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24046

PROPOSED TOURIST INFORMATION CENTRE, EYRE SQUARE, GALWAY

(Image Courtesy GKMP Architects)

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Prepared For:
Galway City Council

Revision Register

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INTRODUCTION

It is proposed by our client, Galway City Council, to develop a new tourist information centre on the Western corner of Eyre Square, Galway. The existing public toilet block will be demolished as part of the works and new WC's will be located within the new facility by way of replacement. The new development will be a single storey structure as detailed on the architectural drawings included with this submission.

The site is situated on the corner of Eyre Square as shown below. The site is

The following report details the proposals for drainage and water services associated with the development and includes a flood risk appraisal.

Figure 1- Proposed Site Location (Courtesy of GKMP Architects)

EXISTING SERVICES

There follows a summary of the current situation with regard to civil engineering services:

Water Supply

Downes Associates has sought a record of public water services in the vicinity from Uisce Eireann. The map extract below indicates that there is a 200mm ductile iron watermain adjacent to the proposed development which continues on three sides of the Square. There is also an existing 25mm spur entering the Square to the North.

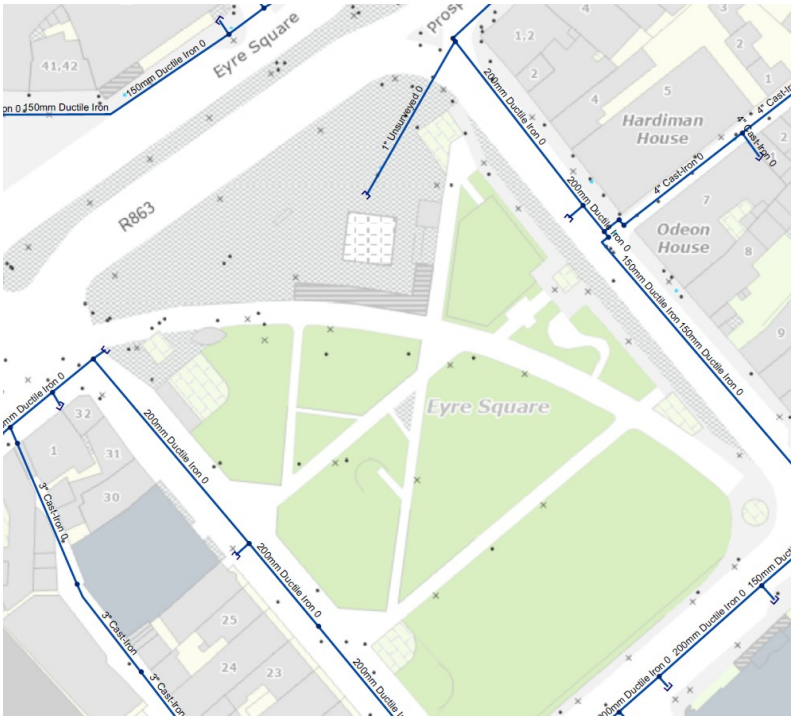

Figure 2- Uisce Eireann Watermain Record Maps

There is an existing public toilet block adjacent to the proposed development location. However no watermain spur to same was detected as part of the utility survey. As this is surprising, this will be investigated further on site as there may be opportunity to utilise same to service the proposed development.

Foul Drainage

Downes Associates has sought a record of public wastewater services in the vicinity from Uisce Eireann. The map extract below indicates that there isa 150mm diameter combined sewer directly adjacent to the development site. There is also an existing 150mm diameter foul sewer within the grassed areas of the Square identified as part of

the utility survey. As this is not shown on Uisce Eireann record maps it is assumed that this is not within their ownership and that a connection to same can be made. This likely serves the existing public toilet block so the status quo will be maintained in that sense.

Figure 3- Uisce Eireann Wastewater Record Maps

Surface Water

An existing 300mm diameter stormwater sewer was identified within the centre of Eyre Square as part of the utility survey. The location of this is highlighted below.

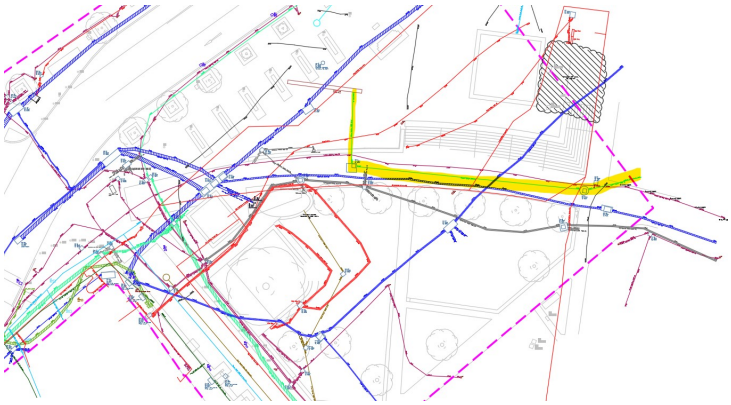

Figure 4- Extract from utility survey

PROPOSED SERVICES

WATER SUPPLY

The permanent water supply solution is indicated on enclosed Downes Associates drawings. This remains unchanged from the existing situation.

Water Supply Source

The attached drawings currently make an allowance for a new connection to the public main. However as noted above, it is expected that there must be some connection already there to serve the existing public toilet block. As this has not yet been identified this will be investigated further on site. Should this existing connection be found then we would propose to simply extend that to the new development thus avoiding the need for a new connection to the public mains.

FOUL DRAINAGE

The permanent foul drainage solution is indicated on enclosed Downes Associates drawings.

The existing foul drainage situation both in terms of effluent quantity and ultimate discharge location remains unchanged. There are no public foul drainage services available on the R410 roadway. As such there has been no requirement to liaise with Uisce Eireann.

The existing private foul drainage system within the site will be removed and replaced with new.

Pipe Design (rerouted foul pipework)

Pipes carrying foul sewage shall be designed to carry a peak flow of 6 times average foul sewage flow (6DWF). Average flow is taken as 225 litres/head/day for a conservative population equivalent of 10. A roughness coefficient, ks of 1.5mm is used for foul sewers. Foul drains are designed to achieve a minimum self-cleansing velocity of 0.8m/s when flowing half full.

Therefore, maximum peak foul discharge to public sewer =

(10x225x6)/ (24x60x60) = 0.16 l/s

Using a 100mm diameter sewer at a gradient of approximately 1:60

Hydriatic performance with ks = 1.5

Full bore condition:

Discharge capacity = 9.0 l/s (>1.25 l/s)

Velocity = 1.18 m/s (>0.16 m/s)

A 100mm diameter sewer laid to a gradient of 1:60 is therefore deemed adequate.

SURFACE WATER DRAINAGE

The permanent surface water drainage solution for the new area of roof (hardstanding) is indicated on enclosed Downes Associates drawings.

Collection and Treatment

Surface water will be collected from the new roof by gutters on Western side which discharge directly to the planter. On the Eastern side, the roof will discharge directly to a new rainwater rill which will feed both the raised planter and a new SuDS/biodiversity feature raingarden adjacent to the new development. The raingarden will in turn overflow to a new soakaway which in turn will be provided with a high level overflow to the existing stormwater system to accommodate emergency or exceedance events. The surface water drainage system for the extension will be separate to the foul water drainage system.

A small area of new hardstanding will be provided as part of the development. This shall comprise new permeable paving ensuring that all stormwater is managed on site.

Refer to a later sub-section for details of SUDS measures adopted. The collection system is shown on the enclosed drawings.

Pipe Design

Pipes carrying surface water within the site shall be sized to cater for a rainfall intensity of 50mm per hour applied to all impermeable roofs. Surface water runoff from impermeable areas is calculated using the Modified Rational Method as follows:

$Q = 2.78C_vC_riA$ (where Q is in l/s, i is in mm/hr and A is in Ha)

$A = 160m^2 = 0.016Ha$ – Roof contributing area

$C_v = 0.75$ and $C_r = 1.3$

$Q = 2.78iA$

$Q_{max} = 2.23$ l/s

A roughness coefficient, k_s of 0.6mm is used for surface water drains. Pipe size and gradient for each run are determined using the Wallingford hydraulic design tables.

Using a 150mm diameter sewer at a gradient of approximately 1:200

Hydriatic performance with ks = 0.6

Full bore condition:

Discharge capacity = 14.9 l/s (>2.23 l/s)

Velocity = 0.82 m/s

Sustainable Surface Water Drainage Measures

The proposed surface water drainage system has been designed in accordance with the policy requirements of the Greater Dublin Strategic Drainage Study (GDSDS), incorporating surface water source control measures and Sustainable Drainage Systems (SuDS).

The proposed use of SuDS is based on detailed consideration of the following criteria:

- Technical Guidance Documents for the "Greater Dublin Strategic Drainage Study Regional Drainage Policies" (GDSDS);
- Engineering guidelines contained in CIRIA Document CIRIA C753 – The SuDS Manual
- Restrictions of the development site in terms of location, context, size, ground conditions and topography;
- Management issues relating to the adoption and operation of SuDS;

In general terms, SuDs measures shall comply with the following principles:

- Achieve adequate water quality treatment.
- Minimise runoff volumes and rates.
- Treat appropriately the stormwater effluent prior to discharge to receiving environment.
- Protect groundwater.
- Maximise amenity potential and ecological benefits where possible.

A detailed SuDS evaluation of the site was carried out including use of the design tools available on the website www.irishsuds.com.

Based on the constraints of the site, the SuDs components considered implementable in this instance are as follows:

- Permeable pavements
- Open Rainwater Rills
- New Planters
- New Raingarden
- Direct Infiltration via soakaway

Source Controls

Maximise permeability within a site to promote attenuation, treatment and infiltration reducing the need for offsite conveyance.

Ref	Measure	Suitable	Comment	Adopted
A.1	Green roofs	No	This is not considered appropriate or economical for such a small development with a sloping roof.	No
A.2	Permeable paving	Yes	Permeable surfacing proposed	Yes
A.3	Grass	Yes	It is proposed to maintain the maximum grassed and planted area coverage for the the site	Yes
A.4	Reinforced grass	No	Not required	No
A.5	Gravelled areas	Yes	Permeable surfacing will be adopted	Yes
A.6	Rainwater harvesting	Yes	Infrastructure will be constructed allowing the future adoption of such measures by owners.	No
A.7	RainTrap	Yes	Infrastructure will be constructed allowing the future adoption of such measures by owners.	No
A.8	Water Butt	Yes	Infrastructure will be constructed allowing the future adoption of such measures by owners.	No

Swales and conveyance channels

Ref	Measure	Suitable	Comment	Adopted
B.1	Swales	No	A soakaway and raingarden have been adopted instead	No
B.2	Canals and rills	Yes	New rainwater rill proposed for conveyance	Yes

Filtration

Ref	Measure	Suitable	Comment	Adopted
C.1	Filter trench	Yes	Soakaway/raingarden provided instead	No
C.2	Bioretention areas	Yes	Soakaway/raingarden provided instead	No

Infiltration

Capture surface water runoff and allow it to infiltrate (soak) and filter through to the subsoil layer, before returning it to the water table below.

Ref	Measure	Suitable	Comment	Adopted
D.1	Soakaways	Yes	Soakaway proposed to rear garden area	Yes
D.2	Infiltration basin	No	Raingarden provided instead	No
D.3	Rain garden	Yes	Raingarden is provided to contribute to nature based SuDS and biodiversity	Yes

Retention and Detention

Designed to either provide storage, through the retention of surface water runoff, or attenuation through the detention of surface water runoff.

Ref	Measure	Suitable	Comment	Adopted
E.1	Detention basins	No	Not considered suitable for a development of this size.	No
E.2	Retention ponds	Yes	Not considered suitable for a development of this size.	No

Ref	Measure	Suitable	Comment	Adopted
E.3	Geocellular systems	Yes	Geocellular soakaway provided	Yes

Wetlands

Densely vegetated water bodies that use sedimentation and filtration to provide treatment of surface water runoff.

Ref	Measure	Suitable	Comment	Adopted
F.1	Wetlands	No	Not considered suitable for a development of this size.	No

Proposed Solution

All rainwater from impermeable areas will be collected via a series of underground pipes where it will then pass through a new raingarden acting as the first nature based SuDS element within the SuDS train. Excess water from the raingarden will be collected via a high level overflow and discharged to a soakaway provided within the front garden area.

The soakaway has been designed in accordance with BRE Digest 365 100 year storm event and includes a 20% increase allowance for climate change. The proposed soakaway shall comprise a geocellular tank measuring 3.5m x 3.5m x 0.6m deep below incoming pipes. The geocellular storage units shall have a minimum 95% voids ratio and shall be wrapped in a fully permeable geotextile liner sheet.

Total contributing area = 410m sq.

Based on the design, the storage volume required is 6.06 m^3 as per the TEDDS calculation extract below.

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.33;	5.1;	1.79;	9.1;	1.46;	0.04;	1.41
10	0.48;	7.4;	1.85;	13.7;	2.18;	0.09;	2.10
15	0.58;	8.9;	1.88;	16.8;	2.69;	0.13;	2.56
30	0.76;	11.7;	1.94;	22.7;	3.63;	0.26;	3.37
60	1.00;	15.4;	1.99;	30.7;	4.91;	0.52;	4.39
120	1.27;	19.6;	2.03;	39.6;	6.34;	1.03;	5.31
240	1.64;	25.3;	2.01;	50.7;	8.11;	2.07;	6.05
360	1.88;	29.0;	1.98;	57.3;	9.16;	3.10;	6.06
600	2.24;	34.5;	1.93;	66.7;	10.67;	5.17;	5.51
1440	3.10;	47.7;	1.83;	87.3;	13.96;	12.40;	1.57

Required storage volume S_{req} = **6.06** m^3

Soakaway storage volume $S_{act} = l \times d \times w \times V_{free}$ = **6.98** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f)$ = 5hr 51min 55s

PASS - Soakaway discharge time less than or equal to 24 hours

Figure 4 - Extract from soakaway calculation

FLOOD RISK MANAGEMENT

Flood Risk Assessment

Primary and Secondary sources of flooding information were gathered and assessed individually in the following chapter as defined in Appendix A of the Planning Systems and Flood Risk Management: Guidelines for Planning Authorities November 2009 report.

Primary Sources for Flood Risk Information

Examination of the Eastern CFRAM Maps available on www.floodinfo.ie reveals the predictive extent of flooding in the vicinity of the site (refer to Figure below). Anticipated flood extents Associated with the coastal flooding are far removed from the site as indicated below. The site is therefore considered not susceptible to flooding from exceedance in any direction.

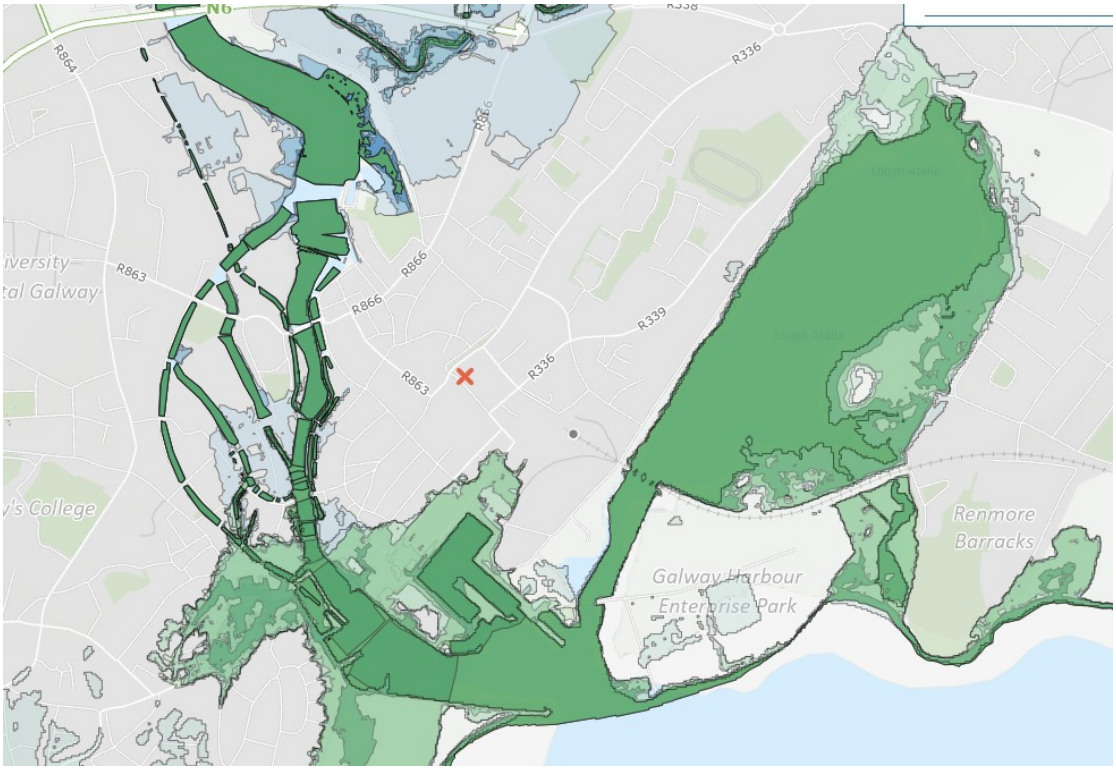

Figure 5 - Extract from CFRAM Maps

Secondary Sources for Flood Risk Information

OPW Flood Record;

An extract from the OPW records found on Floodmaps.ie shown below indicates no recorded flood events in the vicinity of the site. Refer to Image below. Flood events indicated below are far removed from the site.

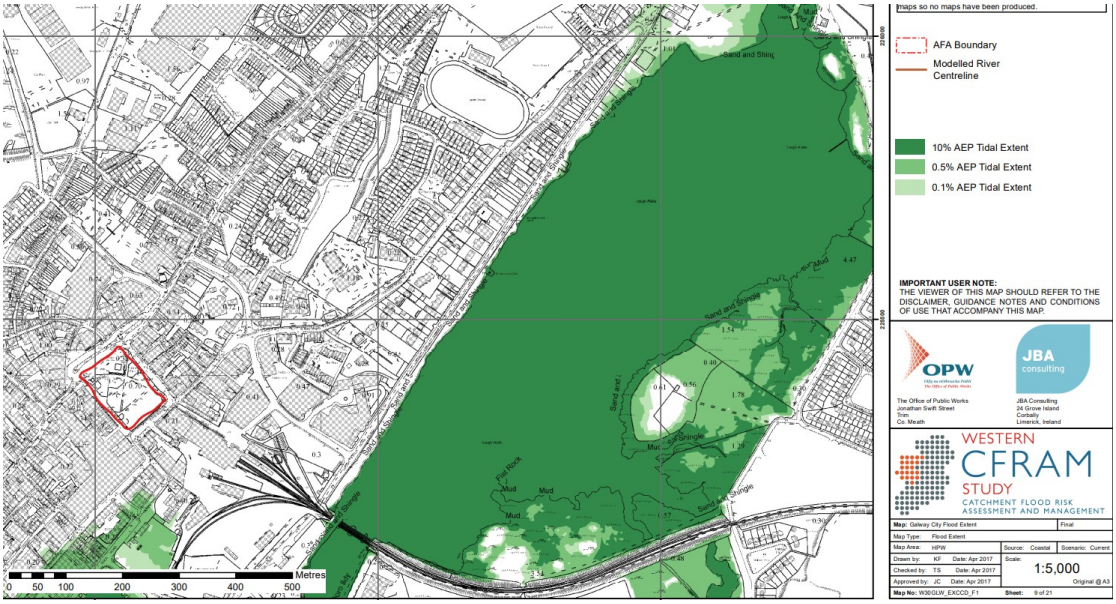

Figure 6 Extract from OPW Floodmaps.ie

Conclusions from Flood Risk Assessment

A flood risk to the site has been identified using available Preliminary Flood Risk Assessments. It is noted that the site is not at risk from Flood Zone A or Flood Zone B events. The proposed dwelling can be considered as being within **Flood Zone C.**

Sequential Approach to Planning

In accordance with "The Planning Systems and Flood Risk Management: Guidelines for Planning Authorities November 2009" a sequential approach has been undertaken during the layout and design stage of the proposed development to ensure that the flooding risks to the proposed development are managed. The diagram below sets out the broad philosophy of the sequential approach which has been adopted within the design and layout of the proposed development.

Figure 7 - Sequential Approach

Vulnerability Class of Proposed Development

The vulnerability class of the development is dependent on the land use and type of development proposed. The "Planning Systems and Flood Risk Management: Guidelines for Planning Authorities" presents a matrix of vulnerability versus flood zone to illustrate appropriate development and the requirement of justification tests. The proposed residential development is classified as a highly vulnerable development. Highly vulnerable developments, such as the proposed development, at risk of Zone A and Zone B flooding require a Justification Test. Therefore, a Justification test is **not required** for the proposed development as based on the evidence outlined above, **the development is considered to be located in Zone C, i.e. an area subject to a low probability of flooding.**