BISHOP LUCEY PARK REDEVELOPMENT

ENGINEERING REPORT FOR

PART 8 PLANNING APPLICATION

Part 8 Planning Engineering Report

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Review

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1.1 Introduction

Hall McKnight Architects have appointed Horganlynch Consulting Engineers to prepare a Part 8 Planning Engineering Report for the proposed redevelopment works to Bishop Lucey Park between South Main Street and the Grand Parade in the medieval quarter of Cork city. Full details of the proposed redevelopment works are set out in Hall McKnight Architects Part 8 planning drawings and supporting documentation.

The proposed development will consist of, among other work the redesign of the existing pathways and new surfacing and access around the park, four distinct structures at each of the park entrances and works around the existing medieval wall.

This report will address the following civil engineering issues:

- Surface Water Disposal
- Foul Water Disposal
- Water Supply
- Flooding

1.2 Site Location

The site is located between South Main Street and the Grand Parade in the medieval quarter of Cork city. The eastern side faces the Grand Parade, whilst the southern side faces the rear of the 2, 3 and 4-storey buildings that face onto Tuckey Street and South Main Street. A 19th century dormer 3-storey building is located at the junction of Tuckey Street and South Main Street, with the remains of the adjacent building, its ground floor front elevation sited within the boundary plot, fronting onto South Main Street. The western boundary has a combined low wall and railing fronting South Main Street. The northern edge has Christ Church Lane as it boundary and faces the former Christchurch Church (now the Triskel Arts Centre) and Christchurch graveyard. Towards the West of the Site is the exposed remains of the medieval city wall.

Figures 1, 2 and 3 below show the site location and proposed development.

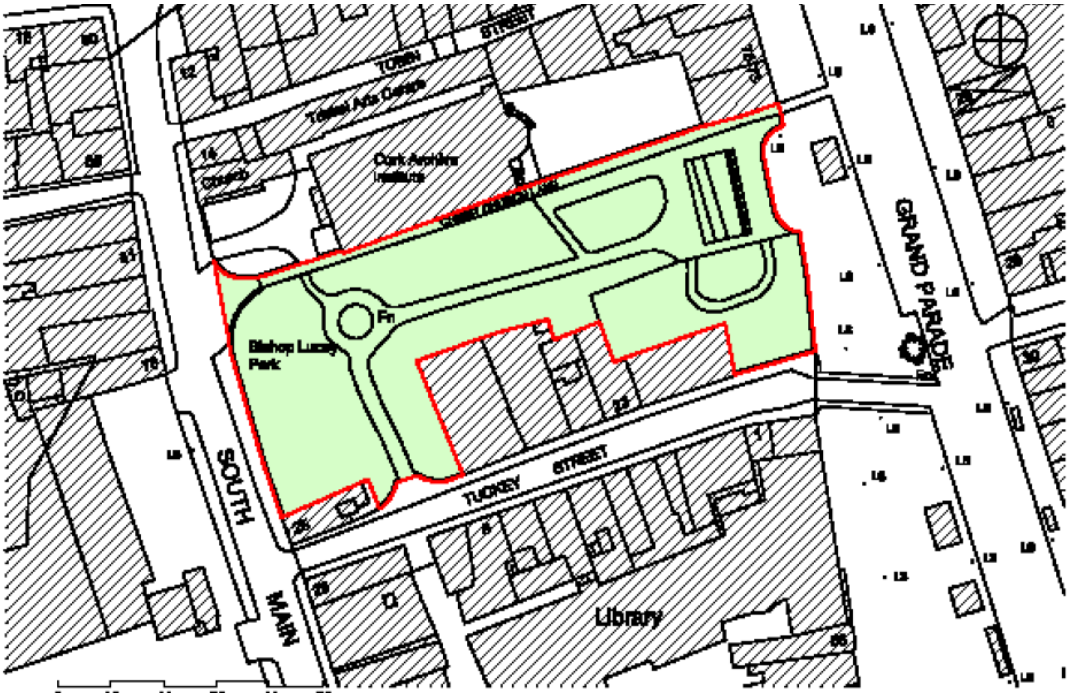


Figure 1 - Existing Ordnance Survey of site

Figure 2 – Plan View of Existing Site

Figure 3 – Proposed Layout Plan

For a full set of information on the proposed works to the park, refer to Hall McKnight Architectural Planning Drawings and Documentations separate to this report.

1.3 Surface Water Drainage

The existing storm water in the park is either discharged via gravity drainage into the moat adjacent to the medieval wall towards the eastern end of the site or collected and discharged via gravity drainage into an existing 450dia combined line on Tuckey Street. This connection occurs through the existing southern entrance on Tuckey Street. There are existing gullies on Christ Church Lane that discharge directly into an existing storm line on Christ Church Lane. This is discharged via gravity drainage to the existing storm line on Grand Parade.

The following is the proposed SUDs strategy for the disposal of storm water generated by the redevelopment:

The surface water collected will no longer discharge into the moat, falls in the surfaces of the lower ground around the proposed plinth will discharge surface water into both the soft landscaping areas or into surface drainage channels that discharge via new gravity drains to the existing drainage network. The western side of the site will discharge to the existing connection on Tuckey Street, the Eastern side of the site will discharge into the existing storm line on Christ Church Lane.

The raised plinth will be constructed on permeable stone fill to allow for good infiltration below the finished surface. Hard surfacing will generally discharge into the permeable gravel areas within the plinth itself and a number of brick slot drains will be incorporated within the area to assist in the collection of the surface water. Surface water collected in the brick slot drains will discharge into the permeable stone fill build-up. A series of perforated land drains within this stone fill will collect and discharge any excess water to an overflow chamber and silt trap manhole prior to discharging to the proposed gravity drainage system noted above. Sumps will be installed adjacent the brick slot drains to allow for maintenance access and silt removal. Flow restrictors will be fitted on the outlet manholes to ensure greenfield run-off rate of 2.0l/s is not exceeded.

There will be a new surface water overflow line installed to the moat, this will discharge into a screened manhole to allow for removal of rubbish and miscellaneous items on a regular basis and will prevent blockages of the line. This screened manhole will then discharge to the existing line on Christ Church Street.

Given the existing levels coincide with the proposed levels along Christ Church Lane it is proposed to leave the existing gullies in place (or renew as appropriate) and utilise the existing drainage strategy for this lane within the park.

Refer to the storm drainage calculations in appendix C. This is based on conservatively low infiltration properties of the ground below the permeable stone fill. On the western side, the system connecting out to Tuckey Street doesn't require any attenuation however on the eastern side of the site, an offline attenuation of 20m^3 prior to the Christ Church Lane

connection is required to ensure a run-off rate of 2.0l/s is achievable without flooding the system. Given the plinth permeable stone build-up varies from 300mm to 700mm across the park, conservatively allowing for 30% void ratio in the stone fill, this gives an average free volume of 167m^3 for water attenuation during a storm period. Based on the above, the void area within the permeable stone fill is more than adequate to deal with any surface water build-up due to the restricted run off rate of 2.0 l/s

See Appendix A: Site Services Drawings

See Appendix C: Storm Water Calculations

1.4 Foul Water Drainage

There are no proposed elements being added to the park that require foul water drainage services within the park.

1.5 Water Supply

It is proposed to utilise the existing water connection on Tuckey Street that is currently supplying water to the site. All fixings and valves associated with this connection will be in accordance with Irish water specifications.

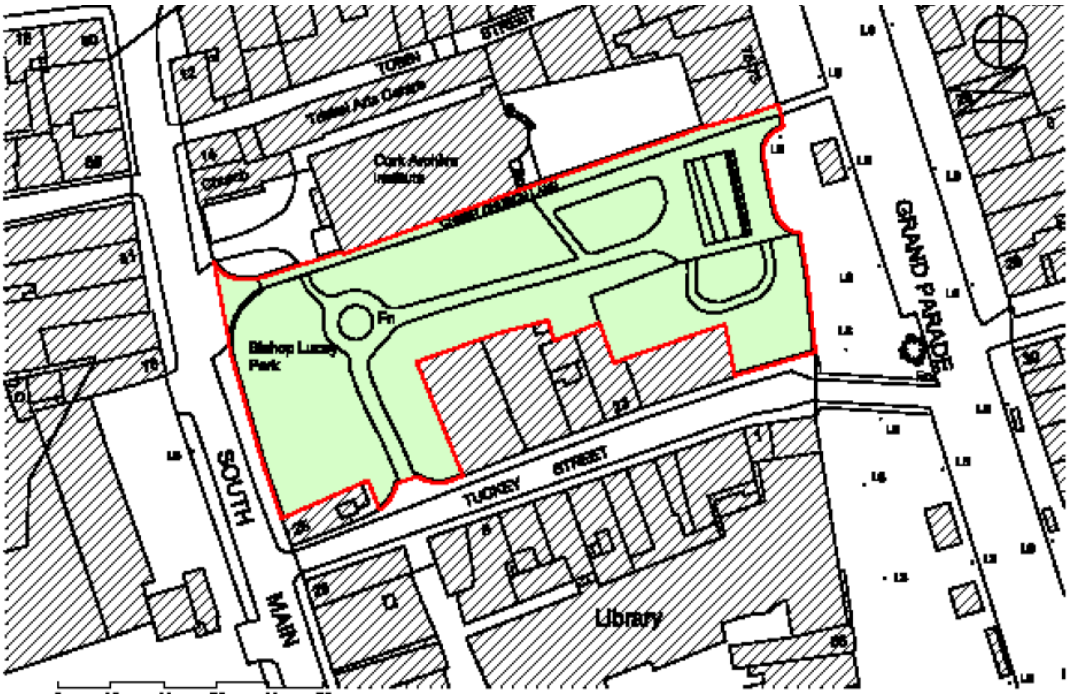
A new 50mm dia ductile iron water line will replace an existing 12.5mm supply to the existing water feature within the park. This line will then run to a mechanical chamber adjacent to the moat to allow for water supply to the moat itself.

See Appendix A: Site Services

- Drg. No. HMK01-002 Proposed Watermain Layout

1.6 Flood Risk Assessment

The following section of this planning engineering Report covers the flood risk assessment for the proposed redevelopment works to Bishop Lucey Park between South Main Street and the Grand Parade in Cork city.



Bishop Lucy Park Site location map - Site outline in Red

Site Topography

A topographical survey of the site has been undertaken and a copy of this survey is set out in Appendix B of this report.

Proposed Development & Site levels

The proposed redevelopment works to Bishop Lucey Park will consist of, among other works, the redesign of the existing pathways and new surfacing and access around the park, removal of park boundary walls, gates and railings, the insertion of a number of distinct park feature structures at each of the park entrances. The development will also include works around the existing medieval wall and the redevelopment of the sunken water mote feature on the Grand Parade side of the Park.

The park site is located circa 150m north of the southern channel of the River Lee.

The general ground level within the site ranges from +2.6m above Ordnance Datum (AOD) at the east of the site to +3.7m AOD at the west end.

The proposed redevelopment works to the Park is shown in the architectural scheme drawings. The redevelopment works will include new features, resurfacing and regrading works.

The new works will generally see the levels within the main area of the Park raised along a new paved platform surface at between 3.6m to 4.45m OD with steps and ramps access up to these levels from the surrounding street and paved areas.

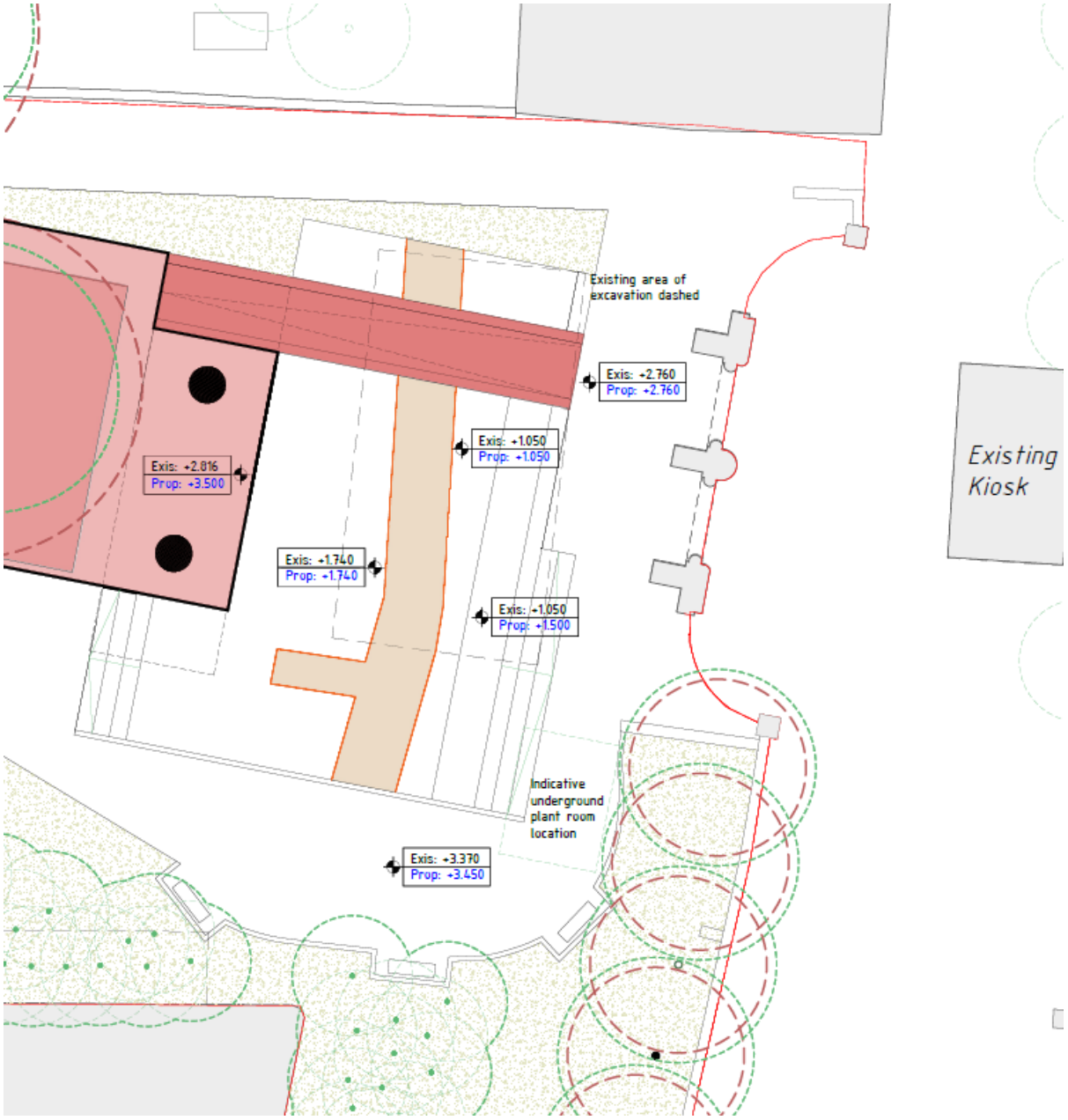
The existing levels to the lane way on the north side of the park along Christchurch which will be resurfaces will be maintained at existing levels between 2.45m at the Grande Parade entrance to 3.65m OD at the South Main street entrance.

The areas around the existing grand parade entrance, the moat and City Wall will be reconfigured. The level at the entrance junction with the Grand Parade footpaths will be retained at 2.45-2.65m OD. while levels around the moat and city wall will be lowered somewhat.

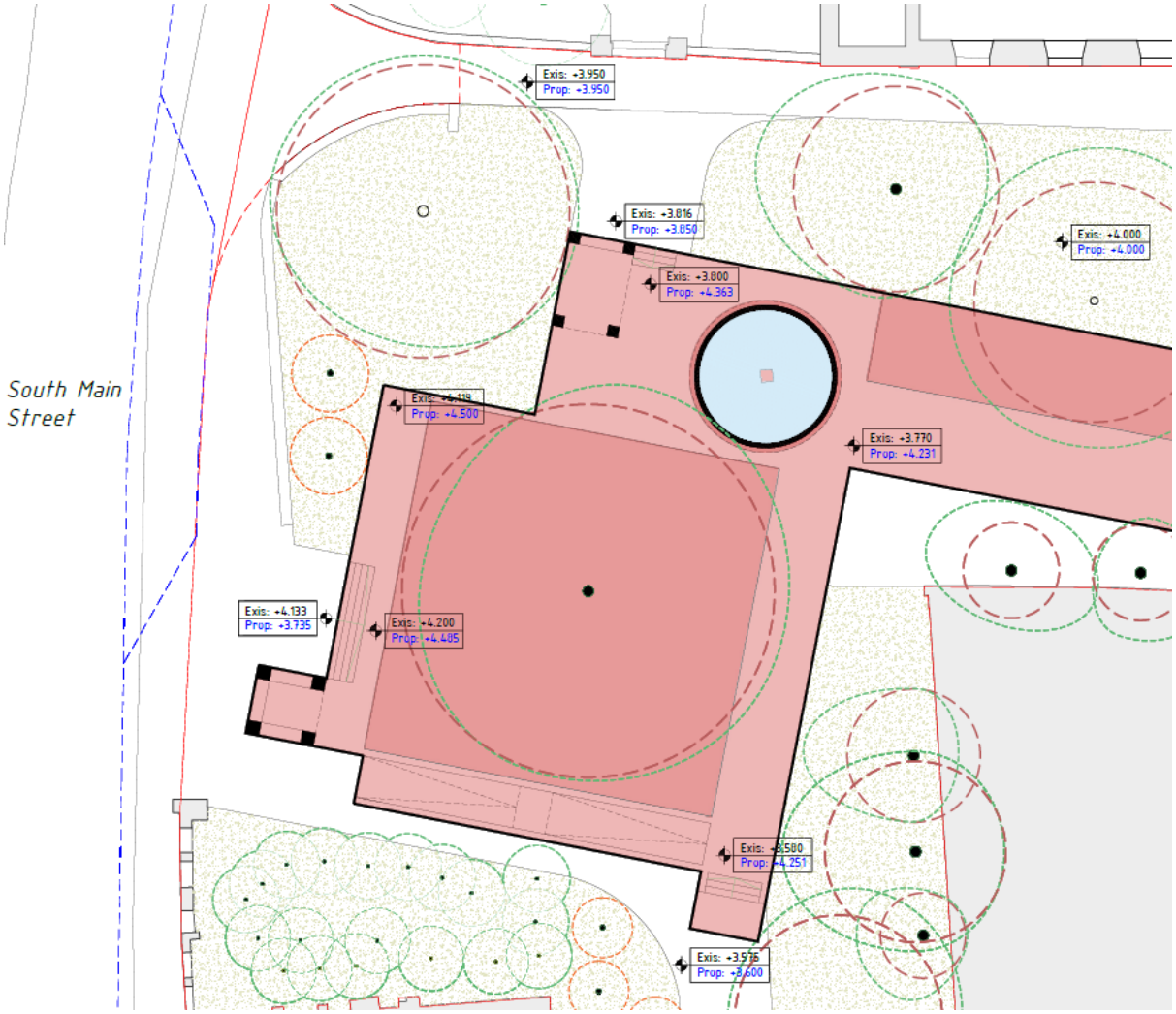
New surfaced ramps, steps and a bridge ramp structure will be installed which will give access to the raised opened up park areas.

Details of the proposed new Park layout with the existing and proposed new levels can be seen in the Architects Proposed Park Plan in Appendix B and in extracts from this drawing shown below.

Full details of the proposed redevelopment works are set out in Hall McKnight Architects Part 8 planning drawings and supporting documentation submission.



Extract from Proposed Park Plan showing existing & proposed levels to the Grand Parade side of the Park.



Extract from Proposed Park Plan showing existing & proposed levels to the South Main Street side of the Park.

As set out in the following sections of this report a potential for risk of flooding has been identified to the eastern end of the Park and therefore a flood risk assessment is required.

This report assesses the flood risk posed for and by the development and sets out the measures proposed to protect the site and mitigate potential development impact.

1.6.1 Planning System and Flood Risk Management (PSFRM) Guidelines

The OPW have published Planning System and Flood Risk Management (PSFRM) Guidelines which outlines three stages in the assessment of flood risk as follows:

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

Stage 2- Initial flood risk assessment – to confirm sources of flooding that may affect a plan area or 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.

Stage 3 - Detailed risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures. This will typically involve use of an existing or construction of a hydraulic model or a river or coastal cell across a wide enough area to appreciate the catchment wide impacts and hydrological processes involved.

The following sections of this report sets out the flood risk assessment of the Bishop Lucy Park redevelopment in accordance with these stages.

1.6.2 Data Collection & flood risk identification (Stage 1)

Outline Solution

The planning application drawings have been reviewed in the context of the proposed development and its relationship to flood risk.

Flood Risk Data Sources

The following sources of data on flood risk for the site area were reviewed:

- Lee CFRAMS Study
- Cork City Flood Relief Scheme
- Flood History - examination of available information on www.floodmaps.ie the OPW website

1.6.3 Lee CFRAMS Study

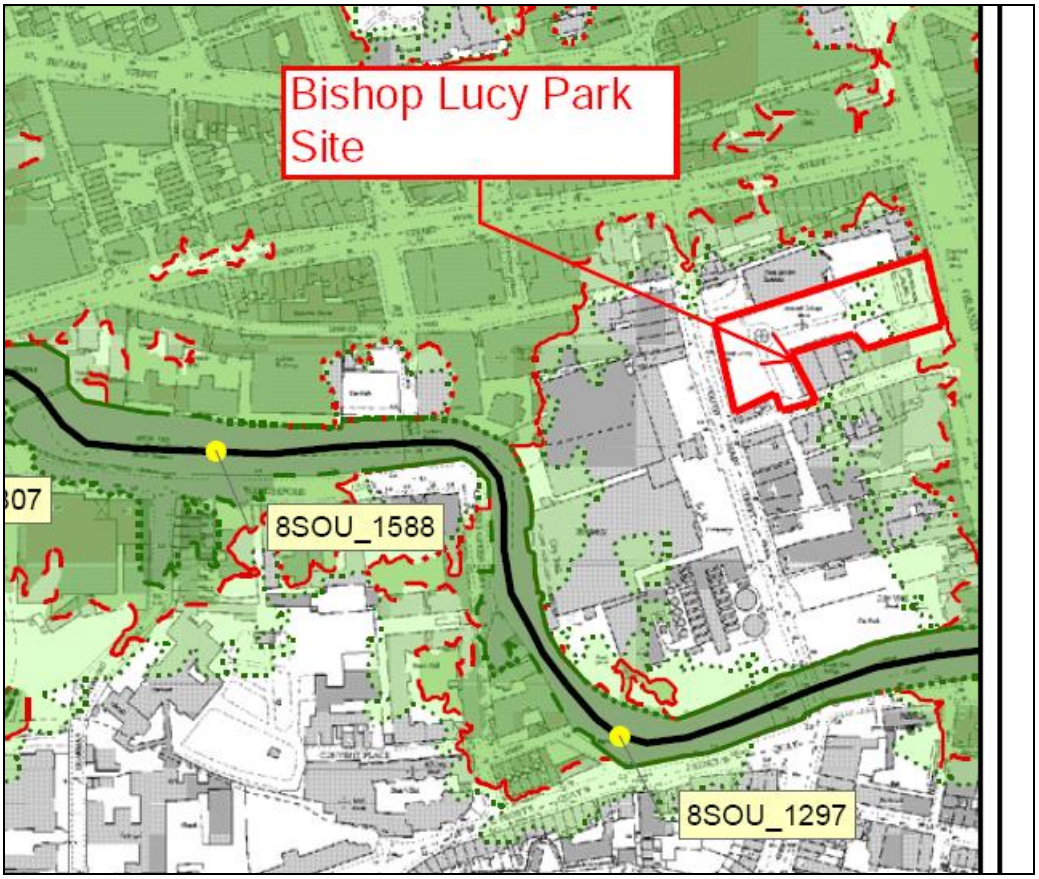
The Office of Public Works (OPW) is the lead State body for the coordination and implementation of Government policy on the management of flood risk in Ireland. The OPW is also the national authority for the implementation of the EU Directive on the Assessment and Management of Flood Risks [2007/60/EC].

The Lee Catchment Flood Risk Assessment and Management Study (Lee CFRAMS) is a catchment-based flood risk assessment and management study of the entire Lee Catchment, including the River Lee, its tributaries and Cork Harbour. It was commissioned by the OPW and the final Report and flood maps were produced in early 2014. Reports and flood maps from the Lee CFRAMS were reviewed as part of the Study for this report. Copies of the flood extent maps relevant to the scope of this report are included in Appendix B.

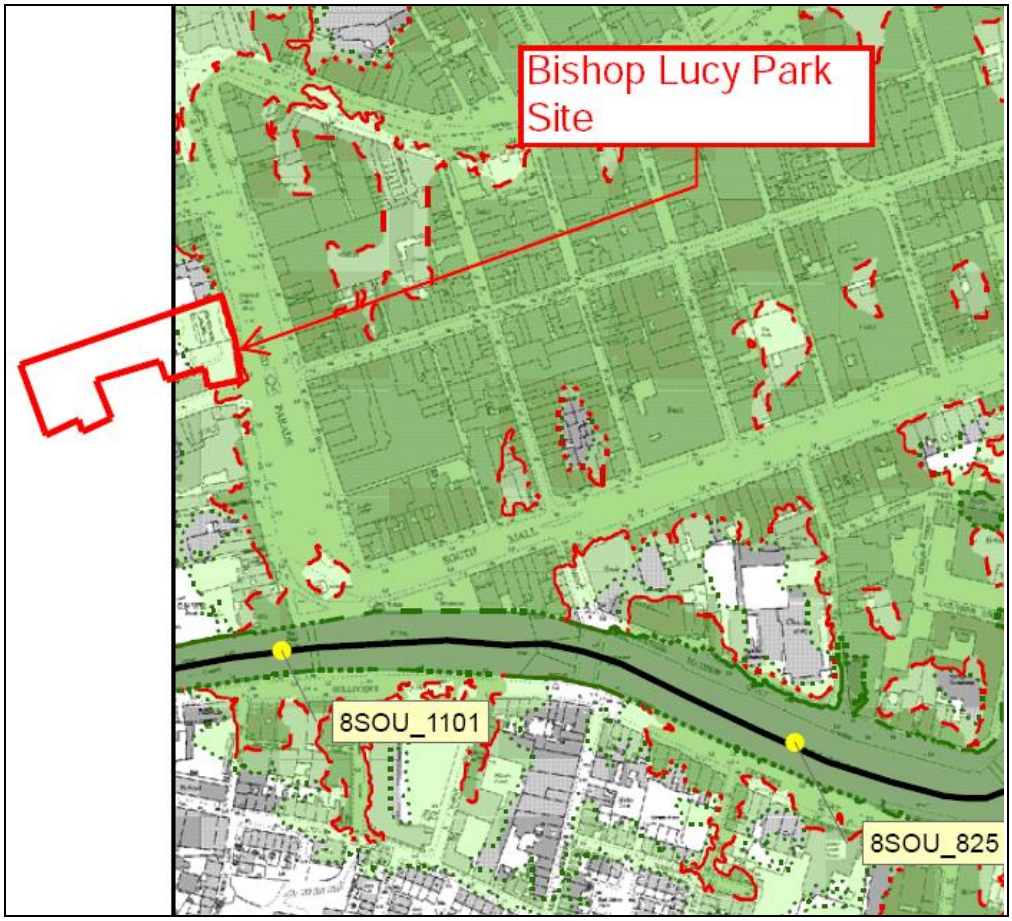
The flood extent maps were produced for various flood events of a given probability of occurrence. These are the 10%, 0.5% and 0.1% annual exceedance probability (AEP) events for tidal flooding (relevant in this case). These are equivalent to the 1 in 10, 1 in 200 and 1 in 1000year flood events respectively. The flood extent maps give predicted flood levels for the 10%, 0.5% and 0.1% flood events at various nodes along the river channels.

The Bishop Lucy Park site lies to the north east of river node 8SOU_1297 and north west of river node 8SOU_1101 which is in the south channel immediately adjacent to the southern end of Grand Parade. These nodes are the nearest to the Park and would be the most relevant in terms of assessment of the flood levels to the area.

The flood extent maps for Tidal flooding for the area around the park can be seen on the flood extent map reference M9/UA/EXT/CURS/003 & 004, see map extracts below.



Extract from Current Flood Extent Map Ref M9/UA/EXT/CURS/003



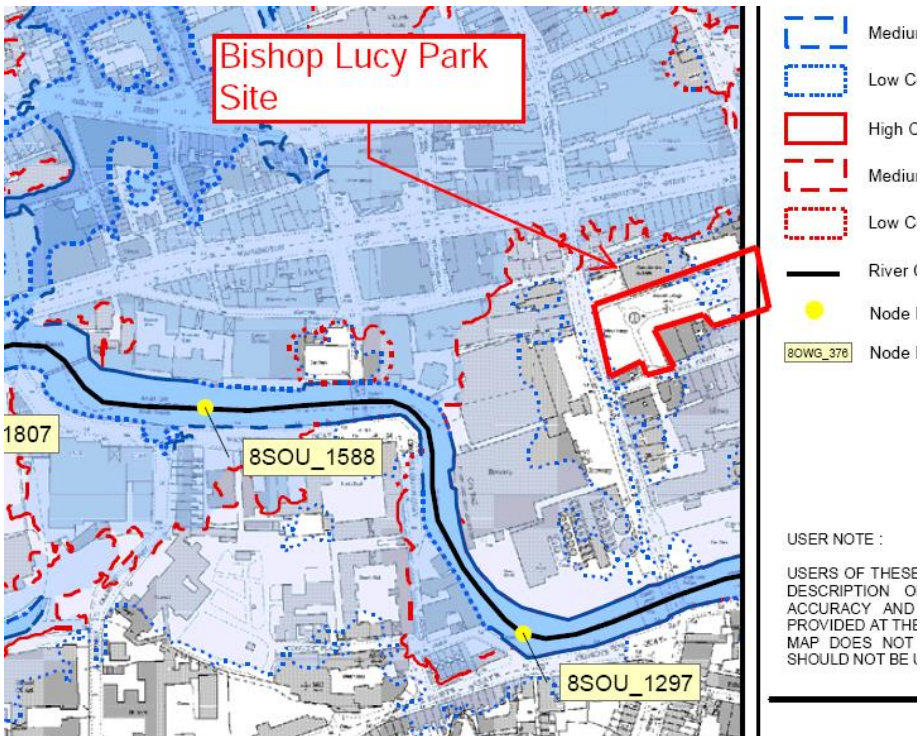
Extract from Current Flood Extent Map Ref M9/UA/EXT/CURS/004

The predicted flood levels for tidal flooding at the nodes 8SOU_1297 & 8SOU_1101 are shown in table 1.1 below. The table shows the predicted tidal flood levels for the current scenario as well as the predicted future scenarios which have been quantified by adding 550mm to the current predicted flood levels.

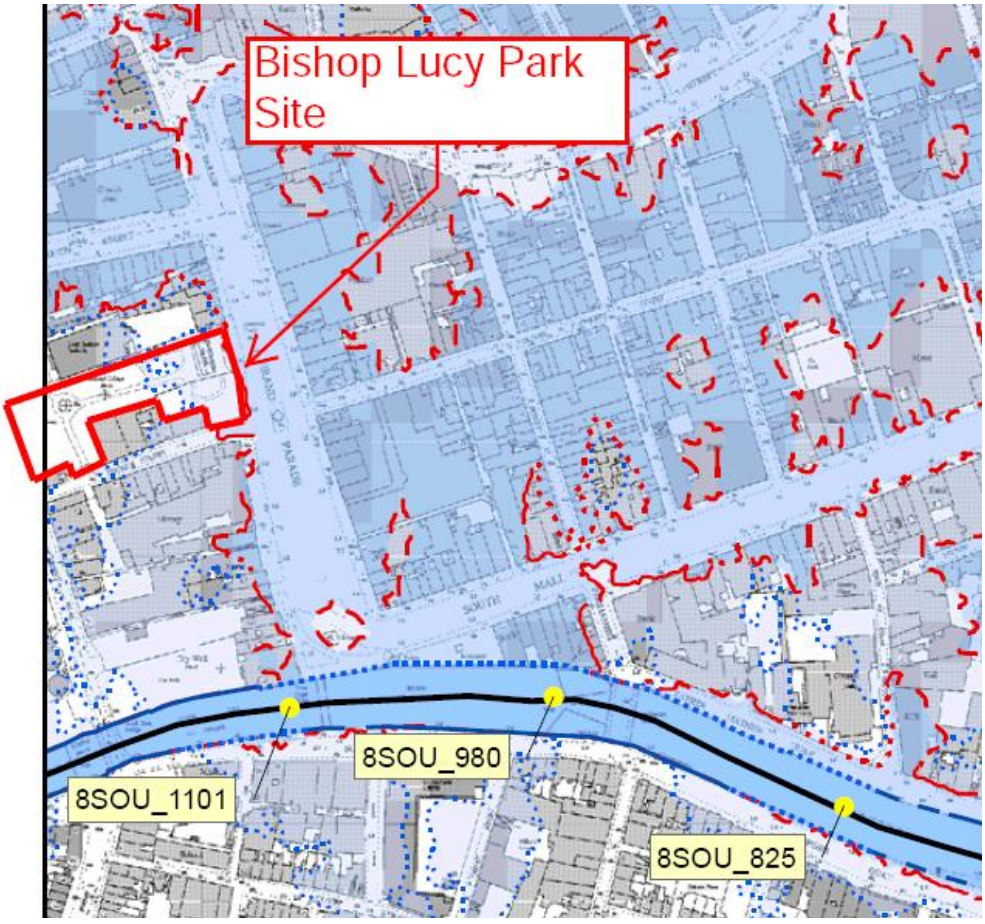
	Predicted flood Levels		
Probability	**10%**	**0.5%**	**0.1%**
Current Scenario @ node 8SOU_1297	2.75	3.15	3.43
Mid-Range Future Scenario @ node 8SOU_1297	3.30	3.70	3.98
Current Scenario @ node 8SOU_1101	2.70	3.05	3.28
Mid-Range Future Scenario@ node 8SOU_1101	3.25	3.60	3.83

Table 1.1 – Predicted Tidal Flood Levels at Node 8SOU 1297 & Node 8SOU 1101

The flood extent maps for fluvial flooding for the area around the park can be seen on the flood extent map reference M8/UA/EXT/CURS/010 & 011, see map extracts below.



Extract from Current fluvial Flood Extent Map Ref M8/UA/EXT/CURS/010



Extract from Current fluvial Flood Extent Map Ref M8/UA/EXT/CURS/011

The predicted flood levels for fluvial flooding at the nodes 8SOU_1297 & 8SOU_1101 are shown in table 1.2 below. The table shows the predicted tidal flood levels for the current scenario as well as the predicted future scenarios which have been quantified by adding 550mm to the current predicted flood levels.

The predicted flood levels for the current scenario for fluvial flooding at node 8SOU_825 are shown in table 1.2 below.

	Predicted flood Levels		
Probability	**10%**	**1%**	**0.1%**
Current Scenario @ node 8SOU_1297	2.22	3.05	3.50
Mid-Range Future Scenario @ node 8SOU_1297	2.77	3.60	4.05
Current Scenario @ node 8SOU_1101	2.05	2.87	3.22
Mid-Range Future Scenario@ node 8SOU_1101	3.05	3.42	3.77

Table 1.2 – Predicted Fluvial Flood Levels at nodes 8SOU_1297 & 8SOU_1101

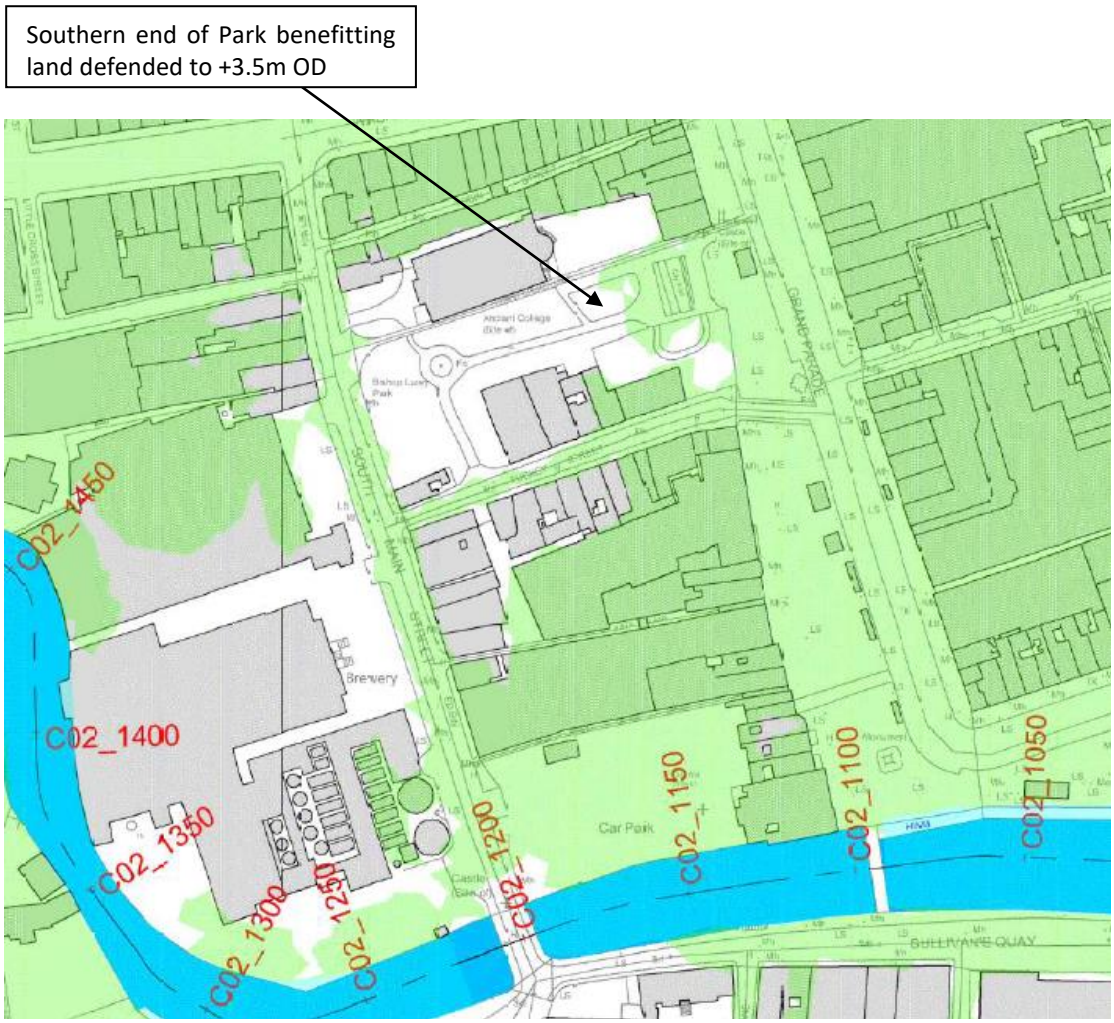
1.6.4 Lower Lee (Cork City) Flood Relief Scheme

The OPW, in conjunction with Cork City and County Councils, are now advancing the Lower Lee (Cork City) Flood Relief Scheme. The scheme will run from Inniscarra Dam to the City Centre protecting over 2,100 properties against tidal and river flooding.

In line with international best practice, the standard of protection provided by the scheme is the 1 in 100-year flood from the River Lee and the 1 in 200-year flood from the tide. The scheme is also adaptable to provide greater protection in the future in response to climate change.

When implemented this flood defence scheme the southern end of Bishop Lucy park will be benefitting lands defended to a level of +3.5m OD against River Lee flood events up to 1.0% AEP Fluvial & 0.5% AEP Tidal as seen the map extract from the flood extents and benefitting areas LLFRS drawing No. LL127

A3 copies of this drawing and the relevant flood defence scheme layout plan drawing for the aera around Bishop Lucy Park which are relevant to the scope of this report are included in Appendix B.



Extract from the flood extents and benefitting areas LLFRS drawing No. LL127 showing areas in green which will be benefitting lands protected to +3.5m OD.

1.6.5 Flood History - OPW Flood Hazard Maps

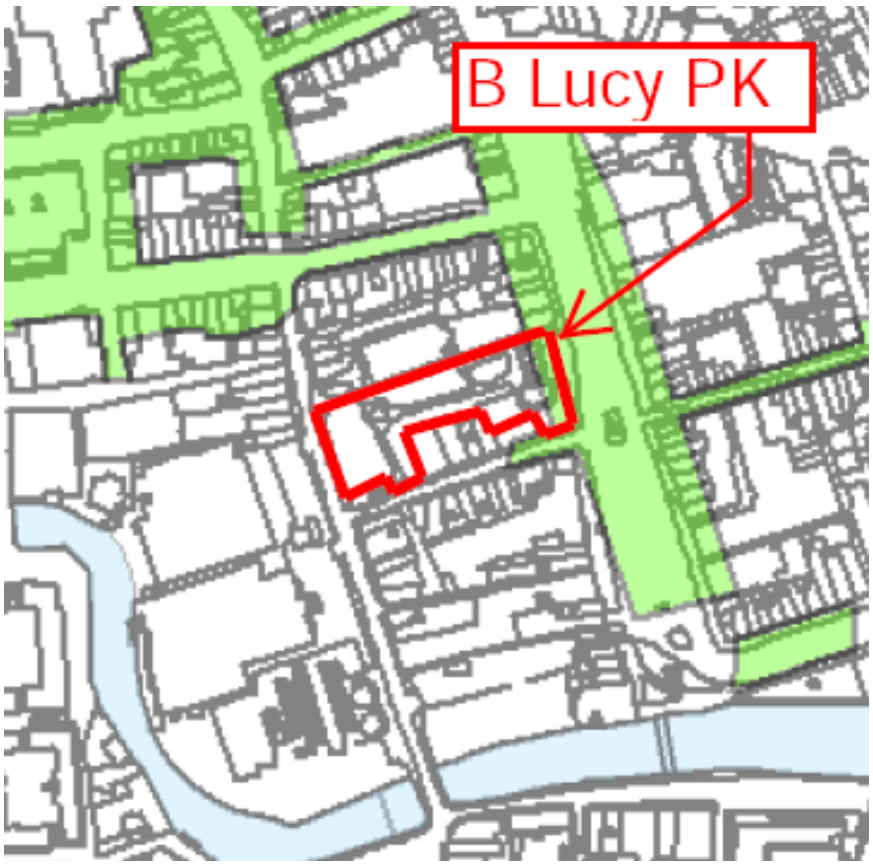
Cork City has experienced significant flooding in the past. The Public Works (OPW) National Flood Hazard Mapping website includes records of numerous flood events from the eighteenth century up to the present times. Some recorded floods pre-date the construction of the Inniscarra dam which was constructed during the 1950's and has been successful in mitigating flooding in Cork City to a degree.

The most well known recent flood occurred in November 2009 and records show that flooding to the lower end of the Park at the Grand Parade entrance occurred during this event.

The OPW have produced a flood extent map which indicates the extent of flooding in Cork City during this flood event. The map extract reproduced below show the extent of the flooding in the area of the site.

It can be seen from this map and the photo below that there was extensive flooding on the Grand Parade. It appears from the map and photographs the flood water level in the area reached somewhere between 2.6 and 2.8m OD. The flooding extended into the lower eastern end of the Park at these levels while most of the park which is at 2.8m OD and above remained free of flood water.

Ref to Appendix B of site Topographic survey with existing site levels



Extract from the OPW 2009 flood extents map showing areas in green which flooded up to circa 2.8m OD on Grand Parade & the lower eastern end of Bishop Lucy Park.

Photo of 2009 Flooding on Grand Parade at corner of Bishop Lucy Park

Stage 1 Flood Risk Assessment Summary

From the review of the above flood data a potential flood risk has been identified to the lower eastern end of the Park there for further stage risk assessments have been undertaken using the above data and are set out in the following sections of this report.

1.6.6 Initial Stage 2 Flood Risk Assessment

The purpose of the initial stage 2 Flood Risk Assessment is primarily to ensure that the relevant flood risk sources are identified so that they can be addressed appropriately in the detailed stage 3 Flood Risk Assessment.

Flooding Sources

Tidal Flooding

Tidal flooding is caused by higher than normal sea levels which occur primarily due to extreme high tides, storm surges, wave action or due to high river flows combining with high tides.

As identified and set out in the stage 1 assessment of this report there is a risk to the Bishop Lucy site from tidal flooding from the southern channel of the river Lee. The flood risk to the park from tidal flooding is assessed in the Stage 3 FRA.

River flooding

River flooding occurs when the capacity of a river channel is exceeded, and water flows onto the adjacent land or flood plain.

As identified and set out in the stage 1 assessment of this report there is a risk to the Bishop Lucy site from tidal fluvial flooding from the southern channel of the river Lee. The flood risk from fluvial flooding is assessed in the Stage 3 FRA.

Overland flow

Overland flow occurs when rainfall intensity exceeds the infiltration capacity of the ground. Overland flow is most likely to occur following periods of sustained and intense rainfall when the ground surface becomes saturated.

As the Park is in the urban city centre location there is no significant risk of overland flow impacting the site as the runoff would be intercepted by urban drainage to the closed pipe drainage systems or would flow directly into the river channel. Furthermore, most of the proposed park levels are above the existing street levels and therefore overland flow would be conveyed around the site.

Based on the above this potential source of flooding does not require further assessment.

Pluvial Flooding

Public Infrastructure Pluvial flooding typically occurs when runoff entering an urban drainage system is too large for the system to discharge or if the system cannot discharge due to blockages or high flood levels in the receiving watercourse.

While there is always potential for flooding due to blockages or capacity issues to the public drainage systems this is not a risk here as the Bishop Lucy Park site levels are generally well above the surrounding streets, their drainage and cover levels. Any surcharging of sewer systems would therefore flood the surrounding streets rather than entering the Park. Any such flooding on the streets is expected to be to relatively shallow depths.

Based on the above this potential source of flooding does not require further assessment.

Groundwater Flooding

Groundwater flooding occurs when the water table rises to the level of the ground surface due to rainfall and flows out over the surface.

As the Park levels are generally higher the the surrounding areas and streets there is no known particular risk of flooding due to high ground water levels. The Park site does not have a history of flooding due to high ground water flooding. For these reasons this source of flooding will not be considered further in this report.

Based on the above this potential source of flooding does not require further assessment

Stage 2 Flood Risk Assessment Summary

The above Stage 2 flood risk assessment has indicated that the main potential sources of flooding at this site are fluvial and tidal flooding. Therefore, a Stage 3 detailed flood risk assessment has been carried out in order to provide a quantitative appraisal of potential flood risk to the Park site as set out in the following section of this report.

1.6.7 Details Stage 3 Flood Risk Assessment

The following stage 3 FRA assesses the flood risk to the Bishop Lucy Park site due to the potential sources of flooding identified in the stage 2 assessment as well as the potential impact of the development on flood risk elsewhere and to establish what mitigation measures, if any, may be required.

Flood Zone Maps

The Flood Risk Management Guidelines document defines three flood zone types as follows:

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

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

Flood Zone C - where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

As set out in the stage 1 & 2 assessment above, from review of the Lee CFRAMS flood maps, tidal and fluvial flooding from the nearby southern channel of the river Lee are the predominant flood risk sources for flooding to the Bishop Lucy Park site.

The pathway for flood waters to the receptor is directly from the southern channel of the Lee river via tidal and fluvial flooding overtopping the quay walls on the southern end of South Main street and flooding up South main street toward the western end of the Park. Also, from flooding overtopping the quay walls at the southern end of Grand Parade and flowing up towards the eastern end of the park on the Grand Parade side.

The Lee CFRAMS flood maps were examined in detail to determine which flood zones the Park site lies within. As per the guidelines the flood zones are defined without taking the effects of future climate change into account.

From these flood maps the lower eastern Park area just at the Grand Parade entrance is in the moderate flood zone B with a 0.1% fluvial and 0.5% APE probability of tidal flooding. The rest of the park is considered to be in flood zone C.

1.6.8 Proposed Development Vulnerability Assessment

Three Vulnerability Classifications for developments are defined in the guidelines based on the proposed land use and type of development which are summarised as follows;

1. **Highly Vulnerable Development:**

   This would include emergency services, hospitals, schools, residential institutions, dwelling houses, essential infrastructure etc.

2. **Less Vulnerable Development:**

   Retail, leisure, commercial, industrial buildings, local transport infrastructure.

3. **Water-compatible development:**

   Docks, marinas and wharves. Amenity and open space, outdoor sports and recreation and essential facilities such as changing rooms.

The Guidelines also include a matrix of vulnerability versus flood zone to differentiate between developments which are appropriate in various flood zones and those which require a Justification Test. The Table below sets out the vulnerability classification versus flood zone development and identifies where a proposed development needs a justification test.

Vulnerability Classification	**Flood Zone A**	**Flood Zone B**	**Flood Zone C**
Highly Vulnerable Development	Test Justification	Test Justification	Test Justification
Appropriate Less Vulnerable Development	Test Justification	Appropriate	Appropriate

Appropriate Water Compatible Development	Appropriate	Appropriate	Appropriate

The Bishop Lucy Park is primarily the redevelopment of an existing amenity and recreation space, this development would be classified as appropriate water compatible for the general park area. As the Park is in a flood zone B and C then from the above table the development is deemed appropriate development in this area and for this reason a Justification Test will not be required.

1.6.9 Review of Predicted Flood Levels & Flood Risk Analysis

From review of the Lee CFRAMS flood maps as set out in the stage 1 assessment the highest predicted flood levels from the nearest river Nodes on either end of the Park based on 0.5% tidal and 0.1% AEP fluvial flooding for current and Mid-Range Future scenarios are as set out in the table below.

AEP	Current Scenario @ node 8SOU_1297		Mid-Range Future Scenario @ node 8SOU_1297		Current Scenario @ node 8SOU_1101		Mid-Range Future Scenario @ node 8SOU_1101	
	Fluvial	Tidal	Fluvial	Tidal	Fluvial	Tidal	Fluvial	Tidal
0.1fluvial/0.5 Tidal	3.50	3.15	4.05	3.70	3.22	3.05	3.77	3.60
Future scenario allows for a 550mm increase in flood level for both fluvial and tidal events.								

From the table above fluvial flooding is the dominant flood event.

1.6.10 Flood Risk Analysis

As noted the flood risk source posed to the development relates to the potential for fluvial flooding to the lower eastern part of the park which may inundate site.

As noted above from review of the Lee CFRAMS flood maps the critical fluvial flood levels around the Park are as follows:

0.1% AEP current (fluvial flooding at South Main Street end of Park) 3.50m OD

0.1% AEP current (fluvial flooding at Grand Parade end of Park) 3.22m OD

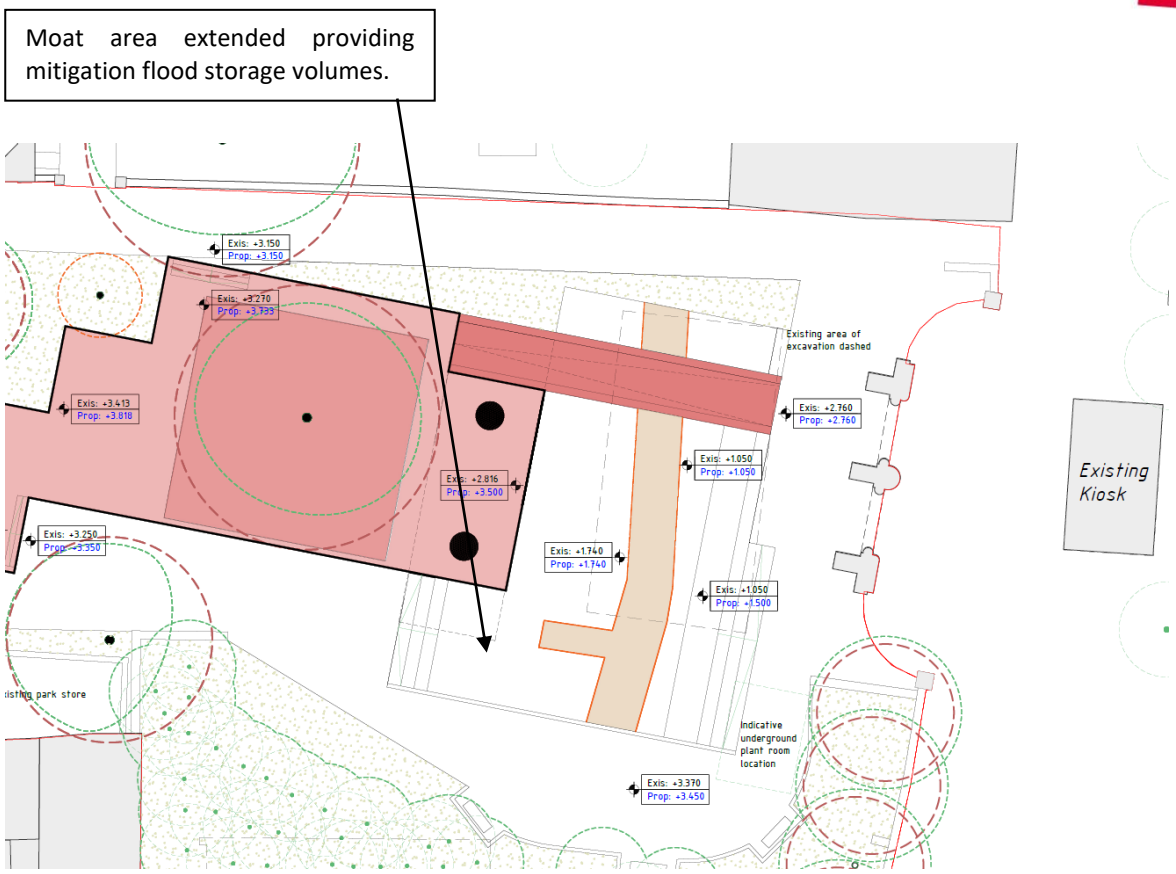
The proposed new entrance levels to the Park from South main street as seen on the Architects plans are to be +3.735m OD. This then steps up to a raised plinth of +4.405m OD or alternatively ramps up onto the plinth to a level of +4.251m OD

The existing entrance level from Tuckey street is +3.57m OD, the proposed level here is +3.600m OD and will steps up to the plinth level of +4.251m OD.

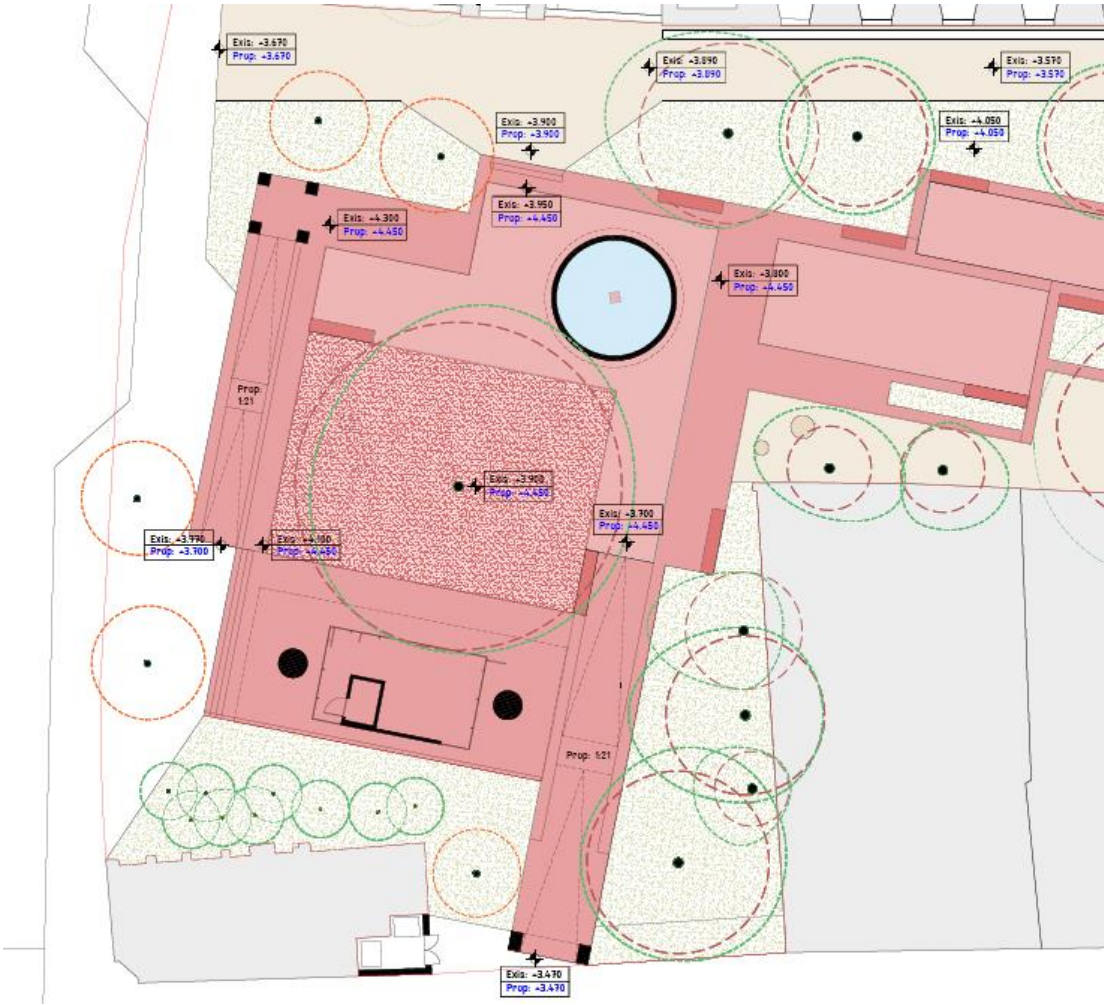
On the Grand Parade side of the Park the existing street paving level at the entrance will be retained at between 2.45m OD & 2.76m OD. There will be ramped and stepped pathways into the Park from this end of the site which will raise up to the main new Park platform level at +3.733m OD to +3.500m OD which will be above the anticipated current & mid range future flood levels.

This area to the eastern end of the Park off the Grand Parade will be redeveloped with a new extended moat water feature and steps and paving around the old city wall. The existing levels around these areas and features will be retained but additional excavation in the area will result in additional flood storage in this area of the park which will more than compensate for the minor loss in flood volumes from the areas which are being raised. This will mitigate against the development of the Park impacting other areas.

On the basis of the above flood assessment, we are satisfied that this Park site can be successfully and safely redeveloped, and flood risks will be mitigated.



Extract from Proposed Park Plan showing existing & proposed levels to the Grand Parade side of the Park.



Extract from Proposed Park Plan showing existing & proposed levels to the South Main Street side of the Park.

1.6.11 Potential Impact of the Development on Flooding Elsewhere.

Generally, potential impacts outside the site can occur due to increased storm water runoff rates from roofs and paved surfaces or due to loss of water storage where part of a flood plain is filled to accommodate development.

As set out in the surface water drainage section of this report the potential impact of flooding elsewhere due to increased storm water runoff rates has been mitigated by incorporating appropriate Sustainable Urban Drainage strategy in the design of the site surface water drainage of the site, ref to section 1.3 of this report.

As noted, the area to the eastern end of the Park off the Grand Parade will be redeveloped with levels around this area lowered. This will provide additional flood storage in this area of the park and will mitigate against the loss of water storage which might otherwise impact other areas around the site.

1.6.12 Assessment of Flood Hazard

Based on the flood risk assessment there is a flood hazard for the Park at the 0.1% AEP (1 in 1000 year return period) fluvial and tidal flood hazard maps. The flood hazard is classified as Low for both fluvial and tidal flooding. In accordance with DEFRA FD2320, this is described as Caution – "Flood zone with shallow flowing water or deep standing water". The flood hazard is therefore considered to be acceptable once appropriate procedures are in place to safely manage evacuation of the property if deemed necessary.

1.6.13 Means of Escape from Property & Emergency Plan.

During an extreme flood, the main area of the park will be above the flood levels. The streets around the Park however would be flooded. The depth of flooding on the South Main Street side of the park would generally be quite low at less the 0.25m under current 0.1% AEP flood levels and up to 0.6m deep under mid-range flood events. At these flood depths high side emergency vehicles would be able to access the park from South Main Street via South gate bridge to evacuate any persons trapped in the park.

Cork City Council has a Major Emergency Plan and a Severe Weather Plan which would be activated when necessary. There is a facility in place to receive alerts of severe whether events. It is also proposed to implement a flood forecasting warning system as part of the Cork City Flood Relief Scheme. The flood warning system should assist in alerting Cork City Council Park management and staff who can ensure safe evacuation of the Park occurs prior to the onset of a flood.

Where evacuation of the park is necessary following the onset of a flood, this should be done by Cork City Council and the emergency services.

1.6.14 Conclusion

On the basis of the above flood assessment, we are satisfied that this Park site can be successfully and safely redeveloped, and flood risks will be mitigated.

Appendix A -

Site Services Drawings:

Drg. No. HMK01-001 Proposed Storm and Foul Drainage

Drg. No. HMK01-002 Proposed Watermain Layout

PIPE COVER CHART: WITHOUT CONCRETE ENCASEMENT	
LOCATION:	MIN.COVER.
SEWERS IN ROAD	1200
SEWERS IN OPEN SPACES	-
NOT ADJACENT TO ROADS	900
SEWERS IN GARDENS	600
WATERMAINS ALL LOCATIONS	900
WATER SERVICES ALL LOCATONS	600
ELEC/ESB CABLE DUCTS IN ROADWAY	900
ELEC/ESB CABLE DUCTS IN FOOTPATHS	500
NATURAL GAS MAINS IN ROADWAYS	800
NATURAL GAS MAINS IN FOOTPATHS	600
TELECOM DUCTS IN ROADWAYS	750
TELECOM DUCTS IN FOOTPATHS	350
CABLE TV DUCTS IN ROADS & FOOTPATHS	450

LEGEND

- EXISTING FOUL MANHOLE
- EXISTING FOUL MANHOLE
- EXISTING FOUL SEWER — EXISTING FOUL MANHOLE
- EXISTING STORM SEWER — EXISTING FOUL MANHOLE
- NEW FOUL AJ
- NEW FOUL MANHOLE
- 225Ø uPVC FOUL SEWER — NEW FOUL SEWER
- NEW STORM MANHOLE
- 225Ø uPVC STORM SEWER — NEW uPVC STORM SEWER PIPE
- 110Ø PERFORATED LAND DRAIN — NEW PERFORATED LAND DRAINAGE PIPE
- SUMP AREA IN SLOT DRAINS - FOR CLEANING
- NEW ACO DRAINAGE CHANNEL
- NEW BRICK SLOT DRAINAGE CHANNEL

ALL WASTERWATER DETAILS ARE TO COMPLY WITH AND BE ADOPTED FROM THE IRISH WATER - CONNECTION AND DEVELOPER SERVICES DOCUMENT FOR WASTEWATER INFRASTRUCTURE STANDARD DETAILS. REF TO IRISH WATER DOCUMENT No IW-CDS-5030-01
CONTRACTOR IS ALSO TO REFER TO THE CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE DOCUMENT. CONNECTIONS AND DEVELOPER SERVICES. DESIGN AND CONSTRUCTION REQUIREMENTS FOR SELF LAY DEVELOPMENTS DOCUMENT IW-CDS-5030-03

GENERAL NOTES:

1) COPYRIGHT AND OWNERSHIP OF THIS DRAWING IS VESTED IN HORGANLYNCH, WHOSE PRIOR WRITTEN CONSENT IS REQUIRED FOR ITS USE, REPRODUCTION OR FOR PUBLICATION.
2) THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S, SERVICES ENGINEER'S AND HORGAN LYNCH DRAWINGS, DETAILS AND SPECIFICATIONS.
3) ALL DIMENSIONS TO BE CHECKED ON SITE AND ANY DISCREPANCY TO BE REPORTED TO THE ARCHITECT / ENGINEER. FIGURED DIMENSIONS ONLY TO BE USED. DRAWINGS NOT TO BE SCALED. ALL LEVELS ARE STRUCTURAL UNLESS OTHERWISE NOTED.
4) ALL FOUL SEWER PIPES TO BE uPVC & COMPLY WITH THE PROVISIONS IS EN 1401 2009/2012. PIPES TO BE APPLICATION AREA CODE 'UD' STIFFNESS CLASS 8kN/m² (SN8), WITH A JETTING REISISTANCE OF 2600 psi (180 Bar).
5) ALL PIPES TO BE A MINIMUM DISTANCE OF 1m (TO FACE) FROM ROAD KERB. ALL MANHOLES TO BE A MINIMUM DISTANCE OF 0.5m FROM THE KERB. LOCATION OF ALL FOUL DRAINAGE IS INDICATIVE ONLY. FOUL DRAINAGE TO BE LOCATED ON SITE IN ACCORDANCE WITH IRISH WATER DETAILS.

REV	DATE	BY	CHKD	DESCRIPTION
C	21.05.21	NF	KL	REVISED & REISSUED FOR PART 8 PLANNING APPLICATION
A	21.05.21	NF	KL	ISSUED FOR PART 8 PLANNING APPLICATION
A	21.05.21	NF	KL	ISSUED FOR PART 8 PLANNING APPLICATION

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JOB TITLE
BISHOP LUCEY PARK

DRG. TITLE
PROPOSED STORM AND FOUL DRAINAGE

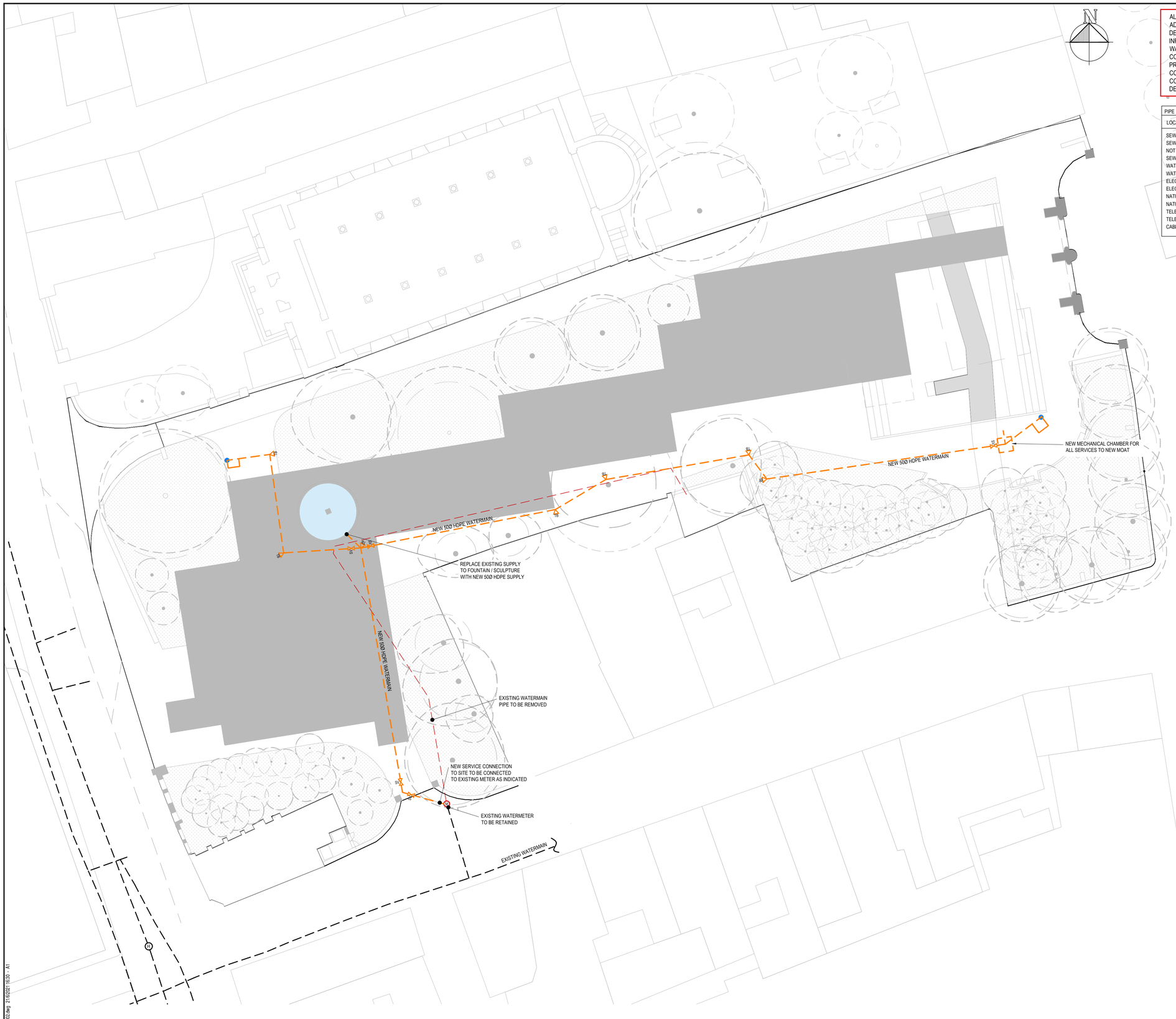
Scales 1:200	A1	Drawn KL
Date FEB-21		C.A.D. REF.- HMK-001.dwg

DRAWING NUMBER **HMK-001** REV. **C**

OVERFLOW CHAMBER DETAIL
SCALE 1:20

TYPICAL SILT TRAP INSPECTION CHAMBER CROSS SECTION
SCALE 1:25

L:\HMK\HMK01\Working\HMK-001.dwg 23/6/2021 17:31 - A1



ALL WATERSUPPLY DETAILS ARE TO COMPLY WITH AND BE ADOPTED FROM THE IRISH WATER - CONNECTION AND DEVELOPER SERVICES DOCUMENT FOR WATER INFRASTRUCTURE STANDARD DETAILS. REF TO IRISH WATER DOCUMENT No IW-CDS-5020-01. CONTRACTOR IS ALSO TO REFER TO THE CODE OF PRACTICE FOR WATER INFRASTRUCTURE DOCUMENT. CONNECTIONS AND DEVELOPER SERVICES. DESIGN AND CONSTRUCTION REQUIREMENTS FOR SELF LAY DEVELOPMENTS DOCUMENT IW-CDS-5020-03

PIPE COVER CHART: WITHOUT CONCRETE ENCASEMENT

LOCATION:	MIN.COVER.
SEWERS IN ROAD	1200
SEWERS IN OPEN SPACES	-
NOT ADJACENT TO ROADS	900
SEWERS IN GARDENS	600
WATERMAINS ALL LOCATIONS	900
WATER SERVICES ALL LOCATONS	600
ELEC/ESB CABLE DUCTS IN ROADWAY	900
ELEC/ESB CABLE DUCTS IN FOOTPATHS	500
NATURAL GAS MAINS IN ROADWAYS	800
NATURAL GAS MAINS IN FOOTPATHS	600
TELECOM DUCTS IN ROADWAYS	750
TELECOM DUCTS IN FOOTPATHS	350
CABLE TV DUCTS IN ROADS & FOOTPATHS	450

LEGEND

- WATER METER LOCATION
- FIRE HYDRANT LOCATION
- NEW SLUICE VALVE
- NEW THRUST BLOCK
- NEW WATERMAIN
- EXISTING WATERMAIN
- EXISTING WATERMAIN TO BE REMOVED
- PROPOSED WATER FOUNTAIN LOCATION

NOTES

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3) ALL DIMENSIONS TO BE CHECKED ON SITE AND ANY DISCREPANCY TO BE REPORTED TO THE ARCHITECT / ENGINEER. FIGURED DIMENSIONS ONLY TO BE USED. DRAWINGS NOT TO BE SCALED. ALL LEVELS ARE STRUCTURAL UNLESS OTHERWISE NOTED.

1.) ALL WATERMAIN LINES TO BE 150mmØ, ALL BRANCH CONNECTIONS TO APARTMENT BLOCKS TO BE 63mmØ UNLESS NOTED OTHERWISE
ALL WATERMAIN LINES TO BE CLASS C 10 BAR PRESSURE. WATERMAIN TO BE LAID A MINIMUM OF 3m FROM PROPOSED STRUCTURE

2.) EACH PREMISE SHALL HAVE :
- AN INDIVIDUAL WATER SUPPLY, TAKEN FROM A MANIFOLD BOX.
- THE MANIFOLD BOX SHALL BE LOCATED ON THE FOOTPATH OUTSIDE THE BUILDING AS CLOSE TO PROPERTY BOUNDARY AS POSSIBLE.
INDIVIDUAL WATER METERS ARE REQUIRED FOR EACH INDIVIDUAL PREMISE.

3.) THE DEVELOPER SHALL MAKE PROVISION FOR ANY REDUNDANT EXISTING WATER SERVICES CONNECTIONS, ALL REDUNDANT EXISTING WATER SERVICES CONNECTIONS SHALL BE TRACED BACK TO THE PUBLIC MAIN BY THE DEVELOPER OR IRISH WATER THROUGH THE CONNECTION AGREEMENT AND SHALL BE BLANKED OFF AT THE DEVELOPERS EXPENSE.

4.) ALL FIRE HYDRANTS WILL BE ACCESSIBLE IN AN EMERGENCY, REFER TO SECTION 3.5 OF WATER CODE OF PRACTICE.

5.) ALL PLANTING OF NEW TREES/SHRUBS ADJACENT TO THE WATERMAIN SHALL COMPLY WITH IRISH WATER STANDARD DETAIL STD-W-12A.

6.) THRUST BLOCKS TO BE PROVIDED ON WATERMAINS AT DEAD ENDS, TEES, BENDS & AT BOTH SIDES OF A SLUICE VALVE CHAMBER, ALL DETAILS TO CONFORM WITH IRISH WATER STANDARD DETAILS DOCUMENT No IW-CDS-5020, ALL INCLUDED WITH THE SPECIFICATIONS DOCUMENTS.

REV	DATE	BY	CHKD	DESCRIPTION
A	DATE	WHO?	WHO?	REV

DRAFT

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JOB TITLE
BISHOP LUCEY PARK

DRG. TITLE
PROPOSED WATERMAIN LAYOUT

Scales 1:200	A1	Drawn KL
Date FEB-21		C.A.D. REF. - HMK-002.dwg

DRAWING NUMBER	HMK-002	REV. A

L:\HMK\HMK001\Working\HMK-002.dwg 21/6/2021 16:20 A1

Appendix B -

Flood Maps

- Tidal Flood Map 1
- Tidal Flood Map 2
- Fluvial Flood Map 1
- Fluvial Flood Map 1
- Flood Extents and Benefitting Areas Sheet 8
- Proposed Flood Defences Plan Layout Sheet 27
- Past Flood Record Cork
- Flood Depth Map

Topographic Site Survey

Proposed site Plan

N

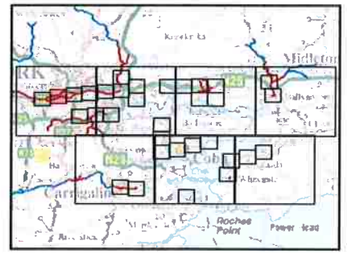
8LEE_4491
8LEE_4291
8LEE_4104
8LEE_3912
8LEE_3719
8LEE_3479
8LEE_3288
8LEE_3099
8LEE_2859
8SO□_2871
8SO□_2705
8SO□_2516
8SO□_2253
8SO□_1977
8SO□_1807
8SO□_1588
8SO□_1297

Bishop Lucy Park Site

Fluvial flooding may also occur within the area shown on this map. Please refer to the fluvial flood extent map. Figure No. M8□□A□E□T□C□RS□010

0,1 0,05 0 0,1 0,2 0,3 0,4 Kilometres

Location Plan :



E□□EN□ M□□

Legend:

- 10 □ AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 □ AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 □ AEP Flood Extent (1 in 1000 chance in any given year)
- Defended area
- High Confidence (□20m) (10□ AEP)
- Medium Confidence (□40m) (10□ AEP)
- Low Confidence (□40m) (10□ and 0.1□ AEP)
- High Confidence (□20m) (0.5□ AEP)
- Medium Confidence (□40m) (0.5□ AEP)
- Low Confidence (□40m) (0.5□ AEP)
- River Centreline
- Node Point
- 001 Node Label (refer to table)

Node Label	Water Level (mOD) per AEP		
	WL 10□	WL 0.5□	WL 0.1□
8LEE_4491	3.07	3.97	4.27
8LEE_4291	3.05	3.94	4.25
8LEE_4104	2.98	3.87	4.19
8LEE_3912	2.84	3.59	3.94
8LEE_3719	2.82	3.52	3.84
8LEE_3479	2.82	3.53	3.85
8LEE_3288	2.78	3.43	3.74
8LEE_3099	2.75	3.34	3.64
8LEE_2859	2.72	3.21	3.45
8SO□_2871	3.33	4.05	4.43
8SO□_2705	3.17	3.79	4.15
8SO□_2516	3.11	3.74	4.12
8SO□_2253	2.97	3.54	3.91
8SO□_1977	2.92	3.48	3.86
8SO□_1807	2.86	3.36	3.73
8SO□_1588	2.81	3.27	3.58
8SO□_1297	2.75	3.15	3.43

□SER NOTE :

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17□19 Lower Hatch Street
Dublin 2
Ireland

Project :
LEE CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT ST□D□

Map :
CORK CIT□

Map Type :	FLOOD EL□TENT		
Source :	TIDAL FLOODING		
Map area :	□RBAN AREA		
Scenario :	C□RRENT		
Figure □y :	Valeria Medina	Date :	10 March 2014
Checked □y :	Ricardo Santaella	Date :	10 March 2014
Approved □y :	Clare Dewar	Date :	10 March 2014

Figure No. : M9□□A□E□T□C□RS□003
Revision 2

Drawing Scale : 1:5,000 Plot Scale : 1:1 □ A3

NOTES:

1. ALL LEVELS ARE IN METRES, UNLESS OTHERWISE STATED.
2. ANY DISCREPANCIES FOUND SHOULD BE REPORTED TO FOCUS SURVEYS LTD. AND ANY OTHER RELEVANT PARTIES.
3. THE COORDINATE SYSTEM IS BASED ON THE IRISH TRANSVERSE MERCATOR GRID.
4. ALL LEVELS ARE RELATED TO AN ORDNANCE SURVEY MALIN HEAD DATUM TRANSFERRED TO SITE BY MEANS OF THE ORDNANCE SURVEY'S ACTIVE GPS NETWORK.
5. ALL LEVELS ARE RELATED TO A SITE TBM WHICH IS A SURVEY STUD SET IN THE PATH TO THE SOUTH-WEST CORNER OF THE SITE, ITS ELEVATION BEING 3.7m MALIN HEAD DATUM AS SHOWN ON THIS DRAWING.
6. IT IS ASSUMED THAT UNDERGROUND SERVICES RUN IN STRAIGHT LINES.
7. LEVELS IN RED ARE TOP OF WALL / OVERHEAD LEVELS

LEGEND:

- MH DENOTES MANHOLE
- CL DENOTES MANHOLE COVER LEVEL
- IL DENOTES MANHOLE INVERT LEVEL
- RG DENOTES ROAD GULLY
- IC DENOTES INSPECTION COVER
- LS DENOTES LAMP STANDARD
- FH DENOTES FIRE HYDRANT
- O/H DENOTES OVERHEAD
- DP DENOTES DOWNPIPE
- GT DENOTES GULLY TRAP
- PO DENOTES PIPE OUTLET

I. T. M.
NORTH

REVISION	REVISION DATE	DESCRIPTION OF REVISION

FOCUS

Focus Surveys Ltd., O'Connell Avenue, Turner's Cross, Cork.
Tel: 021-4314555 e-mail: info@focussurveys.ie

SOCIETY OF CHARTERED SURVEYORS IRELAND

RICS

TITLE

TOPOGRAPHICAL SITE SURVEY.

SURVEY LOCATION

BISHOP LUCEY PARK,
CORK.

CLIENT

CITY ARCHITECT'S DEPARTMENT,
CORK CITY COUNCIL, CITY HALL, CORK.

SCALE	1:200 @ A1
SURVEYED BY	B.C.
DATE	31-01-17
DRAWN BY	B.C.
DATE	02-02-17
CHECKED BY	E.B.

DRAWING NUMBER	REV.
17-004_1	

N

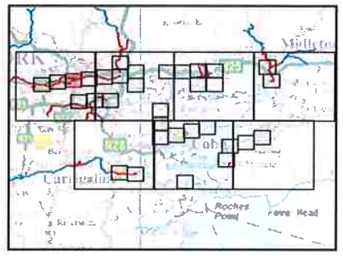
Fluvial flooding may also occur within the area shown on this map. Please refer to the fluvial flood extent map. Figure No. M8□□A□E□T□C□RS□011

Node Label	Water Level (mOD) per AEP		
	WL 10□	WL 0.5□	WL 0.1□
8LEE_2504	2.70	3.13	3.35
8LEE_2276	2.67	3.03	3.24
8LEE_2059	2.67	3.04	3.25
8LEE_1877	2.66	2.99	3.20
8LEE_1673	2.66	3.00	3.21
8LEE_1476	2.66	3.00	3.21
8LEE_1281	2.66	3.00	3.21
8SO□_1101	2.70	3.05	3.28
8SO□_825	2.67	3.01	3.21
8SO□_589	2.67	3.00	3.21
8SO□_349	2.67	3.00	3.21
8SO□_142	2.66	3.00	3.21
8SO□_0	2.66	3.00	3.21

8LEE_2504
8LEE_2276
8LEE_2059
8LEE_1877
8LEE_1673
8LEE_1281
8LEE_1476
8SO□_0
8SO□_142
8SO□_349
8SO□_589
8SO□_1101
8SO□_825

0.1 0.05 0 0.1 0.2 0.3 0.4 Kilometres

Location Plan :



E□EN□ M□□

Legend:

- 10□ AEP Flood Extent (1 in 10 chance in any given year)
- 0.5 □ AEP Flood Extent (1 in 200 chance in any given year)
- 0.1 □ AEP Flood Extent (1 in 1000 chance in any given year)
- Defended area
- High Confidence (□20m) (10□ AEP)
- Medium Confidence (□40m) (10□ AEP)
- Low Confidence (□40m) (10□ and 0.1□ AEP)
- High Confidence (□20m) (0.5□ AEP)
- Medium Confidence (□40m) (0.5□ AEP)
- Low Confidence (□40m) (0.5□ AEP)
- River Centreline
- Node Point
- 001 Node Label (refer to table)

□SER NOTE :

□SERS OF THESE MAPS SHO□LD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACC□RAC□ AND G□IDANCE AND CONDITIONS OF □SE PROVIDED AT THE FRONT OF THIS O ND VOL□ME. IF THIS MAP DOES NOT FORM PART OF A CO□ND VOL□ME, IT SHO□LD NOT □E □SED FOR AN□ P□RPOSE.

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Project :
LEE CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT ST□D□

Map :
CORK CIT□

Map Type :	FLOOD E□TENT		
Source :	TIDAL FLOODING		
Map area :	□R□AN AREA		
Scenario :	C□RRENT		
Figure □y :	Valeria Medina	Date :	10 March 2014
Checked □y :	Ricardo Santaella	Date :	10 March 2014
Approved □y :	Clare Dewar	Date :	10 March 2014

Figure No. : M9□□A□E□T□C□RS□004
Revision 2

Drawing Scale : 1:5,000 Plot Scale : 1:1 □ A3

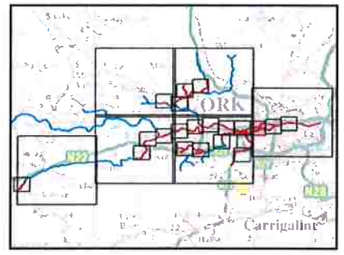
N

8LEE_3099
8LEE_2859
8LEE_3288
8LEE_3479
Bishop Lucy Park Site
8LEE_3912
8LEE_3719
8LEE_4104
8LEE_4291
8LEE_4491
8SO□_1807
8SO□_1588
8SO□_1977
8SO□_1297
8SO□_2253
8SO□_2516
8SO□_2705
8SO□_2871
8SO□_2997

Tidal flooding may also occur within the area shown on this map. Please refer to the tidal flood extent map. Figure No. M9 □A(E□T□C□RS□003

0,1 0,05 0 0,1 0,2 0,3 0,4 Kilometres

Location Plan :



E□□EN□ M□□

Legend:

- 10 □ AEP Flood Extent (1 in 10 chance in any given year)
- 1 □ AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 □ AEP Flood Extent (1 in 1000 chance in any given year)
- Defended area
- High Confidence (□20m) (10□ AEP)
- Medium Confidence (□40m) (10□ AEP)
- Low Confidence (□40m) (10□ and 0.1□ AEP)
- High Confidence (□20m) (1□ AEP)
- Medium Confidence (□40m) (1□ AEP)
- Low Confidence (□40m) (1□ AEP)
- River Centreline
- Node Point
- 8CWG_376 Node Label (refer to table)

Node Label	Water Level (mOD) per AEP		
	WL 10□	WL 1□	WL 0.1□
8LEE_4491	3.64	4.20	4.73
8LEE_4291	3.60	4.17	4.70
8LEE_4104	3.44	4.09	4.63
8LEE_3912	2.66	3.72	4.37
8LEE_3719	2.57	3.59	4.20
8LEE_3479	2.57	3.61	4.22
8LEE_3288	2.40	3.45	4.00
8LEE_3099	2.25	3.30	3.84
8LEE_2859	2.11	3.10	3.50
8SO□_2997	3.88	4.51	5.04
8SO□_2871	3.80	4.41	4.94
8SO□_2705	3.43	4.04	4.61
8SO□_2516	3.31	3.99	4.59
8SO□_2253	2.96	3.70	4.31
8SO□_1977	2.80	3.61	4.24
8SO□_1807	2.63	3.43	4.07
8SO□_1588	2.48	3.26	3.79
8SO□_1297	2.22	3.05	3.50

□SER NOTE :

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Project :
LEE CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT ST□D□

Map :
CORK CIT□

Map Type :	FLOOD E□TENT		
Source :	FL□VIAL FLOODING		
Map area :	□RBAN AREA		
Scenario :	C□RRENT		
Figure □y :	Valeria Medina	Date :	10 March 2014
Checked □y :	Ricardo Santaella	Date :	10 March 2014
Approved □y :	Clare Dewar	Date :	10 March 2014

Figure No. : M8□□A(E□T□C□RS□010
Revision 2

Drawing Scale : 1:5,000 Plot Scale : 1:1 □ A3

N

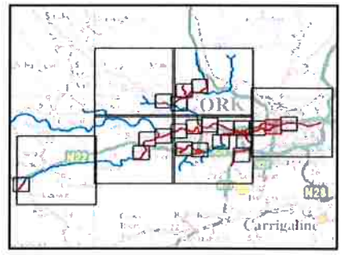
Node Label	Water Level (mOD) per AEP		
	WL 10□	WL 1□	WL 0.1□
8LEE_2705	2.11	3.10	3.49
8LEE_2504	2.05	2.96	3.33
8LEE_2276	1.95	2.80	3.13
8LEE_2059	1.97	2.81	3.15
8LEE_1877	1.93	2.74	3.07
8LEE_1673	1.94	2.75	3.07
8LEE_1476	1.94	2.75	3.07
8LEE_1281	1.94	2.75	3.07
8SO□_1101	2.05	2.87	3.22
8SO□_980	2.02	2.83	3.19
8SO□_825	1.96	2.77	3.10
8SO□_589	1.94	2.75	3.08
8SO□_349	1.94	2.75	3.08
8SO□_142	1.94	2.75	3.08
8SO□_0	1.94	2.75	3.07

8LEE_2705
8LEE_2504
8LEE_2276
8LEE_2059
8LEE_1877
8LEE_1673
8LEE_1476
8LEE_1281
8SO□_0
8SO□_142
8SO□_349
8SO□_589
8SO□_980
8SO□_1101
8SO□_825

Tidal flooding may also occur within the area shown on this map. Please refer to the tidal flood extent map. Figure No. M9□□A□E□T□C□RS□004

0.1 0.05 0 0.1 0.2 0.3 0.4 Kilometres

Location Plan :



E□□EN□ M□□

Legend:

- 10 □ AEP Flood Extent (1 in 10 chance in any given year)
- 1 □ AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 □ AEP Flood Extent (1 in 1000 chance in any given year)
- Defended area
- High Confidence (□20m) (10□ AEP)
- Medium Confidence (□40m) (10□ AEP)
- Low Confidence (□40m) (10□ and 0.1□ AEP)
- High Confidence (□20m) (1□ AEP)
- Medium Confidence (□40m) (1□ AEP)
- Low Confidence (□40m) (1□ AEP)
- River Centreline
- Node Point
- 8OWG_376 Node Label (refer to table)

□SER NOTE :

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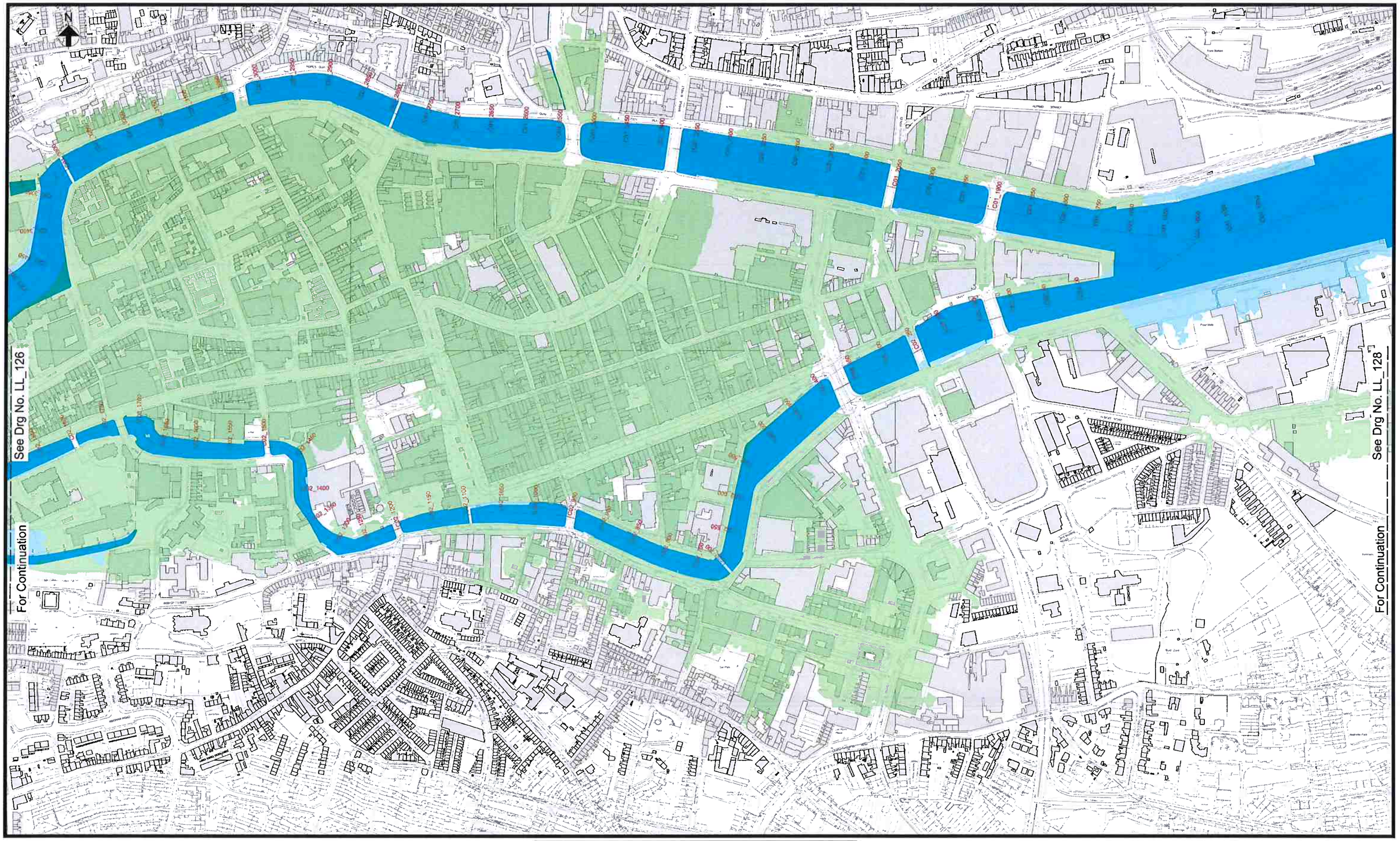
Project :
LEE CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT ST□D□

Map :
CORK CIT□

Map Type :	FLOOD E□TENT		
Source :	FL□VIAL FLOODING		
Map area :	□RD□AN AREA		
Scenario :	C□RRENT		
Figure □y :	Valeria Medina	Date :	10 March 2014
Checked □y :	Ricardo Santaella	Date :	10 March 2014
Approved □y :	Clare Dewar	Date :	10 March 2014

Figure No. : M8□□A□E□T□C□RS□011
Revision 2

Drawing Scale : 1:5,000 Plot Scale : 1:1 □ A3



Location Plan

0 25 50 100 Metres

Legend:
- 1% AEP Fluvial (River Lee) / 0.5% AEP Tidal Flood Extent (1 in 100 year fluvial / 1 in 200 year tidal flood extent)
- Benefitting Lands (Defended against River Lee events up to the 1% AEP Fluvial / 0.5% AEP Tidal)
- Watercourse
- Channel Centreline Reference (C01) and Chainage (1250)

Scale 1:2,500 at A1
Scale 1:5,000 at A3

Drg. No. LL_127 Flood Extents and Benefitting Areas (Sheet 8 of 9)

Notes:
1. Do not scale from drawing.
2. The channels on this drawing have been assigned colours for the purpose of assigning identification labels and interference references.
3. This drawing should be read in conjunction with all other Lower Lee (Cork City) Drainage Scheme Exhibition Drawings and Schedules.

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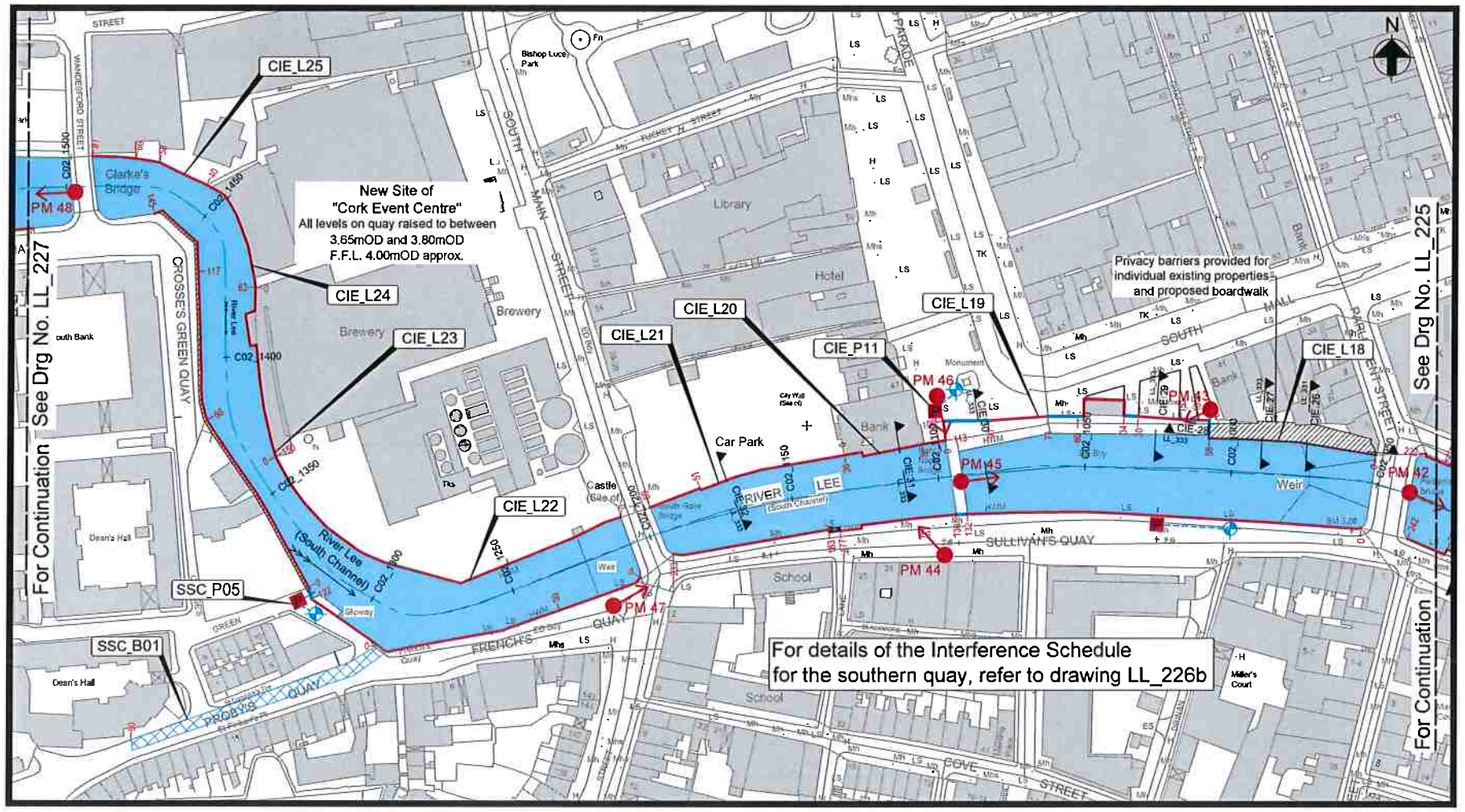


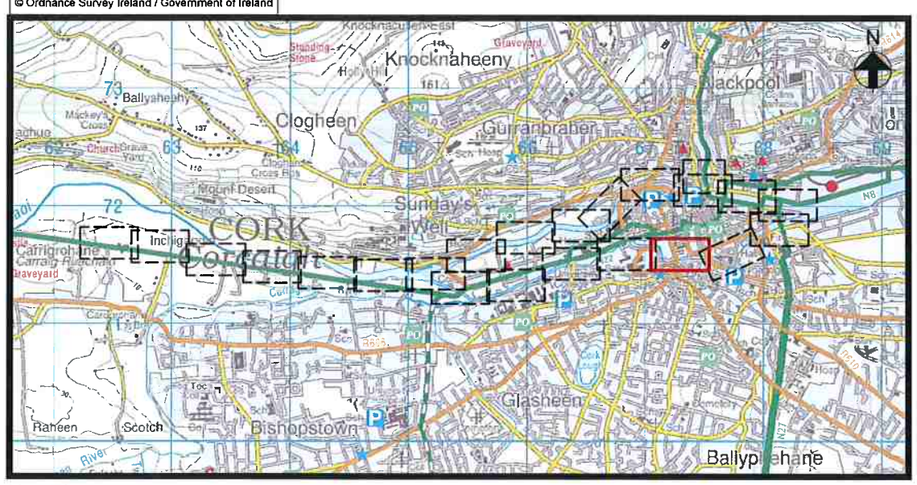
Location Plan

0 5 10 20 50 Metres

Scale 1:1,000 at A1
Scale 1:2,000 at A3

Notes:

1. Do not scale from drawing.
2. Proposed works geometry and extents are subject to detailed design.
3. This drawing should be read in conjunction with all other Lower Lee (Cork City) Drainage Scheme Exhibition Drawings and Schedules.



Key Plan

Scale 1:25,000 at A1
Scale 1:50,000 at A3

Key to Plan

- Watercourse
- C01_300 — Channel centreline, reference (C01) and chainage (300m)
- PM 01 — Photomontage (Location, Orientation and No.)
- CELL_B01 — Interference reference.
- CELL.1 / LL_301 — Location and reference of cross section
- 50 — Proposed works chainage (m)
- Flood defence wall
- Demountable flood defence (type varies)
- Existing surcharged culvert
- Land to be reclaimed
- Proposed pumping station (surface water)
- Proposed manhole (surface water)
- Proposed drain (surface water)
- Proposed rising main (surface water)

Interference Reference	Scheme Element Chainage (m) (DS-US)	Channel Chainage (m)	General Description of New Works
CIE_L18	0 to 58	C02_953 to C02_1010	Proposed sheet pile wall to be constructed in channel to 3.00mOD. Section of existing boardwalk to be removed to connect defence wall to quay. Pedestrian access ramp to be incorporated on dry side of sheet pile wall, connecting Grand Parade quay to Parliament Bridge. Steel plates to be fitted along wet side of ramp to flood defence level of 3.50mOD. Manhole access to be provided to maintain existing services along quay wall.
CIE_L19	0 to 6	C02_1010	Proposed 0.5m high flip up flood barrier to flood defence level of 3.50mOD.
CIE_L19	6 to 10	C02_1010 to C02_1020	Proposed reinforced concrete wall to flood defence level of 3.50mOD. Wall to incorporate seating along length, typically 0.5m above existing ground levels.
CIE_L19	10 to 15	C02_1020 to C02_1025	Proposed 0.5m high flip up flood barrier to flood defence level of 3.50mOD.
CIE_L19	15 to 30	C02_1025 to C02_1038	Proposed reinforced concrete wall to flood defence level of 3.50mOD. Wall to incorporate seating along length, typically 0.5m above existing ground levels.
CIE_L19	30 to 34	C02_1038 to C02_1042	Proposed 0.6m high flip up flood barrier to flood defence level of 3.50mOD.
CIE_L19	34 to 60	C02_1042 to C02_1055	Proposed reinforced concrete wall to flood defence level of 3.50mOD. Wall to incorporate seating along length, typically 0.5m above existing ground levels.
CIE_L19	60 to 71	C02_1055 to C02_1065	Proposed 0.6m high flip up flood barrier to flood defence level of 3.50mOD.
CIE_L19	71 to 91	C02_1065 to C02_1085	Proposed reinforced concrete wall to flood defence level of 3.50mOD. Wall to incorporate seating along length, typically 0.5m above existing ground levels.
CIE_L19	91 to 106	C02_1085 to C02_1098	Proposed 0.5m high flip up flood barrier to flood defence level of 3.50mOD.
CIE_L19	106 to 113	C02_1098	Proposed reinforced concrete wall to flood defence level of 3.50mOD. Wall to incorporate seating along length, typically 0.5m above existing ground levels.
CIE_P11	-	C02_1100	Proposed surface water pumping station and rising main to operate during a flood event. All outlets to be fitted with non-return valves.
CIE_L20	0 to 8	C02_1098 to C02_1106	Proposed local raising of stone wall to flood defence level of 3.50mOD, typically 0.5m above existing levels and waterproofing of existing wall.
CIE_L20	8 to 36	C02_1106 to C02_1134	Proposed raising of four window sills to flood defence level of 3.50mOD, typically 0.15m above existing levels and waterproofing of existing wall.
CIE_L21	0 to 51	C02_1134 to C02_1175	Proposed 0.2m concrete kerb along quay to raise existing ground levels to flood defence level of 3.50mOD. Kerb is to tie into existing masonry wall with guard railing fitted to 1.2m above existing ground levels. The existing quay wall and foundation zones are to be grouted. The soil backing zone is to be grouted. The face of the existing wall is to be cleaned and repointed and the stonework repaired where necessary.
CIE_L21	51 to 69	C02_1175 to C02_1198	Existing masonry wall to be inspected for stability. The existing quay wall and foundation zones are to be grouted. The existing soil backing zone is to be grouted. The face of the existing wall is to be cleaned and repointed and the stonework repaired where necessary.
CIE_L22	0 to 150	C02_1210 to C02_1360	Proposed sheet pile wall to flood defence level of 3.50mOD should proposed Cork Events Centre project not go ahead.
CIE_L23	0 to 63	C02_1360 to C02_1418	Proposed sheet pile wall to flood defence level of 3.50mOD should proposed Cork Events Centre project not go ahead.
CIE_L24	0 to 40	C02_1418 to C02_1457	Proposed sheet pile wall to flood defence level of 3.50mOD should proposed Cork Events Centre project not go ahead.
CIE_L25	40 to 58	C02_1457 to C02_1468	Proposed reinforced concrete flood defence parapet to flood defence level of 3.50mOD, typically 1.2m above existing ground levels. The existing quay wall and foundation zones are to be grouted. Possible additional strengthening works may include the incorporation of micro-piles. A new mass concrete backing wall is to be provided. The face of the existing wall is to be cleaned and repointed and the stonework repaired where necessary.
CIE_L25	58 to 66	C02_1468 to C02_1476	The existing quay wall and foundation zones are to be grouted. Possible additional strengthening works may include the incorporation of micro piles. A new mass concrete backing wall is to be provided. The face of the existing wall is to be cleaned and repointed and the stonework repaired where necessary.
CIE_L25	66 to 81	C02_1476 to C02_1496	Local raising of flood defence line along balcony's to flood defence level of 3.50mOD, typically 0.1m above existing ground levels. The existing quay wall and foundation zones are to be grouted. Possible additional strengthening works may include the incorporation of micro-piles. A new mass concrete backing wall is to be provided. The face of the existing wall is to be cleaned and repointed and the stonework repaired where necessary.

Drg. No. LL_226a Proposed Flood Defences Plan Layout (Sheet 27 of 30)

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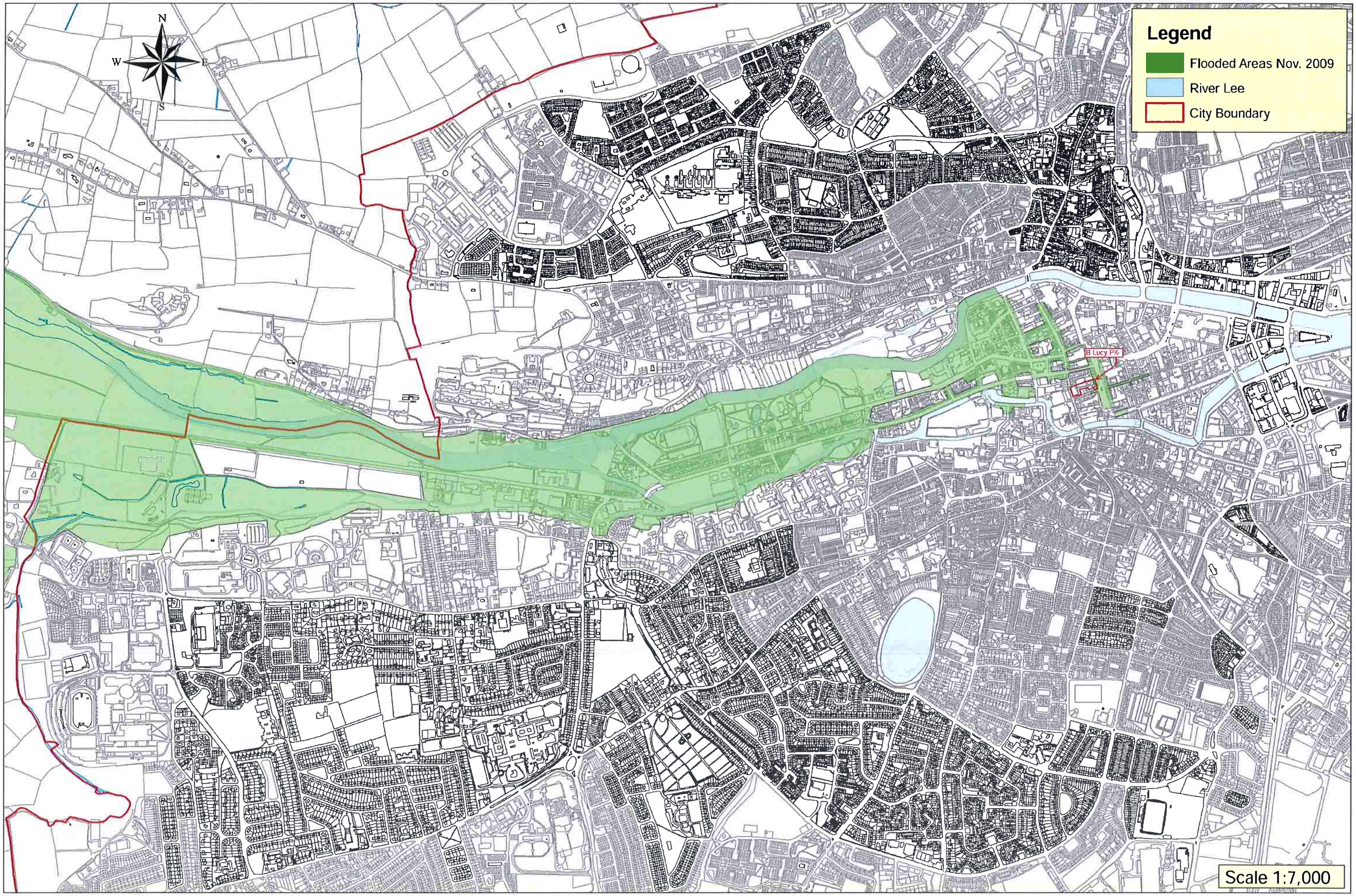
Flood Extent in Cork City 20th November 2009

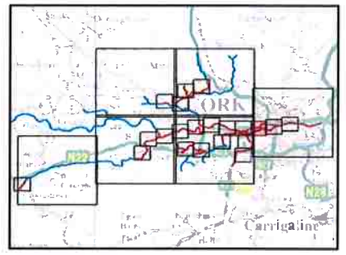


N

Tidal flooding may also occur within the area shown on this map. Please refer to the tidal depth map. Figure No. M9□□A□DEP□1000□003

0.1 0.05 0 0.1 0.2 0.3 0.4 Kilometres

Location Plan :



DE□□□ M□□ □□□ □E□

Legend Depth Grid:

- 0 □0.25 m
- 0.25 □0.50 m
- 0.50 □1.00 m
- 1.00 □1.50 m
- 1.50 □2.00 m
- □2.00 m
- River Centreline

USER NOTE :

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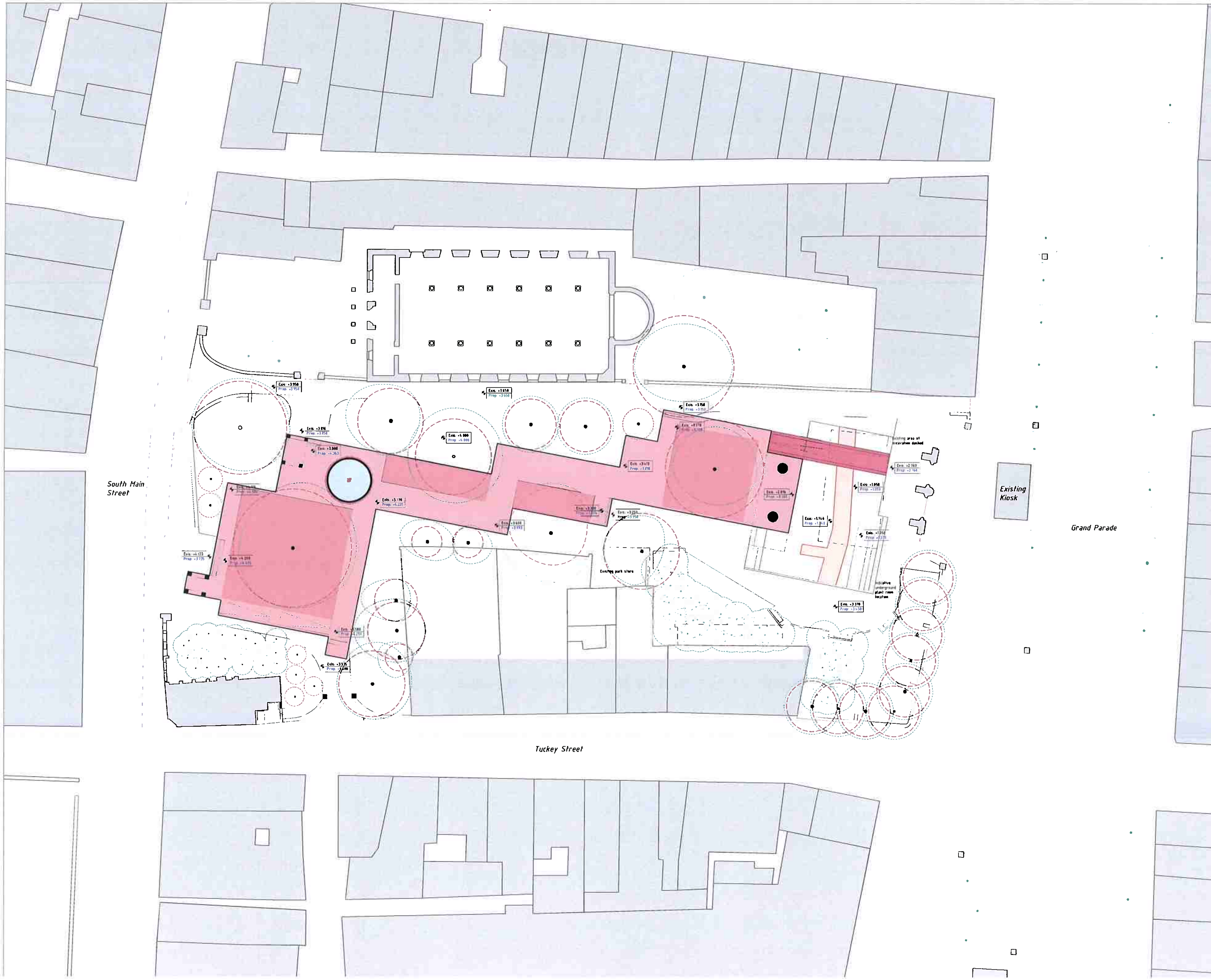
Project :
LEE CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map :
CORK CITY

Map Type :	DEPTH	
Return Period :	0.1% AEP EVENT	
Source :	FLUVIAL FLOODING	
Map area :	URBAN AREA	
Scenario :	CURRENT	
Figure by :	Valeria Medina	Date : 10 March 2014
Checked by :	Ricardo Santaella	Date : 10 March 2014
Approved by :	Clare Dewar	Date : 10 March 2014

Figure No. : M8□□A□DEP□1000□010 | Revision 2

Drawing Scale : 1:5,000 | Plot Scale : 1:1 □ A3



NOTES

All existing level annotations relate to Topographical Site Survey, drawing '2006_01_00_103 Existing Site Survey'.

Do not scale from this drawing. Use figured dimensions only. Figured dimensions are in millimetres. All dimensions and levels shall be verified on site on site before proceeding with works. Areas and levels shown are indicative only to be verified through further design development. Detailed site survey to be carried out to verify positions and level relationships with site features and ordnance survey. Boundaries and existing elevations are indicative only and are to be verified by others. This drawing is to be read in conjunction with other documentation from the architect and design team. The architect must be notified of any discrepancies.

Context drawings are drawn for illustration purposes only and should not be measured/scaled from.

DRAFT

PROJECT

Bishop Lucey Park, Cork

CLIENT

Cork City Council

REV	ISSUE-REVISION	DATE	P
PP01	Pre Planning Design Coordination	25.01.21	TC
PP02	Pre Planning Design Coordination	24.01.21	TC
PP03	Pre Part 8 Draft Issue	02.21	TC
PP0?	Pre Part 8 Draft Issue Updated	03.05.21	TC
PP0?	Pre Part 8 Design Coordination	14.05.21	TC

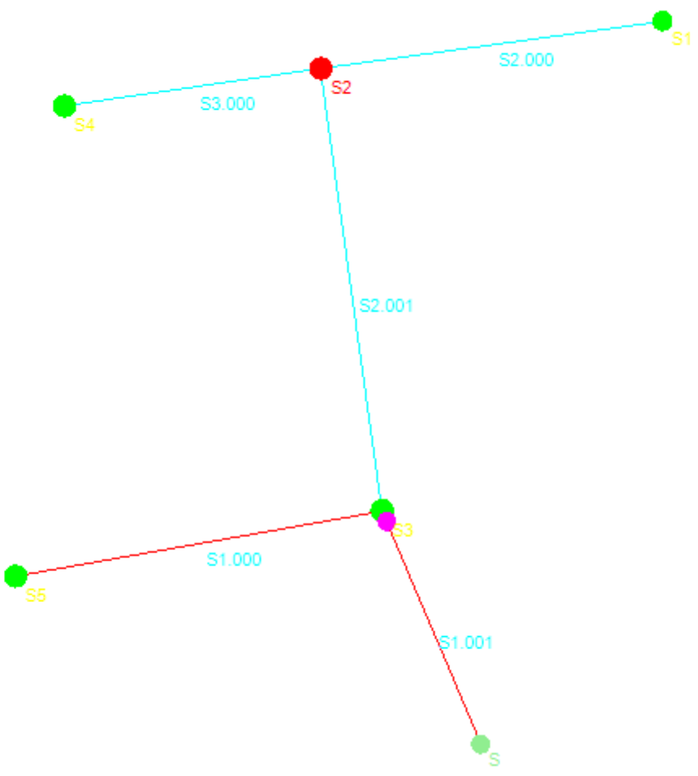
HALL McKNIGHT

UNIT 102
THE LEATHERMARKET
WESTON STREET
LONDON SE1 3ER

DRAWING No. FP05

Appendix C -

Storm Drainage Calculations



Existing Network Details for Storm

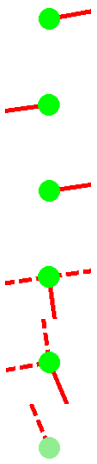
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.000	19.005	0.184	103.3	0.004	5.00	0.600	o	150	Pipe/Conduit
S2.000	17.594	0.200	88.0	0.009	5.00	0.600	o	150	Pipe/Conduit
S3.000	13.227	0.124	106.7	0.006	5.00	0.600	o	150	Pipe/Conduit
S2.001	22.723	0.254	89.5	0.016	0.00	0.600	o	150	Pipe/Conduit
S1.001	12.918	0.117	110.4	0.000	0.00	0.600	o	150	Pipe/Conduit

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
S1.000	5	4.450	2.330	1.970	4.250	2.146	1.954		1200
S2.000	1	3.950	2.600	1.200	4.350	2.400	1.800		1050
S3.000	4	4.350	2.600	1.600	4.350	2.476	1.724		1200
S2.001	2	4.350	2.400	1.800	4.250	2.146	1.954		1200
S1.001	3	4.250	2.146	1.954	3.550	2.029	1.371	Hydro-Brake®	1200

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S5	4.450	2.120	Open Manhole	1200	S1.000	2.330	150				
S1	3.950	1.350	Open Manhole	1050	S2.000	2.600	150				
S4	4.350	1.750	Open Manhole	1200	S3.000	2.600	150				
S2	4.350	1.950	Open Manhole	1200	S2.001	2.400	150	S2.000	2.400	150	
								S3.000	2.476	150	76
S3	4.250	2.104	Open Manhole	1200	S1.001	2.146	150	S1.000	2.146	150	
								S2.001	2.146	150	
S	3.550	1.521	Open Manhole	0		OUTFALL		S1.001	2.029	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S5	597.509	608.232	597.509	608.232	Required	
S1	630.516	636.494	630.516	636.494	Required	
S4	600.001	632.169	600.001	632.169	Required	
S2	613.088	634.081	613.088	634.081	Required	
S3	616.218	611.575	616.218	611.575	Required	
S	621.236	599.671			No Entry	



Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	10.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	18.800	Cv (Summer)	0.750
Return Period (years)	100	Ratio R	0.250	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S3, DS/PN: S1.001, Volume (m³): 3.1

Unit Reference	MD-SHE-0060-2000-1600-2000	Sump Available	Yes
Design Head (m)	1.600	Diameter (mm)	60
Design Flow (l/s)	2.0	Invert Level (m)	2.146
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	75
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	2.0	Kick-Flo®	0.536	1.2
Flush-Flo™	0.263	1.5	Mean Flow over Head Range	-	1.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.3	0.600	1.3	1.600	2.0	2.600	2.5	5.000	3.4	7.500	4.1
0.200	1.5	0.800	1.5	1.800	2.1	3.000	2.7	5.500	3.5	8.000	4.2
0.300	1.5	1.000	1.6	2.000	2.2	3.500	2.9	6.000	3.7	8.500	4.3
0.400	1.5	1.200	1.8	2.200	2.3	4.000	3.0	6.500	3.8	9.000	4.4
0.500	1.3	1.400	1.9	2.400	2.4	4.500	3.2	7.000	4.0	9.500	4.6

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 10.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.800 Cv (Summer) 0.750
Region Scotland and Ireland Ratio R 0.250 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 100.0 DVD Status ON
Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 100
Climate Change (%) 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S1.000	S5	60 Winter	100	+10%	100/15 Summer				3.535	1.055	0.000	0.02		0.4
S2.000	S1	60 Winter	100	+10%	100/15 Summer				3.545	0.795	0.000	0.09		1.6
S3.000	S4	60 Winter	100	+10%	100/15 Summer				3.544	0.794	0.000	0.07		1.1
S2.001	S2	60 Winter	100	+10%	100/15 Summer				3.543	0.993	0.000	0.21		3.7
S1.001	S3	60 Winter	100	+10%	100/15 Summer				3.534	1.238	0.000	0.12		1.9

PN	US/MH Name	Status	Level Exceeded
S1.000	S5	SURCHARGED	
S2.000	S1	SURCHARGED	
S3.000	S4	SURCHARGED	
S2.001	S2	SURCHARGED	
S1.001	S3	SURCHARGED	

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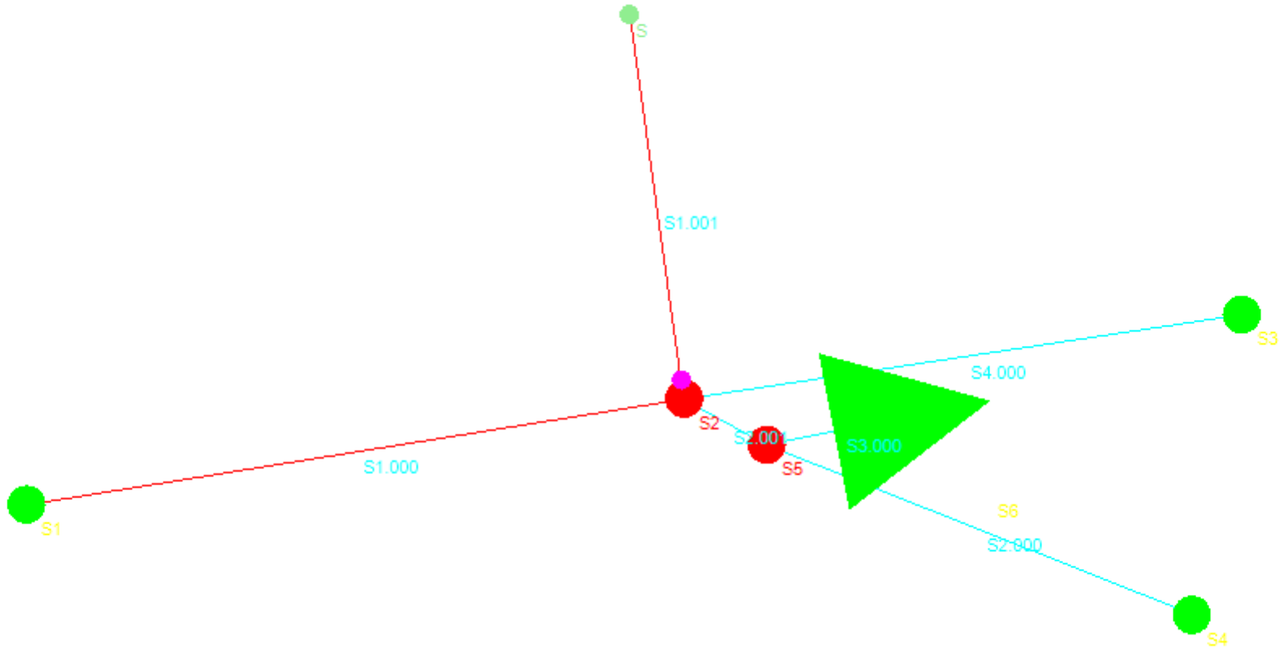


Existing Network Details for Storm

* - Indicates pipe has been modified outside of System 1

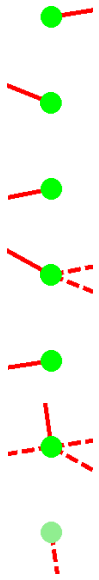
	PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
*	S1.000	20.915	0.209	100.1	0.022	5.00	0.600	o	150	Pipe/Conduit
*	S2.000	14.368	0.144	99.8	0.000	5.00	0.600	o	225	Pipe/Conduit
*	S3.000	4.648	0.044	105.6	0.000	5.00	0.600	o	150	Pipe/Conduit
*	S2.001	2.968	0.065	45.7	0.000	0.00	0.600	o	225	Pipe/Conduit
*	S4.000	17.700	0.259	68.3	0.015	5.00	0.600	o	225	Pipe/Conduit
*	S1.001	12.158	0.122	99.7	0.007	0.00	0.600	o	150	Pipe/Conduit

	PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
*	S1.000	1	4.000	2.600	1.250	3.800	2.391	1.259		1200
*	S2.000	4	3.200	2.600	0.375	3.750	2.456	1.069		1200
*	S3.000	6	3.650	2.500	1.000	3.750	2.456	1.144		1200
*	S2.001	5	3.750	2.456	1.069	3.800	2.391	1.184		1200
*	S4.000	3	3.500	2.650	0.625	3.800	2.391	1.184		1200
*	S1.001	2	3.800	2.391	1.259	3.000	2.269	0.581	Hydro-Brake®	1200

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	4.000	1.400	Open Manhole	1200	S1.000	2.600	150				
S4	3.200	0.600	Open Manhole	1200	S2.000	2.600	225				
S6	3.650	1.150	Open Manhole	1200	S3.000	2.500	150				
S5	3.750	1.294	Open Manhole	1200	S2.001	2.456	225	S2.000	2.456	225	
								S3.000	2.456	150	
S3	3.500	0.850	Open Manhole	1200	S4.000	2.650	225				
S2	3.800	1.409	Open Manhole	1200	S1.001	2.391	150	S1.000	2.391	150	
								S2.001	2.391	225	
								S4.000	2.391	225	
S	3.000	0.731	Open Manhole	0		OUTFALL		S1.001	2.269	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	630.510	641.096	630.510	641.096	Required	
S4	667.099	637.637	667.099	637.637	Required	
S6	658.316	643.859	658.316	643.859	Required	
S5	653.755	642.963	653.755	642.963	Required	
S3	668.664	647.040	668.664	647.040	Required	
S2	651.161	644.405	651.161	644.405	Required	
S	649.440	656.440			No Entry	



Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	10.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	18.800	Cv (Summer)	0.750
Return Period (years)	100	Ratio R	0.250	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S2, DS/PN: S1.001, Volume (m³): 2.7

Unit Reference	MD-SHE-0062-2000-1400-2000	Sump Available	Yes
Design Head (m)	1.400	Diameter (mm)	62
Design Flow (l/s)	2.0	Invert Level (m)	2.391
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	75
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	2.0	Kick-Flo®	0.553	1.3
Flush-Flo™	0.272	1.6	Mean Flow over Head Range	-	1.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.4	0.600	1.4	1.600	2.1	2.600	2.7	5.000	3.6	7.500	4.4
0.200	1.6	0.800	1.6	1.800	2.2	3.000	2.8	5.500	3.8	8.000	4.5
0.300	1.6	1.000	1.7	2.000	2.4	3.500	3.0	6.000	3.9	8.500	4.6
0.400	1.6	1.200	1.9	2.200	2.5	4.000	3.2	6.500	4.1	9.000	4.7
0.500	1.5	1.400	2.0	2.400	2.6	4.500	3.4	7.000	4.2	9.500	4.9

Storage Structures for Storm

Tank or Pond Manhole: S6, DS/PN: S3.000

Invert Level (m) 2.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	20.0	1.000	20.0

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Manhole Headloss Coeff (Global)	0.500	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Foul Sewage per hectare (l/s)	0.000	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Additional Flow - % of Total Flow	10.000	Flow per Person per Day (l/per/day)	0.000

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	18.800
Region	Scotland and Ireland	Ratio R	0.250
Cv (Summer)	0.750		
Cv (Winter)	0.840		

Margin for Flood Risk Warning (mm)	100.0	DVD Status	ON
Analysis Timestep	2.5 Second Increment (Extended)	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
S1.000	S1	120 Winter	100	+10%	100/15 Summer				2.866	0.116	0.000	0.21		3.5
S2.000	S4	120 Winter	100	+10%	100/60 Winter				2.862	0.037	0.000	0.00		0.1
S3.000	S6	120 Winter	100	+10%	100/15 Summer				2.861	0.211	0.000	0.09		1.2
S2.001	S5	120 Winter	100	+10%	100/15 Summer				2.862	0.181	0.000	0.04		1.3
S4.000	S3	120 Winter	100	+10%					2.864	-0.011	0.000	0.04		2.4
S1.001	S2	120 Winter	100	+10%	100/15 Summer				2.862	0.321	0.000	0.10		1.6

PN	US/MH Name	Status	Level Exceeded
S1.000	S1	SURCHARGED	
S2.000	S4	SURCHARGED	
S3.000	S6	SURCHARGED	
S2.001	S5	SURCHARGED	
S4.000	S3	OK	
S1.001	S2	SURCHARGED	