

15th April 2020

1. Summary and recommendations

- We welcome NRW's willingness to fully re-assess the issues raised by this scheme
- Ancient woodlands are an irreplaceable natural resource and we welcome recognition of this by NRW. However, the proposed Flood Storage Area, as part of Measure 14 (currently viewed as the 'most viable' technical solution), would directly destroy an area of ancient woodland, whilst the construction footprint and operational impacts would damage several more hectares of important habitat. Irrespective of any mitigation measures, this will cause a net loss of biodiversity.
- Casehill & Cwm George Woodlands, that would provide the site for the proposed Flood Storage Area, is a well-loved local amenity that provides an important resource for informal recreation purposes, notably for walkers and horse-riders. The introduction of a man-made hard-engineered structure in this unspoilt setting will adversely affect the appeal of the site for people; inundation of the site by floodwater for potentially prolonged periods will also affect the public's ability to use the site and its access infrastructure, notably the footpaths, permissive bridleway created by the Woodland Trust and footbridges.
- We have identified a number of gaps, deficiencies and unanswered questions in the Outline Business Case and supporting ECOR analysis, including:
 - Evidence gaps in the cost-benefit and feasibility assessment for various solutions and limited sensitivity testing of the business case against a range of scenarios
 - No explanation of why wider catchment land use, including tree planting as a flood mitigation measure, seems to have been ruled out
 - No clear evidence of a full consideration of all available options
- We believe the methodology of the ECOR to be fundamentally flawed and not fully compatible with the most recent Green Book guidance. There is a lack of transparency over the valuation methodologies used, which appear not to take into account wider ecosystem service impacts and benefits; an explicit failure to consider the full environmental impacts of the entire construction footprint and operational area of Measure 14; and a misleading approach of portraying compensation packages for damage to access/ amenity and irreplaceable habitats as genuine benefits of the Cadoxton Flood Storage Area proposal, throwing doubt on the legitimacy of the option comparisons within the cost-benefit analysis.

The Woodland Trust recommends that:

- measures put forward specifically as compensation for loss of irreplaceable habitats cannot then be portrayed as net benefits in a cost benefit analysis: loss of ancient woodland remains a net loss.ⁱ
- NRW should consider and implement a range of natural flood management measures *including tree planting* in the Dinas Powys area as a first step before evaluating any other interventions that might be necessary, this being both achievable and likely to have strong community support plus deliver a range of other cost effective benefits.

- Any future proposals should be evaluated fairly taking into account the full range of positive and negative impacts on all relevant ecosystem services in accordance with the goals and ways of working in the Wellbeing of Future Generations Act, and should reflect an integrated land use approach.
- Our technical questions and details are addressed in any future iteration of the OBC.

This summary and our recommendations are supported by a detailed response and technical comments below (with the advice of our appointed hydrology consultant where applicable).

2. Natural Flood Management

The draft OBC concludes that Natural Flood Management (NFM) measures alone would not be sufficient to achieve the desired flood protection for Dinas Powys.

We acknowledge that tree planting and natural flood management options alone may not be enough to prevent future flooding during extreme weather events. However, we question why NRW has focused on a relatively narrow range of NFM measures namely leaky barriers, runoff attenuation features and soil improvement in the catchment (the latter is put forward despite the fact that it is acknowledged in the OBC that there has been no survey work undertaken in the catchment to establish the current condition of soils and soil structure).

We note that the published description of potential NFM measures makes no assessment of tree planting in the catchment. Of particular concern is that NRW seem not to have taken account at all of the fact that research work supported by various agencies including NRW itself has identified that the catchment is well suited to tree planting as a means of reducing flood risk – this is evidence directory SC150005 ‘Working with Natural Processes’ which identifies areas of land as being suited to reduce flood risk through catchment planting:

<https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk>

On the basis of this alone, it would seem an obvious component of the solution for flood protection for Dinas Powys to include tree planting in the catchment as one of the NFM measures.

In addition, given the relatively low cost and multiple ecosystem service and well-being benefits that catchment planting and natural flood mitigation interventions provide, we suggest that these should be progressed as soon as possible, whether or not additional engineering solutions are considered in future. Costings for NFM should be properly assessed taking into account the full range of measures available.

From the public meetings that we have attended, the concept of “NFM Plus” appears to carry a good level of support within the local community unlike other proposed hard engineering solutions. This would present an opportunity for NRW to engage positively with the local community and we would be willing to work with NRW to achieve this. As acknowledged in the draft OBC (p. 5), the Natural Resources Policy sets out three national priorities, one of which is to deliver nature-based solutions.

The Woodland Trust already has experience in this type of project, for example, on our Smithills Estate in Bolton where we are working with the Environment Agency to implement natural flood preventionⁱⁱ and in the Ouse catchment in Sussex.

We believe that our management of Cwm George & Casehill Woods is already making a contribution to the resilience of the Cadoxton catchment: in just twenty years, by reducing management intensity, planting new woodland and allowing scrub and woody debris to expand and accumulate

along streamsid es, we have created a far more complex and biodiverse landscape that contributes a wide range of ecosystem services to the Dinas Powys community. The Woodland Trust could offer to do more, for instance, by riparian tree planting at Casehill and undertaking local NFM measures.

Whilst the Trust acknowledges the draft OBC's conclusion that NFM measures will not deliver NRW's objective to deliver 'low' flood risk if adopted in isolation, we note that their analysis still suggests that the potential benefits outweigh the costs (draft OBC, p16). as a means, alongside other run-off attenuation features, of 'slowing the flow'.

Whilst we are aware of evidence gaps, there is a growing body of case studies that demonstrate not only the efficacy of catchment NFM projects in terms of flood mitigation, but also their broad environmental and social benefits. Natural processes management, including tree planting, can contribute to carbon capture, improve water quality and reduce sediment loss, have positive outcomes for biodiversity and create opportunities for public engagement and amenity. The following give just a few examples:

<http://www.sussexflowinitiative.org/>ⁱⁱⁱ

<https://www.waterbriefing.org/home/company-news/item/14979-yorkshire-water-funds-natural-flood-management-in-upper-wharfedale>^{iv}

<http://slowtheflow.net/community-led-nfm-conference-2/>^v

<https://www.stroud.gov.uk/environment/flooding-and-drainage/stroud-rural-sustainable-drainage-rsuds-project>^{vi}

We are also embarking on a programme of long term monitoring at our new Brynau Farm site at Neath, to measure the ecosystem service impacts of woodland creation on former agricultural land.^{vii}

The Cadoxton catchment is a small, discrete area that would lend itself to a catchment-wide multi-agency approach. This could be a golden opportunity for Welsh Government to pilot a co-produced, approach to NFM in this catchment, led by NRW, from which data and learning could be gathered to inform future flood alleviation schemes. The Trust could support delivery on private/ third party land through our existing [woodland creation offers](#).

Not least, this type of approach is gaining support in Welsh Government; for example Lesley Griffiths AM, Minister of Environment, Energy & Rural Affairs, in reply to an oral question in the Senedd on 5th March 2020 said:

"One of the key priorities of the draft national strategy for flood and coastal erosion risk management in Wales is to deliver more natural interventions and catchment approaches to help improve environmental resilience and I think one thing that we have seen over the past month is you can't just keep building higher walls and using more concrete. We need to look at those natural interventions."

Question. <https://record.assembly.wales/Plenary/6261?lang=en-GB#C276993>

3. Technical comments on the Draft OBC:

We are pleased that in this draft OBC, Natural Resources Wales (NRW) has recognised and given weight to the high level of environmental impact that the proposed Cadoxton Flood Storage Area would have, including upon ancient woods, trees and the amenity value of the Trust's Casehill & Cwm George Woods. In particular, that ancient woodlands, by their very nature, are an irreplaceable

natural resource. However, we have a number of technical queries and issues to raise with regards to this document, as follows.

- Paragraph 1.2.3 (p. 4) – it is stated that Dinas Powys is the 55th ranked community in Wales for river flood risk. Has this changed in the light of recent flood events that occurred elsewhere in Wales earlier in the year?
- Paragraph 2.6.2 (pp. 44 - 46) – Measure 3: it is stated that should the proposed flood storage area proceed, then floodwater would drain away within a 24 hour period. This assumption is subsequently used to justify observations that the effect of floodwater inundation on trees, public footpaths etc would be minimal. We strongly challenge this assumption on the basis of our own observations of the operation of the Flood Storage Area at Cowbridge on the River Thaw. Over a number of winter periods, we have noted that floodwater has been present over a number of weeks. For example, during the recent Storm Ciara and Storm Jorge storms, over three weeks of flood water were stored at Cowbridge. We understand from NRW that this is due in part to a succession of heavy storm events and last winter as a result of a defect in the dam that required repair. It appears from NRW's own data that extreme flood events and unpredictable weather patterns are likely to be a feature going forward. In the light of this, we would suggest that NRW's assessment that floodwater would drain away within 24 hours appears somewhat unrealistic. Given the Cowbridge FSA experience, we believe it is much more likely that floodwater would remain on site at Casehill & Cwm George for much longer periods than 24 hours with all the negative consequences for public access infrastructure, ancient trees and Ancient Woodland. We urge NRW to publish the data regarding flood storage at the Cowbridge FSA to allow local communities to fully understand possible impacts regarding this option.
- Paragraph 2.4 Table 2-2 (pp. 16 – 23) - we note that the Flood Storage Area cost is now £4.59 million – previous estimate in the data reviewed by our hydrology consultants in 2019 was £1.25 million so there appears to be a significant increase. Despite an assertion that 'Green Book' methodology has been used (p48), there is no clarity as to which ecosystem service impacts and costs have been valued within this figure and whether these are restricted to the damages in terms of flood impact or include temporary or long term impacts on, for instance, health and wellbeing and biodiversity.
- Paragraph 2.4 Table 2-2 (pp. 16 – 23) – the costs for the Flood Storage Area does not factor in financial losses that are likely to be suffered by the Woodland Trust. Casehill & Cwm George Woods is one of our most popular sites in Wales close to large urban populations around the capital city. As well as providing a well-loved local amenity, the site is important to the Trust for generating income for its charitable purposes including upkeep of the site and its infrastructure including permissive bridleway and footpaths. This income is derived from such sources as donations, tree dedications, dedications for woodland groves and memberships and legacies. We strongly believe that these income sources will be adversely affected by flooding inundation at the site with the site having to be closed to the public potentially for prolonged periods during flood events. We confirm that we are prepared to share these figures with NRW subject to certain confidentiality conditions (to be discussed). However, we can confirm that we have already had to remove around 7ha from our Dedicate a Tree product area on our webshop due to uncertainty surrounding the scheme and were the Flood Storage Area to go ahead, we forecast around £400k of future income foregone based on loss of sales of the types listed above.
- Paragraph 2.4 Table 2-2 (pp. 16 – 23) – the costs also fail to take into account direct costs incurred in terms of damage to existing access infrastructure within the Flood Storage Area footprint. For example, the surface of the current permissive bridleway would be rendered unusable following a period of inundation and the existing bridge infrastructure has not been designed to withstand repeated immersion. Costs should reflect the likely requirement

for the upgrading of these features to render them fit for purpose under the changed site conditions expected.

- Paragraph 2.4 Table 2-2 (pp. 16 – 23) - the cost for flood defence walls of £8.87 million for 2km length is relatively high at around £4.4k per metre and we are advised is at the upper end of costs for a wall greater than 1.2m high with piled foundations, based on EA outline cost estimates. We understand that the costs allow for significant retaining wall works at some locations.
- Paragraph 2.6.5 – we are advised by our hydrology consultants that there has been no sensitivity test on the economic case for estimated flood flows. In Section 2.6.5, it is stated that “the model outputs are calibrated to reflect flood risk expected from experience of events, so we are confident in the flood risk prediction.” We have not seen any calibration data used in the modelling in the information received thus far.
- Paragraph 2.6.5 – in Section 2.6.5 of the report it is stated that “Increasing the property level threshold from 150mm to 300mm results in a decrease in damages for the walkaway option, which will consequently reduce the benefits for each of the do-something options and the benefit-cost ratios. Based upon preliminary modelling this could reduce benefits by up to 50%, making measures potentially economically unviable with benefit-cost ratios below unity.” It should be confirmed whether a property threshold survey has been undertaken in Dinas Powys – this would normally be the case for an Outline Business Case in order to provide more certainty with the economic damage assessment.

4. Technical comments on the ECOR and supporting documents

This has been considered against NRW’s own evaluation framework, specifically elements of the Role of Environmental Assessment, and Investment Objectives as set out in the ECOR, and our comments are as follows.

Principle - Role of Environmental Assessment

‘Manage adaptively, by planning, monitoring, reviewing and, where appropriate, changing action.’

- Given the timescales over which the flood alleviation objectives are operating, an adaptive approach could comprise the implementation of NFM now, with a subsequent review of additional requirements based on observed data and modelling.

‘Consider the appropriate spatial scale for action.’

- Spatially, the measures modelled all appear to relate directly to interventions around watercourses, rather than including wider land use measures to reduce the run-off peaks from the wider catchment. This appears to run counter to the principles laid out in the Welsh Government’s Draft National Strategy for Flood and Coastal Erosion Risk Management in Wales (June 2019), which states:

‘We are... promoting wider catchment approaches to managing risk, crossborder and multi-agency working, and the sharing of ideas.’

‘Our funding is not only concerned with the construction of new schemes but finding better ways of managing water across catchments, working with communities and maintaining our existing infrastructure so it remains resilient.’

‘... we look to integrate flood schemes with other infrastructure and environmental projects to bring multiple benefits and seek sustainable, better value interventions.’

There are a number of potential mechanisms which could support the integrated delivery of positive land use change, including the developing Sustainable Land Management scheme and the recently announced Wales National Forest. There should be consideration of wider land use as part of an integrated approach to flood management, but have been given no consideration in this ECOR.

'Take account of all relevant evidence and gather evidence in respect of uncertainties.'

- JBA Technical note 2019s1157 states with regard to the Cardiff Road Bridge that 'options for increasing the hydraulic capacity of the bridge and their engineering viability has not been assessed'. We believe that all available options should be fully considered before reaching a conclusion.
- JBA Technical note 2019s1157 relating to the Cardiff Road Bridge – our hydrology consultant advises that the option to increase the capacity of the road bridge has been modelled as a raised bridge deck rather than widening the conveyance of the channel or providing flood relief culverts and considering other head loss improvements due to the plan configuration of the inlets and outlets. The modelled change has led to a very small decrease in total head loss, with about 0.8m of head loss remaining. To close out Cardiff Road Bridge capacity improvements as an option, although it is acknowledged that the costs and disruption are likely to be high, it would be worthwhile modelling a theoretical scenario that dramatically reduces head loss to confirm that upstream impacts are not significant.
- Our recommendation that the Outline Business case be sensitivity tested for difference climate scenarios does not seem to have been taken up, or at least the nature and extent of this sensitivity testing has not been made public.
- JBA Technical note 2017s5603: with regard to NFM, the model appears to have been run with existing land use data from land cover maps (which are at relatively coarse resolution). These data should firstly be ground-truthed. In addition, the models should be re-run to consider other land use scenarios, specifically the establishment of riparian and/ or wider catchment woodland scenarios, on surface roughness and infiltration (as tree planting appears to have been entirely discounted as an NFM measure for the purposes of this ECOR, despite the identification of the catchment in <https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk> as a potential location for riparian planting).
- It is unclear whether the land cover data used takes into account the woodland planting and scrub expansion undertaken by the Woodland Trust in the last 20 years at Cwm George & Casehill Woods (see our Management Plan) and any impact this could have on flow.
- It is also acknowledged that soil structural condition data is lacking and that the model could be revisited were this to be available: we would suggest that better soil data is gathered to inform the cost benefit analysis for NFM in the Upper Cadoxton and East Brook sub-catchments.
- The costs associated with the Cadoxton Flood Storage Area do not in our view take into full account the likely direct costs in terms of damage, replacement and re-design of physical access infrastructure: the current paths and footbridges are not designed to be inundated repeatedly/ for prolonged periods (see points below). There are also staff costs which could be incurred due to a heightened requirement for safety inspections following flood events. Estimates of these costs could be supplied, subject to agreement.
- There has also been no consideration of the business access impact and potential loss of income to the Woodland Trust as a charity: the proposed FSA would inundate areas which are already subject to dedication donations and would preclude further dedication

donations over an area of at least 7ha. The loss of amenity appeal may have an impact on dedications across the site more widely. Again, whilst this information is sensitive, it could be released subject to agreement.

'Take account of the benefits and intrinsic value of natural resources and ecosystems'

- When considering the Cadoxton Flood Storage Area, the revised ECOR makes clear that only the environmental impacts of the dam footprint have been considered in the cost benefit analysis (p46/7). Without full consideration of the potential construction footprint and long term impacts on carbon sequestration, habitat, species and amenity from inundation of the c. 11 ha area, the Environmental Assessment is in our view incomplete (and will inevitably underestimate the true 'cost' of the scheme).
- We welcome the decision that a full statutory Environmental Impact Assessment would be required for the Cadoxton Flood Storage Area option. This EIA, if progressed, should be far more comprehensive than the current ECOR.
 - For instance, it is not clear whether 2017 dormouse surveys at Casehill Woods were adequate to assert that the species is absent: for instance, in accordance with the Dormouse Conservation Handbook 2nd Edition, nest tube surveys should be conducted over a period of several months with a search effort score of at least 20 if the evidence is to be used to inform a development application.
 - We also note that no further tree or woodland assessment has been made since 2017 (Outline Woodland Survey (JBA / Mackley Davies Associates Ltd – April 2017) • Tree Survey and Arboricultural Impact Assessment (JBA / Mackley Davies Associates Ltd – September 2017)): at the time we suggested these were not sufficiently comprehensive yet no further information has apparently been gathered.
 - The ECOR is not supported by any detailed surveys for bats, birds or aquatic life: these would be essential as part of an EIA.
- While the Outline Business Case asserts that 'assessment of benefits has been undertaken in accordance with FCERM-AG, the Multi Colour Manual and Green Book economic analysis methods, using a 100 year appraisal period with present value discounting based on flood damages avoided by implementation of a measure' (para 2.6.3.1), it is not explicit what methodology has been used to calculate the potential costs or benefits in terms of amenity/ landscape value and impacts on well-being resulting from improvements to or restrictions upon countryside access and which specific benefits have been included in the outline valuation. It should be explicit what ecosystem service assessment tool or assessment model has been used for each option to ensure consistency. Recognised models should be used in any EIA.

'Take account of the short, medium and long-term consequences of actions'

- ECOR p39 discusses the chances of inundation in the context of Measure 3/14. Verbal statements from NRW officers and anecdotal evidence from similar projects suggests that comparable Flood Storage Areas have been subject to design issues and have also retained flood water far more frequently and for longer than the modelling suggested. We would ask that NRW publish the real data from the Cowbridge flood storage area to allow comparison and revision of the modelled projections. The business case should be sensitivity tested against the potential adverse impacts of biodiversity and amenity of more prolonged/ frequent inundation events.
- The baseline data provides no information as to whether either Casehill Wood or Newland Wood have historically been wet woodlands. Casehill woodland is clearly not a wet or flood

plain woodland and flooding would fundamentally alter its ecology. Flooding woods (particularly those with no history of such activity) may cause nutrient enrichment of soils or pollution (from sediment or pollutants in the flood waters), thus impacting the ground flora and possibly killing invertebrates or other animals like dormice overwintering in the ground. It may also destabilise soils making trees more vulnerable to collapse in stormy weather: all potentially serious impacts on ancient woodland habitats. Therefore, it is crucial that NRW considers the value of *all* ancient woodland affected, and consider viable alternatives instead that will still achieve the most ecologically sound and functioning catchment with subsequent benefits to reducing flood risk.

'Take action to prevent significant damage to ecosystems'

- We welcome the recognition in the revised ECOR that ancient woodland is a high value habitat and irreplaceable. We, however, note that the proposed Measures 3/14 would destroy an area of ancient woodland and damage a further area through inundation. Welsh planning policy clearly states that loss of irreplaceable habitat should be avoided. We do not accept the principle, implied in the ECOR, that there can be any adequate compensation for ancient woodland loss. Although newly planted woodland will develop some value for wildlife, it will never develop all of the natural characteristics of an ancient wood, or the same cultural value. As such, the flood storage area option cannot be viewed as adhering to this principle.

'Take account of the resilience of ecosystems'

- There has been no systematic effort to identify and evaluate the habitat and cultural value of the ancient trees which stand to be impacted by Measure 3/14. Ancient trees are a rarity in themselves and represent a scarce and unique habitat with its own characteristic biodiversity. A detailed tree survey should pick up these special features, which help to provide habitat niches for an array of dependent species. A continuity of deadwood and mature tree habitats are required for the maintenance of populations of specialist species, many of which are poor colonisers. Damage to ancient trees could impact significantly on local habitat connectivity and the resilience of biodiversity in the face of other threats.
- The destruction of ancient woodland patches would also reduce the resilience of the woodland ecosystem and run contrary to Lawson principles.
- The lack of consideration of the wider land use through the catchment in question in the current ECOR does not represent a full account of ecosystem resilience.

Investment Objectives

'Contribute to the objective of Sustainable Management of Natural Resources by maintaining and enhancing biodiversity and ecosystem resilience, through working with Natural processes and identifying wider environmental opportunities.'

- We note that the benefits of the Measure 4: Flood Walls Through Dinas Powys option, for example, are valued significantly lower (£3.54m) than those of the combined FSA/ NFM option (Measure 14) which is currently the most, albeit marginally, cost effective solution (£6.15m), despite the fact that Measure 4 appears projected to protect more homes and businesses than Measure 14? Could this be explained?
- It is not entirely explicit which 'Green Book-compatible methodology has been used to calculate the cost-benefit figures. It would appear that costs are purely based on direct

construction/ maintenance costs and projected flood damages (namely flood damage costs to property in the Cadoxton catchment; vehicle damages in flood; emergency services costs, OBC section 2.1): there appears to be no valuation of environmental and socio-cultural impacts? Likewise, it appears that benefits for the purposes of the cost benefit analysis are solely calculated on the basis of present value discounting of flood damages avoided, but fail to consider any wider ecosystem services (OBC para 2.6.3.1)? If this is indeed the case, the whole CBA exercise would appear to fall short in its attempt to account for multiple natural resource impacts and benefits, given that the crux of the decision about viability seems to rest so heavily on achieving a benefit-cost ratio of greater than 1, which is the measure for Success Criteria B. The costing methodology should be more clearly defined in the document and should arguably including a much wider range of ecosystem service benefits and disbenefits pertaining to each option.

- Against Measure 14, it suggested that although the costs of the environmental mitigation capital works have been factored into the cost forecast (although these will be underestimated, as they only refer to the indicative value of the footprint of the dam wall itself and not the construction footprint or full extent of the potentially flooded area), they have also costed ‘the indicative value (£) of benefit gained from the other broadleaved woodland’ (p46) – this is unclear and could imply that other existing broadleaf woodland on Woodland Trust land is being classed as a benefit attributable to the Measure, which clearly it is *not*.
- In calculating the benefits (£) of Measure 14, have the proposed environmental and access improvements, that have been factored into the combined FSA/ NFM option specifically as ‘mitigation’ or ‘compensation’, or which are inherent in the creation of structures such as leaky dams (e.g. water quality), been simultaneously included as benefits within the quoted £6.15m figure? If so the methodology is flawed.
- The ECOR quotes Measures 2 & 3 combined (Measure 14) as having the following positive impacts.
 - Improve ecology and geomorphology of the waterbody [inherent presumably in the implementation of RAFs/ leaky dams etc]
 - Work with adjoining landowners to review and alter land management practices to achieve water quality benefits.
 - Enhancement and long-term conservation of the adjoining species rich grassland. [these latter two appear to be mitigation measures, not direct results of the flood alleviation engineering?]
 - Improve public access and recreation facilities within the upper catchment... [This investment is surely mitigation for damage to paths and amenity value, not an additional benefit inherent in the flood storage area construction itself?]
 - Introduce measures to protect and enhance historic environment interests within the area e.g. improved interpretation at the Scheduled Monuments. [Again, this is a mitigation measure to compensate for impacts on a historic landscape and not a benefit of the scheme itself?]
 - Deliver woodland improvement measures e.g. Enhance woodland age structure and species composition through the creation of gaps and thinning. Tree planting to improve connectivity between woodland parcels. Scattered native black poplar planting along the river corridor and across the floodplain to provide continuity of habitat between existing areas of ancient woodland and encourage the redistribution of a rare native tree species. [As stated above, this is work which has been explicitly accounted on the ‘costs’ side as part of the ancient woodland mitigation package – we would content it should therefore not be considered as a positive impact of the scheme, as it is impossible to compensate for the loss of irreplaceable habitat]
 - Aid delivery of long-term objective for the Planted Ancient Woodland Site (PAWS) as recorded within The Woodland Trust’s “Cwm George and Casehill Wood Management Plan 2014-2019” i.e. Gradual removal of remaining conifer components and restoring to broadleaved woodland. Thinning of Beech where dense shade is posing a threat to ground

flora [Again, this is a cost as part of the mitigation package, not a direct benefit of building a dam].

The Woodland Trust contend that measures put forward specifically as compensation for loss of irreplaceable habitats should not be then be put forward as benefits in the cost benefit analysis, because loss of ancient woodland remains a net loss: only benefits that 1) derive directly from the flood mitigation measure (e.g. water quality improvements arising directly from the implementation of leaky dams) or 2) from activity that is 'stand-alone' i.e. not obligated as compensation for damages caused, should be considered as positive impacts, making the comparison across different measures fairer and more balanced.

After all, if these positive conservation actions to improve habitats and access are *not* strictly mitigation for loss and damage pertaining specifically to Measures 3/14, then why not factor them in as beneficial catchment interventions as part and parcel of *every* Measure? There would be nothing to stop improvements such as PAWS restoration, access improvements, pond creation, NFM measures such as restoring more natural river courses or installing leaky dams and riparian or wider catchment planting then being costed in to *any* of the other long list of Measures (their being, after all, relatively low cost in comparison to the total engineering costs). This could significantly change the cost benefit analysis. But NRW cannot have it all ways: these positive impacts cannot be at the same time mitigation costs *and* benefits/ positive impacts counting toward Success Criteria A *and* be selectively applied only to Measures 3/14.

'Contribute to NRW's Well-being objectives and consider the needs and views of the local community through effective engagement.'

- There is, indeed, an opportunity here to consider the issue in a much wider context and potentially deliver multiple benefits for biodiversity and ecosystem resilience at a catchment scale, if the question is broadened from the focused matter of flood risk to the question of wider ecosystem resilience and the well-being of the local community. After all, in a recent address on the Well-being of Future Generations Act, decision makers were reminded that ".....a public body must identify and retain the solution which maximises the contribution to all the pillars of well-being as well as taking reasonable steps to meet their well-being objective. [The Minister] would expect that decisions only contributing to one or two pillars of well-being to be disregarded and those that have multiple benefits across each of the elements of Wellbeing to be selected. The balancing in this revolutionary Act means giving as equal as possible weight to each element and not allowing one to tip the scale."

ⁱ Planning Policy Wales (PPW) 10 sets out that "planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means that development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity" (para 6.4.5 refers). This policy and subsequent policies in Chapter 6 of PPW 10 respond to the Section 6 Duty of the Environment (Wales) Act 2016* (From Letter by the Chief Planner, Planning Directorate, Welsh Government to Heads of Planning in Wales dated 23/10/2019).

ⁱⁱ Smithills is an upland site of moorland and woodland site near Bolton. There, more than 25 different flood prevention measures are being piloted, as well as new findings being gathered. In light of predicted changes in extreme weather patterns due to climate change, the research is bringing in experts from Liverpool University and is being carried out in partnership between the Woodland Trust, Mersey Forest and the Environment Agency as part of the Natural Course project www.naturalcourse.co.uk.

ⁱⁱⁱ The Sussex Flow Initiative (SFI) is a Natural Flood Management (NFM) project working in primarily based in the River Ouse catchment in Sussex. SFI was formed in 2014, as a partnership between the Woodland Trust, Sussex Wildlife Trust and the Environment Agency. It is further supported by funding from Lewes District Council. SFI works with landowners, local people and others to investigate, promote and create natural features designed to slow and store water in the landscape and to help reduce flood peaks. We aim to deliver multiple benefits for people and wildlife, as well as to show how NFM can be used to support traditional flood management methods to help reduce flooding.

^{iv} The firm construct three earth bunds which will reduce and slow down peak flows of floodwater. The bunds – walls to contain floodwater – act as leaky dams which hold back surges in steam flow and allow water in a controlled way to move through the dam. This, combined with tree planting, ponds, scrapes and new wetland habitat will increase the land’s capacity to absorb floodwater and release it slowly.

^v Delegates visited Hardcastle Crags (looked after by the National Trust) to see for themselves the work being carried out by volunteers to slow the flow. To date, in excess of 400 leaky dams have been built throughout this area of natural beauty, and Slow The Flow Calderdale’s bespoke monitoring systems are proving them to be extremely effective at reducing the flood peak.

^{vi} The Stroud Rural SuDs project is an innovative Natural Flood Management project working to reduce flood risk and restore biodiversity throughout the catchment of the River Frome and all its tributaries, including the Slad Brook, Painswick Stream, Nailsworth Stream, Ruscombe Brook and all their named and unnamed tributaries. It is working with landowners to implement natural flood management techniques and restore natural drainage where it is safe and feasible to do so. It works with local community flood groups, land owners, farmers and partner organisations to implement a range of measures that will reduce flood risk but also improve water quality and enhance the biodiversity of the streams, brooks and the wider River Frome catchment.

^{vii} Aberystwyth University were commissioned to produce an initial Scoping Study which outlined the potential methodology for long term ecosystem services monitoring and evaluation. The Woodland Trust is now commissioning the baseline evidence gathering on which to base an ongoing monitoring programme. The purpose of the work is to establish baseline data on the provision of regulating services, specifically ‘Flood and water protection’, ‘Water quality’ and ‘Climate’ at Brynau/Preswylfa, with the intention that ongoing monitoring will be undertaken enabling the evaluation of the impacts of a programme of woodland creation and establishment on these regulating services over time.

END.