

Cork 2030. Role Play Scenario for a City under water.

Introduction

Recently modelled climate change scenarios place Cork in the top rank of European cities most vulnerable to flooding in the context of increasing precipitation and rising sea levels (Guerreiro *et al.*, 2018).

“A flood of a given severity that might typically be expected to occur only once every hundred years would have a one percent (or 1 in a 100) chance of happening in any given year, and would be the 1% AEP flood event. Such an event is sometimes also referred to as the “hundred-year” flood”¹.

Two floods in 2024 and 2027 exceeded the severity of the “100 year flood”. While it is accepted that the occurrence of flood events is random, and that two 1% AEP events could occur within the space of just a few years, statistically this is extremely improbable.

Costs of flood damage in Cork for the period 2020-2030 are now estimated at over 2.9 billion euro. GDP in the City and its hinterland has fallen below that of New Orleans triggering large-scale migration of Cork people to the eastern seaboard.

Following from this the Irish government has finally accepted that a major infrastructure project is now required to address the refugee crisis in Dublin generated by extreme flooding in Cork and other south coast ports.

Causes of Flooding

“Flooding of coastal hinterlands is generally caused by three phenomena: high astronomical tides, storm surges, high river flows or a combination of thereof. While astronomic tides are easily predicted deterministic component of water elevations, storm surges and river flows are of stochastic nature and usually difficult to forecast. Very often both surges and river flows are driven by one process such as storm. Ireland due to its geographical position and direct proximity to the North East Atlantic is exposed to atmospheric and oceanic conditions present in the ocean and therefore, is at increased risk of coastal flooding.”(Olbert *et al* 2015)

See **Figure 1** for extent of AEP flood in Cork.

Solutions

“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, including 900 homes and 1,200 businesses, against tidal and river flooding”².

However, critics charge that the Flood Relief Scheme will destroy the appearance of the city by hiding its most beautiful features and amenities behind ugly concrete walls that will undoubtedly collect the worst kind of graffiti.

¹ <https://www.opw.ie/en/flood-risk-management/floodriskpolicyfunctions/floodrisk/>

² <https://www.lowerleefrs.ie/>

Stepping into this breach, Save Cork City³, proposes an ambitious alternative solution which they say will save the city from flooding while preserving its amenities and heritage by preventing the catastrophic combination of storms, tides and heavy rainfall. The tidal barrage proposed by Save Cork City would be located downstream of the city in the estuary or harbour and cost an estimated €140⁴.

Three sites are currently under consideration as locations for the barrage as shown in Figure 2. The most ambitious is at Roches Point which Duncan Stewart, ecowarrior and Bono's neighbor in the exclusive Dublin suburb of Dalkey believes is the best solution, as locations further up the estuary gradient would not protect all areas⁵. The quay wall option presented by the OPW and Cork City Council he dismisses as "very short term". See **Figure 2** for candidate tidal barrage sites and **Figure 3** for what such a barrage might look like.

Requests for Proposals

As part of the environmental impact assessment (EIA) of a tidal barrage in Cork Harbour stakeholders have requested a Research Vessel (RV) survey of the harbour. Therefore, Save Cork City has launched a Request for Proposals (RFP) for the supply RV data to a tidal barrage Environmental Impact Statement (EIS).

Responses to the RFP should include:

- A coherent plan detailing the lead in, timing and reporting schedule for the survey;
- The data sets to be collected by the survey;
- Rationale for each data set in the context of likely impacts on the ecology, commerce, and amenities of the harbour and estuary
- Advise on which of the proposed locations offers the best protection taking into account impacts on stakeholders and ecology
- Advise on mitigation of impacts;
- Inform the public of other advantages that a barrage might deliver;
- Costings for the survey and survey deliverables.

Responding to the Proposal (Role Play)

Divide into two teams to role-play competing environmental consultancies responding to the RFP. We suggest each team should include:

1. Consultancy CEO
2. Survey Chief Scientist
3. Hydrographer and Geophysicist
4. Oceanographer
5. Benthic Ecologist
6. Marine Biologist

³ <http://savecorkcity.org/>

⁴ <http://savecorkcity.org/docs/Potential-Cork-Save-Cork-City-Solution.pdf>

⁵ <https://www.echolive.ie/corknews/Duncan-Stewart-Put-flood-barrier-at-Roches-Point-091ce144-ad47-4272-8297-6396b244a514-ds>

In these roles, each team member will present their contribution to the execution of the planned survey taking into account as appropriate the following considerations:

- a) Where the survey is to take place
- b) The timeframe of the survey
- c) The lead in period and activities for the survey
- d) The reporting schedule of the survey
- e) How much the survey in its entirety will cost
- f) The data sets and products produced in each role
- g) The equipment and instrumentation needed for each role
- h) How the data can be used to characterises the physical, chemical and biological properties of survey area
- i) Identify impacts and suggest mitigating measures
- j) Prioritise stakeholders and make suggestions for consulting with them

Appendix 1 presents a list of major stakeholders in Cork.

Proposal Costing Guidance

The daily charter rate for the Celtic Voyager II in 2030 is €28,000, which includes all onboard equipment, instrumentation, software systems and accommodation. Other costs to consider include but are by no means restricted to salaries, subcontractors, company overheads, data and sample analysis, consumables, and travel and subsistence. Remember that underestimating costs is a primary cause of corporate insolvency, which can drive your company out of business and damage your professional reputation.

Presentations

Presentations should be no longer than fifteen minutes for each team. Instructors will role play an expert panel convened to evaluate the presentations.

Advice for Teams

- Use your imagination to explore what a 100 year flood would be like in different climate change scenarios.
- Appoint people to the different roles before you leave the vessel on day 1.
- Use the evening of the first day to discuss the scenario and your response to it.
- Finalise your plans on the morning of the second day as we transit from the Port of Cork to Cork Harbour.
- Most importantly, get together to discuss the scenario and thrash it out.
- There are no right, wrong or ridiculous responses!
- Work as a team and have fun!

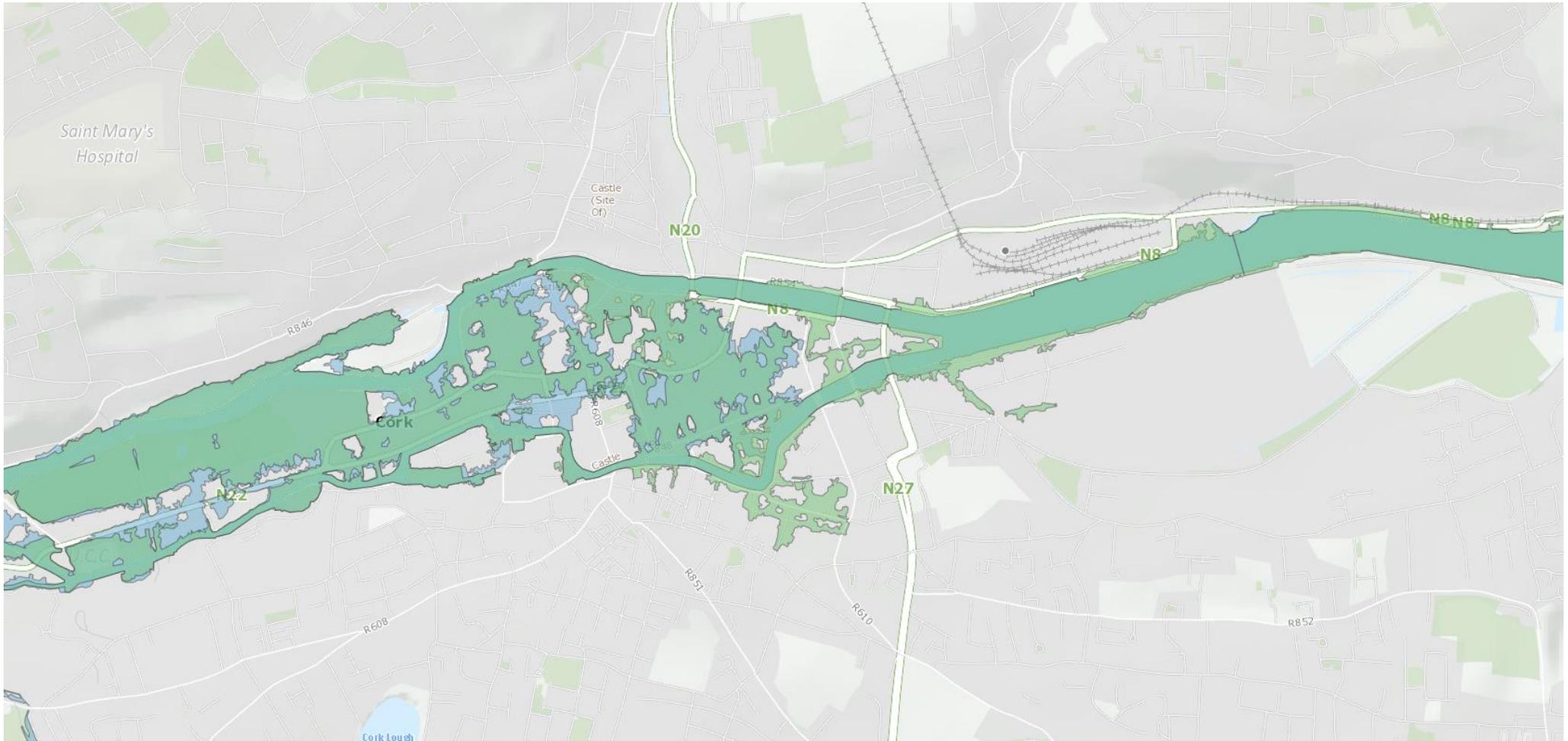


Figure 1. AEP flood of Cork City (Image credit: Office of Public Works)

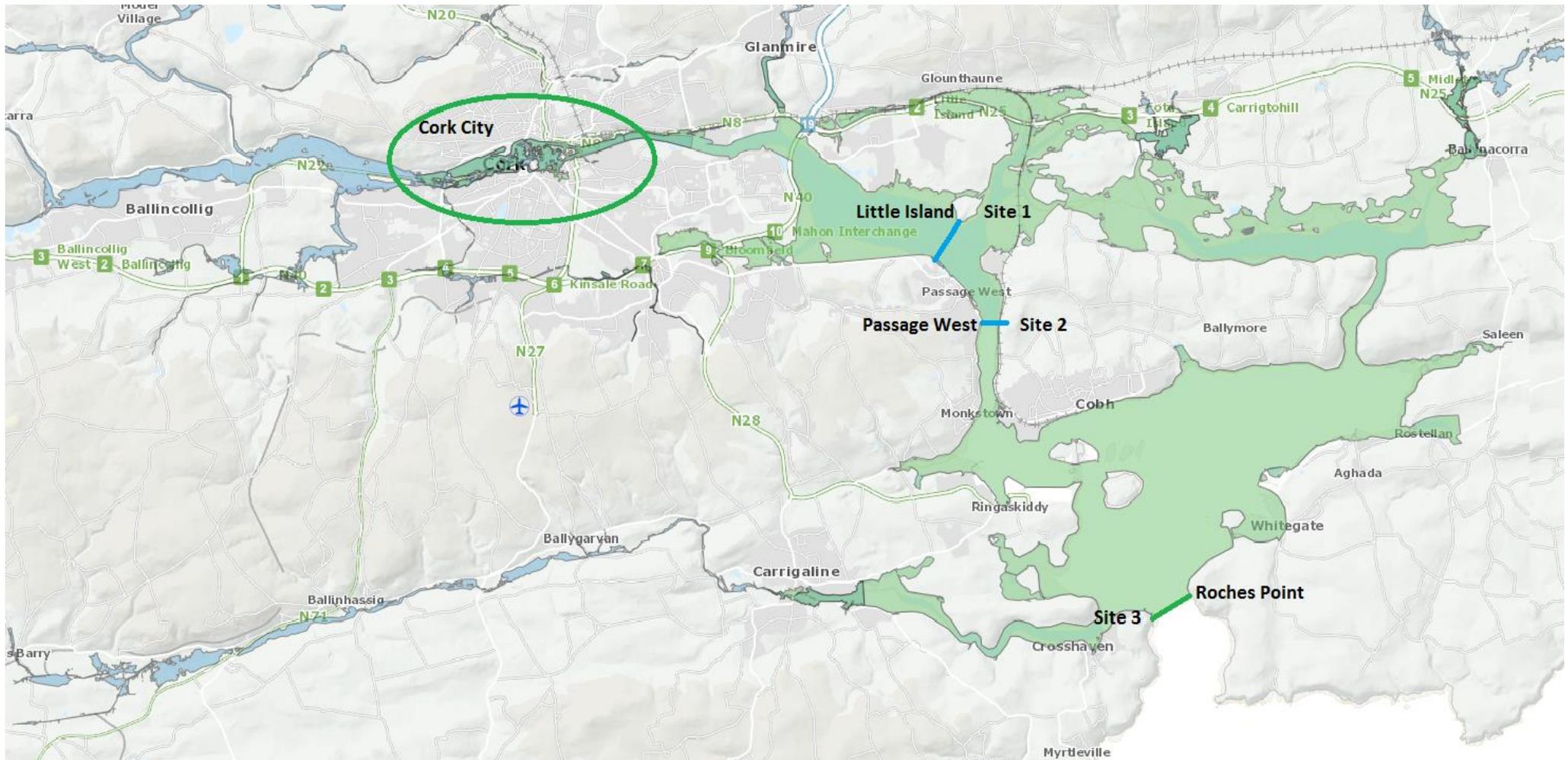


Figure 2. Proposed sites for Flood Barrage on OPW map of Cork city and harbour.



Figure 3. Simulated aerial views of tidal barrages in two locations in Cork Harbour

Appendix 1. List of Stakeholders

Cork City Harbour Stakeholders
Port of Cork
Ringaskiddy Port Redevelopment
Cork Chamber of Commerce
National Parks and Wildlife Service
Environmental Protection Agency
National Marine Planning Framework
Office of Public Works (OPW)
Sustainable Energy Authority for Ireland (SEAI)
Irish Naval Service
An Taisce
Save Cork City
MAREI
South Western River Basin District (SWRBD)
Cork City Council
Cork County Council
Cork Environment Forum
Cork Harbour Alliance for a Safe Environment
Department of Agriculture, Food and the Marine
IDA BIO-PHARMACEUTICAL INDUSTRY IRELAND
Inland Fisheries Ireland
Irish Sailing
Irish Fish Producers Organisation
Irish Wildlife Trust
Royal Cork Yacht Club

References

Guerreiro, S. B. *et al.* (2018) 'Future heat-waves, droughts and floods in 571 European cities', *Environmental Research Letters*. IOP Publishing, 13(3), p. 034009. doi: 10.1088/1748-9326/aaaad3.

Olbert AI, Comer J, Nash S, H. M. (2015) *Mechanisms of flooding in Cork City, Proceedings of the 2015 National Hydrology Conference, Athlone, 17th November 2015*. doi: <http://dx.doi.org/10.13025/S8BC71>.