

THE CHESTER HYDRO

A Project Viability Report for



Donald Insall Associates
Chartered Architects and Historic Building Consultants



Contents

Executive Summary	2
1.0 Introduction	5
2.0 The Building	7
3.0 Condition	18
4.0 Situation and Context	20
5.0 Options	26
6.0 Additional Evaluation of the Preferred Option	48

Appendix

Appendices in separate document

Appendix A	List of Available Studies
Appendix B	Questionnaire
Appendix C	Comparator Attractions and Concepts

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Executive Summary

The Chester Hydro Electric Station is a stone built early 20th century Grade II Listed building adjacent to the Dee Bridge and on the River Dee weir, both Scheduled Monuments.

Chapter 2.1 Page 9

In addition to its heritage significance, the site is covered by a wide range of ecological protection measures and legislation.

Chapter 2.2, Page 11

The Cheshire Historic Buildings Preservation Trust has been exploring possibilities around a response to the climate emergency as a role for the Hydro. The Trust is acting as a vehicle to enable the building to pass from United Utilities to Cheshire Heritage and Sustainability Enterprises CIC (CHASE)

Chapter 2.3, Page 13

The University of Chester remains a stakeholder and partner organisation and had previously funded a proposal to generate electricity. However, this level of generation proved impossible because of ecological considerations. The Trust and CHASE have been proactively engaging with Chester citizens and 293 responses were received to a questionnaire. In parallel CHASE is organising a Green Expo to promote the project, and is working with HyNet, recently selected as a Track 1 cluster decarbonisation project by Government.

Chapter 2.4, Page 13

The Hydro has been abandoned by United Utilities, who used it as a pumping station and although they acknowledge liability for dilapidations, the concrete roof deck has failed and has temporary support. The main Turbine Hall is currently inaccessible other than via a ladder or a steep stair off the Dee Bridge. There is an urgent need for a new use for the Hydro and the current political, economic and emotional focus on the Green economy in reaction to the climate emergency is an opportunity.

Chapter 2.5, Page 16

The freeholder is Cheshire West and Chester Council who have expressed support and provided funding for the appraisal. The leaseholder, United Utilities also wish to pass the Hydro to CHASE.

Chapter 2.6, Page 16

Condition

The Hydro is a sound early 20th century industrial building, stone built for its location but engineered for its function. There is work to be done at low level to reintroduce the through flow of the River Dee and high level to fix its failed concrete flat roof structure but no further emergency repairs seem necessary.

Chapter 3.1, Page 18

The Hydro sits in a key strategic historic location in Chester and this is a key to unlock its future.

Chapter 4.1, Page 20

The proposed uses accord with the Local Plan, with the environmental regulations of other bodies being the principal issues influencing the Hydro's future.

Chapter 4.2, Page 22

The Cheshire West and Chester Conservation Officer have been consulted on the project developments and expressed initial enthusiasm and support.

Chapter 4.3, Page 24

The Trust has taken its time to explore a spectrum of options for the Hydro and how they are expressed in the proposed architectural interventions.

Chapter 5.0, Page 26

A preferred option has been developed through consultation and expert advice.

Chapter 5.4.5, Page 39

A Business Plan sets out the wider economic, educational, cultural and environmental benefits of the proposed new use of the Hydro.

Chapter 6.0, Page 48



1. Introduction

The Cheshire Historic Buildings Preservation Trust has commissioned this report from the consultants listed here to prepare an options appraisal for the reuse of the Grade II Listed Hydro Electric Station on the River Dee in Chester. This appraisal has been part funded by the Architectural Heritage Fund. Funding was also received from Cheshire West and Chester Council through its Climate Emergency Fund and this report explains how the Trust proposes to repair, reuse and extend the Chester Hydro Electrical Station (Chester Hydro) as a publicly accessible centre for our Net Zero future with interpretation, eco-business and green careers promotion as its key functions.

All the energy needed for the operation of the new venture will come from the River Dee and the rich environmental and historical story of the site will also be expressed within the Chester Hydro as part of its story and attraction.

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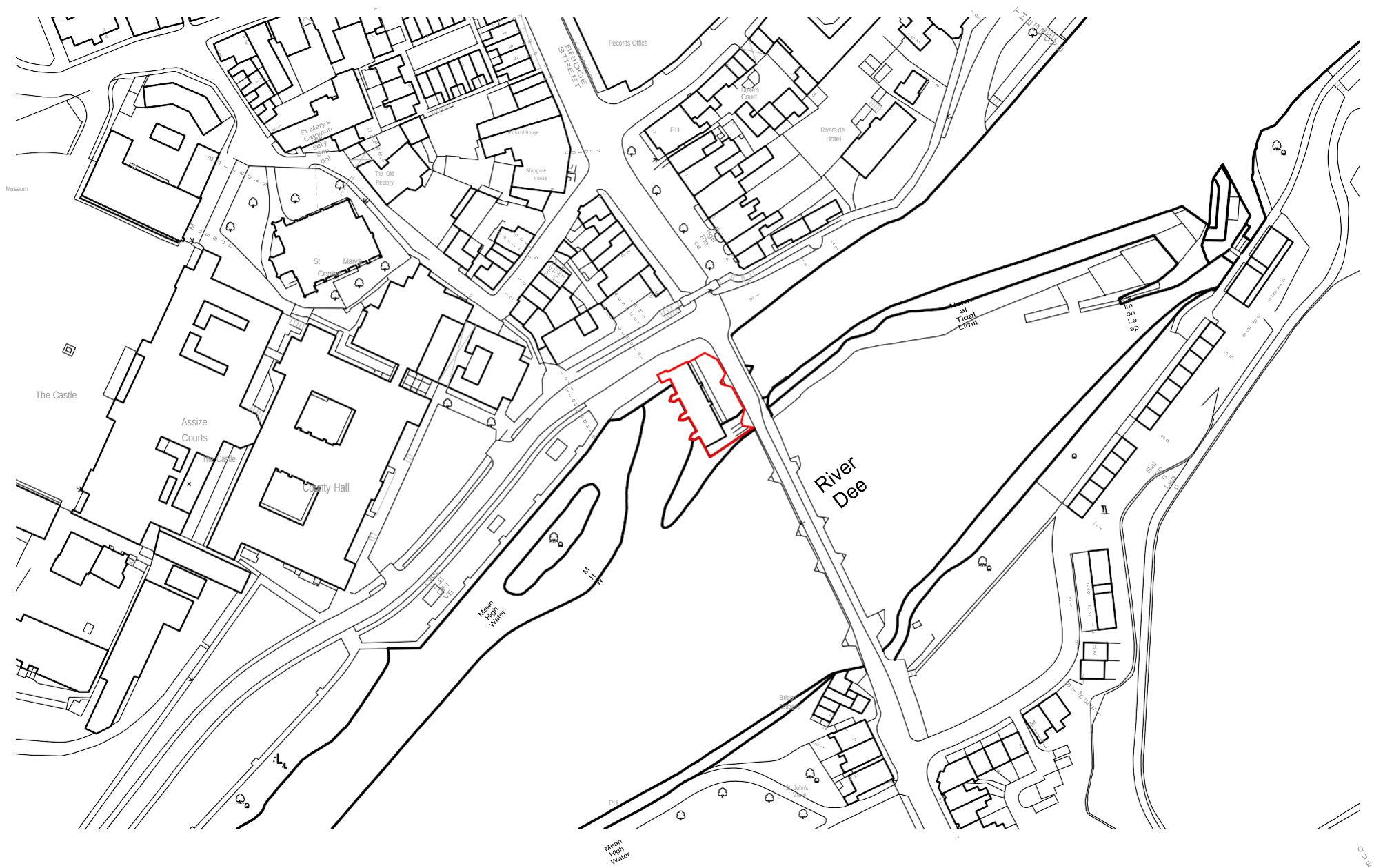
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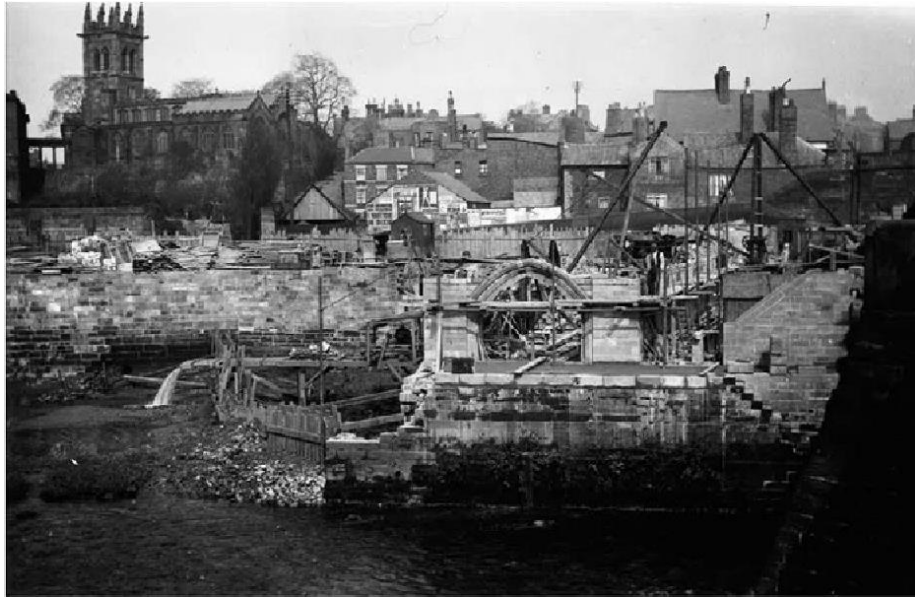
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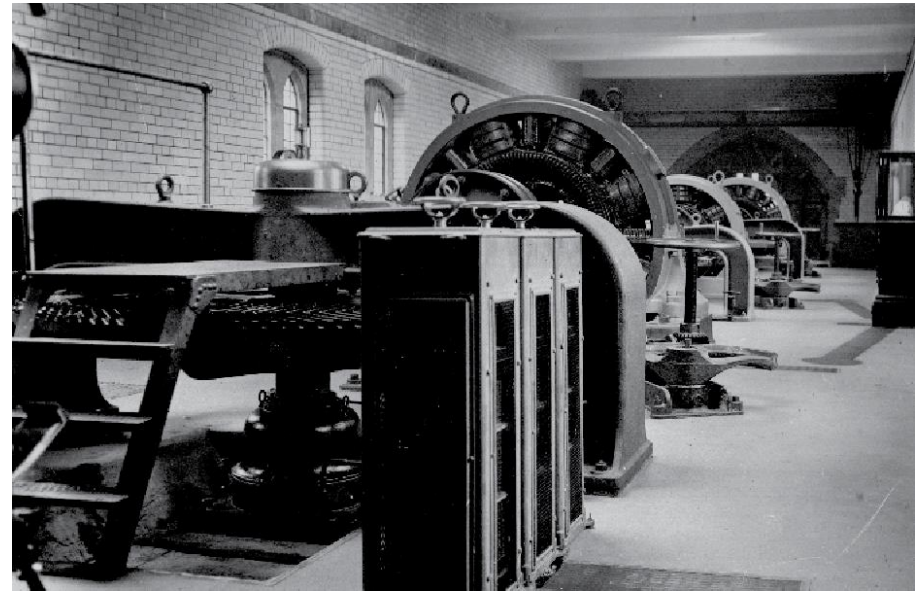
2. The Building

The Hydro Electric Station
Castle Drive
Chester
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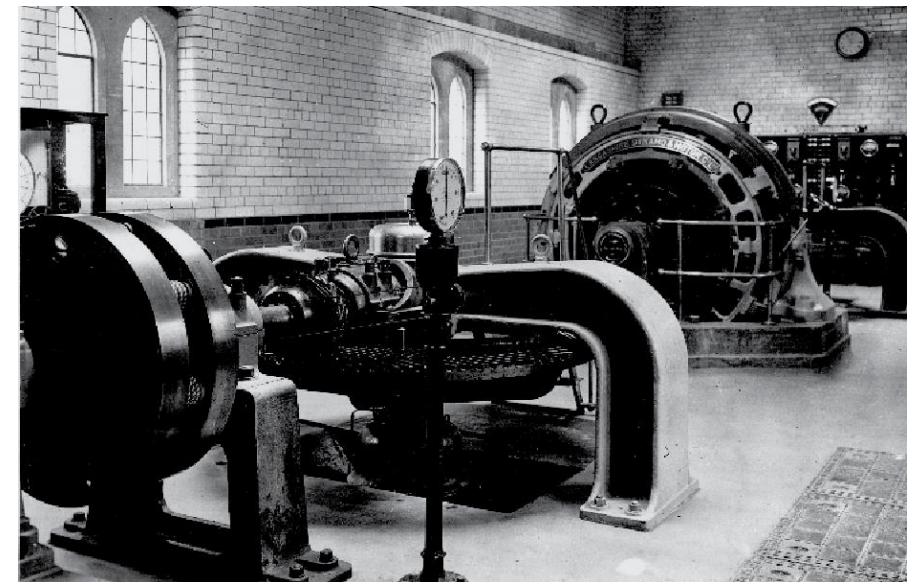
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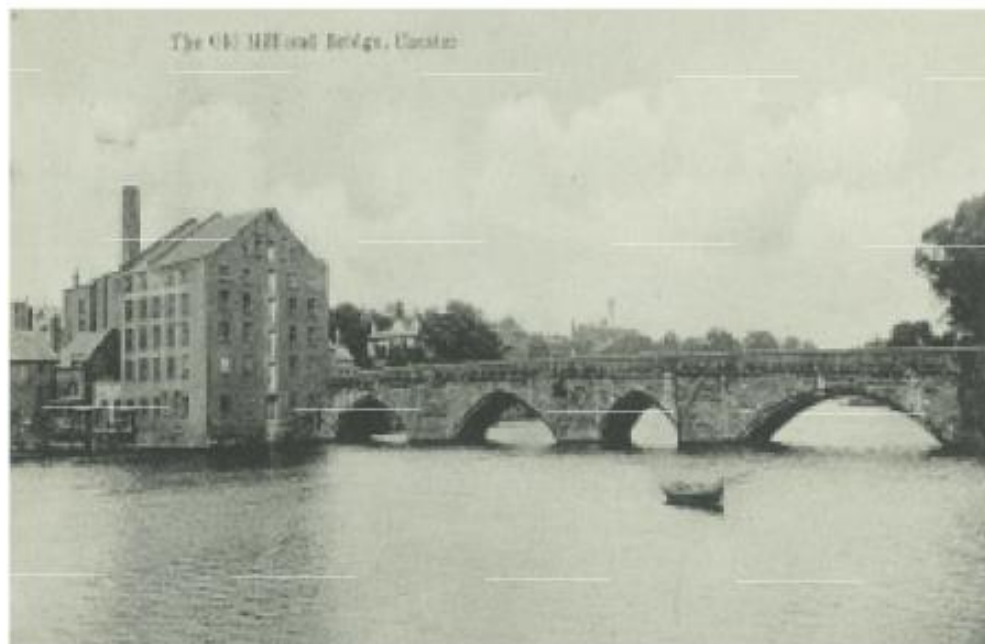
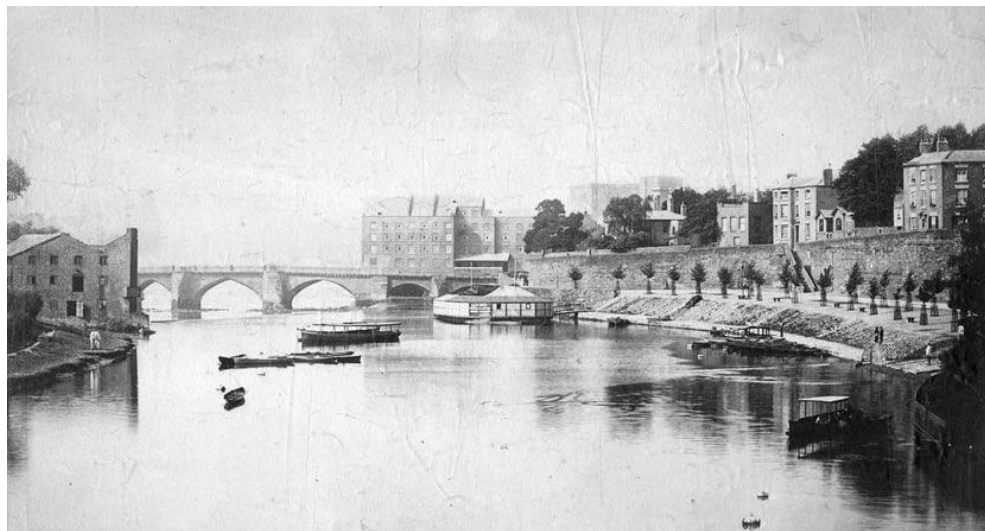
Turbine Hall



Old Dee Mill



Turbine Hall



2.1 Heritage

On the site of the many Dee Mills that have existed from at least 13th century until 1910, the Hydro Electric Station was built by the City Corporation in 1913. It was designed by the City Lighting Engineer, S.E. Britton with guidance and/or pressure from the Chester & North Wales Architectural Society, so that the power station, the first of its kind, was dressed in red sandstone and has a gothic arch to mirror the adjacent Old Bridge. It was the first hydro electric station in England to provide electricity from both tidal and headwater.

There is a +3.5m tidal reach in Chester and the Weir is submerged twice a day, as the flow of water reverses for the full length of the Dee within Chester's borders. There were three turbines in the building set over three chambers, through which the Dee flowed and provided about 500KW or up to 40% of Chester's power requirement until it ceased operation in 1949. The turbines were removed and pumps installed to extract water from the river for industrial processes elsewhere in Cheshire but this operation ceased in about 2015, since then the building has stood idle and has been deteriorating.

The Hydro Electric Station is a Grade II Listed building in a Conservation Area, it sits on the Norman Weir, built by Hugh Lupus in 1093, which is a Scheduled Monument and abuts the Old Dee Bridge, a Grade I Listed building and Scheduled Monument built in about 1387. The bridge's two northernmost arches were built as the race for the Dee Mills on the site of the Hydro and on the upper level of the weir.



2.2 Environmental Significance

The Weir includes a fish ladder at its southern end and a fish trap is manned for 50% of the time through the year. Between 4,000 - 8,000 Dee Salmon are recorded and tagged each year, along with 6,000 – 10,000 Sea Trout, they account for between 20% and 30% of all fish passing up the river, mainly at high tide when the Weir is submerged. The Dee is one of only four Atlantic Salmon Index Rivers but this is only one of a raft of environmental legislative protection for the site, all in addition to its heritage status.

An ambitious scheme to power the University of Chester's campus with new turbines in, and projecting from, the building did not proceed because the flow of water through the Archimedes screws would have been greater than the weir and therefore would have been a 'beacon' for the Dee Salmon. The capacity for significant power generation appears limited, at best and the low velocity generation proposed to power only the Chester Hydro Hub will have to be agreed in detail with the principal legislative body, the Environment Agency. Negotiations are underway.

If it is possible to generate power surplus to the requirements of the building, it could be used for BEV charging at the adjacent Little Roodee car park. However, it is recognised that the River Dee is primarily a water supply "pipe" with flow maintained in summer from four reservoirs. 70% of the flow is abstracted before reaching the weir.

Furthermore, the building is situated within the River Dee Specialist Area of Conservation (SAC), the River Dee site of Special Scientific Interest (SSI) and the proposal will require an Environmental Statement or perhaps an Environmental Impact Assessment under the Town and County Planning (England and Wales) Regulations 2011.

The previous University of Chester work identified that a hydrological study would be needed to assess the water flow at the weir to access and changes to the status quo and a Hydrological Impact Assessment.

Any impact of noise or vibrations from hydro electrical power generation would have to be assessed and verified before detailed proposals were made.

The key environmental legislation is;

- The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011
- The Water Environment Regulations 2003 (SI 2003 No.3242) (WFD) England and Wales
- The Environment Act 1995
- Water Resources Act 1991
- Salmon and Freshwater Fisheries Act 1975
- Wildlife and Countryside Act 1981 (England and Wales) (Amendment) 2004
- Wildlife and Countryside Act 1981 (Amendment) (Wales) 2004
- Conservation of Habitats and Species regulations 2010 (as amended) Habitats Directive (Council Directive 92/43/EE_ Birds Directive (Council Directive 2009/147/EC)
- Ramsar Convention (Dee Estuary 1985 (indirect)
- Convention on Biological Diversity (LBAP and BAP)

Furthermore, the Dee's South bank, although in England is protected by statute by National Resources Wales and the river is jointly managed with the Environment Agency, the English equivalent. Natural England will be a stakeholder authority in any impact assessment affecting the natural environment.

In short, the River Dee is Europe's most managed river and the Hydro Electric Station is probably Chester's most protected building.



The Turbine Hall today

2.3 CHBPT and Chester Hydro

Following the demise of the University of Chester's hydro electricity generation scheme, there remained a group of interested Cestrians who had been stakeholders or at best interested parties. Of prime concern for this group was to find a way to reuse the Hydro Electric Station as a vehicle for tackling the climate emergency, through demonstration and education and to generate some 'free' electricity. The Hydro and the Track 1 hydrogen scheme in Cheshire, was also focusing the minds of this group. A Trust member was invited to attend a rare opportunity to view the inside of the building and their motivation was in finding a new use for a lost cause Listed building. This led to an offer from Donald Insall Associates to explore a way forward with some pro-bono ideas and layouts. In the meantime, CHBPT approached AHF for grant funding for this study and CW&C climate emergency fund for match funding and wider environmental considerations.

CHBPT sees itself as a means of rescuing historic buildings and structures and moving them from one ownership onto another and this is the case with the Chester Hydro. The first group to express an interest in the building has now formed a CIC, CHASE, that will receive and run the Chester Hydro Hub in partnership with other organisations.

CHASE is the managing company for the Chester Hydro scheme. It was founded in early 2021 to act as the facilitating vehicle to identify heritage locations in Cheshire that can be re-purposed or reanimated in a way that preserves the integrity of their original design and construction whilst additionally re-purposing them to provide new viable futures. The CIC is "not for profit" with any surpluses being ploughed back into the operation to support its sustainability. No fees or dividends will be taken by the directors or shareholders.

The CHASE proposition is to establish a Hydro Hub; a focal point for residents, schools and visitors to learn about what a low carbon world will look like and how all aspects of our lives will change as new technologies remove emissions

from our industry, commerce, agriculture, homes, transport and food. CHASE's aim for the complex is to use it for:

- Explaining Chester's green power generation history at this site
- Educating people about water management
- Educating people about the SSSI flora and fauna management
- Educating people about how clean energy destroyed the port of Chester
- Demonstrating the future of clean, renewable energy – water, wind, solar, hydrogen.

We have refined this set of aims into a slightly more focused set of objectives, as follows:

- To save the redundant building and tell the story of the country's first hydro-electric generating plant of its type, and 850 years of hydro power in Chester
- To promote the importance of decarbonised energy, using the building space and location as an engaging learning facility
- To provide advocacy for future high skilled career paths and opportunities in the green economy.

Genius loci is important for the continuity of power generation, and the significance of its history due to its location on the River Dee by the medieval weir and Old Dee bridge.

The CHASE plans are in the context recent announcement of £72m of funding from the UK Government and local industries to develop detailed designs and consenting for HyNet North West, a Hydrogen based zero carbon industrial cluster across the region, intended to deliver on commitments around Net Zero Climate Change 2050. This is an example of technological developments and new skills development and career opportunities that will be created arising from HyNet. CHASE seeks to capitalise on these opportunities at large in bringing its plans to fruition. In addition to developing Chester Hydro, CHASE is planning an annual Green Expo event which will be a trade show and sustainability fair on the banks of the Dee next to the Hub. This will be an opportunity for

local businesses and charities to showcase their sustainability plans, products and services. The general public will have opportunities to buy products while learning about technologies and career opportunities.

2.4 Activities

Comprehensive work has been carried out by the University of Chester, in partnership with Cheshire West and Chester Council, to set out how the Hydro could be transformed into a power plant to provide electric power for the University campus. Some of the studies and documentation for this proposal eventually proved to be a step too far for its environmental impact but it gathered wide support and brought key issues to light. A full list of available studies is included in Appendix A

The key point for this study is that the University planned to install three Archimedes Screw turbines on the downstream side of the building, that would have attracted the Dee's Atlantic Salmon and ended their journey to the upstream spawning grounds.

That this worthy proposal failed through a clash with equally worthy environmental concerns, has given CHBPT / CHASE a reality check and that a commercial generation of electricity is possibly beyond the art of the possible for the Chester Hydro project. However, the plan is to install less vigorous and slower moving turbines wheels within the original chambers below the Turbine Hall and to leave the Dee's Atlantic Salmon to continue their way upstream via the faster flowing weir and fish ladder.

The University Study also included a dilapidations cost assessment and detailed condition survey beyond the scope of this study and CHBPT is grateful to the original study team for its cooperation in allowing it to inform this report.

The Trust's team has been very active in gathering a partnership group including;

- Cheshire West & Chester Council
- University of Chester
- HyNet

In addition to several enthusiastic Chester residents. One direct initiative was an online questionnaire issued in June 2021, 293 responses were received.

A fuller explanation of the questionnaire results are in Appendix B.

As the Hydro Electric Station is currently crowded with redundant machinery and temporary shoring it is only accessible by arrangement with United Utilities and when wearing protective clothing. A Matterport survey was commissioned and is available to view at <https://my.matterport.com/show/?m=wXaqbK8q2sq> allowing a full virtual walkaround inside the building (but not the underwater chambers).



The redundant Chester Hydro Electric Station today

2.5 A Building at Risk

The Hydro Electric Station has no viable use in its current form, state and ownership.

Access

There is no possible public access to the Hydro as the Turbine Hall is about 3 metres below pavement level. The timber 'front door' (seen above) in fact leads to a ladder down to the adjacent sewage pumping station and is not, for obvious reasons, part of this proposal. At present, the Turbine Hall is reached via a stone built narrow steep stair off the Dee Bridge to the area outside the Gothic arch. (See bottom left above)

Condition

The concrete deck roof has failed and is held up with temporary shores and props. There are holes in the roof as the covers are not keeping out the weather. The stonework is suffering from inadequate rainwater clearance from the roof and its spouts but it is fundamentally a soundly engineered early 20th century building.

Pumping Station

The Turbine Hall and under pavement rooms are congested and full of late 20th century redundant pumping equipment and associated switchgear, all of which will have to be craned out through the access holes in the roof and pavement lights in the road, through which they arrived. There is no free space in the building. (See Page 12 check page number) .

Ownership and Timing

The freeholder is Cheshire West and Chester Council but United Utilities has a long lease but has expressed willingness to pass on ownership, as the building no longer has a future in their organisation. Indeed, the pipe from the pumping station has been terminated less than 200 metres away by recent infrastructure works.

At this time therefore, there is a willingness to receive the building, a willingness to donate it with a "dowry" of dilapidation costs, support from the freeholder and focus on the technological response to the climate emergency that has energised a proactive group of Chester professionals.

The Trust believes that the realistic and pragmatic structure of the business plan for the building's future, aimed at regeneration, careers, education, innovation and interpretation, in the context of our net zero carbon future will prove attractive to a variety of grant funding bodies.

2.6 Ownership

The leasehold is held by United Utilities and Cheshire West and Chester Council has inherited the freehold from its legacy council, Chester City Council. The original lease between the Chester Corporation and the West Cheshire Water Board was from 25th March 1951 for a period of 999 years.

A draft lease was drawn up for the University of Chester's potential ownership and for 125 years with 40 year break clauses; an amended version of this document would form the basis of a future tenancy agreement with CHASE. The current land registry plan shows the whole of the weir and the Hydro under one ownership but, as for the University's interest, the weir on the upriver side of the Old Dee Bridge would not be included in a future transfer of ownership.

There are preliminary ownership discussions between CHASE and CW&C, including conversations with the Leader of the Council, who continues to express support for the project.



Flood warning and High Tide 2022

3. Condition

3.1 Summary

The building requires major dilapidation repairs before it can be altered to accommodate new uses.

The major themes are;

- to repair and ensure the structural stability of the concrete deck roof so that the temporary props can be removed from the Turbine Hall;
- to repair the flat roof hatches and rainwater disposal;
- to clear out all the redundant pumping equipment and associated switchgear.

3.2 Emergency Repairs

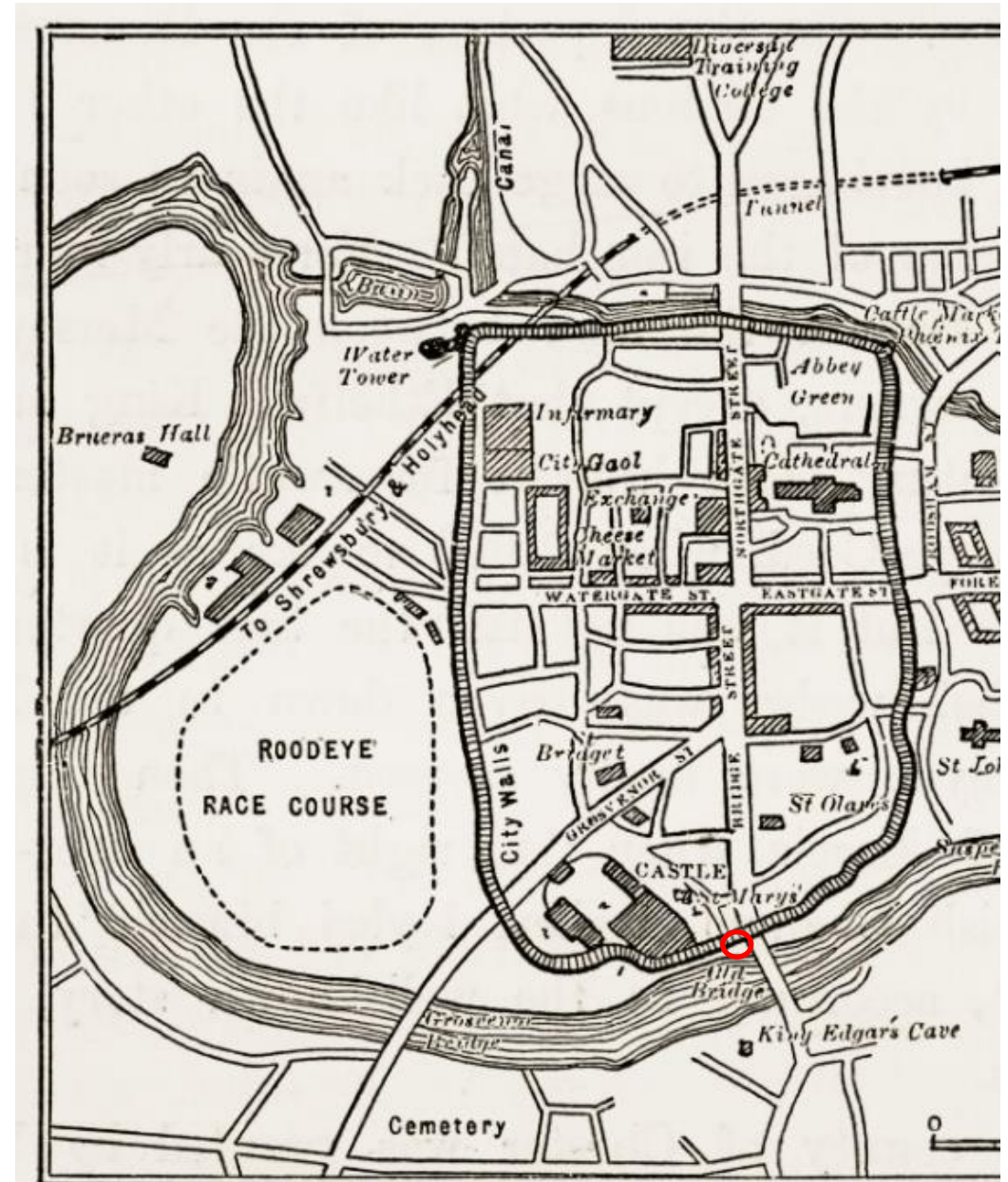
United Utilities has already erected the temporary shoring to the failed section of concrete deck roof and any rainwater inclusion is causing no real damage to the remaining fabric.

3.3 Flooding

The Trust has been monitoring the level of the Turbine Hall and the recent high flood events on the Dee since early 2020. Although the Turbine Hall floor will be kept clear of anything that might be affected by flooding, it is obvious that the Chester Hydro Electric Station engineers set floor level above that of the level protected by the upstream flooding of the Dee Meadows. The photographs above show a spring high tide and flood warning in place (18th February 2022) and the relative level at the same time of the Hydro. The external area to the North and the stone ledge on the East side are at, or just below internal floor level.



The Hydro Electric Station with the City Walls in the foreground



4. Situation and Context

4.1 Location

The Chester Hydro Hub will have a highly visible presence at a key strategic location in the City of Chester.

The building is immediately adjacent to the Old Dee Bridge and the Bridgegate, meaning it;

- sits on the Roman Road route into the City from the South and one of the busiest pedestrian routes into Chester;
- is within a short walk of Bridge Street / Lower Bridge Street shops and catering businesses to the North and Handbridge to the South, across the bridge;
- is at the point where the Chester City Wall circuit meets the River Dee. The City Walls attract at least 1.8 million visitors per year and the Hydro is very visible from the walkway along the Bridgegate;
- is at a mid-point of the ever-busy Riverside walk which follows the Dee, up and downstream from this point;
- is across the road from the main university of Chester City Campus and its Riverside Innovation Centre;
- is a short walk from city centre and Little Roodee car parks;
- is on local bus routes with stops at close proximity, including the hop-on-hop-off tourist bus.
- is within a short walk of Handbridge, one of Chester's principal residential areas and closer still to the housing clustered around the Bridgegate and up Lower Bridge Street;
- is a city centre location in one of the UK's most visited historic places.

The site lies at the confluence of at least four areas of differing positive character;

- the River Dee - a much used promenade east to west, at riverside and along the City Walls which marks its northern edge;
- Handbridge and its local parade of shops and cafés immediately across the Dee Bridge and a traditional housing area immediately adjacent.
- the University Campus in the former County Hall building flanked by Chester Castle.
- The City Walls themselves;
- Lower Bridge Street and an eclectic mix of residential, office, pubs, cafés and hotels immediately through the Bridgegate.

This is a busy and popular area to which residents and visitors alike are drawn via the bridge, via the Bridgegate through the Walls, and at the narrowing of the Riverside Walk where the Bridge over the Dee meets the Walls.

Economic activity appears fairly secure here, there are pubs and cafés very nearby and a large volume of visitors and promenading locals are arguably under-catered for this busy spot, not necessarily in terms of food and beverage but certainly indoor visitor attractions.

One point that arose from the questionnaire was a concern about one of the early options for the Hydro, which was to maintain revenue by wrapping the exhibition and events aspects around café or bar.

There was a reaction from local catering businesses worried about competition from another catering operation and this has informed the Business Plan. The major change to the building that can enable its new life is to add the access pod, from street level, and the addition of the new first floor that will give enough activity space and visibility to the new use.



4.2 Land Use and Planning

4.2.1 One City Plan

The Hydro Electric Station has a specific mention in Chester's main forward planning document. The One City Plan, Item G1 : Water Station on the River Dee states that, in addition to generating electricity, the building "became a place to visit both for education and tourism".

4.2.2 Local Plan CH1

The Local Plan relating to Chester and within which the Hydro sits supports proposals which are in line with the development plan policies (STRAT3): Policy CH1

1. "Protecting the historic core of Chester". IMPACT : POSITIVE – the reuse of the Hydro will ensure the future of a city centre Listed building and bring cultural activity to a key historic site.
2. "Protecting historic routes and grain in the city centre, and reinstatement achieved where possible". IMPACT : POSITIVE – the Hydro sits at the intersection of three strategic and historic routes and will provide a built focus point at this junction.
3. "Recognising archaeology as critical environmental capital". IMPACT : POSITIVE – the Hydro project will have no effect on buried archaeology and will reveal an important element of Chester's industrial archaeology and explain its role in the City's heritage.
4. "Protecting the nature, quality and scale of the strategic open space corridors". IMPACT : NEUTRAL – the proposal has minimal or no impact on open space.

5. "Creating strong and active frontages, appropriate in scale and height to the wider townscape. IMPACT : POSITIVE – the Hydro is "invisible" at present and has only an anonymous door to the sewage pumping stations latter access. The interventions will be at street level and bridge parapet height.
6. "Enhancing the character and appearance of principal gateways and waterways into the city". IMPACT : POSITIVE – the renewed Hydro will respect, enhance and enliven the sense of place at the key historic site where it has a neutral to negative role at present.
7. "Supporting the Chester Cycling Strategy". IMPACT : NEUTRAL – the new use will provide another destination point at a key route junction for cyclists.
8. "Supporting mixed use regeneration proposals". IMPACT : POSITIVE – the Chester Hydro Hub proposed is regeneration and will have a variety of roles within the building.
9. "Development must not give rise to significant advance impacts on air quality". IMPACT : POSITIVE – the project is focussed on clean carbon free energy production.

4.2.3 Local Plan CH2

Policy CH2 states "Development proposals must;

1. "Promote safe walking and cycling routes into and within areas and minimise traffic impact" IMPACT : POSITIVE – there is no detrimental effect on walking routes, although the pavement will narrow at the access pod it is as wide as nearby standard pavements.
2. "Create high quality active and vibrant street frontages, incorporating active uses at ground floor level. IMPACT : POSITIVE – the proposal creates high quality active street frontage where presently there is no activity.

3. "Promote opportunities for mixed use development". IMPACT : POSITIVE – this would be a mixed-use, futureproof development able to adapt new uses in time, if necessary.
4. "Not harm the vitality and viability of the city centre and the district and local retail centres". IMPACT : POSITIVE – the plan is to attract more visitors and residents to the vicinity and increase footfall through the Bridgegate and across the Dee Bridge.

4.2.4 Policy CH2:C Chester Castle and Riverside Area

Specific Local Plan for this site.

"Improvement along the riverside, must have regard for the relevant waterways and conservation strategies and studies".

This has been acknowledged and accepted and formal approaches have been made to The Environment Agency to address the issues that arose with the University of Chester proposal.

"Development proposal for hydro electric power generation at the weir which enables electricity generation that fully respects the significance of the built heritage; archaeology; setting within the wider townscape; and the river ecology will be supported".

The options outlined in this viability appraisal do not include for commercial hydro electric generation which would have a detrimental impact on the eco system of the River Dee, the modern interventions are low key and simple modern lightweight structures, have no impact on any buried or standing archaeology and leaves the original Listed building intact and reused.



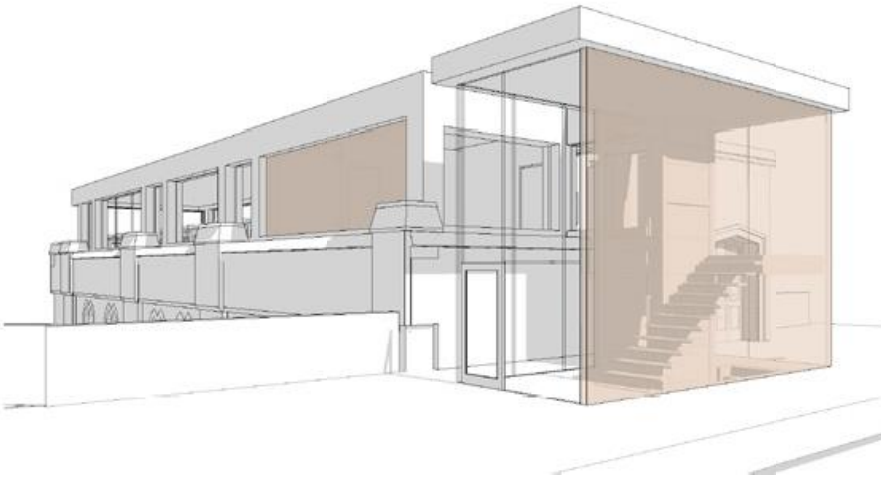
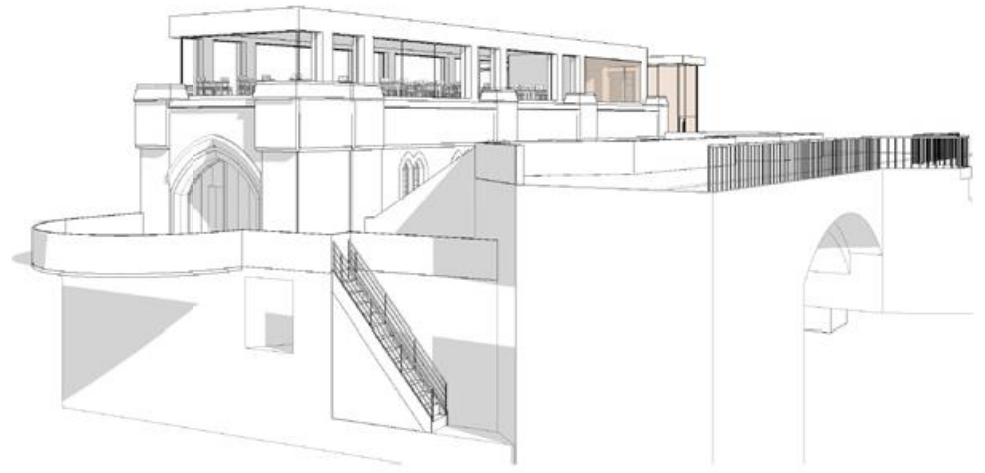
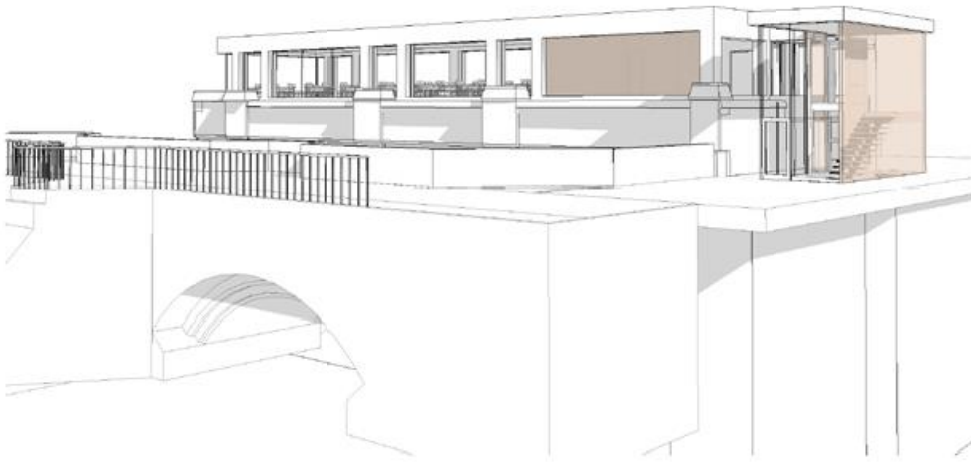
4.3 Potential for Listed Building Consent

The emerging proposals have been discussed with the CW&C Conservation Officers, with particular emphasis on the proposals for the Access Pod at pavement level and of course the “glass box” on top of the roof as explained under Section 5 and 6 that follow.

In discussion with the Conservation Officers, the following were explained as the main guiding principles for the CHBPT/CHASE project;

- historic building conservation being promoted as a key element of our new zero carbon future;
- removing the modern pumping equipment, after determining that there was no machinery of industrial archaeological interest and revealing the original building;
- repair of the historic fabric to maintain as much original fabric as possible;
- minimum intervention into historic fabric and making honest easily read new additions in the under pavement areas;
- making only those new additions that are necessary to bring the building back to life via affording safe access for all and extra space to support the reuse of the historic building;
- new additions leaving as much historic fabric as possible intact and touching historic fabric as “lightly” as possible;
- securing a sustainable long-term future for a Listed building by affording access.

CHBPT has received informal encouragement and support from the CW&C Conservation and Design Office team.



5. Options

The Trust and its partners have spent much effort and time considering how to match the aspiration of bringing the Hydro back to life, as a focus for alternative energy in the Northwest, with the severe limitations of the building and how it might be managed once built.

A full exploration of the possible options has been explored. The Hydro's form, location and levels have real and tangible influences on what can be achieved for its future. The Trust was not concerned with finding a possible commercial use for the building, the momentum behind its interest was based on promoting a physical reaction to the climate emergency. Only options related to this principal were explored in any detail.

Another key element that became obvious, once the services consultants became involved, was that it is all about the River Dee and that all the power needed for the proposal could be obtained from the water that flows, in two directions, through the building.

How to get people into the building challenged the architects as much as finding enough space to meet the aspirations of the Trust. Equality of access and means of escape in case of fire are as important at the Hydro as any other publicly accessible building but presented particular challenges for this river-sited, sunken, disused Listed power station.

As the Business Plan developed, the key elements that became necessary were :

- a permanent exhibition space,
- a space for events which could double up with the exhibition,
- an education space,
- a catering facility that could double up with the education space,
- WCs, storage and back of house

The three main options illustrated on the following pages express the architectural journey towards making the project's principal spatial aims into a viable proportion.

In brief, this is expressed as :

- use of the Turbine Hall alone,
- use of the Turbine Hall with open rooftop access and use,
- a rooftop extension.



5.1 Option 1, Turbine Hall Only

5.1.1 Description

Once the redundant modern electrical and pumping equipment has been removed, to scrap and recycling, under United Utilities' dilapidations obligations and the building fabric repaired under the same budget, the Turbine Hall is a 172 sqm rectangular space ready for repopulation.

Access has to be achieved from pavement level on Castle Drive and the hole cut in the surface to lift out the equipment would be used for a new staircase and lift. There is no other viable location although if Severn Trent would relinquish their ladder access to the sewage pumping station a lift could, in theory, be located there. (They have been asked and have confirmed that they require this access "24/7"). An open light well was considered without a cover but this has security and weathering implications so a cover is deemed necessary. In case of emergency and lack of access back to street level, the external floor level and remains of the Dee Mill at the river end would act as a refuge point for the less able and the existing steep stair up to the Dee Bridge would provide an alternative means of escape, albeit not up to Building Regulations standards.

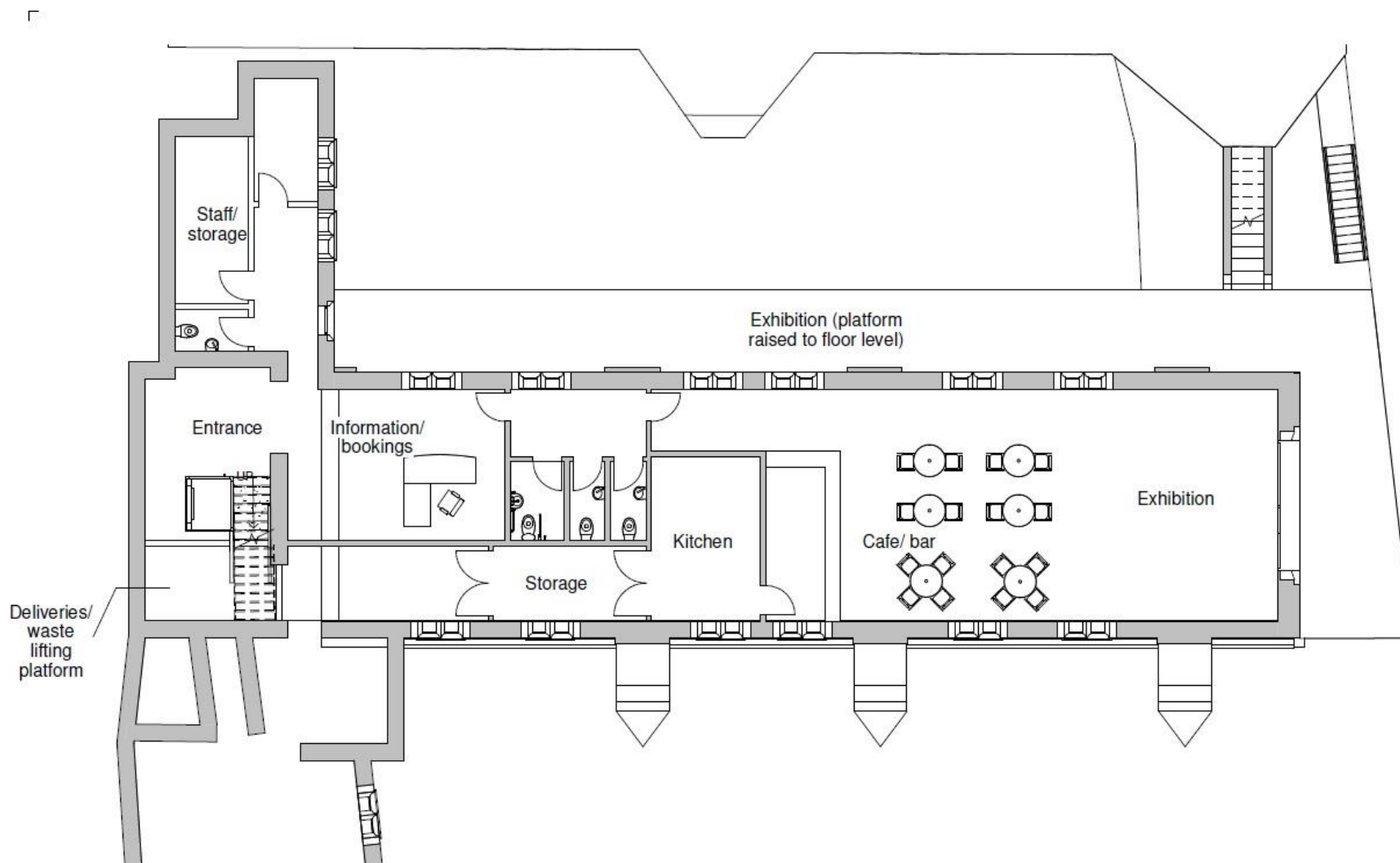
The undercroft would be cleared and reinstated for a hydro electric turbine and heat pump and space has to be found in the Turbine Hall as at least half of the installation must be above water level, which reaches close to floor finish in the time of extreme flood.

There is space for ancillary accommodation, back of house and WCs in the remaining under pavement areas.

5.1.2 Discussion

Although access and emergency egress can be satisfactorily achieved and this is a low cost solution requiring only minimal building work and alteration, the principal obstacle is that the aims of the project cannot be met within the space and each use would be compromised by the other. A servery is shown as the intention is to offer hospitality to visitors although not a commercial café as a full time enterprise and although this can act as a base for volunteer or paid staff, it does compromise the available space for events, exhibition and education.

Summer use of the external river area for a café has been considered, especially given the key location for visitors to river, city and its Walls. There was concern expressed from nearby café operators about competition so the proposal for a café has been shelved.



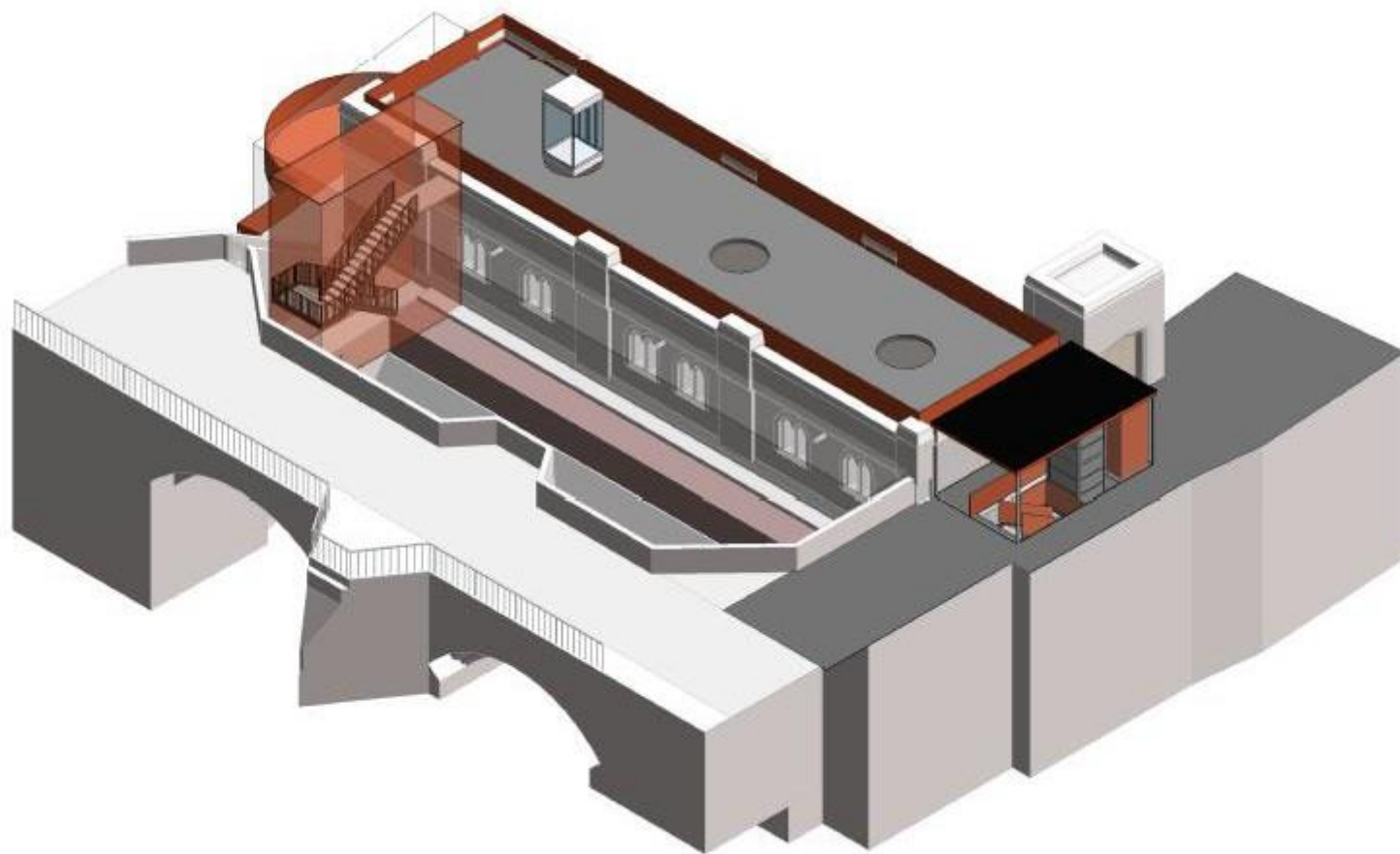
5.2 Option 2, Turbine Hall and a Roof Terrace

5.2.1 Description

Using the roof as a possible extension of a café use was explored. This would be a spectacular location for a fair-weather café providing an income to support the events, education and exhibition activities which could be better accommodated in the Turbine Hall.

However, access would have to be provided from two points to afford means of escape and this is provided in the options by extending the access, down to the Turbine Hall, up onto the roof terrace and a stair sent through one of the three existing circular openings in the concrete deck, the one at furthest distance from the pavement stair. This does compromise the available space for the Turbine Hall activities and would have to be enclosed within the Hall to allow the weather to make its way directly into the Dee.

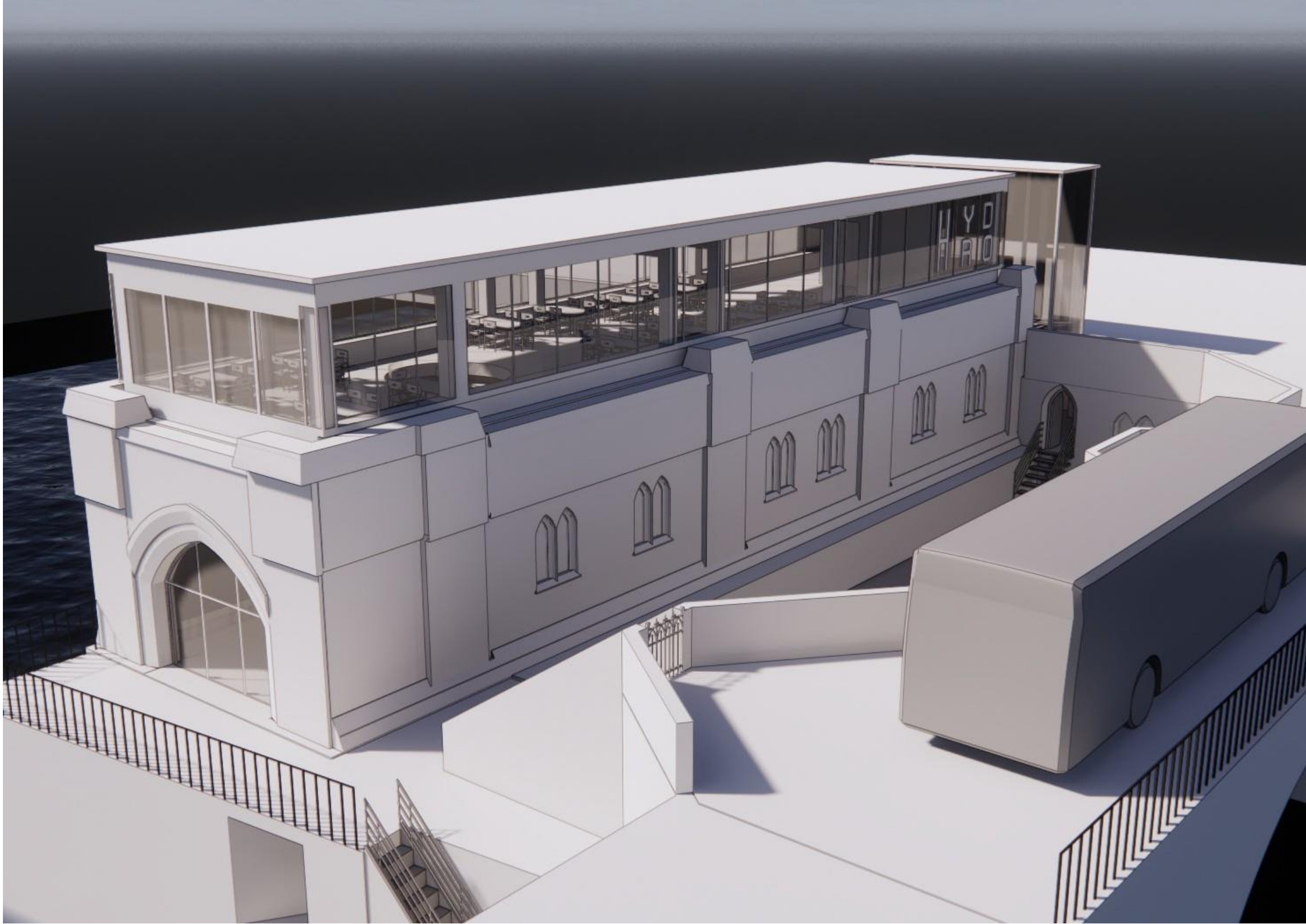
In other aspects, this option is very similar to Option 1 with the major disadvantage that preparation and serving of food and beverage is problematic to say the least.



5.3 Option 3

A natural extension of Options 1 and 2 therefore and demanded by all aspects of the Business Plan is to add more space. A 'glass-box' extension built on the roof has been through several iterations during the development of considerations for the Hydro and this particular design illustrated here was to propose a café/bar on the top floor to provide revenue for the exhibition and events.

Access is from an extended 'Barcelona car park' pavilion on the pavement and via an internal staircase in the same location as Option 2. Other aspects and functions are much as described and considered for Option 1 and especially for the need for much more space.



5.4 Preferred Option

Only one option meets the space demands of the developing project and enables safe full access for all and that is Option 3. The design developed further after the use and management of the Hydro concept was decided upon and a refinement of the proposals to meet the concept is described here and shown in the drawing under this section.

5.4.1 Turbine Hall

The Hall is cleared of equipment and the windows are repaired but the walls bear the scars. The floor retains the polished concrete finish with steel grids over the three openings over the turbine chambers and the River Dee flowing below. There are new openings made in the North wall to facilitate access and the timber doors at the South are adapted as opening shutters to shield a new glazed screen to the gothic arch.

There are three turbine chambers below with corresponding holes in the concrete roof deck above. The Southern is the location for a spiral stair up to the roof extension and down into the turbine chamber to access the heat pump coils and perhaps allow guided visitor access to the chamber. The centre is the location for the hydro electric turbine wheel and the North is to the flowing and tidal water to allow an interpretation and expression of the fluvial and tidal location. Hence the three principal themes of the project, the River environment, hydro electric generation and enhanced alternative energy sources for the building are given a physical expression.

The Turbine Hall's concrete roof deck has failed but will be repaired in-situ to reform its original shape, but a structural steel grid will be built, above the retained travelling crane runners, to provide all the structural integrity for the concrete deck.

In order to keep the Turbine Hall floor as clear as possible for events and exhibitions, which is tight, all the building's servicing and plant is to be mounted on the steel ceiling grid and will be expressed as part of the interpretation and the architectural intervention. This will include the heat pump and hydro electric generator together with pipe, duct and wiring, ventilation and lighting, which will all be interpreted and read from below. Normal servicing and maintenance will take place from above and access will be designed as part of the installation.

5.4.2 Pavement

Access will be from Castle Drive via a 'Barcelona Carpark' glass box as illustrated in the following images

To maintain privacy for the flats across the road and behind the City Walls a punched copper screen fills the North glass wall and punched with a graphics 'HYDRO'. The pavement box is kept clear of the stonework of the hydro electric station and its carved wall inscription, allowing a walk around its exterior. There is one door for general entrance via a metal stair and lift shaft and another fire escape from above and potentially separate access to the first floor education space for, say, evening events or split uses.

5.4.3 Roof Extension

The necessary education, ad hoc café and meeting room accommodation is provided in the rooftop extension which is accessed via a short bridge from the pavement and the spiral stair from the Turbine Hall.

It is constructed from a Cheshire grown timber frame, bolted directly to the concrete deck, cleared of its failed asphalt and revealing a polished concrete floor finish. Steel jointing pieces are expressed as part of the frame. There is a perimeter gutter around the extension which sits behind the low stone parapet and the existing spouts will be reused to take rainwater from roof to river. The roof is an insulated structural timber deck and has a recyclable rubber waterproof layer. A copper clad fascia and gutter complete the roof structure. Walls are a high specification glazed screen incorporating sliding glass

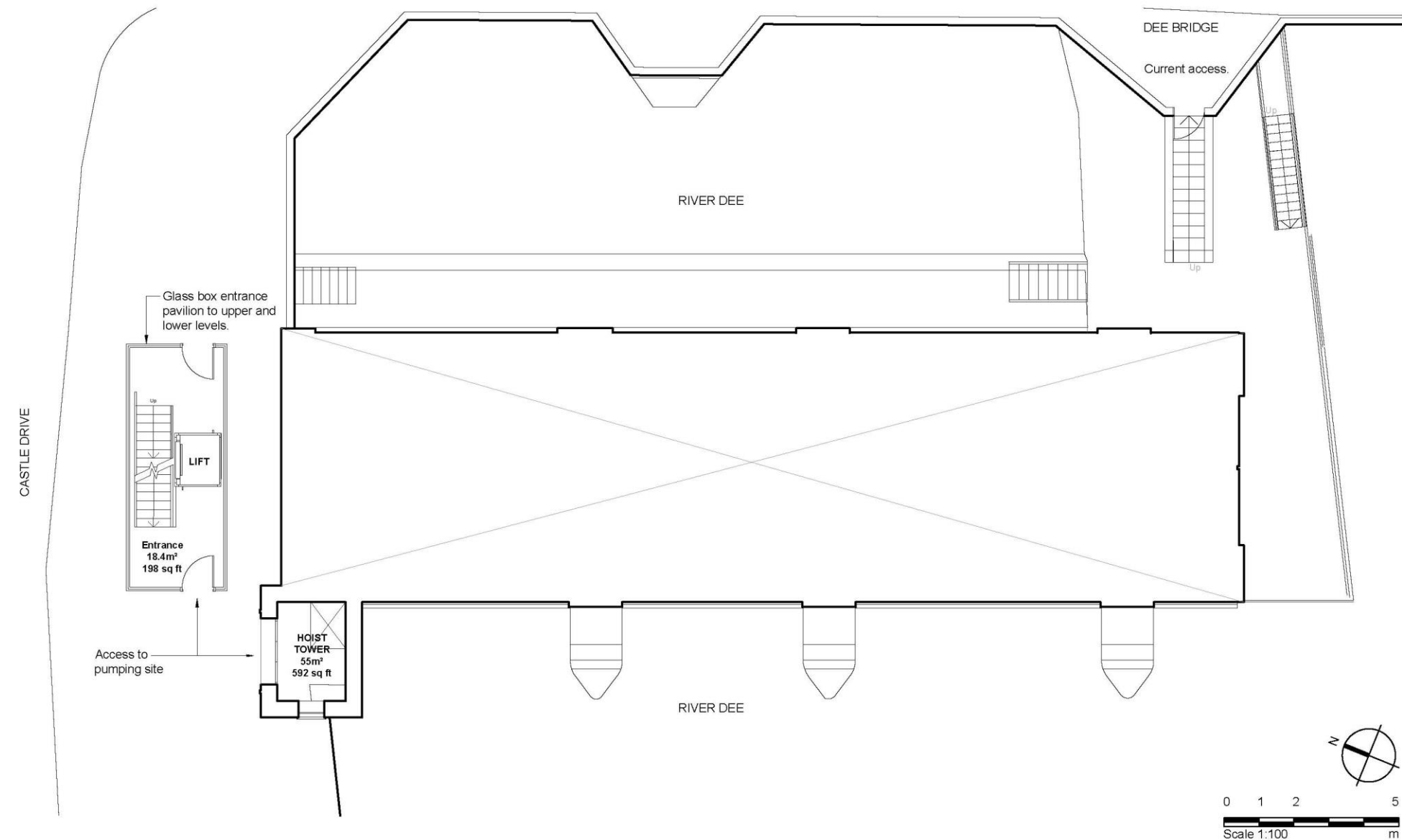
doors and built of a 'handrail height' upstand incorporating a ventilation plenum and a flat panel continuous radiator from the hydro powered heat pump.

Another punched copper screen masks the storage/ kitchen area to the East. Fixed sliding screens will provide sun shading and the opening doors will give cross ventilation on hot days precluding any need for cooling.

5.4.4 External

The concrete deck over the river and the gantry over the mesh and stairs up the Dee Bridge will only be tidied up and new steel balustrades added.

The River is desilted by simply reopening the valves and allowing flowing water to again flow through the turbine chambers. United Utilities' existing proposals for this process are described in Appendix D.



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Drawing Status

F Feasibility
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P Planning
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D Design Development
M Measurement
T Tender
C Construction
R Record

Rev	Date	Own	Auth	Revision
2	15.03.22	RKA	TB	Minor adjustments
1	29.11.21	AZN	TB	Room Areas Added
0	25.11.21	AZN	TB	Initial Issue

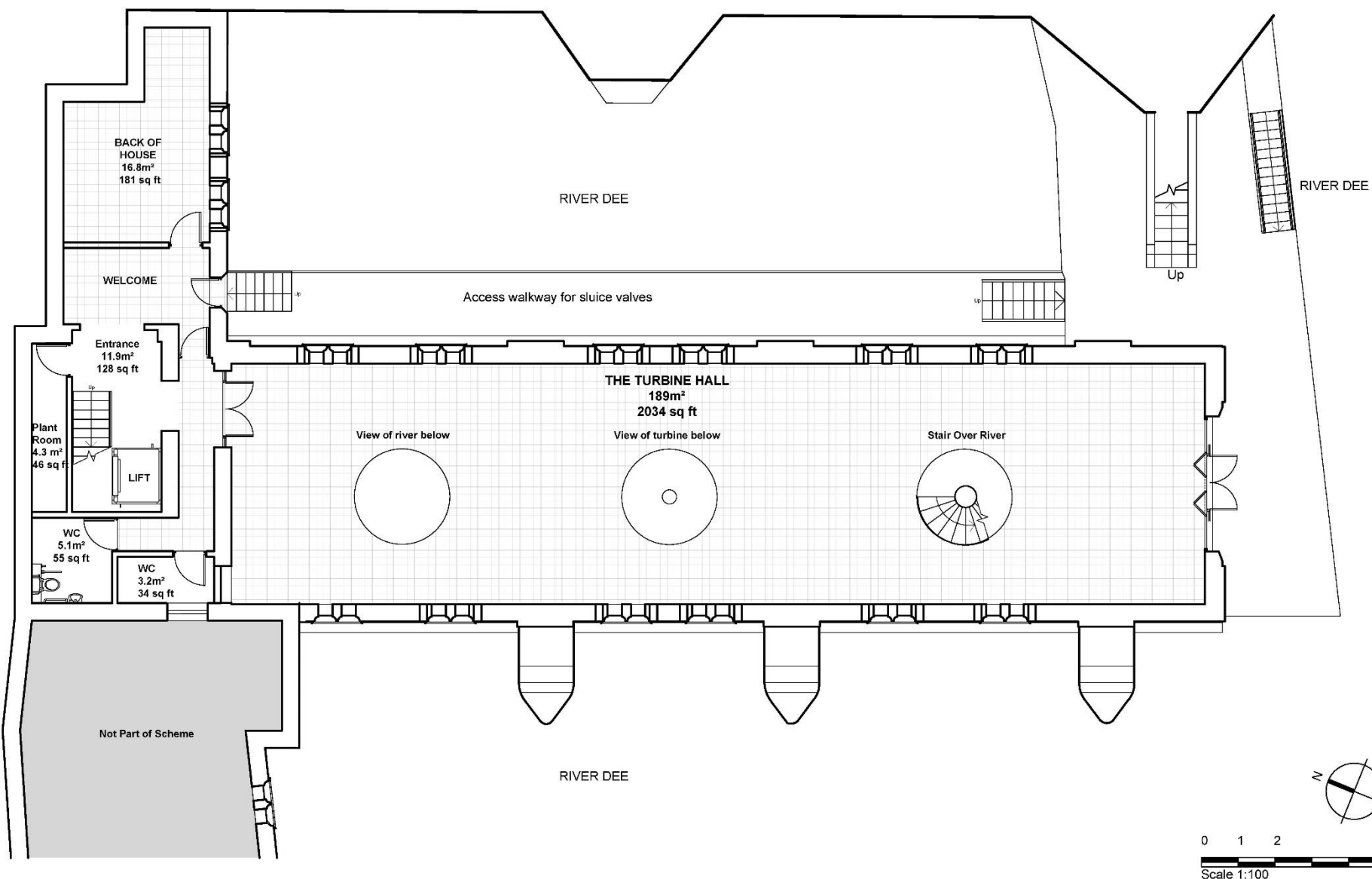
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1	29.11.21	AZN	TB	Room Areas Added
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Chester Weir Sustainability Project, Chester

Project	CHYDR.01	No	2001
Scale (A3)	1: 100	Status	1F
Pavement Level Plan As Proposed		Revision	2



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2	15-02-22	RJA	TB	Minor adjustments
1	20-11-21	AJD	TB	Room Areas Added
0	20-11-21	AJD	TB	Initial Issue
Rev	Date	Drawn	Auth	Revised

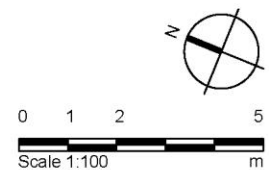
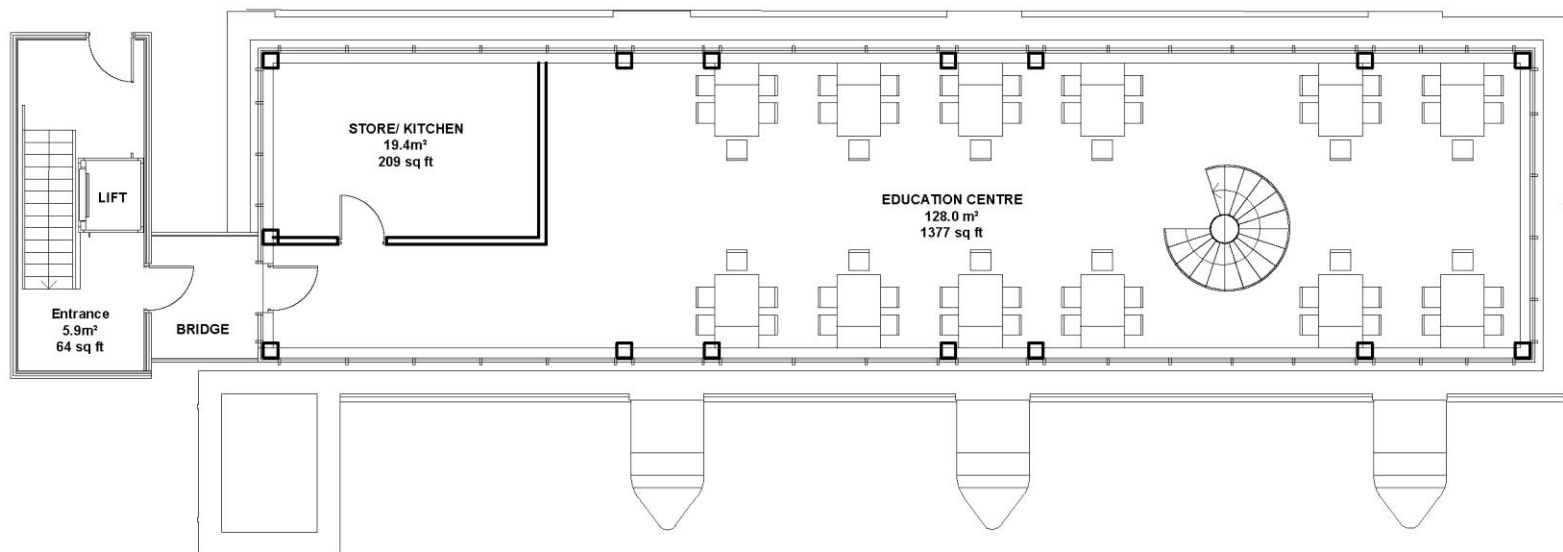
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Chester Weir Sustainability Project, Chester

Ground Floor Plan
As Proposed

Project	No
CHYDR.01	2000
Scale (1:50)	Revisions
1: 100	1F 2



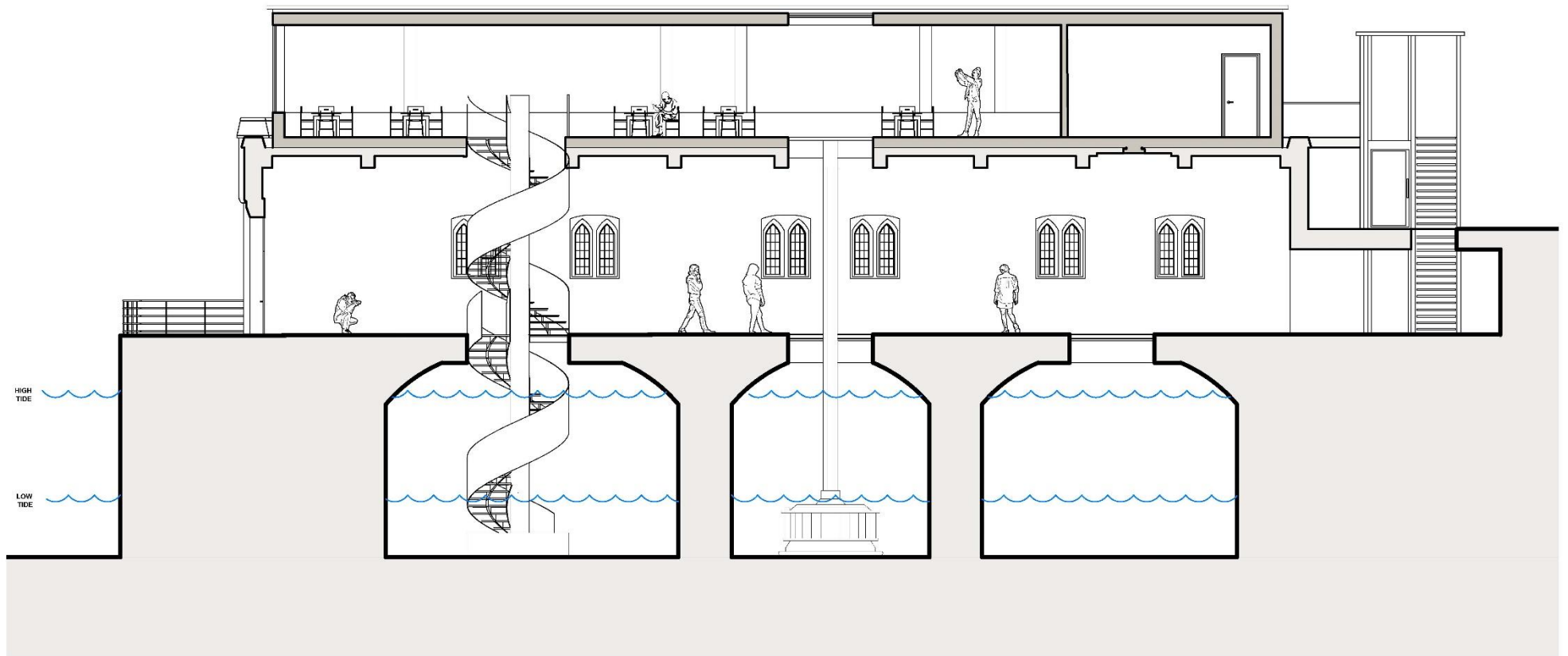
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Drawing Status	
F	Feasibility
S	Sketch Design
P	Planning
B	Building Control
D	Design Development
M	Measurement
T	Tender
C	Construction
R	Record

Rev	Date	Dwn	Auth	Revision
2	15-02-22	RXA	TB	Minor Adjustments
1	29-11-21	AZB	TB	Room Areas Added
0	25-11-21	AZB	TB	Initial Issue

Rev	Date	Dwn	Auth	Revision
2	15-02-22	RXA	TB	Minor Adjustments
1	29-11-21	AZB	TB	Room Areas Added
0	25-11-21	AZB	TB	Initial Issue

Donald Insall Associates Chartered Architects and Historic Building Consultants Chester Weir Sustainability Project, Chester		Project: CHYDR.01 Scale (AS): 1:100	
		No: 2002 Status: 1F Revision: 2	



0 1 2 5
Scale 1:100 m

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C Construction
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Rev	Date	Des	Auth	Revision
0	25-11-21	AJ2	TD	Initial Issue
Rev	Date	Des	Auth	Revision

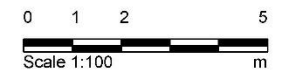
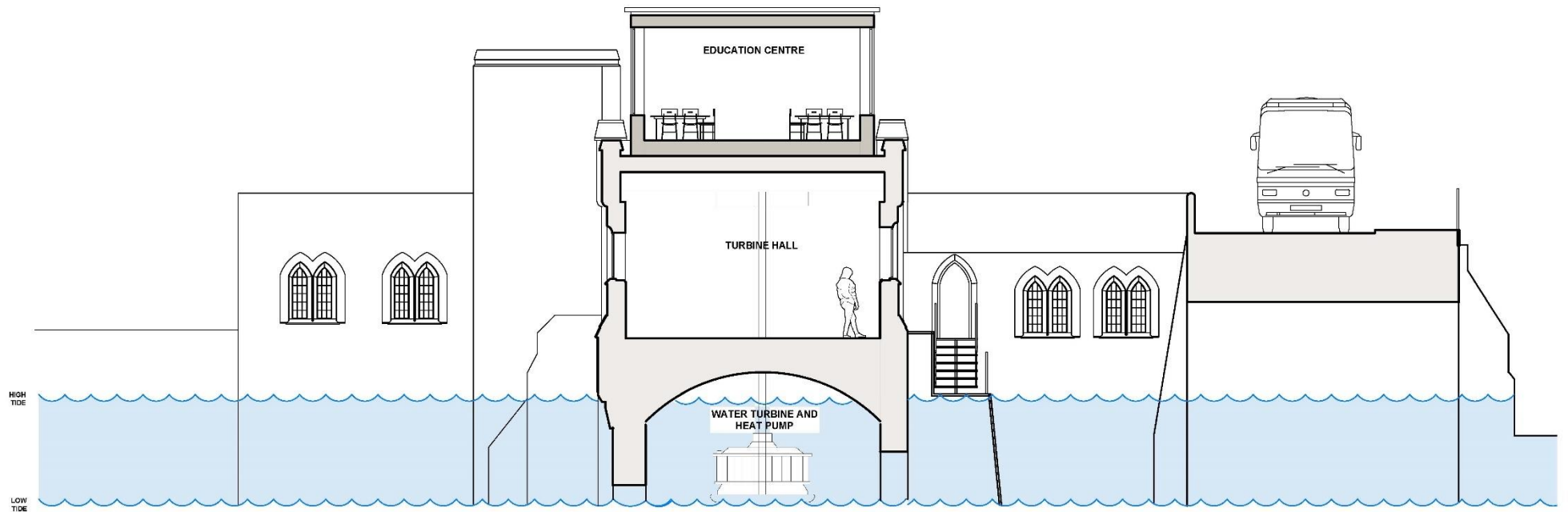
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Chester Weir Sustainability Project, Chester

Section AA - Option 3
As Proposed

Project	CHYDR.01	No	2100
Issue No	1: 100	Status	1F
		Version	0



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D: Design Development
M: Mainstream
T: Tender
C: Construction
R: Review

Rev	Date	Des	Auth	Revision
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Rev	Date	Des	Auth	Revision

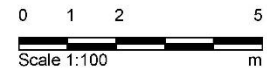
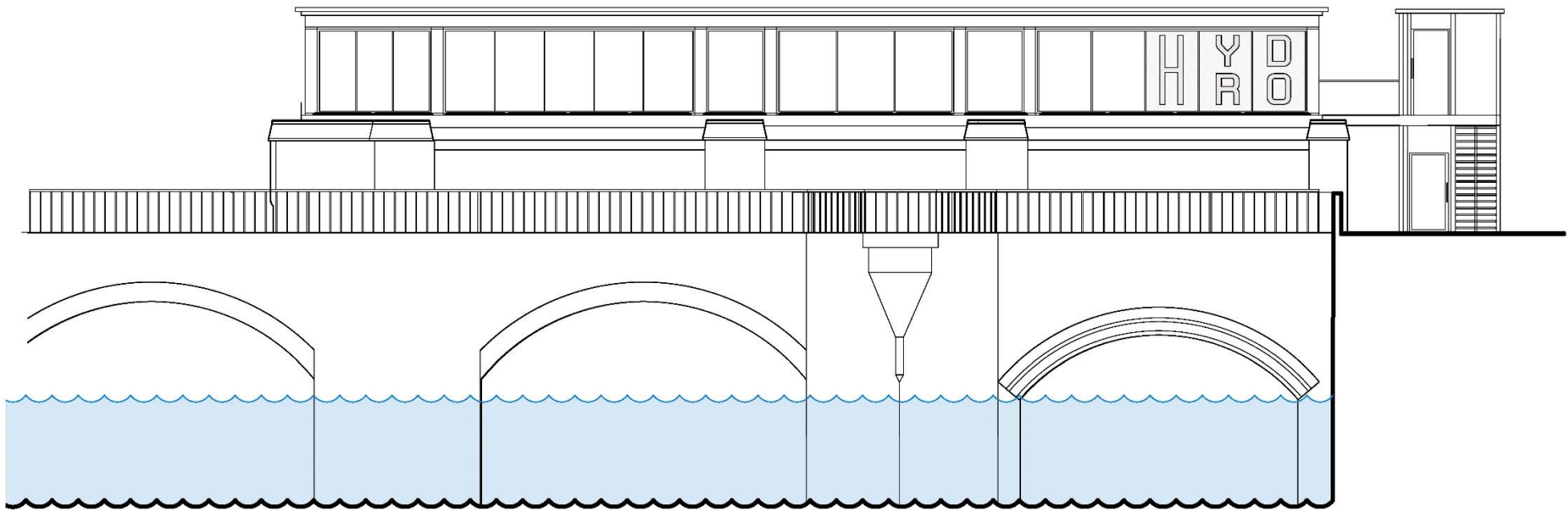
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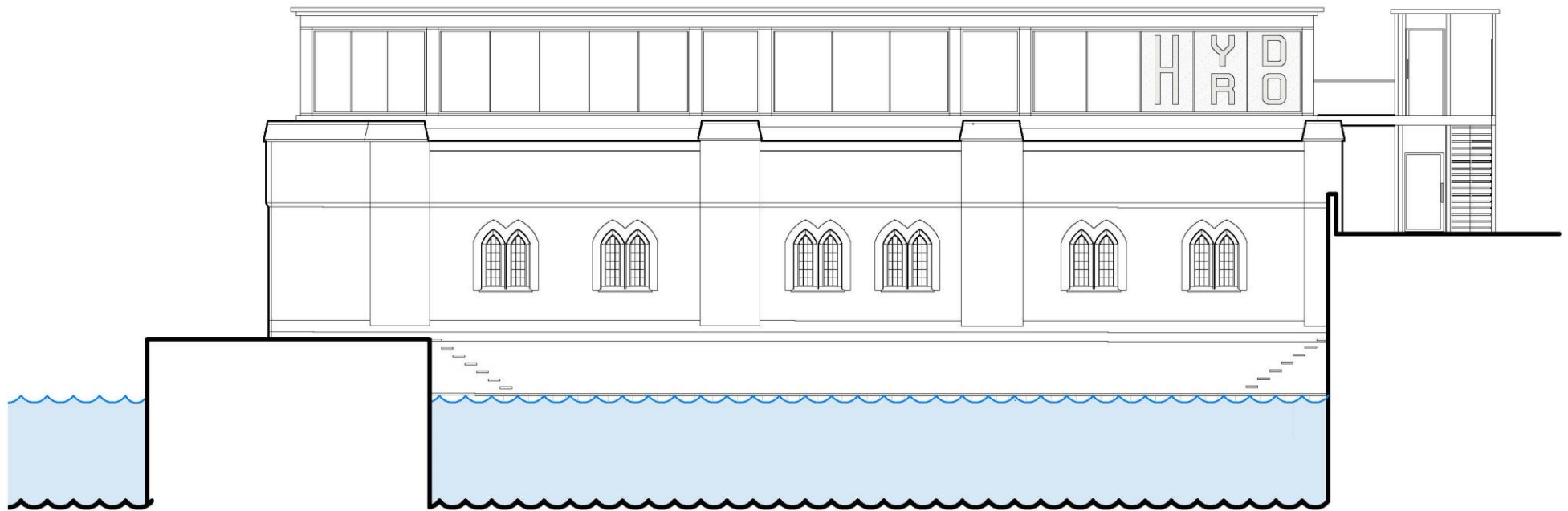
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Section BB - Option 3
As Proposed

Project	Rev
CHYDR.01	2101
Scale (A3)	Status
1:100	1F
	0



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0 1 2 5
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Drawing Status

F

Feasibility

S

Sketch Design

P

Planning

B

Building Control

D

Design Development

M

Measurement

T

Tender

C

Construction

R

Record

Rev

Date

Dwn

Auth

Revision

0

15-02-22

RXA

TB

Initial Issue

Donald Insall Associates

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Chester Weir Sustainability Project, Chester

Project

CHYDR.01

No

2204

Scale (A3)

1: 100

Status

1F

Revision

0

6. Additional Evaluation of the Preferred Option

6.1 Visitor Use Perspective

Whilst the building has the advantage of a prominent location it also presents a number of challenges to design and use as a visitor-facing facility. These relate to lack of visibility to the existing main internal space, which is hidden from view on Castle Drive and is located at a lower level than its pavement. An element of view upwards and into the new glazed top floor structure will be possible, but it will be much easier to see into this upper space from the River Dee Bridge. At low tide, the appearance looking out over the river to the west (and possibly to the east, depending on sluices etc.) may be more of mud than water. There may also be some damp/mud odour evident from outdoor walkways and viewing areas.

Access into the building from Castle Drive into the proposed glass tower (lift/stairs) will be to a free-standing structure that will rely on arresting and inviting visual material to encourage people off the street and over the threshold. The use of vertical totems and moving 'signal' features on the roof could also be used to advantage for this purpose. Surveillance of the entry structure would need to be by way of a video system.

Proceeding down the stairs or lift to the main existing space (the lower level) would be via a lobby with welcome point, toilets and store. Proceeding up the stairs or lift would provide access to the lobby to the rooftop glass learning and event space (the upper level). Views out over the river from lower level would be via the open terrace accessed by the arched end wall which would form a glazed screen. Views from the upper level would be via sliding glazed screens. At lower level, access to the metal maintenance walkway overlooking the water inlet, may be possible, subject to health and safety and operational considerations. At upper level, the glazed box would contain a prep space to support functions and events, a bar and storage for supplies and chairs and tables.

6.2 Accommodation Schedule and Top Floor Layout Options

The building would provide the following internal accommodation:

<i>Street Level</i>	Sq M
Pavement Entrance	18.4
<i>Lower Level - Turbine Hall</i>	
Entrance/Welcome	11.9
Turbine Hall	189.0
Toilets	8.3
Back of House	16.8
Plant	4.3
Total Lower Floor	230.3
<i>Upper Level - Learning/Events Space</i>	
Entrance Lobby	5.9
Learning/Events Space	128.0
Store/Prep Space	19.4
Total Upper Floor	153.3
Grand Total	402.0

Alternative layout configurations of the Upper Floor are shown in the plan on the next page.

6.3 Use Configurations

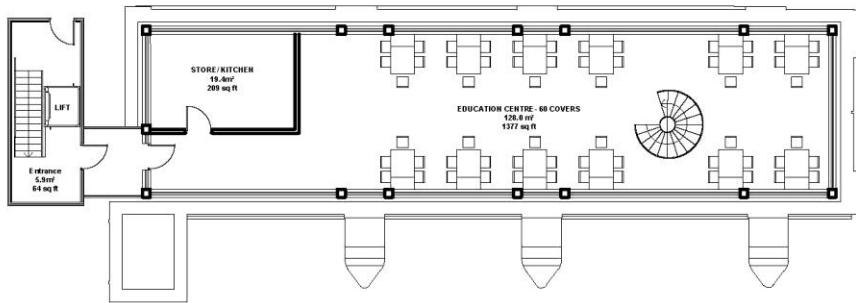
The building can potentially be used in the configurations set out in the table below:

User Category	Use Proposition
Use Type A: Formal learning group	Visit lower floor exhibition, workshop in upper floor learning/function space
Use type B: Booked function or event	Function in upper floor learning/function space, drinks reception in lower floor exhibition space
Use Type C: Walk up visitor – local/tourist	Visit lower floor exhibition, access to upper floor for external viewing and watching/participating in exhibition related 'curated' video or VR

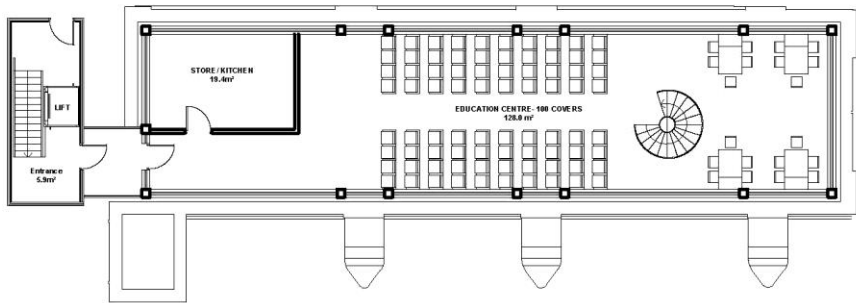
The building will work best when 'programmed' for exclusive use type A, B or C use. This is because the compact nature of the building, the limited space for toilets and lack of breakout space means that multi-use would be very demanding, if not impossible.

Formal learning related use for school age children will obviously only occur in term time and on weekdays, generally finishing by early afternoon. This means that a 'mode change' to an evening function is quite possible. One option would be to programme 'general' walk up visitor use for weekends and school holiday periods. Another option would be to programme schools use on certain weekdays only so that some daytime general visitor access would be possible in addition to weekends and school holidays. It is also worth bearing in mind that operating a facility six or seven days a week is expensive in terms of staff costs.

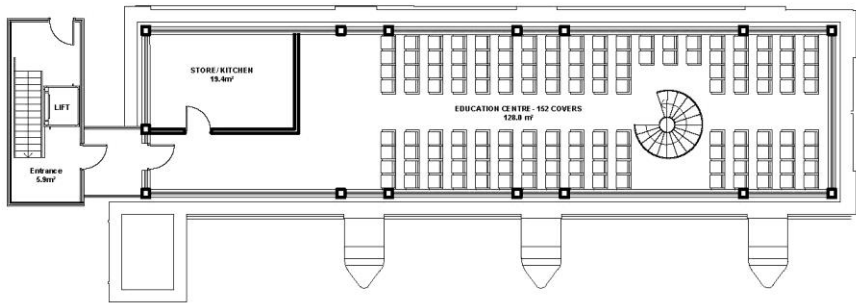
FIRST FLOOR
SKETCH SEATING OPTIONS



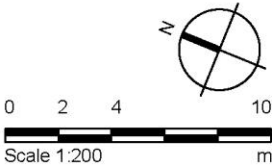
Folding Table Seating
60 Covers



Auditorium + Folding Table Seating
100 Covers



Auditorium Seating
152 Covers



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Chester Weir Sustainability Project, Chester

First Floor- Sketch Seating Options
As Proposed

Project	CHYDR.01	No	0001
Scale (A3)	1: 200	Status	1F
		Revision	0

6.4 Interpretive Approach

The ambition is to develop a new vision and purpose for the former hydro-electric building, retaining it as part of Chester's evolving riverfront heritage and cityscape. The complex would tell the story of the river, the genius loci captured with the continuity of sustainable energy using natural resources and looking towards the innovation of our energy future, focusing on what a low carbon world could look like and how aspects of our lives will change in the coming century.

The Roman city of Chester established on the tidal estuary of the Dee changed dramatically with the Norman invasion of 1066 and the arrival of Hugh 'Lupus' d'Avranches, 1st Earl of Chester. Hugh Lupus built Chester weir in 1093, blocking the tidal estuary, in order to provide power an important source of income, his flour mills. Many centuries of water power followed, with the Dee powering a succession of milling operations on both sides of the river.

6.4.1 Celebrating 850 years of Hydro Power in Chester

With the aspiration to revive net zero river power generation on this site, the project is developing a plan to draw energy directly from the River Dee via a small horizontal turbine to provide electrical power for the building. There will be some battery storage to allow for the tidal ebb experienced at this point of the river. The electricity generated could be used to make hydrogen for further use in the building, for example, or for other uses and activities associated with its operation. A heat pump will draw heat from the river as it passes, both ways, under the hydro and will both heat and, if necessary, cool the building, creating a comfortable environment for visitors.

We envisage that these equipment kits in two of the three turbine chambers could be on display for visitor viewing and interest via a glass or open metal grid deck. The third turbine chamber could potentially have a clear view of the river flow, which varies considerably with tidal movement and upstream rainfall.

We would like new interventions in the historic structure to reflect the same theme. For instance, the lift could be a water powered counterweight mechanism and the light levels could adjust with the tide and the strength of water flow, making the building itself a dynamic and ever-changing space, reflecting the river's mood and character.

6.4.2 Destination Concept - The Dee Green Energy Hub

We propose 'River Lab'¹ - a unique learning environment located on the River Dee in Chester. Housed in the UK's first hydro-electric power station, that was generating electricity from the river more than a century ago, River Lab will lead the way in demonstrating the power and potential of green energy technologies, inspired by the long history of water power along the Dee.

6.4.3 Exhibition Themes and Activity Content

Exhibition and activity content would focus on the River Dee as the 'hook' and the strong 'thread' for a series of topic areas; interpretive engagement opportunities could include a combination of the following topics:

History The history of the River Dee and its relationship with the city's growth and development, including the story of water power, all of which would complement the wall walk themes and the story of bridging/crossing points for example, as well as linking with Chester's Roman history and the harbour in the city. This would be an attractive hook for tourist visitors and would be of interest to local residents who are unaware of the building and interesting content threads.

There are great opportunities for the building being a stop on a walking tour or trail, and there are opportunities to develop a new trail along the river linking destination points of historic sites / events, for example, river power, industry and history. All of these topics would support and complement Chester's strong Roman and medieval offer. In many respects, the history of the river is a missing link in

the story and given its vital role, past and future, deserves greater prominence and appreciation.

Heritage highlights for content could include:

- The building of the weir in 1093 by Hugh Lupus to supply power to his corn mills
- Fulling, needle, snuff and flint mills on both river banks over hundreds of years
- The first water pumping station set up in 1600 by John Tyrer who pumped water to a square tower built on the city's Bridgegate.

Many good social histories and links to the changing city and riverscape (excellent for linking to other stories, great for tourism initiatives that benefit the city as a destination).

Catchment and Wildlife River catchment management and ecology, linked to habitat restoration, agricultural and flood management. Plenty of strong, linking themes that can provide appealing 'hooks' into decarbonised energy. There is also a nice wider contextual story about the river's geography, linking Wales and England/forming the border (traditionally, the ancient border of the Kingdom of Gwynedd) – from Snowdonia where it rises, to the Dee estuary; natural and cultural heritage stories that could bring in both home countries and organisations; the dynamic ecology of tidal zones. All fascinating topics providing tourist visitor interest and natural heritage visitor interest, supporting advocacy of freshwater management and treatment, and interpreting the future of water as a vital and valuable resource – good for stakeholder partners and school/older learning groups.

The Hydro Hub location is wonderful for wildlife stories, and for watching river bird species in the water, on the water and on the riverbanks. Furthermore, seasonality is great for refreshment of stories and repeat visitation (offering repeat, local audience and specialist group interest). The river is a Special Site of Scientific Interest (SSSI) and the Chester weir fish trap and counting station provides specific insight into river health and migratory salmon, providing further seasonal 'highlights' for special interest visitors.

¹ River Lab is a suggested approach to naming the new facility, to focus on the river, and to imply a place of Cheshire Historic Buildings Preservation Trust | HYDRO Report

active engagement/learning /experimentation. Only an ideal

Low carbon/net zero futures The primary purpose of River Lab will be to demonstrate routes to a net zero carbon economy and the fantastic opportunities of green tech careers; making a difference by addressing climate change through carbon capture and storage technologies; demonstrating the future of clean, renewable energy – water, wind, solar, hydrogen; interweaving the contemporary story of the building regeneration, its features and use of river for energy (continuity) can be integral to a visitor/ user experience (all areas of the building), showing the practical application of green technologies for repurposing historic buildings.

Key audiences for this content are likely to include school pupils and students, career changers, special interest groups, business groups and stakeholder organisations.

6.4.4 'River Lab' – the Visitor Experience Potential

The most dynamic potential offer for visitors would provide a mix of facilitated engagement, practical and experiential hands-on and digital exhibits, Virtual Reality (VR)/Augmented Reality (AR) and virtual visiting. The entire experience can be learning based without being didactic by offering an evolving set of insightful exhibits on key topics, all facilitated by passionate and engaging people ('explainers' or 'facilitators'). Where other museums have learning facilities and offers, students and retirees often manage the public engagement very successfully through volunteering. Sponsorship from other Dee stakeholders and from the private sector can also support operational costs.

Heraclitus (544 BC - 483 BC) famously stated that "*No man ever steps in the same river twice, for it's not the same river and he's not the same man.*" Our early thoughts on the visitor experience aims to build upon this idea of fluidity and change by creating a mixture of experiences which are open-ended, dynamic and engaging to the enquiring mind.

We are not planning on creating a science centre with a series of didactic exhibits that impart singular learning outcomes, supported by prescribed facts and key

messages; rather we are actively opening avenues of enquiry, experimentation, intrigue and wonder. To achieve this we don't plan on having lots of exhibits fixed down in set positions that are reliant on being viewed in a prescribed sequence in order to make sense. We want visitors to have fun making sense for themselves. We are facilitating learning that is 'caught, not taught'.

Visitors will experience the River Dee, its history, its seasons, travails and life as a provider of energy through experimentation and play. The underpinning messages will be optimistic, positive and forward-looking, facilitated by enablers and demonstrators that are able to use the gallery and its exhibits creatively and flexibly. To this end, the majority of exhibits will be modular, interchangeable and adaptable.

6.4.5 Organisation of the Space as a Hub for Green Energy

The visitor experience would ideally start with a 'visible' (in terms of its operation) water powered lift. This will act as an attractive feature in itself and will increase visitor numbers and repeat visits to the ground floor gallery. The lift can include solar panels on the outside to achieve a zero carbon rating and the carrying enclosure could include an ambient soundscape, audio visual experiences and information on the amount of power being created by the river at that specific moment of arrival. This is the start of a net zero journey.

The main gallery space provides excellent opportunities to link the visitor experience with views of the river flowing below (subject to tidal conditions), a real turbine generator, also below, and views out over the river and the natural and built landscapes. The gallery could be thematically organised, for example offering: *Life of the River*, *A Source of Energy* and *Genius Loci – Looking Forward*. The following descriptions provide a sense of how visitors could experience River Lab.

Life of the River This experience could start with an experiential discovery area that allows visitors to journey through time. The activities can interpret local geography,

wildlife, flora and fauna and what makes the local landscape especially unique. The emphasis will be on discovery, seeking and finding and connecting the modern river with recognisable elements from its pre-history. Real objects, organic materials and sensory displays can combine to elicit an imaginative response from visitors, piquing interest and raising as many questions as offering ideas and answers. This first suite of exhibits will aim to be tactile, low-tech, hands-on and intuitive.

The early history of the river from the Roman city through to the present day will be important as a means of introducing the theme of harnessing power and power production. The natural ebb and flow of the tidal river underpins the story of Hugh Lupus harnessing the estuary to power his first water mill in 1093. This subject matter offers an excellent opportunity to introduce hands on, tactile and kinetic exhibits alongside historical interpretation and perhaps some loaned artefacts and archive material to show how the river powered its mills over several centuries. Visitors will have the opportunity to enjoy and understand the principles of power production and the principles of redirecting the kinetic energy of the river through experiential activities and play.

The Life of the River experiences fits around the first view over the River Dee, cut out of the floor, and may include a small area that connects with social history stories and collections loaned from the museum. The look and feel of this space will be enhanced by the views of the river and the intention is to feel active, colourful and welcoming to visitors from the lift and stair.

A Source of Power - Green Energy Production This suite of experiences could include a number of modular interchangeable and adaptable exhibits, hands-on in emphasis and specifically designed for intuitive experimentation and open-ended scientific play and enquiry. The activities will fit well around the second glazed floor window over the new horizontal turbine. They can interpret the history of water power in Chester, alongside comparisons with modern turbines and advances in green energy production. Visitors can see for themselves how the new turbine is used to create power for the building and how the power is stored in modern large-scale batteries.

Other themes may include what a turbine is and the best locations for them on a river. This theme can explore why a power production facility was located here specifically (in 1913) and to find out how effective it was at the time by investigating exhibits around the central space. These themes link very well to a number of exciting STEM-based experiences with facilitator enabled demonstrations. These may include drawing energy from a turbine, turning electricity into light and heat, cooling air with turbine power and transferring movement (kinetic energy).

The central gallery space could work particularly well for competitions between school, educational and family groups. Such planned competitions could include energy production, conservation and competitive games with kits of parts on the theme of reducing Chester's carbon footprint.

The look and feel of this space complements the *Life of the River* experiences with a contemporary feel and added space for small gatherings, competitions and demonstrations. A hive of activity with abundant fun and some surprises.

Genius Loci – Looking Forward The final gallery space, around the spiral stair and adjacent to the newly-glazed window and doors could show how the River Dee is thriving today. The changing seasons can be monitored closely, alongside filmed footage and video links to local wildlife, flora and fauna. Visitors will be able to watch a variety of wildlife from otters, water voles, osprey and fish, to freshwater pearl mussels, newts, frogs and insects. The emphasis will be on engagement rather than passively observing. Visitors can be encouraged to look out for some of the River Dee's wild residents on a number of suggested nature trails and walking tours following their visit, and these seasonal topics are ideal for a variety of appealing facilitated events.

Media and activities will be flexible and modular in line with the intended flexibility of the gallery spaces and the planned themes but with a greater emphasis on digital media for monitoring the outdoor environs throughout the seasons. Digital media will enable visitors to make comparisons with other similar sites and locations in the UK and compare wildlife numbers, from Turtle Doves and Winter Ducks to foxes and badgers.

6.4.6 Ambience and Visual Themes

We envisage that very few exhibits will be permanently fixed in position and traditional museum-style wall-mounted interpretation would be minimal. The look and feel of the visitor experience is intended to impart a sense of being dynamic, flexible, and constantly changing in emphasis, depending on visitor numbers, capacity and the planned activities taking place.

Lighting and ambience can reflect the mood of the river, the seasons and the amount of power being generated by the river at a specific time. On a late-summer's day, for instance, the visitor experiences may feel calm, serene and light, only changing when the river gets particularly fast / full. Lighting could be clean and warm with overhead light washes and soothing soundscapes. In spring, the feel could be energetic, bursting with a sense of new life and lighting and soundscapes could feel slightly frenetic as the river flows quickly. Autumn and winter months may have more focused light and dramatic shadows for example. The intention will be that the building space is quite integral, and in tune with, the River Dee and its ebb and flow.

6.4.7 Further Opportunities to Explore – Adding Layers of Interest

- The opportunity for events / exhibitions / displays that rotate frequently. Mini exhibitions, talks, workshops, storytelling on and around an overarching theme.
- Rather than those events / exhibitions / displays above disappearing forever, they could be archived and made available online, building a library of ideas, thoughts, inspiration and learning opportunities.
- A place to launch new stories and initiatives. Create a high quality bespoke catalogue of interesting thoughts - like TED for the future within the subject area.
- Personalise big topics through real-life stories and stories presented by local people wherever possible, engaging Chester residents in meaningful ways.
- Promotions by local or national companies and corporations that are on the leading edge can bring an element of funding to keep things fresh.

6.4.8 Facility Overview

The meeting space will offer a total space of 120 sq. m. within a space that is almost four times longer than its width. (Conventional meeting room design indicates a length to width ratio of 2 to 1 as most preferable.) A 19.4 sq. m. store/kitchen area is located immediately to the left on entry and a secondary access formed by a spiral staircase will be located approximately three quarters of the way into the room linking it to the main exhibition area on the floor below. Other than this link, the key feature of the room is the view it affords of the river and surrounding areas, including part of the City Walls. The main access to the upper level room is provided from street level one floor below by lift and stairs. The generally small WC facilities are provided two floors below and are shared with any other building users and staff.

It is not intended that a permanent catering facility will be available and that any catering services required by event organisers will be provided on a per use contract by a local provider. The option of providing a café facility as part of the upper floor provision has been considered and discounted as:

- It is not mission focused element of the project
- There is insufficient space to meet the core learning/functions/events requirements and a café without unacceptable compromise to both
- There is a substantial level of alternative provision in the locality, both in and around Lower Bridge Street/River Dee frontage and in Handbridge – the Chester Hydro wants to work in concert with existing operators, not compete with them.

Initial designs show education room style seating for 60 visitors and a theatre style layout for 152. In reality these expected capacities may be optimistic. The theatre style seating plan only shows 134 seats, some of which may have a slightly obstructed view of the presenter as a result of the balustrade protecting the top of the staircase. Further the corporate meeting market, introduced briefly below, tends to prefer schoolroom style seating with all delegates seated at tables facing the speaker in a single direction, a U style or boardroom style seating. We estimate that the maximum practical capacities for these scenarios would be 50, 34 and 40 delegates respectively.

The following function room facility observations are based on a desk review of the plans:

- A. Other than the links to the exhibition centre below, the main benefit of the facility is the view that is offered and the opportunities this provides to develop events linked to the riverside and local history and culture. The views however may be off-putting to any organiser concerned about retaining the attention of delegates.
- B. The facility comprises a single room. Many organisers require breakout facilities. It may be possible to split the room with screens or simply by using the staircase balustrade as a divider but where organisers require a second private space, this may be an issue.
- C. If the meeting area is made available during a time when other visitors are in the building it is possible that noise created by these other visitors will be audible and disturbing to meeting room users due to the open nature of the spiral staircase.
- D. The toilets appear small, especially to cater for the maximum capacities projected at this stage and for large numbers of guests attending a catering led event.
- E. During the summer the lack of any significant terraced external space may be a negative factor.
- F. The kitchen store area appears small, especially for any catering led events requiring minimum levels of furniture. (Point of note: it will be necessary to determine an optimum level of furniture taking into account maximum user capacity and storage space). The kitchen will need to be able to offer facilities commensurate with the requirements of food safety legislation, including hand wash basins, at least one catering sink and power sources to enable the use of at least one refrigerator etc. Sufficient working space will also be required by the external caterer however much the food may be prepared off-site. Further thought should be given to the satisfactory ventilation of this area. Effective sound proofing of this space will be essential and a second entrance door to the main space should be considered to provide a porch area to facilitate catering deliveries etc. Waste storage areas will also need to be considered.

- G. Whilst the venue does not have a dedicated car parking area, a number of options are available within relatively easy walking distance.
- H. Function dairy management, events sales and organisation is a time-consuming process. Whilst some of these processes can now be accomplished online, there will be a need for a human interface both prior and during events.
- I. If the scheme supporters wish to compete in the wedding market, then the top floor will need to be licensed and the middle floor used for reception and after ceremony drinks. Under licensing requirements the ceremony area cannot be used for the consumption of food and drink. (It can be made ready for such use after the ceremony.)

6.4.9 Market Overview

At this stage there appear to be three main markets for the facility; namely corporate meetings, educational use and private event hire.

Corporate meetings are part of the meeting and conference market. The Business Visits and Events Partnership (BVEP) estimated that the total market generated revenue of £18.3bn in 2019 from some 1.48m events held in the UK. Most of this activity tends to be focussed in what is known as the golden triangle an area stretching from London to Bristol and north to Birmingham. However small conferences and meetings, compared to International events, have been a consistent source of activity and revenue for venues throughout the UK for many years. BVEP estimated that the total number of meetings in 2020 declined to 200,000 as a result of the COVID pandemic. Whilst there has been a rebound in the market as the effects of COVID have lessened, there is doubt that pre-COVID levels of activity will return in future as a result of the growth of virtual meetings and maybe a decreased appetite for such events. A further consideration here maybe the potential impact of the Metaverse, or several metaverses, that will be designed to enable people to meet online.

A further sector within the meetings market is society and special interest group activities. As the name implies these are meetings organised by special interest groups and societies.

Prior to the pandemic, corporate meetings tended to be held on weekdays, peaking during school term time. The majority of events were for less than 50 delegates. Societies and special interest group meetings tend to occur at weekends and during holiday periods.

Social events. Chester has a population of circa 112,000 whilst the wider area of Chester and Cheshire West had 332,000 residents in early 2021. As a result, in non-pandemic times there is considerable demand for family events including christening parties, weddings, funerals, birthday celebrations and a range of other family events. The wedding market is probably the largest. Bridebook Wedding Venue service states that there were 4,255 weddings in Cheshire in 2019. The total population in Cheshire, East and West, is circa 700,000, indicating that almost 16% of these residents live in Chester. A general estimate, based on population data, indicates that circa 700 weddings are held annually in Chester. A report on the Confetti web site shows that almost 61% of events in 2017 were held in non-religious venues and that 10% of these were held in 'other' venues', meaning not hotels or other 'expected' venues. The use of religious venues is currently in decline. This survey further shows that almost 25% of events were for 50 or fewer guests, the key capacity segment for the project venue. Based on this top level data, the size of the potential market for the project venue is estimated at 11 events per annum, as shown below.

Social events occur throughout the year, though weddings peak during the period April to September.

The location of the venue should enable it to participate in city-based events arising from other activity such as the Chester Races, subject to successful marketing and promotion of the venue and the provision of quality support services. In addition to these social markets, there is also demand from a wide variety of organisations for corporate entertaining events.

6.4.10 Competitive Overview

Meetings and Social Events

The city of Chester has witnessed significant growth in full service hotels over the past 30 years or so. We have identified 15 full service hotels (businesses providing rooms, catering and meeting facilities) that offer a total of 89 meeting rooms to the market through a range of

properties offering a wide range of service quality. In addition, we have identified a further 73 meeting/event rooms at another 14 venues including Chester Zoo, Chester Cathedral, Chester FC, Chester Racecourse, Chester Town Hall, local pubs, Stanley Palace and the Chester Grosvenor Museum. Finally, the Chester University advertises a further 200 rooms, though these are unlikely to be available on a permanent basis.

Currently a mid-market city centre hotel is offering an 8 hour day delegate rate of £29, to include room hire, buffet lunch, teas and coffees, whilst another is quoting £35 to £45 for a similar package. In truth it is no doubt possible to negotiate these rates down given the strong likelihood of weak demand and over supply. A non-hotel city centre venue (Bishops Lloyd Palace, run by Chester Civic Trust) is offering a 110 standing/ 60 seating capacity venue at £15 per hour and a smaller 50 seat venue at £10 per hour.

6.4.11 Social Events

The full serviced hotels and other event venues mentioned previously also form the main competitors in this market. In total there are 20 premises in Chester that are licensed to hold civil ceremonies, though there are additional venues offering facilities for receptions/wedding breakfasts only. This is a highly competitive market.

6.4.12 Themed Events

Themed events are unique, or specialist occasions organised by a venue based on their operating USP (Unique Selling Point) For example the Centre for Alternative Technology at Machynlleth runs a number of 1, 2 day and 5 day courses around topical environmental subjects such as eco-refurbishment, compostable toilets, introduction to renewables for households and making pallet furniture at a cost of £60 to £90 per day. Themed events is a market that will provide the project venue with an opportunity to develop a unique local business proposition but will require focussed input from a project champion, someone willing and able to provide focussed leadership on a daily basis.

Another segment of this market could be the hire of the building to local companies wishing to promote their specialist green/environmental technology services to potential customers. This is not a standard meeting industry segment but may be an opportunity made available to the project venue as a result of its industry specialisation. It is an opportunity total reliant on the aforementioned project champion.

6.4.13 Marketing and Operations

At this stage it has not been determined how the project will be staffed and run. It may be that it will be strongly reliant on volunteers for daily operational duties, and it is also possible that opening times may be restricted to curtail operating costs. However, it will be crucial that once key operating criteria have been established there is a clear and effective marketing strategy. As mentioned previously a strong project champion will also be key to achieving financial targets.

The following revenue/ income estimates assume the employment of an 'operation-lite' approach, using volunteers and external contractors for the provision of food and drink in return for a percentage of revenue. Room hires will also be billed by the external operators but paid directly to the venue. This method of operation will inevitably be marginally less customer friendly than the in-house services operated by a hotel but are likely to be more financially resilient.

