Marlfield
FLOOD RELIEF SCHEME

OPTIONS DEVELOPMENT – ELECTED MEMBERS WORKSHOP

15/03/2023

OPW
Oifig na nOibreacha Poiblí
Office of Public Works

Comhairle Contae Thiobraid Árann
Tipperary County Council

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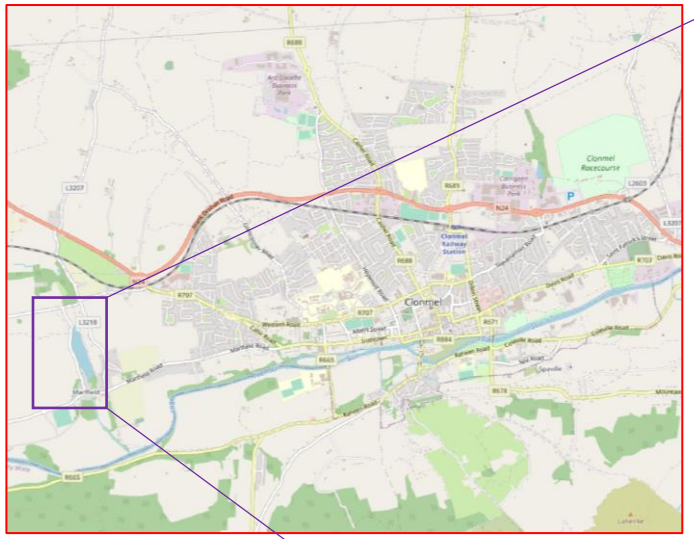
Project Objectives

- Improve the safety of Marlfield dam.
- Prepare a Flood Relief Scheme to alleviate the risk of flooding in Marlfield.

Location

Clonmel, Co. Tipperary

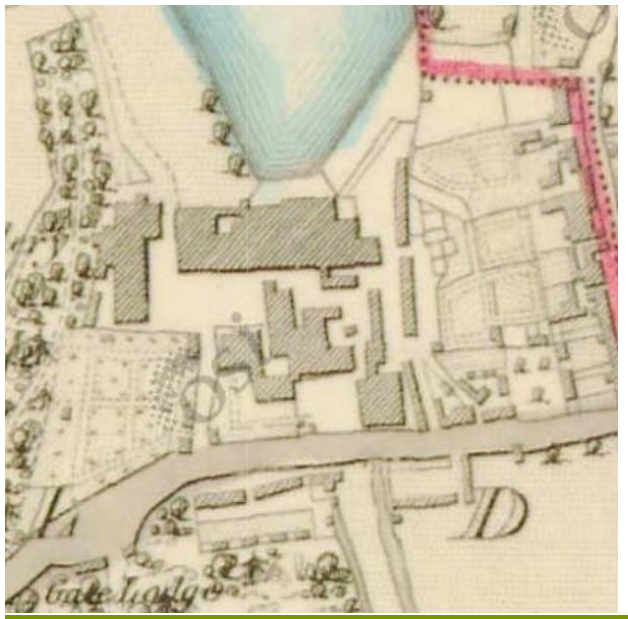


Marlfield

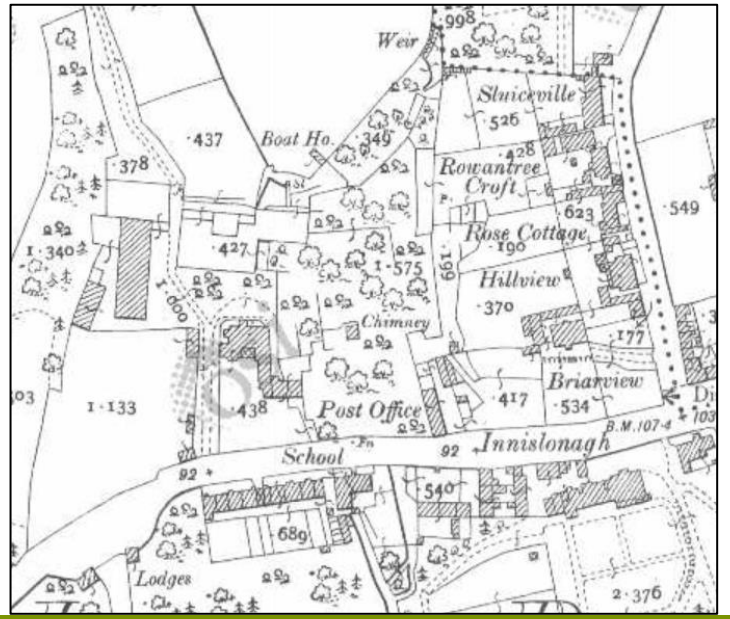
Site History

- Lake and dam were constructed in 1700's.
- A large mill was recorded as being built immediately downstream of the dam in 1769.
- The mill became a distillery from 1817 until closure around 1857.
- Marlfield house installed a hydro turbine, anecdotally used until 1980s.
- Two hydraulic rams provided water supply from the lake for the locality – dates unknown.

OSi First Edition 6" (1829-1841)



OSi 25" map (1897-1913)



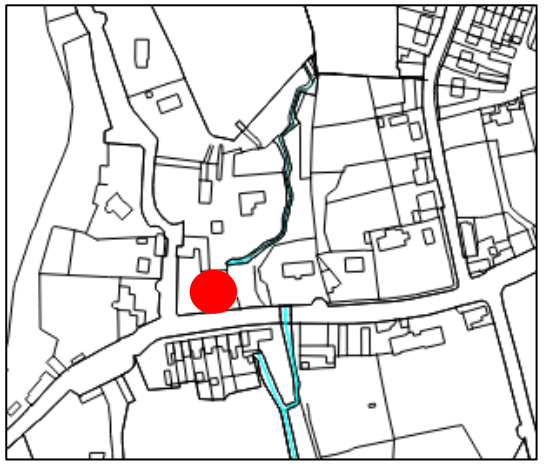
OSi current vector map

Flood History

Frequent flooding downstream of the dam

14th November 2014

28th October 2022



Flood History

February 2021

Constraints

- Environmental/ Social
- Technical
- Climate Change Adaptability

Environmental / Social

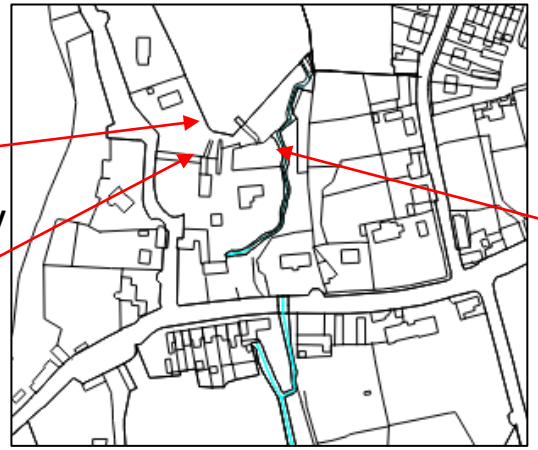
- Lake is a pNHA with significant bird life including wintering species and three populations of national importance and alluvial woodlands
- Northern half of the lake is very shallow (mostly <500mm deep) over deep sediment deposits
- Bat maternity roost in occupied house below the dam (built c2010)
- Channel downstream the dam connects into a SAC (River Suir)
- Village area below the dam is an Architectural Conservation Area and there are protected structures in the village
- Amenity value of the area

Technical - Dam

Dam ownership not fully confirmed

No vehicular access to dam

Pedestrian access through private property



Mill ruins between the house and dam

Ponded water between the house and dam

Dam partly supported by mill wall (3m high)

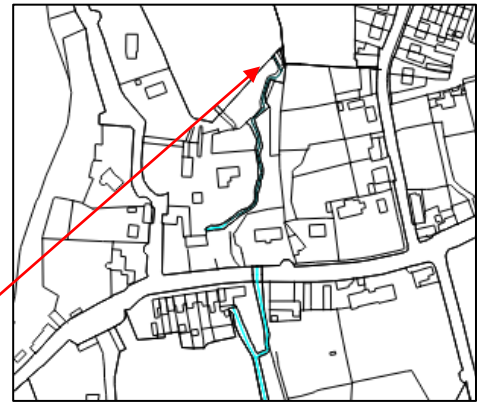
Extensive Tree vegetation

Blocked sluice

Technical - Weir

Difficult access to the weir location

Extensive tree vegetation



Climate Change Adaptability

OPW guidelines for Flood Risk Management (FRM)

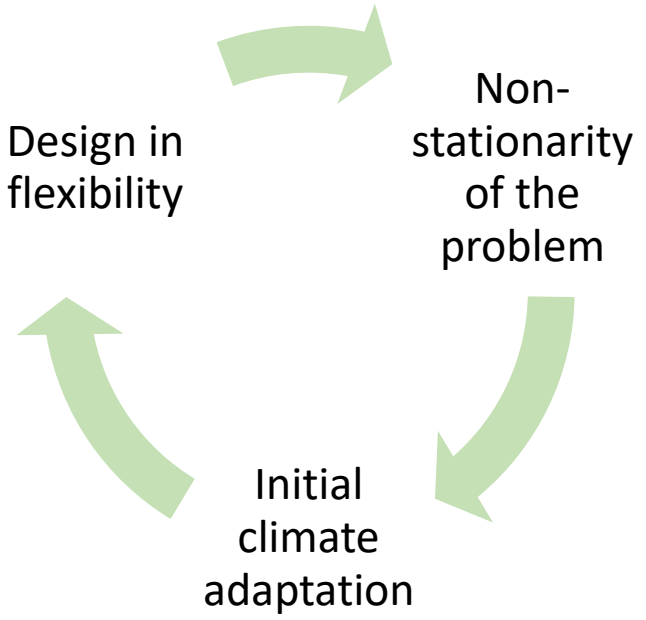
Promoting sustainable communities and supporting our environment through the effective management of the potential impacts of climate change on FRM

Enhancing knowledge of the potential impacts of climate change for FRM through research and assessment.

Adapting FRM practice to effectively manage the potential impact of climate change on future flood risk.

Aligning adaptation to the impact of climate change on FRM across sectors and wider Government policy.

Flooding can affect all aspects of life, and can be impacted, beneficially or detrimentally, by human actions. As such, flooding is a **cross-sectoral issue** that needs to be considered by **all sectors and local authorities** in considering future development and adaptation to future climatic changes



Flood Management Strategies

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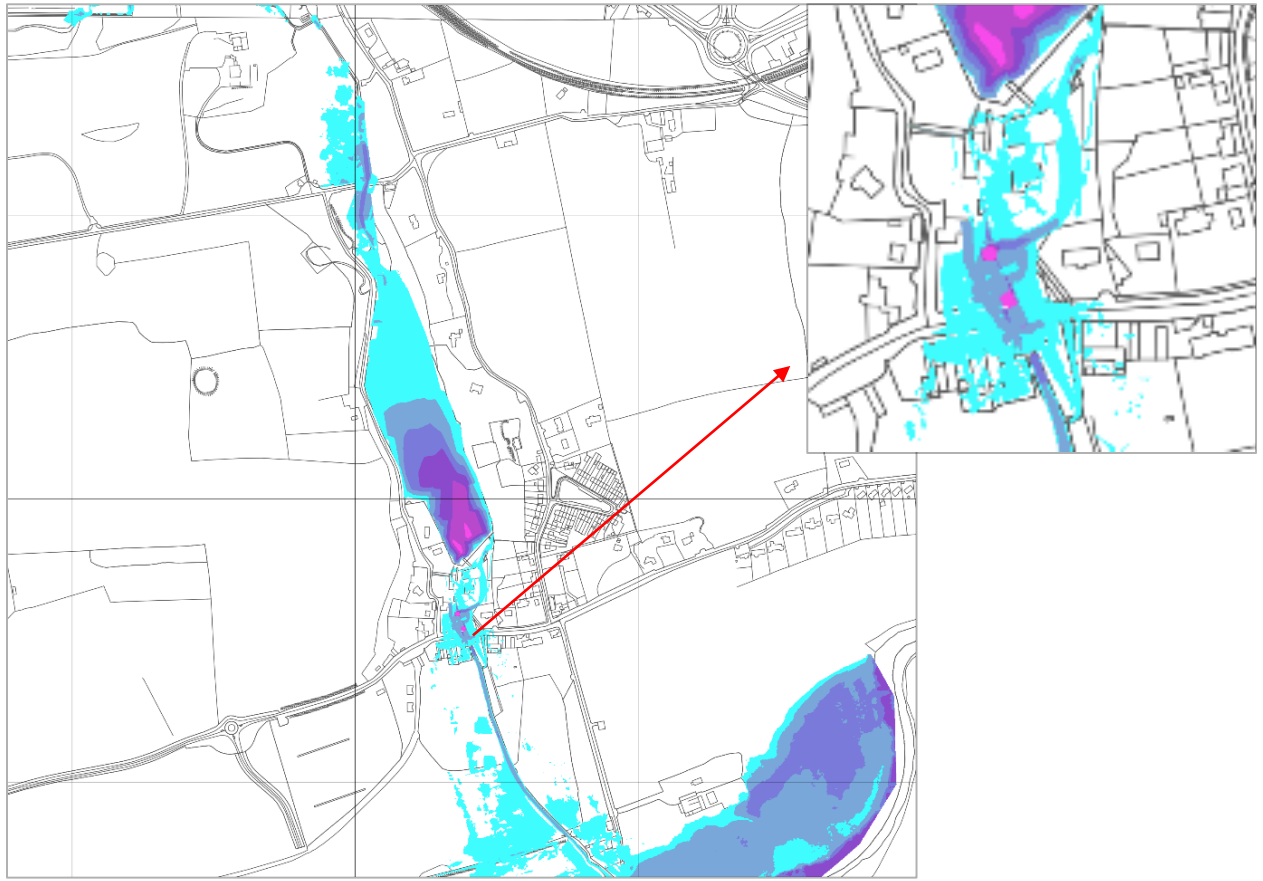
Hydraulic modelling

Option developments

Flooded Areas by Model

100-year Event



Potential Flood Risks for 100-year Event:

- The dam is over topped, potentially increasing erosion of the dam
- Lack of capacity of the bridge downstream the Lake and of the existing culverts
- Flooding of several properties and of the main road

Dam Breach Modelling

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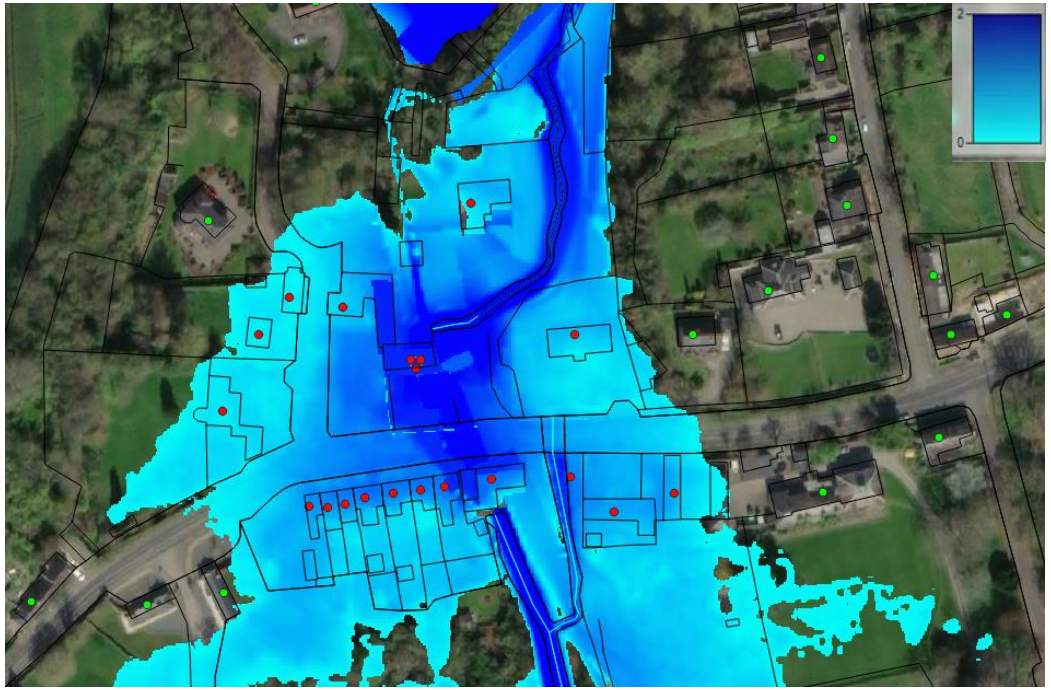
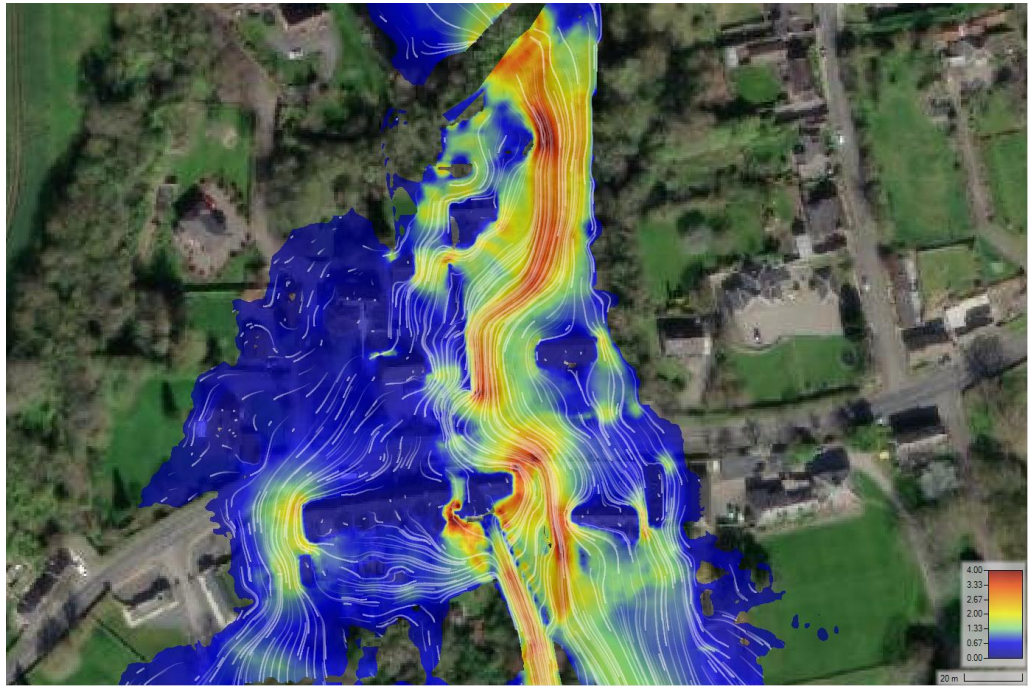
Flow Depth (0-2m)



Flow Velocity (0-4m/s)



Preliminary Screening - Needs

- Dam
  - Reduce the water level in the lake by at least 500mm, or
  - Increase the dam crest level,

  and
  - Remove the trees from the dam, and
  - Protect the toe of the dam from erosion

- Village
  - Reduce the flow through the village, or
  - Increase the conveyance capacity in the village

Design Considerations

- Reduce lake water level
  - Lake depth in northern half is <500mm, lowering the weir could expose large parts of the bed in the northern end. This could change both the habitats and the perceived amenity value.
  - To maintain the northern water level and satisfy Habitats Directive and Water Framework Directive a new mid-lake dam is likely to be required.

- Watercourse works
  - Need to comply with Water Framework Directive and not adversely affect quality, morphology or fish passage, ideally improving them.
  - Impacts on the downstream Suir SAC can be showstoppers.
  - Invasive species must be controlled.

Potentially Viable Measures

Storage

Improvement of Channel Conveyance

Hard Defenses
Concrete walls
Embankments
Barriers

Flow diversion through culvert or open channel

Relocation of properties

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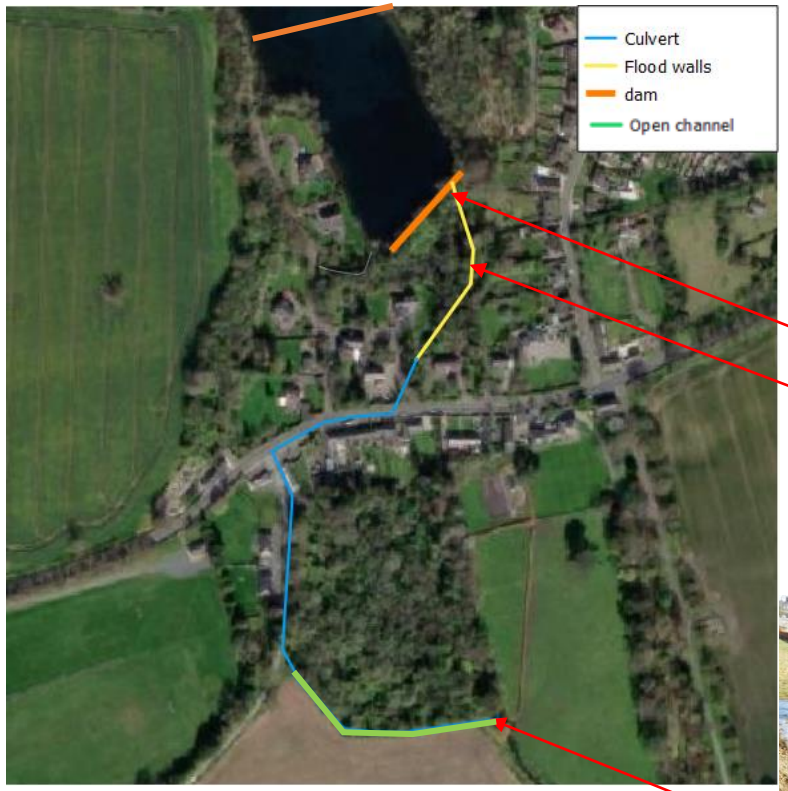
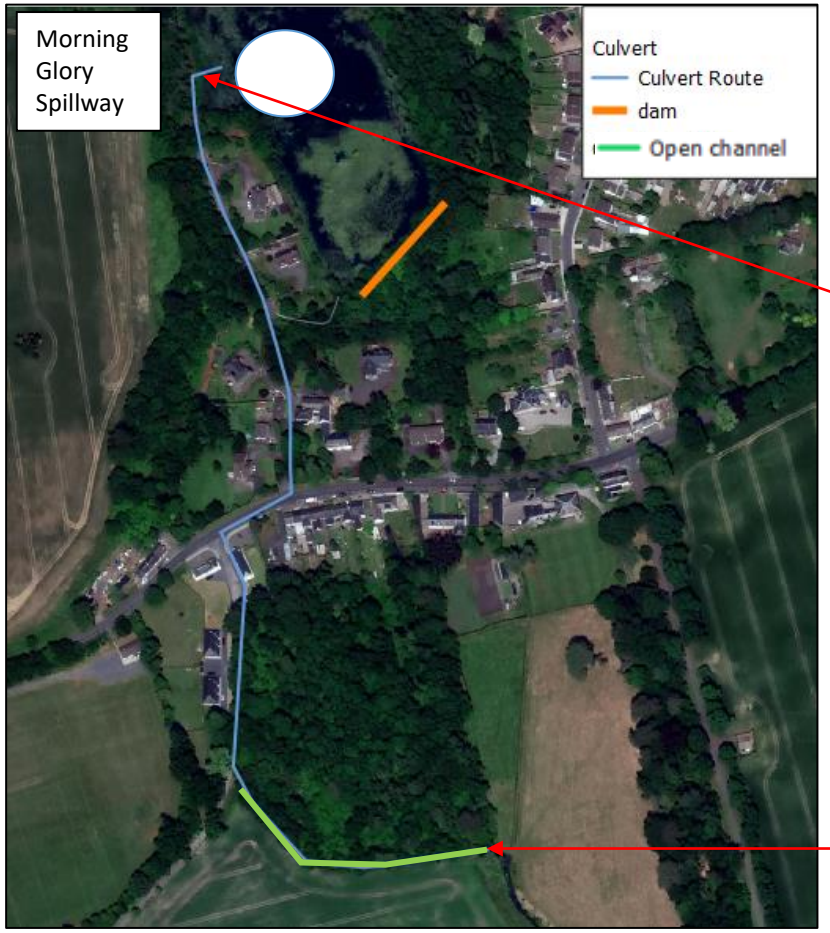
Technically Viable Options

Option 1. Lower Weir and upgrade existing spillway with walls and downstream diversion



- Lowering of the existing weir by 0.5m to 29.4m
- New mid-lake dam to retain water level in northern part of lake
- Flood walls 1.2m high for 90m ca along the spillway
- Diversion of the channel into a new 2.1m diameter culvert 530m ca long

Option 2. Maintaining existing Weir and add diversion culvert on Pond Road



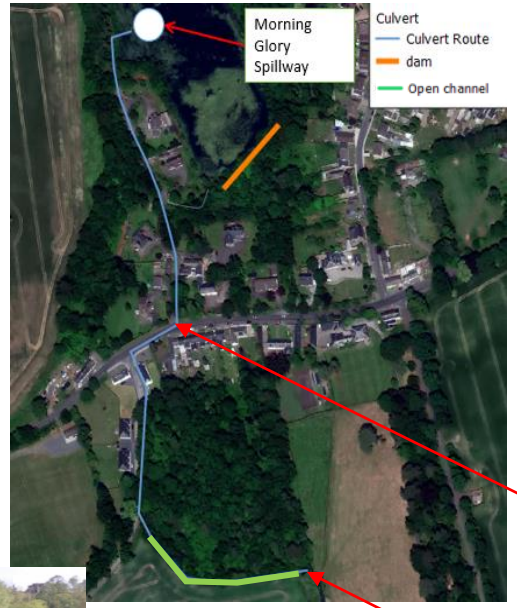
- Maintaining existing weir
- Morning glory type spillway 15m diameter
- Diversion culvert 2.1m diameter down Pond Road 715m ca long

Morning Glory spillway at Vartry Reservoir

Option 3. Lower Weir and divert 1% AEP flow via new culvert at Mill Apartments downstream of existing road culvert with mid-lake dam

- Lowering of the existing weir by 0.5m to 29.4m
- Weir wall across the river (approx. 5m long and 1.5m high) with a 1m^2 opening
- Diversion culvert 2.1m diameter 90m ca long

Option 4. Lower half Weir and add new Overflow with diversion culvert on Pond Road + mid-lake dam

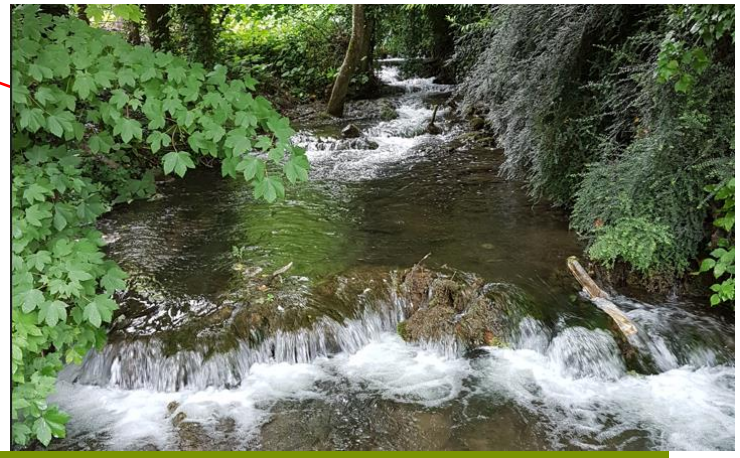


- Lowering half of the existing weir by 0.5m to 29.4m
- Morning glory type spillway 5m diameter
- New dam (100m long and 6m high) north of properties to maintain level on top half of the lake higher than 30m

Sample Morning Glory spillway Design from another project (below).

Option 5. Raise dam embankment and divert 1% AEP flow via open channel and culvert

- Raising the existing dam embankment to at least 30.8m
- Flood wall on the west bank of the stream and of the lake to protect the properties on the lake shore
- Open diversion channel approx. 40m long (4m wide x 1.75m depth)
- Diversion culvert 2.1m diameter 10m ca long
- Regrading works to deepen the existing 40m long channel and provide retaining wall to increase conveyance



Project Structure

Stages

Stage I: Scheme Assessment, Development and Design

- Topographic & CCTV Surveys *Completed*
- Hydrological Analysis *Completed*
- Hydraulic Modelling *Completed*
- Environmental Surveys & Assessments *Baseline Completed*
- Options & Scheme Development ***Ongoing***

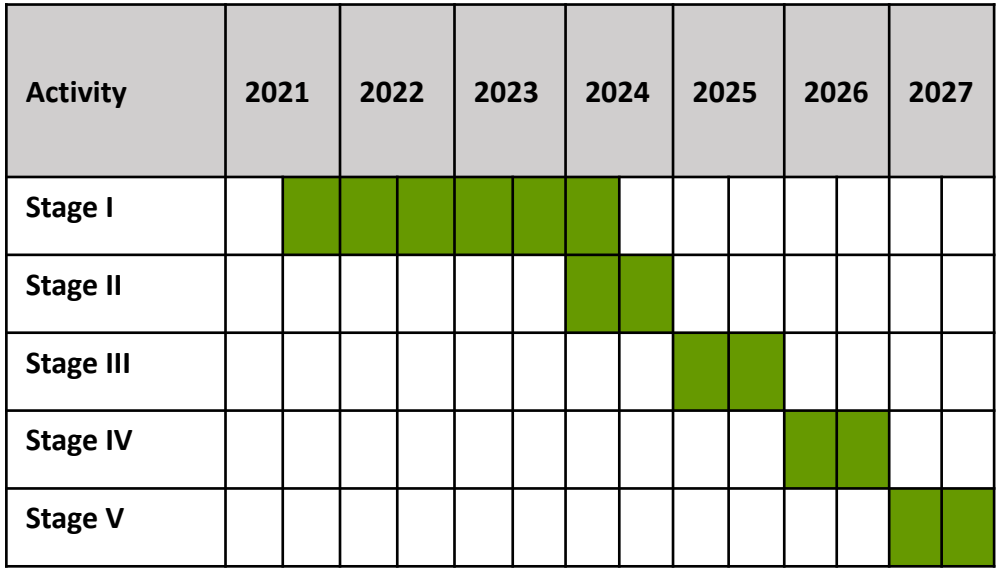
Stage II: Planning

Stage III: Detailed Construction Design & Tender

Stage IV: Construction

Stage V: Handover

Timeline



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Discussion