

Modelling webinar: responses to questions

Responses to stakeholder questions asked at the Reconnecting River Country Program modelling webinar on 27 June 2022.

Responses to questions

Question: Submissions were called for on the Landholder Negotiation Framework, what changes have been made to the framework after reviewing the submissions?

All submissions in response to the Landholder Negotiation Framework (LNF) discussion paper have been considered by the LNF Review Panel. Changes made to the LNF in response to submissions will be set out in a 'What we heard, what we did' report to be released shortly.

Question: Who will pay for the ongoing fence damage and rusting? Who will pay for the weed control?

The NSW Government is developing a methodology to measure and mitigate the potential impacts of the Reconnecting River Country Program called the Impact Management Toolbox (IMT).

The IMT a set of resources to support private landholders, leaseholders and third parties to negotiate how the NSW Government will mitigate the Program impacts and will include:

- a set of mitigation principles
- methods to support decision making including modelling and technical investigations
- methods for valuing the costs of impacts and their mitigation
- guidance on policies and legal agreements.

The IMT will help ensure landholders are fairly compensated for adverse impacts arising from the program. This compensation will cover a range of potential impacts including, among others, the future costs of maintaining and replacing fences, and the future costs of weed management.

Over the coming weeks and months, we will consult and collaborate with landholders, regional focus and peak body groups and First Nations communities to introduce key IMT components and map out the process for discussing specific elements with stakeholders in more detail.

This will build upon the input we have already received from landholders participating in the program's case studies on the draft mitigation principles.

Question: How will the model address property-by-property conditions?

We have used several different datasets, including LiDAR, to capture our best current understanding of property-by-property conditions. Landholder and stakeholder feedback will now play a vital role in helping to ground truth and finalise the inundation mapping and flow options as part of the next phase of the program.

Question: How is ongoing tree removal and broadacre landscape modification (e.g. land levelling, natural drainage blocking/re-direction - irrigation structures acting as levees) being addressed and managed by the modelling process?

The modelling represents current river and floodplain conditions using the most up to date information including the most recent LiDAR data sets that show landscape topography and structures. Landholder and stakeholder feedback will now play an important role in helping to ground truth and finalise the inundation mapping and flow options as part of the next phase of the program. The Department of Planning and Environment intends to update the models with new information as far as practicable prior to implementation.

Question: What consideration has been given to addressing the existing pollution entering the river, before embarking on this project?

Pollution management and control of existing issues is out of scope for this program. The program has undertaken an initial water-quality risk assessment, which considered the influence of higher flow limits on eight potential water-quality issues including hypoxic blackwater (low oxygen water), eutrophication, blue-green algae blooms, salinity, turbidity, weir pool stratification, acid sulphate soils and thermal pollution.

Eutrophication is most relevant to the question about pollution and refers to increasing concentration of nutrients such as nitrogen and phosphorus in rivers and other water bodies, which can have negative biological effects. The CSIRO undertook a study as part of this Program and found no increased risk of adverse water quality events under the Program compared to the current situation for any of the issues investigated, including eutrophication. The same would likely apply to other types of diffuse-source pollution.

Any potential issues with point-source pollution such as from landfills and industrial areas are unlikely to be influenced by the program. However, the program will work with local councils and landholders to identify and develop appropriate mitigation for potential issues on public and private land.

Question: Has it been considered that increasing the high flows of the river will result in much higher levels of erosion and therefore extensive environmental damage and further siltation and restriction of the Barmah Choke?

The program is undertaking a geomorphology risk assessment that considers the likelihood and consequences of potential changes to geomorphic processes such as riverbank erosion in the program area from environmental water deliveries at higher flow rates. The findings of the study will be made available to stakeholders along with findings of other environmental benefit and risk assessments. Once we have those findings, we will be able to identify potential mitigations for any anticipated impacts.

Question: Do you think it is reasonable to inflict the enormous environmental and economic damage to upstream farmers and landholders for a project that appears will have negative effects overall?

The purpose of undertaking a strategic business case is to understand the benefits, costs, risks and opportunities the program may create, and how these would change based on different scenarios. The next step is for the NSW Government to provide these findings to the Australian Government and for the Basin jurisdictions to collectively agree on a way forward.

Question: To make informed decisions concerning the program, the community needs to know what the quantity, height, duration and extent of any planned flows is. Have these been modelled under various scenarios?

We are not at the stage where the flow limits have been set for the program. As part of the strategic business case we considered several different options to understand the benefits, costs, risks and opportunities the program may create under different scenarios. They do not predicate an outcome.

The flow limit options, and their associated frequency, timing and duration will be further explored in consultation with stakeholders.

All flow limit options will be subject to the impact-benefit assessments and consultation with stakeholders as part of the next phase of the program.

The preferred flow limits will not be determined until the full impact-benefit assessment, evaluation (through the Options Evaluation Framework), consultation with the community is complete and agreement is reached between all Basin States.

Question: Can you provide a summary of the discussions on modelling to date so we can refer to it and know what has been discussed?

The presentation provides an overview of the modelling and can be accessed as a recording for future reference on the program's [virtual room](#).

To support ongoing engagement on potential flow options for the program, the NSW Government has released new online inundation modelling for the program area.

These interactive maps show the estimated upper inundation limits if there was a change in flows under several different scenarios.

To view the interactive maps, visit the [virtual room](#) and choose the 'interactive map' icon on the bottom left of the screen.

If you are interested in learning more about the inundation mapping and the broader program, the department is welcoming online case study applications. Please visit the virtual room to [register your interest](#).

Private landholders already participating in the program's on-ground case studies with Local Land Services staff are welcome to access the inundation mapping on the virtual room, however your dedicated Local Land Services officer will be in touch soon to provide you with individual property-scale maps and to work with you to capture comments and feedback.

The program continues to finalise some of its maps and as a result not all maps are currently available. Keep an eye on the virtual room for new maps as they become available.

Question: I would like to know why the landholders along the river have not been contacted directly regarding the program?

A direct mailout went to over 3200 landholders along the Murray and Murrumbidgee rivers in 2021 inviting them to apply to participate in the initial collaboration phase via the case studies.

This was supported by a significant media advertising campaign on radio and in newspapers, as well as a social media campaign, seeking participation in this phase of the program. All landholders who applied to participate were accepted. In March 2022 we also launched the virtual Room which allows all landholders within the project areas to participate in case studies online.

If you are interested in taking part in an online case study, please visit the program's virtual room to [register your interest](#).

Question: Does the increased general flow from 25k-40k include flows from the Kiewa River, or is it just releases from the Hume Weir?

For the Hume to Yarrawonga reach we use the Doctors Point gauge which includes Hume Dam releases and Kiewa River flows.

Question: Has First Nations perspectives being included in the modelling?

The modelling shows our current understanding of inundation extents associated with the flow limit options being investigated. The next step in the process is to share this with stakeholders including First Nations communities and obtain feedback and input, and refine and update the inundation maps to ensure they accurately reflect what happens on the ground.

Question: Who has been invited to provide input into the modelling?

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Question: Who is doing the modelling?

The modelling for the Murray River was undertaken by the Murray-Darling Basin Authority and the NSW Government’s Manly Hydraulics Laboratory.

The department, WaterNSW and several consulting firms are currently finalising the modelling for the Murrumbidgee River.

Question: What are the flow options?

The following flows are being assessed in the Murray and Murrumbidgee project areas.

Murray - Hume to Yarrawonga (flows reported at Doctors Point gauge).

- 25,000 ML/d - current operational limit in the Water Sharing Plan (WSP)
- 30,000 ML/d – flow limit option

- 40,000 ML/d – flow limit option.

Murray - Yarrawonga to Wakool Junction (flows reported at downstream of Yarrawonga Weir)

- 15,000 ML/d (current temporary operational limit))
- 25,000 ML/d – flow limit option
- 30,000 ML/d – flow limit option
- 40,000 ML/d – flow limit option
- 45,000 ML/d – flow limit option.

Murrumbidgee River (flows reported at Wagga Wagga)

- 22000 ML/d (current temporary operational limit)
- 32,000 ML/d – flow limit option
- 36,000 ML/d – flow limit option
- 40,000 ML/d – flow limit option.

The flow options are also shown on Slide 10 of the presentation.

Over the coming months we will engage with stakeholders, including landowners, First Nations communities, public land managers and regional community groups to discuss in more detail:

- the flow options, including estimates of flow and river levels at several locations throughout the Murray and Murrumbidgee project areas
- estimates of frequency, timing and duration of flows at key gauges.

The flow options being investigated will be used as the basis for:

- modelling inundation footprints
- assessing community benefits and impacts
- assessing environmental benefits and risks
- measuring outcomes for First Nations communities
- identifying opportunities and mitigation measures.

We are not at the stage where the flow limits have been set for the program. As part of the strategic business case we considered several different options to understand the benefits, costs, risks and opportunities the program may create under different scenarios. They do not predicate an outcome.

The flow limit options, and their associated frequency, timing and duration will be further explored in consultation with stakeholders.

All flow limit options will be subject to the impact-benefit assessments and consultation with stakeholders as part of the next phase of the program.

The preferred flow limits will not be determined until the full impact-benefit assessment, evaluation (through the Options Evaluation Framework), consultation with the community is complete and agreement is reached between all Basin States.

Question: What is the proposed timing of the flows?

Flows will typically occur between August and October. In some situations, there may be releases between May to July and into November.

As flows travel downstream, the timing will be slightly later:

- along the Murrumbidgee River, the flows will be approximately three weeks later at Hay and one-to-two months later at Balranald
- along the Murray River, the flows will be approximately two weeks later in the Edward-Wakool systems and one-to-two months later in the lower reaches of the Murray River.

Question: When will the modelling be finalised?

The modelling will be refined with input from landholders and other stakeholders. We are presenting the results of the modelling to landholders to get feedback that will help us refine and update the models. We will be seeking this feedback through a structured process which we know will take time. All flow limit options will be subject to the impact-benefit assessments and consultation with stakeholders.

The preferred flow limits will not be determined until the full impact-benefit assessment, evaluation (through the Options Evaluation Framework), consultation with the community is complete and agreement is reached between all Basin States.

Question: How wide is the LiDAR corridor along the river? How far away from the riverbank does it extend?

LiDAR is typically collected across the full width of the floodplain and covers all areas included within the model area. The width of collection depends on the width of the floodplain in a particular area. Multiple LiDAR datasets exist in some locations. Where this is the case each dataset is reviewed for suitability, with the preference being to use the most recent LiDAR reflecting current landscape conditions.

Question: Why did the presentation not show Steven's Weir details?

The presentation includes flow rates and levels at Steven's weir. The location of Steven's weir was just outside of the image shown in the presentation; however, can be viewed via the [virtual room](#) by choosing the 'interactive map' icon on the bottom left of the screen.

Question: What spatial resolution are you modelling at?

The spatial resolution within the Murrumbidgee River models varies between 10m and 20m in the floodplain. The higher resolution is used higher in the catchment, and lower resolution is used in the lower catchment where floodplains are relatively broad and flat.

Some Murray River models use slightly different software with variable spatial resolution; with higher resolution being used along water courses and wetlands, and coarser resolution on broad/flat floodplain areas.

Question: Are you validating the models against historical data that has not been used in calibration?

Models are calibrated using data and information from several past events and then validated against other suitable events that are not being used in calibration to provide an independent check for selected model parameters.

Sensitivity tests are undertaken for model parameters to assess how sensitive each parameter is and how it affects the estimated water levels and inundation extents. In addition, models are carefully reviewed to ensure they are stable and robust.

Question: Are you calculating model output error ranges using input error ranges?

Yes, Sensitivity tests are undertaken for model parameters to assess how sensitive each parameter is and how it affects the estimated water levels and inundation extents. In addition, models are carefully reviewed to ensure they are stable and robust.

Question: Will the flows be increased/reduced depending on the current ground conditions? If this was to happen as the ground is now, I imagine the impact would be more significant.

Yes, environmental water managers and river operators monitor catchment conditions very closely and adjust delivery plans and releases accordingly.

Question: How much of this modelling accounts for First Nations knowledge on the river system?

The modelling shows our current understanding of inundation extents for the flow limit options being investigated. The next step in the process is to share this with stakeholders including First Nations communities and obtain feedback and input.

Question: What constraints are there for initiating the flows? Is the intention to piggyback on the end of a flood event or be completely independent?

The flow option modelling uses conservative assumptions to give 'upper end' estimates of inundation extents so landholders and other stakeholders can see the areas which may be inundated after managed releases.

The buffer level recognises there are risks, albeit small, of exceeding the target flows under some circumstances and is being used to identify the level of mitigation required. This ensures landholders receive the appropriate mitigation measures under the program, including compensation.

Question: Has flow velocity been accounted for in the model?

Yes, the models calculate flow velocities.

Question: There was a lot of reference to the environment having 'less priority' than other - what does this mean?

We understand this question refers to a statement the presenter made regarding the priority for delivering these environmental flows being lower in wet periods when existing unregulated flows are sufficient to meet environmental requirements.

Question: Will the modelled river flows consider storm events in the catchment and how this "tops up" the river (on top of 40,000ML flows for example)?

River operators are constantly reviewing catchment conditions and rainfall forecasts and adjusting dam releases in response. To deliver these higher flows, river operators adjust dam releases by reducing or cancelling releases when high tributary inflows are forecast. The modelling also explicitly considers this risk by including the buffer flow and associated inundation extent, and that buffer will be used for impact mitigation purposes. Delivering these higher flows may also create increased 'airspace' in dams, which would have potential flow mitigation benefits.

Question: Who are the stakeholders? They were listed separately to On-country and community? They were listed with Landholders.

The program's stakeholders include potentially impacted public and private landholders, First Nations communities and the broader community along with regional focus and peak body groups.

Question: In modelling inundation areas are you considering the impact of increased flows on the inputs (e.g. channel erosion)?

Channel erosion and deposition (i.e. the change in channel morphology over time) is not explicitly represented in the hydraulic models. Hydraulic models provide a representation of channel shape using bathymetric data and LiDAR.

Question: Will the web platform mentioned be interactive allowing users to zoom to their area, click on a flow rate (e.g. 25k,30k,40k etc) and see the modelled inundation, similar to Sentinel?

Yes, the platform allows users to explore all the flow limit options the program is investigating.

To view the interactive maps, visit the program's [virtual room](#) and choose the 'interactive map' icon on the bottom left of the screen.

Question: What does the title 'Reconnecting River Country' mean? What was the intention behind that title?

The program aims to achieve a balance of economic, social, cultural and environmental outcomes across southern NSW by improving wetland and floodplain connectivity.

Previously known as the NSW Constraints Measures Program, the new program name was chosen to reflect the fact the program is aiming to improve wetland and floodplain connectivity.

Question: What will happen if landholders do not want to enter into an agreement?

The Landholder Negotiation Framework sets out the process the NSW Government proposes to use to negotiate easements with landholders. Its purpose is to protect the interests of landholders via a transparent, equitable, fair and consistent approach to negotiations, and to ensure all negotiations on mitigation of impacts are conducted in good faith.

Within the framework, all landholders will be afforded reasonable time to negotiate and consider how they would like to see the impacts mitigated.

The Landholder Negotiation Framework Discussion Paper, March 2022, Step 5 outlines options where an agreement cannot be reached. These **could** include:

- arbitration (engaging a third party to resolve the dispute) if the landholder agrees to participate in the process
- voluntary acquisition of the property, rather than an easement, if the landholder prefers this in their circumstances and the potential acquisition meets the criteria developed through the program. The criteria for voluntary acquisition is yet to be established but may be based on the ability of the purchase to contribute to other Government priorities, such as biodiversity or cultural outcomes
- Government relying on statutory exclusion from liability afforded to the NSW Government under the *Water Management Act 2000* and implementing the program in

good faith through river operational arrangements, transparent environmental water planning and extensive, proactive communications before any event.

We received comments and feedback on the draft Landholder Negotiation Framework and we will shortly be releasing a 'What we heard, what we did' report to show how we have taken the feedback into account.

Questions: How does the output for model scenarios inform the eco-hydraulic targets such as those suggested for the ecologic benefits during the development of the Basin Plan and the SDLAM offsets to justify the reductions in water recovery targets?

The modelling was developed to inform the program and the strategic business cases. At this stage the modelling has not been used for any other purpose, but we anticipate it will inform future river and water management activities.

Question: Could this modelling be used to support the idea Murrumbidgee (Wiradyuri name in this part of the country) is a living river and could be given citizen status like the Whanganui in NZ and other rivers around the world?

The naming of any river as a living river and/or its approval for citizen status is the subject of a separate process to the program.

Data collected through the program improves the current information and knowledge the Department of Planning and Environment holds on the Murray and Murrumbidgee river systems. This information and knowledge, subject to meeting privacy requirements, could assist in many other programs outside of the program itself.

Question: Does the Yarrowonga /Murray model consider conditions at the Goulburn River (Vic), such as flows etc?

Yes, we have undertaken detailed analysis of the combination of Murray river and Goulburn river flows to inform the modelling. We have tried to be conservative and so it is possible our current modelled flows and inundation extents overestimate the potential flow outcomes. We will be assessing this further in subsequent program phases, including in response to outcomes of the Victorian Goulburn constraints project feasibility study and stakeholder feedback.

Question: Travel times of flows/releases, i.e. how does the model consider Perquisite Policy Measures (PPMs) releases on top of unregulated flows from Ovens River (Vic)?

To generate inundation mapping for each flow limit option, hydraulic models are run for a particular inflow (river flow) scenario, including the combination of releases from storages and unregulated tributary inflows.

Question: Given LiDAR has an accuracy of (+/-) 10-20cm, which can make a huge difference on a relatively flat flood plain, how is this being addressed?

Hydraulic models are built at a coarser resolution than LiDAR which typically has a 1m resolution. The hydraulic models are calibrated and validated against historical events to test their accuracy. This provides confidence that the model adequately represents flow events in a range of landscapes. Key hydraulic features in the landscape such as embankments and levees are also represented.

Question: How is the ongoing urban "development" (e.g. levees, hard surface channelling stormwater) and broadscale landscape modification for irrigated farming being dealt with?

Within the Murray and Murrumbidgee catchments, changes in landscapes are represented in the hydraulic models in several ways. Hydraulic roughness, which is how the 'friction' of a landscape type is captured in the model, is captured using land use datasets and aerial photography. This includes infrastructure such as roads and rail. In our modelling we used information from very recent LiDAR surveys, which means the models represent current conditions in the catchment, and key hydraulic features in the landscape such as embankments and levees.

Question: The buffer level of Steven's Weir appeared to be 15000ML/d for a 9500ML/day flow. Earlier in the presentation you spoke of under and over predictions to indicate conservative modelling. Is this not a form of buffering?

The upper limit show the upper extent of flow releases targeted at environmental outcomes. The buffer level recognises there are risks, albeit small, of exceeding the target flows under some circumstances and the buffer level is being used to identify the level of mitigation required. This ensures landholders receive the appropriate mitigation measures under the program, including compensation.

Question: Can we see some outputs of velocity and turbulence? This is especially important for aquatic organisms such as fish. Hydraulic variability is a key component to ecological health, so my question is, does the model account for weir pool effects?

We have information on the modelling outputs for the velocity under each flow scenario. The model has the functionality to generate modelling outputs for turbulence and shear stress but these outputs are not standard. By including this functionality we have ensured the hydraulic models have many potential applications.

Question: How can we find the online resource? Will that be through the department's website?

To view the interactive maps or to find out more about the program in general, visit the program's [virtual room](#). A link to the virtual room can also be found on the program's webpage at dpi.e.nsw.gov.au/reconnecting-river-country

Question: Is the interactive web platform, where you can see specific areas and the effect of inundation, available to landholders now?

Yes, to view the interactive maps or to find out more about the program in general, visit the program's [virtual room](#).

If you are interested in learning more about the inundation mapping, the department is welcoming online case study applications. Please visit the virtual room to [register your interest](#).

Private landholders already participating in the program's on-ground case studies with Local Land Services staff are welcome to access the inundation mapping on the virtual room, however your dedicated Local Land Services officer will be in touch soon to provide you with individual property-scale maps and to work with you to capture comments and feedback.

Question: Has excess river flows over the last 12 months been done so satellite imagery could be gathered at river farmer's expense?

No, the flows over the last year were entirely due to dam releases and tributary inflows. While these flows provided an opportunity to collect aerial photography in some program areas, the program had no influence over these flow releases.

Question: Goulburn River does have a major impact on Murray flows if both rivers are in flood conditions, appreciate that CEWH releases are not designed to occur in floods however are the risk factors of conditions of catchments, Hume releases and PPMs being considered?

The combination of Goulburn and Murray flows is always carefully considered by both river operators and environmental water managers when undertaking releases.