Revised Dam Operating Procedures

Purpose

New flood operational procedures have been developed for Carrigadrohid and Inniscarra dams, which will be implemented during periods where extreme fluvial flood events are forecasted and which require intervention to safely manage flood risk through Cork city.

The primary purpose of the new rules is to create storage in the reservoirs in advance of a flood that might otherwise exceed the design flow in Cork. This storage will then allow a flood through Cork to be managed by modifying dam discharges in consideration of inflows on the downstream tributaries so that the total peak flow in Cork is limited to less than the 1% Annual **Exceedence Probability (AEP) (1 in 100 year) fluvial design flow of 555m3/s at Waterworks Weir.**

The new procedures will involve increased advance discharges to create storage. This has the effect of increasing the frequency of medium flood events, which will result in earlier and more frequent flooding (in medium flood events) of primarily agricultural lands downstream in areas termed as 'Washlands'.

'Washlands' are those areas adjacent to the river (and part of the Lee floodplain) which under the Scheme, will be deliberately flooded in advance of a forecasted extreme event, to facilitate pre-emptive lowering of water levels in Carrigadrohid and Inniscarra reservoirs, to create additional storage/attenuation capacity, and subsequently reduce the peak flow during the event

Constraints

- The normal range of operating levels in the dams is not altered
- Minimum and maximum reservoir levels and/or seasonal variations in same, have not been altered to avoid impacting existing environmental receptors/constrain
- Dam safety rules are not impacted
- For road embankment safety reasons, discharges from Carrigadrohid are constrained by a maximum drawdown rate
- Inniscarra discharges are physically constrained by available head at top sluices.
- For safety, there is a limitation on the rate of change of reservoir discharges.





	Operat
Normal Time	Most of the time, the dams will con
In advance of Predicted Extreme Event	The new procedures will involve in create storage in advance of the flo
During Fluvial Event	During the rising flood, continued will ensure that dam storage is reta
During Tidal Event	The New Rules will allow dam dis cycle, and inflows on downstream

Flood States, Actions and Frequencies

Flood State Ref.	Description of Flood State (Trigger)	General Action Required (Dam Discharge)	Envisaged Frequency of Occurrence post- scheme	Historic Frequency of discharges (based on review of last 10 years of record)	Notes
D	Between 96 and 48 hours before inflows to Carrigadrohid predicted to exceed 180m3/s;	Draw reservoirs down to Flood Risk Level (FRL), based on rate calculated by FFS, not normally exceeding 150m3/s from Inniscarra	Likely to occur on average up to 10 to 15 days per year .	For 100 days over last 10 years, discharges exceeded 150m3/s so 10 days per year on average	Negligible change envisaged in frequency of discharges up to 150m3/s.
С	Between 48 and 24 hours before inflows to Carrigadrohid predicted to exceed 285m3/s;	Discharge up to 200m3/s from Inniscarra (or as close to as possible given available head at dam gates)	Likely to occur on average up to 4 days per year .	For 33 days over last 10 years, discharges exceeded 200m3/s so 3 days per year on average	Very marginal increase in frequency envisaged in discharges of between 150m3/s to 200m3/s
В	Between 24 and 3 hours before inflows to Carrigadrohid predicted to exceed 285m3/s	Discharge up to 300m3/s from Inniscarra (or as close to as possible given available head at dam gates)	Likely to occur on average up to 2 days per year .	Only one occurrence over last 10 years	Discharges between 200m3/s and 300m3/s will become significantly more frequent with an occurrence expected to occur once or twice per year.
A	400m3/s threshold inflow to Carrigadrohid is crossed (or forecast to be exceeded at a short lead time of 3 hours).	Manage flow at 540m3/s or less through Cork by adjusting Inniscarra discharge allowing for predicted inflow from downstream tributaries. Discharge from Inniscarra likely to be between 300m3/s and 400m3/s	Likely to occur on average, once every 3 to 5 years	Only one occurrence over last 10 years	Minor increase in the frequency of such discharges as this will only occur around the peak of extreme events.

Roles and Responsibilities

There are two primary roles involved in implementing the revised operational rules, during flood conditions, as follows:

- Flood (Advisory) Body, the OPW through its agents* fulfilling the role required under the Lower Lee (Cork **City) Drainage Scheme.**
- Electricity • Reservoir Operator – **Supply Board (ESB)**
- It is envisaged that Cork City Council will act as agents for the OPW in carrying out the functions of the Flood (Advisory) Body

Flood Forecasting System

- well as real time data during event
- It will run continuously, monitoring for potential extreme events
- above a predefined threshold that could otherwise result in flooding.
- discharge rates
- Shournagh/Bride and Tide Levels
- allow for the greater uncertainty at longer lead times
- There will be some false alarms, but these will serve an important training function.

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ncreased advance discharges (with graduated increases) to bod

increased discharges, not exceeding the threshold of flooding, ained until it is needed at the peak of the event

scharges to be managed optimally in conjunction with the tidal tributaries.

Flood Forecasting System (FFS) now developed which uses forecasted rainfall in lead up to event as

It will provide an alarm to the operator, a number of days out, when a predicted significant event is

This will allow Dam levels to be lowered at predefined spill rates which won't flood property (buildings), in preparation for/anticipation of the extreme event. The dam discharge pattern to be followed will be that determined by the FFS, which has an inbuilt function to calculate the required

It will allow management of discharges in real time (if required) taking account of inflow from the

Trigger levels are set conservatively low to ensure that large events are caught. The trigger levels