

DÁIL ÉIREANN

AN COMHCHOISTE UM CHULTÚR, OIDHREACTH AGUS GAELTACHT

JOINT COMMITTEE ON CULTURE, HERITAGE AND THE GAELTACHT

Dé Céadaoin, 18 Deireadh Fómhair 2017

Wednesday, 18 October 2017

The Joint Committee met at 1.30 p.m.

MEMBERS PRESENT:

Deputy Seán Canney,	Senator Maura Hopkins,
Deputy Michael Collins,	Senator Marie-Louise O'Donnell.
Deputy Danny Healy-Rae,	
Deputy Martin Heydon,	
Deputy Éamon Ó Cuív,	
Deputy Niamh Smyth.	

In attendance: Deputies Aindrias Moynihan and Donnchadh Ó Laoghaire..

DEPUTY PEADAR TÓIBÍN IN THE CHAIR.

Lower Lee (Cork City) Flood Relief Scheme: Discussion

Chairman: Comhairlím ar chomhaltaí a ngutháin póca a mhúchadh ionas nach gcuirfidh siad isteach ar chóras fuaimne agus craolacháin na cruinnithe. I advise members to turn off their mobile telephones as they interfere with the sound system.

Senator Marie-Louise O'Donnell: And the thought process.

Chairman: And the thought process. We are going to discuss today the Lower Lee (Cork city) flood relief scheme. Inniu déanfaimid plé ar scéim maolú tuile an Laoi íochtarach Chathair Corcaigh. I welcome all our guests and witnesses here to the meeting and thank them for travelling from Cork in the circumstances. We appreciate it and look forward to their statements. In attendance from the Save Cork City group are Mr. John Hegarty and Ms Catherine Kirwan. From the Office of Public Works are Mr. John Sydenham, commissioner, and Mr. Ezra MacManamon. Also present is Mr. Ken Leahy from Arup, consulting engineers.

Before I ask the witnesses to address the committee, I wish to draw their attention to the fact that, by virtue of section 17(2)(l) of the Defamation Act 2009, witnesses are protected by absolute privilege in respect of their evidence to the committee. However, if they are directed by the committee to cease giving evidence in respect of a particular matter and they continue to do so, they are entitled thereafter only to qualified privilege in respect of their evidence. They are directed that only evidence connected with the subject matter of these proceedings is to be given and they are asked to respect the parliamentary practice to the effect that, where possible, they should not criticise or make charges against any person or entity by name or in such a way as to make him, her or it identifiable. The opening statements and any other documents the witnesses have submitted to the committee may be published on the committee website after this meeting. Members are reminded of the long-standing parliamentary practice to the effect that they should not comment on, criticise or make charges against persons outside the Houses or an official either by name or in such a way as to make him or her identifiable.

Leanfaimid ar aghaidh ar dtús le Mr. John Hegarty agus Ms Catherine Kirwan.

Deputy Seán Canney: Before we start, can I seek clarification on the purpose of today's meeting? I believe the appropriate setting for dealing with this issue is the local authority in Cork. How come our committee is dealing with this today?

Chairman: Obviously, this is a committee dealing with culture, heritage and Gaeltacht affairs. One of the issues concerning the project is that it will have a significant impact on the heritage of Cork city. In other words, much of the existing riverside infrastructure is of major note culturally and in terms of heritage. It dates back many centuries in some cases. The proposed project is seeking to alter the structures or replace them with newer ones. As a result, there is fear that much of the heritage will be lost. The project has wider connotations in that there will be an impact on flooding in Cork city, as implied by the Deputy. We will find from the testimony from both sides that the protection against the flooding is of key interest to all participants in this debate. When an issue of heritage arises in the country, it would be wrong for the committee that deals with it to close its eyes to it.

Deputy Danny Healy-Rae: Why is there no elected member from Cork local authority in the delegation today? It seems to me that they would have an overriding say on behalf of all the people they represent. They are not involved today and we cannot hear what they have to say.

Chairman: If the Deputy would like Cork local authority members to attend, I would be very happy to take the suggestion.

Deputy Danny Healy-Rae: Obviously, they will not be here this evening before-----

Chairman: We can timetable them in for another meeting if the Deputy feels so strongly about it.

Deputy Danny Healy-Rae: How were today's delegates chosen?

Chairman: What happens is that members of the committee are asked - I make a request regularly - to suggest topics for debate and submit them to me and the clerk for the purpose of filling up the schedule for future meetings. We have not had any suggestions from the Deputy for a while on who should be appearing before the committee to discuss issues. I made a suggestion-----

Deputy Danny Healy-Rae: It was the Chairman who made the suggestion.

Chairman: Every Member is asked on a regular basis. It is the responsibility of all members of the committee to suggest organisations whose representatives should appear before us on issues within the remit of the committee. We have delegates from Cork present and it would be good manners to deal with them while they are here and then let them go, because they may have to get trains or buses afterwards. We will take questions after we have heard the presentations. I ask Mr. Hegarty to start.

Mr. John Hegarty: Save Cork City is a voluntary group. We started in January 2017 because we were concerned about the impact of the lower Lee flood relief scheme and that the majority of people in the city know nothing about the proposals for walls as flood defences within the historic centre of Cork. The Arterial Drainage Act has been used as a vehicle to implement the proposals, leaving many people uninformed. We have found that, while everyone in Cork wants flood relief, most do not want the type of flood relief presented by the walls scheme. We also found that the OPW proposal had not adequately considered the negative impact of the walls on the environment of the city. The historic defences are an irreplaceable element of the character of the city. The walls scheme was designed as an engineering solution only and with little consideration of other issues.

The OPW's economic impact assessment of the walls scheme is inadequate and the cost-benefit analysis excludes economic loss suffered by businesses during construction as well as the long-term impact on the local economy. We found that many of those who supported the walls scheme were in fear of losing flood prevention funding. People had often been told by the OPW that the walls scheme was the only possible solution and that a barrier would be too expensive. The OPW's estimate of €1 billion for a tidal barrier was an exaggeration of cost for an outline and impractical solution involving two barriers on either side of Great Island. This was based on a 350 m tidal surge gate in Rotterdam from the 2014 rivers document, which also recommended a no-walls solution generally in Ireland.

We decided to investigate a more economical design and location for a tidal barrier for Cork. An independent report commissioned by us from HR Wallingford, experts in tidal barriers and climate change, has found that a barrier can be built for €140 million, approximately the same figure as the current walls proposal.

We are convinced that the walls would severely affect the local economy of the city, repre-

sent a significant waste of public funds and potentially be a dangerous flood relief solution for Cork. We want the right flood protection for the city and the River Lee. We want a solution that is climate change resilient and protects our valuable heritage. We call on the Government to adopt our proposals for flood protection and to investigate this matter in the national interest.

The walls scheme would lead to the mass destruction of significant, antique and rare items of heritage throughout the historic core of Cork city. Loss of heritage would affect the city's ability to attract investment and tourism as well as diminish the environment for those who live in the city and have already invested there. The World Bank states: "A city's conserved historic core can also differentiate that city from competing locations - branding it nationally and internationally - thus helping the city attract investment and talented people." It also states: "In addition, heritage anchors people to their roots, builds self-esteem, and restores dignity."

Traffic diversions, dust, noise and the closing of roads and bridges would cause serious loss to the local economy during proposed construction of the walls. Many of our local family businesses would not survive the construction impact of the scheme. The factors of unmapped water mains and cables and unknown underground conditions within the city centre would lead to significant delays and budget overruns.

A tidal barrier report was commissioned by Save Cork City to determine the suitability of Cork for a tidal barrier and provide a reasonable cost estimate. It has been prepared by Mr. David Ramsbottom and Mr. Peter Hunter of HR Wallingford, international experts in flood management. Both authors have vast experience in flood relief and tidal barriers, having worked on the Thames, Cardiff and St. Petersburg barriers. The report reads:

The estimated cost of the barrier at 2017 prices is €140 million.... There is no doubt that a barrier could be built at the proposed location.... The alternative scheme [of the tidal barrier] has the major benefit of not requiring the construction of walls along the quays in the city ... the [tidal barrier proposal] would also avoid the scenario of overtopping or failure of flood walls in the city, which would cause a serious risk to life as well as damage to the city."

The report predicts that the tidal barrier could cost more or less than the €140 million figure, or between €110 million and €170 million.

HR Wallingford is a world leader in hydrology and climate change. The authors of the report have a combined experience of 80 years. They have studied the upstream conditions of the River Lee following the 2009 flood event that caused so much damage in the city. It is with this knowledge that they have written their report. The overwhelming evidence supports a tidal barrier solution at Little Island. HR Wallingford believes that the tidal barrier would minimise environmental impact on the river and avoid failure of flood walls.

According to Mr. Ramsbottom, the alternative solution for flood protection in Cork is viable and would have the major benefit of minimum disruption in the city. A tidal barrier is an effective means of preventing tidal flooding and providing storage for fluvial flooding, which would work in combination with dam management to protect the city.

In the OPW's walls scheme, all of the historic quay parapet walls of Cork's historic centre are proposed to be removed down to the current ground level. The walls scheme facilitates higher flood water levels that are above the ground floors of people's homes. This represents a new and dangerous precedent for the city and the people who know about it do not want it.

The walls scheme relies on extensive grouting with concrete by excavating miles of trench-

es and filling behind every quay wall in the city centre. We have witnessed that flooding comes up through the ground and drains in the city. What the OPW proposes would not be achievable and we are advised that it would dramatically affect the city's water table. It is like trying to stop time. This could lead to the widespread subsidence of historic buildings, alterations to the water table in the city and an increase in water levels and speeds in the river.

The walls scheme proposes 46 pump chambers to keep the city behind the walls from filling up like a bowl of water. The scheme proposes more than 8 km of walls and embankments. In the historic city, the OPW scheme includes 22 pump chambers and 5.7 km of concrete walls of varying height and width.

The HR Wallingford report makes a grave statement relating to the safety of the walls scheme where it outlines clearly that the tidal barrier solution would "avoid the scenario of overtopping or failure of flood walls in the city, which could cause a serious risk to life". The walls scheme has been highlighted by the HR Wallingford report as being a potentially dangerous solution.

The Dutch say that, when considering flood walls, it is better to choose the shortest form of defence, as it is easier to predict the outcome, more economical to construct and maintain and significantly less likely to fail. We refer the committee to Edgecumbe in New Zealand, which flooded extensively in April due to a small breach in a walls-based flood protection system. We also refer to New Orleans in 2017, which flooded due to its pump system not starting when required.

The walls scheme would cost much more than estimated based on the complexity of the proposal. The tidal barrier would protect far more of the city's area than the walls scheme would. If the walls scheme had to extend to cover the same area as the tidal barrier, it would cost more than €500 million.

A tidal barrier is a predictable, defined project in a defined place. Construction of a barrier, if managed correctly, provides certainty and predictability of outcome, including how much it would cost and how long it would take to build. The independent HR Wallingford report confirms this. A tidal barrier would protect vast additional areas of the city, including the docklands and vital infrastructure of roads and rail routes. Without the protection of a tidal barrier, the development of Cork's docklands is not economically viable.

Litigation arising from damage to property is inevitable if the walls scheme proceeds in the historic city. In addition, rebuilding the quay walls and cast railings that are proposed to be removed would cost hundreds of millions of euro. It would be like throwing out the family silver.

A tidal barrier could be constructed in two years following site investigation and design. It is a faster form of flood relief than the walls proposal. A tidal barrier is environmentally a better choice for Cork. This solution promotes slowing the absorption of rainwater into the landscape and thus slowing the flow of the river. We promote a more biodiverse landscape and better soil quality. The HR Wallingford report reads: "A tidal barrier is the preferred choice for Cork because the present tidal regime is maintained and the impacts on navigation, drainage, morphology, saline intrusion, water quality, fish passage and the environment are minimised by the barrier." We believe there to be a greater environmental impact from a walls-based scheme. We note the significant number of mature trees that would be lost in the city as well as the widespread disturbance of habitats and pollution on the river.

The tidal barrier solution can adapt to climate change, ensuring that Cork city would be safe

for generations. The walls scheme cannot adapt to sea level rise without significant use of de-mountables and-or major additional spending. The Thames Barrier has been closed 179 times since it became operational in 1982, protecting the city of London. Of these closures, 92 were to protect from tidal flooding and 87 to protect from combined tidal and fluvial flooding. These figures are from the UK Environment Agency.

HR Wallingford examined the upstream conditions of the River Lee following the 2009 flood event. It is with this knowledge that it has written its report. The Save Cork City tidal barrier location allows for the storage of water from upstream when the barrier gate is closed and thus the tidal barrier can protect against combined tidal and fluvial flooding. A recent proposal for a new form of dam at Dromcarra by Professor Philip O’Kane would add to upstream fluvial protection. The current upstream Carrigadrohid Dam, altered in 1991, may now be fitted with a responsive flood gate which would further increase fluvial protection for the city. The city is already protected from fluvial flooding and the capacity can be increased in many sustainable ways. The walls scheme actively facilitates increased water levels and increased flow rates in the river. The walls scheme promotes a dangerous, fast-flowing river in the city and considers the north channel of the River Lee as a drainage route. The OPW called the walls scheme “the Lower Lee (Cork City) Drainage Scheme” in its public consultation of December 2016.

We propose an economical tidal barrier for Cork in our solution document, Potential Cork, between Little Island and Horsehead on the edge of Lough Mahon. The 60 m wide gate is based on consultation with the Port of Cork authority. It referred us to the opening span of proposed bridges on the river at 50 m. By way of comparison, 60 m is also the width of the access gate in the Thames Barrier. The tidal barrier would allow for the development of the historic city centre in a manner that would give it a competitive edge and secure the well-being of residents and traders in the city. Repair and restoration of the historic quay wall defences combined with sensitive design addition would ensure that the city is viable socially and economically. Cork is a maritime city whose character has been influenced heavily by trading relationships with France and the Netherlands as well as the south of England. Many people came ashore in Cork and influenced the design of the city, where Cornish and French slate hanging, Dutch brickwork and Italian plasterwork are still in evidence.

The quay walls, railings and bridges of Cork allow for connection with the river, which is part of the daily lives of the people. The tidal barrier would allow for the maintenance of the historic quay walls in the manner of many historic European cities. We see this as a major advantage to Cork if it is to develop as a city capable of growing and attracting investment in the future. We believe that Cork’s historic quays should be nominated for UNESCO world heritage status. We also believe that the OPW walls scheme contravenes the obligations of the Granada Convention. Liverpool’s maritime port has UNESCO world heritage status. Cork was trading hundreds of years before Liverpool. The tidal barrier would mean faster flood relief for Cork and value for money for the taxpayer. The tidal barrier would allow the city to move forward now. Many improvements to the city and the river catchment can be achieved while a tidal barrier is being constructed. This is not possible with a walls scheme which may establish its goal only after six to ten years of construction.

The lack of investigation of a tidal barrier solution before now has let down the people of Cork. Years of pursuing a scheme that is not right for the city has delayed flood relief. The OPW should be considered protectors of our national heritage, not destroyers of it. The Save Cork City solution to flood relief works as part of an integrated flood defence system. It is the only solution for Cork if we are to have viable and extensive flood relief. A tidal barrier is the

safest, most predictable, and most economical solution. It represents the best value for money. Our proposals are supported by academics and flood relief experts, flood defence agencies, environmentalists and many thousands of Cork citizens. Support for a tidal barrier is increasing in Cork and a forced walls solution would not represent fair play or fair local democracy. John F. Kennedy said: “An error does not become a mistake until you refuse to correct it.” We formally thank our supporters here and thank the committee again for allowing us to present to it.

Chairman: I call on the OPW to make its presentation.

Mr. John Sydenham: Before we begin our presentation, do Senators and Deputies have copies of the OPW presentation?

Chairman: I am told that all the documents for all the committee meetings are circulated electronically before each meeting.

Senator Marie-Louise O’Donnell: I have all the documents except the OPW’s presentation.

Chairman: Could we get hard copies of it? We will not disrupt Mr. Sydenham’s presentation, but perhaps we could get hard copies while the presentation is happening.

Mr. John Sydenham: Unfortunately, part of our presentation contains a number of visuals and images to which I was going to refer. I recommend that Deputies and Senators, perhaps at a later date, look at the proposal and see some of the visuals.

I thank the Chairman, Senators and Deputies for having invited us here to outline the proposed Lower Lee (Cork City) Flood Relief Scheme.

Senator Marie-Louise O’Donnell: Excuse me, Chairman. I cannot hear what Mr. Sydenham is saying.

Mr. John Sydenham: Sorry.

Senator Marie-Louise O’Donnell: If he does not mind, perhaps he could speak up. I know it is awful but I want to listen to him and I do not have his speech in front of me.

Mr. John Sydenham: Cork city has a long history of flooding. This scheme will provide protection against tidal and river flooding to about 2,100 properties, including 900 homes, and will extend from the Inniscarra Dam to the city centre, which is a distance of approximately 19 km. While many options were considered in the development of this scheme by the OPW, which is a body that has extensive experience and knowledge in the areas of flood risk management and conservation, in partnership with Cork City and County Councils, the scheme presented here today is the only technically viable and cost-beneficial option to provide the required standard of protection to Cork. The current estimated life cost of the project at €140 million represents the largest flood relief project proposed in Ireland. Substantial stakeholder and public consultation has taken place on this project. It is estimated that this will protect against significant flood damage. It is worth pointing out that the 2009 river flood and the 2014 tidal flood amounted to €90 million and €40 million in damages, respectively. Work on this project determined that the solution required optimised use of existing hydroelectric dams for flood storage and flood defences downstream. In line with international best practice, the standard of protection to be provided by the scheme is the one-in-100-year flood from the River Lee and the one-in-200-year flood from the tide. This is part of an overall statutory process. The

scheme is being progressed under the Arterial Drainage Acts and the statutory process is ongoing. The formal public consultation - that is, the public exhibition - of the scheme commenced last December and is being progressed in close partnership with both Cork City Council and Cork County Council.

I will refer to certain images that members have in front of them. The following key points need to be taken into consideration when looking at this scheme in more detail. Over €20 million is to be invested in the repair of the historic quay walls, many of which are at risk of collapse, as occurred with Grenville Place in the 2009 flood. Over 400 heritage structures within the city area will be protected. As part of the process, the detailed design staff include a grade 1 OPW conservation architect to ensure we are protecting the cultural heritage accordingly. The proposed defence height of the majority of the quays is 2 ft or less. I refer the committee to figure 2. Figure 2 is another photomontage but it gives a clear perception of existing key walls, which members will see in the images of the existing walls and what we are proposing. Do members have that image?

Senator Marie-Louise O'Donnell: Yes.

Mr. John Sydenham: Regarding the word “walls”, if one looks at the relative height increases from the existing walls to those proposed, one will see they are modest, and we are reinstating a number of railings of architectural and aesthetic significance. I now refer the committee to figure 3.

Figure 3 shows part of the city at Bachelor's Quay. It shows both the existing situation and the proposed situation, and note that there is no substantial increase in the relative heights. Equally, we are introducing a footpath which will allow greater amenity, greater access to the river and greater visual appreciation. Our interventions are modest. Figure 4 is a cross section of that area. It shows both the existing cross section and the proposed cross section. One of the key elements in what is proposed in the solution is reinforcing the quay walls. In the 2009 flood, parts of the wall in Grenville Place, which is adjacent to the Bachelor's Quay area, collapsed into the river. The walls must be strengthened. There is significant structural damage on many of the quay walls. I draw the members' attention to the cross section which shows that the relative height gain in terms of its visual impact is marginal. We are raising the road area, introducing a footpath and, most importantly, as seen in the shaded green section, we will reuse the existing stone cladding. That is hugely important in preserving the original materials where feasible and minimising the visual impact while at the same time reinforcing the quay wall and providing the level of protection required.

Over three quarters of the quay walls will have an element of open railing below guarding height, as shown in figure 2. Over 1 km of new river side walkways will be provided by the scheme, which will enhance connectivity with the river and greater public amenity. An experienced urban public realm landscape architect is part of the detailed design team, whose remit is to ensure that the defences are integrated unobtrusively into enhanced public spaces. Existing unattractive concrete upstands and railings will be replaced with new architecturally designed railings. That can also be seen in figure 2. Taking account of feedback received at exhibition stage, the proposed scheme is being changed on quays which have original historic railings. At Sullivan's Quay and North Mall, demountable barriers are proposed so that existing railings can be retained in their current form, thus ensuring that there is no heritage impact. I refer the members to figure 5. The green railings are on the opposite side of the quay which we showed earlier on Bachelor's Quay. We propose to retain those railings while having demountable barriers which will protect the existing trees and the railings. The level of impact on that area is

minimised. We are working closely with the local authority to ensure that is done to maximum effect.

I will summarise the main elements of the scheme. I have discussed the flood defences. That is integrated with a flood forecasting system using forecast rainfall measures, enhanced operation of hydroelectric dam management during flood events, washlands upstream of the city, flow control on the south channel and a variety of ancillary works. The scheme has the support of the vast majority of the elected representatives of both local authorities, Cork City Council and Cork County Council. Key stakeholders such as the chamber of commerce and the Cork Business Association, which together represent between 900 and 1,200 businesses, are also fully supportive of the scheme. The Irish National Flood Forum supports the scheme. The OPW is of the firm view that the scheme has the support of the majority of residents and property owners in Cork city who wish to see a scheme implemented as quickly as possible to protect them from the devastating floods which have been experienced by the city.

Save Cork City has proposed an alternative solution which tries to solve Cork's flooding problem by dealing independently with the fluvial or river and tidal problems. It has proposed a tidal barrier at Little Island, which would only address the tidal flooding problems. This barrier is not considered viable for a variety of reasons, including impacting negatively on highly sensitive EU designated environmental sites in Cork Harbour. The location proposed by Save Cork City has limited ability to cope with the likely future impacts of climate change. Save Cork City recently commissioned HR Wallingford to prepare a cost estimate report on its proposal. The report is, therefore, only a high level cost estimate of the Save Cork City proposal. The report notes that "further study will be needed to develop the design for a barrier and refine the cost estimate".

In response to public interest at exhibition stage, the OPW instructed its consultants to examine further the costs and issues around the provision of a tidal barrier at a number of locations around Cork Harbour, including that proposed by Save Cork City. In preparing this study, Arup has drawn on the expertise of its relevant international experts, undertaken detailed harbour modelling and liaised with key stakeholders such as the Port of Cork Company. This study includes a detailed analysis of barrier costs for the scale of barrier likely to be required as well as analysing the cost estimate for the Save Cork City proposal. This is currently being finalised. We believe that the HR Wallingford cost estimate is an underestimate of the true cost of a tidal barrier.

In terms of upstream measures to address river flooding, Save Cork City has advocated natural flood management and-or improved use of the dams. However, all scientific evidence confirms that natural flood management measures cannot significantly reduce peak flows in large flood events in large catchments. Work undertaken by OPW's consultants has confirmed this is the case in Cork. It is noteworthy that the HR Wallingford report arrived at a similar conclusion.

The OPW scheme incorporates optimised use of the dams to reduce peak flows. In developing the scheme, new operational rules have been developed in close collaboration with the ESB, the owner of the dams, making use of state-of-the-art modelling techniques which account for the real world constraints and ensure that the rules are robust and provide a reliable solution. The storage capacity benefits of the dams are optimised in the scheme in line with operational rules, and some low level defences will still be required.

With regard to the integrated approach that has been adopted on this scheme, Cork City

Council will shortly launch a planning application under Part VIII of the Planning Acts for Morrison's Island public realm and flood defence scheme, the flood defence element of which is the first phase of the Cork city flood relief project. The Morrison's Island project is representative of the approach and standard which the wider scheme will deliver. With high quality visual aids supporting the application, the public will be able to see clearly the unobtrusive and enhanced quaysides that will be created. Figure 6 gives an indication of the treatment of Morrison's Island. It shows the existing situation and what is proposed. It is important to stress that this is an evolving development and we will be consulting widely during the Part VIII consultation process on how this can be optimised to the best effect for the benefit of the city.

In conclusion, the OPW is fully satisfied that the planning, development and design process for the proposed Cork city flood relief scheme has been rigorous and of the highest professional standard. We have considered all the potential alternatives and have determined that the only technically viable and cost beneficial solution is the scheme as exhibited. This integrated and holistic scheme will substantially free the people of Cork from the worry and stress of living with flood risk and it will remove barriers to future private investment and help to reinvigorate the city centre. The OPW and Cork City Council would be concerned about further delays to this project amid continued exposure of Cork city residents and businesses to flood risk. The Commissioners of Public Works intend to submit the scheme to the Minister for Public Expenditure and Reform for approval in the shortest timeframe possible.

I thank the Chairman and members of the committee for their attention.

Chairman: Gabhaim míle buíochas as an gcur i láthair sin. I will start with my questions. There is no doubt that flood prevention is the objective of both sides of the debate. Anybody who has seen the catastrophic damage that has occurred in Cork over the last number of years would obviously be of the view that we must tackle flooding in the most efficient manner possible. That is important. Economic costs will be crucial in whatever solution is selected for this. The impact on business is also very important. It is very important to determine which proposal would have the least impact. The area which each solution covers is obviously an important element. I know there is disagreement over costs and we will hopefully drill down into those questions in a little while. The cost per acre protected is also a key question. In my view, the amount of space a solution looks after would be the yardstick by which to measure the cost of a particular project.

I will ask a couple of questions of the Office of Public Works first. Which of these projects does the OPW think is least invasive with respect to businesses? I imagine that work on the walls will involve works on some of the roads and that there will be construction works in the city for a number of years. Which roads would have to be closed and what construction would have to happen in that period of time? How long would it take from start to finish, from when the first shovel hits the ground to when the project is finished?

Mr. John Sydenham: As I outlined, the area which will be encapsulated by the scheme is quite expansive. It covers from the Inniscarra dam right into the city centre - about 19 km. That will be done in a variety of phases. The priority phases are within the city centre. There is impact from construction work, there is no use pretending there is not. It is the nature of it. Once we are working in the city centre area there will be disruption, but we are doing everything possible to manage it as part of designing the phasing of the schemes. We have had detailed consultations with the local authority, its traffic department and An Garda Síochána on the optimum way to phase the works. The overall projected timeline for the entire scheme from start to finish is approximately ten years. The first two phases, which will provide the

bulk of the defences within the city centre, can be accomplished in a much shorter time period. Therefore, the impact on the city centre will vary as we move through the city. I will ask Mr. MacManamon to speak about out planned approach in more detail.

Mr. Ezra MacManamon: I thank the commissioner. On the phasing and delivery of the project, as the commissioner, Mr. Sydenham, has said, there will be disruption involved in the construction of the project. There is no avoiding that. This is an essential public infrastructure project. However, the project's delivery has been broken up into phases. One of the aspects which has driven the breaking up of the project into phases is the desire to manage, control and minimise the disruption to the city which will arise from the project's construction. If members still have copies of the presentation, I would refer them to page 20 where there is an indication and description of the phasing of the project. It indicates that the first three phases of the project will start off with the Morrison's Island element, which is a localised area in the city centre, to which the commissioner referred. This element will be led by Cork City Council under the Part 8 planning process. While that is a small area in terms of disruption, because it only has one quay side on which there are not many businesses in operation, it will protect the vast majority of the city centre, through the Grand Parade area, Oliver Plunkett Street and Patrick Street, from tidal flooding. In 2014, that area of the city centre was flooded and hundreds of properties were affected. That phase will protect those hundred of properties when it is initially implemented.

Looking upstream, the next phase of the project will be from Inniscarra dam down to the area of the Kingsley Hotel. That is the bulk of the 19 km which the commissioner, Mr. Sydenham, mentioned earlier in his presentation. Construction of those works will be out in the open countryside. The works are being constructed on agricultural lands. Again, that will not cause any significant construction in the city area. Following on from that there will be a phase which will cover from the Kingsley Hotel to the area of the Tyndall National Institute. This phase moves down through parkland, Fitzgerald Park and the tennis club area of the city. Again I emphasis that is an area in which there are not many businesses in operation or a lot of traffic. Very little disruption to business in the city will arise from that phase. The vast majority of the benefit and the protection will be provided between those three phases. After that-----

Chairman: I have only ten minutes for my own questions and I have a number of other questions. I appreciate the depth of information Mr. MacManamon has given me and I thank him for it. One of the questions I asked was what the difference was in the areas of land protected by the two proposed projects. How many hectares are protected by the walls and how many are protected by the tidal barrier?

Mr. Ezra MacManamon: That is not a criterion which we normally use to measure the benefit arising from flood relief schemes. We do not have figures to answer that question for the Chairman. We consider and measure the benefit by the number of properties which are protected.

Chairman: What is the difference between the number of properties protected?

Mr. Ezra MacManamon: Approximately 2,100 properties would benefit from the design standard of the scheme we are proposing. There may be other areas which would benefit from the barrier scheme which Save Cork City is proposing but we have not counted those properly.

Chairman: The OPW's project includes demountable barriers which are to be put on bridges, is that correct?

Mr. Ezra MacManamon: There are flood gates which have also been described as demountable.

Chairman: Do the bridges close? If the city is under threat, does the OPW's scheme involve closing the bridges to traffic?

Mr. Ezra MacManamon: I thank the Chairman for that question. It gives me an opportunity to mention the public consultation which has happened throughout the development of this project. In 2014 we indicated demountable barriers at bridge locations. The business community and the public in Cork made the point to us strongly that they wanted, insofar as possible, the bridges to remain open in times of floods. We have changed the design since bringing it to the exhibition. We now have gates which will close the footpaths on the bridges, but the roads on the bridges will remain open. As I said, the traffic routes across the bridges will remain open. There are gates, which will be permanently in place, which will be closed when a flood is expected.

Chairman: The bridges will close when a flood is expected then.

Mr. Ezra MacManamon: The gates will only close the footpaths on the bridge. The roads on the bridges will remain open and will be protected separately with permanent defences.

Chairman: Mr. MacManamon mentioned the average height of the wall. What is the highest wall foreseen under the OPW's planned project?

Mr. Ezra MacManamon: The highest wall within the city area is 1.2 m or 4 ft.

Chairman: It will be 4 ft.

Mr. Ezra MacManamon: That is in the built-up city centre area.

Chairman: For what distance would a 4 ft wall run alongside the river?

Mr. Ezra MacManamon: One of the illustrations to which the commissioner referred members earlier, on Bachelor's Quay, is an example of where there would be a wall approximately 4 ft in height. It would include the length of that quay. The commissioner also mentioned Grenville Place, which is around the corner and not visible in the illustration on page-----

Chairman: Such walls would not extend more than a couple of hundred metres.

Mr. Ezra MacManamon: At a guess I would say the distance would be of that order.

Chairman: Okay. That is good.

Mr. Ezra MacManamon: The Chairman should be aware that is a guess.

Chairman: I want to ask Save Cork City a question. In its understanding, what is the difference between the acreages covered by the two projects? A key issue is that Save Cork City's project defends against tidal surges while the OPW's proposed project defends against fluvial flooding. Is there any way that Save Cork City's project can mitigate against river flooding? How does its project deal with that?

Mr. John Hegarty: The tidal barrier would work by separating a high tidal surge from the fluvial issue. It also allows for any amount of fluvial water coming from upstream to be stored behind the barrier when it is closed. It manages fluvial flood by separating it from the tidal

flood. We are also proposing that the current dams be optimised. There are a few different ways in which that can be dealt with. We are talking about a tidal barrier which would protect roads, the tunnel and train lines. It would go right down to Little Island, which would mean the Docklands, Mahon, Blackrock and all of those areas of the city would be protected. These are hugely populated areas so we are talking about protecting a lot more people. I do not have the exact figures for that. Demountable barriers in the city might have the result of preventing people from getting to other parts of the city. Our approach would mean that people in that area of the city would be allowed to travel unhindered in the event of a flood. That would mean getting to schools, to hospitals, to work and to the city centre. Our map on page 8 shows the extent of the wall's protection as opposed to the extent of the barrier's protection.

There is an interesting fact about the docklands. It is difficult to get development going at the moment because developers cannot make money out of different schemes and the conditions of the docklands in Cork are such that they are below water level in many areas. It is, therefore, difficult to develop in the docklands, without it being protected from flooding. In the docklands at the moment, only retail development is allowed at ground floor level because that is allowed in an area which might flood. Therefore, the docklands can only on ground floor level really ever develop as something that is in massive competition with our indigenous business in the city centre.

Chairman: I live along the River Boyne where flooding works have been carried out over the years. If a particular part of a river is protected from flooding, the flooding is often displaced to the next opportunity the river has to find that low level. If the city centre of Cork is protected, would it not be the case that the river in full tilt would seek to find the docks while finding an exit to flood?

Mr. John Sydenham: This in terms of the overall approach. It is what we call the CFRAM, which is done on a river catchment area. It looks at the entire length of the river, the landmasses around it, the various courses and the topology to prevent what the Chairman has spoken about, which is that by fixing one problem one is not dislocating. This scheme is integrated. It is looking at all aspects of what happens in that catchment area, so it protects those areas upstream and downstream.

Senator Marie-Louise O'Donnell: I am not from Cork, which puts me at a disadvantage today and I know there are colleagues here who know more about this. I am going on what I have read and have heard and I am not an engineer, so I have to bow to the witnesses' greater judgment. My knowledge of the OPW down through the years is that it has been extraordinary and excellent and has made a distinctive and distinguished contribution to Ireland and its preservation. I start from that premise and nothing that I read here makes me think otherwise. That might be my own innocence but, on first reading, it does not make me think otherwise. When we talk about disruption, one has to consider Dublin during the last three years of the Luas works. There is nothing like the disruption from the flooding of people's houses. It is the greatest disruption of all time.

I thank Mr. Hegarty for his presentation. Will he tell me about his voluntary group? Where did it originate? Did he say that the vast majority of the people in the city knew nothing about the Lower Lee flood relief scheme? What did he mean by that? Who did he survey? Who is he representing? I am sure he is representing people, but who exactly is he representing? Where does he come from, what is the background to what he is doing and what does he intend to do if his perspectives are not met? Where does he intend to bring his argument or beliefs on how it should be done? Where does he want to continue given the impasse? There is obviously a

genuine impasse from his point of view, but where does he want to see this going?

Mr. John Hegarty: We are here to represent a growing number of people in Cork. We started out as a group of professional people to look at this issue. We attended the consultation of the OPW. Looking at the figures, we found that 44 people attended their consultation process in July 2013, with only 181 attending in 2014 and 186 in 2017. Therefore, we found that no one in Cork really knew about this proposal. It was not advertised widely and an effort was not made to inform people in order that they would know about it and could comment on it at the early stages. We are a group of architects, engineers, hydrologists and historians and many people from UCC and around the world have supported us with knowledge and calculations.

The more we looked into the scheme, the more impact we found it to have and the more the specialists who were advising us said that this is not right, that it is old-fashioned technology and an old-fashioned approach. It is an approach that would not be carried out in the Netherlands because long miles of defences are not the right way to carry out flood relief. A shorter flood relief solution should be chosen. We were told that things were dangerous, and we started with the impact on heritage. The heritage impact got people of Cork in their hearts. We have 16th, 17th, 18th and 19th century walls in the city centre. Up to a few weeks ago, Viking remains were being found in the city centre. We started to look at the widespread loss of that authentic fabric in the city centre. Businesses in the city centre are worried about having something similar to the Luas works that could run over ten years in the centre of Cork. That is alarming to everybody. It also was alarming that one could not alter the walls in respect of possible sea level rise.

A lot of money is being spent on a solution that is not manageable into the future. Insurance companies do not like demountable flood barriers. People want insurance in Cork. The proposal for demountables to protect heritage is a management nightmare for the city to have to implement into the future.

Ms Catherine Kirwan: On how people did not know about it, I was very concerned that the public consultation days were held during holiday time. They were held on 17 July 2013, 29 July 2014, just before the August weekend, and over the Christmas period. Further, even if a few people saw the advertisements in the paper, it was described as the Lower Lee drainage scheme. I did not know what that meant and nobody really knew what it meant. Apparently there were advertisements on the radio as well but everyone in the group has yet to meet a person who heard them. We strongly feel that this was going to sort of roll in under the radar. No one knew about it. When we started publicising it, people were quite shocked at the extent of the scheme. The OPW has spoken about how it respects heritage and the other department of the OPW strongly respects heritage and is the guardian of our heritage. However, this concerns the OPW drainage department.

Replacing authentic heritage with replicas is not the same thing as preserving heritage. Would we replace the Ardagh chalice with a modern replica? I do not think we would. What we have in Cork is authentic and real. Mr. Hegarty knows a lot more about it than I do. I am just a lay person who loves walking around the city. I do not know the ins and outs of where these things are from but I know that they were all locally made and constructed and are utterly irreplaceable. Replacing them with concrete is just not acceptable when there is an alternative. One of the problems all along has been that all of the business people and residents of the city have been told, even here today, that there is no alternative and that this is the only option. If people are told there is no alternative - to take it or leave it - that will influence people to support the scheme. However, there is an alternative, which is an economic one, and that is what

we have come up with.

For example, in 2014, Cork Chamber of Commerce was saying exactly what we are saying. It was saying that concrete flood barriers could damage the city's river potential and that it could potentially damage the ability of the city to realise its obvious riverside potential and negatively impact on the attractiveness of the city as a location for inward investment and tourism. Eventually, it was told there was no other option. It was a case of take the walls or get nothing. Back in 2014, we could have written that document. That is what the chamber of commerce was telling the OPW. It was very worried about the impact.

Those who visit places such as Bruges, Amsterdam, Venice will not be interested in replicas of what was there but the real thing. That is what we are trying to preserve.

Senator Marie-Louise O'Donnell: If the witness had made that argument at 1.45 p.m., I would have understood what she is trying to tell us. Although my colleagues might be very well informed and have conducted much research on the matter, I am coming to this issue completely cold. There is currently an impasse. What is the intention of the Save Cork City group in this regard? Will it take court proceedings to stop progress or will it go away or somewhere else? At what stage is that process?

Ms Catherine Kirwan: No decision has yet been made. Approximately 1,100 submissions have been made, many of them by groups. Thousands of people have put in submissions, but some have been signed by multiple people.

Senator Marie-Louise O'Donnell: Yes.

Ms Catherine Kirwan: We have not received an answer to those submissions and they are still under consideration. We do not yet know the answer. We have met the Minister on two occasions and he is very approachable. Everything we have done, such as attending the committee or commissioning the HR Wallingford report, is to try to bring sense to the argument.

Senator Marie-Louise O'Donnell: Which Minister did the witness meet?

Ms Catherine Kirwan: We met the Minister of State at the Department of Public Expenditure and Reform, Deputy Kevin Boxer Moran.

Senator Marie-Louise O'Donnell: In that case, why is the matter before this committee? I heard-----

Ms Catherine Kirwan: It has responsibility for heritage-----

Senator Marie-Louise O'Donnell: I was being facetious. The witness did not answer my question. There is an impasse. Does she feel the relevant bodies can come together-----

Ms Catherine Kirwan: We have not yet received an answer. When one is received, we will be able to answer the Senator.

Senator Marie-Louise O'Donnell: The witness has an answer of sorts because we are discussing it here today.

Chairman: There has not been a decision.

Ms Catherine Kirwan: There has not yet been a decision.

Mr. John Hegarty: We can answer that question. We intend to keep informing people about the impact of the scheme and keep highlighting how important the city is and the authentic, historic and economic value of our proposals. We have to keep informing people of what we believe to be a very grave-----

Senator Marie-Louise O'Donnell: Is the Save Cork City group likely to take the issue to Europe to question it-----

Mr. John Hegarty: I do not know.

Senator Marie-Louise O'Donnell: I thank the witnesses.

Deputy Seán Canney: I was Minister of State with responsibility for this area prior to the current Minister of State, Deputy Moran, and launched the exhibition stage of the lower Lee Cork city flood relief scheme in December. I am from Galway, not Cork, and will not get involved in the local element. I am very surprised the issue is before this committee and that no local authority elected representatives or affected business people have been invited to appear. This is a committee to discuss culture, heritage and the Gaeltacht. The argument on a solution to flooding in Cork city concerns engineering.

The witnesses mentioned disruption and so on. When I was Minister, Cork people told me there was a hell of a lot of disruption when there was flooding in the city. A solution must be found. A huge amount of time was given to public consultation at exhibition stage. It was extended and I thank the Office of Public Works, OPW, for doing that. Many submissions have come in and it is premature to have this meeting until the exhibition stage process is complete. I am surprised that people are here while the process is ongoing. I am not saying they are not welcome but the process should be allowed to progress to completion. The exhibition stage is all about consultation. Mr. Sydenham mentioned that amendments or similar have been made as a result of the public consultation process. We need to allow that process to complete and let its findings come out. I am concerned that we may end up in a long-drawn-out legal battle where nothing happens. The people of Cork deserve more than that and we need to be sensible about it.

Ms Catherine Kirwan: I can no longer call the Deputy "Minister".

Deputy Seán Canney: Ms Kirwan can call me Seán.

Ms Catherine Kirwan: As regards the disruption Deputy Canney referenced, the OPW cost-benefit analysis completely excludes any losses sustained during construction. It looks at that and ignores it completely. Even if every family business in the city centre were forced to close, it would not form part of the cost-benefit analysis. That is wrong and makes no sense. We attended a meeting many months ago with the steering committee and were told that the heritage loss, which has been acknowledged by the OPW, is part of the cost-benefit analysis. We believe the loss of heritage has been given an inadequate weighting and forms just a small part of the cost-benefit analysis, but in reality it is an irreplaceable part of the character of the city. As I said, one goes to Bruges to look not at concrete but at what has been there for centuries.

Deputy Seán Canney: The witness discussed cost-benefit analysis. That was a bone of contention for me when I was Minister of State. It is a double-edged sword. No project might be undertaken if one has to take account of the disruption caused by construction. There must be some pain to get some gain. It is a double-edged sword if Ms Kirwan is saying there is go-

ing to be disruption and loss as a result of something being done to improve things in the long term. If that is used in cost-benefit analysis, God help any Minister who is trying to get work done. We have to be careful what we wish for in this regard.

Ms Catherine Kirwan: The great advantage of the tidal barrier is that there would be zero disruption to the city centre.

Deputy Seán Canney: If disruption had to be taken account of in all cost-benefit analyses, many projects that are happening and are of benefit would never have seen the light of day. We must be careful in that regard. We should see what the process brings us.

Ms Catherine Kirwan: We look forward to seeing what happens.

Deputy Michael Collins: The witnesses are very welcome to the committee. I represent the constituency of Cork South-West, which knows plenty about flooding. There are many very successful schemes under way and currently planned in Bandon, Clonakilty and Skibbereen. I have heard many of the issues raised by the witnesses discussed on the airwaves. While it does not affect my constituency, it is of interest to me because it affects Cork. Have the witnesses tried to thrash out some or all of the issues with the OPW? Public consultation is one thing but round-table discussions might be able to resolve some of the issues. It might be gone beyond that stage, although I hope it has not because the biggest priority everyone must be aware of is that of saving people's homes and businesses.

My constituency is very prone to flooding. Homes were destroyed by flooding in Ballylickey, which is between Bantry and Kealkill. I have been involved in politics as a councillor and subsequently a Deputy for approximately three and a half years and I cannot convince the powers that be to put a machine into the river in Ballylickey to clean it out. An elderly resident was one of several from that area to ring me on Sunday evening because they were terrified that the storm was going to cause a tidal surge and destroy their homes. In fairness to the local authority, it supplied residents with sandbags. However, it would be very simple to rectify the issue. It is scandalous and a failure for me as a public representative to talk about that solution for three and a half years when I would rather shut up, face the fines and put the bloody machine in there myself, as I had to do elsewhere previously. We should put the bloody machine in there, clean out the rivers and stop messing with people's lives. We should clean out the river and save people's homes instead of talking about pearl mussels and flies and bees and this and that.

That is where they need to start. It needs a common sense approach. I have listened to every excuse as to why this will not happen for another year or two, and let the elderly people suffer, let their homes be flooded to 5ft or 6ft. It is scandalous beyond belief. I acknowledge Deputies Canney and Moran's efforts as Ministers of State in this area. Deputy Moran visited those areas with me two months ago. We went into people's homes at 10 p.m. I am sure not many other Ministers would do the like. He saw the situation at first hand along the Ballylickey line and Castletownbere where there are serious issues.

Is there any hope of the witnesses sitting down together to try to sort this out? It is a major issue for them. I am not the expert and I not making any judgment. I can sympathise with what they are saying and I know they are speaking for the greater good of Cork but these experts also say it is for the greater good of Cork. We cannot be the referee. I would like the two parties to sit down together to try to sort it out. As they said no decision has been made and on that basis there is time for negotiation.

Mr. John Hegarty: We are absolutely for flood relief. We have seen at first hand what flooding does to people's lives and the difficulties they go through. We have spoken to people who have had very difficult situations in Cork city centre. We do not believe the proposal is the right one. It may not even work. Flood waters come up through the ground of people's buildings in Cork. It is very difficult to build walls that will prevent that happening in the future. There are issues of subsidence, water tables. The city is built on timber piles, the same as Venice. These kinds of wall solutions have been rejected in Venice and in the Netherlands. We have the support of the senior deputy director of Netherlands Water, who gives out the money for flood relief in the Netherlands, who says this is an antique solution. It means building walls that will very soon fail in some place. If we allow fast flowing water through the city in that case that failure will mean a catastrophic flooding of the city so we will be setting ourselves up for something that is not a good idea fundamentally for the city.

It is not just a question of heritage. I could talk all day about heritage. Cork is an incredible resource in this country that is not recognised or exploited. What is there in terms of heritage is as good as Venice. Our document, which anyone can read online, has illustrations of Cork city that would make one's eyes water at what might be lost in the city centre. Our maritime connection to the world has influenced who and what we are and the physical environment that we live in every day. This solution is not right.

We are for flood relief. We know the burden of proof is much harder for a group like ours so we have put the time and the work in and found a solution that is more economically viable and that protects more people, that keeps transport open, that will allow us to repair, restore and develop our city, that is good for developers, for money and heritage, good for hearts, minds and lives. It will not have demountables for miles running in front of our houses and homes. We do not want that. It is not just me or Ms Kirwan who do not want it. There are thousands of others like us. They are in the business community. They are behind us saying they will support us but they cannot say who they are. There are people in the city centre who are literally crying at the thought that this would happen to their beautiful antique city. This is a city of opera, of navigation, and its development was influenced by northern Europe in such a specific way that we would be mad as a society to get rid of it in this way.

Ms Catherine Kirwan: Many of our supporters have been flooded. A colleague of mine has been flooded three times. That person had the flood barrier which held but the water came up through the toilet, the sink and the floor. A pub owner, I do not want to name but who has a family business in the city centre, has been flooded many times and grew up with flood water. He does not want this solution. He loves the quays. He wants a solution that protects the city. He said climate change is here and we need to do something that protects the city. He says these walls will not work. They do not want them. A nationally well-known restaurant, which was also flooded, does not want the walls. It is not just us, the do-gooders but people who have been flooded.

Deputy Danny Healy-Rae: I welcome everyone here today from both sides. It is clear there are differing views on how the flooding in Cork should be dealt with. I do not agree with climate change. Flooding and storms happened long before there was ever a combustible engine. I reiterate that in spite of Monday's storm. We have had changes and differences in the patterns of climate going back in our history. It is hard for me to decide who is right or wrong in this matter. If the Government is committed to providing funding to deal with the problem a decision needs to be arrived at sooner rather than later. Everyone should get around the table. That is why I asked whether there is any representation from elected members and there is none.

What weight will be given to what we say to the witnesses today? We do not have engineering qualifications. I do not anyway. The people in the Office of Public Works, OPW, surely have and Mr. Hegarty does. We on this side do not.

I have always asked when the flood water comes back up the sewers and the sinks why not have non-return valves fitted? Met Eireann is very good now at advance warnings and we hope that will continue. That would give people a chance to use sandbags or whatever. It is horrible when the sewer water comes into the house. That is worse than clear or clean water coming in. I am sure a non-return valve could be fitted to every pipe. I know a little bit about that through dealing with diesel engines over the years. I am sure that could work.

In the past when people had no hope they would say, "You can't keep out the tide". The witnesses appear to have a proposal with this barrier. My worry is that if the tide cannot come in, how is the water from the Lee going to get out? That is a big question. Will there be massive pumps pumping the water out over the tidal barrier? How much will it cost to keep it running?

I am of the same view as Deputy Collins. I have been arguing in Kerry County Council and since coming to the Dáil for cleaning out our rivers. They need to be cleaned out. They have not been cleaned out for the past 20 years. Indeed the River Shannon has not been touched since the late 1800s, when the British last cleaned it out. I am glad that Deputies Canney and Moran have finally arrived on the scene with machines. I am delighted to hear that because we have places in Kerry affected, the Flesk river and many other rivers around the county. They are blocked because they have not been cleaned out. The reason is that farmers have been prohibited from going near any river for the past 20 years because they would lose their farm payments. They have been advised they would be prosecuted and then subsequently lose their farm payments. By and large the farmers would have done a lot of work to keep the rivers clean if they were allowed to do so. I will continue to fight to ensure that will be allowed to happen again because that is causing a lot of trouble all over the country.

I am not able to say who is right or wrong here. We welcome the witnesses and will listen to them. I ask them to get around the table and sort it out quickly. We all know what happens when funding appears to be available. I will give just one example. We had funding for a water scheme in Cloghane iron mills in 2008 or thereabouts. It was granted and sanctioned, and advised to all the members of the council. Word then came that the national finances were banjaxed. We did not get money for that since then. We need to be aware of that. If there is a difference between the two groups represented here it needs to be resolved because the money will go elsewhere and it would be left behind. I would not like to see that happening. I go to Cork too; it is my nearest city. We would like to see everyone happy there and not be continually flooded during bad weather.

Chairman: I call an Teachta Ó Laoghaire.

Deputy Donnchadh Ó Laoghaire: Do we want a response?

Chairman: Ní raibh ceist ar bith ann - just a speech.

Ms Catherine Kirwan: There was a lot-----

Chairman: Tá brón orm.

Mr. John Hegarty: We would welcome sitting down with the OPW because we have a lot in common. When we heard about the OPW working on the river in Cork and proposing flood-

relief solutions, we were delighted because we thought at last the OPW was coming and would do a really good job. We thought there would be a big heritage involvement from the OPW on the other side, but that was not the case. We have a lot of common ground. Our schemes have a lot of common ground. We are both saying that some kind of barrier has to be built to protect the citizens of Cork. We are just proposing a far more sensible one that is manageable and costs less to manage. Our estimates and HR Wallingford's estimates are that it would cost €1 million a year to manage a tidal barrier. If these people say it is that way, it is that way. We wonder what the wall scheme would cost to manage every year with all those demountables and everything like that.

A tidal barrier works very simply. It rarely closes. This year it might have only closed on one day or not at all. It is not really a barrier. It allows free-flowing movement for traffic. The proposed width is wider than any of the bridges proposed for the city. The tidal barrier is a very simple object that allows fluvial flooding and tidal flooding to be separated in times of need. It is a very simple thing. It is how the Thames barrier works. It protects cities all over the world with this kind of simple technology. That is what I have to say about a tidal barrier. It works and these people say it works. That was the first thing they said in their report before they said they would even bother costing it.

Chairman: I call an Teachta Ó Laoghaire.

Deputy Danny Healy-Rae: I have just one question. Is using non-return valves a runner?

Ms Catherine Kirwan: No.

Deputy Danny Healy-Rae: Could that system be put in place for a city like Cork?

Mr. John Hegarty: It is proposed as part of the solution. The problem with Cork is that it is so ancient. The pipes and underground rivers and waterways are so difficult to predict. When water comes up into people's shops and businesses, it sometimes seeps through the skirting boards. It seeps from underground and they do not know where it comes from. It also comes through the lavatory, but it is coming from under the ground as well. Therefore, it would not solve the problem entirely.

Ms Catherine Kirwan: When the Ford plant was built, I was told by somebody who was involved in that all the American engineers came over and fitted non-return valves, and the plant flooded anyway.

Chairman: I call Mr. Sydenham.

Mr. John Sydenham: I will ask Mr. MacManamon to comment as he is closer to it.

Mr. Ezra MacManamon: Non-return valves would certainly be considered for all of the drainage outfalls in the city. There is a perception in Cork that there is a problem with the water coming up from the ground, as the witnesses from Cork city are saying. That is true and it is being investigated. Our consultants are doing a lot of work on that as we move into the detailed design stage of the project. Apart from Cork, it is a problem that is well known wherever we consider building flood defences. Seepage of water through the ground is always a problem that we consider when we are considering building flood defences. We deal with it through a variety of engineering means such as putting in sheet-piled cut-offs under flood defences or embankments to stop the water flowing from the river through the ground into the protected area behind or flood defence embankments which lengthen the flow-paths that are involved and

things like that.

We are very much aware of this problem and we are addressing it through the non-return valves the Deputy asked about and also giving it wider consideration as we move into the detailed design processes.

Mr. John Hegarty: The advice we have is that it will not work because it is such an extensive area.

Chairman: That has not been contradicted as such. There are opportunities to use those technologies, but it is agreed that the water also comes up through the ground in places.

Mr. Ezra MacManamon: We are aware of the problem of water flowing in as people here have described. We will deal with it and it will be addressed satisfactorily.

Deputy Donnchadh Ó Laoghaire: I thank the representatives of Save Cork City and the OPW for attending today. I commend the OPW on its many years of good work in Cork city. Irrespective of people's view of the particular scheme, it is a civic service to interrogate a project such as this in an intensive way. Public consultation is a regular cause of frustration for public representatives. At most public consultations, we are the only ones there. Unfortunately it is the nature of it regardless of how well they are advertised. Unfortunately it is not until a bit down the stream, for want of a better term, that one very often realises the concerns that people have. That applies to roads, bridges and anything one can think of.

As my questions are brief, I will put all of them together. I ask the witnesses from Save Cork City about the HR Wallingford report. Did it take account of the implications for the shipping channels in Cork Harbour? Would its proposed location at Horsehead have any implications for leisure use by people living in Monkstown and Passage West?

The OPW presentation indicated that the outline of the HR Wallingford report might not be sustainable in the context of global warming. I ask for a response to that. There are different designs at each different section along the north quays and south quays; there are railings, walls and glass and places where it is being left alone. While I know it can be said that there are implications for the whole project where are the sections of most concern from a heritage point of view?

My next question is for the OPW. The witnesses from Save Cork City have made a point relating to global warming. I cannot remember the extent but a rise in sea levels, unfortunately, is not inconceivable and the walls are not adequate in height and would have to be increased to protect the city and achieve the same end. Is that something that has been explored? What is the view of the witnesses on the possibility of having to increase the current height of the walls?

Regardless of the current circumstances and the cost-benefit analysis, do the witnesses believe that in the future a flood barrier might be feasible? What are the implications for the special protection area? What would be the impact of either project on the Cork Harbour special protection area?

From the point of view of the OPW, a certain heritage loss has been factored in. How significant will it be? Is it possible to say how many metres of stone walls on the quays will be affected?

Mr. John Hegarty: I will start on the width of the tidal barrier. We spoke to the local port

authority. Opening bridges have been proposed for the city further up the river. They have 50 m wide openings. Our design and proposal has a 60 m wide opening, which is larger than the 50 m proposed for the rest of the city, which would allow ships of a larger format to get as far as the bridges that are proposed but not get up to the city. The Port of Cork said that a 50 m wide opening in the tidal barrier would be correct so there is no implication for shipping.

Ms Catherine Kirwan: There is no implication for leisure use either.

Mr. John Hegarty: For leisure use we see that Lough Mahon may well be better protected in the future so Lough Mahon and all of the area behind the barrier would be better for leisure use. We see the connection between the city, the docklands and the historic city in terms of our connection with the river as being improved and that people would use the river much more. We have spoken to boating clubs and there are many hundreds of people using the river on a Saturday morning and the number is growing. We also see a future for people living on house boats in the centre of the city. We have spoken to those groups and we are supported by the boat clubs and by anybody who uses the river for leisure activities.

In terms of the possibility of sea level rise, we feel and HR Wallingford also say that the tidal barrier can be built to protect us for a very long time so it is a much more future-proofed solution for the city. We feel the walls cannot rise. Although the highest proposed wall in the city centre is 1.2 m, as the OPW has said, there are ground levels raised up in different areas as well, so the top of the walls can be 2 m higher than current ground levels and people's front door can end up being 2 m below the current walls. There are subtleties about the OPW's scheme that everybody would need to understand and that is what we are trying to help people to understand.

The loss to heritage in the city centre would be extensive. There are rubble stone walls by St. Finbarr's, which are the precursors to the cut stone walls that are further down. There are walls with medieval and renaissance fabric and stonework that were built in the 16th and 17th centuries.

Deputy Donnchadh Ó Laoghaire: Is that down by Francis Quay?

Mr. John Hegarty: Yes, down by Francis Quay, the South Gate Bridge and by St. Finbarr's. There are waterways that are untouched for a very long time. The bridges along Wandesford Quay are absolutely exquisite. I have seen a quay in Verona that is comparable to the bridge by Wandesford Quay. We have got incredible pieces of antiquity in Cork that people are just not aware of and that are not being looked after either nationally or locally. We know that the OPW could look after them. They are flood defences. We just do not want water levels that are so high that they would create such a change that we end up living under water. The scheme is designed to have faster flowing higher levels of water in the city, in particular in the North Channel, so the people on the north side of the city have to have this in their river.

We face the issue of rotting foundations, water tables and the possibility that we have to be protected given that we have 22 pump chambers with pumps that could fail at any moment. That has happened in other cities. People have been flooded just because the pumps have failed. We must look at what the maintenance burden is for the future as sea levels rise, and if they do how many more demountables will be in the city with no insurance for people. I have family living on the quays. The question is whether we will be looking out at a 2 m high wall, if the city will be unsafe because of that and if, eventually, the river will just turn into a drainage channel.

I ask committee members to cast their minds to Amsterdam, Bruges or any city that looks after its waterways and allows people to engage with them and see what the possibilities for Cork could be. We are here because we are afraid for the future viability of our city and the people living there, not just in terms of heritage but in terms of how people want to live and could live there.

Ms Catherine Kirwan: To add to that, we were told when we attended a meeting with the steering committee in the OPW a number of months ago that the walls were being built to be added to, but what would probably happen is that it is unlikely that the people of Cork would put up with a 2 m high wall and that there would be a wall breach in the future which would have catastrophic consequences and then a tidal barrier would be built. What we are saying is that the tidal barrier should be built now. In the words of Roy Keane, fail to prepare, prepare to fail. We are saying why wait until after the catastrophic flood to build the tidal barrier that we were told by the OPW would be cost-neutral in the future? It would be a complete no-brainer to build a tidal barrier in the future in an unspecified number of years. We are saying, build it now, lads. What is the point in wasting public money on building walls that will not be needed in future because the tidal barrier will be built?

Mr. John Hegarty: We are also saying build it now because it is not as expensive as the OPW said it would be. The estimates and the outline design that were referenced in relation to cost estimates was for a tidal barrier in Rotterdam that is wider than the Eiffel Tower is high and that has no bearing on any type of solution for Cork. That is where the estimates came from in terms of costs. It also came from a document, Rivers 2040, where the diagram of the barrier is back to front and would not be able to open onto the hillside landscape of Passage West. That is the very simple outline basis of something that is not thought through. The figures are enormous figures but we do not believe a tidal barrier would cost that amount. We have a tidal barrier costed by HR Wallingford and if anyone wants to talk to them they can ring them up and talk to them or meet them. They know what they are talking about. A tidal barrier would work for Cork and it is cost-effective.

Chairman: Have all Deputy Ó Laoghaire's questions been answered?

Mr. John Hegarty: Could I make one point because it is an important point?

Chairman: Sure.

Mr. John Hegarty: In the future, if sea levels rise, the tunnel in Cork will be flooded, the rail line will be flooded, the roads coming from Dublin will be flooded, the roads that take people to work will be flooded and the roads that take people to the major hospital, CUH, will be flooded. Our tidal barrier protects all of that whereas the wall scheme cannot adapt to that. We are talking about a scheme that any time there is a major flood event would shut the city down, and as time goes on, it would shut the city down even more.

We are also talking about the cleanliness of the water in the river. We are talking about good soil quality. We are talking about a scheme that looks at the best practices in flood relief management and uses them on our river to create a completely integrated and managed river that is safe and clean and works into the future. The wall scheme is an old-fashioned scheme and if it is built, it is so engineering heavy that it will move problems to places that have never ever had problems.

Ms Catherine Kirwan: It is worth looking again at the map on page 8 of our document,

which shows that the OPW walls scheme finishes at the tip of the island. When I was going to the train station this morning, I noticed that the water at Horgan's Quay was quite high and it occurred to me that in the future, the quay would not be protected by the OPW walls scheme, but it would be protected by the Save Cork City tidal barrier, which has been recommended by people who have significant experience with tidal barriers. I do not mean to insult any of the OPW personnel when I say they have built tidal barriers, and supervised the construction of such barriers, but a sea-based tidal barrier has never previously been built in Ireland. There is always a first time. It should happen in this case. It will happen in the future, so why not now?

Chairman: I invite the officials from the OPW to respond to Deputy Ó Laoghaire's questions.

Mr. John Sydenham: Many issues have been raised. Statements about 2 m high walls are not helpful to what we are trying to achieve. Everybody is looking for the best solution for the people of Cork. We want to protect the city. The previous illustrations I have shown the committee have depicted what we are proposing to do. I do not think anyone could construe that we are proposing to erect 2 m high walls anywhere. My colleague, Mr. Leahy, will deal in much more detail with the issues the Deputy raised in his specific questions. There has been a great deal of discussion and a vast amount of analysis on this issue. Many detailed studies and surveys were conducted before we arrived at the solution that is being proposed. These complex and involved engineering projects required a vast amount of analysis and study before the optimum solution, which is what we are presenting, was arrived at. It is almost being implied that we are providing for something outdated that will not work. That is completely misleading. This solution is based on all the factors we studied. We studied the possibility of a tidal barrier in tremendous detail. Mr. Leahy will talk in more detail about the level of rigour with which we analysed the possibility of a tidal barrier. Taking into consideration the level of protection required, the risks and the issues in the broader catchment area, we are recommending a solution that is the optimum one from the perspectives of cost and efficiency. It will deal with the challenges presented. My colleague, Mr. Leahy, will speak in more detail about that and respond to some of the specific questions that were asked.

Mr. Ken Leahy: I would like to speak about the options that were considered. There has been talk about outdated solutions and about what works well in other locations. When any flood relief scheme is being considered, the most important thing is the best solution for the location in question, bearing in mind all of the location's constraints and objectives. It is very dangerous to try to compare the solution we are proposing with other solutions in other countries. It is untrue to say that countries like the Netherlands do not look at walled solutions or direct defence solutions. Direct defences make up a significant proportion of the Dutch solutions. They are integrated with other elements. The solution for Cork is no different from that. It has been suggested that the design of the scheme will funnel even faster waters through the city, but that is incorrect. A fundamental part of the design of the scheme is the optimisation of the use of the dams to reduce the flow into the city and therefore reduce the velocities and the flows through the city. The scheme will reduce rather than increase this risk. When factors like the flood forecasting system, the operation of the dam and the regulation of the flow between the north and south channels are taken into account, it is clear that direct defences comprise just one small part of a very integrated approach to flood risk management in the city, which deals with both fluvial and tidal flooding.

When we speak about the various possible solutions, including the tidal barrier, it is important to ensure everyone has clarity. We must make sure we are comparing apples with apples.

The front page of the HR Wallingford report is of interest because it confirms what the report is and is not. Essentially, it is a high-level cost estimate of the barrier concept being advocated by the Save Cork City group. The HR Wallingford report notes that navigation, sedimentation and environmental issues would all warrant significant analysis and consideration in order to establish the size of the gates required. It notes that the cost estimate is extremely sensitive to those factors. That is very much the case. Rather than designing or sizing those gates, those who drew up the HR Wallingford report took the Save Cork City concept and worked from there. I am not privy to the details behind that. As the location proposed by Save Cork City is over 1 km in width, the flow through that portion of the channel has 1 km to pass through. The Save Cork City proposal would narrow that opening to 150 m, or one eighth of its current width. This would fundamentally alter the dynamics and velocities in the harbour. It is likely that it would have significant impacts on navigation, shipping, erosion, sedimentation and the environmentally designated sites - the special protection areas and the special areas of conservation - which are immediately proximate to it. Therefore, it is not at all reasonable to assume that the barrier, as costed, would be technically viable.

As part of the work we are undertaking and finalising, which has involved discussions with the Port of Cork, we have engaged in detailed modelling of velocities. It is likely that the barrier would have to be significantly wider, which would cause the cost of it to increase. The HR Wallingford cost estimate of €140 million relates to the cost of construction only. It must be acknowledged that there would be a significant maintenance cost in addition to that. It has been estimated that the overall cost would come to €165 million when the cost of 25 years of maintenance is included. OPW schemes provide for 50 years of maintenance. If a barrier were constructed purely as a tidal scheme, it would deal with the issue of tidal flooding and not with the fluvial flood risk to the west of Cork city where tide is not an influence. The cost of the damage arising from tidal-only flooding tends to be between €40 million and €50 million. At a cost of €165 million, the proposed barrier it would have a cost-benefit ratio of 0.3. Clearly, it is not economically viable as a stand-alone tidal scheme. The additional cost of dealing with the fluvial problem to the west of the city, as part of a combined fluvial scheme, would drive up the overall cost significantly. Even allowing for the total combined damages or benefit of the scheme of €185 million, it would remain non-cost-beneficial.

When we look at this proposal, we have to consider when a tidal barrier might become viable and consider what else is needed as part of it. Mr. Sydenham mentioned the N25 and the railway line. At the location proposed by the Save Cork City group, there is a bypass route to the north along the railway line and the N25. Therefore, further ancillary works would be needed to defend those areas directly and that costing would have to be included. At that location, there is reasonable storage for upstream waters to flow into the River Lee from the River Glashaboy in the current scenario. In the mid-range future scenario, which is based on a 20% to 30% increase in flows and a 0.5 m sea level rise, a barrier at that location would start to run out of storage capacity. That would not be the optimum location if a 1 m sea level rise were to occur in the context of longer-term climate change. In addition, it would not protect Midleton, which is also at significant tidal flood risk. That risk will increase in the future scenario. It is probable that in the longer-term scenario, a barrier either side of Great Island would be more viable while also being more expensive. The question of whether a barrier will be a viable option at some point arises in this context. It may well become a viable option if sea levels rise by between 0.5 m and 1 m, but it is not viable at present.

I would like to make another point about the climate change scenario. If direct defences are not built in the city, the level at which flooding occurs will remain at approximately 2.5 m. If a

sea level rise of 1 m occurs at the point at which a barrier becomes viable, the barrier will have to be closed every day to protect the city from flooding. This would have huge implications for navigation, the environment and the operation of the harbour.

In reality any future tidal barrier will only work in conjunction with raised defences in the east of the city and they will work together to ensure that the barrier would only need to be closed in extreme events, with the defence walls protecting against the more frequent events. In the short term, the direct defences are cost beneficial, are the correct solution for Cork protecting against both fluvial and tidal flooding. They are the first step and in 50 years or more it might be necessary to run a tidal barrier in conjunction with them. It is important that we compare like with like. A tidal barrier is not cost beneficial at the moment and is not viable. It has been studied in detail. All the issues that the HR Wallingford report said needed to be considered have been in our assessment, and were considered to an extent in the precursor to this work which was the Lee catchment flood risk assessment and management study, CFRAMS, by Halcrow which is another reputable international consultant.

Chairman: I gave this section 23 minutes which is considerably longer than we would normally give for an answer because I wanted to be fair to the OPW and also the campaign from Cork. Our committee has heard much good information on this matter and I thank both the campaign and the OPW for coming before the committee and educating it on the pros and cons of the flood prevention proposals from both organisations. We appreciate it. I wish both groups a safe journey back to Cork.

The committee will now go into private session to deal with a number of issues.

The joint committee went into private session at 3.35 p.m. and adjourned at 3.40 p.m. until 1.30 p.m. on Wednesday, 1 November 2017.