

Summary of feasibility report prepared for Hexham Town Council and Hexham River Hydro by Inter Hydro Technology Ltd on the potential for hydropower generation on the River Tyne at Hexham Bridge July 2011

The report examines the feasibility of hydropower generation on the River Tyne at Hexham Bridge. It considers the catchment hydrology and flows in the river, revenue generation projections, economic viability and the concerns of the angling community. It takes into account a site visit and discussions with the Environment Agency, Tyne Rivers Trust and its consultants, and Northumberland County Council Planning Department. Two viable options for such a scheme have been identified as shown on the attached plan drawings of the south bank of the river at Hexham Bridge:

Concept 1

This scheme would capture flows from the Tyne that flow into the two southernmost arches of Hexham Bridge. The existing structure would not be altered on the upstream apron or within the arches. On the downstream apron a high 'crump' weir would be constructed on top of the existing apron; without cutting or otherwise damaging the apron. The crump weir was chosen because it presents a sloping wall on both its upstream and downstream faces, which reduces the overturning effect of increasing river flows. The weir would abut the bridge piers at their downstream face and have a horizontal top, creating a head pond which will taper from approximately 30 m wide at the entrance to approximately 4 m wide at the tail where the water will enter the turbine. The power house would be built into the flood bank. Water discharged from the turbine would be co-located with the entrance to any fish pass installed by Tyne Rivers Trust.

Concept 2

This scheme would require the creation of a riverside intake upstream of Hexham Bridge, with a bay being created to house screens to lead the water into a buried pipeline running from the intake chamber to the turbine. Water would be conducted via a large diameter buried pipeline passing under the A6079 making use of an existing walkway under the road, always maintaining a slope sufficient to deliver the design flow to the turbine on the downstream side of the bridge. On the downstream side of the bridge a powerhouse would be built into the flood bank. Water abstracted upstream would be discharged on the downstream side adjacent to any fish pass installed by Tyne Rivers Trust.

Electricity Production

Both schemes are based on the installation of an Archimedes screw type 100Kw turbine at the site. Taking into account flow projections and Environment Agency requirements on river flows to be maintained, the estimation is that, Concept 1 would generate up to 675Mwh of electricity in an average year whilst Concept 2 would generate up to 720Mwh.

Construction Risks/Opportunities

Concept 1

- scheme entirely in-river, creating potential difficulties during construction process: construction could only normally be carried out between 1 June and 31 October in any year;
- attaching diversionary weir to existing apron during construction could be difficult with possibilities of pressure causing damage to apron and affecting bridge footings;
- proximity of fish pass exit to hydro intake may require measures which could limit water abstraction during fish migration period, reducing generation capacity;
- construction of scheme requires construction of fish pass at same time with consent/ involvement of Environment Agency and Tyne Rivers Trust.

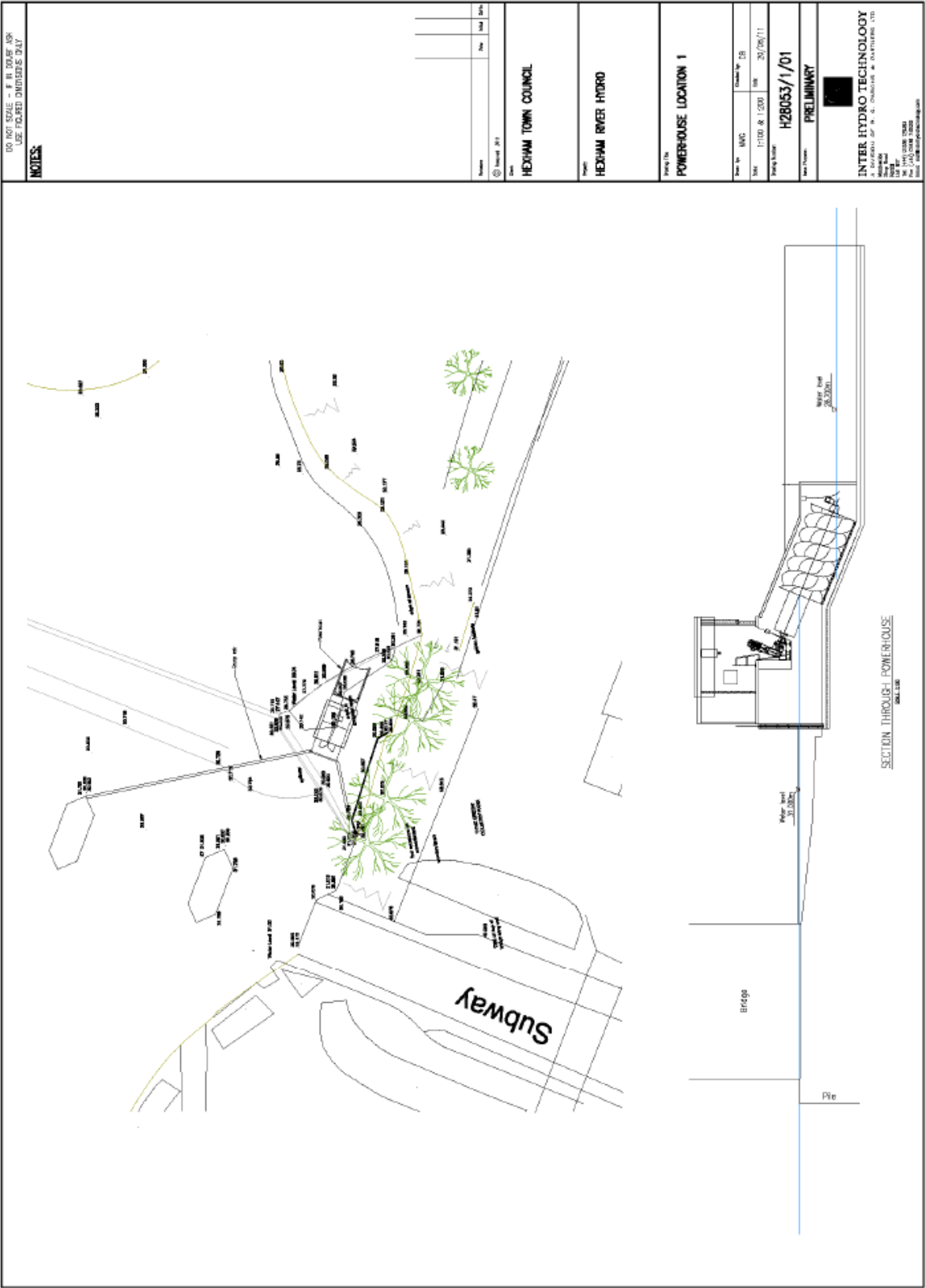
Concept 2

- no effects on existing structures;
- possibilities of engineering and construction problems installing pipeline through walkway under bridge;
- construction of the majority of the intake structure could be completed without breaking through into the river until last minute, allowing construction throughout year;
- opportunity to create additional boat launching area.

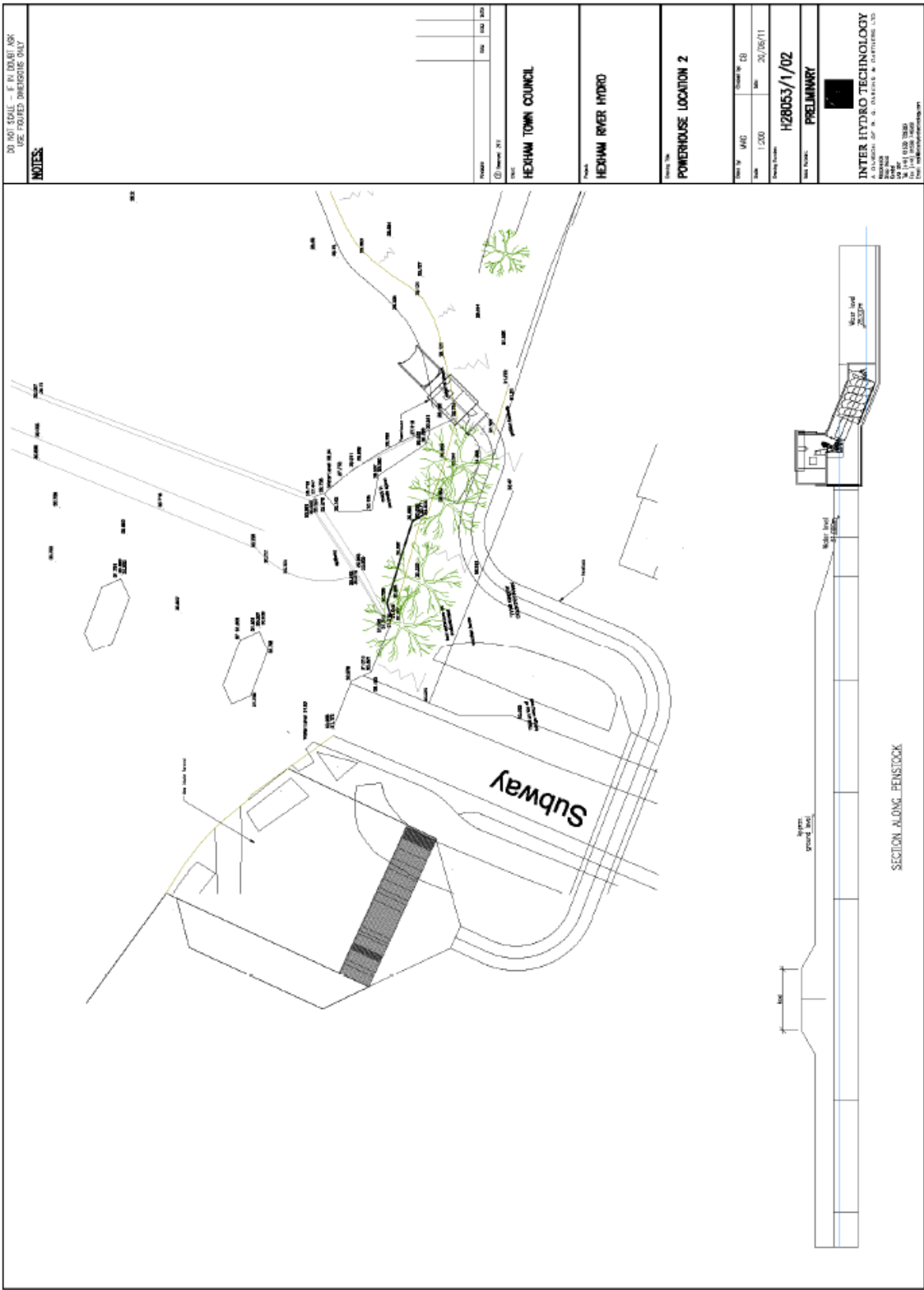
Conclusion

Despite potential difficulties with both Concepts, including the fact that the Tyne is a major fishing river and the proximity of a bridge which is also a listed Ancient Monument, the report concludes that there is the potential for a viable hydropower generation scheme at Hexham Bridge. Before proceeding further it will be necessary to take into account the needs of all stakeholders which will require time and careful negotiation. Discussions will also be needed in the short term with the highways authority and with the Environment Agency to determine the strategies, especially for abstraction, which might allow Concept 1 to be developed. Concept 2 has a higher development cost but will produce slightly more energy.

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Concept 1



Concept 2

Pros and cons of the two alternative Tyne hydro power designs

Concept 1 (fed by weir on bridge apron)

Advantages:

Simpler design, cheaper to construct
Slightly shorter payback time

Disadvantages:

May not be able to operate at full capacity during fish migration season
Greater risk of flood damage, both during construction and during operation
Could exacerbate risk of flood damage to apron below bridge
Construction work mostly in-river, so limited to summer months

Concept 2 (fed by intake above bridge)

Advantages:

Generates more power from same specification turbine
Overall environmental impact likely to be lower
Intake pond could provide extra amenities for Tyne Green

Disadvantages:

Construction involves tunnelling, so would cost more and probably take longer
Mature trees might need to be felled to make way for intake pond