

# Ecological enhancement works in floodplain management plans

## Fact sheet

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This fact sheet provides guidance on the rules, assessment criteria and process for the environmental assessment of ecological enhancement works in management zone A (main floodways) and management zone D (special protection) of a floodplain management plan (FMP).

Ecological enhancement works are flood works that improve flood connectivity to flood-dependent ecological assets specified in local, State or Commonwealth environmental plans, policy or legislation for the purpose of enhancing the ecological value of the asset.

These types of works are permitted in management zone A and, in some FMP, management zone D.



**Please note:** They are not to be used as a cover for the approval of irrigation and other agricultural infrastructure.

Ecological enhancement works aim to provide a positive outcome for the environment, consistent with principles of the *Water Management Act 2000* which allows for a FMP to deal with the restoration or rehabilitation of land, water sources or their dependent ecosystems, in particular, to the following:

- the passage, flow and distribution of flood water,
- existing dominant floodways and exits from floodways,
- rates of flow, floodwater levels and duration of inundation,
- downstream natural flood regimes, including spatial and temporal variability.

Ecological enhancement works must:

- improve flood connectivity to a flood-dependent ecological asset that is listed in a local, State or Commonwealth environmental plan, policy or legislation, and
- provide an enhancement to the ecological value of the flood-dependent ecological assets through the improved flood-connectivity, and
- meet the assessment criteria specified for management zone B of the relevant FMP.

## What information is required to accompany an application for an ecological enhancement work?

A flood work application for an ecological enhancement work (EEW) should include a report including all information necessary to enable WaterNSW to assess the proposal.

The following provides an outline of what a report must include:

### Opening statement

A statement signed by the applicant that the proposed EEW described within the proposal has been designed to improve flood connectivity to [the target ecological asset] which will be achieved through (description of the proposal).

### Executive Summary

Provide summary of the purpose of the EEW, including its design.

### Description of ecological asset

Identify target asset and desired objectives and outcomes.

Note: The ecological asset must be true to the definition of an ecological asset, which is provided in the relevant FMP.

#### Details of the ecological asset, including a:

- statement of whether the ecological asset is broadly a wetland and/or floodplain ecosystem and/or groundwater recharge area.
- map identifying the ecological asset spatially.
- description of the species and values that comprise the ecological asset (see schedule 1 of the relevant FMP).
- statement identifying the FMP and/or local, State or Commonwealth environmental policy or legislation the ecological asset is mapped, recognised in or protected by (to meet the requirements of the rules for EEWs).
- statement of the current condition of the ecological asset and details of any previous restoration efforts, if relevant. Evidence may include current and historical photographs of the ecological asset and EEW site to enable monitoring of ecological outcomes. All recent photo points should be identified by GPS coordinates.
- description of the known water requirements of the ecological asset with reference to available published and unpublished information to capture the best available knowledge.

### Description of flood behaviour

Details of flood behavior in the area, including:

- likely source/s (i.e. entry/exit points) and type/s of flood connectivity to the ecological asset.
- any trends or changes to flood behavior.
- a description of how flood connectivity to the ecological asset have been altered and the impacts of this to the ecological asset. Evidence may include historical and recent photography of the site.

## Description of non target ecological, cultural or heritage assets or values

Identify and map other flood-dependent ecological, cultural or heritage assets or values potentially impacted by the proposed EEW (non-target assets).

## Hydraulic objectives

Identify relevant strategies the EEW will use to meet the hydraulic target to improve flood connectivity for floods less than or equal to the small design flood.

### For example:

- improve the passage, flow and distribution of flood water.
- restore existing dominant floodways and exits from floodways.
- restore rates of flow, floodwater levels and duration of inundation.
- restore downstream water flows.
- restore natural flood regimes, including spatial and temporal variability.

## Environmental outcomes

Identify relevant strategies the EEW will use to meet the environmental outcomes that results from the improved flood connectivity.

### For example:

- maintain or improve the structure and condition of habitat for waterbirds, fish and other amphibious fauna.
- contribute to nutrient, sediment and carbon cycling.
- improve opportunities for floodplain fauna to migrate, reproduce and feed.
- support recruitment of floodplain vegetation, including flowering, seeding and germination
- suppress the growth and intrusion of invasive vegetation weed species.
- improve wetland ecosystem resilience.

## Design specifications

### Design specifications must include:

- a plan of the proposed work/s.
- a map showing the location of the proposed work and the ecological asset in question.
- demonstrate that the height and configuration of the EEW are such that they would be overtopped by larger floods. The applicant must refer to small design flood results and local flood marks to estimate flood heights.
- reference to best-available historical flood imagery.
- reference to best-available digital elevation models (DEM), survey results and/or contours (preferably showing hillshade).

- provide a flood study to show where and how the EEW is expected to affect flood behavior on properties other than the landholding under application and the assessment criteria for management zone B have been met.
- describe how the proposed work/s will improve flood connectivity of small floods (of less than or equal in size to the small design flood) that has been previously altered.
- other relevant design specifications.

## Hydraulic modelling and reporting

Outline how the EEW will improve the behavior of floods less than or equal to the small design flood.

Hydraulic modelling is required to demonstrate that the proposed ecological enhancement work will meet the local hydraulic and cumulative impact assessment criteria and is used to predict hydraulic changes associated with the proposed work(s).

Hydraulic models have been developed for each FMP and flows can be extracted from these to be used by the applicant and/or consultants to develop their own model and run design floods and scenarios. This flow data is made available to you after the initial [pre-application meeting with WaterNSW](#).

### The following minimum design flood should be used:

- All design floods within the relevant FMP,
- Flow for which the environmental outcome is designed (e.g., environmental water delivery).

Assessment should be focused on the smaller events as these would be most affected by the proposed ecological enhancement work.

### The scenarios required to be modelled are:

- With the ecological enhancement work,
- Without the ecological enhancement work.

If the ecological enhancement work is part of a wider application including other types of flood works, the ecological enhancement work(s) should be modelled separately to isolate the potential impacts and benefits.

Provide inundation extent, depth, velocity and depth velocity product maps for each modelled design flood and scenario as well as the change in these variables. That is, afflux or flood level mapping.

### Quantify the following for each design flood and scenario:

- Total area,
- Area of the target ecological asset,
- Area of non-target flood-dependent ecological asset.

Report the volume, maximum velocity and maximum depth of each design flood and scenario for the target and non-target assets. Report other variables as required to demonstrate improved flood connectivity and associated environmental outcomes.

**Include evidence that the height and configuration of the works are such that they would be overtopped by larger floods. Include reference to:**

- model (where required) impacts on flood behaviour under a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods.
- local flood marks.
- best-available historical flood imagery.
- best-available DEM (preferably showing hillshade).
- survey results.
- contours.

### Environmental outcomes

Outline how the EEW is expected to improve flood connectivity to the ecological asset with reference to the known water requirements of the ecological asset.

**This assessment should be completed by an ecohydrologist or person of similar experience in floodplain ecology and must fulfil the following:**

- a) Describe and assess any construction related impacts to floodplain ecology.
- b) Provide an assessment of predicted changes to the target and non-target ecological assets, tabulating predicted changes to hydraulic variables (showing both % change and magnitude of change).
- c) Describe the hydraulic changes to the target ecological asset and show how these changes meet the desired hydraulic objectives and environmental outcomes.
- d) Document any changes to non-target ecological assets and assess the likely impact to floodplain ecology, flow paths and flood connectivity.
- e) Provide any mitigation measures that will be used to limit impacts to the environment and maintain flood connectivity during the construction and operation of the flood work. This should include a review of impacts and effectiveness post-construction and a flow of a magnitude similar to which the structure was designed.

### Risks

**Outline any potential risks and management strategies to mitigate risks associated with the EEW proposal. These may include, but not be limited to, the following risk of:**

- changes to water quality/conditions.
- changes to flood water distribution.
- changes to flood duration (e.g., permanent inundation of ecological assets dependent on periodic flooding).
- changes to flood water velocities impacting ecological assets.
- erosion.

- passage.
- negative impacts to non-target ecological or cultural assets.
- negative impacts on native fish passage if EEW is constructed in areas of native fish passage.

## Monitoring, evaluation and reporting

The applicant should outline a monitoring plan for the assessment of EEW against the hydraulic and ecological objectives identified by the applicant. The plan should provide a method for monitoring and reporting on how the EEW improves the behavior of small floods and enhances identified ecological assets.

### The plan should consider:

- appropriate indicators and timeframes to assess hydraulic and ecological outcomes.
- standards for the actual measurement.
- appropriate evidence i.e., ecological sampling on-site, aerial/satellite imagery, photographs.

## References

Correct and complete citations of all documentation referred to within the report for independent verification.

## Appendices and attachments

Sub-consultant reports and supporting information as required.

### Need help?

If you need more information, please contact our Customer Service Centre on [1300 662 077](tel:1300662077), Monday to Friday between 8am-5pm or email [Customer.Helpdesk@waternsw.com.au](mailto:Customer.Helpdesk@waternsw.com.au)

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