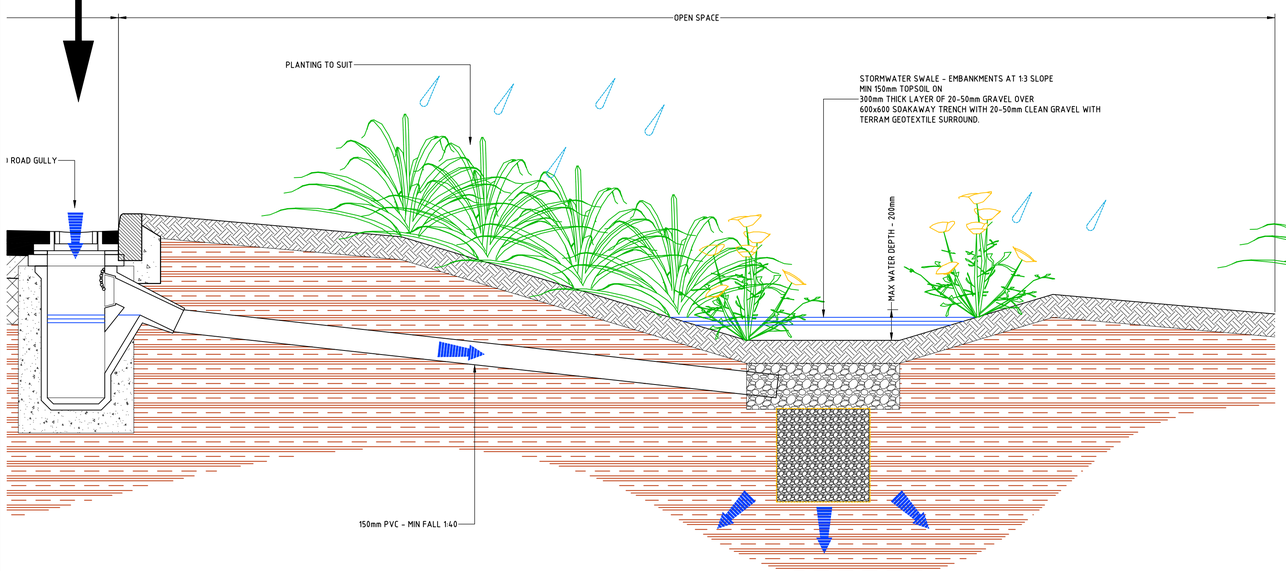
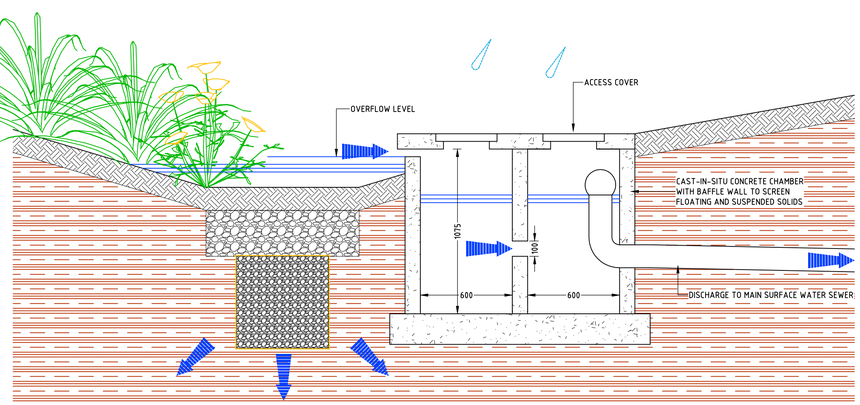


TYPICAL SECTION THROUGH SUSTAINABLE DRAINAGE TO DRIVEWAY, PUBLIC ROAD AND SWALE

SCALE 1:20

NOT TO BE USED FOR CONSTRUCTION





SWALE OVERFLOW CHAMBER

SCALE 1:20

REV	DATE	DESCRIPTION	BY/CHKD/APPR

Client

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RESIDENTIAL DEVLOPMENT AT
MASSEYTOWN, MACROOM, CO. CORK
SURFACE WATER DETAILS

Drawn	Scale	Project Number	Rev.
POR	AS SHOWN	109-72	~
Chkd.	Date		
POR	11/2022	Drawing Number	
Apprd.	Status	162	A1
EOD	PLANNING P1		

NOTES:
1. ALL HOUSE DRAINS TO BE 150mmØ.
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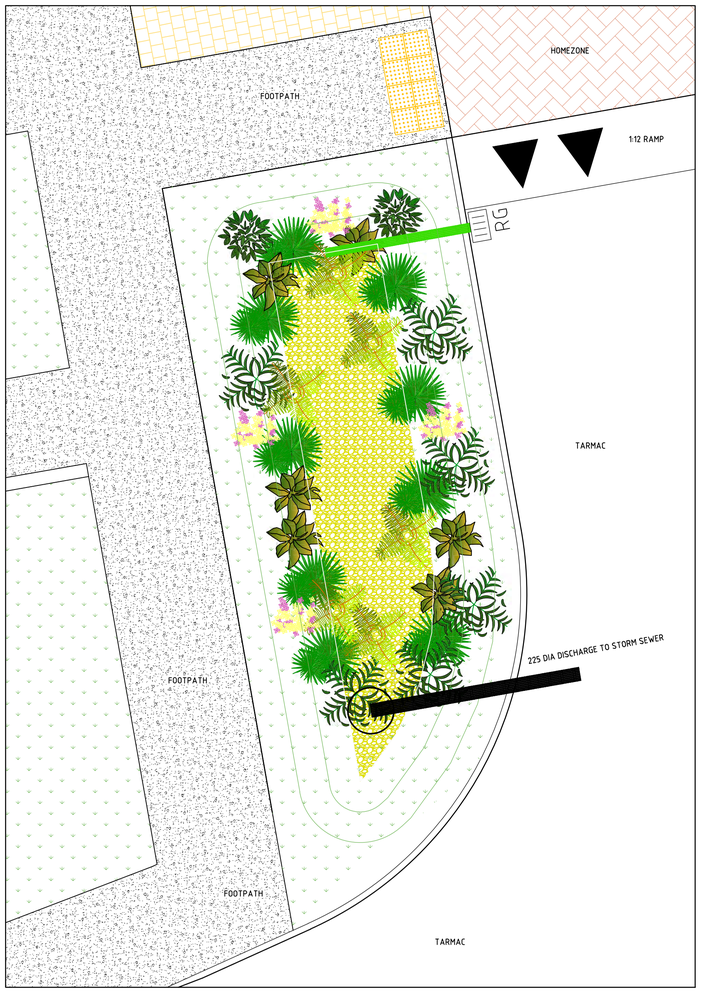
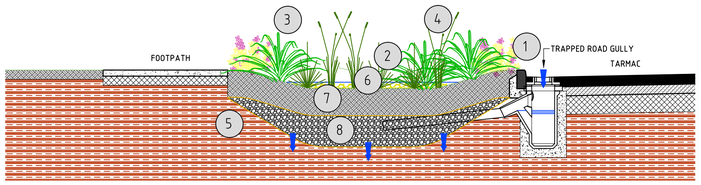


TYPICAL RAIN GARDEN - PLAN

SCALE 1:50



TYPICAL RAIN GARDEN - SECTION

SCALE 1:50

OUTLINE SPECIFICATION NOTES FOR RAIN-GARDEN PLANTER

CONTRACTOR TO FAMILIARISE THEMSELVES WITH 'GUIDANCE ON THE CONSTRUCTION OF SUDS', CIRIA C768, 2017; 'THE SUDS MANUAL', CIRIA C753, 2015, 'SITE HANDBOOK FOR THE CONSTRUCTION OF SUDS' CIRIA C698, 2007, AND 'DESIGNING RAIN GARDENS: A PRACTICAL GUIDE', URBAN DESIGN LONDON

1. KERB ON 50MM BEDDING CEMENT STABILISED AGGREGATE MIN. STRENGTH OF C10/15. KERB TO BE FINISHED MIN. 125MM ABOVE ROAD LEVEL, ON 200MM ST3 CONCRETE FOUNDATION ON MIN. 100MM CL808 SUB-BASE.
2. FREEBOARD: 200MM MIN. DEPTH 'FREEBOARD' PROVIDES POTENTIAL WATER STORAGE SPACE ABOVE THE TOPSOIL.
3. 1:3 GRADIENT SIDE SLOPE DOWN TO FILTER MEDIUM TO PROVIDE 'FREEBOARD' STORAGE IN INUNDATIONS, PLANTED WITH VEGETATION; AT KERB-CUT TO BE LANDSCAPED WITH 500MM WIDE GRASS SEEDING TO SLOW SURFACE WATER INGRESS SPEED/SCOUR/EROSION.
4. PERENNIAL WATER TOLERANT PLANTING.
5. FILTER FABRIC: GEOTEXTILE SEPARATOR LAYER TO LINE EXCAVATED BIO-RETENTION AREA.

COMPOSITION

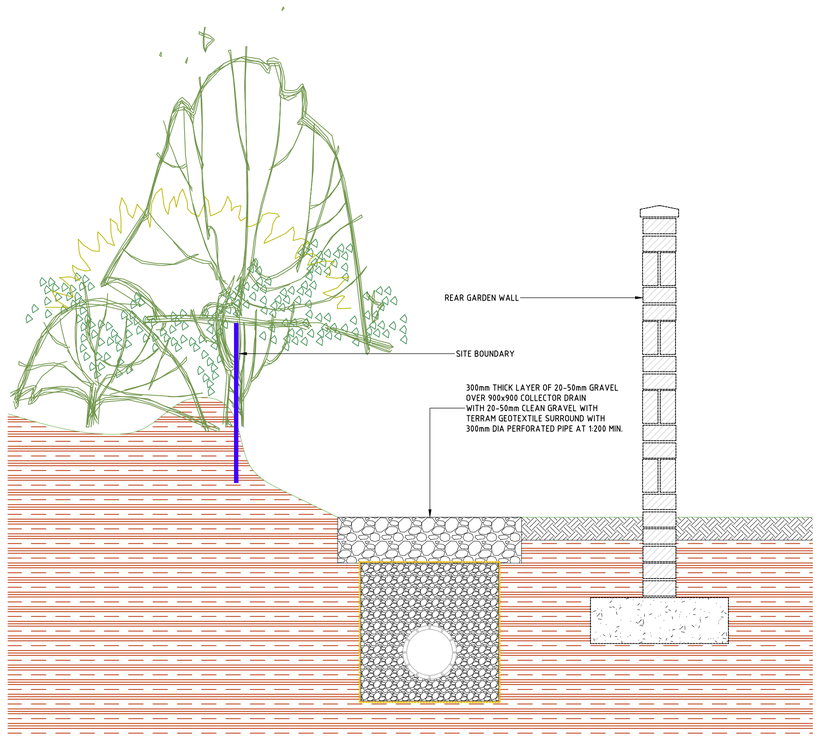
6. NON-ORGANIC MULCH LAYER:
WASHED AND DRIED RIVER (PEA) GOLDEN GRAVEL SURFACING IN BIO-RETENTION AREA. DEPTH: 75MM.
FILTER GROWING MEDIA: 'FILTER MEDIA FOR BIORETENTION AREA' BY ENRICH OR EQUIVALENT APPROVED TO MEET CIRIA CRITERIA FOR BIO-RETENTION AREA SOILS. FILTER GROWING MEDIA MUST BE SUFFICIENTLY PERMEABLE TO ALLOW WATER TO PASS THROUGH IT. THE FILTER MEDIUM MUST BE MANUFACTURED TO BS 3882:2015 AND SUITABLE FOR USE IN A BIO-RETENTION/SWALE AREA. THE FILTER MEDIUM SHOULD BE WELL-GRADED AND THE COMPOSITION SHOULD CONTAIN LIMITED PARTICLE SIZE RANGE:
· ORGANIC MATTER CONTENT 3-5%;
· PH RANGE OF 5.5-8.5 (1:2.5 SOIL/WATER EXTRACT);
· ELECTRICAL CONDUCTIVITY (EC) SHOULD BE <3300MS/CM (1:2.5 SOIL/CASO4 EXTRACT).
· TOTAL NITROGEN SHOULD BE 0.10-0.30%;
· EXTRACTABLE PHOSPHOROUS 16-100MG/L;
· EXTRACTABLE POTASSIUM 120-900MG/L.
METHOD OF ANALYSIS IN ACCORDANCE WITH BS 3882:2015.
<5% CLAY AND SILT (<0.063MM)
<20% FINE SAND (0.063-0.2MM)
<35%-65% MEDIUM SAND (0.2-0.6MM)
<50%-60% COARSE SAND (0.60-2.0MM)
<10% FINE GRAVEL (2.0-6.0MM)

7. FILTER GROWING MEDIA CAN COMPRISE A FREE-DRAINING AMENDED SOIL MIX COMPRISING 55% SAND, GRADED AS ABOVE: 30% MULTI-PURPOSE GRADE TOPSOIL TO BS 3882:2015 AND 15% PEAT-FREE COMPOST TO IS 441. MATERIAL SHOULD BE WELL-MIXED AND MEET THE PERMEABILITY REQUIREMENTS AS LISTED ABOVE.
- FILTER GROWING MEDIA CAN COMPRISE A CUSTOM MIX OF CRUSHED AND SANDY SILT LOAM TO PROVIDE A VERY FREE-DRAINING GROWING MEDIUM.
- VOLUME OF FILTER GROWING MEDIA SHOULD BE BASED ON 110% OF PLAN VOLUME, TO ACCOUNT FOR SETTLING OR COMPACTION.
- SIZE DISTRIBUTION: 100% PASSING THROUGH A 25MM SCREEN; 50% PASSING THROUGH A 10MM SCREEN.
- MOISTURE CONTENT: 12-30%
- PERMEABILITY RANGE: 100-300MM/H
- PURITY: SUSTAINABLE, FREE FROM PHYSICAL AND CHEMICAL CONTAMINANTS AND PATHOGENS.

8. TRANSITION LAYER OR GEOTEXTILE SEPARATOR LAYER.
NON-WOVEN GEOTEXTILE FABRIC WITH A FLOW RATE OF >110 LITRES PER MINUTE PER METRE, TO PREVENT INTER-MIXING OF GRANULAR MATERIALS AND SOILS, AND PREVENT THE INGRESS OF FINES INTO DRAINAGE MEDIA.

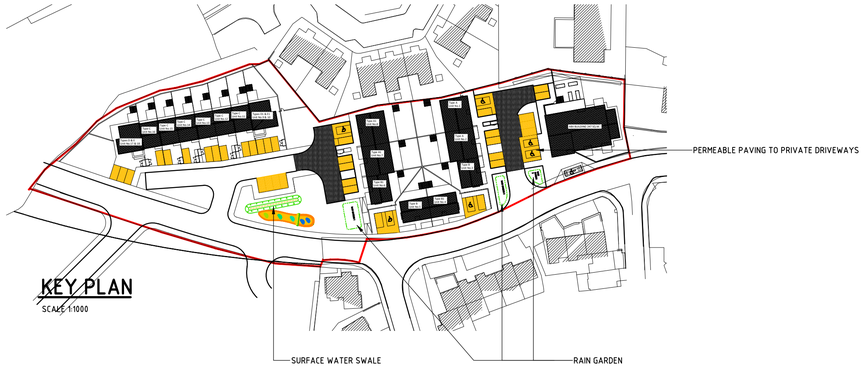
DRAINAGE LAYER:
SUB-BASE MATERIALS SUCH AS 4/20 AGGREGATE OR CRUSHED RECYCLED CONCRETE WITH 'NO FINES' PARTICLES (TESTED TO ENSURE IT WILL NOT LEACH CONTAMINANTS INTO THE WATER). COARSE GRADED AGGREGATE 4/20 AND 4/40 TO BS 7533-13-2009.

AGGREGATES FOR PLANTING BEDS.
SAND: COARSE, GRAINED SHARP SAND WITH NEUTRAL PH.
GRIT: 2-5MM HORTICULTURAL GRIT
CRUSHED MATERIALS: CRUSHED AND GRADED RUBBLE



COLLECTOR DRAIN

SCALE 1:20



KEY PLAN

SCALE 1:1000

NOT TO BE USED FOR CONSTRUCTION

REV	DATE	DESCRIPTION	BY/CHKD/APPR

Client

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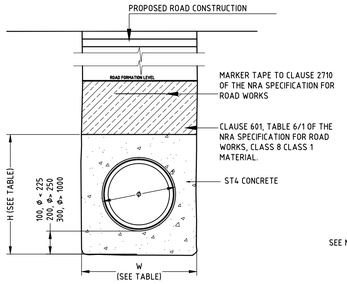
PROPOSED RESIDENTIAL DEVLOPMENT AT MACROOM, CO. CORK

SUSTAINABLE DRAINAGE DETAILS

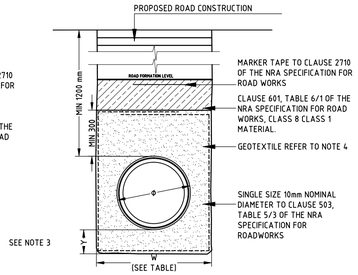
Drawn	Scale	Project Number	Rev.
POR	AS SHOWN	109-72	~
Chkd.	Date		
POR	11/2022	Drawing Number	
Apprd.	Status	163	A1
EOD	PLANNING P1		

PIPE Ø	TRENCH WIDTH	CONCRETE SURROUND
(mm)	W (mm)	H (mm)
80	500	400
100	500	400
150	600	450
200	600	450
250	750	650
300	750	650
350	750	750
400	900	850
450	900	850
500	1000	850
1050	2200	1600
1200	2400	1750



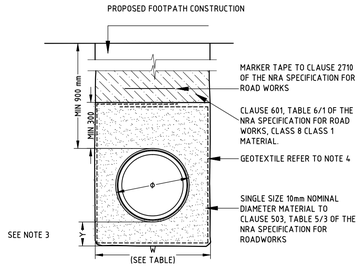
WATERMAIN CONCRETE BED & SURROUND

FOR USE IN TRAFFICKED AREAS MINIMUM COVER 0.9m



WATERMAIN TRENCH AND BEDDING DETAILS

FOR USE IN TRAFFICKED AREAS WITH MINIMUM COVER 1.2m



WATERMAIN TRENCH AND BEDDING DETAILS

FOR USE IN NON TRAFFICKED AREAS MINIMUM COVER 0.9m

NOTES:

1. TRENCH SIDES SHALL BE VERTICAL FROM BOTTOM OF TRENCH TO AT LEAST 300mm OVER CROWN OF PIPE. WHERE THE DEPTH OF COVER OVER THE PIPE BARREL EXCEEDS 2100mm THE LEVEL TO A HEIGHT OF 300mm OVER PIPE BARREL. TRENCH WIDTH SHALL BE RESTRICTED TO 2100 FROM FORMATION.

2. SAND PIPE BEDDING LAYING AND SURROUND SHALL COMPLY WITH CLAUSE 503 OF THE NRA SPECIFICATION FOR ROADWORKS.

3. DIMENSION 'Y' SHALL BE:
OD/4 WITH A MINIMUM OF:
200mm DEPTH FOR PIPELINES IN ROCK
150mm DEPTH FOR PIPELINES IN UNIFORM SOILS AND
DEPTH TO BE MAINTAINED UNDER PIPE SOCKETS.

4. IN WET FINE-GRAINED SOILS THE MIGRATION OF FINE SOIL PARTICLES INTO THE VOIDS OF THE BEDDING IS TO BE MINIMISED BY SURROUNDING THE GRANULAR MATERIAL WITH A GEOTEXTILE FILTER, COMPLYING WITH CLAUSE 517 OF THE NRA SPECIFICATION FOR ROAD WORKS.

5. TRENCH FILL MATERIAL SHALL COMPLY WITH CLAUSE 601, TABLE 6/1 OF THE NRA SPECIFICATION FOR ROAD WORKS AND SHALL BE READILY COMPACTABLE MATERIAL FREE FROM TREE ROOTS, VEGETABLE MATTER, BUILDING RUBBISH, FROZEN SOIL, CLAY LUMPS EXCEEDING 75mm AND STONE EXCEEDING 25mm NOMINAL DIAMETER.

6. BEDDING MATERIAL FROM TRENCH FORMATION TO PIPE CROWN LEVEL SHALL BE WELL COMPACTED IN 150mm LAYERS. BEDDING MATERIAL FROM PIPE CROWN TO 300mm ABOVE CROWN SHALL BE LIGHTLY COMPACTED BY HAND IN 75mm LAYERS.

7. THIS DRAWING IS COPYRIGHT AND IS NOT TO BE COPIED OR REPRODUCED IN PART OR IN WHOLE WITHOUT THE WRITTEN APPROVAL OF THE ENGINEERS.

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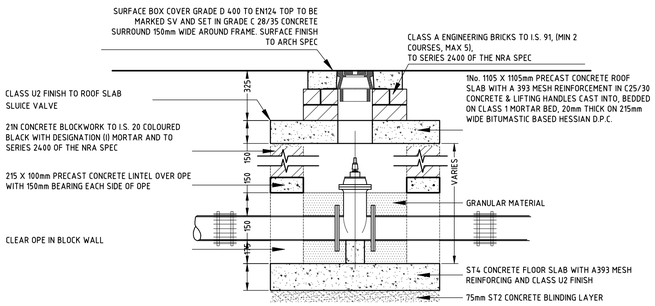
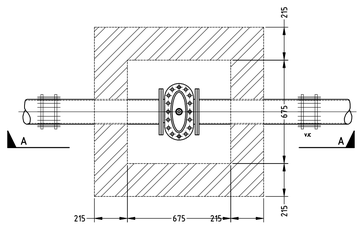
SLUICE VALVE DETAILS

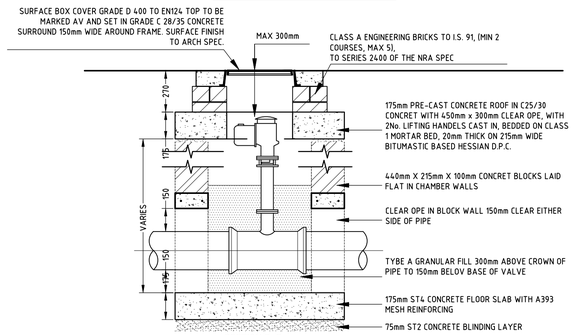


SECTION A-A

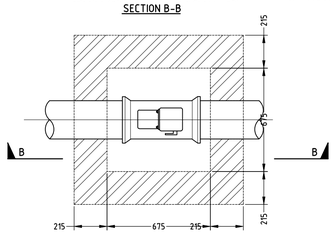


PLAN

AIR VALVE DETAILS

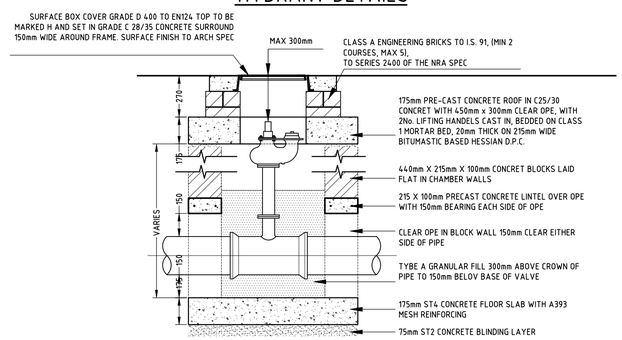


SECTION B-B

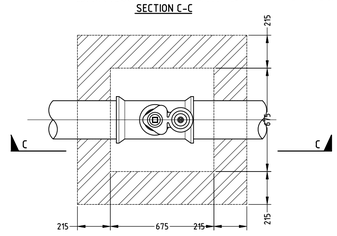


PLAN

HYDRANT DETAILS

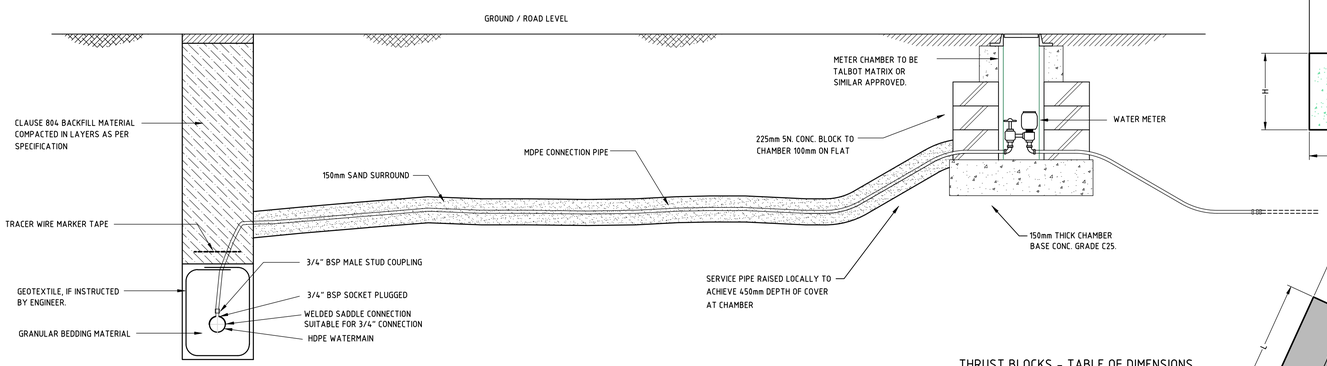


SECTION C-C



PLAN

NOT TO BE USED FOR CONSTRUCTION

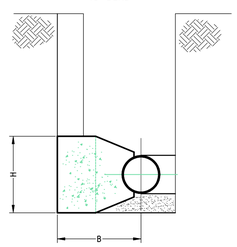


DOMESTIC CONNECTION ARRANGEMENT

THRUST BLOCKS - TABLE OF DIMENSIONS

FITTING	DIMENSIONS (mm)		
	H	L	B
11.25° BEND	500	300	400
22.5° BEND	500	400	500
45° BEND	550	700	500
90° BEND	600	1100	700
TEE	600	800	700

- 45° BEND -



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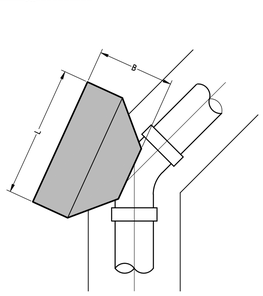
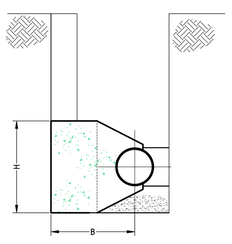


PLAN

- 90° BEND -



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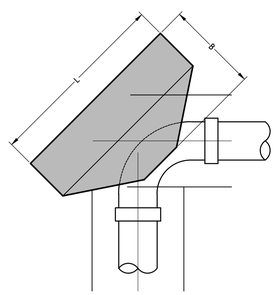
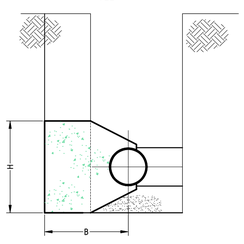


PLAN

- TEE -



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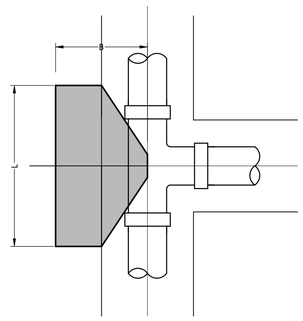

PLAN

REV	DATE	DESCRIPTION	BY/CHKD/APPR

Client

TUATH HOUSING

PHM Consulting
Civil - Structural - Environmental
11 Mallow Street, Limerick, Ireland V94 WRN4
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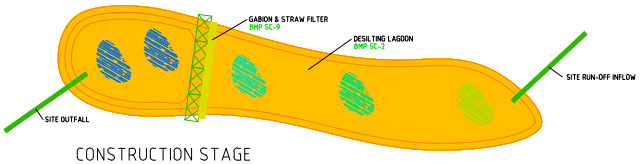
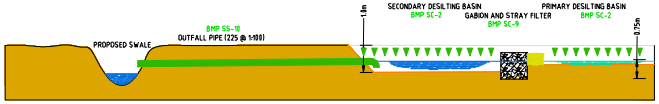
RESIDENTIAL DEVELOPMENT AT MASSEYTOWN, MACROOM, CO. CORK
WATERMAIN DETAILS

Drawn	Scale
POR	AS SHOWN
Chkd.	Date
POR	11/2022
Apprd.	Status
EOD	PLANNING P1

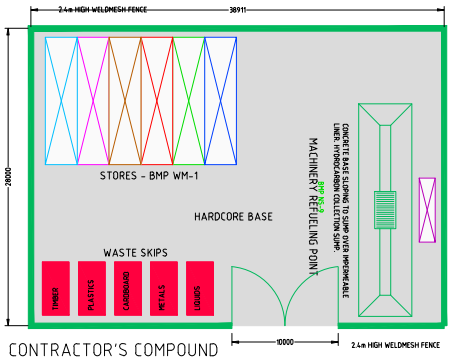
Project Number	Rev.
109-72	~
Drawing Number	
171	A1



CONSTRUCTION STAGE
SURFACE WATER MANAGEMENT
SCALE 1:200



TEMPORARY SURFACE WATER MANAGEMENT
SCALE 1:100



CONTRACTOR'S COMPOUND
SCALE 1:250

RECEPTION OFFICE (PREFAB)
MEETING ROOM / OFFICES (PREFAB)
CANTEEN / WELFARE FACILITIES (PREFAB)
SMALL PLANT STORE (STEEL)
S&H EQUIPMENT STORE (STEEL)
HAZARDOUS MATERIAL STORE (STEEL)

NOT TO BE USED FOR CONSTRUCTION

NOTES:
1. ALL HOUSE DRAINS TO BE 100mm Ø PVC SN8.
2. LOCAL DRAINS TO RUN AT A GRADIENT OF 1/40 UNLESS OTHERWISE NOTED.
3. DOUBLE GULLIES TO BE PROVIDED AT ALL ROAD SAG CURVES & CUL DE SACS WHERE INDICATED. SEPARATE CONNECTIONS 150mm DIA. SHALL BE PROVIDED FOR EACH GULLY. NO GULLEY SHALL BE MORE THAN 10m FROM A SURFACE WATER CONNECTION.
4. HOUSE DRAINS SHALL NOT PASS THROUGH A PROPERTY THEY DO NOT SERVE.
5. MANHOLES ON HOUSE DRAIN RUNS SHALL BE LOCATED IN PRIVATE PROPERTY IN ALL CASES.
6. FOR SEWER LONG SECTIONS SEE DRAWING No.'s 130 SERIES
7. FOR ROAD CONSTRUCTION DETAILS SEE DRG. No. 151.
8. FOR MANHOLE DETAILS SEE DRG. No. 152.
9. FOR PIPE BEDDING DETAILS SEE DRG. No. 153.
10. ALL PIPES WHICH ARE TO BE TAKEN IN CHARGE BY THE LOCAL AUTHORITY ARE TI BE CONCRETE PIPES COMPLYING WITH I.S. 6 & I.S. 164 OR B.S. 5911.
11. ALL PIPES WHICH ARE TO BE TAKEN IN CHARGE BY IRISH WATER ARE TI BE CONSTRUCTED IN ACCORDANCE WITH RELEVANT IW CODE OF PRACTICE AND STANDARD DETAILS.

REV	DATE	DESCRIPTION	BY/CHKD/APPR

Client
TUATH HOUSING

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PROPOSED RESIDENTIAL DEVELOPMENT AT
MASSEYTOWN, MACROOM, CO. CORK
CONST. ENVIRONMENTAL MANAGEMENT PLAN

Drawn	POR	Scale	1:250
Chkd.	POR	Date	11/2022
Apprd.	EOD	Status	PLANNING P1

Project Number	109-72
Rev.	~
Drawing Number	181
	A1