

### Dinas Powys Flood Scheme AST Scoring Description

Score	Impact	Description
1	Very positive	Very significant positive impact to criteria, providing multiple + wide-reaching benefit or enhancement
2	Positive	Significant positive compliance or impact to criteria, providing local benefit or enhancement
3	Slightly positive	Some positive compliance or impact to criteria
4	Neutral	No or negligible impact to criteria
5	Slightly negative	Some negative impact to criteria, potentially reduced by mitigation
6	Negative	Significant negative impact to criteria, requiring management and / or mitigation
7	Very negative	Very significant negative impact to criteria, difficult to manage and / or mitigation

**Dinas Powys Flood Scheme AST Scoring**

Category	Criteria	Considerations	Catchment Natural Flood Management	East Brook channel storage	Flood scheme through Dinas Powys	Cadoxton River upstream storage	Comment
Technical	Design Standard	Properties protected in 2017 3.33% AEP event	44	151	197	192	Not scored (Residential count only)
		Properties protected in 2017 1% AEP event	0	31	197	167	Not scored (Residential count only)
	Construction and Maintenance	Working with Natural Processes	1	2	6	3	
		Constructability	4	4	7	5	
		Maintenance requirements	5	4	4	6	
	<b>Category Total</b>			<b>10</b>	<b>10</b>	<b>17</b>	<b>14</b>
Environmental and Social	Public amenity	Impact on amenity, access, PRoW	3	4	5	6	
	Natural environment	Impact on biodiversity (habitat, AW, designated sites, species)	2	4	6	7	
	Landscape and Visual	Impact on landscape character	4	4	6	6	
	Heritage	Impact upon cultural heritage (Scheduled Monuments, Cwrt-yr-Ala Registered Park and Garden, Listed Buildings)	4	4	4	5	
	Climate change adaptation	Ability to be managed / adapted in the future	3	3	3	2	
		Carbon footprint	4	4	7	5	
	Geomorphology / WFD	Impact on river geomorphology and WFD status of waterbody	2	3	6	6	
	Contamination	Issues of ground contamination	4	4	4	4	
<b>Category Total</b>			<b>26</b>	<b>30</b>	<b>41</b>	<b>41</b>	
Strategic	Landownership	Support or objection of landowners	4	4	7	7	
	Permissions	Likelihood of obtaining various approvals (eg planning permission, EIA, WFD), potential conditions, or escalation	4	4	6	7	
	Public Health and Safety	Public misuse and associated risks	4	4	4	4	
	Disruption	Disruption to public and community during construction and by new asset	4	4	7	6	
	Public support	Support of general public, community groups, elected representatives	2	3	6	7	
<b>Category Total</b>			<b>18</b>	<b>19</b>	<b>30</b>	<b>31</b>	
<b>GRAND TOTAL</b>			<b>54</b>	<b>59</b>	<b>88</b>	<b>86</b>	
<b>RANK</b>			<b>1st</b>	<b>2nd</b>	<b>4th</b>	<b>3rd</b>	

Dinas Powys Flood Scheme AST Scoring Explanation

Category	Sub-category	Considerations	Catchment Natural Flood Management	East Brook channel storage	Flood scheme through Dinas Powys	Cadotton River upstream storage
Technical	Design standard	Working with Natural Processes	NFM measures rely on natural processes, such as soil alleviation to increase infiltration, very small-scale local attenuation or tree planting, so they are integral to the option.	Small-scale local attenuation - improving storage capacity of the river channel, works with nature by allowing base flows to pass naturally, however stores flood flows in over sized channels.	Improving conveyance / capacity of the river channel works with nature by allowing flood flows to pass naturally, however coupled with containment by defences to prevent floodwater storing in the floodplain, due to properties being built in it, does not contribute to working with the natural catchment processes. It is noted that the Cadotton River is already de-naturalised through much of the village.	Flood storage temporarily attenuates river flows in designated floodplain location, mimicking natural processes, but in a manufactured fashion.
	Construction and Maintenance	Constructability	Simple and low infrastructure works, typically akin to farming practices would be straight forward to construct and require little materials or machinery, however, significant disposal quantities. Some uncertainty in construction of some options may require trial / error approach. Works would not disturb many residents due to scale and isolated locations, with access along Cwrt-Yr-Ala. Access to individual NFM sites may be challenging with local conditions (topography, ground conditions).	Simple and low infrastructure works, would be straight forward to construct however will require imported materials and heavy machinery. Some uncertainty in construction of final option, will require detailed design. Works would not disturb many residents due to scale and isolated location, with access from Cardiff Road. Access to site may be challenging with local conditions (topography, ground conditions).	Construction of piled walls through the heart of the village along river channel (piling and concrete in brownfield) would be very difficult due to space and access constraints and numerous adjoining properties / gardens. Channel widening would be disruptive and difficult in linear location. Raising bridges would require significant demolition and temporary works. Construction would cause significant disturbance, noise, vibration and light issues to hundreds of residents as well as traffic / pedestrian management issues. No obvious compound location identified.	Embankment across valley (regular earthworks in greenfield), but will involve reasonable earth movements, potentially mitigated if local borrow pit is used. Reservoir structure will require Panel Engineer sign off, so increased specification, inspection and testing required during construction. Works would not disturb many residents due to isolated location, but access route would be confirmed as will disturb more residents if from south. Walkers in valley will be disturbed during construction.
	Maintenance requirements	Inspection and maintenance depends on type, form and number of measures. Semi-regular (quarterly) inspections anticipated to monitor presence and performance of large number of measures, dispersed over large local area. Maintenance expected to be low, but some measures, such as soil alleviation or RAFs, may need repeating every few years.	Inspection and maintenance depends on type, form, final design and number of measures. Semi-regular (quarterly) inspections anticipated to monitor presence and performance of measure, however structures only spread over small local area. Maintenance expected to be low, but complete replacement of dam members could be required every 20 to 30 years.	Significant lengths of walls and embankments. Generally low inspection and maintenance. Raised or widened structures will be passed back to owner (eg highway authority).	Will be a Category A statutory reservoir. Regular (monthly) inspections required. Annual maintenance will include grass cutting and trash screen clearance.	
Public amenity	Impact on amenity, access, PRoW	Specific impacts unknown as type, form and number of measures not specified. However, typical nature and function of NFM features (ponds, leaky barriers, tree planting) would be expected to have some positive impacts to public amenity.	Typical nature and function leaky barriers would be expected to have some positive impacts. However, location is on private land away from public access sites.	An extensive network of flood walls through Dinas Powys will impact access along the Cadotton River, reducing people's amenity enjoyment of the river with less connectivity. However, locally widening channel section presents an opportunity to improve connectivity for a short length. Potential impact upon protected and notable species during construction and operation. Species present as recorded or potentially present as suitable habitat include Bats, Badgers, Otters, Dormouse, Reptiles, Amphibians, Invertebrates, Nesting Birds - Kingfisher in particular as it burrows within high river banks. Further surveys (inc extended phase 1 habitat survey) and assessment (Preliminary Ecological Appraisal) needed if option progresses to determine likely impact.	In any year, there is between 50% and 100% chance that up to ~750m of the PRoW will be inundated with flood water, making it unusable for up to 24hrs during a flood event, and subject to WT operating / reopening. This will coincide / follow a very heavy rainfall event. Part of the PRoW is on the well publicised Salmon Leap Walk, one of 10 Vale Walks in VoG. Flood storage inundation would impact two Woodland Trust Permissive Footpaths. ~60m of PRoW will need to be permanently re-routed to accommodate the embankment, but the route is unlikely to alter significantly in plan, instead being raised to pass over the embankment. Footpaths could be improved to increase accessibility or protected from higher-frequency events to remain usable for larger majority of time. The flood storage inundation would impact a Woodland Trust Permissive Bridleway (approximately 150m stretch). The Permissive Bridleway is one of only two bridleways located within the south east of VoG. Valley would retain general amenity use with FSA present.	
	Impact on biodiversity	Specific impacts unknown as type, form and number of measures not specified. However, typical nature and function of NFM features (ponds, leaky barriers, tree planting) would be expected to have positive impacts to benefit the natural environment.	Typical nature and function of leaky barriers would be expected to have positive impacts to benefit the natural environment. Construction will involve loss of some trees immediately to where leaky barriers are situated. No nature conservation designations within vicinity of site. Works will need to give consideration to protected and notable species such as Bats, otters, reptiles, amphibians, nesting birds (including kingfisher).	Construction of river bank walls, bridge improvements and channel widening throughout village will lead to loss of riverine habitat, likely to consist of Section 7 priority habitats "Lowland mixed deciduous woodland", "wet Woodland" and "River". Total area of riverine habitat loss likely to be ~8,000m2 within urban area. River habitat impact - ref geomorphology. Habitat improvement and creation of Section 7 priority habitat could be incorporated to option, including 2-stage channel for biological improvement to existing canalised channel. Potential impact upon protected and notable species during construction and operation. Species present as recorded or potentially present as suitable habitat include Bats, Badgers, Otters, Dormouse, Reptiles, Amphibians, Invertebrates, Nesting Birds - Kingfisher in particular as it burrows within high river banks. Further surveys (inc extended phase 1 habitat survey) and assessment (Preliminary Ecological Appraisal) needed if option progresses to determine likely impact.	~983m2 of irreplaceable Ancient Woodland lost to construct embankment. Adjoining broadleaved woodland to be lost may have some ancient woodland characteristics. FSA inundation likely to negatively impact composition of ancient woodland ground flora and soils, although trees unlikely to be impacted. 1 in 2 chance per year that ~4,365m2 of ancient woodland will be inundated. 1 in 1000 chance per year that ~6,906m2 of ancient woodland will be inundated. Ancient woodland part of Coed Cwyd-Gwyn and Case Hill Wood SINC (local non-statutory designation with high nature conservation value). Section 7 priority habitat "Lowland mixed deciduous woodland" will be lost with ~4,385m2 broadleaved woodland lost for embankment footprint, which may have some ancient woodland characteristics. Broadleaved woodland forms part of Case Hill Wood SINC. During extreme flood event (1 in 1000 chance) ~44,736m2 of broadleaved woodland would be inundated during a flood event and for ~24hrs after. A smaller area subject to more regular inundation may transition from lowland mixed deciduous woodland to wet woodland (also a Section 7 priority habitat). Inundation may cause nutrient loading or introduce invasive species to negatively impact woodland. Three Veteran Trees (a tree which shows ancient characteristics) and one Notable Tree (a tree which is significant locally), all oaks, are in the flood storage inundation area. Unlike these trees will be adversely impacted due to frequency and duration of inundation. Five well managed Hawthorn hedgerows (Section 7 priority habitat) with a low diversity of other woody species are located in 1:1000 chance flood storage area inundation extent. Unlike hedges will be adversely impacted due to frequency and duration of inundation. Opportunity to enhance existing hedgerows and plant new hedgerows. Small scale loss of ~60m of river bank (Section 7 priority habitat) for embankment and culvert, including likely loss of riparian woodland and scrub habitat (quantity included in lowland mixed deciduous woodland above). River habitat impact - ref geomorphology. Opportunity to create new Section 7 priority habitat: wet woodland, ponds and hedgerows. And improve quality of existing Section 7 priority habitats and connectivity between them. Potential to impact upon protected and notable species during construction and operation. Species present as recorded or potentially present as suitable habitat include Bats, Badgers, Otters, Dormouse, Reptiles, Invertebrates, Nesting Birds - Kingfisher in particular as it burrows within high river banks. 2017 Dormouse survey concluded that Dormice were not present, but could move in to area. Further surveys needed if option progresses. Opportunity to make habitat improvements to support specific protected or notable species.	
	Impact on landscape character	Specific impacts unknown as locations, type, form and number of measures not specified. However, typical nature and function of NFM features (ponds, leaky barriers, tree planting) are unlikely to detrimentally impact the landscape and may bring some benefit, although would be implemented in existing greenfield space.	Flood storage area located in Cwrt-Yr-Ala Basin Special Landscape Area (SLA) local non-statutory landscape designation by LA for area of high landscape importance. Unlikely to be any visual receptors given nature of leaky barriers being situated within existing channel. Whilst some localised tree loss is envisaged, works are unlikely to detrimentally impact the landscape.	Walls would create visual barrier between residential and public areas and the river due to their height and proximity to the banks, canalising the watercourse to have a negative impact upon the landscape. Walls would be clad (likely brick) as opposed to exposed pile or concrete, to improve landscaping of asset and reduce impact of feel. Amending existing structures would have little impact to landscape. Walls' most northern point adjoins Dinas Powys Conservation Area, but unlikely to have significant adverse effect considering proximity and scale of wall (0.75m high), although wall would have to be sensitive and in keeping with existing features (possibly stone clad with bespoke coping). Widening a short section of channel and potentially creating two-stage channel at sections along the reach has opportunity to improve landscape quality of water body itself.	Flood storage area located in Cwrt-Yr-Ala Basin Special Landscape Area (SLA) - local non-statutory landscape designation by LA for area of high landscape importance. Area has minimal manmade elements and limited access by road. Key visual receptors include residential properties and Public / Permissive Rights of Ways. Notable visual effects unlikely >500m. Embankment will alter visual appearance of valley, impacting SLA, but impact should be reduced by sensitive design and screening from key visual receptors. Floodwater inundation unlikely to significantly impact SLA as Infiltration and Temporary. Landscape Visual Impact Assessment required if progressed. Upmost extent of flood storage area extends to Michaelston-Le-Pit Conservation Area, so any local work to manage flood risk will have to consider this. 15 TPO's situated in flood storage area, unlikely to be significantly impacted by infrequent and temporary inundation, but further assessment needed.	
Environmental and Social	Heritage	Impact(s) upon Cultural Heritage (Scheduled Monuments, Cwrt-Yr-Ala Registered Park and Garden, Listed Buildings)	Specific impacts unknown as locations, type, form and number of measures not specified. However, typical nature and function of NFM features (ponds, leaky barriers, tree planting), there's unlikely to be detrimentally impact to heritage features.	No historic environment designations or know historic features within vicinity of works. There's unlikely to be detrimentally impact to heritage features. Archaeological watching brief recommended for proposed scheme, especially in-channel works.	No Scheduled Monuments, Listed Buildings or known historic features near proposed flood walls. Archaeological watching brief recommended for proposed scheme, especially in-channel works.	No historic designations located within flood storage area to impact. Setting of three adjoining Scheduled Monuments (Cwm George Camp SM; Tyn y Coed Earthworks SM; Dinas Powys Castle SM) could be impacted by flood storage area. Assessment of impact upon SM setting required (Cadw advised) as FSA has potential to change historic landscape character of area. FSA will cross and impact upon two non-designated historic features (Dinas Powys Mill Race; Historic Boundary of Newland Wood). GQAT recommends survey to record prior to affecting. Archaeological watching brief recommended for proposed scheme.
	Climate change adaption	Ability to be managed / adapted in the future	Can theoretically adapt by providing more measures, but may be difficult in practice to achieve as all measures required will need to be implemented at outset.	Can theoretically adapt by adjusting base flows, leakage rate, widening deepening channels to increase storage volumes, but may be difficult in practice to achieve.	Extensive construction required to raise walls along most of length, and extend upstream and downstream, to achieve assets similar to Defences Option 3. Wall foundations could be future proofed by oversizing to allow future raising. Option could be combined with other measures, such as upstream storage.	Storage area offers flexibility to manage or modify operation in future to deal with range of flood events. FSA hydraulic control could be amended to optimise to climate change or flow estimations. Embankment crest height could be raised to protect the higher SoP, but would result in greater adverse impacts to upstream properties and infrastructure as per 1a.
	Carbon footprint	NFM features (ponds, leaky barriers, tree planting) will have low carbon footprint and potential positive carbon capture, subject to type and number.	Leaky barriers, will have medium carbon footprint due to use of pile foundations and heavy machinery, however potential positive carbon capture could result through improved bio diversity.	Extensive walls require high quantities of high carbon steel and concrete, producing high carbon footprint. Second hand piles could be sourced, but unlikely to be supplied in sufficient quantity. Ensure % recycled steel in pile production, and consider travel distance. Ensure cement replacements used in concrete.	Mainly earthworks involved which has a relatively low carbon footprint. Can be significantly reduced if local borrow pit material is sourced. Some concrete and metal required, with higher carbon footprint, for hydraulic control / culvert.	
Geomorphology / WFD	Impact on geomorphology and WFD status of waterbody	Specific impacts / benefits unknown as locations, type, form and number of measures not specified. However, typical nature and function of NFM features (ponds, leaky barriers, tree planting) are likely to benefit local water environment, particularly improving local biodiversity and water quality, as work with natural processes so would maintain waterbody's WFD status and assist achieving status objectives.	Leaky barriers are likely to benefit local water environment, particularly improving local biodiversity and water quality. Low flows would be unimpeded.	Biological: Works will remove ~8,008m2 of riverine habitat (trees/vegetation), which would negatively impact waterbody. Two-stage channel provides opportunity to deliver biological improvement to the existing canalised channel. Chemical & Physico Chemical: Defences will not effect status of waterbody. Good pollution prevention measures required at design (FRAP). Preliminary WFD Assessment not undertaken for this option.	Hydromorphological: Overall, at this outline design stage, whilst there's potential (e.g. impact on river continuity and sediment transport processes within the watercourse), it's not foreseen the Flood Storage Area is likely to adversely impact the WFD status or the waterbody, based on Hydromorphological Elements' (WFD Assessment - Dec 2017). Nevertheless, changes in flow and sediment transport will need to be considered further when additional information becomes available should this option be progressed to detail design stage. Biological: Depending on the embankment/culvert design there's potential for adverse effects to fish (e.g. potential for increased sediment upstream and the effect this would have on fish eggs within gravels), invertebrates (e.g. potential for changes in sedimentation and flow/hydrodynamics to impact on invertebrates upstream and downstream of the culvert), macrophytes and phytoplankton (inundation of nutrient rich farmland could mobilise nutrients in agricultural soil into the waterbody which may cause eutrophication). Again, should this option progress to detail design further detailed impact assessment should be undertaken to assess potential risks to these biological elements and subsequently whether the proposed scheme could affect waterbody status or inhibit the waterbody from achieving its status objectives. More information regarding design before a definitive consensus can be reached. Chemical & Physico Chemical: It has been concluded that the construction and operational activities associated with the proposed flood storage area are unlikely to affect the status of chemical elements of the River Cadotton waterbody. Physicochemical elements are also unlikely to be significantly affected, though the risk of increased nutrient (phosphate and ammonia) input to the waterbody from increased inundation of nutrient-rich farmland, and the effects this may have, further considered at detailed design stage will be necessary should this option progress.	
	Contamination	Issues of ground contamination	No significant ground contamination issues expected as no contaminated ground identified in area. Any occurrence is likely to be micro scale and managed locally.	No significant ground contamination issues expected as no contaminated ground identified in area. Any occurrence is likely to be micro scale and managed locally.	No significant ground contamination issues expected as no contaminated ground identified in area. However, possibility is raised as urban area. Any occurrence is likely to be micro scale and managed locally.	No significant ground contamination issues expected as no contaminated ground identified in area. Any occurrence is likely to be micro scale and managed locally.
	Landownership	Support or objection of landowners	Landowner support unknown as limited engagement, but likely to be variably receptive to measures which will reduce the quantity of measures implemented and flood protection achieved.	Landowner support provisionally positive.	Large number of properties impacted by significant and lengthy disruption during construction. Very likely to receive several objections and risk of CPO's. However, may also receive support from some as properties would benefit from scheme. Residents will also have a new wall in their garden or outside their house. Highway approvals required with VoG to amend existing structures over river.	Woodland Trust does not support option, so CPO likely. Other landowners provisionally not supportive of option, so CPO possible, but embankment could be relocated to reduce impacts and remove objection / CPO. Minor flood risk management required upstream and for property access. Permanent access road to embankment required, but route unclear.
Strategic	Permissions	Likelihood of obtaining various approvals (eg planning permission, EIA, WFD), potential conditions, or escalation	Planning permission may be required, but should be consented with few conditions. WFD Assessment needed. Should be compliant. Flood Risk Activity Permit (FRAP) required, should be consented. Protected Species Licences may be necessary.	Planning permission would be required (likely no EIA). Extensive conditions likely. WFD Assessment needed. Risk of challenge to compliance, despite mitigation. Flood Risk Activity Permit (FRAP) required, should be consented. Protected Species Licences may be necessary. Conservation Area Consent. Public Path Order needed.	Planning permission with EIA would be required, and may be called in (AW). Risk of not achieving consent. Extensive conditions likely. Public Path Order needed and may be difficult to comply with alternative provisions. WFD Assessment needed. Should be compliant, with mitigation. Flood Risk Activity Permit (FRAP) required, should be consented. Protected Species Licences may be necessary. TPO's may need addressing.	
	Public Health and Safety	Public misuse and associated risks	Measures unlikely to create hazards for public risk.	Measures unlikely to create hazards for public risk.	Walls should separate people from accessing river, but safe egress points will be required. Wall tops / copings to discourage use.	Informing and warning of FSA inundation needed to valley users and safe egress.
	Disruption	Disruption to public and community during construction and by new asset	Construction impact of NFM measures would be very low due to isolated locations away from MLP properties and low input to construct works requiring low vehicle movements through MLP.	Construction impact of leaky barriers would be very low due to isolated locations away from properties and low input to construct works requiring low vehicle movements.	Extensive and prolonged heavy construction works throughout the centre of Dinas Powys, causing widespread disruption to residents and motorists. Once operational walls would not cause disruption.	Construction impact of embankment would be low due to isolated location, mainly impacting ~2 nearby residents. Users of valley (~50,000/year) would be disrupted, but alternative routes provided during construction (as PRoW). Local borrow pit would reduce traffic movements around Dinas Powys. When inundating (average once a year for short, small event (not full)) FSA would restrict use of valley.
	Public support	Support of general public, community groups, elected representatives	Option generally supported by consultation responses to date. Some opposition may arise as does not provide sufficient standard of protection comparable to other options.	Option generally supported by consultation responses to date. Some opposition may arise as does not provide sufficient standard of protection comparable to other options.	Varied and mixed responses regarding option to date so difficult to summarise as +ve or -ve. Walls option is not favoured by consultation responses to date, but option supporters do not make overwhelming support and would likely face public opposition, especially from properties at risk or near works.	Varied and mixed responses regarding option to date so difficult to summarise as +ve or -ve, but opposition is growing. FSA option is favoured by consultation responses to date, but does not have overwhelming support and will likely face increasing public opposition, especially from users of the valley.