

Culture and Communities Committee

10.00am, Thursday, 13 October 2022

Dowie's Mill Weir Fish Pass, River Almond

Executive/routine Wards Council Commitments	Routine 1 – Almond
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1. Recommendations

- 1.1 It is recommended that Culture and Communities Committee:
 - 1.1.1 Notes the content of this report;
 - 1.1.2 Agrees the construction of a rock ramp at Dowie's Mill Weir;
 - 1.1.3 Supports the development of the rock ramp proposal to detailed design stage and subject to further stakeholder engagement in the design process; and
 - 1.1.4 Allows the Executive Director of Place to progress the necessary arrangements for the construction of a fish pass at Dowie's Mill Weir, subject to Planning consent being approved and adequate funding being in place.

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Report

Dowie's Mill Weir Fish Pass, River Almond

2. Executive Summary

- 2.1 This report provides an update on the Dowie's Mill Weir Fish Pass on the River Almond and seeks approval to progress with development of a rock ramp at this location to improve fish migration.

3. Background

- 3.1 Dowie's Mill Weir is situated on the lower reaches of the River Almond, approximately 1.7km upstream of the river mouth in the Forth estuary and approximately 180m downstream of the Cramond Brig. The weir is Council-owned and has a history that dates back to the 1600s. The weir fed Dowie's Mill, long since demolished.
- 3.2 While there are eight weirs on the River Almond, Dowie's Mill Weir is one of seven local authority weirs identified for improvement. Work has now been completed at six of the other local authority weirs, leaving Dowie's Mill Weir as the final one.
- 3.3 Large parts of Dowie's Mill Weir are in very poor condition. The weir was last breached and subsequently repaired in 1962. If Dowie's Mill Weir were to fail, this could potentially put the upstream riverbanks, gas main, sewer, and Cramond Brig at serious risk of erosion and damage.
- 3.4 The provision of fish migration at any existing impoundment (e.g., weirs and dams) is the responsibility of the structure owner(s) under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 ('CAR').
- 3.5 The Almond Barriers Project is an ongoing initiative along the River Almond to improve fish passage that allows migratory fish to extend their distribution in the catchment. The project is a partnership between the Scottish Environment Protection Agency (SEPA), the Forth Rivers Trust, West Lothian Council, and the City of Edinburgh Council. The project covers more than 200km of the river and its tributaries and aims to improve fish passage at seven weir locations including Dowie's Mill Weir.
- 3.6 SEPA has identified that the weir presents an obstacle to fish migration and impacts on both the habitat connectivity and natural movement of materials, such as

gravels, in the river. In turn, these pressures contribute to the poor Water Framework Directive (WFD) status assigned to the River Almond. Improving fish passage at Dowie's Mill Weir will therefore have environmental benefits and help improve the status of the river and its catchment.

- 3.7 The River Almond Walkway runs along the right bank of the river and allows direct views of Dowie's Mill weir, which is a key landmark along the route. The walkway is well-used and highly regarded, allowing easy access to picturesque riverside views. This landscape and amenity value is recognised through local planning policy designations as an Area of Outstanding Landscape Quality and a Special Landscape Area. The site is also within the Green Belt and the Cramond Conservation Area.
- 3.8 The City of Edinburgh Council is legally obliged to remove or ease physical barriers to the passage of fish along the River Almond that are in its ownership and Scotland's River Basin Management Plan prioritises the Almond barriers for fish migration works.
- 3.9 Dowie's Mill Weir is a 70m wide predominantly concrete weir, with sections of concrete capping boulders and a variety of downstream face gradients. There are several points along the crest of the weir where concrete sections are missing or fragmented, showing the boulders below. The weir is in a noticeably poor state of repair and would appear likely to further degrade in the future. This is likely to alter passability for fish in unpredictable ways and be a risk to the long-term success of future improvement works unless action is taken.
- 3.10 The existing fish pass, consisting of a 1.3m wide bypass channel built into the weir structure and sited immediately adjacent to the right-hand bank, is sub-optimal for fish passage owing to the turbulent and confused flow and large head drops.

Importance of fish passage

- 3.11 The River Almond is a known salmonid fishing river with sea trout and Atlantic salmon present at different times of the year. These are important migratory fish that are in general decline and the seven redundant local authority weirs are individually, and cumulatively, an obstruction to their migration.
- 3.12 Dowie's Mill Weir is the second weir upstream of the tidal limit on the River Almond and fish passage at the weir is critical for populations of migratory fish species.

Defining a fish pass

- 3.13 The purpose of a fish pass is to allow the free passage along the water course of endemic fish species of the appropriate developmental stage(s) at the appropriate time(s) of year. This would support the passage of juvenile salmonids (smolts), adult migratory salmonids, and the needs of different life stages of freshwater fish species.
- 3.14 The Environment Agency defines a fish pass as "any form of conduit, channel, lift, other device or structure which facilitates the free passage of migrating fish over, through or around any dam or other obstruction, whether natural or man-made, in either an upstream or a downstream direction."

- 3.15 A fish pass provides support for priority species including Atlantic salmon (*Salmo salar*); Brown trout (*Salmo trutta*); European eel (*Anguilla anguilla*); Sea lamprey (*Petromyzon marinus*); River lamprey (*Lampetra fluviatilis*); and Brook lamprey (*Lampetra planeri*).

Removal of the Weir

- 3.16 A report commissioned by the River and Fisheries Trusts undertaken by Jeremy Benn Associates (JBA) Consulting in 2017 developed a detailed design for removal of the weir. Although considered to be the best option for fish passage (because it removes the weir that is an obstruction in the river, restores fish passage over a range of flows for all species, restores natural sediment transport, reduces poaching opportunities, and requires minimal maintenance), this option proved unpopular and received objections following public consultations. The JBA report suggested weir removal with a riffle-pool-boulder rapid as the preferred option. This would include removing the weir and reinstating the riverbed with a boulder rapid in the reprofiled high energy section, incorporating a pool-riffle sequence in low flow areas.

4. Main report

- 4.1 Several studies relating to the barriers and fish passage on the River Almond have been undertaken since 2010. Due to the age of the existing weir structure, its condition and integrity, and issues with fish passage, it is now necessary to undertake improvements to Dowie's Mill Weir.
- 4.2 Due to the degree of community anxiety about weir removal, the options for easement of the weir were considered by AECOM, including:
- 4.2.1 Weir removal;
 - 4.2.2 Reducing barrier height plus rock ramp;
 - 4.2.3 Full width rock ramp 2%;
 - 4.2.4 Full width rock ramp 5%;
 - 4.2.5 Combination pass;
 - 4.2.6 Bypass channel;
 - 4.2.7 Baffle-brush pass; and
 - 4.2.8 New downstream weir with baffle-brush pass.

Review of options for a fish pass

- 4.3 AECOM reviewed potential alternative options to consider local preferences, manage stakeholder expectations and objections, enhance the local environment, and hopefully gain planning approval. A hierarchy of options from the fish passage appraisal is given in Appendix 1.
- 4.4 This work supported the development of a rock ramp proposal as the next best option to weir removal. Key benefits of the rock ramp are that it maintains the historical weir structure and the character of the slow-flowing water upstream, as

well as being capable of providing a suitable degree of fish passage by adhering to available fish pass guidance.

Rejection of weir removal

- 4.5 Removing the weir was opposed by the local community over the impounded water, sometimes called the “mill pond”, upstream of the weir being valued.
- 4.6 Other risks were identified in the JBA report including slope instability at Dowies’ Mill Lane, undermining of pipeline crossings, and undermining of the historic Cramond Brig. Measures would then be required to protect the pipeline with a boulder bar below to stabilise the river level but allow fish migration. The removal of Dowie’s Mill Weir will affect Category A listed Cramond Brig. Dowie’s Mill Weir formed part of a historic mill complex now represented by Category B and C Listed mill cottages, and so forms part of the historic setting of these Listed Buildings. Listed building consent will therefore be required for any scour protection at Cramond Brig. Furthermore, Dowie’s Mill Weir is situated within the Cramond Conservation Area. As a result, the works should conserve or enhance the historic fabric and avoid adverse impacts on setting. A heritage assessment will be undertaken as part of the detailed design process to set out the heritage significance of the weir and its setting, and to establish the likely impact of the proposed work on that significance. This will include consideration of both designated and non-designated heritage assets.

Rock ramp option

- 4.7 It is acknowledged that any option that does not involve complete removal of the weir would be sub-optimal for fish migration. However, evaluating and finding the next best option was critical because the proposal should support migration for multiple fish species with a wide range of swimming ability moving upstream and downstream, meet public approval, and not drastically change the character of the area environmentally nor significantly impact the important heritage associated with Dowie’s Mill Weir.
- 4.8 Rock ramps involve the construction of a roughened slope on the downstream side of the weir to create a semi-natural riverbed. General rock ramp requirements are outlined in the design guidance (see background information item 8.1), and include:
 - 4.8.1 Ramp gradients of less than or equal to 5%;
 - 4.8.2 Ramp typically covers the whole width of the river;
 - 4.8.3 Inclusion of a low flow channel(s) recommended if required to achieve adequate passage conditions;
 - 4.8.4 Resting pools included within ramps of higher head (>1m);
 - 4.8.5 Notches in the weir crest would help ensure fish can negotiate the crest;
 - 4.8.6 Minimum resting pool depth 1.2m for large salmon; not less than 0.6m for trout and coarse fish;
 - 4.8.7 Heterogeneity in the rock ramp design can enable poorer swimmers to use the pass e.g., by adding a cross slope to the ramp; and

4.8.8 Small fish and invertebrates have been shown to be able to use rock ramps for migration, making use of the interstitial system between the boulders and cobbles.

4.9 The outline design involves the construction of a rock ramp at a 3% gradient with a series of three ramps and three resting pools, with the upstream end at Dowie's Mill Weir. A review of fish passage performance indicates that the rock ramp proposal allowing passage for all species can be achieved for a full range of flow conditions, subject to confirmation at detailed design stage through hydraulic modelling. The existing weir would be retained and not impact on water levels upstream of the weir. The ramp would extend across the full width of the river and include a low flow channel of adequate depth to ensure water was available at low river flows for fish passage. A 3% gradient aligns with national, regional and local policies, although a steeper gradient is within design criteria, again subject to confirmation at detailed design stage and evidence provided for consideration at planning application stage as well as obtained from feedback from further stakeholder engagement. Visualisations of the fish pass proposal have been prepared (see background information item 8.7).

Analysis of rock ramp option

4.10 Any design has to consider that the river is a dynamic environment, and a rock ramp is likely to change as natural river processes act upon it, which will require ongoing monitoring (e.g., blockages in the low flow channel; sediment in resting pools and self-sealing of ramp; integrity of weir structure and islands; and inspection following flood events). However, the consultant suggests that the proposed rock pass is considered relatively low maintenance compared to more technical fish passes.

4.11 The Forth Rivers Trust has been critical of the rock ramp proposal because it is not the best solution for fish passage compared to removal of the weir. Concerns centre on the rock ramp as compromising several areas including fish passage. SEPA and Forth Rivers Trust consider there to be unknown cumulative impacts each time a decision is reached not to remove a barrier to fish passage. As the River Almond already has several barriers, there is already a cumulative effect on fish passage. The six other local authority weirs have had technical solutions installed, including a rock ramp at Howden Bridge.

4.12 Until a solution has been constructed at Dowie's Mill Weir, the great majority of the River Almond catchment will remain largely inaccessible to migratory fish, risking the viability of the River Almond Barriers Project and leaving Scottish Government invested upstream assets "stranded".

5. Next Steps

5.1 Subject to approval by the Committee in support of the rock ramp option outlined above, the project will progress to the detailed design stage, which will then be submitted for planning permission.

- 5.2 Further assessments will be required prior to developing the detailed design by the consultants including, for example, detailed engineering design (involving civil, hydraulic, structural and geotechnical engineering disciplines) to take the current outline design to a point where a design package suitable for construction procurement can be developed. To inform the requirements of detailed design and to enable a planning application to be submitted, the following areas require further assessment to be carried out including areas of landscape and visual impacts, arboriculture, heritage, ecology, EIA screening, and flood risk.
- 5.3 Planning permission will be required before any subsequent procurement for the construction and delivery of the rock ramp option.
- 5.4 A Controlled Activities Regulations (CAR) licence would be required from SEPA for fish passage works prior to any construction.
- 5.5 Agreement will also need to be reached with Rosebery Estates, as adjacent landowners, to secure relevant access and egress locations and facilitate construction work.

6. Financial impact

- 6.1 The costs to implement the proposed rock ramp based on similar construction at the Howden rock ramp fish pass (also on the River Almond) ranges between £900,000 and £1.6m. These costs are likely to exceed the costs associated with weir removal (although earlier cost estimates for weir removal are now outdated).
- 6.2 Scottish Government funding is available for works to remove obstacles to fish passage at weirs owned by local authorities but not for ongoing maintenance of redundant structures. Scottish Government and SEPA have confirmed that a suitably designed rock ramp at Dowies is eligible for Scottish Government funding.
- 6.3 £635,867 was awarded to the Council in 2018 from the Scottish Government (in connection with the programme of securing improvements to the physical condition of Scotland's water environment) allowing the Council to carry out works to improve or restore the physical characteristics of the River Almond towards a classification of good ecological status or potential by removing or easing barriers to fish passage at certain weirs. A further £600,000 was awarded in 2022 to allow the Council to progress to groundworks based on the most recent costs estimates.
- 6.4 There will be ongoing maintenance costs associated with the rock pass after the construction phase around monitoring, inspection, and carrying out any necessary repair works. Costs would be borne by the Council and will most likely depend on the frequency and intensity of flood events thus making it difficult to quantify future financial liabilities. Reducing maintenance costs will be a consideration during the detailed design stage.

7. Stakeholder/Community Impact

- 7.1 Three online and two in-person public engagement sessions were held in June 2022 providing an update to stakeholders and the public on the proposals for the rock ramp. Stakeholders included external representatives from Cramond Community Council, Cramond Angling Club, Friends of the River Almond Walkway, Cramond Heritage Trust, COLAB, Forth Rivers Trust, and SEPA; and internal representatives from Heritage, Bereavement Services, Structures and Flooding, Parks and Greenspace, and Planning. Summary of feedback is provided in Appendix 2.
- 7.2 In-person events were advertised with posters and letter drops to residents living nearby. Of the 37 public comments received (as of 28 July 2022) during the in-person engagement sessions that who completed a comments card or emailed a response, 32 were in favour (86%) of the rock ramp option, one (3%) was against, and four were undecided (11%).
- 7.3 Direct feedback has been received from local residents and community interest groups affected by the proposals, and their views will be considered as part of the detail design process.
- 7.4 Further stakeholder engagement will be required as the detailed design stage reaches completion, assuming approval by Committee to continue. This will also consider any outstanding elements from earlier stakeholder engagement. Any further public responses received prior to Committee will also be considered as part of the detailed design stage.
- 7.5 Any fundamental changes to the overall proposal subsequent to more detailed design will also be shared with stakeholders and the public through the resulting planning application process.
- 7.6 Any ancillary work to be included to minimise further disruption. Some repairs have been identified that should be carried out to the collapsed riverbank upstream of the weir as part of the construction of the fish pass. This element of additional repair and maintenance work would not be eligible for SG funds.
- 7.7 The design minimises the use of concrete and maximises the reuse of materials already on site which will help to maintain natural systems and provide a lower carbon footprint than traditional construction work. The large material would be removed from the channel during construction and stockpiled until it can be utilised to form the rock ramp structure. Some material will need to be imported to raise the riverbed above current levels, and it is intended that this material will be obtained from local sources.
- 7.8 An important consideration is given to site access for the construction phase. Dowie's Mill Lane is the location of the River Almond Walkway, as well as serving as the only access to the local properties, and it would therefore be preferable to keep this open during construction. Initial inspection has indicated that Dowie's Mill Lane is less suitable for primary site access due to spatial constraints and concerns

regarding bank stability. It is considered that the works could be carried out without requiring access along Dowie's Mill Lane.

- 7.9 Some localised tree removal would be required and potentially removal of invasive plant species that have been identified on the riverbank.

8. Background reading/external references

- 8.1 Environment Agency - Fish Pass Manual 2010 ([pdf](#)).
- 8.2 JBA Consulting - Design Report for Dowie's Mill Weir 2017 ([pdf](#)).
- 8.3 Removing Barriers to Fish Passage on the River Almond - Finances and Resources Committee Report - [23 March 2017](#).
- 8.4 [Structural Inspection](#) (2018) – Report by AECOM.
- 8.5 [Easement Exhibition and Online Comment Report](#) (2019).
- 8.6 Public engagement presentation slides (2022) ([pdf](#)).
- 8.7 Visualisations of the fish pass proposal (2022) ([pdf](#)).

9. Appendices

- 9.1 Appendix 1 - Hierarchy of options from the fish passage appraisal.
- 9.2 Appendix 2 - Summary of stakeholder engagement feedback.

Appendix 1 - Hierarchy of options from the fish passage appraisal

Rank	ID	Option	Justification	Appraisal Notes
1	A	Weir removal	Removal is generally the best option for fish passage.	
2	B	Reducing barrier height with rock ramp	Lowering the height of the barrier should be considered first. This option has been ranked based on implementation with a rock ramp. Not as good as removal as fish are still required to ascend the barrier.	Could be other options that are not rock ramp, but these are secondary in terms of performance
3	C	Full width rock ramp 2% gradient	If the barrier cannot be reduced in height, a low-gradient full width rock ramp offers the next best solution since it most closely resembles a natural channel.	
4	D	Full width rock ramp 5%	Similar benefits to the above rock ramp option but 5% is the limit for this type of option.	
5	E	Combination pass	This could be considered as an enhancement of a rock ramp solution if the rock ramp is unable to fully achieve design criteria in its own right.	This is a variation on 5% gradient rock ramp and would only be considered if there were some issues with that option.
6=	F	Bypass channel	A bypass channel appears to require a high proportion of flow to achieve significant fish passage benefits. It could be designed with a smaller flow, but this would make it more like a technical fish pass, thereby compromising its performance and potentially increasing maintenance. A bypass channel could also be prone to falling trees / debris.	Bypass channel, baffle brush pass and new downstream weir are quite similar in ranking. If occasional drying out of the weir can be accepted, then a bypass channel could be designed to perform similar to the above "Combination Pass"
6=	G	Baffle-brush pass	A baffle-brush pass could be of interest but is unlikely to outperform a rock ramp.	
6=	H	New downstream weir with baffle brush pass	A new, higher, downstream weir is unlikely to be supported by SEPA or funded if there are other potential options available. It would, however, offer some advantages over the current weir location.	

Appendix 2 - Summary of stakeholder engagement feedback

Discussion Point	Response
Concerns raised about reinstatement of existing ground.	Access will be taken where the rock ramp will be built, so do not expect much riverbed will need to be reinstated. Changes between existing riverbed and changed river level can be established clearly through use of geotextile. The issue will be explored during the detailed design stage.
Heritage was raised as a point of interest.	A heritage impact assessment would be undertaken during detailed design stage.
Outline design flood risk review modelled a 2% gradient.	A flood risk assessment would be undertaken during detailed design stage (for the proposed 3% gradient).
The outline design indicated methods to ensure that during periods of dry weather, water is retained in the low flow channel.	It was confirmed that during detailed design a specified method would be presented and confidence in approach would be outlined.
The inclusion of vegetation islands was welcomed but the stability of islands during flood events was queried.	This would be established during detailed design stage.
Would the rock material shape, particularly the armourstone, would be rounded or straight edged with a preference given for rounded material?	This would be established during detailed design stage. It is acknowledged however that rounded material would be more aesthetically pleasing but it is harder to obtain.
Would fishing be allowed on the rock ramp, as fishing is not allowed on a fish pass. If fishing is not allowed along the rock ramp stretch, then this would be a significant loss to the angling club.	In discussion with Forth Rivers Trust about fishing rights, it was stated that Howden Rock Ramp upstream on the River Almond does not fall under the technical fish pass classification, and instead is considered an extension to the weir. Thus, a similar approach would be taken at Dowie's Mill Weir and anglers would there lose the ability to fish along the stretch of the river where the rock ramp will be situated plus a short distance (25m) up and down stream.
Whether the inclusion of timber in the rock ramp would give sufficient longevity or cause issues for future maintenance.	This would be established during detailed design stage.

Concerns about interstitial flow.	This would be established during detailed design stage.
Concerns relating to downstream migration particularly on the eastern side.	This would be established during detailed design stage.
Concerns whether the rock ramp is the best solution compared to weir removal.	
Protection of the multi-faith ash scattering site. The site should remain available and open. Due to the presence and discovery of uncremulated remains being scattered at the site, there are concerns that human remains may not be washed downstream.	Careful and sensitive consideration would be given during the design and construction stages to ensure that the ash scattering site can continue to be used and also ensure the sensitive handling of any presence of human remains during excavations.
Initial findings of a high-level flood risk assessment appear to be acceptable.	To verify the initial findings, a full flood risk assessment would be developed at the detailed design stage and submitted as part of the application for Planning permission.