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SuDS Management Plan

Unit 1, M50 Business Park

Client: Creighton Properties LLC

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1.2 Review of Background Information

The proposed development is located within the district of South Dublin County Council (SDCC) and is therefore subject to the provisions of the SDCC Development Plan 2022-2028. The SuDS strategy is outlined within Section 4.2.2 of the SDCC Development Plan 2022-2028.

Surface water drainage considerations for the site are subject to the requirements of the SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide (2022); and Greater Dublin Strategic Drainage Study (GSDSDS) Volumes 2, 3 and 5 (March 2005).

in response to application for planning permission submitted for development at Unit 1, M50 Business Park, Ballymount, Dublin 12 (Reg Ref SD22A/0460).

This report is to be read in conjunction with reports and drawings submitted in support of the planning application for development at Unit 1, M50 Business Park, Ballymount, Dublin 12 (Reg Ref SD22A/0460):

- RPT-22_112-CSE-00-XX-RP-C-0001 Engineering Services Report Drainage and Water Services
- RPT-22_112-CSE-00-XX-RP-C-002 Site Specific Flood Risk Assessment.

and

- 22_112-CSE-00-XX-DR-C-2010 Topographical Survey Layout Plan
- 22_112-CSE-00-XX-DR-C-2100 Existing Surface Water Drainage Layout Plan
- 22_112-CSE-00-XX-DR-C-2110 Proposed Surface Water Drainage Layout Plan
- 22_112-CSE-00-XX-DR-C-2111 Proposed Permeable and Impermeable Areas
- 22_112-CSE-00-XX-DR-C-2112 Proposed Surface Water Attenuation System General Arrangement 1
- 22_112-CSE-00-XX-DR-C-2113 Proposed Surface Water Attenuation System General Arrangement 2
- 22_112-CSE-00-XX-DR-C-2114 Proposed Surface Water Attenuation System General Arrangement 3

2 Existing Site Characteristics

2.1 Existing Land Use

The existing site is a brownfield site with a total area of approximately 0.86 hectares, located within the M50 Business Park, Ballymount, Dublin 12. The existing site is currently being developed and is in use as a warehouse facility.

2.2 Geology

The Site Investigation of the existing ground conditions was undertaken Arup as the engineer and carried out by Site Investigations Ltd as the contractor.

Made ground comprising of grey silty sandy gravel was generally observed 0.90 metres below ground or less. Overburden comprising of brown sandy gravelly silty clay with cobbles extend to a maximum of 2.00 mbgl in trial pits and window sample logs, but a maximum of 8.10 mbgl in boreholes. Bedrock was recorded at depths ranging from 7.30 mbgl at RC02 to 8.10 mbgl RC01. See **Appendix A** for Borehole, Trial Pit and Window Sample Logs.

A soakaway test was proposed but had to be abandoned as the pit encountered boulder obstructions at 0.60 mbgl. See **Appendix B** for the Soakaway Test.

2.3 Topography

The site generally falls from southwestern boundary to northeastern boundary with existing ground levels varying between 68.14 m OD to 66.49 m OD. The existing site topography is shown in Figure 2.

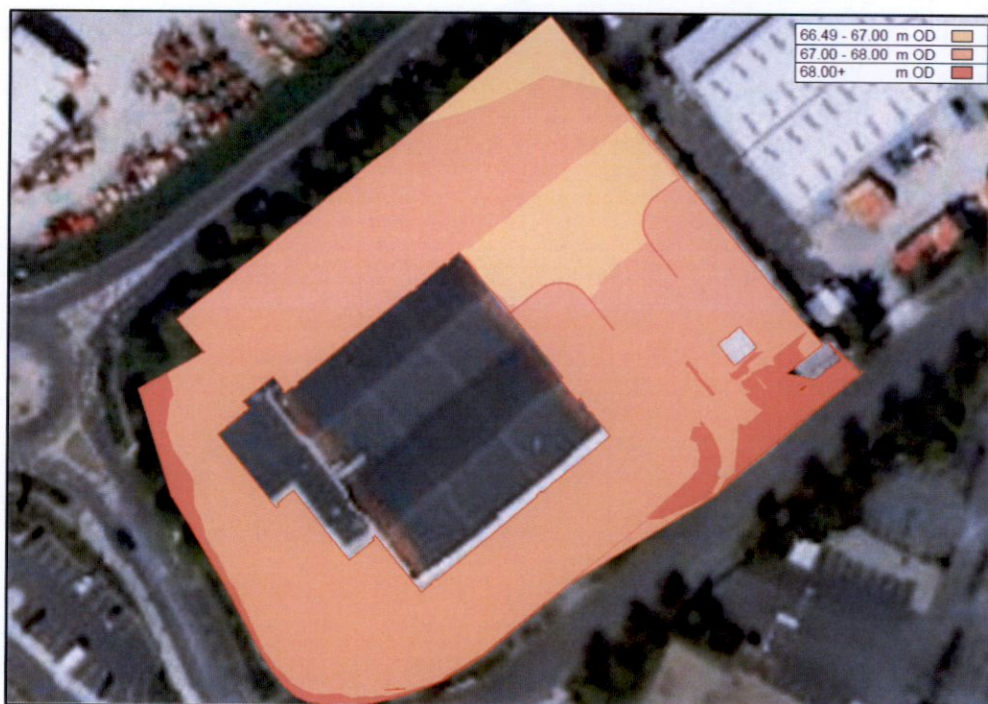


Figure 2 Existing Site Topography.

2.4 Flood Risk

As outlined in report no. 22_112-CSE-00-XX-RP-C-002 Site Specific Flood Risk Assessment, the site is within Flood Zone C with a low probability of flooding in accordance with the OPW Guidelines, 2009, "The Planning System and Flood Risk Management Guidelines for Planning Authorities".

2.5 Utilities

The existing utilities within the site have been identified through Ground-Penetrating Radar (GPR) Survey carried out jointly by PCA and Precision Utility Mapping (refer to **Appendix C**). For the existing surface water drainage network refer to Section 2.3 of report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services; and drawing no. 22_112-CSE-00-XX-DR-C-2100 Existing Surface Water Drainage Layout Plan.

2.6 Planning Requirements

The following planning requirements constrain SuDS design:

- In the Confirmation of Feasibility (CoF), reference no. CDS22003496, Irish Water stipulated Proposed Option 1 for a 100mmØ metered pipe to connect existing fire flow mains to the fire flow tank was feasible without the requirement for upgrades to the Irish Water network (refer to **Appendix D** for the CoF). As a result, a pumphouse and sprinkler tanks to the total storage volume of 250.72 m³ have been provisioned (refer to Section 2.3 of report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services).

3 Flow Route Analysis

3.1 Existing Flow Route Analysis

The existing flow route analysis is shown in Figure 3 below, which demonstrates how the existing site behaves. It depicts the existing flow conveyance, overflow arrangements and exceedance routes.



Figure 3 Existing Flow Route Analysis.

3.2 Modified Flow Route Analysis

The modified flow route analysis has been conducted in conjunction with the proposed development layout levels and inform the overall SuDS and surface water management strategy by predicting the flow of runoff within the site area. Figure 4 below, which demonstrates the modified flow route.

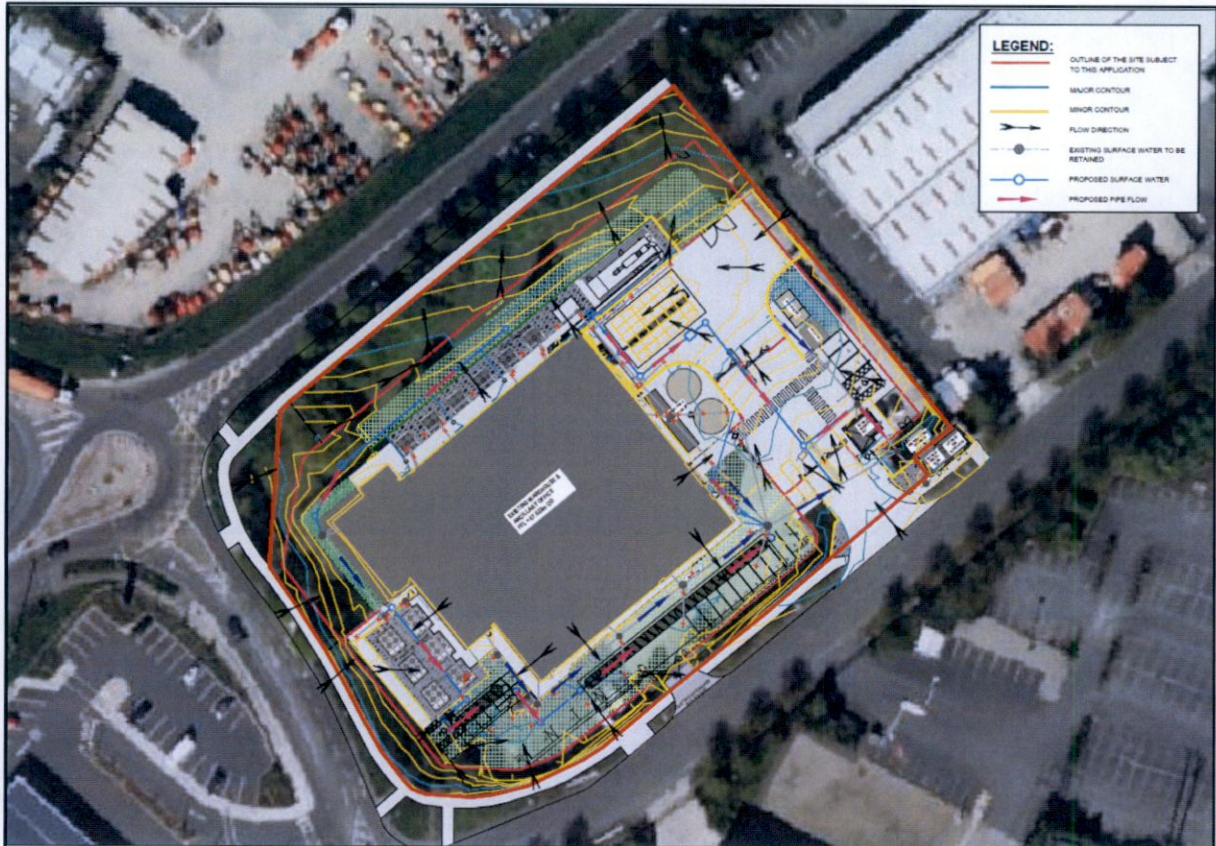


Figure 4 Modified Flow Route Analysis.

4 Overview of Sustainable Urban Drainage Systems (SuDS)

The SuDS Manual C753 (2015) published by CIRIA defines sustainable drainage or SuDS is a way of managing rainfall that minimises the negative impacts on the quantity and quality of runoff whilst maximising the benefits of amenity and biodiversity for people and the environment.

In this section of the report site specific SuDS components are proposed, and the impacts on the quantity and quality of runoff and its associated benefits of amenity and biodiversity are discussed.

4.1 Proposed SuDS Components

SuDS should not be thought of as an individual component, but as an interconnected system designed to manage, treat and make best use of surface water, from where it falls as rain to the point at which it is discharged into the receiving environment beyond the boundaries of the site (The SuDS Manual C753 (2015) published by CIRIA).

The selection of SuDS components are restricted by spatial constraints and existing services congestion. Spatial constraints are attributed to the planning requirements identified in Section 2.6, the existing building footprints to be retained, the design loadings of the existing building, the provision for surface water attenuation and the requirement for services are to be contained within the security perimeter.

As a result, the following SuDS components are provided:

4.1.1 Green Roofs

Green roofs provide a living surface on top of buildings which intercepts and reduces surface water runoff by storing water in their substrate and supporting root uptake and evapotranspiration. Green roofs provide a means of attenuating and treating surface water runoff at the source. It is proposed to provide this solution at the proposed bike shelter and bin store. It is not structurally feasible to be adopted on the existing building due to structural loading capacity.

4.1.2 Permeable Paving (Grasscrete)

Permeable paving promotes the infiltration of rainwater through the surface and into to the underground storage void system before infiltrating into the ground. This offers an efficient means of intercepting runoff, reducing the volume and frequency of runoff and providing a treatment medium close to its source. For the proposed grasscrete areas, refer to drawing no. 22_112-CSE-00-XX-DR-C-2111 Proposed Permeable and Impermeable Areas.

4.1.3 Attenuation Tanks

Attenuation storage tanks are used to create large below ground voided space to be used to temporarily store surface water runoff before infiltration, controlled release, or use.

Refer to the following planning drawings in relation to the provision of surface water attenuation tanks:

- 22_112-CSE-00-XX-DR-C-2110 Proposed Surface Water Drainage Layout Plan
- 22_112-CSE-00-XX-DR-C-2112 Proposed Surface Water Attenuation System General Arrangement 1
- 22_112-CSE-00-XX-DR-C-2113 Proposed Surface Water Attenuation System General Arrangement 2
- 22_112-CSE-00-XX-DR-C-2114 Proposed Surface Water Attenuation System General Arrangement 3.

4.2 Water Quantity

As discussed in Section 2.3 of report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services, existing site's internal network has no provision for surface water attenuation. Thus, unmanaged surface water runoff generated within the site increases flood risk within the site and is likely to increase flood risk elsewhere during critical storm events.

As outlined in RPT-22_112-005 Proposed Surface Water Attenuation Overview, surface water attenuation is to be provided to manage the volumes of surface water runoff generated within the proposed development such that flood risk is managed. The discharge from the site is reduced from 332.78 l/s to 1.73 l/s in the 1 | 100 year event; a reduction of 99%. As a result, there is no resultant increase in flood risk downstream of the site.

4.3 Water Quality

4.3.1 Source Control and Management Trains

In order to satisfy the Water Quality SuDS Design criterion, a source control and management train approach is adopted. This requires several SuDS systems in series in order to have sufficient pollutant removal efficiency to treat runoff prior to discharging to the surface water network. This is in accordance with CIRIA SuDS Manual C753.

The volume and frequency of surface water runoff is delayed and attenuated at or near its source through the provision of the following source control SuDS components: green roofs and permeable paving. In addition to this, site control (i.e. attenuation storage tanks) have been provided to ensure that surface water runoff from the site, up to 1 in 100 year rainfall return period with 20% climate change allowance, does not exceed the permitted discharge rate of 1.73 l/s.

The following SuDS management trains have been provided for roof and road runoff:

Road Runoff:

Within the permeable paving areas (i.e. grasscrete areas), road runoff is subjected to a minimum of 2-Stage treatment: Stage 1 – treatment within grasscrete permeable paving and Stage 2 – treatment within the bypass interceptor. Whereas in the hardstanding areas, road runoff is subjected to a minimum of 1-Stage treatment within the bypass petrol interceptor.

Roof Runoff:

Within the green roofed areas, roof runoff is subjected to a minimum of 2-Stage treatment: Stage 1 – treatment within the green roof and Stage 2 – treatment within the bypass interceptor. The existing buildings to be retained have not be designed for green or blue roof loadings and as a result, roof runoff. is subjected to a minimum of 1-Stage treatment within the bypass petrol interceptor. The exception to this is the Bike Shelter and the bin store which are provided with green roofs and will be subject to 2-Stage treatment.

Refer to drawing no. 22_112-CSE-00-XX-DR-C-2111 Proposed Permeable and Impermeable Areas.

4.3.2 Pollution Prevention Measures

Petrol and oil interceptors are proposed in areas where there is risk of pollution by petrol, oil, silt, or other suspended materials. In accordance with European Standards pr EN 858: Parts 1 & 2 and Pollution Prevention Guidelines PPG3, all surface car parks shall be fitted with a Class I Light Liquid Separator before discharging to the surface water network.

4.4 Amenity and Biodiversity

Amenity relates to the usefulness and appearance of SuDS features and considers multi-functionality and visual quality. Key amenity elements include:

- Legibility – The proposed SuDS components are on the surface and are easy to understand how the surface water management system works. Blockages and other performance risks are easy to rectify through the provision of a surface water operations and maintenance plan (see **Appendix E**).
- Accessibility – all parts of the proposed SuDS scheme can be easily reached as there is no demarcation requirement.
- Multi-functionality and visual character – The proposed SuDS components are multifunctional as they do not only function as SuDS but have been incorporated into the overall landscape and site layout levels to provide visual characteristics.

Biodiversity considerations provide habitat and connectivity within and around the proposed development. In conjunction with the overall landscape of the site, green roofs provide topographical diversity and implicitly provide connectivity and habitat opportunities.

5 South Dublin County Council SuDS Checklist

Table 1 – SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide Designer’s Checklist

Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
1. Data gathering				
1.1	Information to understand site parameters including geology, topography, flood risk, utilities, landscape context, community and wildlife.	To understand site constraints that inform Concept Design.	Yes	The following were conducted: - Site Investigation (See Appendix A for Borehole and Trial Pit Logs and Appendix B for Infiltration Test Results.) - Topographical Survey (See Appendix F for Topographical Survey) - Flood Risk Assessment (See report no. RPT-22_112-CSE-00-XX-RP-C-002 Site Specific Flood Risk Assessment)
1.2	Planning requirements that influence SuDS design.	To be aware of planning constraints that impact SuDS design.	Yes	In Section 2.6 of this report, the following planning constraints were identified: - The provision of a pumphouse and sprinkler tanks to the total storage volume of 250.72 m ³ (refer to Section 2.3 of report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services).
2. Flow route analysis				
2.1	Existing flow routes	To understand site hydrology.	Yes	The site generally falls from southwestern boundary to northeastern boundary with existing ground levels varying between 68.14 to 66.49 metres Ordnance Datum (m OD).
2.2	Modified flow routes	To understand the impact of development.	Yes	The modified flow route provides the necessary conveyance, overflow arrangements and exceedance criteria based on the proposed development layout whilst ensuring the natural hydrology of the site is maintained.
3. General SuDS design elements				
3.1	Collection of rainfall runoff	Runoff retained at or near the surface.	Yes	Taking into account the inconclusive infiltration results outlined in the Site Investigation (See Appendix B) and the planning constraints listed in Checklist Reference 1.2 , surface water runoff is retained at or near the surface where practicably possible.

Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
3.2	Source control	Primary treatment stage to protect the development.	Yes	Permeable surfaces (i.e. grasscrete roads) and green roofs at the Bike Shelter and Bin Store have been provided.
3.3	Conveyance	At or near the surface.	Yes	Surface conveyance is used where practicably possible given the planning constraints listed in Checklist Reference 1.2 .
3.4	Management train	SuDS components in series to manage quantity and quality.	Yes	Where practicably possible, road runoff is subjected to no less than a 2-stage treatment process: stage 1 – treatment within the permeable paving and stage 2 – treatment within the bypass petrol interceptor. Whereas existing roof runoff is subjected to a minimum of 1-stage treatment within the hydrodynamic separator. Roof drainage from the bike shelter and bin store will be subject to 2-stage treatment – green roof and bypass interceptor. For certain sections of the existing hard standing area at the loadings bays areas it is only feasible to provide 1-stage treatment due to the nature of the operations (i.e. HGV turning movements).
3.5	Sub-catchments	Dividing development into discreet parcels of land each with a SuDS component.	Yes	Where practicably possible grasscrete roads, filter drains and swales have been provided given the planning site constraints listed in Checklist Reference 1.2. These elements intercept and treat the runoff prior to entering the overall attenuation for the entire catchment.
3.6	Storage	Indicate extent and location where runoff is stored.	Partially	Taking into account the planning constraints listed in Checklist Reference 1.2, it is not practicably possible to provide a long-term SuDS storage structure with a total volume of 480 m3 including freeboard (see RPT-22_112-005 Proposed Surface Water Attenuation Overview). In order to attenuate runoff for the 1 in 100 year storm event + 20% climate change, an attenuation storage tank as outlined in report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services.
3.7	Flow control	Location to demonstrate storage location.	Yes	A hydrobrake is provided downstream of the concrete storage tank (see Section 2.4.5 of report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services).
3.8	Outfall	Locations and method discharge.	Yes	Attenuated flows are discharged from the hydrobrake manhole into the tie-in existing manhole located at the northeast site boundary before outfalling into the M50 Business Park drainage network southeast of the site. (See RPT-22_112-005 Proposed Surface Water Attenuation Overview).

Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
4. Quantity				
4.1	Confirm interception losses will occur.	Demonstrate the use of SuDS components that provide interception losses.	Yes	Interception losses occur: - SuDS related losses due to infiltration: grasscrete roads and green roofs at the Bike Shelter and Bin Store. - Non-SuDS related losses: full retention separator and bypass separator (See Section 2 of report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services).
4.2	Confirm how rate of flow from development will be reduced to Greenfield runoff rates	Demonstrate restricted flow rates are achievable. Increase in allowable discharge rates where direct discharge is made to estuary or sea will only be permitted in agreement with SDCC Drainage Department.	Yes	The area for the proposed development site is c.0.86 ha thus the allowable discharge rate to meet Greenfield runoff is 1.73 l/s. Discharge from the site will be controlled by means of an online hydrobrake vortex control (see RPT-22_112-005 Proposed Surface Water Attenuation).
4.3	Confirm how runoff will be managed to Greenfield runoff volumes.	Demonstrate that scale of SuDS will be sufficient to deal with volumes generated.	No	Given the planning constraints listed in Checklist Reference 1.2 and service congestion, there is insufficient space for the proposed SuDS components to sufficiently manage surface water runoff to Greenfield runoff volumes. Therefore, storage and a flow control has been provided as per Checklist Reference 3.6 and 3.7 .
4.4	Confirm climate change allowance and whether urban creep is applied.	Demonstrate additional volumes to be managed.	Yes	In accordance with South Dublin County Council Climate Change Action Plan (2019-2024), a climate change allowance of 20% has been adopted.
4.5	Confirm 'long term storage'.	Demonstrate no increase in runoff from pre-development status.	Yes	As per Checklist Reference 3.6 and 3.7 , long term storage with a total volume of 480 m ³ and a downstream online hydrobrake vortex control with allowable discharge of 1.73 l/s is provided to ensure that Greenfield runoff rate is not exceeded. (See RPT-22_112-005 Proposed Surface Water Attenuation Overview.)

Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
5. Quality				
5.1	Confirm 'treatment stage' requirements.	Demonstrate SuDS components used in series to mitigate 'pollution hazard level'.	Yes	Where practicably possible, road runoff is subjected to no less than a 2-stage treatment process: stage 1 – treatment within the permeable paving swale and stage 2 – treatment within the bypass petrol inceptor. Whereas existing roof runoff is subjected to a minimum of 1-stage treatment within the hydrodynamic separator. Roof drainage from the bike shelter and bin store will be subject to 2-stage treatment – green roof and bypass interceptor. For certain sections of the existing hard standing area at the loadings bays areas it is only feasible to provide 1-stage treatment due to the nature of the operations (i.e. HGV turning movements)
5.2	Confirm source control is present.	Demonstrate protection of development to enable amenity and biodiversity benefits.	Yes	Where practicably possible, source control such as permeable surfaces provide the first stage of treatment, intercepting primary pollution and reducing runoff flow rates.
5.3	Confirm interception losses.	Demonstrate everyday pollution retained on site.	Yes	Interception losses occur: - SuDS related losses due to infiltration: grasscrete roads and green roofs. - Non-SuDS related losses: full retention separator and bypass separator (See Section 2 of the report no. 22_112-CSE-00-XX-RP-C-002 Engineering Services Report Drainage and Water Services).
6. Amenity				
6.1	Legibility	An understanding of how the SuDS function by people using or managing the site.	Yes	The proposed SuDS components are on the surface and are easy to understand how the surface water management system works. Blockages and other performance risks are easy to rectify through the provision of a surface water operations and maintenance plan (see Appendix E).
6.2	Accessibility	All parts of the SuDS easily reached and safe for recreation and maintenance. Safety by design.	Yes	All parts of the proposed SuDS scheme can be easily reached as there is no demarcation requirement.
6.3	Multi-functionality	All parts of the SuDS landscape usable whenever possible.	Yes	The proposed SuDS components are multifunctional as they do not only function as SuDS but have been incorporated into the overall landscape and site layout levels to provide visual characteristics.

Checklist Reference	Information required	Rationale	Adapted to scheme	Action taken to acquire information required or incorporate rationale
6.4	Visual character	All elements of the SuDS design attractive (or at least visually neutral, e.g., inlets, outlets, and control structures) and safe.	Yes	Refer to Checklist Reference 6.3 .
7. Biodiversity				
7.1	Clean water	A controlled flow of clean water' within and outside the site using 'source control' and the 'management train'	Yes	Surface water conveyance and open SuDS features such as the grasscrete roads and green roofs, incorporated into the overall landscape site layout plan, provide topographical diversity and implicitly provide connectivity and habitat opportunities.
7.2	Connectivity	Links to outside and within development to ensure plants and animals can travel between habitat areas.	Yes	Refer to Checklist Reference 7.1 .
7.3	Topographical diversity	Variable vertical and horizontal structures for complex habitat development.	Yes	Refer to Checklist Reference 7.1 .
7.4	Habitat creation	Exploit opportunities through ecological design.	Yes	Refer to Checklist Reference 7.1 .
7.5	Sympathetic management	Create a mosaic of habitat types through maintenance.	No	Due to planning constraints, the site serves as a connector providing habitat opportunities through incorporating the proposed SuDS components into the overall landscaping and provision of applicable maintenance.









6 Conclusion

The existing site characteristics (such as geology, topography, flood risk and utilities) and the applicable Irish Water planning requirements that influence the overall SuDS strategy and design have been identified. The natural hydrology of the site has been investigated through flow route analysis in order to understand the impact of the proposed development.





Subsequently, the strategy for managing SuDS and surface water runoff was developed. SuDS components have been provided to control runoff frequency, flow rates, volumes and reduce concentrations of contaminants to acceptable levels. The proposed treatment train approach assures that both runoff quantity and quality are addressed through the overall techniques of pollution prevention and source control, whilst maximising the benefits of amenity and biodiversity.

The proposed strategy aligns with the provisions of the South Dublin County Council (SDCC) Development Plan 2022-2028 and the requirements as outlined in the SDCC Sustainable Drainage Explanatory, Design and Evaluation Guide (2022) as far as practicably possible.

Appendix A Borehole and Trial Pit Logs




Contract No: 6032		Trial Pit Log				Trial Pit No: TP01			
Contract:	DUB602 - Ski Lodge	Easting:	709884.685	Date:	22/08/2022				
Location:	Ballymount, Dublin 12	Northing:	730169.540	Excavator:	JCB 3CX				
Client:	-	Elevation:	67.76	Logged By:	P. McGonagle				
Engineer:	Arup	Dimensions (LxWxD) (m):	2.00 x 0.60 x 1.20	Status:	FINAL				
Level (mbgl)	Stratum Description		Legend	Level (mOD)		Samples / Field Tests		Water Strike	
Scale:	Depth			Scale:	Depth:	Depth	Type	Result	
	0.12	MADE GROUND: concrete.			67.64				
	0.25	MADE GROUND: reinforced concrete.			67.51				
	0.48	MADE GROUND: grey silty sandy gravel (Cl. 804).			67.28				
	0.90	MADE GROUND: grey silty sandy gravel (Cl. 6F2).			67.0				
	1.00	Stiff brown slightly sandy gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of sandstone. Cobbles are angular to subangular of sandstone.			66.86	1.00	B	PMc23	
	1.00				66.56	1.00	D	PMc24	
	1.20	Obstruction - possible boulders.			66.5	1.00	ES	PMc25	
		Pit terminated at 1.20m							
	1.50				66.0				
	2.00				65.5				
	2.50				65.0				
		Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:		Key:		
		Obstruction - possible boulders.	Pit walls stable.	Dry	-		B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental		


Contract No: 6032		Trial Pit Log				Trial Pit No: TP02			
Contract: DUB602 - Ski Lodge		Easting: 709852.288	Date: 22/08/2022						
Location: Ballymount, Dublin 12		Northing: 730159.299	Excavator: JCB 3CX						
Client: -		Elevation: 67.51	Logged By: P. McGonagle						
Engineer: Arup		Dimensions (LxWxD) (m): 2.00 x 0.60 x 1.35	Status: FINAL						
Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples / Field Tests			Water Strike
Scale:	Depth			Scale:	Depth:	Depth	Type	Result	
	0.12	MADE GROUND: concrete.			67.39				
	0.27	MADE GROUND: reinforced concrete.			67.24				
	0.54	MADE GROUND: grey silty sandy gravel (Cl. 804).			67.0				
	0.95	Firm brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of sandstone. Cobbles are angular to subangular of sandstone.			66.97	0.60	ES	PMc26	
	1.35	Stiff brown slightly sandy very gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of sandstone. Cobbles are angular to subangular of sandstone.			66.56	0.80 0.80	B D	PMc27 PMc28	
	1.35	Obstruction - possible boulders. Pit terminated at 1.35m			66.16	1.30 1.30	B D	PMc29 PMc30	
	1.5				66.0				
	2.0				65.5				
	2.5				65.0				
		Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:		Key:		
		Obstruction - possible boulders.	Pit walls stable.	Dry	-		B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental		

Contract No: 6032		Trial Pit Log				Trial Pit No: TP03			
Contract: DUB602 - Ski Lodge		Easting: 709813.662	Date: 19/08/2022						
Location: Ballymount, Dublin 12		Northing: 730171.918	Excavator: 3T tracked excavator						
Client: -		Elevation: 67.59	Logged By: P. McGonagle						
Engineer: Arup		Dimensions (LxWxD) (m): 3.30 x 0.30 x 0.70	Status: FINAL						
Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples / Field Tests			Water Strike
Scale:	Depth			Scale:	Depth:	Depth	Type	Result	
	0.10	TOPSOIL.		67.5	67.49				
		MADE GROUND: brown slightly sandy slightly gravelly silty clay with low brick content.							
	0.50	MADE GROUND: brown slightly sandy gravelly silty clay with low cobble content.		67.09	67.09	0.50	ES	PMc20	
				67.0		0.60	B	PMc21	
						0.60	D	PMc22	
	0.70	30mm PVC water main encountered - pit terminated. Pit terminated at 0.70m		66.89					
	1.0			66.5					
	1.5			66.0					
	2.0			65.5					
	2.5			65.0					
		Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:		Key:		
		Underground service.	Pit walls stable.	Dry	-		B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental		

Contract No: 6032	Trial Pit Log	Trial Pit No: TP05
----------------------	---------------	------------------------------

Contract: DUB602 - Ski Lodge	Easting: 709817.922	Date: 22/08/2022
Location: Ballymount, Dublin 12	Northing: 730113.294	Excavator: JCB 3CX
Client: -	Elevation: 67.60	Logged By: P. McGonagle
Engineer: Arup	Dimensions (LxWxD) (m): 2.00 x 0.60 x 2.00	Status: FINAL

Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples / Field Tests			Water Strike	
Scale:	Depth			Scale:	Depth:	Depth	Type	Result		
	0.08	MADE GROUND: tarmacadam.								
	0.16	MADE GROUND: grey silty sandy gravel (Cl. 804).		67.5	67.52					
		Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of sandstone. Cobbles are angular to subangular of sandstone.			67.44					
	0.5						0.50	ES	PMc31	
	1.0						1.00	B	PMc32	
							1.00	D	PMc33	
	2.0	Pit terminated at 2.00m			65.60	2.00	B	PMc34		
					65.5	2.00	D	PMc35		
	2.5				65.0					

	Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
	Scheduled depth.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

TP01 Sidewall



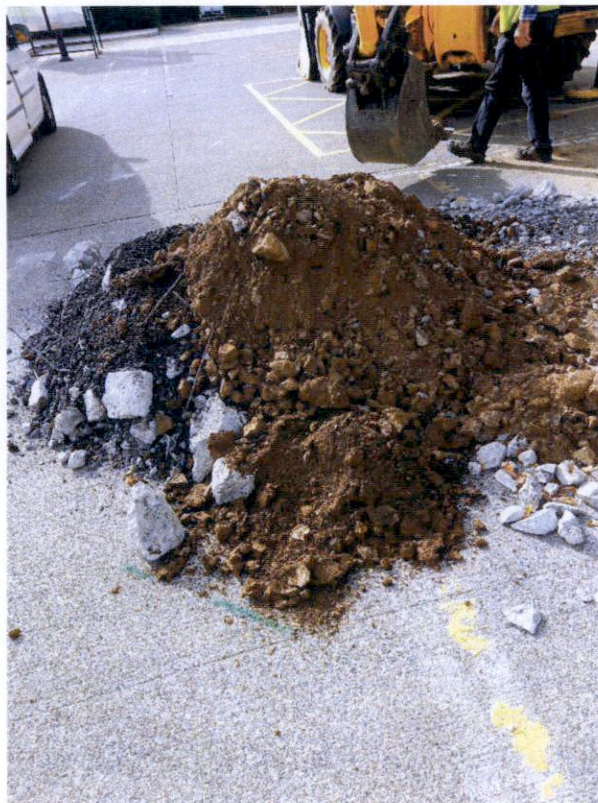
TP01 Spoil



TP02 Sidewall



TP02 Spoil



TP03 Sidewall



TP03 Spoil



TP04 Sidewall



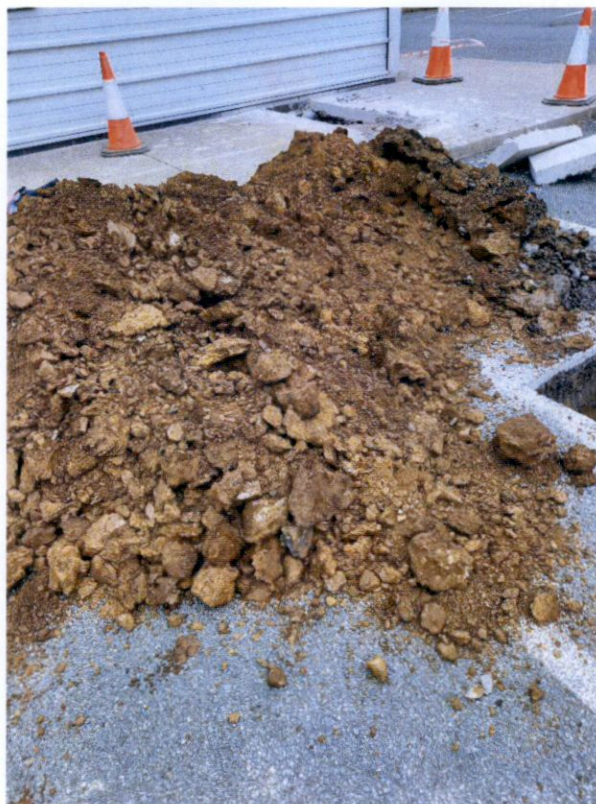
TP04 Spoil









TP05 Sidewall



TP05 Spoil



Contract No: 6032		Window Sample Log					Corehole No: WS01		
Contract:	DUB602 - Ski Lodge	Easting:	709849.232	Date Started:	31/08/2022				
Location:	Ballymount, Dublin 12	Northing:	730203.113	Logged By:	D. Clarke				
Client:	-	Elevation:	67.26	Scale:	1:15				
Engineer:	Arup	Rig Type:	Competitor 130	Sheet No:	Sheet 1 of 1				
Depth (m)		Strata Description	Legend	Level (mOD)		Samples			Backfill
Scale	Depth			Scale	Level	Depth	Type	Ref.	
		TOPSOIL.							
	0.20	MADE GROUND: grey silty sandy gravel with low cobble content.			67.06				
	0.30	Firm brown slightly sandy gravelly silty CLAY with high cobble content.			66.96				
	0.50								
	0.70	Brown silty gravelly SAND.			66.56				
	1.00								
	1.50								
	1.60	Brown silty sandy GRAVEL with low cobble content.			65.66				
	2.00	No recovery.			65.26				
	2.50								
	3.00	End of Sample at 3.00m			64.26				
		Remarks:							
		No recovery from 2.00m to 3.00m.							

WS01 0.00m - 1.00m

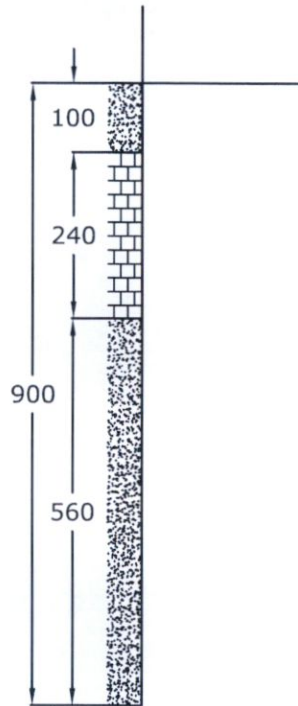


WS01 1.00m - 2.00m



Foundation Pits

FIP01



Foundation Details:

100mm concrete overlying 240mm blocks overlying 560mm concrete. No extension from building wall.

Ground Conditions:

- 0.00m:** MADE GROUND: concrete.
- 0.10m:** MADE GROUND: grey silty sandy gravel (mixed CL.804 and Cl. 6F2).
- 0.54m:** Firm brown slightly sandy gravelly silty CLAY with medium cobble content.
- 1.40m:** Pit terminated.



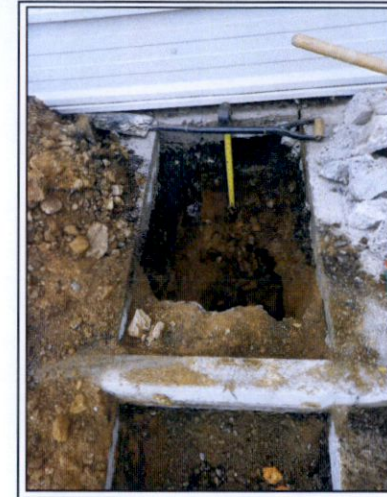
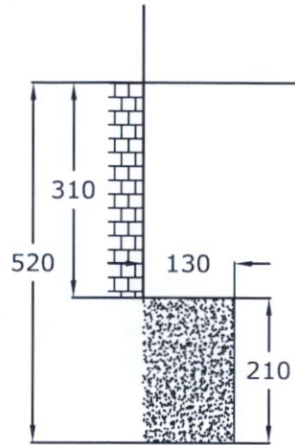
SITE INVESTIGATIONS LTD

Project: DUB602 - Ski Lodge
 Location: Ballymount, Dublin 12
 Consultant: Arup

Logged by: P. McGonagle	Excavation Started: 18/08/2022	Excavation Finished: 18/08/2022	CONTRACT NUMBER
Scale: NOT TO SCALE, ALL DISTANCES IN mm			6032
DEPTH ARE TO THE TOP OF SERVICES			

Foundation Pits

FIP02



Foundation Details:

310mm concrete blocks overlying 210mm concrete foundation, extends 130mm from wall.

Ground Conditions:

- 0.00m:** MADE GROUND: concrete.
- 0.10m:** MADE GROUND: grey silty sandy gravel (mixed CL.804 and Cl. 6F2).
- 0.35m:** Firm brown slightly sandy gravelly silty CLAY with medium cobble content.
- 1.20m:** Pit terminated.



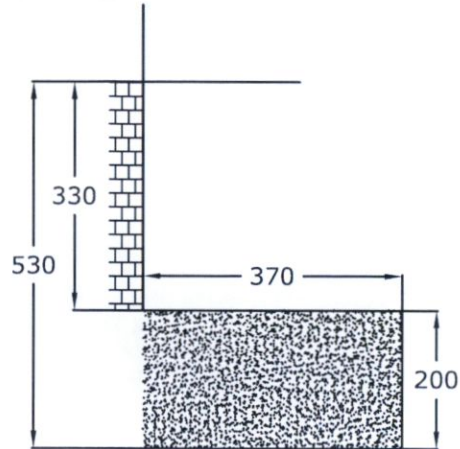
SITE INVESTIGATIONS LTD

Project: DUB602 - Ski Lodge
 Location: Ballymount, Dublin 12
 Consultant: Arup

Logged by: P. McGonagle	Excavation Started: 18/08/2022	Excavation Finished: 18/08/2022	CONTRACT NUMBER
Scale: NOT TO SCALE, ALL DISTANCES IN mm			6032
DEPTH ARE TO THE TOP OF SERVICES			

Foundation Pits

FIP03



Foundation Details:

330mm concrete blocks overlying 200mm concrete foundation, extends 370mm from wall.

Ground Conditions:

- 0.00m:** MADE GROUND: tarmacadam.
- 0.06m:** MADE GROUND: grey silty sandy gravel (CL.804).
- 0.44m:** Firm brown slightly sandy slightly gravelly silty CLAY with medium cobble content.
- 0.60m:** Pit terminated.



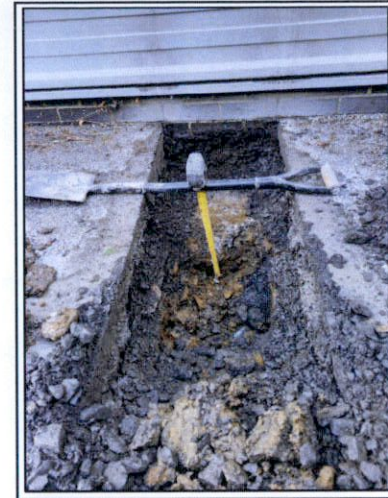
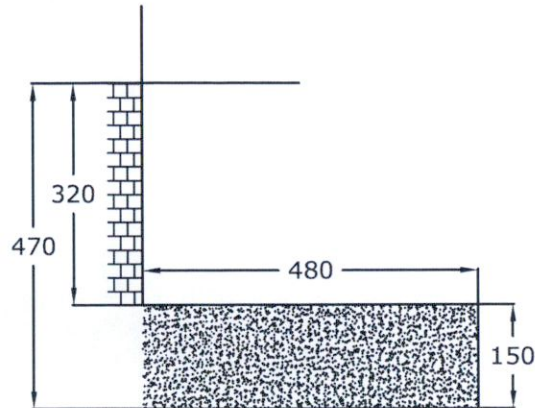
SITE INVESTIGATIONS LTD

Project: DUB602 - Ski Lodge
 Location: Ballymount, Dublin 12
 Consultant: Arup

Logged by: P. McGonagle	Excavation Started: 19/08/2022	Excavation Finished: 19/08/2022	CONTRACT NUMBER
Scale: NOT TO SCALE, ALL DISTANCES IN mm			6032
DEPTH ARE TO THE TOP OF SERVICES			

Foundation Pits

FIP04



Foundation Details:

320mm concrete blocks overlying 150mm concrete foundation, extends 480mm from wall.

Ground Conditions:

- 0.00m:** MADE GROUND: tarmacadam.
- 0.06m:** MADE GROUND: grey silty sandy gravel (CL.804).
- 0.36m:** Firm brown sandy gravelly silty CLAY with medium cobble content.
- 0.55m:** Pit terminated.



SITE INVESTIGATIONS LTD

Project: DUB602 - Ski Lodge
 Location: Ballymount, Dublin 12
 Consultant: Arup

Logged by:
P. McGonagle

Excavation Started:
19/08/2022

Excavation Finished:
19/08/2022

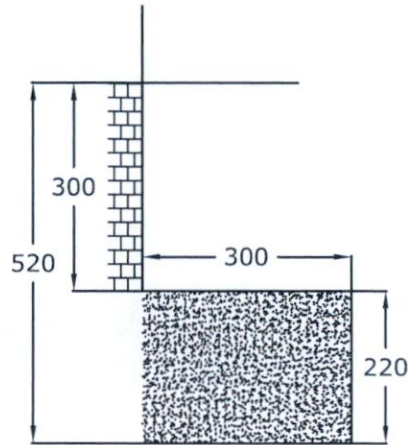
CONTRACT
NUMBER

Scale:
NOT TO SCALE, ALL DISTANCES IN mm
DEPTH ARE TO THE TOP OF SERVICES

6032

Foundation Pits

FIP05



Foundation Details:

300mm concrete blocks overlying 220mm concrete foundation, extends 300mm from wall.

Ground Conditions:

- 0.00m:** MADE GROUND: tarmacadam.
- 0.06m:** MADE GROUND: grey silty sandy gravel (CL.804).
- 0.18m:** Firm brown slightly sandy slightly gravelly silty CLAY with medium cobble content.
- 0.60m:** Pit terminated.



SITE INVESTIGATIONS LTD

Project: DUB602 - Ski Lodge
 Location: Ballymount, Dublin 12
 Consultant: Arup

Logged by:
P. McGonagle

Excavation Started:
19/08/2022

Excavation Finished:
19/08/2022

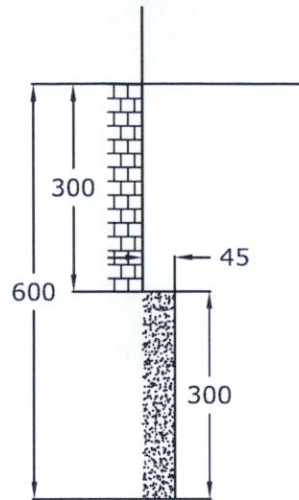
CONTRACT
NUMBER

Scale:
NOT TO SCALE, ALL DISTANCES IN mm
DEPTH ARE TO THE TOP OF SERVICES

6032

Foundation Pits

FIP06



Foundation Details:

300mm concrete blocks overlying 300mm concrete foundation, extends 45mm from wall.

Ground Conditions:

0.00m: MADE GROUND: concrete.

0.10m: MADE GROUND: grey silty sandy gravel (mixed CL.804 and CL. 6F2).

0.20m: Firm brown slightly sandy slightly gravelly silty CLAY with medium cobble content.

0.70m: Pit terminated.



SITE INVESTIGATIONS LTD

Project: DUB602 - Ski Lodge
 Location: Ballymount, Dublin 12
 Consultant: Arup

Logged by:
P. McGonagle

Excavation Started:
18/08/2022

Excavation Finished:
18/08/2022

CONTRACT
NUMBER

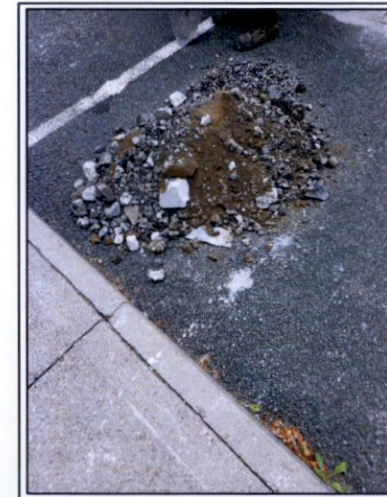
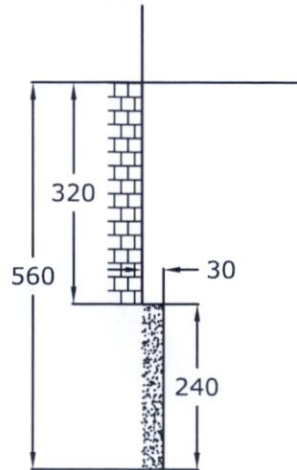
Scale:
NOT TO SCALE, ALL DISTANCES IN mm

DEPTH ARE TO THE TOP OF SERVICES

6032

Foundation Pits

FIP07



Foundation Details:

320mm concrete blocks overlying 240mm concrete foundation, extends 30mm from wall.

Ground Conditions:

- 0.00m:** MADE GROUND: concrete.
- 0.08m:** MADE GROUND: grey silty sandy gravel (CL.804).
- 0.38m:** Firm brown slightly sandy slightly gravelly silty CLAY with medium cobble content.
- 0.60m:** Pit terminated.



SITE INVESTIGATIONS LTD

Project: DUB602 - Ski Lodge
 Location: Ballymount, Dublin 12
 Consultant: Arup

Logged by:
P. McGonagle

Excavation Started:
22/08/2022

Excavation Finished:
22/08/2022

CONTRACT
NUMBER

Scale:
NOT TO SCALE, ALL DISTANCES IN mm
DEPTH ARE TO THE TOP OF SERVICES

6032

Contract No: 6032	Rotary Corehole Log				Corehole No: RC01	
----------------------	----------------------------	--	--	--	-----------------------------	--

Contract:	DUB602 - Ski Lodge	Easting:	709870.698	Date Started:	14/09/2022
Location:	Ballymount, Dublin 12	Northing:	730179.994	Date Completed:	14/09/2022
Client:	-	Elevation:	67.50	Drilled By:	MEDL
Engineer:	Arup	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	FI/m	
		Hand dug excavation pit.									
0.5					67.0						
1.0	1.00	Open hole drilling - driller reports returns of brown silty sandy CLAY with cobbles and boulders.			66.5	66.50					
1.5					66.0						
2.0					65.5						
2.5					65.0						
3.0					64.5						
3.5					64.0						
4.0					63.5						
4.5					63.0						
5.0					62.5						
5.5					62.0						
6.0					61.5						
6.5					61.0						
7.0					60.5						
7.5					60.0						
8.0	8.10	Moderately strong to strong light grey LIMESTONE with abundant karstic features. Slightly to moderately weathered. <i>Discontinuities - rough, planar to undulating and stepped, tight to open, sub-horizontal and 30-50° dip, surfaces stained brown with some clay infilling.</i>			59.5	59.40					
8.5					59.0						
9.0		<i>Discontinuities - non-intact.</i>			58.5						
9.5		<i>Discontinuities - karstic feature.</i>			58.0						
		<i>Discontinuities - non-intact.</i>									
Continued on next page											

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
				0.00	12.50	Bentonite	-

Contract No: 6032	Rotary Corehole Log	Corehole No: RC01
----------------------	---------------------	-----------------------------

Contract:	DUB602 - Ski Lodge	Easting:	709870.698	Date Started:	14/09/2022
Location:	Ballymount, Dublin 12	Northing:	730179.994	Date Completed:	14/09/2022
Client:	-	Elevation:	67.50	Drilled By:	MEDL
Engineer:	Arup	Rig Type:	Sondeq	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill
				Scale	Depth		TCR/%	SCR/%	RQD/%	FI/m	
		Moderately strong to strong light grey LIMESTONE with abundant karstic features. Slightly to moderately weathered. <i>Discontinuities - karstic feature.</i>									
10.5				57.0		10.30 - 11.00	0	0	0	Cave	
11.0		<i>Discontinuities - rough, planar and stepped, tight to open, sub-horizontal and 40-50° dip, occasionally sub-vertical, surfaces stained brown.</i>		56.5		11.00 - 11.80	90	69	58	3	
11.5				56.0		11.80 - 12.50	36	36	23		
12.0			55.5								
12.5	12.50	End of Corehole at 12.50m	55.0	55.00							
13.0			54.5								
13.5			54.0								
14.0			53.5								
14.5			53.0								
15.0			52.5								
15.5			52.0								
16.0			51.5								
16.5			51.0								
17.0			50.5								
17.5			50.0								
18.0			49.5								
18.5			49.0								
19.0			48.5								
19.5			48.0								

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
			0.00	12.50	Bentonite	-	

Contract No: 6032	Rotary Corehole Log	Corehole No: RC02
----------------------	---------------------	-----------------------------

Contract: DUB602 - Ski Lodge	Easting: 709816.994	Date Started: 13/09/2022
Location: Ballymount, Dublin 12	Northing: 730112.498	Date Completed: 14/09/2022
Client: -	Elevation: 67.57	Drilled By: MEDL
Engineer: Arup	Rig Type: Sondeq	Status: FINAL

Depth (m)	Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill
			Scale	Depth		TCR/%	SCR/%	RQD/%	FI/m	
0.0 - 1.00	Hand dug excavation pit.		67.5							
1.00 - 7.30	Open hole drilling - driller reports returns of brown silty sandy CLAY with cobbles and boulders.		66.57							
7.30 - 8.00	Moderately strong to strong light grey beige LIMESTONE with frequent calcite veins and abundant karstic features. Slightly to moderately weathered, occasionally highly weathered. <i>Discontinuities - rough, planar and undulating, occasionally stepped, tight to open, sub-horizontal and sub-vertical dip, surfaces stained grey and brown with some clay infilling.</i>		60.27		N=22 (2,3/3,5,7,7)					
8.00 - 8.30					7.30 - 8.30	98	61	43	7	
8.30 - 9.30	<i>Discontinuities - rough, planar to slightly undulating and stepped, tight to open, sub-horizontal and 20-30° dip, surfaces stained grey and brown with some clay infilling.</i>				8.30 - 9.30	100	93	93	3	
9.30 - 10.30					9.30 - 10.30	98	98	84		


Continued on next page

	Installation:		Backfill:			Remarks:	
	From:	To:	Pipe Type:	From:	To:		Type:
				0.00	10.30		Bentonite

Contract No: 6032	Rotary Corehole Log	Corehole No: RC02
----------------------	---------------------	-----------------------------

Contract:	DUB602 - Ski Lodge	Easting:	709816.994	Date Started:	13/09/2022
Location:	Ballymount, Dublin 12	Northing:	730112.498	Date Completed:	14/09/2022
Client:	-	Elevation:	67.57	Drilled By:	MEDL
Engineer:	Arup	Rig Type:	Sondeq	Status:	FINAL

Depth (m)		Stratum Description	Legend	Level (mOD)		Samples	Rock Indices				Backfill
Scale	Depth			Scale	Depth		TCR/%	SCR/%	RQD/%	FI/m	
	10.30	Moderately strong to strong light grey beige LIMESTONE with frequent calcite veins and abundant karstic features. Slightly to moderately weathered, occasionally highly weathered. End of Corehole at 10.30m		57.5	57.27						
	10.5				57.0						
	11.0			56.5							
	11.5			56.0							
	12.0			55.5							
	12.5			55.0							
	13.0			54.5							
	13.5			54.0							
	14.0			53.5							
	14.5			53.0							
	15.0			52.5							
	15.5			52.0							
	16.0			51.5							
	16.5			51.0							
	17.0			50.5							
	17.5			50.0							
	18.0			49.5							
	18.5			49.0							
	19.0			48.5							
	19.5			48.0							

	Installation:			Backfill:			Remarks:
	From:	To:	Pipe Type:	From:	To:	Type:	
				0.00	10.30	Bentonite	

RC01 Box 1 of 2



RC01 Box 2 of 2



RC02 Box 1 of 1

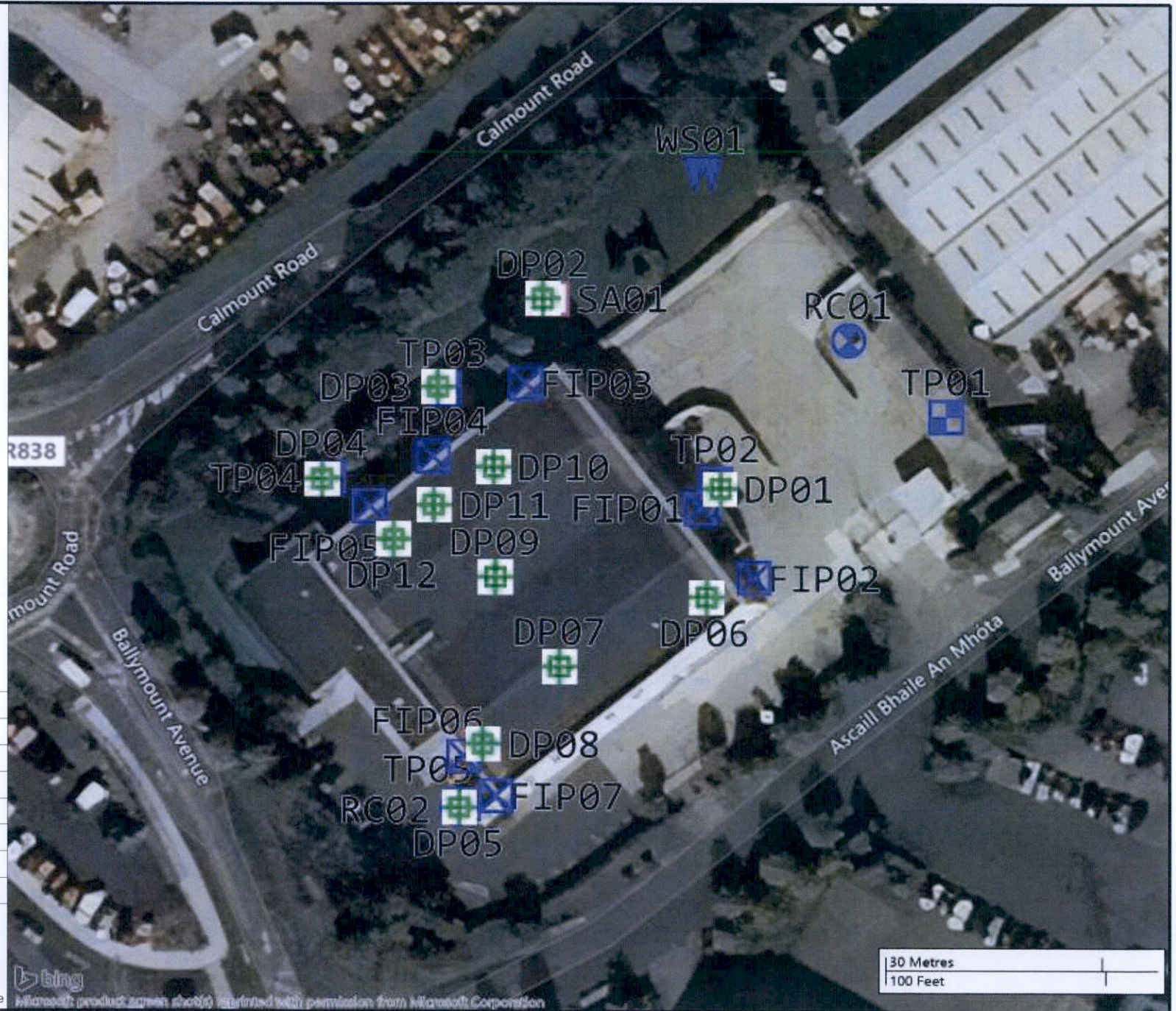


Survey Data

Location	Irish Transverse Mercator		Elevation	Irish National Grid	
	Easting	Northing		Easting	Northing
Trial Pits					
TP01	709884.685	730169.540	67.76	309957.823	230142.364
TP02	709852.288	730159.299	67.51	309925.419	230132.121
TP03	709813.662	730171.918	67.59	309886.784	230144.742
TP04	709797.689	730158.896	67.76	309870.808	230131.717
TP05	709817.922	730113.294	67.60	309891.046	230086.106
Window Samples					
WS01	709849.232	730203.113	67.26	309922.362	230175.944
Dynamic Probes					
DP01	709852.888	730158.629	67.55	309926.019	230131.451
DP02	709827.424	730184.945	67.47	309900.549	230157.772
DP03	709812.865	730172.133	67.56	309885.987	230144.957
DP04	709796.966	730158.727	67.77	309870.085	230131.548
DP05	709817.329	730112.769	67.58	309890.453	230085.580
Soakaway Tests					
SA01	709828.569	730184.944	67.56	309901.694	230157.771
Foundation Inspection Pits					
FIP1	709850.117	730155.804	67.68	309923.247	230128.625
FIP2	709858.187	730146.140	67.75	309931.319	230118.959
FIP3	709825.293	730172.870	67.66	309898.418	230145.695
FIP4	709812.373	730162.259	67.60	309885.495	230135.081
FIP5	709803.557	730155.072	67.84	309876.677	230127.893
FIP6	709817.747	730120.080	67.78	309890.871	230092.893
FIP7	709822.445	730114.560	67.74	309895.570	230087.372
Rotary Coreholes					
RC01	709870.698	730179.994	67.50	309943.833	230152.820
RC02	709816.994	730112.498	67.57	309890.118	230085.309

Legend Key

-  Locations By Type - DP
-  Locations By Type - IP
-  Locations By Type - OP
-  Locations By Type - RC
-  Locations By Type - TP
-  Locations By Type - WS



Contract No:	6032
Contract Name:	DUB602 - Ski Lodge
Location:	Ballymount, Dublin 12
Client:	-
Engineer:	Arup
Title:	Site Plan
Scale:	1:750
Drawn By:	SL



Site Investigations Ltd
 The Grange
 12th Lock Road
 Lucan
 Co. Dublin
 T: 01 6108768
 e: info@siteinvestigations.ie

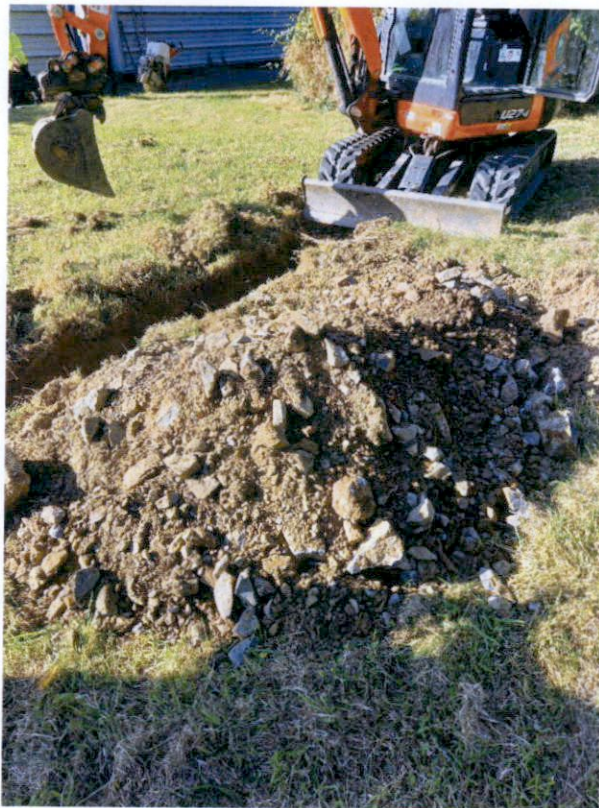
 Microsoft product screen shots reproduced with permission from Microsoft Corporation

Appendix B Infiltration Test Results

SA01 Sidewall



SA01 Spoil



Appendix C GPR Survey

Appendix D Confirmation of Feasibility (CoF)

CONFIRMATION OF FEASIBILITY

Conor Doherty

3rd Floor, The Highline Bakers Point
Pottery Road
Dun Laoghaire
Co. Dublin
A96 KW29

30 June 2022

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

Our Ref: CDS22003496 Pre-Connection Enquiry
Site at Junction of Kingswood Road, and Kingswood Drive,
Tallaght, Dublin 24

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Business Connection of 2 unit(s) at Site at Junction of Kingswood Road, and Kingswood Drive, Tallaght, Dublin 24, (the **Development**).

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection** - Feasible without infrastructure upgrade by Irish Water

The development can proceed on the proviso that the customer provides storage for all annual cooling needs with a maximum allowable annual demand from the site limited to 2 975m³.

This storage will be filled in winter by agreement with Irish Water operations and used as required during the summer months.

Approximately 20m of new 200mm ID pipe main to be laid to connect the site development to the existing 200mm uPVC main in

Kingswood Drive. Bulk meter must be installed on this connection.

- **Wastewater Connection** - Feasible without infrastructure upgrade by Irish Water

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Irish Water.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

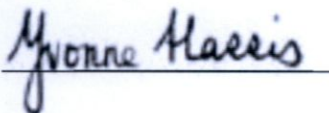
Where can you find more information?

- **Section A** - What is important to know?
- **Section B** - Details of Irish Water's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Irish Water's network(s). This is not a connection offer and capacity in Irish Water's network(s) may only be secured by entering into a connection agreement with Irish Water.

For any further information, visit www.water.ie/connections, email newconnections@water.ie or contact 1800 278 278.

Yours sincerely,



Yvonne Harris
Head of Customer Operations

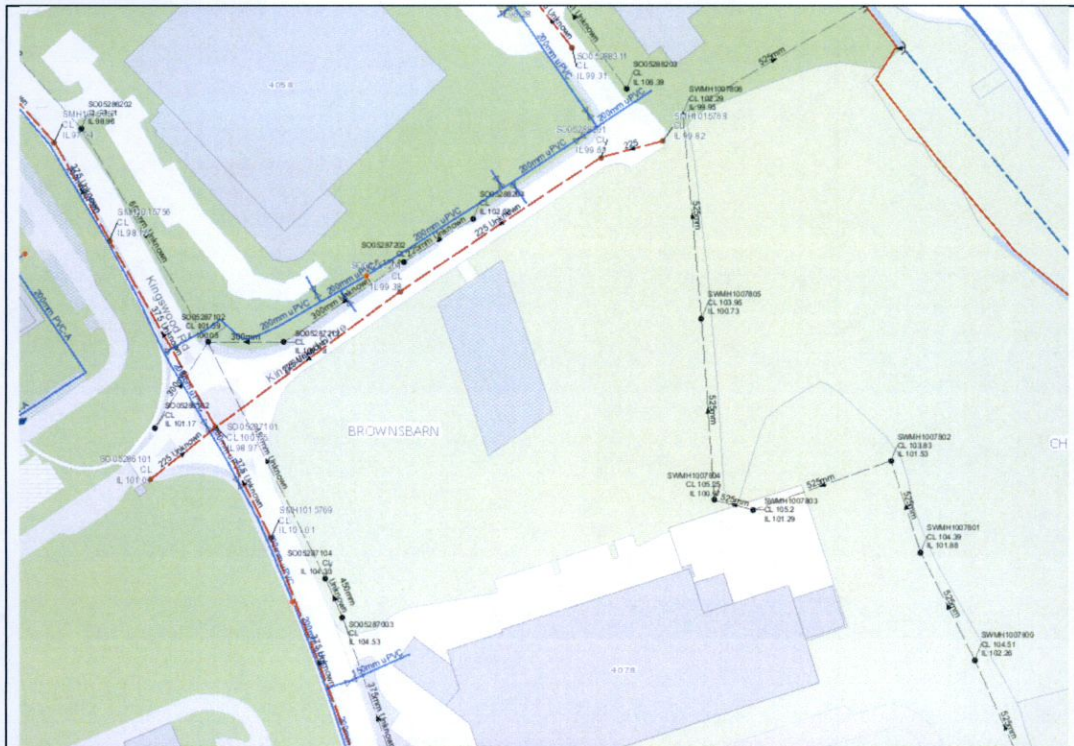
Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	<ul style="list-style-type: none"> • Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application <u>and be granted and sign</u> a connection agreement with Irish Water.
When should I submit a Connection Application?	<ul style="list-style-type: none"> • A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	<ul style="list-style-type: none"> • Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	<ul style="list-style-type: none"> • All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. <p>*Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works</p>
Fire flow Requirements	<ul style="list-style-type: none"> • The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • What to do? - Contact the relevant Local Fire Authority
Plan for disposal of storm water	<ul style="list-style-type: none"> • The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • What to do? - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Irish Water's network(s)?	<ul style="list-style-type: none"> • Requests for maps showing Irish Water's network(s) can be submitted to: datarequests@water.ie

<p>What are the design requirements for the connection(s)?</p>	<ul style="list-style-type: none"> • The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with <i>the Irish Water Connections and Developer Services Standard Details and Codes of Practice</i>, available at www.water.ie/connections
<p>Trade Effluent Licensing</p>	<ul style="list-style-type: none"> • Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ <p>**trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)</p>

Section B – Details of Irish Water’s Network(s)

The map included below outlines the current Irish Water infrastructure adjacent the Development: To access Irish Water Maps email datarequests@water.ie



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Note: The information provided on the included maps as to the position of Irish Water’s underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Irish Water.

Whilst every care has been taken in respect of the information on Irish Water’s network(s), Irish Water assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Irish Water’s underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Irish Water’s underground network(s) 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.

Appendix E SuDS O&M Plan

Surface Water Operation and Maintenance (O&M) Activities

All operation and maintenance activities should be in accordance to the following guidelines:

- Greater Dublin Strategic Drainage Study GSDSDS- Volume 3 – Environmental Management
- CIRIA 2015SuDS Manual, Part E - Chapter 32

Considerations for surface water O&M:

Requirement	Assessment/Action
Maintenance access – ensuring appropriate and long-term access to all points in the system where future maintenance may be required	A standard minimum of 600mm diameter opening is provided for all manhole, chambers and treatment system. Removable gullies grate opening with a minimum size of 450mm X 320mm.
Bypass systems or appropriate temporary drainage infrastructure for use if required during sediment management or other maintenance activities.	Not required
The availability of disposal areas for organic arisings (green waste) and sediments.	To be included as part of maintenance contract of the development

Types of SuDS systems used that require O&M activities:

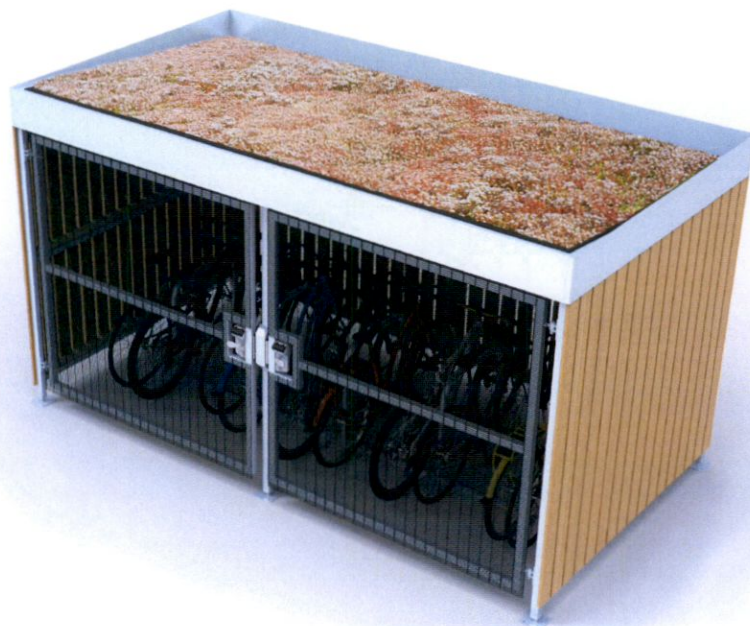
- **Permeable Paving**
- **Green Roofs**
- **Attenuation Storage**

O&M activities required as following:

Operation and maintenance activities	SuDS Component		
	Permeable Paving	Green Roofs	Attenuation Storage
O&M Activities			
Regular maintenance			
Inspection	■	■	■
Litter/debris removal	■		□
Grass cutting	□		□
Weed/invasive plant control	□	■	
Shrub management	□		
Shoreline vegetation management			
Aquatic vegetation management			
Occasional maintenance			
Sediment management	■		■
Vegetation/plant replacement		■	
Vacuum sweeping and brushing	■		
Remedial maintenance			
Structure rehabilitation/repair	□	□	□
Infiltration surface reconditioning	□		
■ Will be required □ May be required			

Operation & Maintenance Instructions

Wooden, Mesh & Green Roof Bike Shelters



The Wooden & Mesh Bike Shelter are an attractive cycle parking solution that is perfect for those seeking an environmentally sustainable solution. They can be fitted with a CO2 capturing sedum Green Roof.

The shelters are ideal with Toast Racks or Semi Vertical Bike Rack, enabling users to lock their bikes up securely inside the unit. This product comes with swing or sliding gates.

To ensure maximum life can be achieved with the shelters, as well as minimising the costs for any potential refurbishments, this manual has been created to assist in any ongoing maintenance requirements.

Operating Instructions

If the shelter has gates, they are unlocked using the mechanical coded locking handle. For swing gated shelters, the gates open outwards. For sliding gated shelters, the gates slide towards the central column, overlapping its pair. Only one gate should be opened at a time. For both gates, they are slam locked once the gates are shut and the handle secures in its housing. Should the gate close when inside the shelter, the same code can be used to exit. It should be checked that the gates are locked before leaving the shelter.

For information on how to operate the lock handle and how to set and change the code, see [Locinox's instructions](#).

Cycles should be locked to the racks inside the shelter using two good quality locks that secure the frame and wheels.

Maintenance Schedule Instructions

- If the shelter has swing gates, grease the hinge bolts using Lithium grease.
- Check that the lock handles are working properly.
- Spray dry lubricant into the external lock cylinder where the key is inserted.
- All bolting and fixings should be checked to ensure they remain tight and intact. Replace fixings that have been removed or worked their way from the structure.
- Remove any litter or organic debris from inside the shelter.

Galvanised Steelwork (frame, flashings & racks)

Parts are hot dip galvanized to BS EN ISO 1461; a sacrificial layer of zinc is bonded to the base metal to protect from corrosion. In rural and urban areas (C1 -C3) this provides many years of protection, in highly corrosive coastal or industrial areas (C4, C5-I, C5-M) lifespan is reduced. Regular care can help prolong lifespan.

Cleaning

Cleaning should be conducted routinely at three monthly intervals and six months should be considered the longest interval. In industrial or marine locations particular attention should be paid to regular maintenance due to harsher atmosphere.

- Clean with a dilute solution of mild liquid detergent. Avoid excessively hot solutions.
- Use a soft bristle brush. Do not use abrasive tools on the coating. After cleaning, rinse thoroughly with fresh water. Ensure that areas that are not normally exposed to rain are washed and rinsed also.
- Do not use strong solvent type cleaners. Where the use of solvent is required, such as cleaning paint spills, use nothing other than Methylated Spirits. Ensure that the contact time is as short as possible and rinse the solvent cleaner thoroughly from the surface with copious amounts of drinking quality water.
 - Methylated Spirits is highly flammable and extreme safety and care should be exercised when using this product.
 - It is strongly recommended that a small test area be checked first, to ensure that no damage will occur to the whole area.
- Any areas exhibiting a rust mark should be wiped over as above. This is the atmospheric rust caused by steel particles caught in the rainwater. The discolouration should be removed at the periodic cleaning but does not pose a threat to the integrity of the surface.
- Galvanised structures may exhibit a white powdery oxide deposit, sometimes known as "white rust". This is usually due to water being held against the surface of the structure and holding condensation/rainwater. This is not detrimental to the structure, but the cause should be investigated, and a remedy sought as soon as possible as this is an acceleration of the normal process of sacrificial corrosion of galvanised structures.

This accelerated breakdown may limit the structure life to less than the 25 years normally associated with galvanised structures.

Removal of the "white rust" by wiping with an acetic acid solution is suggested, 5% by volume in water and quickly washing away with copious amounts of clean drinking quality water. Ensure all operators wear correct & appropriate PPE (Personal Protective Equipment at Work Regulations 1992) and are informed of the COSHH Requirements when cleaning the structure and using this media. Should you expose the surface to this media incorrectly (proportions/period of contact) the surface will become stained black.

Graffiti Removal

Remove any graffiti as soon as possible after its application. Use a spray suitable for non-porous surfaces (e.g. Urban Hygiene easy-off Graffiti Remover) and follow the instructions on the product.

Clean the area after the graffiti has been removed with fresh water as described in the *Cleaning* section.

Repair

Knocks and bruising to the structure should not pose a significant threat to the life of the structure provided the galvanised surface remains unbroken. Any light damage resulting in a break in the galvanised surface should be painted with zinc rich quality paint such as galvafruid or other proprietary paint. Any areas repaired in this way should be monitored annually and repainted as necessary. Parts with heavy damage may need to be replaced.

- Ensure damaged area is clean prior to repair.
- Abrade damaged area using 240 Grit glass paper ensuring even abrasion around edges.
- Apply zinc spray following manufacturer's instructions for an even application. Ensure all raw steel is thoroughly coated.

Any excessive heat generated, such as from a fire within or adjacent to the shelter/structure, may cause deterioration of the galvanised surface and accelerated corrosion/premature failure in the structure may occur. Any such cases where fire may have damaged part of the whole of the structure, it should be assessed to determine follow up action/continued use.

Powder Coated Steelwork (roof sheets, mesh & custom frames)

Powder coating parts can provide many years of protection. Regular care can help prolong lifespan of the material, finish and colour.

Cleaning

Cleaning should be conducted routinely at three monthly intervals and six months should be considered the longest interval. In industrial or marine locations particular attention should be paid to regular maintenance due to harsher atmosphere.

- Clean with a dilute solution of mild liquid detergent. Avoid excessively hot solutions.
- Use a soft bristle brush. Do not use abrasive tools on the coating. After cleaning, rinse thoroughly with fresh water. Ensure that areas that are not normally exposed to rain are washed and rinsed also.
- Do not use strong solvent type cleaners. Where the use of solvent is required, such as cleaning paint spills, use nothing other than Methylated Spirits. Ensure that the contact time is as short as possible and rinse the solvent cleaner thoroughly from the surface with copious amounts of drinking quality water.
 - Methylated Spirits is highly flammable and extreme safety and care should be exercised when using this product.
 - It is strongly recommended that a small test area be checked first, to ensure that no damage will occur to the whole area.
- Any areas exhibiting a rust mark should be wiped over as above. This is the atmospheric rust caused by steel particles caught in the rainwater. The discolouration should be removed at the periodic cleaning but does not pose a threat to the integrity of the surface.

Graffiti Removal

Remove any graffiti as soon as possible after its application. Use a spray suitable for non-porous surfaces (e.g. Urban Hygiene easy-off Graffiti Remover) and follow the instructions on the product.

Clean the area after the graffiti has been removed with fresh water as described in the *Cleaning* section.

Repair

Any small chips to powder coating due to damage should be rectified as described below. It is recommended seeking professional painting services to achieve best results. Parts with damage extending beyond the surface powder coat may need to be replaced. Contact Cyclehoop for technical advice.

- Cut and remove, or abrade, any loose coatings back to solid metal.
- Using 240 Grit glass paper, abrade damaged area to bright, solid metal, ensuring that the surface is not polished. Thoroughly clean and dry these surfaces before applying the specified materials, which must be applied as recommended by the paint system manufacturer.
- Coat the prepared areas with the appropriate anti-corrosive primer recommended by the materials supplier.
- When the first primer coat has dried, apply a second primer coat in a neat band to the prepared area so that the primer extends beyond the prepared area, covering the original surface.
- Once the primer has dried, apply aerosol topcoat following manufacturer's instructions for an even application.

ThermoWood Pine Cladding (wooden cladding)

ThermoWood cladding has a long-lasting life span, which is one advantage that's convenient because it will need little maintenance. Maintenance period for the ThermoWood treated materials are much longer than the regular wood. Regular untreated wood will face problems such as rotting, fungal growth, insect holes, bending, etc. and therefore will require more frequent maintenance. ThermoWood products will not face the same problems above and therefore the maintenance period is much longer.

If the cladding is low to the ground and prone to dirt splashes, then a sponge over with a washing up liquid and hose off is adequate. If the cladding is accessible and it has got grubby over time, then you can apply the 3 simple steps mentioned below to make it look like new again.

1. Cleaning

The first step is to completely clean the cladding of any dirt that has built up over time, we recommend using our Owatrol Prepdeck Cleaner/Stripper (2.5L). Prepdeck Stripper/Cleaner is a professional, high-grade product specially designed for the removing of old solid and semi-transparent stains, grade stamps, mill glaze and other surface contaminants from wood.

Please note: When using Prepdeck you must neutralise the surface afterwards with Net-trol. This prevents any reaction with the new coating to be applied.

Apply using a conventional 5ltr pump sprayer, spray thoroughly over the boards and leave for about 10 mins before jet washing off thoroughly.

2. Prepare

The second step is using Owatrol Net-Trol Neutraliser (2.5L) while the cladding is wet. Then thoroughly jet wash off.

3. Finish

The last step is applying Messmers UV Plus Oil for Decking (3.78L). Messmer's UV Plus is a premium natural wood finish that is specially formulated to penetrate the wood's surface to enhance the natural beauty and with its unique UV inhibitors, helps retain the timbers colour. This product has excellent resistance to UV degradation.

This will need to be applied by using either a cloth or a sponge. Coverage per tin on new timber is approx. 4m². Each timber panel of the shelter measures approx. 4m².

Please Note: Any surplus or runs on the surface need to be removed before the oil dries to avoid it becoming tacky.

Sedum Blanket (green roof)

The beauty of a sedum roof is that it is relatively low maintenance. That said, there are some tasks that are essential.

It is recommended that you access your sedum roof twice a year, in spring and in autumn to carry out a quick and easy maintenance regime.

Before tackling any roofing job, you need to consider the safety of yourself and other people. Always check any equipment before starting work and make sure somebody is nearby should you need to call for extra help. If possible, complete maintenance tasks without standing on the roof of the shelter.

Sedum roof jobs for spring and early summer

Clear away debris

Any fallen leaves, rubbish or winter detritus needs to be removed. It's important that all the sedum plants can see daylight and that the drainage outlets along the rear of the shelter remain clear.

Feed the roof

Be sure to feed your sedum roof when the weather starts to warm up and plants start to grow.

We recommend using Enviromat Sedum Fertiliser at a rate of 30 grams per square metre.

This is an easy to apply granular feed, but it must be watered in within 24 hours of application.

Sedum Fertiliser contains all the nutrients that a sedum roof will need, but in a slow-release formula so that unused nutrients don't get washed away by rainfall.

NEVER EXCEED THE MANUFACTURERS RECOMMENDED RATE. Too much Nitrogen will encourage weeds to grow on the roof and will also kill the sedum plants.

Check for bare areas

If you have any large areas (bigger than an A4 piece of paper) where the vegetation has disappeared, these may need a little bit of re-generation. Provided that the air temperature is constantly above about 6 degrees and we're not experiencing drought conditions, all you need to do is break some small pieces off existing plants and press them into the growing medium on the bare area.

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info@cyclehoop.com

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Smaller bare areas will normally re-vegetate themselves once the plants have been fed and started their growth spurt.

If you have serious problems with bare patches on your green roof, or if you are at all concerned. Please contact us for advice.

Sedum roof jobs for autumn and winter

Clear away debris

Never leave fallen leaves, twigs or detritus on a green roof for more than a couple of weeks, they will suffocate and kill the plants. It's important that all the sedum plants can see daylight and that the drainage outlets along the rear of the shelter remain clear.

Check condition

Check that the sedum blankets are securely fixed and ready for the winter weather.

DO NOT FEED SEDUM PLANTS IN AUTUMN OR WINTER.

There is no need to remove spent flower heads from the sedum plants but please pull out any unwanted plants that may have established themselves during the summer. **ESPECIALLY** tree seedlings and/or any deep rooted or vigorous plants.

Appendix F Topographical Survey