



**MODIFICATION REQUEST:
Koondrook-Perricoota Forest Flood
Enhancement Project
(MP 09_0098 MOD 1)**

***Discharges to the Barbers Creek system and
Thule Creek and construction of a new Sandy
Bridge***



Environmental Assessment Report
Section 75W of the
Environmental Planning and Assessment Act 1979

June 2017

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1. BACKGROUND

Forestry Corporation (the Proponent) has submitted a request to modify the project approval for the Koondrook-Perricoota Flood Enhancement Project (the project). The project was approved on 15 August 2010 by the then Deputy Director-General, Development Assessment and Systems Performance, of the Department of Planning, under delegation from the then Minister for Planning.

The project involves the construction and operation of infrastructure, including a diversion channel and other water flow regulation structures, to divert water from the River Murray to periodically flood River Red Gum Forest within the Koondrook and Perricoota State Forests. The project is required to support flood dependent ecological communities — by allowing for up to 100 days of managed inundation where there have not been recent natural flood events — and reduce impacts to nearby property by reducing the time it takes for flood waters to recede. A map of the project is provided at **Figure 1**.

The operation of the project involves three phases: filling, inundation, and recession. Of importance to this modification request, the approved project (in part) diverted water during the recession phase to waterways in the Barbers Creek system, up to a maximum discharge rate of 250ML/day for each waterway. The discharge rate determines the duration of the recession phase, when the flooded system empties.

Through development of the Operating Plan for the project, and informed by detailed hydrodynamic modelling, the Proponent has determined that the project needs to be modified to reduce environmental risks associated with longer recession phases in the Barbers Creek system. The Proponent has concluded that the current limits on diversion rates through the Barbers Creek system will cause flood water to back up through the Koondrook-Perricoota Forest, necessitating reduced inflow rates and reducing the extent of inundation.

The Proponent's investigations, after project approval, have also revealed that one of the creeks (Calf Creek) thought to be part of the Barbers Creek system is separated from that system by a levee. To support water to flow out of the Forest following inundation, the Proponent has investigated allowing discharges to nearby Thule Creek. However, discharges through Thule Creek were not envisaged in the project approval, and are therefore not currently permitted. The Proponent, through this modification, seeks to allow discharges to Thule Creek.

The Proponent asserts that, without changes to the project, pooling in the Barbers Creek system and limits on using Thule Creek will:

- affect water quality by increasing the likelihood of hypoxic (low dissolved oxygen) water forming
- impact ecological values along the system, through increased risk of fish being trapped in the Forest, and overwatering of River Red Gum Forest and the endangered Inland Grey Box Woodland in the area
- impact adjacent landholdings.

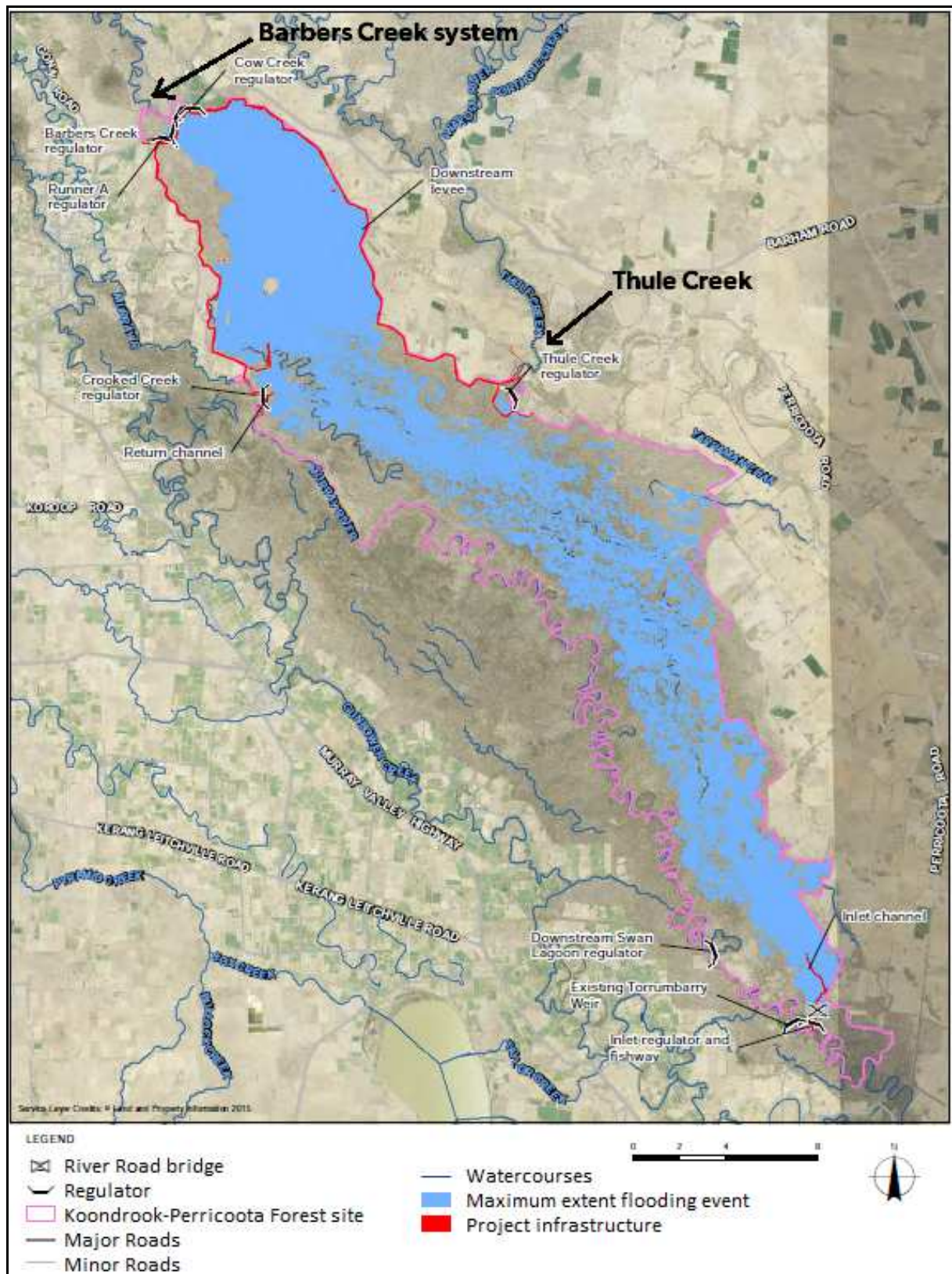


Figure 1 Approved project (Source: *Koondrook-Perricoota Forest Flood Enhancement Works: Section 75W modification Environmental Assessment* (Forestry Corporation, February 2017))

2. PROPOSED MODIFICATION

2.1 Modification Description

To improve the operation of the project, this modification request (Modification 1) proposes two main changes to the hydrological aspects of the project:

- increasing the maximum diversion rate to Barbers Creek system
- allowing managed discharges to nearby Thule Creek.

The changes are intended to provide an increased level of inundation for flood-dependent River Red Gums, and reduce the period that properties are affected along the Barbers Creek system after an event.

These changes would be managed through an 'alternative downstream flow option'. The Proponent would use the existing approved infrastructure to manage flows to the alternative downstream flow option; no new additional structures are required to give effect to this option. However, the Operating Plan is part of the approved Operation Environment Management Plan (OEMP), which would need to be amended to include procedures for the alternative downstream flow option.

The Proponent also proposes to build a new bridge over Barber Creek to retain private property access during managed events. This bridge would replace the existing Sandy Bridge, which has been load-limited due to previous damage and recently bypassed by a new low-level road constructed on an embankment. Clearing of 0.45 hectares of River Red Gum Forest would be required for construction of the bridge. The bridge would be operated and maintained by Murray River Council.

The modification is summarised in **Table 1**.

Table 1: Key Proposed Modifications

<i>Aspect</i>	<i>Description</i>
<i>Flows</i>	Implementation of an alternative downstream flow option, increasing total managed releases from 1000 ML/day to 3000 ML/day, with 1000ML/day to Thule Creek and the remainder to Barbers and Cow Creeks and Runner A
<i>Built infrastructure</i>	Construction of a new bridge over Barber Creek at Sandy Bridge Road

3. STATUTORY CONTEXT

3.1 Modification of the Minister's Approval

The project is considered a transitional Part 3A project, under Schedule 6A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Proponent may therefore seek to modify the project in accordance with section 75W of the Act.

Consideration of the modification request under section 75W of the EP&A Act is appropriate as the proposed modification is not consistent with the project approval, but would have limited environmental consequences beyond those which had been the subject of assessment.

3.2 Delegated Authority

On 16 February 2015, the then Minister for Planning delegated her powers and functions under section 75W of the EP&A Act to Executive Directors in the Planning Services division of the Department in cases where there are less than 10 public submissions (not including submissions from public authorities) in the nature of objections in respect of the modification request, no political disclosure statement has been made, and the relevant local council has not made an objection.

The Executive Director, Priority Projects Assessments may determine this modification, as the modification meets the terms of this delegation.

4. CONSULTATION AND SUBMISSIONS

4.1 Exhibition

Under Section 75X(2)(f) of the EP&A Act, the Secretary is required to make the modification request publicly available. The Department exhibited the modification request (**Appendix A**) between Friday 10 March 2017 and Friday 31 March 2017 (inclusive) at the following locations:

- Department of Planning and Environment: Information Centre, 320 Pitt Street, Sydney NSW 2000
- Nature Conservation Council of NSW: Level 14, 338 Pitt Street, Sydney NSW 2000
- Murray River Council: 21-25 Conargo Street, Mathoura NSW 2710
- Murray River Council: 15 Murray Street, Barham NSW 2732.

The Department placed a notice of the exhibition in the *Koondrook Barham Bridge Times* on 9 March 2017, and in the *Deniliquin Pastoral Times* and the *Echuca Riverina Herald* on 10 March 2017, and wrote to previous submitters and agencies inviting submissions on the modification request.

4.2 Submissions

One objection was received from the public, from the **Wakool River Association**.

The Wakool River Association reiterated that it remains opposed to any managed watering until outstanding third party impacts are addressed. The submission raised concerns that the alternative downstream flow option would not create a framework to address the community's main concerns of third party impacts, including issues with block banks (structures built to store water) on Barbers Creek, and detailed specific concerns with the effects of a managed event.

Four submissions were received from public authorities.

Office of Environment and Heritage (OEH) noted that the modification request did not follow the Framework for Biodiversity Assessment, but considered there would be no significant impact from the removal of four hollow-bearing trees associated with the bridge construction. OEH requested the Proponent firm its commitment to archaeological assessment and subsurface testing of the potential archaeological deposit at the site of Sandy Bridge, and also requested further details about flooding impacts of and on the bridge.

National Parks and Wildlife Services Division (South-west Region and Landforms and Rehabilitation Unit) of OEH supports the proposal, and requested to be engaged once operations in Thule Creek commence, in order to manage effects on Whymoul, Weetupa and Noorong National Parks.

Department of Primary Industries (DPI) supported varying the discharge rate, and measures to address water quality impacts, while requesting further information about impacts of any water quality effects on the Wakool River.

DPI also recommended it be consulted in the update to the Operating Plan (including preparation of a Fish Management Plan) and recommended the Proponent prepare a Construction Environmental Management Plan (CEMP) for construction of the Sandy Bridge replacement.

Murray Darling Basin Authority supported the modification, noting that it had been closely involved in its development.

Submissions are available at **Appendix B**.

4.3 Response to Submissions

The Proponent provided a response to the issues raised in submissions, in a Response to Submissions Report (RtS), which was published on the Department's website (see **Appendix C**).

The Department received two submissions following publication of the RtS, from OEH and DPI.

OEH reviewed the RtS and noted that the issues it had raised including biodiversity, Aboriginal cultural heritage and flooding had been addressed. In particular, OEH noted the Proponent had confirmed in the RtS that it would accept a condition that required archaeological assessment and subsurface testing in consultation with OEH before construction of Sandy Bridge, once detailed design has been finalised, and further details provided about the bridge.

DPI also reviewed the RtS, and noted that there remained a risk of potential significant impacts to fish due to stranding, that required measures to address and mitigate.

The Department has considered the issues raised in submissions, and the Proponent's responses, in its assessment of the proposed modification.

5. ASSESSMENT

The Department considers the key issues for the proposed modification to be hydrology, impacts on third party property, and ecology.

5.1 Hydrology

The modification proposes a change in the way the project releases water downstream during managed flood events. The objective of the modification is to increase outflow rates, to reduce the duration of the recession phase and allow for a longer inundation phase during a managed flood event. This would reduce the period

that properties are affected along the Barbers Creek system after an event, while providing an increased level of inundation for flood-dependent River Red Gums.

Following approval of the project, the Proponent reviewed the operational risks of the project as part of development of the Operating Plan, which would govern the operation of the managed flood events. The Operating Plan identified that limits on discharges to Barbers Creek and the restriction of flows to Thule Creek would contribute to risks of hypoxic water formation, bank erosions, and the overall extent of inundation. Following an agency workshop in 2011, the Murray Darling Basin Authority conducted hydrodynamic modelling of a number of operational scenarios for the project, including eight detailed options, for increase release rates.

The key residual impact with the modelled scenarios was the effect of overbank flows on private property. To address this, the Proponent developed a changed operating process that would limit flows to the top of the bank of the watercourse.

This changed process—the alternative downstream flow option, would allow for discharges:

- to Barbers Creek system — 2000ML/day (previously limited to 1000ML/day)
- to Thule Creek — 1000ML/day (previously not permitted).

The Proponent has characterised these limits as 'nominal'. The primary and overriding intent is for flow rate of outflows to increase, while being limited to top of bank flows to limit third party property impacts. Further, the Proponent has flagged that flows would need to be varied to reduce bank erosion (notching and bank slumping) through the use of stop logs at the regulators, and adaptive management would be required to avoid impacts in areas where banks are lower than elsewhere in the system.

A hydrograph showing the revised modelled outflows through these creek systems during the maximum flood event is provided below at **Figure 2**.

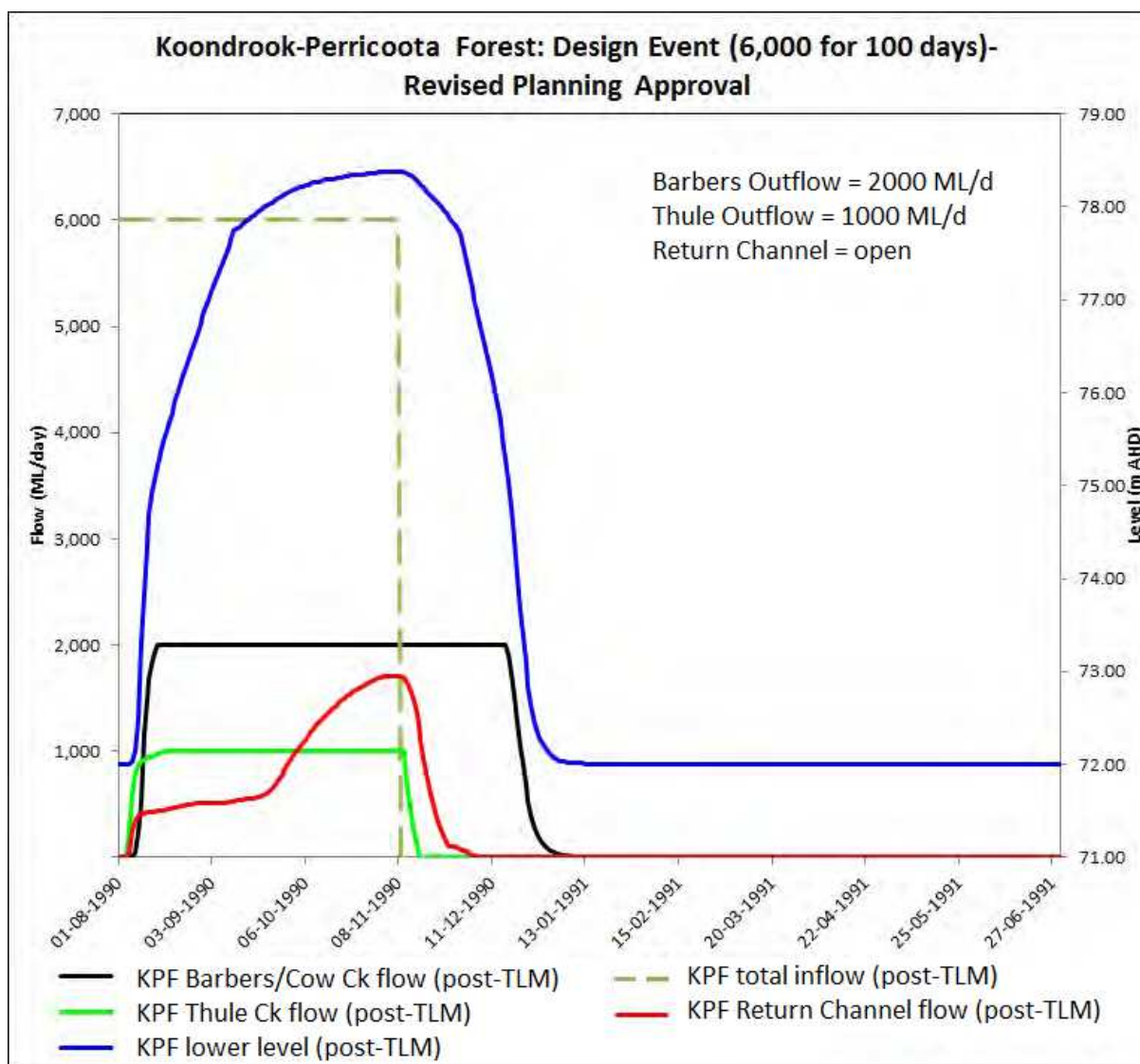


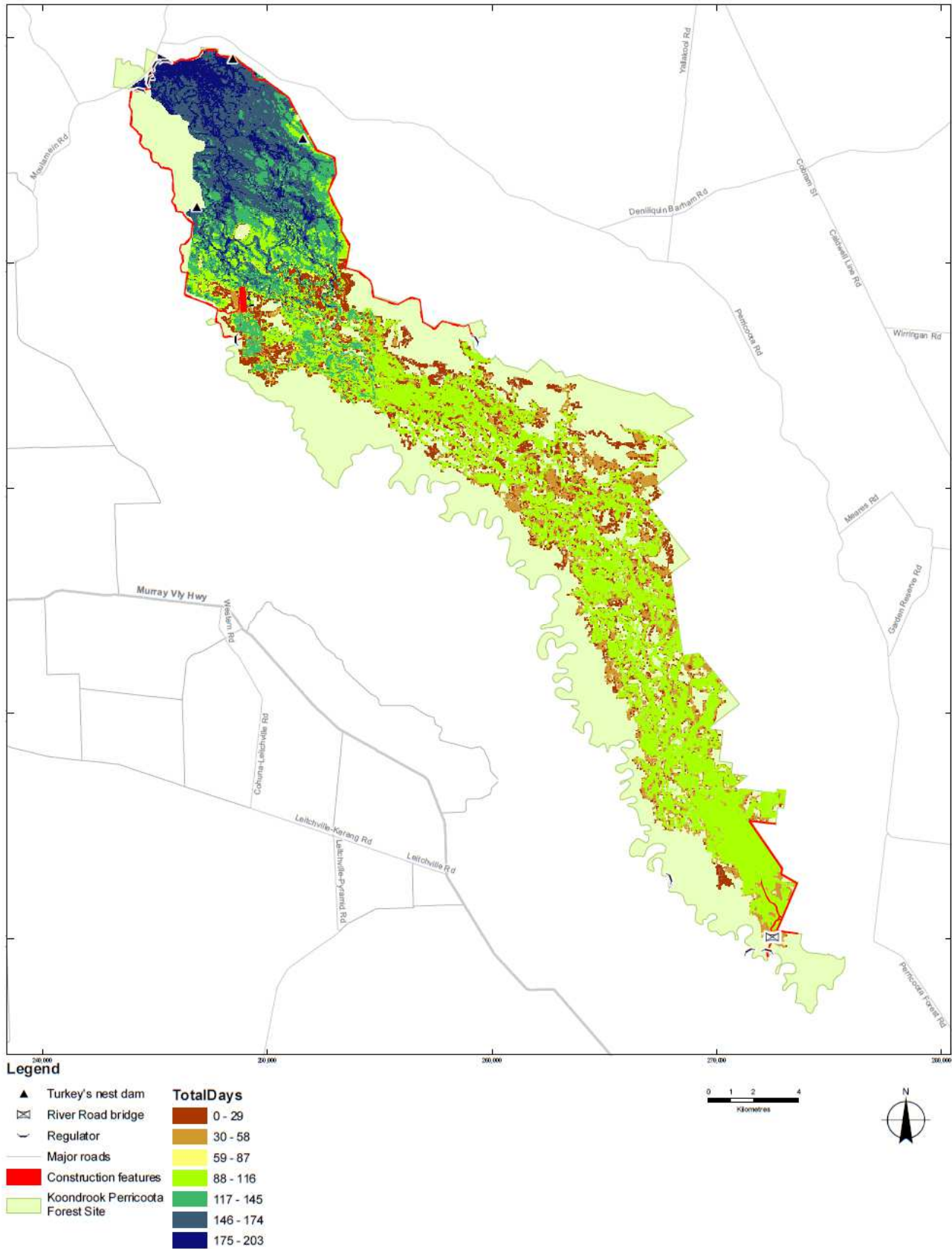
Figure 2 Outflow rates (Source: Koondrook-Perricoota Forest Flood Enhancement Works: Section 75W modification Environmental Assessment (Forestry Corporation, February 2017))

In summary, the Proponent states that the duration of discharges to downstream waterways in a managed flood event under the modified proposal would be reduced to 145 days, from 250 days under the approved project. The currently-approved long duration of events is a major concern of the Wakool River Association, and the Department supports this reduction as a way to reduce effects on affected landholders.

The Proponent's modelling indicates that the alternative downstream flow option would increase the area of forest inundated between 88 and 145 days, and reduce the area inundated for both shorter and longer periods. This is because the increase in inflow rate generally increases the duration of inundation, while the increase in outflow rate reduces the duration of water pooling for long periods at the downstream end of the Forest.

Maps showing the change in inundation between the approved project and the proposed modification are provided at **Figure 3**.

Approved Project — Extent of flooding during managed flood event



Proposed Modification — Extent of flooding during managed flood event

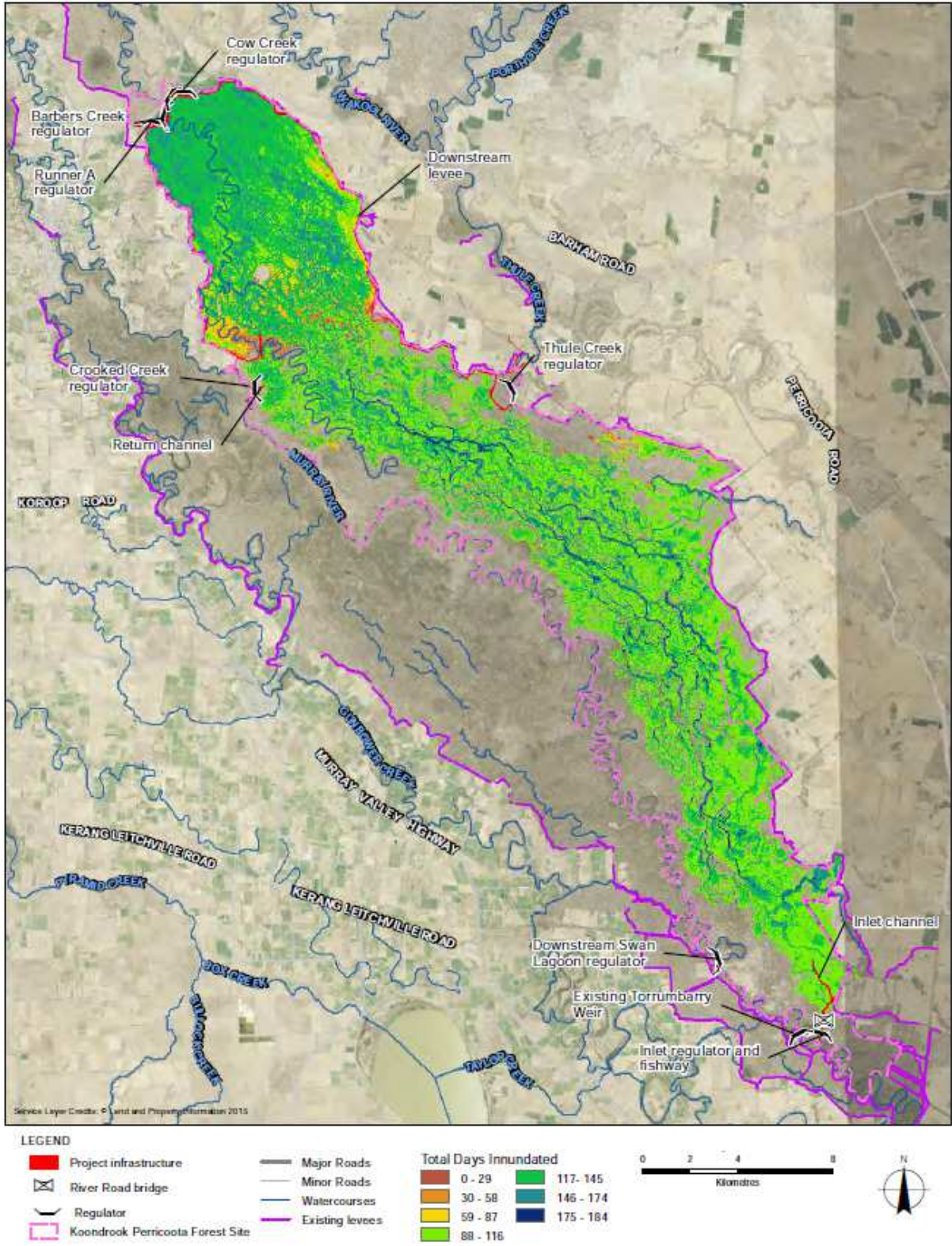


Figure 3 Extent of flooding during managed flood event — approved project (left) and as proposed in MOD 1 (right)
(Source: Appendix C (Ecology Assessment)—Koondrook-Perricoota Forest Flow Enhancement Works, Environmental Assessment (NSW Office of Water and Forests NSW, March 2010) and Koondrook-Perricoota Forest Flood Enhancement Works: Section 75W modification Environmental Assessment (Forestry Corporation, February 2017))

The Department considers that the changes in flow and inundation would have a positive effect on achieving the objectives of the project to support flood dependent species and ecological communities. This effect includes inundating an additional 3,307 hectares of River Red Gum communities, and other flood-tolerant species within their tolerance ranges.

However, the Department also considers that minimising third party impacts is an important guiding principle for the Operating Plan. In this regard, the Department has considered the concerns raised by the Wakool River Association in its submission and also as summarised in the modification request.

The modification request details impacts on land uses in and along the Forest, and potential mitigation strategies. Other than construction of the Sandy Bridge to maintain existing property access, specific mitigation responses would be primarily developed in consultation with landowners.

The proposal would result in new impacts to landholders along Thule Creek. To address these impacts, the Proponent would consult with potentially affected landholders and enter into arrangements with each landholder on specific mitigation measures — which may include building new access points during managed events, construction of levees, or erection of new fencing — or for creation of an easement to flood.

The arrangements would need to be proportionate to the level of impact at each property. An adaptive management process is considered to be the best way for the project to identify and regulate impacts on the downstream banks affected by the modification. As part of this process, the Proponent has committed to additional monitoring work to identify natural low points in the banks of the Barbers Creek system and Thule Creek, and the Department accepts this commitment.

The next step is for that monitoring to identify the varied bank heights, and inform the setting of flows under the Operating Plan, and/or the development of new controls or new infrastructure to reduce impacts on private property with the consent of landowners. On this point, the Department reiterates the existing requirement that the OEMP include 'measures to avoid an increase in flooding risks to landholders as a result of operation of the project works, including consultation with the local community in addressing the risks and management measures, such as... the Wakool River Association'.

The Department considers that the proposed approach is appropriate, and consistent with that taken to date for the approved project and under the general requirements of the project approval.

Finally, the Department acknowledges that the Wakool River Association submission raised concerns that the project as modified did not address existing third party impacts related to issues with existing block banks. The Proponent has identified that any restoration work would require those block banks to first be licenced, and the Department accepts that this process is the appropriate avenue for those issues to be addressed.

Sandy Bridge

The Proponent considers that a new crossing of Barbers Creek is required to allow for safe property access during a maximum managed flood event. The bridge would be constructed above the 'bankfull level of the creek', along the current alignment of the Sandy Bridge Road.

OEH requested the Proponent provide additional information about the flood effects of and on the proposed bridge. In response, the Proponent asserts that the new structure would have negligible additional effect beyond that of the existing bridge, noting the existing bridge will be demolished. The Department accepts this conclusion, in principle, and notes that the OEH has subsequently indicated their issues had been addressed.

To ensure the full range of flooding effects has been considered in detailed design, the Department has recommended a condition requiring the CEMP to detail the process of certification or verification of the structural adequacy of the bridge, abutments and any required road works.

The Department's assessment of design and construction matters for the Sandy Bridge is detailed in **section 5.3** of this report.

5.2 Ecology

The proposal would alter the managed flood regime, changing the extent and duration of inundation across the area, and affecting the likelihood of hypoxic water. This would have consequential impacts on vegetation communities and fish species in the Forest.

The Proponent characterises vegetation of the area based on the geomorphology and flood regime of the area. In summary, the area is divided broadly into Black Box woodland, River Red Gum woodland, River Red Gum forest and floodplain marshes (primarily in order of the frequency and duration of flooding), with specific ecological communities found within these vegetation types. There are eight vulnerable or endangered ecological communities in the Forest, listed variably under the *Threatened Species Conservation Act 1995*, *Fisheries Management Act 1994* and the *Environment Protection and Biodiversity Conservation Act 1999*. These include Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions, an ecological community not tolerant of flooding and impacted by the project.

As discussed in **section 5.1**, the modification would alter the area and duration of inundation from that set out in the approved project. This is proposed to better reflect the tolerance of vegetation communities for different periods of inundation. For instance, while there would be an increase in the duration of inundation to some areas of Inland Grey Box Woodland, there would be a reduction of 26 hectares in the area under inundation.

The alternative downstream flow option would also have consequential changes to the risk of hypoxic water developing. Because the option would reduce the inundation time, the time water is stored during warmer months would also reduce, with

commensurate reductions in the risk of waters 'ponding' and falling dissolved oxygen levels.

The Department accepts that the overall effect of the modification would be to improve ecological outcomes. However, there are aspects of the changed flow regimes that would need ongoing and adaptive management to avoid ecological impacts.

The Proponent's ecological assessment indicates that 16 fish species (including the listed Murray cod, Silver perch, and Freshwater catfish) are likely to enter the Forest during managed flood events, and may be affected by the increased flow rates — DPI Fisheries raised particular concerns about potential fish passage issues and fish stranding. For instance, the flows could encourage downstream migration of large bodied fish which could be trapped in stream by flow regulating infrastructure.

A critical issue is whether the alternative downstream flow option will require fish passage to be specifically provided for at the flow regulators. In practice, this would require the Proponent to monitor the likelihood of fish passage and allow for potential infrastructure to allow fish passage, similar to the fishways provided for elsewhere in the project approval.

DPI Fisheries has recommended the Fish Management Plan and Operating Plan be updated to include a program to monitor and manage triggers to fish movement and potential impacts to fish passage, and include a protocol for to determine management and strategies. The Department has recommended a condition that reflects these positions, and requires the updated Fish Management Plan to be finalised to the reasonable satisfaction of DPI Fisheries before the alternative downstream flow option is implemented.

Overall, the Department accepts that the modification would improve the ecological outcomes of a managed flood event. The Department also considers that, subject to the recommended conditions, that key risks of the alternative downstream flood option, including risks to fish species from impacts on fish passage, and the potential of hypoxic water forming, can be managed acceptably throughout operation.

5.3 Sandy Bridge

5.3.1. Sandy Bridge—construction clearing

Clearing of approximately 20 River Red Gums would be required to allow construction of the new Sandy Bridge. Of these trees, four include hollows, with potential to provide species for tree-dwelling fauna. To control effects of clearing, the Proponent has committed to preparing and implementing a supporting CEMP for the construction of the bridge that addresses all relevant conditions of approval and commitments.

The Department considers that the details of the CEMP should be specifically tailored to include site-specific procedures for species with potential to use the site as habitat. For instance, at the Department's request, the Proponent's RtS provide specifics of measures to protect microchiropteran bats during construction, including a pre-clearance survey and protocols for managing any bats found on site. The Department supports OEH's recommendation that the Proponent include detail in the

CEMP about the sensitive construction techniques it intends to use for the site, to supplement the existing commitments to pre-clearance surveys.

The Department considers that ecological impacts of the Sandy Bridge are acceptable, with the implementation of a supporting CEMP for the construction of the bridge that addresses these requirements. The Department has recommended a condition that requires the Proponent to prepare the CEMP in consultation with OEH. The Department also accepts the Proponent's position that an offset is not required for the bridge works, given the clear overall ecological benefits of the project, and noting OEH's advice that this approach is consistent with that taken for the approved project.

5.3.2. Aboriginal Cultural Heritage

The Proponent commissioned a cultural heritage assessment of the site surrounding the proposed Sandy Bridge, which concluded that the entirety of the site would be considered a potential archaeological deposit, with moderate potential for subsurface deposits. A shell scatter was identified within the study area, and a culturally marked tree was located outside the extent of works.

The Proponent has committed to further analysis of the site, including subsurface testing. The Department supports this commitment, and has recommended a condition confirming the commitment subject to a minor amendment at OEH's request to provide greater certainty.

Any recommendations arising from the subsurface testing must be given effect in the construction process. In this regard, the Department has recommended a condition that requires the CEMP to include details of how the Proponent will determine whether any additional management measures would be implemented to mitigate impacts, having consideration to the findings of subsurface archaeological investigations.

The Department considers that, subject to the implementation of these conditions, the impacts of construction works for Sandy Bridge can be managed acceptably.

5.3.3. Design and Construction

The Department notes that the Sandy Bridge would be constructed by the Proponent to the design requirements of Murray River Council. Following construction, Council would operate and maintain the bridge.

The Department requested the Proponent provide detail about certification of the bridge prior to operation. The Proponent in response confirmed that the process of confirming structural adequacy through detailed design would be conducted with Council. To ensure procedures and responsibilities are clearly defined, the Department has recommended a condition that the CEMP detail procedures for certification or verification of the structural adequacy of the bridge, abutments and any road works required for Sandy Bridge.

The Department also considers that construction should be conducted with the benefit of input from key stakeholder and users, and in accordance with standard construction controls. As such, the Department has recommended the CEMP also include clear procedures for consultation with affected landowners, tenants and road

users during removal of the existing bridge and construction of Sandy Bridge. The Department considers that the noise and waste impacts of demolition works and construction would be acceptable, provided that the Proponent implement feasible and reasonable measures.

Finally, to ensure that the handover of operation of the bridge to Council after construction is clearly documented, the Department has recommended that the OEMP includes a summary of arrangements for Murray River Council to commence operation and maintenance of the new Sandy Bridge, and that this be prepared in consultation with Council.

The Department considers that these requirements would ensure that the removal of the existing bridge, and design and construction of the new Sandy Bridge, would progress in a robust and acceptable manner.

6. CONCLUSION

The Department has assessed the modification request in accordance with section 75W of the EP&A Act.

The Department concludes that the proposed modification is acceptable because it would increase inundation of River Red Gum Forests, and maintain private property access. The Department has recommended several conditions to confirm the Proponent's commitments and consolidate updated agency advice on requirements for management plans to guide the project.

Consequently, it is recommended that the modification be approved subject to the recommended conditions.

7. RECOMMENDATION

It is recommended that the Executive Director, Priority Projects Assessments, as delegate of the Minister for Planning:

- **considers** the findings and recommendations of this report, noting that the Department considers that the application is approvable, subject to conditions;
- **determines** that the Proponent's request is a modification under section 75W of the EP&A Act; and
- if the Executive Director determines to modify the approval, **signs** the attached notice of modification.

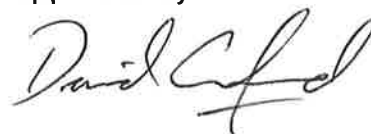
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APPENDIX A MODIFICATION REQUEST

See the Department's website at

http://majorprojects.planning.nsw.gov.au/?action=view_job&job_id=5311

APPENDIX B SUBMISSIONS

See the Department's website at

http://majorprojects.planning.nsw.gov.au/?action=view_job&job_id=5311

APPENDIX C RESPONSE TO SUBMISSIONS REPORT

See the Department's website at

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APPENDIX D RECOMMENDED MODIFYING INSTRUMENT
