

REPORT TO: PLANNING & TRANSPORT COMMITTEE - 8 SEPTEMBER 2008

REPORT ON: DUNDEE FLOOD STUDIES

REPORT BY: DIRECTOR OF PLANNING & TRANSPORTATION

REPORT NO: 357-2008

1 PURPOSE OF REPORT

- 1.1 To advise Committee of the findings of recently commissioned studies into river and coastal flooding within the Dundee City Council boundaries.
- 1.2 To authorise the City Engineer to obtain tenders for a second stage Coastal Flood Study which will undertake Option Appraisal, Environmental Impact Assessment and Economic Assessment of any potential flood prevention/coastal protection schemes that may be required.

2 RECOMMENDATION

- 2.1 It is recommended that Committee:
 - a notes the findings of the recent Dundee River Flood Study and the Stage 1 Coastal Flood Study.
 - b authorises the City Engineer to obtain tenders for a Stage 2 Coastal Flood Study.

3 FINANCIAL IMPLICATIONS

- 3.1 The Head of Finance advises that an allowance of £150,000 has been made within the Council's Capital Budget for 2008/09 for the completion of the Stage 2 Coastal Flood Study.

4 BACKGROUND

- 4.1 Dundee City Council as a local Enforcement Authority has powers under the Flood Prevention (Scotland) Act 1961 Section 2(1) (a) and (b) and the Coast Protection Act 1949 Section (4) to undertake appropriate measures as necessary to mitigate flooding of non-agricultural land.
- 4.2 As a consequence of repeated flooding events in Dundee in recent years resulting in road closures and property damage, and in recognition of climate change and recent national flood events, the Director of Planning and Transportation commissioned flood impact assessments for the main Dundee inland rivers and for the Dundee estuarine coastline and River Tay frontage.

River Flood Study

- 4.3 A specialist Consultant was appointed to review previous studies carried out on Dundee inland rivers and update the existing Dighty hydrological model which was first developed in 1995. The model was updated to include developments that have taken place since 1995 and has taken account of higher predicted flow rates and adjustments to rainfall intensities resulting from climate change. The model has also been extended to include the contributing tributaries to the Dighty Water including the Gelly, Fithie, Murroes, Fowlis and Liff watercourses.

- 4.4 The outcome of the study is that there are no major flood issues arising. The updated model and report will continue to inform the planning and development process within Dundee.

Stage 1 Coastal Flood Study

- 4.5 A second specialist Consultant was engaged in 2006 under a wide ranging brief to carry out a study to assess the following:

Meteorological and Tidal effects
Overtopping and Flooding
Existing Assets/Protection
Coastal Erosion

The study area extends from Invergowrie Bay to the Dighty Burn at Monifieth, on the northern shore of the estuary of the River Tay.

A copy of the Stage 1 Coastal Flood Study Report is available in the members lounge.

- 4.6 The main findings of the Consultant's report are:

4.6.1 Meteorological and Tidal Effects

This part of the study considered meteorological and tidal effects in order to predict maximum water levels for a 1 in 200 year event specific to the River Tay in 2007 and 2057. Extreme water levels contain a number of components including astronomical tide levels, tidal surge due to barometric pressure, surge due to wind and wave effects, fluvial influence and tidal amplification up the estuary.

Climate change in terms of rising sea levels and increased wind speed effects on wave height were also considered in accordance with guidance from DEFRA (the Department for Environment, Food and Rural and Affairs). For information, the rise in sea level is predicted to be 2.5mm/year to 2025, 7mm/year to 2055 and 10mm/year to 2085 (ie a total rise of 280mm over a 50 year period).

The results of this part of the study identified the various return period water levels and wave criteria to be considered against the existing sea defences. It should be noted that the design maximum water levels have a confidence level of plus or minus 300mm.

4.6.2 Overtopping and Flooding

A topographic survey was carried out of the existing sea defences and the adjacent land. Using the data determined from the meteorological and tidal effects study, flood risk maps were then prepared for a 1 in 200 year event occurring in 2007 and in 2057 (with climate change).

An analysis of the overtopping has shown that 6% of the frontage defence heights are below the 1 in 1 year still water level, 19% are below the 1 in 10 year and 55% are below the 1 in 200 year still water level predicted for 2007. The areas with the lowest defence heights are Broughty Ferry (to the west side of the castle), some sections of Dundee Port, Riverside (east of the Tay Rail Bridge) and Dundee Airport.

Maps showing the potential extent of flooding on the Dundee coastline for a 1 in 200 year flood event occurring in 2007 were produced as part of the study. Due to the topography of Dundee, the extent of potential flooding for a 1 in 200 year event in 2057 (with climate

change) is similar to the 2007 maps but of greater depth. These maps generally concur with the flood mapping issued and available from SEPA (The Scottish Environment Protection Agency).

4.6.3 Existing Assets

A visual survey and inspection of the existing assets along the whole length of the Tay Estuary coastline was carried out. The information gathered from the inspection will be used to assess the need to repair or upgrade the existing coastal defences in order to provide adequate protection. In addition to the fact that some of the defences are not of sufficient height, the inspections revealed that much of the asset is in need of maintenance and repair.

From the study findings, the Consultant has recommended that an Option Appraisal and Cost/Benefit analysis be carried out to appraise the range of options for each different length of coastline type identified that requires remedial action. The Option Appraisal will examine a range of alternative solutions, consider the advantages and disadvantages and identify a preferred option which provides the most appropriate and cost effective solution.

4.6.4 Coastal Erosion

As there is generally sea wall protection from the Stannergate westwards, a coastal erosion assessment was carried out on the Dundee frontage only between Stannergate and the Dighty Burn near Monifeith. The assessment identified current locations of erosion, compared historic maps combined with the recent shoreline survey and modelled sediment movement combined with the effects of sea level rise.

Currently, there is ongoing erosion in several areas between Stannergate and the Dighty Burn, particularly between Stannergate to Douglas Terrace at the Grassy Beach and also from Bridge Street to Sandy Point.

An assessment of the potential extent of coastal erosion and the position of the future shoreline in 2057 was carried as part of the study. One of the main causes for the projected continued erosion is the predicted rise in sea levels which, if nothing is done, may result in 3 to 4 metres of retreat in the shoreline over the next 50 years for the frontage between Stannergate and Douglas Terrace. The predicted erosion is substantially worse for the frontage between Broughty Castle and Bridge Street.

Continued monitoring of the coastline profile is necessary through annual coastal surveys to monitor the rate of erosion and the need for protection measures.

Stage 2 Coastal Flood Study

- 4.7 In order to progress any potential flood prevention/coastal protection scheme that may be required, a second stage Coastal Flood Study is required which would undertake Option Appraisal, Environmental Impact Assessment and Economic Assessment of such schemes. This particularly looks at the assets to be protected and the cost and environmental issues associated with providing the protection. This requires to be carried out in accordance with Scottish Government guidance, 'Flood Prevention Schemes: Guidance for Local Authorities'. It is recommended that the City Engineer is authorised to obtain tenders for this second stage study at an estimated cost of £150,000. Tenders will be reported for approval to a future committee. On conclusion of the second stage report, it is anticipated that Dundee City Council will be in a position to consult and seek

additional funding for any recommended schemes as part of the capital block settlement to Councils.

- 4.8 It should be noted that the Scottish Government is in the process of introducing a Flooding Bill. The Scottish Government has published its formal response to the Rural Affairs and Environment Committee Report into flooding alongside a report on the responses to the public consultation on 'The Future of Flood Risk Management in Scotland'. The new flooding legislation is due to be introduced to Parliament in September 2008. The new legislation is not expected to change the need to carry out the recommended Stage 2 Coastal Flood Study.
- 4.9 It should also be noted that an Emergency Flood Plan has been produced by Dundee City Council. The plan is updated regularly and is used to ensure that the Council is both informed and prepared for local scale flood events. The Council is also a member of the Tayside SCG (Strategic Co-ordinating Group) and works closely with all emergency services and other category 1 and 2 responders. Tayside SCG have produced a multi agency Flood Response Plan to deal with any potential large scale flood events within the Tayside area.

5 POLICY IMPLICATIONS

- 5.1 This Report has been screened for any policy implications in respect of Sustainability, Strategic Environmental Assessment, Anti Poverty, Equality Impact Assessment and Risk Management. There are no major issues.

6 CONSULTATIONS

- 6.1 The Chief Executive, Depute Chief Executive (Support Services), Depute Chief Executive (Finance), Head of Finance, Assistant Chief Executive (Community Planning) and Director of Leisure and Communities have been consulted and are in agreement with the contents of this report.

7 BACKGROUND PAPERS

- 7.1 None

Mike Galloway
Director of Planning & Transportation

Fergus Wilson
City Engineer

FW/GN/EH

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Dundee City Council
Tayside House
Dundee